

APPENDIX III
EMISSIONS CALCULATIONS

Hess, Perth Amboy New Jersey
WGS
Summary

	(A) O2 (%)	(B) O2 diff.	(C) % Dev. from avg. conc.	(A) CO2 (%) (ppm)	(B) CO2 diff.	(C) % Dev. from avg. conc.
Points	avg conc.	avg conc.	avg. conc.	avg conc.	avg conc.	avg. conc.
A1	1.27	-0.12	-8.82	18.18	0.04	0.25
A2	1.53	0.14	10.04	18.01	-0.12	-0.68
A3	1.38	-0.02	-1.22	18.21	0.08	0.43
Overall avg (D)	1.39			18.14	<0.3% CO2	<5%

equations: B = A - D
C = ((A - D)/D) *100

Allowable Criteria (which ever is least restrictive):

(B) or (C)	not stratified < 5% or < 0.3%O2	minimal stratification >5% but < 10% or >0.3% O2 but <0.5% O2	stratified > 10% or >0.5 O2%
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Minimal Required Sampling	Not stratified	1 - point sampling
	Minimal stratification	3 - point sampling
	Stratified	12 - point sampling (six points per port)

Date/Time	Messages	Oxygen	CO	NOx	CO2	THC
9/14/2010 9:20		1.38			18.1	
9/14/2010 9:20		1.41			18	
9/14/2010 9:21		1.4			18	
9/14/2010 9:21		1.25			18.2	
9/14/2010 9:22		1.17			18.3	
9/14/2010 9:22		1.13			18.3	
9/14/2010 9:23		1.24			18.2	
9/14/2010 9:23		1.17			18.3	
9/14/2010 9:24		1.3			18.2	
9/14/2010 9:24		1.26			18.2	

Point 1 in 1.27 #DIV/0! #DIV/0! 18.18

9/14/2010 9:30	1.3			18.3
9/14/2010 9:30	1.65			17.9
9/14/2010 9:31	1.5			18
9/14/2010 9:31	1.42			18.1
9/14/2010 9:32	1.72			17.9
9/14/2010 9:32	1.82			17.8
9/14/2010 9:33	1.48			18
9/14/2010 9:33	1.32			18.3
9/14/2010 9:34	1.55			18
9/14/2010 9:34	1.58			18

Point 2 mid 1.53 #DIV/0! #DIV/0! 18.01

9/14/2010 9:40	1.34			18.2
9/14/2010 9:40	1.34			18.2
9/14/2010 9:41	1.26			18.3
9/14/2010 9:41	1.45			18.1
9/14/2010 9:42	1.13			18.4
9/14/2010 9:42	1.1			18.5
9/14/2010 9:43	1.3			18.3
9/14/2010 9:43	1.44			18.2
9/14/2010 9:44	1.54			18.1
9/14/2010 9:44	1.87			17.8

Point 3 out 1.38 #DIV/0! #DIV/0! 18.21

Project Name: Hess Corporation
Perth Amboy, NJ

Source: FCCU - Wet Gas Scrubber

Test Date: 9/14/10

Condition: normal production

GAS TESTED	SAMPLE RUN ID	CONCENTRATIONS (% O ₂ & CO ₂ , PPM ALL OTHERS)										STACK			Mass Emissions	
		CERTIFIED STANDARD	PRE-TEST RESPONSE	POST-TEST RESPONSE	POST-TEST ZERO	PRE-TEST ZERO	POST-TEST ZERO	RAW AVERAGE	BIAS CORRECTED AVERAGE	FROM WET TO DRY AVERAGES	@ 0% O ₂	FLOW RATE (dscfm)	(J)	(K)	(Lb/Hr)	(Lb/mmBTU)
O ₂	1	2.49	2.5	2.5	0.1	0.1	0.1	1.31	1.255	N/A						
O ₂	2	2.5	2.5	2.5	0.1	0.1	0.1	1.38	1.326	N/A						
O ₂	3	2.5	2.5	2.5	0.1	0.1	0.1	1.34	1.291	N/A						
CO	1	254	258.8	257.5	-0.2	-0.2	-0.8	140.28	138.247	N/A	147.082	131872	79.176			
CO	2	254	257.5	257.5	-0.8	-0.8	-0.8	127.91	126.567	N/A	135.138	131872	72.486			
CO	3	254	257.5	256.3	-0.8	-0.8	0.1	133.42	132.081	N/A	140.775	127069	72.889			
NOX	1	111.3	111.0	115.2	0.0	0.0	0.0	53.78	52.926	N/A	56.308	131872	49.779			
NOX	2	111.3	115.2	114.1	0.0	0.0	0.0	52.79	51.251	N/A	54.722	131872	48.204			
NOX	3	111.3	114.1	113.6	0.0	0.0	0.0	53.01	51.825	N/A	55.236	127069	46.968			
CO ₂	1	22.1	21.9	21.8	0.2	0.2	0.3	18.32	18.486	N/A						
CO ₂	2	22.1	21.8	21.8	0.3	0.3	0.3	18.66	18.868	N/A						
CO ₂	3	22.1	21.8	21.8	0.3	0.3	0.3	18.47	18.677	N/A						
THC	1	44.5	44.9	43.9	-0.2	-0.2	-0.2	15.78	15.944	19.565	20.816	131872	6.4007			
THC	2	44.5	43.9	43.9	-0.2	-0.2	-0.2	11.95	12.258	15.042	16.060	131872	4.9209			
THC	3	44.5	43.9	43.9	-0.2	-0.2	-0.2	14.84	15.179	18.825	19.850	127069	5.8711			
SO ₂	1	91.1	87.5	90.5	-0.4	-0.4	1.0	18.68	18.880	N/A	20.087	131872	24.706			
SO ₂	2	91.1	90.5	90.0	1.0	1.0	0.9	18.11	17.505	N/A	18.691	131872	22.907			
SO ₂	3	91.1	90.0	90.2	0.9	0.9	0.7	17.41	16.949	N/A	18.065	127069	21.372			

The Following Calculations are Used In This Spreadsheet:

$$G = (F - ((D+E)/2)) \times A / ((B+C)/2) - ((D+E)/2)$$

$$H = ((20.9-D)/(20.9-G_{O_2})) \times G$$

$$J = I \times 0.15505 \times 10^{-6} \times G \text{ or } L \times MW_{GAS}$$

$$K = (20.9 / (20.9 - G_{O_2})) \times G \times A_{CO} \text{ or } NO_x \text{ or } SO_2 \times B_{fuel}$$

$$\text{Where -- } A_{CO} = 7.2678E-08 \text{ And...}$$

$$A_{NOx} = 1.1940E-07$$

$$A_{THC} = 4.1530E-08$$

$$A_{SO_2} = 1.6612E-07$$

$$L = (100 / (100 - M)) \times G_{THC}$$

% H₂O (M)

$$B_{nat. gas} =$$

$$B_{nat. gas} =$$

$$B_{fuel oil} =$$

8710

N/A

9190

run 1(R1 CTM-033)

run 2(R1 CTM-033)

run 3(R2 CTM-033)

18.51

18.51

18.50

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber Exhaust
 Run 1

Date time	O2	CO	NOx	CO2	THC as CH4	SO2
9/14/2010 9:25	1.21 %	139.9 PPM	57.2 PPM	18.3 %	16.42 PPM	18.1033 PPM
9/14/2010 9:25	1.29 %	140 PPM	52.9 PPM	18.2 %	15.27 PPM	18.223 PPM
9/14/2010 9:26	1.2 %	139.1 PPM	49 PPM	18.3 %	14.49 PPM	18.2224 PPM
9/14/2010 9:26	1.08 %	140.8 PPM	50.9 PPM	18.4 %	13.94 PPM	18.3747 PPM
9/14/2010 9:27	1.2 %	139.6 PPM	52.4 PPM	18.3 %	14.09 PPM	18.7589 PPM
9/14/2010 9:27	1.39 %	137.7 PPM	49.8 PPM	18.1 %	15.43 PPM	18.8085 PPM
9/14/2010 9:28	1.12 %	151.4 PPM	41.1 PPM	18.4 %	14.52 PPM	18.4654 PPM
9/14/2010 9:28	0.91 %	154.8 PPM	54.6 PPM	18.6 %	14.03 PPM	18.4818 PPM
9/14/2010 9:29	1.23 %	137 PPM	49.1 PPM	18.3 %	15.64 PPM	18.4173 PPM
9/14/2010 9:29	1.05 %	136.6 PPM	54 PPM	18.4 %	14.11 PPM	18.3996 PPM
9/14/2010 9:30	1.3 %	135.1 PPM	60.8 PPM	18.3 %	13.49 PPM	18.5211 PPM
9/14/2010 9:30	1.65 %	133.1 PPM	56.6 PPM	17.9 %	12.98 PPM	18.3005 PPM
9/14/2010 9:31	1.5 %	130.9 PPM	55 PPM	18 %	13.44 PPM	18.2442 PPM
9/14/2010 9:31	1.42 %	132.1 PPM	59.4 PPM	18.1 %	14.14 PPM	18.6253 PPM
9/14/2010 9:32	1.72 %	134.1 PPM	61.8 PPM	17.9 %	14.55 PPM	18.5732 PPM
9/14/2010 9:32	1.82 %	132.8 PPM	52.3 PPM	17.8 %	15.23 PPM	18.6056 PPM
9/14/2010 9:33	1.48 %	134.3 PPM	53 PPM	18 %	16.08 PPM	18.4984 PPM
9/14/2010 9:33	1.32 %	136.1 PPM	59.4 PPM	18.3 %	14.37 PPM	18.4724 PPM
9/14/2010 9:34	1.55 %	137.4 PPM	59.2 PPM	18 %	14.65 PPM	18.5793 PPM
9/14/2010 9:34	1.58 %	139.4 PPM	59.7 PPM	18 %	15.48 PPM	18.518 PPM
9/14/2010 9:35	1.59 %	141.1 PPM	58.4 PPM	17.9 %	16.58 PPM	18.5762 PPM
9/14/2010 9:35	1.46 %	144.4 PPM	55.1 PPM	18.1 %	17.13 PPM	18.4764 PPM
9/14/2010 9:36	1.41 %	146.1 PPM	53.6 PPM	18.2 %	15.07 PPM	18.6673 PPM
9/14/2010 9:36	1.35 %	144.1 PPM	57 PPM	18.2 %	13.06 PPM	18.6596 PPM
9/14/2010 9:37	1.32 %	140.2 PPM	54 PPM	18.2 %	12.63 PPM	18.8219 PPM
9/14/2010 9:37	1.2 %	135.1 PPM	54.1 PPM	18.3 %	11.42 PPM	19.1567 PPM
9/14/2010 9:38	1.44 %	132.7 PPM	54.3 PPM	18.2 %	14.52 PPM	19.1948 PPM
9/14/2010 9:38	1.37 %	138.1 PPM	53.2 PPM	18.2 %	22.4 PPM	19.2873 PPM
9/14/2010 9:39	1.36 %	141 PPM	58.6 PPM	18.2 %	23.28 PPM	18.6929 PPM
9/14/2010 9:39	1.43 %	145.1 PPM	51.5 PPM	18.2 %	18.97 PPM	18.123 PPM
9/14/2010 9:40	1.34 %	147.5 PPM	57.1 PPM	18.2 %	16.17 PPM	18.1065 PPM
9/14/2010 9:40	1.34 %	147.6 PPM	54.1 PPM	18.2 %	13.48 PPM	18.1553 PPM
9/14/2010 9:41	1.26 %	141.1 PPM	60.2 PPM	18.3 %	13.97 PPM	18.6425 PPM
9/14/2010 9:41	1.45 %	140.1 PPM	49 PPM	18.1 %	16.58 PPM	19.0472 PPM
9/14/2010 9:42	1.13 %	141.4 PPM	47.7 PPM	18.4 %	17.49 PPM	19.3079 PPM
9/14/2010 9:42	1.1 %	143 PPM	56.6 PPM	18.5 %	21.26 PPM	19.2216 PPM
9/14/2010 9:43	1.3 %	148.1 PPM	55.3 PPM	18.3 %	19.16 PPM	19.0706 PPM
9/14/2010 9:43	1.44 %	147.1 PPM	59.2 PPM	18.2 %	18.26 PPM	18.761 PPM
9/14/2010 9:44	1.54 %	144.7 PPM	66.7 PPM	18.1 %	15.19 PPM	18.8711 PPM
9/14/2010 9:44	1.87 %	141.1 PPM	63.3 PPM	17.8 %	17.22 PPM	18.9439 PPM
9/14/2010 9:45	1.89 %	142 PPM	58.9 PPM	17.7 %	21.47 PPM	18.8845 PPM
9/14/2010 9:45	1.59 %	142.4 PPM	60.8 PPM	18 %	18.15 PPM	18.8788 PPM
9/14/2010 9:46	1.8 %	143 PPM	58.8 PPM	17.8 %	18.57 PPM	18.9362 PPM
9/14/2010 9:46	1.62 %	147.1 PPM	63 PPM	18 %	18 PPM	18.9665 PPM
9/14/2010 9:47	1.55 %	148.1 PPM	54.8 PPM	18 %	16.57 PPM	18.9848 PPM
9/14/2010 9:47	1.29 %	147 PPM	55.4 PPM	18.3 %	16.1 PPM	18.9594 PPM
9/14/2010 9:48	1.45 %	145 PPM	57.2 PPM	18.2 %	15.39 PPM	18.906 PPM
9/14/2010 9:48	1.46 %	139 PPM	60 PPM	18.1 %	15.15 PPM	18.8248 PPM
9/14/2010 9:49	1.52 %	139.1 PPM	59.5 PPM	18.1 %	16.22 PPM	19.1449 PPM
9/14/2010 9:49	1.59 %	139.4 PPM	55.4 PPM	18 %	17.43 PPM	19.0795 PPM
9/14/2010 9:50	1.35 %	141 PPM	58.4 PPM	18.2 %	17.49 PPM	19.2556 PPM
9/14/2010 9:50	1.48 %	139 PPM	60.1 PPM	18.1 %	16.19 PPM	18.9872 PPM
9/14/2010 9:51	1.5 %	136 PPM	54.9 PPM	18.1 %	17.16 PPM	18.9319 PPM
9/14/2010 9:51	1.33 %	135.2 PPM	51.5 PPM	18.2 %	38.31 PPM	18.7959 PPM
9/14/2010 9:52	1.13 %	136 PPM	54.4 PPM	18.4 %	18.12 PPM	18.9897 PPM
9/14/2010 9:52	1.3 %	137 PPM	57.1 PPM	18.3 %	17.14 PPM	18.9033 PPM
9/14/2010 9:53	1.45 %	141.1 PPM	58.4 PPM	18.2 %	17.99 PPM	18.9393 PPM
9/14/2010 9:53	1.33 %	144.4 PPM	53 PPM	18.2 %	17.09 PPM	19.0614 PPM
9/14/2010 9:54	1.27 %	146.3 PPM	55 PPM	18.3 %	16.26 PPM	18.998 PPM
9/14/2010 9:54	1.24 %	146.5 PPM	55.8 PPM	18.4 %	16.34 PPM	19.0028 PPM
9/14/2010 9:55	1.33 %	146 PPM	55 PPM	18.3 %	14.93 PPM	19.0616 PPM
9/14/2010 9:55	1.57 %	145 PPM	56.6 PPM	18.1 %	15.99 PPM	19.0024 PPM
9/14/2010 9:56	1.4 %	145.4 PPM	51.2 PPM	18.2 %	14.11 PPM	19.0604 PPM
9/14/2010 9:56	1.28 %	142.9 PPM	53.4 PPM	18.3 %	16.18 PPM	19.1866 PPM
9/14/2010 9:57	1.21 %	142.6 PPM	49.1 PPM	18.3 %	17.1 PPM	18.9699 PPM
9/14/2010 9:57	1.09 %	141.7 PPM	52.9 PPM	18.4 %	15.99 PPM	18.9033 PPM
9/14/2010 9:58	1.13 %	143.4 PPM	53.3 PPM	18.5 %	15.43 PPM	19.0246 PPM
9/14/2010 9:58	1.25 %	142 PPM	48.6 PPM	18.3 %	14.08 PPM	18.8846 PPM
9/14/2010 9:59	1.12 %	138.1 PPM	49.9 PPM	18.5 %	15.28 PPM	18.834 PPM
9/14/2010 9:59	1.12 %	137.1 PPM	51.2 PPM	18.4 %	16.46 PPM	18.9065 PPM
9/14/2010 10:00	1.2 %	140.1 PPM	47.8 PPM	18.4 %	16.42 PPM	18.7682 PPM
9/14/2010 10:00	1.02 %	141.9 PPM	43.8 PPM	18.5 %	18.29 PPM	18.7978 PPM

9/14/2010 10:01	1.08 %	140.7 PPM	45.6 PPM	18.6 %	15.45 PPM	18.7182 PPM
9/14/2010 10:01	1.03 %	140.5 PPM	52.4 PPM	18.6 %	16.17 PPM	18.6715 PPM
9/14/2010 10:02	1.12 %	143.1 PPM	46.6 PPM	18.5 %	16.35 PPM	18.6577 PPM
9/14/2010 10:02	1.07 %	144.4 PPM	54.7 PPM	18.6 %	16.17 PPM	18.5513 PPM
9/14/2010 10:03	1.28 %	144 PPM	53.9 PPM	18.3 %	15.15 PPM	18.3844 PPM
9/14/2010 10:03	1.09 %	142.1 PPM	56.3 PPM	18.5 %	15.45 PPM	18.3956 PPM
9/14/2010 10:04	1.24 %	143.3 PPM	51.5 PPM	18.4 %	14.31 PPM	18.5322 PPM
9/14/2010 10:04	1.25 %	142 PPM	53.3 PPM	18.4 %	15.08 PPM	18.8243 PPM
9/14/2010 10:05	1.22 %	136 PPM	53.2 PPM	18.4 %	15.14 PPM	18.7249 PPM
9/14/2010 10:05	1.34 %	136 PPM	48 PPM	18.3 %	14.91 PPM	18.7742 PPM
9/14/2010 10:06	1.12 %	136.9 PPM	51.3 PPM	18.5 %	14.1 PPM	18.7757 PPM
9/14/2010 10:06	1.2 %	134 PPM	45.3 PPM	18.4 %	12.12 PPM	18.841 PPM
9/14/2010 10:07	1.02 %	128.9 PPM	43.8 PPM	18.6 %	13.68 PPM	18.9002 PPM
9/14/2010 10:07	1.05 %	127.6 PPM	51.2 PPM	18.6 %	14.27 PPM	18.7757 PPM
9/14/2010 10:08	1.22 %	131 PPM	56.1 PPM	18.5 %	15.06 PPM	18.6055 PPM
9/14/2010 10:08	1.31 %	137.1 PPM	52.8 PPM	18.3 %	15.35 PPM	18.6005 PPM
9/14/2010 10:09	1.18 %	137.4 PPM	48 PPM	18.4 %	15.14 PPM	18.5983 PPM
9/14/2010 10:09	1.12 %	139.3 PPM	52.2 PPM	18.6 %	15.41 PPM	18.6232 PPM
9/14/2010 10:10	1.2 %	140.4 PPM	46.9 PPM	18.5 %	13.22 PPM	18.7273 PPM
9/14/2010 10:10	1.11 %	137.9 PPM	51.3 PPM	18.6 %	14.32 PPM	18.7518 PPM
9/14/2010 10:11	1.17 %	137.1 PPM	53.1 PPM	18.5 %	13.43 PPM	18.6285 PPM
9/14/2010 10:11	1.13 %	140 PPM	54.8 PPM	18.5 %	14.34 PPM	18.5613 PPM
9/14/2010 10:12	1.37 %	141.1 PPM	56.5 PPM	18.3 %	15.05 PPM	18.6039 PPM
9/14/2010 10:12	1.31 %	144 PPM	48.1 PPM	18.4 %	15.01 PPM	18.5084 PPM
9/14/2010 10:13	1.11 %	142.9 PPM	57.9 PPM	18.6 %	15.02 PPM	18.483 PPM
9/14/2010 10:13	1.22 %	138.7 PPM	52 PPM	18.5 %	14.52 PPM	18.4964 PPM
9/14/2010 10:14	1.14 %	139.4 PPM	53.3 PPM	18.6 %	13.47 PPM	18.6234 PPM
9/14/2010 10:14	1.19 %	138.1 PPM	42.7 PPM	18.5 %	13 PPM	18.9544 PPM
9/14/2010 10:15	1.1 %	139.3 PPM	47.4 PPM	18.6 %	14.64 PPM	18.794 PPM
9/14/2010 10:15	1 %	140.4 PPM	46.8 PPM	18.7 %	13.29 PPM	18.7271 PPM
9/14/2010 10:16	0.95 %	137.9 PPM	48.1 PPM	18.7 %	13.49 PPM	18.6139 PPM
9/14/2010 10:16	1.05 %	136.9 PPM	51 PPM	18.7 %	13.98 PPM	18.3627 PPM
9/14/2010 10:17	1.23 %	138.1 PPM	47.7 PPM	18.6 %	14.39 PPM	18.3768 PPM
9/14/2010 10:17	1.11 %	139.8 PPM	41.2 PPM	18.6 %	15.16 PPM	18.39 PPM
9/14/2010 10:18	0.94 %	132.4 PPM	49.2 PPM	18.8 %	16.68 PPM	18.2665 PPM
9/14/2010 10:18	1.05 %	134 PPM	49.1 PPM	18.7 %	15.52 PPM	18.1783 PPM
9/14/2010 10:19	1.26 %	134.8 PPM	47 PPM	18.6 %	14.51 PPM	18.2813 PPM
9/14/2010 10:19	1.18 %	136.1 PPM	53.4 PPM	18.6 %	15.92 PPM	18.3194 PPM
9/14/2010 10:20	1.24 %	141 PPM	51.1 PPM	18.6 %	16.43 PPM	18.1045 PPM
9/14/2010 10:20	1.33 %	146 PPM	52.1 PPM	18.5 %	15.61 PPM	18.1806 PPM
9/14/2010 10:21	1.25 %	147.2 PPM	58.1 PPM	18.6 %	15.12 PPM	18.0689 PPM
9/14/2010 10:21	1.38 %	146.8 PPM	59.7 PPM	18.5 %	15.19 PPM	17.9954 PPM
9/14/2010 10:22	1.62 %	148.2 PPM	63.6 PPM	18.3 %	16.03 PPM	18.2711 PPM
9/14/2010 10:22	1.76 %	147.9 PPM	57.6 PPM	18.1 %	13.56 PPM	18.387 PPM
9/14/2010 10:23	1.51 %	140.4 PPM	54.4 PPM	18.3 %	16.11 PPM	18.3498 PPM
9/14/2010 10:23	1.51 %	137.7 PPM	58.4 PPM	18.4 %	15.17 PPM	18.7239 PPM
9/14/2010 10:24	1.54 %	135.9 PPM	62.2 PPM	18.3 %	15.44 PPM	18.7145 PPM
9/14/2010 10:24	1.72 %	136.1 PPM	60.5 PPM	18.2 %	15.06 PPM	18.7381 PPM

Run 1	1.310 %	140.278 PPM	53.782 PPM	18.318 %	15.780 PPM	18.683 PPM
Averages	O2	CO	NOx	CO2	THC	SO2

FCCU - Wet Gas Scrubber Exhaust

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber Exhaust
 Run 2

Date time	O2	CO	NOx	CO2	THC as CH4	SO2
9/14/2010 10:50	1.59 %	126.8 PPM	54.9 PPM	18.3 %	11.98 PPM	20.8086 PPM
9/14/2010 10:50	1.39 %	126.1 PPM	54.9 PPM	18.5 %	14.18 PPM	20.4383 PPM
9/14/2010 10:51	1.59 %	130.1 PPM	57.4 PPM	18.4 %	13.95 PPM	19.8664 PPM
9/14/2010 10:51	1.46 %	135.1 PPM	53.7 PPM	18.4 %	14.04 PPM	19.565 PPM
9/14/2010 10:52	1.26 %	135.4 PPM	55.3 PPM	18.6 %	13.63 PPM	18.8853 PPM
9/14/2010 10:52	1.36 %	136.1 PPM	57.5 PPM	18.6 %	12.54 PPM	18.8207 PPM
9/14/2010 10:53	1.47 %	133.8 PPM	54.7 PPM	18.5 %	13.4 PPM	18.7183 PPM
9/14/2010 10:53	1.46 %	130.1 PPM	56.9 PPM	18.5 %	13.18 PPM	18.6302 PPM
9/14/2010 10:54	1.49 %	136.1 PPM	55.9 PPM	18.4 %	13.1 PPM	18.569 PPM
9/14/2010 10:54	1.44 %	139.1 PPM	57.3 PPM	18.5 %	12.63 PPM	18.661 PPM
9/14/2010 10:55	1.38 %	141.7 PPM	56 PPM	18.5 %	14.09 PPM	18.6819 PPM
9/14/2010 10:55	1.44 %	142.1 PPM	56.5 PPM	18.5 %	13.03 PPM	18.6526 PPM
9/14/2010 10:56	1.51 %	141.7 PPM	60.5 PPM	18.5 %	13.01 PPM	18.6886 PPM
9/14/2010 10:56	1.5 %	140.1 PPM	57.7 PPM	18.4 %	13.47 PPM	18.7194 PPM
9/14/2010 10:57	1.69 %	139.7 PPM	53.3 PPM	18.3 %	13.17 PPM	18.686 PPM
9/14/2010 10:57	1.38 %	136.7 PPM	54.8 PPM	18.5 %	13.63 PPM	18.6555 PPM
9/14/2010 10:58	1.4 %	132.5 PPM	45.4 PPM	18.5 %	13 PPM	18.8103 PPM
9/14/2010 10:58	1.1 %	137 PPM	55.7 PPM	18.8 %	13.02 PPM	18.8586 PPM
9/14/2010 10:59	1.28 %	137.3 PPM	48.5 PPM	18.7 %	12.12 PPM	18.9835 PPM
9/14/2010 10:59	1.26 %	138.2 PPM	52.1 PPM	18.7 %	13.06 PPM	19.021 PPM
9/14/2010 11:00	1.32 %	136.8 PPM	52.9 PPM	18.6 %	11.82 PPM	18.9194 PPM
9/14/2010 11:00	1.44 %	132.9 PPM	46.6 PPM	18.5 %	12.12 PPM	18.9189 PPM
9/14/2010 11:01	1.26 %	130.6 PPM	50.5 PPM	18.7 %	12.02 PPM	18.9675 PPM
9/14/2010 11:01	1.44 %	131.3 PPM	55.7 PPM	18.5 %	11.48 PPM	19.0673 PPM
9/14/2010 11:02	1.61 %	130.8 PPM	45.1 PPM	18.3 %	10.98 PPM	18.9237 PPM
9/14/2010 11:02	1.27 %	130.7 PPM	50.4 PPM	18.6 %	12.39 PPM	18.6517 PPM
9/14/2010 11:03	1.23 %	128.6 PPM	47.4 PPM	18.7 %	13.13 PPM	18.8517 PPM
9/14/2010 11:03	1.16 %	126.8 PPM	42.9 PPM	18.8 %	13.49 PPM	18.7952 PPM
9/14/2010 11:04	1 %	127.2 PPM	45.1 PPM	18.9 %	13.57 PPM	18.6795 PPM
9/14/2010 11:04	1.08 %	130.2 PPM	51.2 PPM	18.9 %	11.51 PPM	18.866 PPM
9/14/2010 11:05	1.25 %	126.7 PPM	53.5 PPM	18.7 %	12.09 PPM	18.5845 PPM
9/14/2010 11:05	1.3 %	129.1 PPM	45 PPM	18.6 %	11.09 PPM	18.5436 PPM
9/14/2010 11:06	1.16 %	127.7 PPM	54.7 PPM	18.8 %	11.2 PPM	18.5654 PPM
9/14/2010 11:06	1.42 %	129 PPM	48.9 PPM	18.6 %	13.01 PPM	18.5549 PPM
9/14/2010 11:07	1.19 %	133 PPM	42.6 PPM	18.7 %	12.53 PPM	18.6411 PPM
9/14/2010 11:07	1 %	129.3 PPM	48.7 PPM	18.9 %	11.8 PPM	18.8586 PPM
9/14/2010 11:08	1.18 %	122.7 PPM	46.1 PPM	18.8 %	12.59 PPM	18.8317 PPM
9/14/2010 11:08	1.17 %	123 PPM	44.3 PPM	18.8 %	13.61 PPM	18.8155 PPM
9/14/2010 11:09	1.03 %	126 PPM	36 PPM	18.9 %	12.23 PPM	18.8044 PPM
9/14/2010 11:09	0.88 %	126.6 PPM	44.9 PPM	19.1 %	12.08 PPM	18.4854 PPM
9/14/2010 11:10	1.03 %	126.1 PPM	37.7 PPM	18.9 %	11.92 PPM	18.5432 PPM
9/14/2010 11:10	0.83 %	126.3 PPM	46.7 PPM	19.1 %	12.5 PPM	18.6385 PPM
9/14/2010 11:11	1.11 %	127.2 PPM	48.3 PPM	19 %	12.65 PPM	18.558 PPM
9/14/2010 11:11	1.09 %	125.7 PPM	46 PPM	19 %	12.06 PPM	18.4983 PPM
9/14/2010 11:12	1.19 %	125.1 PPM	49.7 PPM	18.9 %	14.23 PPM	18.4206 PPM
9/14/2010 11:12	1.28 %	128 PPM	52.4 PPM	18.9 %	12.12 PPM	18.4299 PPM
9/14/2010 11:13	1.35 %	129.6 PPM	52.7 PPM	18.9 %	11.7 PPM	18.3487 PPM
9/14/2010 11:13	1.44 %	128.5 PPM	57.9 PPM	18.8 %	11.3 PPM	18.6727 PPM
9/14/2010 11:14	1.72 %	128.4 PPM	51.8 PPM	18.5 %	11.92 PPM	18.506 PPM
9/14/2010 11:14	1.47 %	128.1 PPM	58.5 PPM	18.8 %	11.28 PPM	18.2056 PPM
9/14/2010 11:15	1.57 %	126.6 PPM	60.1 PPM	18.7 %	11.66 PPM	18.2427 PPM
9/14/2010 11:15	1.79 %	126.2 PPM	55.7 PPM	18.5 %	11.15 PPM	18.4988 PPM
9/14/2010 11:16	1.54 %	124.8 PPM	55.4 PPM	18.7 %	11.94 PPM	18.3488 PPM
9/14/2010 11:16	1.52 %	125.1 PPM	57.7 PPM	18.7 %	11.05 PPM	18.1476 PPM
9/14/2010 11:17	1.63 %	124.8 PPM	55.8 PPM	18.6 %	11.5 PPM	18.0774 PPM
9/14/2010 11:17	1.59 %	123.7 PPM	56.1 PPM	18.6 %	11.03 PPM	18.1694 PPM
9/14/2010 11:18	1.75 %	124.2 PPM	63.8 PPM	18.6 %	11.55 PPM	18.315 PPM
9/14/2010 11:18	1.99 %	123.7 PPM	59.8 PPM	18.3 %	11.95 PPM	18.4067 PPM
9/14/2010 11:19	1.8 %	123.1 PPM	59.9 PPM	18.4 %	12.14 PPM	18.2241 PPM
9/14/2010 11:19	1.69 %	124.7 PPM	61.4 PPM	18.5 %	11.13 PPM	18.001 PPM
9/14/2010 11:20	1.73 %	127.1 PPM	61.3 PPM	18.5 %	12.27 PPM	18.0018 PPM
9/14/2010 11:20	1.84 %	128.3 PPM	57.1 PPM	18.4 %	13.01 PPM	18.0798 PPM
9/14/2010 11:21	1.58 %	127.5 PPM	57.7 PPM	18.6 %	11.11 PPM	17.9647 PPM
9/14/2010 11:21	1.57 %	127.6 PPM	55.6 PPM	18.6 %	10.54 PPM	17.5943 PPM
9/14/2010 11:22	1.44 %	123.7 PPM	54.9 PPM	18.6 %	11.13 PPM	17.9166 PPM
9/14/2010 11:22	1.37 %	124.1 PPM	48.6 PPM	18.6 %	10.11 PPM	18.1534 PPM
9/14/2010 11:23	1.31 %	123.9 PPM	55 PPM	18.7 %	10.42 PPM	18.4345 PPM
9/14/2010 11:23	1.41 %	119.8 PPM	55.1 PPM	18.6 %	11.33 PPM	18.0989 PPM
9/14/2010 11:24	1.29 %	120.2 PPM	48.3 PPM	18.7 %	11.05 PPM	18.1129 PPM

9/14/2010 11:24	1.15 %	121.4 PPM	54.4 PPM	18.9 %	11.16 PPM	18.2802 PPM
9/14/2010 11:25	1.39 %	122.4 PPM	52.9 PPM	18.7 %	11.17 PPM	18.3869 PPM
9/14/2010 11:25	1.33 %	120.8 PPM	46 PPM	18.6 %	11.11 PPM	18.3561 PPM
9/14/2010 11:26	1.09 %	120.6 PPM	55.7 PPM	18.9 %	11.1 PPM	18.305 PPM
9/14/2010 11:26	1.39 %	120.4 PPM	52.1 PPM	18.7 %	10.61 PPM	18.3043 PPM
9/14/2010 11:27	1.41 %	121.2 PPM	53.5 PPM	18.7 %	12 PPM	18.2425 PPM
9/14/2010 11:27	1.39 %	126.2 PPM	53.1 PPM	18.6 %	10.93 PPM	18.0765 PPM
9/14/2010 11:28	1.36 %	125.8 PPM	58.6 PPM	18.7 %	11.2 PPM	18.0416 PPM
9/14/2010 11:28	1.67 %	126.2 PPM	59.8 PPM	18.4 %	11.45 PPM	17.7499 PPM
9/14/2010 11:29	1.71 %	128.3 PPM	58.7 PPM	18.3 %	13.57 PPM	17.9554 PPM
9/14/2010 11:29	1.63 %	130.2 PPM	48.2 PPM	18.4 %	13.05 PPM	17.7487 PPM
9/14/2010 11:30	1.25 %	133.3 PPM	59.3 PPM	18.8 %	11.52 PPM	17.6589 PPM
9/14/2010 11:30	1.68 %	135.4 PPM	61.1 PPM	18.4 %	12.98 PPM	17.6165 PPM
9/14/2010 11:31	1.6 %	135.5 PPM	54.6 PPM	18.4 %	13.88 PPM	17.8722 PPM
9/14/2010 11:31	1.43 %	134.7 PPM	51.3 PPM	18.5 %	11.96 PPM	17.8954 PPM
9/14/2010 11:32	1.38 %	132.8 PPM	49.3 PPM	18.7 %	12.04 PPM	18.1604 PPM
9/14/2010 11:32	1.32 %	133.2 PPM	51 PPM	18.7 %	12.65 PPM	18.2303 PPM
9/14/2010 11:33	1.19 %	132.9 PPM	53.7 PPM	18.8 %	12.38 PPM	17.9246 PPM
9/14/2010 11:33	1.29 %	129.7 PPM	46.7 PPM	18.7 %	12.51 PPM	17.677 PPM
9/14/2010 11:34	1.17 %	132.2 PPM	51.9 PPM	18.8 %	12.31 PPM	17.7611 PPM
9/14/2010 11:34	1.29 %	129.9 PPM	43.7 PPM	18.7 %	12.08 PPM	17.6224 PPM
9/14/2010 11:35	1.12 %	131.2 PPM	46.7 PPM	18.9 %	11.46 PPM	17.3858 PPM
9/14/2010 11:35	1.14 %	128.8 PPM	50.8 PPM	18.8 %	11.96 PPM	17.1684 PPM
9/14/2010 11:36	1.2 %	126.7 PPM	57.4 PPM	18.8 %	11.91 PPM	17.156 PPM
9/14/2010 11:36	1.44 %	124.6 PPM	45.7 PPM	18.6 %	11.16 PPM	16.9159 PPM
9/14/2010 11:37	1.07 %	129.2 PPM	43.6 PPM	18.9 %	11.45 PPM	16.7204 PPM
9/14/2010 11:37	1.2 %	125.8 PPM	55.6 PPM	18.9 %	11.09 PPM	16.5785 PPM
9/14/2010 11:38	1.47 %	124.7 PPM	55.2 PPM	18.6 %	11.63 PPM	16.8122 PPM
9/14/2010 11:38	1.49 %	122.7 PPM	57.6 PPM	18.6 %	11.17 PPM	16.9634 PPM
9/14/2010 11:39	1.4 %	123.2 PPM	53.9 PPM	18.6 %	11.17 PPM	17.0854 PPM
9/14/2010 11:39	1.56 %	120.8 PPM	50.5 PPM	18.5 %	10.58 PPM	17.0036 PPM
9/14/2010 11:40	1.25 %	122.2 PPM	50.5 PPM	18.8 %	11.07 PPM	16.8402 PPM
9/14/2010 11:40	1.34 %	122.8 PPM	50.7 PPM	18.7 %	11.45 PPM	16.7772 PPM
9/14/2010 11:41	1.39 %	120.8 PPM	50.8 PPM	18.7 %	11.11 PPM	16.8101 PPM
9/14/2010 11:41	1.46 %	119.8 PPM	53.7 PPM	18.6 %	10.66 PPM	16.8689 PPM
9/14/2010 11:42	1.38 %	118.6 PPM	57.8 PPM	18.7 %	11.53 PPM	16.8035 PPM
9/14/2010 11:42	1.45 %	123.6 PPM	53.7 PPM	18.6 %	10.6 PPM	17.0685 PPM
9/14/2010 11:43	1.5 %	121.8 PPM	53.5 PPM	18.6 %	11.56 PPM	17.1812 PPM
9/14/2010 11:43	1.46 %	121.2 PPM	55.6 PPM	18.6 %	12.13 PPM	17.176 PPM
9/14/2010 11:44	1.45 %	123.2 PPM	53.1 PPM	18.6 %	11.21 PPM	17.0329 PPM
9/14/2010 11:44	1.37 %	123.8 PPM	52 PPM	18.7 %	11.05 PPM	16.8344 PPM
9/14/2010 11:45	1.28 %	123.6 PPM	54.8 PPM	18.7 %	11.05 PPM	16.6927 PPM
9/14/2010 11:45	1.36 %	125.2 PPM	54.9 PPM	18.7 %	11.36 PPM	16.6439 PPM
9/14/2010 11:46	1.44 %	125.5 PPM	53.7 PPM	18.6 %	10.04 PPM	16.9123 PPM
9/14/2010 11:46	1.27 %	124.8 PPM	48 PPM	18.8 %	12.27 PPM	17.1867 PPM
9/14/2010 11:47	1.17 %	121.7 PPM	52 PPM	18.9 %	10.96 PPM	17.2946 PPM
9/14/2010 11:47	1.26 %	123.2 PPM	53.8 PPM	18.8 %	10.86 PPM	17.0988 PPM
9/14/2010 11:48	1.33 %	124.2 PPM	58 PPM	18.8 %	11.34 PPM	16.9891 PPM
9/14/2010 11:48	1.44 %	125.4 PPM	55.6 PPM	18.6 %	11.2 PPM	17.1251 PPM
9/14/2010 11:49	1.39 %	125.5 PPM	52.5 PPM	18.7 %	10.16 PPM	17.2264 PPM
9/14/2010 11:49	1.37 %	124.6 PPM	55.4 PPM	18.7 %	10.14 PPM	17.2789 PPM
Run 2	1.378 %	127.909 PPM	52.793 PPM	18.656 %	11.948 PPM	18.110 PPM
Averages	O2	CO	NOx	CO2	THC as CH4	SO2
FCCU - Wet Gas Scrubber Exhaust						

Hess Corporation, Perth Amboy, NJ
 FCCU - Wet Gas Scrubber Exhaust
 Run 3

Date time	O2	CO	NOx	CO2	THC as CH4	SO2
9/14/2010 12:58	1.41 %	135.5 PPM	55.108 PPM	18.37 %	14.03 PPM	17.38179 PPM
9/14/2010 12:59	1.45 %	132.4 PPM	57.862 PPM	18.27 %	14.64 PPM	17.75912 PPM
9/14/2010 12:59	1.38 %	133.4 PPM	53.884 PPM	18.37 %	13.42 PPM	17.35587 PPM
9/14/2010 13:00	1.34 %	129.9 PPM	51.334 PPM	18.37 %	14.38 PPM	17.46387 PPM
9/14/2010 13:00	1.37 %	129 PPM	53.476 PPM	18.47 %	15.86 PPM	17.66462 PPM
9/14/2010 13:01	1.49 %	133 PPM	47.866 PPM	18.37 %	15.95 PPM	17.79462 PPM
9/14/2010 13:01	1.47 %	135.4 PPM	50.722 PPM	18.27 %	15.96 PPM	17.80947 PPM
9/14/2010 13:02	1.51 %	132.8 PPM	53.374 PPM	18.17 %	13.33 PPM	17.87805 PPM
9/14/2010 13:02	1.28 %	130.1 PPM	52.252 PPM	18.17 %	15.03 PPM	17.67299 PPM
9/14/2010 13:03	1.52 %	131 PPM	47.968 PPM	18.27 %	14.91 PPM	17.28 PPM
9/14/2010 13:03	1.4 %	133.3 PPM	47.05 PPM	18.27 %	14.51 PPM	17.43485 PPM
9/14/2010 13:04	1.33 %	134.1 PPM	51.946 PPM	18.37 %	15.54 PPM	17.43026 PPM
9/14/2010 13:04	1.58 %	136.3 PPM	52.252 PPM	18.17 %	14.5 PPM	17.36465 PPM
9/14/2010 13:05	1.64 %	135.1 PPM	56.026 PPM	18.07 %	14.36 PPM	17.47224 PPM
9/14/2010 13:05	1.69 %	133.8 PPM	48.988 PPM	18.07 %	14.53 PPM	17.36397 PPM
9/14/2010 13:06	1.56 %	132.1 PPM	50.416 PPM	18.17 %	13.9 PPM	17.56134 PPM
9/14/2010 13:06	1.56 %	130.1 PPM	52.762 PPM	18.17 %	13.55 PPM	17.50235 PPM
9/14/2010 13:07	1.75 %	126.8 PPM	50.62 PPM	18.07 %	13.54 PPM	17.55459 PPM
9/14/2010 13:07	1.56 %	128 PPM	55.21 PPM	18.17 %	14.8 PPM	17.57376 PPM
9/14/2010 13:08	1.56 %	129.3 PPM	55.516 PPM	18.17 %	15.79 PPM	17.38908 PPM
9/14/2010 13:08	1.5 %	130.4 PPM	53.986 PPM	18.17 %	15.57 PPM	17.48007 PPM
9/14/2010 13:09	1.5 %	130.5 PPM	52.66 PPM	18.27 %	13.6 PPM	17.4825 PPM
9/14/2010 13:09	1.54 %	131.4 PPM	52.762 PPM	18.17 %	14.8 PPM	17.60198 PPM
9/14/2010 13:10	1.38 %	130.1 PPM	55.414 PPM	18.37 %	13.94 PPM	17.40407 PPM
9/14/2010 13:10	1.41 %	129 PPM	42.97 PPM	18.37 %	14.29 PPM	17.52057 PPM
9/14/2010 13:11	1.16 %	131 PPM	46.234 PPM	18.57 %	15.56 PPM	17.45712 PPM
9/14/2010 13:11	1.16 %	132.4 PPM	56.23 PPM	18.57 %	15.5 PPM	17.29094 PPM
9/14/2010 13:12	1.55 %	131 PPM	54.496 PPM	18.27 %	14.47 PPM	17.12705 PPM
9/14/2010 13:12	1.37 %	132 PPM	53.068 PPM	18.37 %	15.68 PPM	17.23086 PPM
9/14/2010 13:13	1.32 %	132.4 PPM	50.926 PPM	18.37 %	13.93 PPM	17.22506 PPM
9/14/2010 13:13	1.39 %	130.7 PPM	54.292 PPM	18.37 %	13.38 PPM	17.38557 PPM
9/14/2010 13:14	1.49 %	129 PPM	54.598 PPM	18.27 %	14.44 PPM	17.44686 PPM
9/14/2010 13:14	1.49 %	127.6 PPM	52.762 PPM	18.27 %	12.62 PPM	17.60009 PPM
9/14/2010 13:15	1.31 %	128.2 PPM	48.682 PPM	18.47 %	12.74 PPM	17.85686 PPM
9/14/2010 13:15	1.1 %	128 PPM	56.332 PPM	18.67 %	12.82 PPM	17.79314 PPM
9/14/2010 13:16	1.46 %	125.7 PPM	54.598 PPM	18.37 %	13.97 PPM	17.57997 PPM
9/14/2010 13:16	1.27 %	126.3 PPM	49.498 PPM	18.47 %	15.64 PPM	17.30187 PPM
9/14/2010 13:17	1.09 %	128.9 PPM	56.638 PPM	18.67 %	15.5 PPM	17.05806 PPM
9/14/2010 13:17	1.27 %	130.3 PPM	54.496 PPM	18.57 %	14.9 PPM	16.94007 PPM
9/14/2010 13:18	1.42 %	129.5 PPM	51.844 PPM	18.37 %	14.55 PPM	17.11301 PPM
9/14/2010 13:18	1.21 %	129.9 PPM	53.986 PPM	18.57 %	16.44 PPM	17.20143 PPM
9/14/2010 13:19	1.31 %	132.9 PPM	53.68 PPM	18.47 %	15.52 PPM	17.04686 PPM
9/14/2010 13:19	1.29 %	134.9 PPM	58.984 PPM	18.47 %	13.56 PPM	16.96505 PPM
9/14/2010 13:20	1.67 %	132.9 PPM	55.924 PPM	18.17 %	13.93 PPM	17.21169 PPM
9/14/2010 13:20	1.54 %	130.5 PPM	58.27 PPM	18.27 %	13.9 PPM	17.26164 PPM
9/14/2010 13:21	1.47 %	130.4 PPM	51.538 PPM	18.27 %	13.8 PPM	17.26569 PPM
9/14/2010 13:21	1.43 %	129.8 PPM	55.516 PPM	18.47 %	13.44 PPM	17.25381 PPM
9/14/2010 13:22	1.4 %	128.8 PPM	52.15 PPM	18.37 %	14.74 PPM	17.21561 PPM
9/14/2010 13:22	1.29 %	129.3 PPM	51.946 PPM	18.47 %	15.49 PPM	17.15756 PPM
9/14/2010 13:23	1.38 %	129.3 PPM	50.824 PPM	18.47 %	15.52 PPM	17.14514 PPM
9/14/2010 13:23	1.34 %	128.9 PPM	54.394 PPM	18.47 %	15.6 PPM	17.04267 PPM
9/14/2010 13:24	1.41 %	129.8 PPM	49.6 PPM	18.47 %	12.57 PPM	17.01527 PPM
9/14/2010 13:24	1.31 %	130.8 PPM	56.23 PPM	18.57 %	14.41 PPM	16.96343 PPM
9/14/2010 13:25	1.32 %	129.9 PPM	48.07 PPM	18.47 %	12.61 PPM	17.14527 PPM
9/14/2010 13:25	1.15 %	128.8 PPM	57.046 PPM	18.67 %	13.93 PPM	17.27055 PPM
9/14/2010 13:26	1.59 %	130.1 PPM	49.6 PPM	18.27 %	15.09 PPM	17.17902 PPM
9/14/2010 13:26	1.29 %	131.2 PPM	52.558 PPM	18.47 %	14.29 PPM	16.9583 PPM
9/14/2010 13:27	1.28 %	130.4 PPM	51.028 PPM	18.47 %	13.5 PPM	16.98773 PPM
9/14/2010 13:27	1.36 %	130.8 PPM	59.392 PPM	18.47 %	13.66 PPM	16.94696 PPM
9/14/2010 13:28	1.55 %	129.5 PPM	53.17 PPM	18.27 %	13.57 PPM	17.05334 PPM
9/14/2010 13:28	1.4 %	131.8 PPM	50.926 PPM	18.37 %	14.38 PPM	17.14352 PPM
9/14/2010 13:29	1.31 %	134.1 PPM	56.128 PPM	18.47 %	13.48 PPM	17.0933 PPM
9/14/2010 13:29	1.39 %	129.8 PPM	51.334 PPM	18.47 %	14.45 PPM	17.36559 PPM
9/14/2010 13:30	1.34 %	129.8 PPM	51.742 PPM	18.47 %	15.74 PPM	17.21426 PPM
9/14/2010 13:30	1.41 %	133.9 PPM	50.212 PPM	18.47 %	14.54 PPM	17.11193 PPM
9/14/2010 13:31	1.22 %	134.5 PPM	56.026 PPM	18.57 %	14.33 PPM	17.21723 PPM
9/14/2010 13:31	1.3 %	134.2 PPM	55.618 PPM	18.57 %	14.63 PPM	17.21088 PPM
9/14/2010 13:32	1.45 %	135.2 PPM	50.416 PPM	18.37 %	14.34 PPM	17.14649 PPM
9/14/2010 13:32	1.21 %	133.5 PPM	51.742 PPM	18.57 %	14.78 PPM	17.22884 PPM

9/14/2010 13:33	1.34 %	134.1 PPM	48.784 PPM	18.57 %	14.48 PPM	17.06859 PPM
9/14/2010 13:33	1.23 %	132.8 PPM	56.842 PPM	18.57 %	13.93 PPM	17.06819 PPM
9/14/2010 13:34	1.48 %	131.5 PPM	53.272 PPM	18.27 %	12.61 PPM	16.97261 PPM
9/14/2010 13:34	1.33 %	128.8 PPM	48.58 PPM	18.47 %	14.55 PPM	16.96802 PPM
9/14/2010 13:35	1.16 %	128.9 PPM	48.172 PPM	18.67 %	13.51 PPM	17.04497 PPM
9/14/2010 13:35	1.21 %	128.8 PPM	50.212 PPM	18.67 %	12.99 PPM	17.10248 PPM
9/14/2010 13:36	1.23 %	126 PPM	51.742 PPM	18.67 %	12.54 PPM	17.08871 PPM
9/14/2010 13:36	1.21 %	126.3 PPM	55.924 PPM	18.57 %	12.5 PPM	17.38922 PPM
9/14/2010 13:37	1.27 %	124.5 PPM	55.822 PPM	18.57 %	12.65 PPM	17.47035 PPM
9/14/2010 13:37	1.32 %	126.9 PPM	47.254 PPM	18.47 %	14.48 PPM	17.26205 PPM
9/14/2010 13:38	1.09 %	131.1 PPM	55.618 PPM	18.77 %	14.34 PPM	16.90281 PPM
9/14/2010 13:38	1.38 %	131.3 PPM	61.636 PPM	18.57 %	14.82 PPM	16.87379 PPM
9/14/2010 13:39	1.58 %	131.9 PPM	54.7 PPM	18.27 %	13.92 PPM	16.81601 PPM
9/14/2010 13:39	1.27 %	132.8 PPM	53.374 PPM	18.57 %	13.71 PPM	16.8368 PPM
9/14/2010 13:40	1.26 %	132.9 PPM	54.292 PPM	18.67 %	14.51 PPM	16.94048 PPM
9/14/2010 13:40	1.29 %	135.1 PPM	56.128 PPM	18.57 %	15.11 PPM	17.21736 PPM
9/14/2010 13:41	1.38 %	135.3 PPM	52.456 PPM	18.47 %	14.89 PPM	17.06022 PPM
9/14/2010 13:41	1.26 %	135.7 PPM	50.518 PPM	18.57 %	13.48 PPM	17.29769 PPM
9/14/2010 13:42	1.3 %	133.5 PPM	54.292 PPM	18.57 %	14.5 PPM	17.48304 PPM
9/14/2010 13:42	1.51 %	133.9 PPM	50.212 PPM	18.37 %	14.86 PPM	17.65881 PPM
9/14/2010 13:43	1.11 %	135.7 PPM	52.762 PPM	18.77 %	14.34 PPM	17.82689 PPM
9/14/2010 13:43	1.25 %	133.5 PPM	56.026 PPM	18.57 %	15.56 PPM	17.7552 PPM
9/14/2010 13:44	1.29 %	136.9 PPM	53.17 PPM	18.57 %	17.72 PPM	17.69823 PPM
9/14/2010 13:44	1.21 %	138.7 PPM	56.23 PPM	18.67 %	15.51 PPM	17.54447 PPM
9/14/2010 13:45	1.38 %	138.7 PPM	53.374 PPM	18.47 %	15.03 PPM	17.25543 PPM
9/14/2010 13:45	1.37 %	138.4 PPM	55.108 PPM	18.57 %	15.54 PPM	17.21939 PPM
9/14/2010 13:46	1.27 %	138.3 PPM	55.312 PPM	18.57 %	14.39 PPM	17.44821 PPM
9/14/2010 13:46	1.26 %	138.5 PPM	50.416 PPM	18.67 %	16 PPM	17.49627 PPM
9/14/2010 13:47	1.21 %	139 PPM	52.966 PPM	18.67 %	15.69 PPM	17.62088 PPM
9/14/2010 13:47	1.16 %	140.2 PPM	55.108 PPM	18.67 %	15.96 PPM	17.72469 PPM
9/14/2010 13:48	1.27 %	142.2 PPM	50.11 PPM	18.57 %	15.76 PPM	17.89317 PPM
9/14/2010 13:48	1.1 %	140.8 PPM	49.804 PPM	18.77 %	17.87 PPM	17.89128 PPM
9/14/2010 13:49	1.12 %	142.2 PPM	43.786 PPM	18.77 %	16.7 PPM	17.91221 PPM
9/14/2010 13:49	1.02 %	141.8 PPM	48.478 PPM	18.87 %	15.72 PPM	17.7332 PPM
9/14/2010 13:50	1.09 %	141 PPM	48.478 PPM	18.77 %	16.42 PPM	17.65503 PPM
9/14/2010 13:50	1.18 %	140.8 PPM	51.334 PPM	18.77 %	16.23 PPM	17.69513 PPM
9/14/2010 13:51	1.25 %	141 PPM	53.272 PPM	18.67 %	14.73 PPM	17.63289 PPM
9/14/2010 13:51	1.17 %	141.7 PPM	52.864 PPM	18.67 %	16 PPM	17.88021 PPM
9/14/2010 13:52	1.09 %	142 PPM	59.8 PPM	18.77 %	17.86 PPM	18.21096 PPM
9/14/2010 13:52	1.38 %	144.2 PPM	58.474 PPM	18.47 %	16.59 PPM	18.04613 PPM
9/14/2010 13:53	1.37 %	144 PPM	58.984 PPM	18.47 %	16.45 PPM	17.84579 PPM
9/14/2010 13:53	1.44 %	143.8 PPM	57.046 PPM	18.47 %	17.62 PPM	17.98281 PPM
9/14/2010 13:54	1.48 %	142.5 PPM	54.19 PPM	18.47 %	16.96 PPM	18.05868 PPM
9/14/2010 13:54	1.35 %	142.5 PPM	51.742 PPM	18.47 %	17.65 PPM	18.13928 PPM
9/14/2010 13:55	1.4 %	143.2 PPM	53.374 PPM	18.57 %	17.45 PPM	18.35474 PPM
9/14/2010 13:55	1.17 %	144.2 PPM	49.192 PPM	18.67 %	16.59 PPM	18.17532 PPM
9/14/2010 13:56	1.03 %	142.6 PPM	57.76 PPM	18.87 %	17.6 PPM	18.08082 PPM
9/14/2010 13:56	1.32 %	142.4 PPM	57.454 PPM	18.57 %	15.59 PPM	18.03654 PPM
9/14/2010 13:57	1.48 %	140.8 PPM	47.356 PPM	18.47 %	17.54 PPM	18.00995 PPM
9/14/2010 13:57	1.1 %	141 PPM	55.108 PPM	18.77 %	18.52 PPM	17.81069 PPM
9/14/2010 13:58	1.22 %	124.3 PPM	57.352 PPM	18.67 %	14.52 PPM	16.9587 PPM
Run 3	1.344 %	133.421 PPM	53.012 PPM	18.470 %	14.843 PPM	17.414 PPM
Averages	O2	CO	NOx	CO2	THC as CH4	SO2
FCCU - Wet Gas Scrubber Exhaust						

Plant: Hess Corp.
Unit: FCCU
Location: Outlet
Parameter Cyanide via CTM-033

Molar Mass (A)

26.02

Run	1	2	3
Impinger	1b, 2b	1-3	1-3
Date	9/14/10	9/14/10	9/14/10
Condition	Full	Full	Full
Stack Flowrate (DSCFM) (B)	135,403	128,346	134,180
Stack Moisture (%) (C)	18.93	19.02	18.74
Adjusted Total Meter Volume (CF)		38,492,019	38,657,736
Meter Volume (DSCF) (D)	20,004	40,432	37,983
Sampling Duration (min) (T)	19,461	37,487	
Sample Concentration (ug) (G)	36.00		
	14,500	25,000	27,000
Emissions:			
Pounds / hour (H) emissions RATE			
Pounds / hour total (N)	13.3168	11.2983	12.5905
Parts/million (dry) (J)	24.42	21.86	23.30
Parts/million (wet) (K)	19.80	17.70	18.93
Oxygen (%) (L)	1.3	2.4	1.8
Parts/million (dry) @15% O2 (M)	7.35	6.97	7.20
average ppm (dry)	21.95338417		

Equations:

(G) = value as reported by lab

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(M) = (J)(5.9/(20.9-L))

(N)=sum of G * T/60

Adjusted meter volume (CF) - recorded meter volume prorated to acct for CO2 absorbed

Dry std meter volume for partial run impingers -a, b - is calculated by applying ratio of the complete run adj meter vol: dscf (CF/D)

40.432/39.317

For all runs, Impingers 2 and 3 had non-detect (DL of 1,000 ug) - no breakthrough
1/2 DL (500 ug) has been used for calculations when results are < DL

Plant: Hess Corp.

Unit: FCCU

Location: Outlet

Parameter Cyanide via CTM-033

Molar Mass (A) 26.02

Run	4	4	4
Impinger	1a, 2a	1b, 2b	3
Date	9/21/10	9/21/10	9/21/10
Condition	Full	Full	Full
Stack Flowrate (DSCFM) (B)		125,799	
Stack Moisture (%) (C)		20.38	
Adjusted Total Meter Volume (CF)	27.934	11.927	39.678
Meter Volume (DSCF) (D)	28.166	12.026	40.007
Sampling Duration (min) (T)	51.00	21.00	72.00
Sample Concentration (ug) (G)	24,500	7,300	500.000

Emissions:

Pounds / hour (H) emissions RATE	14.4440	10.0795	0.2075
Pounds / hour total (N)		16.22	
Parts/million (dry) (J)	28.51	19.89	0.41
Parts/million (wet) (K)	22.70	15.84	0.33
Oxygen (%) (L)	1.4	1.4	1.4
Parts/million (dry) @15% O2 (M)	8.63	6.02	0.12

average ppm (dry) 32.17654033

Equations:

(G) = value as reported by lab

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(M) = (J)(5.9/(20.9-L))

(N)=sum of G * T/60

Adjusted meter volume (CF) - recorded meter volume prorated to acct for CO2 absorbed

Dry std meter volume for partial run impingers -a, b - is calculated by applying ratio of the complete run adj meter vol: dscf (CF/D)
39.862/40.193

All imp 2, 3, and 4 were < DL.
The 1/2 DL (5000 ug) has been used for calculations when results are < DL

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/14/10
Sampling Location:	Outlet
Run No.:	1
Run Times:	0920-1138
	FCCU
	CTM-033 cyanide

Input Data:	
Adjusted Total Metered Volume (Cubic Feet) [Vm]: **	40.451
Total Water Caught (grams) [Wc]:	189.4
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	29.9
Carbon Dioxide (%) [CO2]:	18.5
Oxygen (%) [O2]:	1.4
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72
Percent CO2 absorbed**	7.05

Actual meter volume is prorated to obtaine Adjusted metered volume

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	39.336
Water Volume (cubic feet @ stp) [Vws]:	8.934
Moisture (%) [Bws]:	18.51
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.016
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.61
Absolute Stack Pressure ("Hg) [Pa]:	29.96
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	67.21
Stack - @ stp [Vss]:	59.74
Nozzle - Actual [Vn]:	58.61
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	182146
@ stp [SCFM]:	161887
Dry @ stp [DSCFM]:	131924
Sample Isokinetics (%) [I]:	98.1

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.760	0.53	72	72	134	0.87178
2	1.000	0.70	72	72	134	1.00000
3	1.300	0.91	73	73	134	1.14018
4	1.400	0.98	73	73	134	1.18322
5	1.500	1.05	75	75	134	1.22474
6	1.500	1.05	75	75	135	1.22474
7	1.550	1.09	77	77	135	1.24499
8	1.500	1.05	78	78	135	1.22474
9	1.450	1.02	78	78	135	1.20416
10	1.450	1.02	79	79	135	1.20416
11	1.300	0.91	80	80	135	1.14018
12	0.940	0.66	80	80	135	0.96954
13	1.100	0.77	84	84	135	1.04881
14	1.400	0.98	85	85	135	1.18322
15	1.400	0.98	85	85	135	1.18322
16	1.450	1.02	86	86	135	1.20416
17	1.450	1.02	86	86	135	1.20416
18	1.500	1.05	86	86	135	1.22474
19	1.400	0.98	88	88	135	1.18322
20	1.400	0.98	88	88	136	1.18322
21	1.300	0.91	89	89	136	1.14018
22	1.200	0.84	90	90	136	1.09545
23	0.900	0.63	90	90	135	0.94868
24	0.540	0.38	90	90	135	0.73485
25						
Averages:		[H]	[Tm]		[Ts]	[dP]
		1.279	0.90		81.6	135
						1.12360

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)((17.647)/((H / 13.6)+(Pb)))/(Tm + 460)$	
$Vws = (Wc) / 21.2$	
$Bws = (100)(Vws)/(Vws + Vms)$	
$MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$	
$MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$	
$Pa = Pb + ((Ps) / 13.6)$	
$Vsa = (85.48)(Cp)(dP)((Ts+460)/((MWw)(Pa)))^{0.5}$	
$Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$	
$ACFM = (Vsa)(CSA)(60)$	
$SCFM = (Vss)(CSA)(60)$	
$DSCFM = (SCFM)(100 - (Bws) / 100)$	
$Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$	
$I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/14/10
Sampling Location:	Outlet
Run No.:	2
Run Times:	1256-1505
	FCCU
	CTM-033 cyanide

Input Data:	
Adjusted Total Metered Volume (Cubic Feet) [Vm]: **	38.492
Total Water Caught (grams) [Wc]:	180.2
Stack Static Pressure ("H2O) [Ps]:	0.95
Barometric Pressure ("Hg) [Pb]:	29.89
Carbon Dioxide (%) [CO2]:	18.6
Oxygen (%) [O2]:	1.4
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72
Percent CO2 absorbed**	6.1

Actual meter volume is prorated to obtaine Adjusted metered volume

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	37.487
Water Volume (cubic feet @ stp) [Vws]:	8.500
Moisture (%) [Bws]:	18.48
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.032
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.62
Absolute Stack Pressure ("Hg) [Pa]:	29.96
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	64.76
Stack - @ stp [Vss]:	57.54
Nozzle - Actual [Vn]:	55.84
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	175495
@ stp [SCFM]:	155930
Dry @ stp [DSCFM]:	127108
Sample Isokinetics (%) [I]:	97.0

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.100	0.77	78	78	135	1.04881
2	1.200	0.84	78	78	135	1.09545
3	1.300	0.91	79	79	135	1.14018
4	1.300	0.91	79	79	135	1.14018
5	1.400	0.98	79	79	135	1.18322
6	1.400	0.98	81	81	135	1.18322
7	1.350	0.95	82	82	136	1.16190
8	1.350	0.95	82	82	136	1.16190
9	1.200	0.84	83	83	135	1.09545
10	1.100	0.77	83	83	135	1.04881
11	0.910	0.64	83	83	135	0.95394
12	0.620	0.43	84	84	135	0.78740
13	0.760	0.53	82	82	135	0.87178
14	0.900	0.63	82	82	135	0.94868
15	1.200	0.84	82	82	135	1.09545
16	1.400	0.98	82	82	135	1.18322
17	1.400	0.98	81	81	135	1.18322
18	1.350	0.95	79	79	135	1.16190
19	1.400	0.98	79	79	135	1.18322
20	1.350	0.95	79	79	135	1.16190
21	1.300	0.91	79	79	135	1.14018
22	1.200	0.84	79	79	135	1.09545
23	1.100	0.77	79	79	134	1.04881
24	0.830	0.58	79	79	135	0.91104
25						
Averages:	1.184	0.83	80.5		135	1.08272
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:

$V_{ms} = (V_m)(Y)(17.647)/((H / 13.6)+(P_b))/(T_m + 460)$
 $V_{ws} = (W_c) / 21.2$
 $B_{ws} = (100)(V_{ws})/(V_{ws} + V_{ms})$
 $MW_d = ((0.44)(CO_2)) + ((0.32)(O_2)) + ((0.28)(100 - (CO_2 + O_2)))$
 $MW_w = (0.18)(B_{ws}) + ((100 - B_{ws})(MW_d) / 100)$
 $P_a = P_b + ((P_s) / 13.6)$
 $V_{sa} = (85.48)(C_p)(dP)/((T_s+460)/((MW_w)(P_a)))^{0.5}$
 $V_{ss} = (17.647)(V_{sa})(P_a)/((T_s) + 460)$
 $ACFM = (V_{sa})(CSA)(60)$
 $SCFM = (V_{ss})(CSA)(60)$
 $DSCFM = (SCFM)(100 - (B_{ws}) / 100)$
 $V_n = (V_{ms} + V_{ws})/(((D_n / 2)^2)(3.14 / 144)(min)(60))$
 $I = (V_n / V_{ss})(100)$

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/14/10
Sampling Location:	Outlet
Run No.:	3
Run Times:	1610-1810
	FCCU
	CTM-033 cyanide

Input Data:	
Adjusted Total Metered Volume (Cubic Feet) [Vm]: **	38.658
Total Water Caught (grams) [Wc]:	186
Stack Static Pressure ("H2O) [Ps]:	0.83
Barometric Pressure ("Hg) [Pb]:	29.89
Carbon Dioxide (%) [CO2]:	18.5
Oxygen (%) [O2]:	1.7
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72
Percent CO2 absorbed**	5.9

Actual meter volume is prorated to obtaine Adjusted metered volume

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	37.983
Water Volume (cubic feet @ stp) [Vws]:	8.774
Moisture (%) [Bws]:	18.76
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.028
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.58
Absolute Stack Pressure ("Hg) [Pa]:	29.95
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	66.01
Stack - @ stp [Vss]:	58.71
Nozzle - Actual [Vn]:	56.78
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	178879
@ stp [SCFM]:	159101
Dry @ stp [DSCFM]:	129247
Sample Isokinetics (%) [I]:	96.7

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.970	0.68	75	75	135	0.98489
2	0.770	0.54	75	75	135	0.87750
3	0.920	0.64	76	76	135	0.95917
4	1.200	0.84	76	76	135	1.09545
5	1.400	0.98	76	76	134	1.18322
6	1.500	1.05	76	76	134	1.22474
7	1.500	1.05	76	76	134	1.22474
8	1.400	0.98	77	77	134	1.18322
9	1.300	0.91	77	77	134	1.14018
10	1.300	0.91	77	77	134	1.14018
11	1.200	0.84	77	77	134	1.09545
12	0.870	0.61	77	77	134	0.93274
13	1.200	0.84	75	75	134	1.09545
14	1.400	0.98	75	75	134	1.18322
15	1.400	0.98	75	75	134	1.18322
16	1.400	0.98	76	76	134	1.18322
17	1.450	1.02	76	76	135	1.20416
18	1.500	1.05	75	75	135	1.22474
19	1.400	0.98	75	75	134	1.18322
20	1.400	0.98	75	75	134	1.18322
21	1.300	0.91	75	75	134	1.14018
22	1.300	0.91	76	76	134	1.14018
23	0.930	0.65	76	76	134	0.96437
24	0.570	0.40	76	76	134	0.75498
25						
		[H]	[Tm]		[Ts]	[dP]
Averages:	1.233	0.86	75.8		134	1.10340

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)((17.647)/((H / 13.6)+(Pb)))/(Tm + 460)$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$ $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/21/10
Sampling Location:	Outlet
Run No.:	4
Run Times:	0909-1128
	FCCU
	CTM-033 cyanide

Input Data:	
Adjusted Total Metered Volume (Cubic Feet) [Vm]: **	39.678
Total Water Caught (grams) [Wc]:	217.1
Stack Static Pressure ("H2O) [Ps]:	0.93
Barometric Pressure ("Hg) [Pb]:	30.24
Carbon Dioxide (%) [CO2]:	18.2
Oxygen (%) [O2]:	1.4
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72
Percent CO2 absorbed**	8

Actual meter volume is prorated to obtain Adjusted metered volume

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	40.007
Water Volume (cubic feet @ stp) [Vws]:	10.241
Moisture (%) [Bws]:	20.38
Dry Molecular Weight (lb/lb-mol) [MWd]:	30.968
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.33
Absolute Stack Pressure ("Hg) [Pa]:	30.31
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	64.77
Stack - @ stp [Vss]:	58.30
Nozzle - Actual [Vn]:	61.02
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	175534
@ stp [SCFM]:	157999
Dry @ stp [DSCFM]:	125799
Sample Isokinetics (%) [I]:	104.7

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.980	0.72	65	65	134	0.98995
2	1.250	0.84	65	65	135	1.11803
3	1.300	0.87	66	66	135	1.14018
4	1.300	0.87	67	67	135	1.14018
5	1.350	0.90	67	67	134	1.16190
6	1.350	0.90	69	69	135	1.16190
7	1.350	0.90	69	69	134	1.16190
8	1.350	0.90	70	70	135	1.16190
9	1.300	0.95	71	71	134	1.14018
10	1.100	0.74	71	71	134	1.04881
11	0.870	0.58	72	72	135	0.93274
12	0.510	0.34	72	72	133	0.71414
13	1.150	0.77	70	70	134	1.07238
14	1.350	0.90	70	70	133	1.16190
15	1.300	0.87	70	70	134	1.14018
16	1.350	0.90	70	70	134	1.16190
17	1.400	0.94	70	70	134	1.18322
18	1.400	0.94	65	65	134	1.18322
19	1.350	0.90	65	65	135	1.16190
20	1.300	0.87	66	66	135	1.14018
21	1.300	0.87	66	66	134	1.14018
22	1.200	0.80	66	66	134	1.09545
23	0.940	0.63	67	67	134	0.96954
24	0.550	0.37	67	67	133	0.74162
25						
Averages:	1.192	0.80	68.2		134	1.08431
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)((17.647)/((H / 13.6)+(Pb)))/(Tm + 460)$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$ $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

Plant: Hess Corp.
Unit: FCCU
Location: Outlet
Parameter Cyanide via CARB 426

Molar Mass (A) 26.02

Run Date Condition	1 9/14/10 Full	2 9/14/10 Full	3 9/14/10 Full
Stack Flowrate (DSCFM) (B)	134,870	127,717	133,638
Stack Moisture (%) (C)	18.99	19.08	18.80
Meter Volume (DSCF) (D)	39.750	37.396	38.904
Sample Concentration (ug) (G)	2,057	1,660	1,797
<u>Emissions:</u>			
Pounds / hour (H)	0.9213	0.7481	0.8148
Parts/million (dry) (J)	1.70	1.45	1.51
Parts/million (wet) (K)	1.37	1.18	1.23
Oxygen (%) (L)	1.4	1.4	1.7
Parts/million (dry) @15% O2 (M)	0.51	0.44	0.47

Equations:

(G) = value as reported by lab

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(M) = (J)(5.9/(20.9-L))

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/14/10
Sampling Location:	Outlet
Run No.:	1
Run Times:	0921-1139
	FCCU
	CARB 426 cyanide

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	40.845
Total Water Caught (grams) [Wc]:	197.5
Stack Static Pressure ("H2O) [Ps]:	0.86
Barometric Pressure ("Hg) [Pb]:	29.9
Carbon Dioxide (%) [CO2]:	18.5
Oxygen (%) [O2]:	1.4
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Port Ext 5.5"

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	39.750
Water Volume (cubic feet @ stp) [Vws]:	9.316
Moisture (%) [Bws]:	18.99
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.016
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.54
Absolute Stack Pressure ("Hg) [Pa]:	29.96
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	69.25
Stack - @ stp [Vss]:	61.43
Nozzle - Actual [Vn]:	59.58
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	187676
@ stp [SCFM]:	166479
Dry @ stp [DSCFM]:	134870
Sample Isokinetics (%) [I]:	97.0

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.300	1.04	74	74	136	1.14018
2	1.500	1.20	75	75	136	1.22474
3	1.500	1.20	75	75	136	1.22474
4	1.550	1.24	76	76	136	1.24499
5	1.550	1.24	77	77	136	1.24499
6	1.600	1.28	78	78	136	1.26491
7	1.550	1.24	80	80	136	1.24499
8	1.500	1.20	81	81	136	1.22474
9	1.500	1.20	82	82	136	1.22474
10	1.300	1.04	83	83	135	1.14018
11	1.050	0.84	83	83	135	1.02470
12	0.550	0.44	83	83	137	0.74162
13	0.780	0.62	86	86	136	0.88318
14	0.990	0.79	87	87	136	0.99499
15	1.400	1.12	87	87	136	1.18322
16	1.500	1.20	88	88	136	1.22474
17	1.500	1.20	89	89	136	1.22474
18	1.500	1.20	89	89	137	1.22474
19	1.500	1.20	89	89	137	1.22474
20	1.500	1.20	88	88	137	1.22474
21	1.450	1.16	89	89	136	1.20416
22	1.450	1.16	89	89	136	1.20416
23	1.300	1.04	89	89	136	1.14018
24	1.100	0.88	90	90	136	1.04881
25						
Averages:	1.351	1.08	83.6		136	1.15533

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)((17.647)/((H / 13.6) + (Pb)) / (Tm + 460))$	
$Vws = (Wc) / 21.2$	
$Bws = (100)(Vws) / (Vws + Vms)$	
$MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$	
$MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$	
$Pa = Pb + ((Ps) / 13.6)$	
$Vsa = (85.48)(Cp)(dP)((Ts + 460) / ((MWw)(Pa)))^{0.5}$	
$Vss = (17.647)(Vsa)(Pa) / ((Ts) + 460)$	
$ACFM = (Vsa)(CSA)(60)$	
$SCFM = (Vss)(CSA)(60)$	
$DSCFM = (SCFM)(100 - (Bws) / 100)$	
$Vn = (Vms + Vws) / (((Dn / 2)^2)(3.14 / 144)(min)(60))$	
$I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ	FCCU CARB 426 cyanide
Date:	9/14/10	
Sampling Location:	Outlet	
Run No.:	2	
Run Times:	1258-1506	

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	38.685
Total Water Caught (grams) [Wc]:	186.9
Stack Static Pressure ("H2O) [Ps]:	0.86
Barometric Pressure ("Hg) [Pb]:	29.89
Carbon Dioxide (%) [CO2]:	18.6
Oxygen (%) [O2]:	1.4
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Output Data:	
Metered Volume (dry cubic feet @stp) [Vms]:	37.396
Water Volume (cubic feet @ stp) [Vws]:	8.816
Moisture (%) [Bws]:	19.08
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.032
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.55
Absolute Stack Pressure ("Hg) [Pa]:	29.95
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	65.67
Stack - @ stp [Vss]:	58.24
Nozzle - Actual [Vn]:	56.11
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	177955
@ stp [SCFM]:	157826
Dry @ stp [DSCFM]:	127717
Sample Isokinetics (%) [I]:	96.4

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.680	0.54	77	77	136	0.82462
2	0.970	0.78	79	79	136	0.98489
3	1.300	1.04	82	82	136	1.14018
4	1.300	1.04	85	85	136	1.14018
5	1.400	1.12	84	84	136	1.18322
6	1.400	1.12	87	87	137	1.18322
7	1.400	1.12	86	86	137	1.18322
8	1.350	1.08	87	87	136	1.16190
9	1.300	1.04	87	87	136	1.14018
10	1.200	0.96	88	88	136	1.09545
11	1.100	0.88	88	88	136	1.04881
12	0.860	0.69	89	89	135	0.92736
13	1.200	0.96	89	89	136	1.09545
14	1.300	1.04	89	89	136	1.14018
15	1.400	1.12	90	90	136	1.18322
16	1.400	1.12	90	90	136	1.18322
17	1.400	1.12	90	90	136	1.18322
18	1.400	1.12	88	88	136	1.18322
19	1.400	1.12	88	88	136	1.18322
20	1.400	1.12	88	88	136	1.18322
21	1.300	1.04	89	89	136	1.14018
22	1.200	0.96	89	89	136	1.09545
23	0.930	0.74	89	89	136	0.96437
24	0.550	0.44	89	89	135	0.74162
25						
Averages:	1.214	0.97	87.0		136	1.09540
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:

$Vms = (Vm)(Y)((17.647)((H / 13.6)+(Pb)))/(Tm + 460)$
 $Vws = (Wc) / 21.2$
 $Bws = (100)(Vws)/(Vws + Vms)$
 $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$
 $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$
 $Pa = Pb + ((Ps) / 13.6)$
 $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$
 $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$
 $ACFM = (Vsa)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = (SCFM)(100 - (Bws) / 100)$
 $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$
 $I = (Vn / Vss)(100)$

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date: 9/14/10	FCCU
Sampling Location: Outlet	CARB 426
Run No.: 3	cyanide
Run Times: 1612-1818	

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	40.145
Total Water Caught (grams) [Wc]:	190.9
Stack Static Pressure ("H2O) [Ps]:	0.82
Barometric Pressure ("Hg) [Pb]:	29.89
Carbon Dioxide (%) [CO2]:	18.5
Oxygen (%) [O2]:	1.7
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	38.904
Water Volume (cubic feet @ stp) [Vws]:	9.005
Moisture (%) [Bws]:	18.80
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.028
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.58
Absolute Stack Pressure ("Hg) [Pa]:	29.95
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	68.41
Stack - @ stp [Vss]:	60.73
Nozzle - Actual [Vn]:	58.18
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	185395
@ stp [SCFM]:	164569
Dry @ stp [DSCFM]:	133638
Sample Isokinetics (%) [I]:	95.8

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.300	1.04	83	83	135	1.14018
2	1.500	1.20	84	84	135	1.22474
3	1.600	1.28	84	84	135	1.26491
4	1.500	1.20	85	85	135	1.22474
5	1.500	1.20	86	86	135	1.22474
6	1.500	1.20	86	86	135	1.22474
7	1.500	1.20	87	87	135	1.22474
8	1.400	1.12	87	87	135	1.18322
9	1.400	1.12	88	88	135	1.18322
10	1.200	0.96	88	88	135	1.09545
11	0.940	0.75	89	89	135	0.96954
12	0.550	0.44	89	89	135	0.74162
13	1.400	1.12	88	88	136	1.18322
14	1.500	1.20	86	86	136	1.22474
15	1.500	1.20	85	85	136	1.22474
16	1.500	1.20	85	85	136	1.22474
17	1.500	1.20	85	85	136	1.22474
18	1.500	1.20	85	85	136	1.22474
19	1.500	1.20	85	85	136	1.22474
20	1.400	1.12	85	85	136	1.18322
21	1.200	0.96	85	85	136	1.09545
22	1.100	0.88	84	84	136	1.04881
23	0.980	0.78	84	84	135	0.98995
24	0.750	0.60	84	84	135	0.86603
25						
Averages:	1.322	1.06	85.7		135	1.14237
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:

$Vms = (Vm)(Y)((17.647)/((H / 13.6) + (Pb)))/(Tm + 460)$
 $Vws = (Wc) / 21.2$
 $Bws = (100)(Vws)/(Vws + Vms)$
 $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$
 $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$
 $Pa = Pb + ((Ps) / 13.6)$
 $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$
 $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$
 $ACFM = (Vsa)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = (SCFM)(100 - (Bws) / 100)$
 $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$
 $I = (Vn / Vss)(100)$

Project Name:

Hess Corporation
Perth Amboy, NJ

Source: FCCU

Condition: normal product

Test Date: 9/14 & 21 /10 Cyanide trains via CTM-033 & CARB 426

GAS TESTED	SAMPLE RUN ID	CONCENTRATIONS (% O ₂ & CO ₂ ; PPM ALL OTHERS)							
		CERTIFIED STANDARD	PRE-TEST RESPONSE	POST-TEST RESPONSE	PRE-TEST ZERO	POST-TEST ZERO	RAW AVERAGE	BIAS CORRECTED AVERAGE	DELTA % CO2
		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(L)
O2 stack	1	2.5	2.4	2.4	0.1	0.1	1.39	1.397	N/A
O2 train	1	2.5	2.4	2.4	0.0	0.1	1.54	1.564	N/A
O2 stack	2	2.5	2.4	2.4	0.1	0.1	1.41	1.416	N/A
O2 train	2	2.5	2.4	2.4	0.1	0.1	1.50	1.503	N/A
O2 stack	3	2.5	2.4	2.4	0.1	0.0	1.65	1.690	N/A
O2 train	3	2.5	2.4	2.4	0.1	0.0	1.60	1.645	N/A
O2 stack	4	2.5	2.4	2.4	0.0	0.0	1.39	1.440	N/A
O2 train	4	2.5	2.4	2.4	0.1	0.0	1.49	1.520	N/A
CO2 stack	1	22.1	21.9	21.9	0.2	0.3	18.34	18.468	7.066
CO2 train	1	22.1	22.0	22.0	0.0	0.1	11.37	11.401	N/A
CO2 stack	2	22.1	21.9	21.9	0.3	0.3	18.48	18.606	6.116
CO2 train	2	22.1	22.0	22.1	0.1	0.1	12.51	12.490	N/A
CO2 stack	3	22.1	21.9	22.0	0.3	0.3	18.41	18.486	5.877
CO2 train	3	22.1	22.1	22.1	0.1	0.1	12.65	12.609	N/A
CO2 stack	4	22.1	22.0	22.0	0.0	0.1	18.09	18.166	7.945
CO2 train	4	22.1	22.0	22.0	0.0	0.1	10.20	10.221	N/A

The Following Calculations are Used In This Spreadsheet:

$$G = (F - ((D+E)/2)) \times (A/((B+C)/2) - ((D+E)/2))$$

$$H = (13.9/(20.9-G_{O_2})) \times G$$

$$J = I \times 0.15505 \times 10^{-6} \times G \times MW_{GAS}$$

$$K = (20.9/(20.9-G_{O_2})) \times G \times A_{CO \text{ or } NO_x} \times B_{fuel}$$

$$\text{Where -- } A_{CO} = 7.2678E-08 \quad \text{And ...}$$

$$A_{NO_x} = 1.1940E-07$$

$$A_{THC} = 4.1530E-08$$

$$L = (100/(100-M)) \times G_{THC}$$

CTM-033 Stack and TRAIN O2 CO2
RUN 1

Date/Time	Messages O2	CO2	O2 train	CO2 train	(ANIN8);Group 1;Instrument TCPIP 1;%
9/14/2010 9:20		1.38	18.1	20.7815	0.1028
9/14/2010 9:20		1.41	18	20.7846	0.1004
9/14/2010 9:21		1.4	18	20.7895	0.0983
9/14/2010 9:21		1.25	18.2	20.7925	0.0966
9/14/2010 9:22		1.17	18.3	20.7943	1.5891
9/14/2010 9:22		1.13	18.3	19.8151	0.536
9/14/2010 9:23		1.24	18.2	19.1797	3.7054
9/14/2010 9:23		1.17	18.3	13.4524	7.4299
9/14/2010 9:24		1.3	18.2	6.7285	9.3126
9/14/2010 9:24		1.26	18.2	3.3843	10.2862
9/14/2010 9:25		1.21	18.3	2.1142	10.6408
9/14/2010 9:25		1.29	18.2	1.7065	10.821
9/14/2010 9:26		1.2	18.3	1.5868	10.9758
9/14/2010 9:26		1.08	18.4	1.4752	11.084
9/14/2010 9:27		1.2	18.3	1.4752	11.2219
9/14/2010 9:27		1.39	18.1	1.4307	11.3282
9/14/2010 9:28		1.12	18.4	1.3497	11.2957
9/14/2010 9:28		0.91	18.6	1.3423	11.1947
9/14/2010 9:29		1.23	18.3	1.444	11.3485
9/14/2010 9:29		1.05	18.4	1.3774	11.4832
9/14/2010 9:30		1.3	18.3	1.2333	11.3479
9/14/2010 9:30		1.65	17.9	1.3034	11.3571
9/14/2010 9:31		1.5	18	1.2866	11.1774
9/14/2010 9:31		1.42	18.1	1.4013	10.9487
9/14/2010 9:32		1.72	17.9	1.6494	10.9479
9/14/2010 9:32		1.82	17.8	1.6899	10.9793
9/14/2010 9:33		1.48	18	1.6703	10.7999
9/14/2010 9:33		1.32	18.3	1.8085	10.6835
9/14/2010 9:34		1.55	18	1.9055	10.799
9/14/2010 9:34		1.58	18	1.7249	10.8264
9/14/2010 9:35		1.59	17.9	1.5831	10.7659
9/14/2010 9:35		1.46	18.1	1.6794	10.7177
9/14/2010 9:36		1.41	18.2	1.7591	10.676
9/14/2010 9:36		1.35	18.2	1.7626	10.7143
9/14/2010 9:37		1.32	18.2	1.6463	10.7391
9/14/2010 9:37		1.2	18.3	1.5918	10.6746
9/14/2010 9:38		1.44	18.2	1.5691	10.7447
9/14/2010 9:38		1.37	18.2	1.5014	10.8041
9/14/2010 9:39		1.36	18.2	1.4098	10.7925
9/14/2010 9:39		1.43	18.2	1.5081	10.8002
9/14/2010 9:40		1.34	18.2	1.5376	10.8247
9/14/2010 9:40		1.34	18.2	1.5265	10.8264
9/14/2010 9:41		1.26	18.3	1.5535	10.8341
9/14/2010 9:41		1.45	18.1	1.5354	10.9666
9/14/2010 9:42		1.13	18.4	1.5001	10.9443
9/14/2010 9:42		1.1	18.5	1.4366	10.8617
9/14/2010 9:43		1.3	18.3	1.505	11.0099
9/14/2010 9:43		1.44	18.2	1.368	11.0495
9/14/2010 9:44		1.54	18.1	1.2995	11.0177
9/14/2010 9:44		1.87	17.8	1.3962	10.9053
9/14/2010 9:45		1.89	17.7	1.5206	10.8318

CTM-033 Stack and TRAIN O2 CO2
RUN 1

9/14/2010 9:45	1.59	18	1.6638	10.6906
9/14/2010 9:46	1.8	17.8	1.9017	10.6759
9/14/2010 9:46	1.62	18	1.9744	10.7586
9/14/2010 9:47	1.55	18	1.8748	10.7501
9/14/2010 9:47	1.29	18.3	1.9056	10.7885
9/14/2010 9:48	1.45	18.2	1.872	10.8955
9/14/2010 9:48	1.46	18.1	1.74	10.9606
9/14/2010 9:49	1.52	18.1	1.5535	10.8785
9/14/2010 9:49	1.59	18	1.5658	10.9333
9/14/2010 9:50	1.35	18.2	1.598	10.9253
9/14/2010 9:50	1.48	18.1	1.6473	10.893
9/14/2010 9:51	1.5	18.1	1.6815	11.0667
9/14/2010 9:51	1.33	18.2	1.5838	10.9823
9/14/2010 9:52	1.13	18.4	1.591	10.9726
9/14/2010 9:52	1.3	18.3	1.6182	11.0948
9/14/2010 9:53	1.45	18.2	1.5091	11.2335
9/14/2010 9:53	1.33	18.2	1.3547	11.1721
9/14/2010 9:54	1.27	18.3	1.371	11.1237
9/14/2010 9:54	1.24	18.4	1.5002	11.2796
9/14/2010 9:55	1.33	18.3	1.4965	11.3523
9/14/2010 9:55	1.57	18.1	1.4172	11.3831
9/14/2010 9:56	1.4	18.2	1.3772	11.2651
9/14/2010 9:56	1.28	18.3	1.3877	11.1781
9/14/2010 9:57	1.21	18.3	1.4975	11.126

Port A points 1-12

1.411167	18.16167	1.558157	10.97331
o2 stk	CO2 stk	O2 train	co2 train

9/14/2010 9:57	1.09	18.4	1.5404	11.1898
9/14/2010 9:58	1.13	18.5	1.4467	4.826
9/14/2010 9:58	1.25	18.3	6.6867	0.3499
9/14/2010 9:59	1.12	18.5	17.7304	0.267
9/14/2010 9:59	1.12	18.4	20.0862	0.235
9/14/2010 10:00	1.2	18.4	20.4976	0.2155
9/14/2010 10:00	1.02	18.5	20.5842	0.1969
9/14/2010 10:01	1.08	18.6	20.6214	0.1808
9/14/2010 10:01	1.03	18.6	20.6461	0.1707

pH checks

9/14/2010 10:25	1.6	18.3	20.7617	0.0973
9/14/2010 10:26	1.38	18.4	20.7893	0.0965
9/14/2010 10:26	1.52	18.4	20.7952	0.0935
9/14/2010 10:27	1.44	18.4	20.7985	0.0921
9/14/2010 10:27	1.38	18.5	20.7998	0.0903
9/14/2010 10:28	1.36	18.5	20.8025	0.088
9/14/2010 10:28	1.53	18.4	20.805	0.0885
9/14/2010 10:29	5.01	16.9	20.8052	0.0885
9/14/2010 10:29	2.6	21.4	20.8052	0.0884
9/14/2010 10:30	2.47	21.8	20.8029	5.0582

CTM-033 Stack and TRAIN O2 CO2
RUN 1

9/14/2010 10:30	2.46	21.8	16.7464	3.6186
9/14/2010 10:31	2.45	21.8	14.3807	7.731
9/14/2010 10:31	2.46	21.8	8.9664	10.4003
9/14/2010 10:32	2.45	21.9	4.297	11.3544
9/14/2010 10:32	2.45	21.9	2.5456	11.8568
9/14/2010 10:33	2.44	21.9	2.0104	11.9287
9/14/2010 10:33	0.8	7.4	1.9153	12.0553
9/14/2010 10:34	0.12	0.8	1.839	12.2596
9/14/2010 10:34	0.08	0.3	1.7352	12.346
9/14/2010 10:35	0.08	0.3	1.6968	12.2323
9/14/2010 10:35	0.08	0.3	1.8273	12.3066
9/14/2010 10:36	0.08	0.2	1.7403	12.3591
9/14/2010 10:36	0.11	0.3	1.6252	12.3495
9/14/2010 10:37	0.08	0.2	1.6163	12.2698
9/14/2010 10:37	0.08	0.2	1.6105	12.2382
9/14/2010 10:38	0.08	0.2	1.5746	12.2583
9/14/2010 10:38	0.08	0.2	1.4473	12.1764
9/14/2010 10:39	0.08	0.2	1.4326	12.1565
9/14/2010 10:39	0.08	0.2	1.4036	12.1298
9/14/2010 10:40	0.13	0.3	1.3494	12.2235
9/14/2010 10:40	0.08	0.2	1.2466	12.1417
9/14/2010 10:41	0.08	0.1	1.2706	12.164
9/14/2010 10:41	0.08	0.1	1.2814	12.105
9/14/2010 10:42	0.07	0.1	1.2833	12.0799
9/14/2010 10:42	0.07	0.1	1.291	12.0179
9/14/2010 10:43	0.07	0.1	1.3115	11.9295
9/14/2010 10:43	0.07	0.1	1.414	12.0616
9/14/2010 10:44	0.07	0.1	1.3637	12.0737

Port B, Points 1-5

0.115909 0.545455 1.512523 12.17883
o2 stk CO2 stk O2 train co2 train
drift checks being done for stack

9/14/2010 10:44	0.08	0.1	1.3203	11.9044
9/14/2010 10:45	0.8	7.7	1.4995	4.6233
9/14/2010 10:45	3.8	10.5	6.9394	0.3588
9/14/2010 10:46	19.45	1	17.8121	0.2667
9/14/2010 10:46	20.4	0.2	20.0963	0.2277
9/14/2010 10:47	20.44	0.2	20.5094	0.2021
9/14/2010 10:47	20.46	0.1	20.6009	0.1855
9/14/2010 10:48	19.06	1.1	20.6345	7.5458
9/14/2010 10:48	5.52	13.8	15.1873	0.9628
9/14/2010 10:49	1.75	18	16.216	1.5278
9/14/2010 10:49	1.4	18.5	17.6347	0.1881
9/14/2010 10:50	1.59	18.3	19.9934	0.162
9/14/2010 10:50	1.39	18.5	20.5633	0.1518
9/14/2010 10:51	1.59	18.4	20.6731	0.1441
9/14/2010 10:51	1.46	18.4	20.7002	0.1396
9/14/2010 10:52	1.26	18.6	20.7118	0.1334
9/14/2010 10:52	1.36	18.6	20.7219	0.1281

pH checks

CTM-033 Stack and TRAIN O2 CO2
RUN 1

9/14/2010 11:18	1.99	18.3	20.7859	0.0924
9/14/2010 11:19	1.8	18.4	20.7895	3.8449
9/14/2010 11:19	1.69	18.5	17.4141	4.2477
9/14/2010 11:20	1.73	18.5	12.5902	8.5698
9/14/2010 11:20	1.84	18.4	7.4885	10.6457
9/14/2010 11:21	1.58	18.6	3.8162	11.3598
9/14/2010 11:21	1.57	18.6	2.5473	11.6391
9/14/2010 11:22	1.44	18.6	2.2277	11.8192
9/14/2010 11:22	1.37	18.6	2.0002	11.9446
9/14/2010 11:23	1.31	18.7	1.8633	11.9405
9/14/2010 11:23	1.41	18.6	1.7433	11.9654
9/14/2010 11:24	1.29	18.7	1.6207	11.947
9/14/2010 11:24	1.15	18.9	1.5356	11.8624
9/14/2010 11:25	1.39	18.7	1.5724	11.8946
9/14/2010 11:25	1.33	18.6	1.5187	11.9486
9/14/2010 11:26	1.09	18.9	1.391	11.845
9/14/2010 11:26	1.39	18.7	1.4655	11.8515
9/14/2010 11:27	1.41	18.7	1.4662	11.9393
9/14/2010 11:27	1.39	18.6	1.3309	11.8007
9/14/2010 11:28	1.36	18.7	1.4029	11.772
9/14/2010 11:28	1.67	18.4	1.5056	11.6915
9/14/2010 11:29	1.71	18.3	1.5335	11.5744
9/14/2010 11:29	1.63	18.4	1.5082	11.4172
9/14/2010 11:30	1.25	18.8	1.693	11.336
9/14/2010 11:30	1.68	18.4	1.8214	11.3311
9/14/2010 11:31	1.6	18.4	1.7966	11.5024
9/14/2010 11:31	1.43	18.5	1.581	11.3311
9/14/2010 11:32	1.38	18.7	1.6885	11.2952
9/14/2010 11:32	1.32	18.7	1.7469	11.3502
9/14/2010 11:33	1.19	18.8	1.6125	11.3737
9/14/2010 11:33	1.29	18.7	1.5278	11.3988
9/14/2010 11:34	1.17	18.8	1.4735	11.4968
9/14/2010 11:34	1.29	18.7	1.3817	11.4876
9/14/2010 11:35	1.12	18.9	1.3516	11.5168
9/14/2010 11:35	1.14	18.8	1.3028	11.3528
9/14/2010 11:36	1.2	18.8	1.2936	11.3139
9/14/2010 11:36	1.44	18.6	1.2701	11.283
9/14/2010 11:37	1.07	18.9	1.2408	11.2809
9/14/2010 11:37	1.2	18.9	1.2577	11.2293
9/14/2010 11:38	1.47	18.6	1.3753	11.2853
9/14/2010 11:38	1.49	18.6	1.3001	11.129
Port B, Points 6-12				
	1.352424	18.6697	1.520391	11.56632
	o2 stk	CO2 stk	O2 train	co2 train

9/14/2010 11:39	1.4	18.6	1.2181	10.8601
9/14/2010 11:39	1.56	18.5	1.3074	10.7382
9/14/2010 11:40	1.25	18.8	1.4508	10.7142
9/14/2010 11:40	1.34	18.7	1.5159	10.7603
9/14/2010 11:41	1.39	18.7	1.5158	0.6965

overall averages for Run 1 CTM-033

1.390323 18.34194 1.544756 11.18373 train avgs excludes Port B pts 1-5
1.53859 11.3741 train includes Port B pts 1-5

7.158205 CO2 dif
6.967839

For run 1, using delta of 7.05 % CO2 for CTM033 calcs

CTM033 Stack and Train O2 CO2

R3

Date/Time	Messages	O2	CO2	O2 train	CO2 train
9/14/2010 16:10			19.68	1	20.8058
9/14/2010 16:10			19.72	0.8	20.8059
9/14/2010 16:11			19.77	0.5	20.8059
9/14/2010 16:11			1.45	17.5	20.8079
9/14/2010 16:12			1.42	18.7	20.808
9/14/2010 16:12			1.66	18.4	20.6338
9/14/2010 16:13			1.66	18.4	19.289
9/14/2010 16:13			1.8	18.3	12.4238
9/14/2010 16:14			1.82	18.3	5.8944
9/14/2010 16:14			1.62	18.3	3.1368
9/14/2010 16:15			1.66	18.3	2.1767
9/14/2010 16:15			1.79	18.4	1.8612
9/14/2010 16:16			1.66	18.4	1.72
9/14/2010 16:16			1.81	18.3	1.6471
9/14/2010 16:17			1.7	18.3	1.6206
9/14/2010 16:17			1.77	18.3	1.6177
9/14/2010 16:18			1.75	18.2	1.6115
9/14/2010 16:18			1.84	18.2	1.6526
9/14/2010 16:19			1.78	18.1	1.6356
9/14/2010 16:19			1.66	18.2	1.654
9/14/2010 16:20			1.75	18.2	1.7523
9/14/2010 16:20			1.77	18.2	1.8162
9/14/2010 16:21			1.81	18.2	1.7617
9/14/2010 16:21			1.69	18.3	1.7273
9/14/2010 16:22			1.74	18.4	1.7015
9/14/2010 16:22			1.78	18.2	1.6995
9/14/2010 16:23			1.54	18.4	1.6669
9/14/2010 16:23			1.77	18.4	1.693
9/14/2010 16:24			1.88	18.2	1.7008
9/14/2010 16:24			1.54	18.3	1.5885
9/14/2010 16:25			1.71	18.4	1.6249
9/14/2010 16:25			1.67	18.4	1.6826
9/14/2010 16:26			1.71	18.2	1.5835
avgs			1.73	18.27619	1.674181

Port A, Points 1-5

9/14/2010 16:26	1.66	18.4	1.5689	12.4837
9/14/2010 16:27	1.77	18.3	1.6774	11.3551
9/14/2010 16:27	1.65	18.3	3.5437	0.4284
9/14/2010 16:28	1.69	18.4	16.2825	0.2924

pH check

CTM033 Stack and Train O2 CO2

R3

9/14/2010 16:38	1.81	18.2	20.7464	0.119
9/14/2010 16:38	1.91	18.2	20.7504	0.1165
9/14/2010 16:39	1.99	18.1	20.755	0.1139
9/14/2010 16:39	1.85	18.1	20.7577	0.112
9/14/2010 16:40	1.88	18.2	20.7612	0.1098
9/14/2010 16:40	1.96	18.2	20.6114	6.6612
9/14/2010 16:41	1.86	18.1	12.5797	8.5387
9/14/2010 16:41	1.77	18.1	9.1655	12.0259
9/14/2010 16:42	1.84	18.1	4.4677	12.9754
9/14/2010 16:42	1.88	18	2.5492	13.1789
9/14/2010 16:43	1.69	18	2.0523	13.2476
9/14/2010 16:43	1.77	18	1.9266	13.2179
9/14/2010 16:44	1.81	17.9	1.9062	13.1797
9/14/2010 16:44	1.91	17.9	1.9334	13.174
9/14/2010 16:45	1.73	18.1	1.9079	13.3008
9/14/2010 16:45	1.59	18	1.7302	13.2282
9/14/2010 16:46	1.64	18	1.7073	13.1775
9/14/2010 16:46	1.41	18.1	1.732	13.2175
9/14/2010 16:47	1.35	18.4	1.627	13.1393
9/14/2010 16:47	1.46	18.7	1.6029	13.0081
9/14/2010 16:48	1.47	18.6	1.721	12.9768
9/14/2010 16:48	1.56	18.5	1.7498	13.0615
9/14/2010 16:49	1.49	18.5	1.6001	13.0779
9/14/2010 16:49	1.79	18.5	1.5029	12.9946
9/14/2010 16:50	1.7	18.3	1.467	12.9836
9/14/2010 16:50	1.77	18.4	1.4388	12.7928
9/14/2010 16:51	1.69	18.4	1.5544	12.7152
9/14/2010 16:51	1.77	18.3	1.5896	12.7225
9/14/2010 16:52	1.87	18.2	1.5612	12.6827
9/14/2010 16:52	1.83	18.3	1.5406	12.6067
9/14/2010 16:53	1.78	18.2	1.6096	12.6182
9/14/2010 16:53	1.76	18.2	1.6212	12.4561
9/14/2010 16:54	1.8	18.2	1.709	12.5129
9/14/2010 16:54	1.66	18.4	1.7039	12.5288
9/14/2010 16:55	1.7	18.5	1.6632	12.4454
9/14/2010 16:55	1.54	18.5	1.6592	12.4904
9/14/2010 16:56	1.56	18.5	1.6101	12.4789
9/14/2010 16:56	1.51	18.5	1.6172	12.3799
9/14/2010 16:57	1.63	18.5	1.6388	12.368
9/14/2010 16:57	1.53	18.6	1.5932	12.3329
9/14/2010 16:58	1.73	18.4	1.5638	12.3115
9/14/2010 16:58	1.65	18.4	1.5548	12.3104
9/14/2010 16:59	1.63	18.4	1.5631	12.2844
9/14/2010 16:59	1.78	18.5	1.5815	12.0803
avgs	1.663529	18.32059	1.662935	12.76774

Port A, Points 6-12

9/14/2010 17:00	1.78	18.3	1.6406	11.9252
9/14/2010 17:00	1.56	18.4	1.6634	11.9039
9/14/2010 17:01	1.71	18.2	1.6348	11.877
9/14/2010 17:01	1.54	18.5	2.0777	0.4905
9/14/2010 17:02	1.6	18.6	15.0154	0.3141

CTm-033 Stack and Train O2 CO2
RUN 2

Date/Time	Messages O2	CO2	O2 train	CO2 train	(ANIN8);Group 1;Instrument
9/14/2010 12:56		4.9	15.3	20.818	0.084
9/14/2010 12:56		4.4	15.7	20.8155	0.0831
9/14/2010 12:57		4.16	16.0	20.816	0.083
9/14/2010 12:57		3.35	16.6	20.8167	0.0826
9/14/2010 12:58		15.04	5.7	20.8154	0.3121
9/14/2010 12:58		1.41	18.4	20.1766	1.4461
9/14/2010 12:59		1.45	18.3	17.2132	5.0064
9/14/2010 12:59		1.38	18.4	12.1055	8.3502
9/14/2010 13:00		1.34	18.4	5.9378	9.7185
9/14/2010 13:00		1.37	18.5	3.1081	10.1658
9/14/2010 13:01		1.49	18.4	2.1828	10.3464
9/14/2010 13:01		1.47	18.3	1.8831	10.4185
9/14/2010 13:02		1.51	18.2	1.7299	10.5491
9/14/2010 13:02		1.28	18.2	1.5376	10.6283
9/14/2010 13:03		1.52	18.3	1.4092	10.6
9/14/2010 13:03		1.4	18.3	1.4146	10.591
9/14/2010 13:04		1.33	18.4	1.3613	10.4597
9/14/2010 13:04		1.58	18.2	1.403	10.3852
9/14/2010 13:05		1.64	18.1	1.4217	10.326
9/14/2010 13:05		1.69	18.1	1.3798	10.2847
9/14/2010 13:06		1.56	18.2	1.4601	10.2428
9/14/2010 13:06		1.56	18.2	1.5689	10.2091
9/14/2010 13:07		1.75	18.1	1.6242	10.2409
9/14/2010 13:07		1.56	18.2	1.5644	10.2052
9/14/2010 13:08		1.56	18.2	1.5218	10.1364
9/14/2010 13:08		1.5	18.2	1.5681	10.1577
9/14/2010 13:09		1.5	18.3	1.5971	10.1635
9/14/2010 13:09		1.54	18.2	1.5653	10.1273
9/14/2010 13:10		1.38	18.4	1.5351	10.1489
9/14/2010 13:10		1.41	18.4	1.4988	10.0868
9/14/2010 13:11		1.16	18.6	1.5739	10.0422
9/14/2010 13:11		1.16	18.6	1.5645	10.1051
9/14/2010 13:12		1.55	18.3	1.5148	10.2906
9/14/2010 13:12		1.37	18.4	1.3587	10.3019
Port B, Points 1-5					
	1.477727	18.24727	1.507855	10.28556	
	O2 Stk	CO2 Stk	O2 train	CO2 train	
pH check					
9/14/2010 13:33		1.34	18.6	20.793	0.0906
9/14/2010 13:33		1.23	18.6	20.7959	0.0908
9/14/2010 13:34		1.48	18.3	20.795	0.0905
9/14/2010 13:34		1.33	18.5	20.7953	0.0894
9/14/2010 13:35		1.16	18.7	20.7697	6.4687
9/14/2010 13:35		1.21	18.7	13.7483	0.1625
9/14/2010 13:36		1.23	18.7	18.6859	0.1156
9/14/2010 13:36		1.21	18.6	20.3916	0.1037
9/14/2010 13:37		1.27	18.6	20.7091	0.0982
9/14/2010 13:37		1.32	18.5	20.7671	0.0962
9/14/2010 13:38		1.09	18.8	20.7826	0.0964

CTm-033 Stack and Train O2 CO2
RUN 2

9/14/2010 13:38	1.38	18.6	20.787	0.0942
9/14/2010 13:39	1.58	18.3	20.7877	0.7991
9/14/2010 13:39	1.27	18.6	19.1261	4.4692
9/14/2010 13:40	1.26	18.7	9.7863	8.4923
9/14/2010 13:40	1.29	18.6	5.7871	10.7164
9/14/2010 13:41	1.38	18.5	3.0852	11.4809
9/14/2010 13:41	1.26	18.6	2.0612	11.743
9/14/2010 13:42	1.3	18.6	1.7839	11.8522
9/14/2010 13:42	1.51	18.4	1.7311	11.9531
9/14/2010 13:43	1.11	18.8	1.6343	11.9808
9/14/2010 13:43	1.25	18.6	1.5718	11.7908
9/14/2010 13:44	1.29	18.6	1.694	11.8872
9/14/2010 13:44	1.21	18.7	1.5996	11.8863
9/14/2010 13:45	1.38	18.5	1.5383	11.8538
9/14/2010 13:45	1.37	18.6	1.536	11.8903
9/14/2010 13:46	1.27	18.6	1.5317	11.8109
9/14/2010 13:46	1.26	18.7	1.5772	11.8494
9/14/2010 13:47	1.21	18.7	1.6207	11.8962
9/14/2010 13:47	1.16	18.7	1.6144	11.9544
9/14/2010 13:48	1.27	18.6	1.5706	11.9914
9/14/2010 13:48	1.1	18.8	1.5396	11.985
9/14/2010 13:49	1.12	18.8	1.5007	11.917
9/14/2010 13:49	1.02	18.9	1.4959	11.8624
9/14/2010 13:50	1.09	18.8	1.4273	11.9302
9/14/2010 13:50	1.18	18.8	1.3807	12.082
9/14/2010 13:51	1.25	18.7	1.2905	12.1001
9/14/2010 13:51	1.17	18.7	1.2529	12.0631
9/14/2010 13:52	1.09	18.8	1.2883	11.8732
9/14/2010 13:52	1.38	18.5	1.3574	11.7949
9/14/2010 13:53	1.37	18.5	1.4086	11.8074
9/14/2010 13:53	1.44	18.5	1.392	11.6917
9/14/2010 13:54	1.48	18.5	1.4992	11.6366
9/14/2010 13:54	1.35	18.5	1.5929	11.5505
9/14/2010 13:55	1.4	18.6	1.6736	11.5517
9/14/2010 13:55	1.17	18.7	1.7117	11.5581
9/14/2010 13:56	1.03	18.9	1.6982	11.6406
9/14/2010 13:56	1.32	18.6	1.6007	11.7234
9/14/2010 13:57	1.48	18.5	1.5379	11.8241
9/14/2010 13:57	1.1	18.8	1.4214	11.7745
9/14/2010 13:58	1.22	18.7	1.4448	11.6386
9/14/2010 13:58			1.5572	11.4402
9/14/2010 13:59			1.5838	11.4466
9/14/2010 13:59			1.4867	11.4836

post drifts s

Port B, Points 6 - 12

1.267451	18.60137	1.531822	11.80479
O2 Stk	CO2 Stk	O2 train	CO2 train

9/14/2010 14:21	1.29	18.7	20.7693	0.493
9/14/2010 14:21	1.35	18.7	19.5562	5.3166
9/14/2010 14:22	1.24	18.6	12.5939	4.9533
9/14/2010 14:22	1.16	18.7	11.7735	8.3497
9/14/2010 14:23	1.32	18.6	6.9635	10.5113

CTm-033 Stack and Train O2 CO2
RUN 2

9/14/2010 14:23	1.46	18.6	3.798	11.5125
9/14/2010 14:24	1.42	18.5	2.437	11.9219
9/14/2010 14:24	1.39	18.4	2.0012	12.1649
9/14/2010 14:25	1.31	18.5	1.8223	12.3258
9/14/2010 14:25	1.44	18.5	1.7458	12.4775
9/14/2010 14:26	1.58	18.4	1.7008	12.7086
9/14/2010 14:26	1.52	18.4	1.6047	12.8048
9/14/2010 14:27	1.48	18.5	1.5449	12.8871
9/14/2010 14:27	1.43	18.6	1.4717	12.9273
9/14/2010 14:28	1.44	18.5	1.458	12.9854
9/14/2010 14:28	1.41	18.6	1.5136	12.9989
9/14/2010 14:29	1.35	18.6	1.6508	13.1293
9/14/2010 14:29	1.39	18.6	1.6265	13.0998
9/14/2010 14:30	1.45	18.7	1.6561	13.0976
9/14/2010 14:30	1.44	18.6	1.6003	12.9446
9/14/2010 14:31	1.43	18.4	1.702	13.2253
9/14/2010 14:31	1.47	18.4	1.6059	13.4206
9/14/2010 14:32	1.54	18.3	1.3632	13.4369
9/14/2010 14:32	1.51	18.4	1.3108	13.4087
9/14/2010 14:33	1.37	18.5	1.3112	13.4518
9/14/2010 14:33	1.31	18.5	1.2914	13.3895
9/14/2010 14:34	1.35	18.6	1.3417	13.4262
9/14/2010 14:34	1.46	18.5	1.287	13.5291
9/14/2010 14:35	1.57	18.5	1.1828	13.5579
9/14/2010 14:35	1.65	18.4	1.1311	13.5192

Port A, Points 1-5

1.447391	18.49565	1.518426	13.08334
O2 Stk	CO2 Stk	O2 train	CO2 train

9/14/2010 14:44	1.61	18.5	16.7705	0.1822
9/14/2010 14:45	1.54	18.4	19.9003	0.1533
9/14/2010 14:45	1.51	18.6	20.5591	0.1408
9/14/2010 14:46	1.52	18.6	20.6903	0.5455
9/14/2010 14:46	1.48	18.5	19.2508	6.3626
9/14/2010 14:47	1.49	18.5	11.514	9.6462
9/14/2010 14:47	1.57	18.4	7.7285	12.2204
9/14/2010 14:48	1.64	18.5	3.6719	13.1116
9/14/2010 14:48	1.65	18.4	2.1593	13.4228
9/14/2010 14:49	1.71	18.4	1.6965	13.6762
9/14/2010 14:49	1.73	18.4	1.4737	13.7109
9/14/2010 14:50	1.64	18.4	1.3557	13.6765
9/14/2010 14:50	1.68	18.5	1.4072	13.7127
9/14/2010 14:51	1.64	18.4	1.45	13.7226
9/14/2010 14:51	1.57	18.4	1.4677	13.6499
9/14/2010 14:52	1.51	18.4	1.5989	13.6742
9/14/2010 14:52	1.54	18.5	1.6364	13.9333
9/14/2010 14:53	1.53	18.5	1.4216	13.8848
9/14/2010 14:53	1.49	18.6	1.4085	13.7927
9/14/2010 14:54	1.45	18.5	1.5358	13.7833
9/14/2010 14:54	1.34	18.4	1.5859	13.8995
9/14/2010 14:55	1.37	18.5	1.56	13.8859
9/14/2010 14:55	1.48	18.5	1.5568	13.8456

CTm-033 Stack and Train O2 CO2
RUN 2

9/14/2010 14:56	1.39	18.6	1.6283	13.9207
9/14/2010 14:56	1.45	18.6	1.6228	13.9913
9/14/2010 14:57	1.49	18.5	1.5902	13.9669
9/14/2010 14:57	1.6	18.5	1.601	14.1118
9/14/2010 14:58	1.39	18.4	1.5014	14.1354
9/14/2010 14:58	1.28	18.5	1.4809	14.1881
9/14/2010 14:59	1.52	18.6	1.5298	14.2954
9/14/2010 14:59	1.53	18.5	1.4397	14.2803
9/14/2010 15:00	1.61	18.6	1.3719	14.2708
9/14/2010 15:00	1.48	18.5	1.3803	14.31
9/14/2010 15:01	1.55	18.4	1.4326	14.4062
9/14/2010 15:01	1.54	18.4	1.4112	14.5052
9/14/2010 15:02	1.59	18.4	1.4079	14.5367
9/14/2010 15:02	1.53	18.4	1.4098	14.4575
9/14/2010 15:03	1.52	18.4	1.469	14.5672
9/14/2010 15:03	1.34	18.5	1.465	14.5916
9/14/2010 15:04	1.21	18.6	1.4414	14.6195
9/14/2010 15:04	1.34	18.6	1.4495	14.6074
9/14/2010 15:05	1.39	18.5	1.5291	14.6559
9/14/2010 15:05	1.27	18.6	1.5695	14.6423
9/14/2010 15:06	1.28	18.6	1.5021	14.5638
9/14/2010 15:06	1.34	18.6	1.5165	14.6067
9/14/2010 15:07	1.44	18.5	1.5038	14.3567

Port A, Points 6-12

avgs 1.48 18.49189 1.497524 14.14691

overall averages 1.408 18.485 1.514 12.505
O2 Stk CO2 Stk O2 train CO2 train

delta for CO2
5.980
use 6.0

R3

pH check

9/14/2010 17:17	1.9	18.3	20.4242	0.1336
9/14/2010 17:17	1.78	18.2	20.6927	0.1278
9/14/2010 17:18	1.7	18.3	20.7447	0.274
9/14/2010 17:18	1.7	18.5	19.8567	3.4613
9/14/2010 17:19	1.56	18.3	15.1908	7.2179
9/14/2010 17:19	1.66	18.5	10.3768	10.5258
9/14/2010 17:20	1.64	18.4	4.9505	11.7065
9/14/2010 17:20	1.53	18.4	2.6784	12.1189
9/14/2010 17:21	1.34	18.6	1.9384	12.2863
9/14/2010 17:21	1.57	18.6	1.7225	12.4178
9/14/2010 17:22	1.7	18.5	1.589	12.6434
9/14/2010 17:22	1.55	18.4	1.4492	12.6341
9/14/2010 17:23	1.69	18.5	1.4871	12.6326
9/14/2010 17:23	1.5	18.4	1.5642	12.6595
9/14/2010 17:24	1.73	18.5	1.5696	12.6141
9/14/2010 17:24	1.88	18.4	1.61	12.6853
9/14/2010 17:25	1.65	18.4	1.5816	12.6474
9/14/2010 17:25	1.8	18.4	1.6167	12.5413
9/14/2010 17:26	1.71	18.3	1.6894	12.5178
9/14/2010 17:26	1.79	18.4	1.6473	12.4999
9/14/2010 17:27	1.82	18.3	1.6717	12.377
9/14/2010 17:27	1.83	18.3	1.6485	12.3731
9/14/2010 17:28	1.73	18.3	1.68	12.3448
9/14/2010 17:28	1.64	18.3	1.7071	12.422
9/14/2010 17:29	1.67	18.4	1.6982	12.4187
9/14/2010 17:29	1.77	18.4	1.6435	12.3955
9/14/2010 17:30	1.57	18.3	1.5972	12.3519
9/14/2010 17:30	1.59	18.4	1.5935	12.4012
9/14/2010 17:31	1.62	18.4	1.5858	12.5133
9/14/2010 17:31	1.7	18.5	1.4957	12.5343
avgs	1.690952	18.4	1.6118	12.50595

Port B, Points 1-5

9/14/2010 17:32	1.67	18.4	1.4712	12.5241
9/14/2010 17:32	1.61	18.4	1.4387	12.4298
9/14/2010 17:33	1.73	18.4	1.4879	11.0417
9/14/2010 17:33	1.69	18.3	3.7052	0.4264

pH check

R3

9/14/2010 17:49	1.41	18.6	20.7892	0.1093
9/14/2010 17:50	1.57	18.8	20.7904	0.107
9/14/2010 17:50	1.47	18.5	20.7935	0.1055
9/14/2010 17:51	1.52	18.7	20.7959	0.4822
9/14/2010 17:51	1.94	18.4	19.651	3.7985
9/14/2010 17:52	1.56	18.4	14.9817	8.3841
9/14/2010 17:52	1.47	18.8	9.5906	10.937
9/14/2010 17:53	1.46	18.6	4.6081	11.7939
9/14/2010 17:53	1.58	18.7	2.6524	12.242
9/14/2010 17:54	1.52	18.6	1.8642	12.3853
9/14/2010 17:54	1.61	18.6	1.6285	12.53
9/14/2010 17:55	1.42	18.6	1.5422	12.6162
9/14/2010 17:55	1.51	18.5	1.5467	12.6326
9/14/2010 17:56	1.59	18.5	1.568	12.718
9/14/2010 17:56	1.61	18.6	1.5265	12.6206
9/14/2010 17:57	1.54	18.5	1.6144	12.6467
9/14/2010 17:57	1.59	18.6	1.6532	12.7654
9/14/2010 17:58	1.66	18.7	1.5972	12.7995
9/14/2010 17:58	1.6	18.5	1.5621	12.7171
9/14/2010 17:59	1.56	18.5	1.5412	12.7458
9/14/2010 17:59	1.58	18.6	1.5175	12.7682
9/14/2010 18:00	1.44	18.7	1.5866	12.7441
9/14/2010 18:00	1.43	18.7	1.6258	12.7549
9/14/2010 18:01	1.47	18.7	1.5818	12.8473
9/14/2010 18:01	1.64	18.6	1.4525	12.8133
9/14/2010 18:02	1.33	18.6	1.4158	12.7853
9/14/2010 18:02	1.33	18.8	1.3989	12.7252
9/14/2010 18:03	1.42	18.8	1.4672	12.9142
9/14/2010 18:03	1.33	18.7	1.4105	12.9756
9/14/2010 18:04	1.46	18.8	1.323	12.9234
9/14/2010 18:04	1.46	18.7	1.3326	12.9522
9/14/2010 18:05	1.68	18.6	1.3081	12.9726
9/14/2010 18:05	1.53	18.4	1.3033	12.9875
9/14/2010 18:06	1.59	18.7	1.321	12.8892
9/14/2010 18:06	1.6	18.4	1.4555	12.9841
9/14/2010 18:07	1.58	18.7	1.5022	12.9365
9/14/2010 18:07	1.58	18.6	1.4419	12.7466
9/14/2010 18:08	1.67	18.5	1.4939	12.8059
9/14/2010 18:08	1.58	18.6	1.441	12.784
9/14/2010 18:09	1.68	18.4	1.44	12.7557
9/14/2010 18:09	1.6	18.6	1.4849	12.8156
9/14/2010 18:10	1.57	18.5	1.4831	12.8127
9/14/2010 18:10	1.64	18.4	1.5428	12.8515
avg	1.539688	18.59688	1.483794	12.80648

Port B, Points 6-12

overall avg 1.645093 18.40926 1.6021 12.65181

R3

CTM033 Stack and Train O2 CO2
Run 4

Date/Time	Messages	O2	CO2	O2 train	CO2 train
9/21/2010 9:09		1.44	17.9	20.6951	0.2148
9/21/2010 9:09		1.39	17.9	20.8742	0.1834
9/21/2010 9:10		1.46	18	20.909	0.1623
9/21/2010 9:10		1.49	18	20.1569	2.0046
9/21/2010 9:11		1.31	17.9	17.6684	5.1737
9/21/2010 9:11		1.36	18	9.0033	7.8797
9/21/2010 9:12		1.32	18	3.9944	8.8715
9/21/2010 9:12		1.51	18	2.2444	9.0732
9/21/2010 9:13		1.49	17.9	1.8379	9.138
9/21/2010 9:13		1.46	17.9	1.7342	9.2647
9/21/2010 9:14		1.59	17.9	1.6619	9.352
9/21/2010 9:14		1.73	17.8	1.7235	9.2501
9/21/2010 9:15		1.56	17.7	1.6549	9.2201
9/21/2010 9:15		1.29	17.8	1.6135	9.2791
9/21/2010 9:16		1.34	18.1	1.5847	9.2693
9/21/2010 9:16		1.29	18.1	1.4927	9.2063
9/21/2010 9:17		1.3	18.1	1.433	9.1664
9/21/2010 9:17		1.3	18.1	1.4134	9.1081
9/21/2010 9:18		1.32	18.1	1.4148	9.0291
9/21/2010 9:18		1.63	18	1.4703	8.8666
9/21/2010 9:19		1.51	17.8	1.5746	8.8242
9/21/2010 9:19		1.29	18	1.5236	8.8416
9/21/2010 9:20		1.34	18	1.547	8.6901
9/21/2010 9:20		1.38	18.1	1.5165	8.7449
9/21/2010 9:21		1.42	18.2	1.3836	8.6061
9/21/2010 9:21		1.43	18	1.4841	8.5621
9/21/2010 9:22		1.52	18	1.5547	8.4209
9/21/2010 9:22		1.41	18	1.6193	8.3645
9/21/2010 9:23		1.69	17.9	1.6016	8.2716
9/21/2010 9:23		1.5	17.9	1.5643	8.3327
9/21/2010 9:24		1.38	17.9	1.4895	8.3568
9/21/2010 9:24		1.45	18.1	1.571	8.4329
9/21/2010 9:25		1.4	18.1	1.4522	8.3326
avgs		1.437826	17.98696	1.536726	8.80557

Port A, Points 1-5

note lower CO2 - 4 impingers vs 3 for Runs 1-3

9/21/2010 9:25	1.47	18	4.6909	0.2544
9/21/2010 9:26	1.62	18	19.2303	0.1854
9/21/2010 9:26	1.34	17.8	20.7854	0.1682

pH check

9/21/2010 9:32	1.47	18	14.0739	0.1489
9/21/2010 9:32	1.54	18	20.2988	0.1235
9/21/2010 9:33	1.74	17.9	20.925	0.1153
9/21/2010 9:33	1.44	17.8	19.8456	4.5879
9/21/2010 9:34	1.62	18	10.3629	7.105
9/21/2010 9:34	1.43	18	5.4196	8.9005
9/21/2010 9:35	1.41	18	2.4897	9.3319
9/21/2010 9:35	1.61	18	1.8187	9.4353

CTM033 Stack and Train O2 CO2
Run 4

9/21/2010 9:36	1.55	17.9	1.6798	9.4979
9/21/2010 9:36	1.45	18	1.6452	9.5724
9/21/2010 9:37	1.47	18	1.6588	9.6421
9/21/2010 9:37	1.37	18	1.6399	9.6206
9/21/2010 9:38	1.36	18.1	1.5799	9.6037
9/21/2010 9:38	1.24	18.2	1.5172	9.65
9/21/2010 9:39	1.41	18.1	1.4281	9.6064
9/21/2010 9:39	1.43	18	1.5265	9.5687
9/21/2010 9:40	1.56	18	1.5674	9.5007
9/21/2010 9:40	1.4	17.9	1.6664	9.5981
9/21/2010 9:41	1.35	18.1	1.5983	9.7106
9/21/2010 9:41	1.37	18.1	1.515	9.744
9/21/2010 9:42	1.43	18.1	1.4904	9.7687
9/21/2010 9:42	1.3	18	1.5212	9.84
9/21/2010 9:43	1.35	18.1	1.4545	9.8267
9/21/2010 9:43	1.51	18.1	1.456	9.7548
9/21/2010 9:44	1.64	18	1.5683	9.8173
9/21/2010 9:44	1.63	18.1	1.5075	9.8177
9/21/2010 9:45	1.49	17.9	1.6111	9.8539
9/21/2010 9:45	1.38	18.1	1.5417	9.9076
9/21/2010 9:46	1.33	18	1.5087	9.8257
9/21/2010 9:46	1.38	18.2	1.479	9.8961
9/21/2010 9:47	1.34	18.2	1.3759	9.928
9/21/2010 9:47	1.29	18.2	1.333	9.9645
9/21/2010 9:48	1.37	18.1	1.3674	10.0008
9/21/2010 9:48	1.32	18.1	1.4183	10.0644
9/21/2010 9:49	1.57	18.1	1.4331	10.0319
9/21/2010 9:49	1.48	17.9	1.5457	9.9742
9/21/2010 9:50	1.37	18	1.6097	10.0376
9/21/2010 9:50	1.51	18.1	1.5198	10.0771
9/21/2010 9:51	1.46	18	1.5143	10.0739
9/21/2010 9:51	1.36	18	1.5583	10.1249
9/21/2010 9:52	1.47	18.1	1.5013	10.0775
9/21/2010 9:52	1.25	18	1.5015	9.9184
9/21/2010 9:53	1.36	18.2	1.516	9.9205
9/21/2010 9:53	1.44	18.1	1.4348	9.9405
9/21/2010 9:54	1.3	18.2	1.42	9.991

Port A, Points 6-12

avgs 1.413243 18.06216 1.519189 9.831051
o2 Stck CO2 Stk O2 Train CO2 train

pH check

9/21/2010 10:02	1.31	18.1	20.9731	0.1151
9/21/2010 10:03	1.16	18.1	21.0053	0.1115
9/21/2010 10:03	1.31	18.3	21.0113	0.1091
9/21/2010 10:04	1.29	18.2	21.0143	0.1071
9/21/2010 10:04	1.4	18.1	19.4444	6.8594
9/21/2010 10:05	1.48	18.1	8.8133	7.221
9/21/2010 10:05	1.38	18	5.9274	9.898
9/21/2010 10:06	1.44	18.1	2.7566	10.5616
9/21/2010 10:06	1.53	18	1.9212	10.7878
9/21/2010 10:07	1.62	18	1.7558	10.9225
9/21/2010 10:07	1.59	17.8	1.7358	10.8663

CTM033 Stack and Train O2 CO2
Run 4

9/21/2010 10:08	1.42	18	1.5984	11.1032
9/21/2010 10:08	1.28	18.1	1.6273	11.3616
9/21/2010 10:09	1.55	18	1.4973	11.325
9/21/2010 10:09	1.41	17.9	1.6131	11.3407
9/21/2010 10:10	1.19	18	1.5785	11.416
9/21/2010 10:10	1.16	18.2	1.422	11.5296
9/21/2010 10:11	1.15	18.2	1.3308	11.5286
9/21/2010 10:11	1.07	18.3	1.2791	11.5862
9/21/2010 10:12	1.27	18.3	1.1921	11.5008
9/21/2010 10:12	1.46	18.2	1.3163	11.4627
9/21/2010 10:13	1.44	18	1.451	11.3964
9/21/2010 10:13	1.26	18	1.5106	11.3955
9/21/2010 10:14	1.26	18.2	1.4301	11.4914
9/21/2010 10:14	1.34	18.2	1.3677	11.5623
9/21/2010 10:15	1.31	18.2	1.3045	11.5422
9/21/2010 10:15	1.38	18.2	1.3062	11.5015
9/21/2010 10:16	1.39	18.1	1.3817	11.4566
9/21/2010 10:16	1.25	18.1	1.4478	11.5502
9/21/2010 10:17	1.25	18.3	1.3226	11.5802
9/21/2010 10:17	1.51	18.1	1.2748	11.4149
9/21/2010 10:18	1.58	17.9	1.4995	11.3292
9/21/2010 10:18	1.39	17.9	1.6118	11.3653
9/21/2010 10:19	1.41	18	1.5454	11.4483

Port B, Points 1-5

avgs 1.3576 18.088 1.456008 11.39909
o2 Stck CO2 Stk O2 Train CO2 train

pH check

9/21/2010 10:58	1.41	18.1	20.2141	0.3186
9/21/2010 10:58	1.38	18.1	20.8038	0.0974
9/21/2010 10:59	1.22	18.2	21.0175	0.0936
9/21/2010 10:59	1.42	18.2	21.046	0.0922
9/21/2010 11:00	1.31	18.2	21.0501	0.0917
9/21/2010 11:00	1.45	18.2	21.0506	0.6486
9/21/2010 11:01	1.32	18.1	20.2594	4.9993
9/21/2010 11:01	1.28	18.2	11.4187	9.2869
9/21/2010 11:02	1.44	18.2	4.3156	10.251
9/21/2010 11:02	1.49	18.1	2.3407	10.4707
9/21/2010 11:03	1.31	18.1	1.9136	10.5569
9/21/2010 11:03	1.69	18.2	1.5468	10.5793
9/21/2010 11:04	1.69	18	1.5876	10.5509
9/21/2010 11:04	1.31	18	1.4361	10.6048
9/21/2010 11:05	1.45	18.2	1.5136	10.5805
9/21/2010 11:05	1.49	18.1	1.6162	10.6369
9/21/2010 11:06	1.54	18.1	1.4682	10.5828
9/21/2010 11:06	1.4	18.1	1.5132	10.5896
9/21/2010 11:07	1.41	18.1	1.4862	10.6254
9/21/2010 11:07	1.49	18	1.596	10.5061
9/21/2010 11:08	1.42	18.1	1.3924	10.4774
9/21/2010 11:08	1.4	18.1	1.4521	10.4198
9/21/2010 11:09	1.27	18.2	1.4962	10.4339
9/21/2010 11:09	1.24	18.3	1.5129	10.4444
9/21/2010 11:10	1.36	18.3	1.4348	10.4342

CTM033 Stack and Train O2 CO2

Run 4

9/21/2010 11:10	1.06	18.2	1.44	10.4902	
9/21/2010 11:11	1.25	18.5	1.3736	10.541	
9/21/2010 11:11	1.29	18.3	1.3275	10.5286	
9/21/2010 11:12	1.25	18.3	1.373	10.5022	
9/21/2010 11:12	1.13	18.3	1.3769	10.4306	
9/21/2010 11:13	1.24	18.4	1.3667	10.4946	
9/21/2010 11:13	1.56	18.3	1.2979	10.5008	
9/21/2010 11:14	1.65	17.9	1.475	10.3158	
9/21/2010 11:14	1.37	18	1.5468	10.5048	
9/21/2010 11:15	1.42	18.1	1.4139	10.5774	
9/21/2010 11:15	1.1	18.2	1.5862	10.575	not in avgs
9/21/2010 11:16	1.46	18.3	1.3968	10.679	
9/21/2010 11:16	1.3	18.1	1.4422	10.829	
9/21/2010 11:26	1.15	18.4	4.2643	11.2566	high vacuum.
9/21/2010 11:27	1.04	18.4	2.2317	11.7788	impinger 3 removed from train
9/21/2010 11:27	1.29	18.5	1.5922	11.6993	
9/21/2010 11:28	1.25	18.3	1.3813	11.5728	
9/21/2010 11:28	1.14	18.3	1.3954	11.5909	Port B, Points 6-12
1.347188 18.20625 1.461257 10.69792					
o2 Stck CO2 Stk O2 Train CO2 train					

OVERALL AVGS

1.38812 18.09231 1.493849 10.2016

delta CO2 7.890704

7.9

Hess Corp.
Perth Amboy, NJ
FCCU

Multi-Metals		Run 1	0947-1123											
9/15/10		Time:												
Meter Volume (dscf) (A)			51.713											
Stack Flow (DSCFM) (B)			132846											
Metal	Method	Front Half Concentrations (micrograms)			Back Half Concentrations (micrograms)			Front Emissions		Back Emissions		Total Emissions		
		(C) Sample	(D) Blank	(E) Net	(C) Sample	(D) Blank	(E) Net	(F) Grams/second	(G) Pounds/hour	(F) Grams/second	(G) Pounds/hour	(F) Grams/second	(G) Pounds/hour	
Arsenic				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Cadmium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Chromium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Lead		4.38	2.66	1.72		2.00	0.000	0.00007364	0.00058446	0.00008563	0.00067961	0.00015927	0.00126407	
Mercury				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Nickel				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	

Multi-Metals		Run 2	1421-1556													
9/15/10		Time:														
Meter Volume (dscf) (A)			50.874													
Stack Flow (DSCFM) (B)			129761													
Metal	Method	(C) Sample	(D) Front Half Concentrations (micrograms)		(E) Net	(C) Sample		(D) Back Half Concentrations (micrograms)		(E) Net	(F) Front Emissions		(F) Back Emissions		(G) Total Emissions	
			Blank	Net		Blank	Net	Grams/second	Pounds/hour		Grams/second	Pounds/hour	Grams/second	Pounds/hour		
Arsenic				0.000	0.000					0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Cadmium				0.000	0.000					0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Chromium				0.000	0.000					0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Lead			4.06	2.86	1.40	1.73	0.000	0.000	0.000	0.000	0.00005951	0.00047233	0.00007354	0.00058367	0.00105601	
Mercury				0.000	0.000					0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Nickel				0.000	0.000	0.000				0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	

Multi-Metals		Run 3	1703-1853												
9/15/10		Time:													
Meter Volume (dscf) (A)			54.348												
Stack Flow (DSCFM) (B)			137241												
Metal	Method	(C) Front Half Concentrations (micrograms)				(D) Back Half Concentrations (micrograms)		(E) Net		(F) Front Emissions		(G) Back Emissions		(F) Total Emissions	
		Sample	Blank	Net	Sample	Blank	Grams/second	Pounds/hour	Grams/second	Pounds/hour	Grams/second	Pounds/hour			
Arsenic				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Cadmium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Chromium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Lead		4.65	2.66	1.99		2.17	0.000	0.0008375	0.00066471	0.0009133	0.00072484	0.00017508	0.00138955	0.00138955	
Mercury				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	
Nickel				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	

Equations:

E = (C - D)

F = (E / A) (B) (0.016667 minutes/second) (1.0E-6 grams/microgram)

G = (F) (3600 seconds/hour) (0.002205 pounds/gram)

Note that:

If a fraction had an ND value reported, THESE EMISSIONS are calculated using ZERO (0) rather than the detectin limit.

No ND's on this project.

Blank corrections were completed here. No correction completed for ND result.

Averages

0.00000000 Arsenic
0.00000000 Cadmium
0.00000000 Chromium
0.00123654 Lead
0.00000000 Mercury
0.00000000 Nickel

Hess Corp.
Perth Amboy, NJ
FCCU

Multi-Metals		Run 1										
9/15/10	Time:	0947-1123										
Meter Volume (dscf) (A)			51.713									
Stack Flow (DSCFM) (B)			132846									
Metal	Method	(C)	(D)	(E)	(C)	(D)	(E)	(F)	(G)	(F)	(G)	(G)
		Front Half Concentrations (micrograms)			Back Half Concentrations (micrograms)			Front Emissions		Back Emissions		Total Emissions
		Sample	Blank	Net	Sample	Blank	Net	Grams/second	Pounds/hour	Grams/second	Pounds/hour	Grams/second
Arsenic				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Cadmium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Chromium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Lead		4.38	0.00	4.38	2.00	0.000	2.000	0.00018753	0.00148834	0.00008563	0.00067961	0.00216795
Mercury				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Nickel				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000

Multi-Metals		Run 2										
9/15/10	Time:	1421-1556										
Meter Volume (dscf) (A)			50.874									
Stack Flow (DSCFM) (B)			129761									
Metal	Method	(C)	(D)	(E)	(C)	(D)	(E)	(F)	(G)	(F)	(G)	(G)
		Front Half Concentrations (micrograms)			Back Half Concentrations (micrograms)			Front Emissions		Back Emissions		Total Emissions
		Sample	Blank	Net	Sample	Blank	Net	Grams/second	Pounds/hour	Grams/second	Pounds/hour	Grams/second
Arsenic				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Cadmium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Chromium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Lead		4.06	0.00	4.06	1.73	0.000	1.730	0.00017259	0.00136977	0.00007354	0.00059367	0.0024613
Mercury				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Nickel				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000

Multi-Metals		Run 3										
9/15/10	Time:	1703-1853										
Meter Volume (dscf) (A)			54.348									
Stack Flow (DSCFM) (B)			137241									
Metal	Method	(C)	(D)	(E)	(C)	(D)	(E)	(F)	(G)	(F)	(G)	(G)
		Front Half Concentrations (micrograms)			Back Half Concentrations (micrograms)			Front Emissions		Back Emissions		Total Emissions
		Sample	Blank	Net	Sample	Blank	Net	Grams/second	Pounds/hour	Grams/second	Pounds/hour	Grams/second
Arsenic				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Cadmium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Chromium				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Lead		4.65	0.00	4.65	2.17	0.000	2.170	0.00019571	0.00155322	0.00009133	0.00072484	0.00227806
Mercury				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Nickel				0.000			0.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000

Equations:
E = (C - D)
F = (E / A) (B) (0.016667 minutes/second) (1.0E-6 grams/microgram)
G = (F) (3600 seconds/hour) (0.002205 pounds/gram)

Note that:
If a fraction had an ND value reported, THESE EMISSIONS are calculated using ZERO (0) rather than the detectin limit.
No ND's on this project.
No blank corrections completed here.

Averages

0.00000000	Arsenic
0.00000000	Cadmium
0.00000000	Chromium
0.00213315	Lead
0.00000000	Mercury
0.00000000	Nickel

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date: 9/15/10	FCCU
Sampling Location: Outlet	EPA M29
Run No.: 1	lead
Run Times: 0947-1123	

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	51.950
Total Water Caught (grams) [Wc]:	240.7
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	30.11
Carbon Dioxide (%) [CO2]:	18.1
Oxygen (%) [O2]:	1.5
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	84
Port Ext 5.5"	

Output Data:	
Metered Volume (dry cubic feet @stp) [Vms]:	51.713
Water Volume (cubic feet @ stp) [Vws]:	11.354
Moisture (%) [Bws]:	18.00
Dry Molecular Weight (lb/lb-mol) [MWd]:	30.956
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.62
Absolute Stack Pressure ("Hg) [Pa]:	30.17
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	66.82
Stack - @ stp [Vss]:	59.78
Nozzle - Actual [Vn]:	57.39
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	181082
@ stp [SCFM]:	162013
Dry @ stp [DSCFM]:	132846
Sample Isokinetics (%) [I]:	96.0

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.400	1.48	71	71	136	1.18322
2	1.400	1.48	71	71	135	1.18322
3	1.400	1.48	72	72	135	1.18322
4	1.500	1.59	73	73	135	1.22474
5	1.500	1.59	73	73	135	1.22474
6	1.500	1.59	73	73	135	1.22474
7	1.400	1.48	74	74	135	1.18322
8	1.400	1.48	74	74	135	1.18322
9	1.300	1.38	74	74	135	1.14018
10	1.200	1.27	74	74	135	1.09545
11	0.920	0.98	75	75	134	0.95917
12	0.680	0.72	76	76	134	0.82462
13	0.780	0.83	74	74	132	0.88318
14	1.050	1.11	74	74	134	1.02470
15	1.300	1.38	75	75	135	1.14018
16	1.400	1.48	76	76	135	1.18322
17	1.400	1.48	77	77	136	1.18322
18	1.500	1.59	77	77	136	1.22474
19	1.500	1.59	78	78	136	1.22474
20	1.500	1.59	79	79	136	1.22474
21	1.300	1.38	80	80	136	1.14018
22	1.100	1.17	81	81	136	1.04881
23	1.100	1.17	81	81	136	1.04881
24	0.940	1.00	81	81	136	0.96954
25						
Averages:		[H]	[Tm]		[Ts]	[dP]
		1.270	75.5		135	1.12107

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)/((H / 13.6)+(Pb))/(Tm + 460)$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$ $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/15/10
Sampling Location:	Outlet
Run No.:	2
Run Times:	1421-1556
	FCCU
	EPA M29 lead

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	52.667
Total Water Caught (grams) [Wc]:	239.5
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	30.05
Carbon Dioxide (%) [CO2]:	18.7
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	84

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	50.874
Water Volume (cubic feet @ stp) [Vws]:	11.297
Moisture (%) [Bws]:	18.17
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.044
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.67
Absolute Stack Pressure ("Hg) [Pa]:	30.11
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	65.48
Stack - @ stp [Vss]:	58.52
Nozzle - Actual [Vn]:	56.57
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	177444
@ stp [SCFM]:	158575
Dry @ stp [DSCFM]:	129761
Sample Isokinetics (%) [I]:	96.7

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.200	1.27	86	86	135	1.09545
2	1.300	1.38	86	86	135	1.14018
3	1.300	1.38	86	86	135	1.14018
4	1.350	1.43	87	87	134	1.16190
5	1.400	1.48	89	89	135	1.18322
6	1.400	1.48	90	90	135	1.18322
7	1.400	1.48	90	90	136	1.18322
8	1.300	1.38	91	91	135	1.14018
9	1.250	1.33	92	92	134	1.11803
10	1.100	1.17	92	92	135	1.04881
11	0.900	0.95	92	92	135	0.94868
12	0.510	0.54	92	92	134	0.71414
13	0.560	0.59	90	90	134	0.74833
14	0.890	0.94	90	90	135	0.94340
15	1.300	1.50	91	91	135	1.14018
16	1.400	1.61	92	92	135	1.18322
17	1.500	1.73	92	92	135	1.22474
18	1.450	1.67	92	92	135	1.20416
19	1.400	1.61	93	93	134	1.18322
20	1.450	1.67	93	93	134	1.20416
21	1.450	1.67	94	94	134	1.20416
22	1.300	1.50	93	93	134	1.14018
23	1.300	1.50	93	93	134	1.14018
24	1.000	1.15	93	93	134	1.00000
25						
Averages:	1.225	1.35	90.8		135	1.09888
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)((H / 13.6)+(Pb))/((Tm + 460))$	
$Vws = (Wc) / 21.2$	
$Bws = (100)(Vws)/(Vws + Vms)$	
$MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$	
$MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$	
$Pa = Pb + ((Ps) / 13.6)$	
$Vsa = (85.48)(Cp)(dP)((Ts+460)/((MWw)(Pa)))^{0.5}$	
$Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$	
$ACFM = (Vsa)(CSA)(60)$	
$SCFM = (Vss)(CSA)(60)$	
$DSCFM = (SCFM)(100 - (Bws) / 100)$	
$Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$	
$I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date: 9/15/10	FCCU
Sampling Location: Outlet	EPA M29
Run No.: 3	lead
Run Times: 1703-1853	

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	55.695
Total Water Caught (grams) [Wc]:	256.9
Stack Static Pressure ("H2O) [Ps]:	0.83
Barometric Pressure ("Hg) [Pb]:	30.1
Carbon Dioxide (%) [CO2]:	19.0
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	1
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	84

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	54.348
Water Volume (cubic feet @ stp) [Vws]:	12.118
Moisture (%) [Bws]:	18.23
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.092
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.71
Absolute Stack Pressure ("Hg) [Pa]:	30.16
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	69.24
Stack - @ stp [Vss]:	61.94
Nozzle - Actual [Vn]:	60.48
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	187629
@ stp [SCFM]:	167842
Dry @ stp [DSCFM]:	137241
Sample Isokinetics (%) [I]:	97.6

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.700	0.78	84	84	134	0.83666
2	1.050	1.17	85	85	135	1.02470
3	1.400	1.55	85	85	135	1.18322
4	1.500	1.67	86	86	135	1.22474
5	1.500	1.67	87	87	134	1.22474
6	1.700	1.89	87	87	134	1.30384
7	1.700	1.89	88	88	135	1.30384
8	1.700	1.89	88	88	135	1.30384
9	1.600	1.78	90	90	135	1.26491
10	1.700	1.89	90	90	135	1.30384
11	1.600	1.78	91	91	135	1.26491
12	1.300	1.44	90	90	135	1.14018
13	0.780	0.87	85	85	136	0.88318
14	0.980	1.09	85	85	135	0.98995
15	1.200	1.33	87	87	135	1.09545
16	1.450	1.61	85	85	135	1.20416
17	1.600	1.78	85	85	136	1.26491
18	1.700	1.89	85	85	135	1.30384
19	1.600	1.78	85	85	135	1.26491
20	1.600	1.78	85	85	136	1.26491
21	1.600	1.78	85	85	135	1.26491
22	1.400	1.55	85	85	135	1.18322
23	1.100	1.22	85	85	135	1.04881
24	0.590	0.65	85	85	135	0.76811
25						
Averages:	1.377	1.53	86.4		135	1.16316

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)/((H / 13.6)+(Pb))/(Tm + 460)$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$ $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$ $Pa = Pb + (Ps) / 13.6$ $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

Plant: Hess Corp.
Unit: FCCU
Location: Outlet
Parameter H2SO4

Molar Mass (A) 98 as H2SO4

Run Date Condition	1 9/15/10 Full	2 9/15/10 Full	3 9/15/10 Full
Stack Flowrate (DSCFM) (B)	130,212	131,103	133,777
Stack Moisture (%) (C)	17.75	19.05	18.10
Meter Volume (DSCF) (D)	37.982	39.338	40.942
Sample Concentration (ug) (G)	11,300	7,100	7,800
<u>Emissions:</u>			
Pounds / hour (H) as H2SO4	5.1136	3.1234	3.3642
Parts/million (dry) (J)	2.59	1.57	1.66
Parts/million (wet) (K)	2.13	1.27	1.36
Oxygen (%) (L)	1.5	1.3	1.3
Parts/million (dry) @15% O2 (M)	0.79	0.47	0.50

Equations:

(G) = value as reported by lab

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(M) = (J)(5.9/(20.9-L))

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/15/10
Sampling Location:	Outlet
Run No.:	1
Run Times:	0949-1217
	FCCU
	EPA M8 SO3/H2SO4 mist

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	39.201
Total Water Caught (grams) [Wc]:	173.8
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	30.11
Carbon Dioxide (%) [CO2]:	18.1
Oxygen (%) [O2]:	1.5
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.989
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Port Ext 5.5"

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	37.982
Water Volume (cubic feet @ stp) [Vws]:	8.198
Moisture (%) [Bws]:	17.75
Dry Molecular Weight (lb/lb-mol) [MWd]:	30.956
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.66
Absolute Stack Pressure ("Hg) [Pa]:	30.17
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	65.49
Stack - @ stp [Vss]:	58.42
Nozzle - Actual [Vn]:	56.08
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	177484
@ stp [SCFM]:	158317
Dry @ stp [DSCFM]:	130212
Sample Isokinetics (%) [I]:	96.0

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.800	0.66	77	77	137	0.89443
2	1.000	0.83	78	78	137	1.00000
3	1.200	1.00	77	77	136	1.09545
4	1.300	1.08	77	77	137	1.14018
5	1.300	1.08	79	79	137	1.14018
6	1.400	1.16	80	80	137	1.18322
7	1.400	1.16	81	81	136	1.18322
8	1.400	1.16	82	82	137	1.18322
9	1.400	1.16	83	83	137	1.18322
10	1.300	1.08	84	84	137	1.14018
11	1.300	1.08	84	84	137	1.14018
12	1.200	1.00	84	84	137	1.09545
13	0.900	0.75	85	85	137	0.94868
14	0.690	0.57	85	85	137	0.83066
15	1.200	1.00	85	85	137	1.09545
16	1.300	1.08	86	86	137	1.14018
17	1.300	1.08	86	86	137	1.14018
18	1.300	1.08	87	87	137	1.14018
19	1.400	1.16	89	89	137	1.18322
20	1.400	1.16	88	88	137	1.18322
21	1.300	1.08	88	88	137	1.14018
22	1.200	1.00	88	88	137	1.09545
23	1.200	1.00	88	88	137	1.09545
24	0.95	0.79	88	88	137	0.97468
25						0.00000
		[H]	[Tm]		[Ts]	[dP]
Averages:	1.214	1.01	83.7		137	1.09777

This Spreadsheet Uses The Following Equations/Calculations:

$Vms = (Vm)(Y)(17.647)((H / 13.6) + (Pb)) / (Tm + 460)$
 $Vws = (Wc) / 21.2$
 $Bws = (100)(Vws) / (Vws + Vms)$
 $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$
 $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$
 $Pa = Pb + ((Ps) / 13.6)$
 $Vsa = (85.48)(Cp)(dP) / ((Ts + 460) / ((MWw)(Pa)))^{0.5}$
 $Vss = (17.647)(Vsa)(Pa) / ((Ts) + 460)$
 $ACFM = (Vsa)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = (SCFM)(100 - (Bws) / 100)$
 $Vn = (Vms + Vws) / (((Dn / 2)^2)(3.14 / 144)(min)(60))$
 $I = (Vn / Vss)(100)$

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/15/10
Sampling Location:	Outlet
Run No.:	2
Run Times:	1515-1701
	FCCU
	EPA M8
	SO3/H2SO4 mist

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	41.244
Total Water Caught (grams) [Wc]:	196.2
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	30.05
Carbon Dioxide (%) [CO2]:	18.7
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.989
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	39.338
Water Volume (cubic feet @ stp) [Vws]:	9.255
Moisture (%) [Bws]:	19.05
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.044
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.56
Absolute Stack Pressure ("Hg) [Pa]:	30.11
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	67.03
Stack - @ stp [Vss]:	59.76
Nozzle - Actual [Vn]:	59.01
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	181647
@ stp [SCFM]:	161946
Dry @ stp [DSCFM]:	131103
Sample Isokinetics (%) [I]:	98.7

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.910	0.76	85	85	136	0.95394
2	1.300	1.08	87	87	136	1.14018
3	1.400	1.16	88	88	135	1.18322
4	1.400	1.16	89	89	136	1.18322
5	1.500	1.25	90	90	135	1.22474
6	1.500	1.25	90	90	135	1.22474
7	1.500	1.25	91	91	136	1.22474
8	1.400	1.26	92	92	135	1.18322
9	1.400	1.26	93	93	136	1.18322
10	1.200	1.08	93	93	136	1.09545
11	0.960	0.86	93	93	136	0.97980
12	0.530	0.48	93	93	136	0.72801
13	0.710	0.64	92	92	135	0.84261
14	0.930	0.84	92	92	136	0.96437
15	1.300	1.17	93	93	136	1.14018
16	1.400	1.26	94	94	136	1.18322
17	1.500	1.35	95	95	137	1.22474
18	1.500	1.35	95	95	137	1.22474
19	1.450	1.31	95	95	137	1.20416
20	1.450	1.31	96	96	137	1.20416
21	1.450	1.31	96	96	137	1.20416
22	1.400	1.26	87	87	136	1.18322
23	1.400	1.26	87	87	137	1.18322
24	1.100	0.99	87	87	136	1.04881
25						
Averages:		[H]	[Tm]		[Ts]	[dP]
		1.275	1.12		91.4	136
						1.12134

This Spreadsheet Uses The Following Equations/Calculations:

$Vms = (Vm)(Y)(17.647)/((H / 13.6)+(Pb))/((Tm + 460)$
 $Vws = (Wc) / 21.2$
 $Bws = (100)(Vws)/(Vws + Vms)$
 $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$
 $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$
 $Pa = Pb + ((Ps) / 13.6)$
 $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$
 $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$
 $ACFM = (Vsa)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = (SCFM)(100 - (Bws) / 100)$
 $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$
 $I = (Vn / Vss)(100)$

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date: 9/15/10	FCCU
Sampling Location: Outlet	EPA M8
Run No.: 3	SO3/H2SO4 mist
Run Times: 1915-2031	

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	41.566
Total Water Caught (grams) [Wc]:	191.8
Stack Static Pressure ("H2O) [Ps]:	0.87
Barometric Pressure ("Hg) [Pb]:	30.12
Carbon Dioxide (%) [CO2]:	18.9
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.187
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	72

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	40.942
Water Volume (cubic feet @ stp) [Vws]:	9.047
Moisture (%) [Bws]:	18.10
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.076
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.71
Absolute Stack Pressure ("Hg) [Pa]:	30.18
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	67.35
Stack - @ stp [Vss]:	60.27
Nozzle - Actual [Vn]:	60.70
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	182507
@ stp [SCFM]:	163339
Dry @ stp [DSCFM]:	133777
Sample Isokinetics (%) [I]:	100.7

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.810	0.73	80	80	135	0.90000
2	1.000	0.90	80	80	135	1.00000
3	1.300	1.17	80	80	136	1.14018
4	1.350	1.22	80	80	136	1.16190
5	1.400	1.26	80	80	136	1.18322
6	1.500	1.35	81	81	135	1.22474
7	1.500	1.35	80	80	135	1.22474
8	1.500	1.35	80	80	136	1.22474
9	1.550	1.40	80	80	135	1.24499
10	1.500	1.35	80	80	135	1.22474
11	1.450	1.31	80	80	135	1.20416
12	1.200	1.08	79	79	135	1.09545
13	1.100	0.99	78	78	135	1.04881
14	1.200	1.08	78	78	135	1.09545
15	1.350	1.22	78	78	135	1.16190
16	1.400	1.26	78	78	135	1.18322
17	1.500	1.35	78	78	136	1.22474
18	1.500	1.35	78	78	135	1.22474
19	1.500	1.35	78	78	135	1.22474
20	1.450	1.31	78	78	135	1.20416
21	1.400	1.26	78	78	135	1.18322
22	1.250	1.13	78	78	135	1.11803
23	0.890	0.80	78	78	135	0.94340
24	0.520	0.47	78	78	134	0.72111
25						
Averages:	1.297	1.17	79.0		135	1.13177

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)((H / 13.6) + (Pb)) / (Tm + 460)$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws) / (Vws + Vms)$ $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$ $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)((Ts + 460) / ((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa) / ((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws) / (((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

Project Name: Hess Corporation
Perth Amboy, NJ

Source: FCCU

Condition: normal production

Test Date: 9/15/10 M29 & M8 trains

GAS TESTED	SAMPLE RUN ID	CONCENTRATIONS (% O ₂ & CO ₂ ; PPM ALL OTHERS)										STACK FLOW RATE (dscfm)	Mass Emissions	
		CERTIFIED STANDARD	PRE-TEST RESPONSE	POST-TEST RESPONSE	PRE-TEST ZERO	POST-TEST ZERO	RAW AVERAGE	BIAS CORRECTED AVERAGE	FROM WET TO DRY AVERAGES	@ 7% O ₂	(J)		(K)	
O ₂	1 both trains	2.49	2.5	2.4	0.1	0.0	1.54	1.547	N/A					
O ₂	2 M29	2.5	2.4	2.4	0.0	0.0	1.27	1.314	N/A					
O ₂	2 M8	2.5	2.4	2.4	0.0	0.0	1.26	1.303	N/A					
O ₂	3 M29	2.5	2.4	2.4	0.0	0.0	1.30	1.346	N/A					
O ₂	3 M8	2.5	2.4	2.4	0.0	0.0	1.27	1.321	N/A					
CO ₂	1 both trains	22.1	22.0	22.1	0.2	0.3	18.11	18.105	N/A					
CO ₂	2 M29	22.1	22.1	21.9	0.3	0.3	18.63	18.668	N/A					
CO ₂	2 M8	22.1	22.1	21.9	0.3	0.3	18.68	18.716	N/A					
CO ₂	3 M29	22.1	21.9	22.0	0.3	0.3	18.91	18.994	N/A					
CO ₂	3 M8	22.1	21.9	22.0	0.3	0.3	18.78	18.867	N/A					

The Following Calculations are Used In This Spreadsheet:

$$G = (F - ((D+E)/2)) \times (A/((B+C)/2) - ((D+E)/2))$$

$$H = (13.9/(20.9-G_{O_2})) \times G$$

$$J = I \times 0.15505 \times 10^{-6} \times G \times MW_{GAS}$$

$$K = (20.9/(20.9-G_{O_2})) \times G \times A_{CO \text{ or } NOx} \times B_{fuel}$$

Where --

$$A_{CO} = 7.2678E-08$$

$$A_{NOx} = 1.1940E-07$$

$$A_{THC} = 4.1530E-08$$

$$L = (100/(100-M)) \times G_{THC}$$

And...

$$B_{nat. gas} = 8710$$

$$B_{nat. gas} = N/A$$

$$B_{fuel oil} = 9190$$

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 1 - M29 & M8 trains

Date	time	O2	CO2
	9/15/2010 9:47	1.49	18.1 %
	9/15/2010 9:47	1.33	18 %
	9/15/2010 9:48	1.29	18.1 %
	9/15/2010 9:48	1.43	18.4 %
	9/15/2010 9:49	1.4	18.1 %
	9/15/2010 9:49	1.49	18.2 %
	9/15/2010 9:50	1.62	18 %
	9/15/2010 9:50	1.37	18.1 %
	9/15/2010 9:51	1.49	18.1 %
	9/15/2010 9:51	1.61	18.1 %
	9/15/2010 9:52	1.63	18 %
	9/15/2010 9:52	1.83	17.8 %
	9/15/2010 9:53	1.67	17.7 %
	9/15/2010 9:53	1.69	17.8 %
	9/15/2010 9:54	1.65	17.8 %
	9/15/2010 9:54	1.87	17.7 %
	9/15/2010 9:55	1.71	17.8 %
	9/15/2010 9:55	1.48	17.8 %
	9/15/2010 9:56	1.59	18.1 %
	9/15/2010 9:56	1.58	17.8 %
	9/15/2010 9:57	1.35	18 %
	9/15/2010 9:57	1.52	18.2 %
	9/15/2010 9:58	1.54	18 %
	9/15/2010 9:58	1.6	18 %
	9/15/2010 9:59	1.67	17.9 %
	9/15/2010 9:59	1.63	17.9 %
	9/15/2010 10:00	1.78	17.9 %
	9/15/2010 10:00	1.84	17.8 %
	9/15/2010 10:01	1.67	17.8 %
	9/15/2010 10:01	1.57	18 %
	9/15/2010 10:02	1.64	17.9 %
	9/15/2010 10:02	1.83	17.8 %
	9/15/2010 10:03	1.75	17.7 %
	9/15/2010 10:03	1.64	17.8 %
	9/15/2010 10:04	1.51	18 %
	9/15/2010 10:04	1.57	18 %
	9/15/2010 10:05	1.58	18 %
	9/15/2010 10:05	1.65	17.9 %
	9/15/2010 10:06	1.49	18 %
	9/15/2010 10:06	1.65	18 %
	9/15/2010 10:07	1.61	18 %
	9/15/2010 10:07	1.73	18 %
	9/15/2010 10:08	1.74	17.8 %
	9/15/2010 10:08	1.5	18 %
	9/15/2010 10:09	1.7	18 %
	9/15/2010 10:09	1.77	17.7 %
	9/15/2010 10:10	1.41	17.9 %
	9/15/2010 10:10	1.77	18 %
	9/15/2010 10:11	1.6	17.8 %
	9/15/2010 10:11	1.72	17.9 %
	9/15/2010 10:12	1.78	17.8 %
	9/15/2010 10:12	1.69	17.8 %
	9/15/2010 10:13	1.57	17.7 %
	9/15/2010 10:13	1.63	18 %
	9/15/2010 10:14	1.64	17.8 %
	9/15/2010 10:14	1.43	18 %
	9/15/2010 10:15	1.46	18.1 %
	9/15/2010 10:15	1.54	18.1 %
	9/15/2010 10:16	1.58	18 %
	9/15/2010 10:16	1.57	18.1 %
	9/15/2010 10:17	1.67	17.9 %
	9/15/2010 10:17	1.93	17.7 %
	9/15/2010 10:18	1.73	17.8 %

9/15/2010 10:18	1.53	18 %
9/15/2010 10:19	1.65	18 %
9/15/2010 10:19	1.55	17.9 %
9/15/2010 10:20	1.71	17.9 %
9/15/2010 10:20	1.72	17.8 %
9/15/2010 10:21	1.8	17.8 %
9/15/2010 10:21	1.64	17.8 %
9/15/2010 10:22	1.43	17.9 %
9/15/2010 10:22	1.48	18 %
9/15/2010 10:23	1.54	18 %
9/15/2010 10:23	1.52	18 %
9/15/2010 10:24	1.38	18.1 %
9/15/2010 10:24	1.27	18.1 %
9/15/2010 10:25	1.31	18.2 %
9/15/2010 10:25	1.51	18.1 %
9/15/2010 10:26	1.53	18 %
9/15/2010 10:26	1.36	18.1 %
9/15/2010 10:27	1.49	18.2 %
9/15/2010 10:27	1.52	18 %
9/15/2010 10:28	1.72	18 %
9/15/2010 10:28	1.73	17.9 %
9/15/2010 10:29	1.81	17.8 %
9/15/2010 10:29	1.52	17.8 %
9/15/2010 10:30	1.39	18 %
9/15/2010 10:30	1.39	18.1 %
9/15/2010 10:31	1.29	18 %
9/15/2010 10:31	1.52	18.1 %
9/15/2010 10:32	1.44	17.9 %
9/15/2010 10:32	1.5	18 %
9/15/2010 10:33	1.65	18 %
9/15/2010 10:33	1.49	17.9 %
9/15/2010 10:34	1.22	18.2 %
9/15/2010 10:34	1.48	18.2 %
9/15/2010 10:35	1.49	18 %
9/15/2010 10:35	1.73	17.9 %
9/15/2010 10:36	1.57	17.9 %
9/15/2010 10:36	1.56	18 %
9/15/2010 10:37	1.83	17.9 %
9/15/2010 10:37	1.44	17.9 %
9/15/2010 10:38	1.58	18.1 %
9/15/2010 10:38	1.37	18 %
9/15/2010 10:39	1.49	18.1 %
9/15/2010 10:39	1.74	18.1 %
9/15/2010 10:40	1.56	18 %
9/15/2010 10:40	1.57	18 %
9/15/2010 10:41	1.75	17.9 %
9/15/2010 10:41	1.75	17.8 %
9/15/2010 10:42	1.81	17.8 %
9/15/2010 10:42	1.82	17.7 %
9/15/2010 10:43	1.6	17.8 %
9/15/2010 10:43	1.82	18 %
9/15/2010 10:44	1.83	17.8 %
9/15/2010 10:44	1.74	17.7 %
9/15/2010 10:45	1.63	17.9 %
9/15/2010 10:45	1.71	17.8 %
9/15/2010 10:46	1.42	18 %
9/15/2010 10:46	1.47	18.1 %
9/15/2010 10:47	1.52	18.1 %
9/15/2010 10:47	1.74	17.9 %
9/15/2010 10:48	1.87	17.7 %
9/15/2010 10:48	1.56	17.9 %
9/15/2010 10:49	1.52	17.9 %
9/15/2010 10:49	1.51	18.1 %
9/15/2010 10:50	1.49	18 %
9/15/2010 10:50	1.33	18.1 %
9/15/2010 10:51	1.55	18 %
9/15/2010 10:51	1.63	18.2 %
9/15/2010 10:52	1.58	18 %

9/15/2010 10:52	1.84	18 %
9/15/2010 10:53	1.9	17.7 %
9/15/2010 10:53	1.69	18 %
9/15/2010 10:54	1.58	17.9 %
9/15/2010 10:54	1.68	17.9 %
9/15/2010 10:55	1.54	17.9 %
9/15/2010 10:55	1.5	18.1 %
9/15/2010 10:56	1.58	17.9 %
9/15/2010 10:56	1.44	18 %
9/15/2010 10:57	1.43	18.2 %
9/15/2010 10:57	1.5	18.2 %
9/15/2010 10:58	1.4	18.1 %
9/15/2010 10:58	1.67	18.1 %
9/15/2010 10:59	1.6	17.9 %
9/15/2010 10:59	1.55	18 %
9/15/2010 11:00	1.7	18 %
9/15/2010 11:00	1.72	17.9
9/15/2010 11:01	1.9	17.8
9/15/2010 11:01	1.66	17.6
9/15/2010 11:02	1.46	18.1
9/15/2010 11:02	1.34	18.1
9/15/2010 11:03	1.56	18.1
9/15/2010 11:03	1.48	18
9/15/2010 11:04	1.53	18.2
9/15/2010 11:04	1.76	18
9/15/2010 11:05	1.31	17.9
9/15/2010 11:05	1.54	18.2
9/15/2010 11:06	1.29	18.1
9/15/2010 11:06	1.52	18.2
9/15/2010 11:07	1.48	18
9/15/2010 11:07	1.36	18.2
9/15/2010 11:08	1.37	18.2
9/15/2010 11:08	1.66	18.1
9/15/2010 11:09	1.75	17.9
9/15/2010 11:09	1.55	17.8
9/15/2010 11:10	1.43	18.1
9/15/2010 11:10	1.58	18.1
9/15/2010 11:11	1.69	18
9/15/2010 11:11	1.72	18
9/15/2010 11:12	1.45	17.9
9/15/2010 11:12	1.43	18.1
9/15/2010 11:13	1.25	18.2
9/15/2010 11:13	1.36	18.2
9/15/2010 11:14	1.56	18.2
9/15/2010 11:14	1.81	18.1
9/15/2010 11:15	1.55	17.9
9/15/2010 11:15	1.51	17.9
9/15/2010 11:16	1.46	18.2
9/15/2010 11:16	1.42	18.2
9/15/2010 11:17	1.81	18
9/15/2010 11:17	1.43	18.1
9/15/2010 11:18	1.58	18.2
9/15/2010 11:18	1.68	17.9
9/15/2010 11:19	1.57	17.9
9/15/2010 11:19	1.73	18
9/15/2010 11:20	1.82	17.9
9/15/2010 11:20	1.8	17.9
9/15/2010 11:21	1.64	17.7
9/15/2010 11:21	1.54	18.1
9/15/2010 11:22	1.43	18
9/15/2010 11:22	1.41	18.3
9/15/2010 11:23	1.48	18.2
9/15/2010 11:23	1.42	18.2
9/15/2010 11:24	1.61	18.3
9/15/2010 11:24	1.52	18
9/15/2010 11:25	1.53	18.1
9/15/2010 11:25	1.71	18
9/15/2010 11:26	1.78	18

9/15/2010 11:26	1.6	18
9/15/2010 11:27	1.59	18.1
9/15/2010 11:27	1.39	18.2
9/15/2010 11:28	1.64	18.1
9/15/2010 11:28	1.61	18.1
9/15/2010 11:29	1.49	18.1
9/15/2010 11:29	1.53	18.1
9/15/2010 11:30	1.67	18.1
9/15/2010 11:30	1.82	17.9
9/15/2010 11:31	1.85	17.8
9/15/2010 11:31	1.66	18
9/15/2010 11:32	1.84	17.9
9/15/2010 11:32	1.76	17.9
9/15/2010 11:33	1.72	17.9
9/15/2010 11:33	1.7	18.1
9/15/2010 11:34	1.64	18
9/15/2010 11:34	1.68	18.1
9/15/2010 11:35	1.58	18.2
9/15/2010 11:35	1.74	18
9/15/2010 11:36	1.49	18.1
9/15/2010 11:36	1.62	18.2
9/15/2010 11:37	1.68	18.1
9/15/2010 11:37	1.57	18.3
9/15/2010 11:38	1.55	18
9/15/2010 11:38	1.72	18
9/15/2010 11:39	1.69	18
9/15/2010 11:48	0.94	18.7
9/15/2010 11:48	1.26	18.6
9/15/2010 11:49	1.29	18.4
9/15/2010 11:49	1.25	18.4 %
9/15/2010 11:50	1.32	18.4
9/15/2010 11:50	1.37	18.3
9/15/2010 11:51	1.37	18.4
9/15/2010 11:51	1.41	18.3
9/15/2010 11:52	1.28	18.3
9/15/2010 11:52	1.38	18.4
9/15/2010 11:53	1.13	18.4
9/15/2010 11:53	1.26	18.5
9/15/2010 11:54	1.08	18.5
9/15/2010 11:54	1.31	18.5
9/15/2010 11:55	1.37	18.4
9/15/2010 11:55	1.34	18.2
9/15/2010 11:56	1.08	18.5
9/15/2010 11:56	1.15	18.5
9/15/2010 11:57	1.16	18.5
9/15/2010 11:57	1.11	18.5
9/15/2010 11:58	0.99	18.7
9/15/2010 11:58	1.04	18.6
9/15/2010 11:59	1.21	18.7
9/15/2010 11:59	1.29	18.4
9/15/2010 12:00	1.17	18.4
9/15/2010 12:00	1.26	18.4
9/15/2010 12:01	1.33	18.5
9/15/2010 12:01	1.29	18.5
9/15/2010 12:02	1.62	18.3
9/15/2010 12:02	1.49	18.2
9/15/2010 12:03	1.23	18.2
9/15/2010 12:03	1.33	18.4
9/15/2010 12:04	1.29	18.3
9/15/2010 12:04	1.36	18.4
9/15/2010 12:05	1.43	18.4
9/15/2010 12:05	1.44	18.3
9/15/2010 12:06	1.37	18.3
9/15/2010 12:06	1.37	18.4
9/15/2010 12:07	1.38	18.3
9/15/2010 12:07	1.35	18.4
9/15/2010 12:08	1.32	18.4
9/15/2010 12:08	1.42	18.4

9/15/2010 12:09	1.36	18.3
9/15/2010 12:09	1.45	18.4
9/15/2010 12:10	1.36	18.3
9/15/2010 12:10	1.56	18.2
9/15/2010 12:11	1.65	18.1
9/15/2010 12:11	1.69	18.2
9/15/2010 12:12	1.71	18
9/15/2010 12:12	1.52	18
9/15/2010 12:13	1.33	18.2
9/15/2010 12:13	1.3	18.4
9/15/2010 12:14	1.26	18.3
9/15/2010 12:14	1.41	18.4
9/15/2010 12:15	1.66	18.2
9/15/2010 12:15	1.75	18
9/15/2010 12:16	1.46	18
9/15/2010 12:16	1.56	18
9/15/2010 12:17	1.8	18.1
9/15/2010 12:17	1.68	17.9
9/15/2010 12:18	1.4	18.1
9/15/2010 12:18	1.45	18.2
9/15/2010 12:19	1.59	18.2
9/15/2010 12:19	1.36	18.2
9/15/2010 12:20	1.37	18.2
9/15/2010 12:20	1.29	18.3
9/15/2010 12:21	1.38	18.4
9/15/2010 12:21	1.57	18.3
9/15/2010 12:22	1.47	18.1
9/15/2010 12:22	1.35	18.2
9/15/2010 12:23	1.6	18.2
9/15/2010 12:23	1.84	18
9/15/2010 12:24	1.97	17.9
9/15/2010 12:24	1.77	17.8
9/15/2010 12:25	1.63	18
9/15/2010 12:25	1.51	18.1
9/15/2010 12:26	1.6	18.2
9/15/2010 12:26	1.67	18
9/15/2010 12:27	1.91	17.9

Run 1	1.541 %	18.109 %
Averages	O2	CO2
FCCU - Wet Gas Scrubber		

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 2 - M29

Date time	O2	CO2
9/15/2010 14:21	1.21 %	18.6 %
9/15/2010 14:21	1.29 %	18.6 %
9/15/2010 14:22	1.38 %	18.6 %
9/15/2010 14:22	1.24 %	18.5 %
9/15/2010 14:23	1.35 %	18.6 %
9/15/2010 14:23	1.27 %	18.6 %
9/15/2010 14:24	1.24 %	18.5 %
9/15/2010 14:24	1.16 %	18.6 %
9/15/2010 14:25	1.25 %	18.4 %
9/15/2010 14:25	1.31 %	18.6 %
9/15/2010 14:26	1.06 %	18.6 %
9/15/2010 14:26	1.2 %	18.7 %
9/15/2010 14:27	1.39 %	18.6 %
9/15/2010 14:27	1.36 %	18.5 %
9/15/2010 14:28	1.31 %	18.3 %
9/15/2010 14:28	1.02 %	18.7 %
9/15/2010 14:29	1.24 %	18.7 %
9/15/2010 14:29	1.44 %	18.5 %
9/15/2010 14:30	1.35 %	18.4 %
9/15/2010 14:30	1.11 %	18.5 %
9/15/2010 14:31	1.19 %	18.7 %
9/15/2010 14:31	1.03 %	18.7 %
9/15/2010 14:32	1.29 %	18.7 %
9/15/2010 14:32	1.22 %	18.5 %
9/15/2010 14:33	1.2 %	18.7 %
9/15/2010 14:33	1.23 %	18.6 %
9/15/2010 14:34	1.35 %	18.6 %
9/15/2010 14:34	1.41 %	18.5 %
9/15/2010 14:35	1.37 %	18.5 %
9/15/2010 14:35	1.39 %	18.4 %
9/15/2010 14:36	1.27 %	18.5 %
9/15/2010 14:36	1.42 %	18.6 %
9/15/2010 14:37	1.42 %	18.4 %
9/15/2010 14:37	1.21 %	18.4 %
9/15/2010 14:38	1.27 %	18.7 %
9/15/2010 14:38	1.5 %	18.4 %
9/15/2010 14:39	1.36 %	18.4 %
9/15/2010 14:39	1.33 %	18.5 %
9/15/2010 14:40	1.12 %	18.6 %
9/15/2010 14:40	1.07 %	18.8 %
9/15/2010 14:41	1.31 %	18.7 %
9/15/2010 14:41	1.32 %	18.6 %
9/15/2010 14:42	1.3 %	18.5 %
9/15/2010 14:42	1.33 %	18.5 %
9/15/2010 14:43	1.15 %	18.5 %
9/15/2010 14:43	1.29 %	18.6 %
9/15/2010 14:44	1.31 %	18.5 %
9/15/2010 14:44	1.15 %	18.7 %
9/15/2010 14:45	1.22 %	18.7 %
9/15/2010 14:45	1.23 %	18.7 %
9/15/2010 14:46	1.31 %	18.6 %
9/15/2010 14:46	1.3 %	18.5 %
9/15/2010 14:47	1.03 %	18.6 %
9/15/2010 14:47	1.01 %	18.8 %
9/15/2010 14:48	1.22 %	18.8 %
9/15/2010 14:48	1.46 %	18.5 %
9/15/2010 14:49	1.3 %	18.6 %
9/15/2010 14:49	1.53 %	18.3 %
9/15/2010 14:50	1.3 %	18.3 %
9/15/2010 14:50	1.24 %	18.6 %
9/15/2010 14:51	1.51 %	18.5 %
9/15/2010 14:51	1.41 %	18.4 %
9/15/2010 14:52	1.31 %	18.5 %

9/15/2010 14:52	1.23 %	18.6 %
9/15/2010 14:53	1.44 %	18.6 %
9/15/2010 14:53	1.24 %	18.5 %
9/15/2010 14:54	1.17 %	18.6 %
9/15/2010 14:54	1.11 %	18.7 %
9/15/2010 14:55	1.12 %	18.8 %
9/15/2010 14:55	1.15 %	18.7 %
9/15/2010 14:56	1.25 %	18.7 %
9/15/2010 14:56	1.11 %	18.6 %
9/15/2010 14:57	1.22 %	18.7 %
9/15/2010 14:57	1.44 %	18.5 %
9/15/2010 14:58	1.29 %	18.6 %
9/15/2010 14:58	1.38 %	18.6 %
9/15/2010 14:59	1.45 %	18.4 %
9/15/2010 14:59	1.14 %	18.6 %
9/15/2010 15:00	1.23 %	18.8 %
9/15/2010 15:00	1.26 %	18.6 %
9/15/2010 15:01	1.4 %	18.6 %
9/15/2010 15:01	1.37 %	18.4 %
9/15/2010 15:02	1.26 %	18.5 %
9/15/2010 15:02	1.37 %	18.8 %
9/15/2010 15:03	1.32 %	18.5 %
9/15/2010 15:03	1.24 %	18.6 %
9/15/2010 15:04	1.41 %	18.6 %
9/15/2010 15:04	1.36 %	18.5 %
9/15/2010 15:05	1.37 %	18.5 %
9/15/2010 15:05	1.39 %	18.5 %
9/15/2010 15:06	1.48 %	18.5 %
9/15/2010 15:06	1.5 %	18.4 %
9/15/2010 15:07	1.53 %	18.4 %
9/15/2010 15:07	1.32 %	18.5 %
9/15/2010 15:08	1.46 %	18.6 %
9/15/2010 15:08	1.37 %	18.5 %
9/15/2010 15:09	1.35 %	18.6 %
9/15/2010 15:09	1.43 %	18.6 %
9/15/2010 15:10	1.4 %	18.6 %
9/15/2010 15:10	1.52 %	18.4 %
9/15/2010 15:11	1.3 %	18.5 %
9/15/2010 15:11	1.16 %	18.7 %
9/15/2010 15:12	1.27 %	18.7 %
9/15/2010 15:12	1.29 %	18.6 %
9/15/2010 15:13	1.26 %	18.6 %
9/15/2010 15:13	1.08 %	18.7 %
9/15/2010 15:14	1.18 %	18.7 %
9/15/2010 15:14	1.26 %	18.7 %
9/15/2010 15:15	1.13 %	18.7 %
9/15/2010 15:15	1.01 %	18.7 %
9/15/2010 15:16	1.28 %	18.8 %
9/15/2010 15:16	1.26 %	18.6 %
9/15/2010 15:17	1.37 %	18.7 %
9/15/2010 15:17	1.4 %	18.4 %
9/15/2010 15:18	1.26 %	18.6 %
9/15/2010 15:18	1.25 %	18.6 %
9/15/2010 15:19	1.34 %	18.6 %
9/15/2010 15:19	1.31 %	18.5 %
9/15/2010 15:20	1.35 %	18.6 %
9/15/2010 15:20	1.41 %	18.4 %
9/15/2010 15:21	1.32 %	18.5 %
9/15/2010 15:21	1.15 %	18.7 %
9/15/2010 15:22	1.27 %	18.7 %
9/15/2010 15:22	1.14 %	18.7 %
9/15/2010 15:23	1.18 %	18.7 %
9/15/2010 15:23	1.07 %	18.7 %
9/15/2010 15:24	1.11 %	18.8 %
9/15/2010 15:24	1.25 %	18.7 %
9/15/2010 15:25	1.27 %	18.6 %
9/15/2010 15:25	1.18 %	18.7 %
9/15/2010 15:26	1.19 %	18.8 %

9/15/2010 15:26	1.08 %	18.7 %
9/15/2010 15:27	1.19 %	18.8 %
9/15/2010 15:27	1.14 %	18.7 %
9/15/2010 15:28	1.31 %	18.7 %
9/15/2010 15:28	1.37 %	18.6 %
9/15/2010 15:29	1.5 %	18.5 %
9/15/2010 15:29	1.89 %	18.3 %
9/15/2010 15:30	1.42 %	18.3 %
9/15/2010 15:30	1.44 %	18.5 %
9/15/2010 15:31	1.57 %	18.4 %
9/15/2010 15:31	1.45 %	18.5 %
9/15/2010 15:32	1.39 %	18.5 %
9/15/2010 15:32	1.44 %	18.5 %
9/15/2010 15:33	1.12 %	18.6 %
9/15/2010 15:33	1.38 %	18.7 %
9/15/2010 15:34	1.37 %	18.5 %
9/15/2010 15:34	1.18 %	18.6 %
9/15/2010 15:35	1.46 %	18.7 %
9/15/2010 15:35	1.27 %	18.4 %
9/15/2010 15:36	1.33 %	18.6 %
9/15/2010 15:36	1.63 %	18.5 %
9/15/2010 15:37	1.48 %	18.3 %
9/15/2010 15:37	1.19 %	18.4 %
9/15/2010 15:38	1.12 %	18.8 %
9/15/2010 15:38	1.19 %	18.6 %
9/15/2010 15:39	1.2 %	18.7 %
9/15/2010 15:39	1.3 %	18.7 %
9/15/2010 15:40	1.15 %	18.6 %
9/15/2010 15:40	1.33 %	18.6 %
9/15/2010 15:41	1.4 %	18.5 %
9/15/2010 15:41	1.35 %	18.5 %
9/15/2010 15:42	1.24 %	18.6 %
9/15/2010 15:42	1.28 %	18.5 %
9/15/2010 15:43	1.29 %	18.6 %
9/15/2010 15:43	1.39 %	18.5 %
9/15/2010 15:44	1.35 %	18.5 %
9/15/2010 15:44	1.58 %	18.4 %
9/15/2010 15:45	1.36 %	18.4 %
9/15/2010 15:45	1.15 %	18.6 %
9/15/2010 15:46	1.26 %	18.7 %
9/15/2010 15:46	1.42 %	18.6 %
9/15/2010 15:47	1.18 %	18.5 %
9/15/2010 15:47	1.21 %	18.7 %
9/15/2010 15:48	1.24 %	18.6 %
9/15/2010 15:48	1.05 %	18.7 %
9/15/2010 15:49	1.35 %	18.7 %
9/15/2010 15:49	1.29 %	18.6 %
9/15/2010 15:50	1.04 %	18.6 %
9/15/2010 15:50	1.05 %	18.7 %
9/15/2010 15:51	1.04 %	18.8 %
9/15/2010 15:51	1.41 %	18.7 %
9/15/2010 15:52	1.08 %	18.6 %
9/15/2010 15:52	1.27 %	18.8 %
9/15/2010 15:53	1.09 %	18.7 %
9/15/2010 15:53	1.18 %	18.7 %
9/15/2010 15:54	1.16 %	18.7 %
9/15/2010 15:54	1.53 %	18.5 %
9/15/2010 15:55	1.27 %	18.4 %
9/15/2010 15:55	1.07 %	18.7 %
9/15/2010 15:56	1.01 %	18.8 %
9/15/2010 15:56	1.21 %	18.8 %
9/15/2010 15:57	1.42 %	18.7 %
9/15/2010 15:57	1.26 %	18.4 %
9/15/2010 15:58	1.11 %	18.7 %
9/15/2010 15:58	1.35 %	18.7 %
9/15/2010 15:59	1.42 %	18.5 %
9/15/2010 15:59	1.3 %	18.5 %
9/15/2010 16:00	1.14 %	18.7 %

9/15/2010 16:00	1.37 %	18.7 %
9/15/2010 16:01	1.22 %	18.6 %
9/15/2010 16:01	1.09 %	18.7 %
9/15/2010 16:02	1.24 %	18.8 %
9/15/2010 16:02	1.35 %	18.6 %
9/15/2010 16:03	1.3 %	18.6 %
9/15/2010 16:03	1.4 %	18.7 %
9/15/2010 16:04	1.44 %	18.5 %
9/15/2010 16:04	1.15 %	18.5 %
9/15/2010 16:05	1.2 %	18.7 %
9/15/2010 16:05	1.24 %	18.7 %
9/15/2010 16:06	1.38 %	18.6 %
9/15/2010 16:06	1.12 %	18.6 %
9/15/2010 16:07	1.31 %	18.7 %
9/15/2010 16:07	1.27 %	18.6 %
9/15/2010 16:08	1.21 %	18.7 %
9/15/2010 16:08	1.37 %	18.5 %
9/15/2010 16:09	1.46 %	18.6 %
9/15/2010 16:09	1.47 %	18.5 %
9/15/2010 16:10	1.24 %	18.5 %
9/15/2010 16:10	1.19 %	18.7 %
9/15/2010 16:11	1.06 %	18.8 %
9/15/2010 16:11	1.24 %	18.8 %
9/15/2010 16:12	1.26 %	18.7 %
9/15/2010 16:12	1.52 %	18.5 %
9/15/2010 16:13	1.28 %	18.5 %
9/15/2010 16:13	1.26 %	18.6 %
9/15/2010 16:14	1.28 %	18.7 %
9/15/2010 16:14	1.19 %	18.6 %
9/15/2010 16:15	1.04 %	18.8 %
9/15/2010 16:15	0.93 %	18.9 %
9/15/2010 16:16	0.94 %	19 %
9/15/2010 16:16	0.92 %	18.9 %
9/15/2010 16:17	0.99 %	19 %
9/15/2010 16:17	0.96 %	19 %
9/15/2010 16:18	1.08 %	19 %
9/15/2010 16:18	1.1 %	18.8 %
9/15/2010 16:19	1.13 %	18.8 %
9/15/2010 16:19	1.42 %	18.6 %
9/15/2010 16:20	1.14 %	18.6 %
9/15/2010 16:20	0.99 %	18.9 %
9/15/2010 16:21	1.15 %	18.9 %
9/15/2010 16:21	1.13 %	18.8 %
9/15/2010 16:22	1.14 %	18.8 %
9/15/2010 16:22	1.03 %	18.8 %
9/15/2010 16:23	1.31 %	18.9 %
9/15/2010 16:23	1.3 %	18.7 %
9/15/2010 16:24	1.13 %	18.7 %
9/15/2010 16:24	1.14 %	18.9 %
9/15/2010 16:25	1.32 %	18.8 %
9/15/2010 16:25	1.2 %	18.7 %
9/15/2010 16:26	1.24 %	18.8 %
9/15/2010 16:26	1.02 %	18.8 %
9/15/2010 16:27	1.24 %	18.8 %
9/15/2010 16:27	1.19 %	18.8 %
9/15/2010 16:28	1.16 %	18.8 %
9/15/2010 16:28	1.3 %	18.9 %
9/15/2010 16:29	1.25 %	18.8 %
9/15/2010 16:29	1.43 %	18.7 %
9/15/2010 16:30	1.45 %	18.7 %
9/15/2010 16:30	1.52 %	18.5 %
9/15/2010 16:31	1.59 %	18.5 %
9/15/2010 16:31	1.7 %	18.4 %
9/15/2010 16:32	1.32 %	18.6 %
9/15/2010 16:32	1.15 %	18.7 %
9/15/2010 16:33	1.31 %	18.8 %
9/15/2010 16:33	1.27 %	18.7 %
9/15/2010 16:34	1.18 %	18.9 %

9/15/2010 16:34	1.46 %	18.8 %
9/15/2010 16:35	1.26 %	18.6 %
9/15/2010 16:35	1.37 %	18.7 %
9/15/2010 16:36	1.22 %	18.7 %
9/15/2010 16:36	1.24 %	18.8 %
9/15/2010 16:37	1.07 %	18.8 %
9/15/2010 16:37	1.15 %	18.9 %
9/15/2010 16:38	1.07 %	18.9 %
9/15/2010 16:38	1.05 %	18.9 %
9/15/2010 16:39	1.09 %	19 %
9/15/2010 16:39	1.03 %	18.9 %
9/15/2010 16:40	1.1 %	19 %
9/15/2010 16:40	1.28 %	18.9 %

Run 2	1.267 %	18.630 %
Averages	O2	CO2
FCCU - Wet Gas Scrubber		

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 2 - M8

Date	time	O2	CO2
9/15/2010	15:15	1.13 %	18.7 %
9/15/2010	15:15	1.01 %	18.7 %
9/15/2010	15:16	1.28 %	18.8 %
9/15/2010	15:16	1.26 %	18.6 %
9/15/2010	15:17	1.37 %	18.7 %
9/15/2010	15:17	1.4 %	18.4 %
9/15/2010	15:18	1.26 %	18.6 %
9/15/2010	15:18	1.25 %	18.6 %
9/15/2010	15:19	1.34 %	18.6 %
9/15/2010	15:19	1.31 %	18.5 %
9/15/2010	15:20	1.35 %	18.6 %
9/15/2010	15:20	1.41 %	18.4 %
9/15/2010	15:21	1.32 %	18.5 %
9/15/2010	15:21	1.15 %	18.7 %
9/15/2010	15:22	1.27 %	18.7 %
9/15/2010	15:22	1.14 %	18.7 %
9/15/2010	15:23	1.18 %	18.7 %
9/15/2010	15:23	1.07 %	18.7 %
9/15/2010	15:24	1.11 %	18.8 %
9/15/2010	15:24	1.25 %	18.7 %
9/15/2010	15:25	1.27 %	18.6 %
9/15/2010	15:25	1.18 %	18.7 %
9/15/2010	15:26	1.19 %	18.8 %
9/15/2010	15:26	1.08 %	18.7 %
9/15/2010	15:27	1.19 %	18.8 %
9/15/2010	15:27	1.14 %	18.7 %
9/15/2010	15:28	1.31 %	18.7 %
9/15/2010	15:28	1.37 %	18.6 %
9/15/2010	15:29	1.5 %	18.5 %
9/15/2010	15:29	1.89 %	18.3 %
9/15/2010	15:30	1.42 %	18.3 %
9/15/2010	15:30	1.44 %	18.5 %
9/15/2010	15:31	1.57 %	18.4 %
9/15/2010	15:31	1.45 %	18.5 %
9/15/2010	15:32	1.39 %	18.5 %
9/15/2010	15:32	1.44 %	18.5 %
9/15/2010	15:33	1.12 %	18.6 %
9/15/2010	15:33	1.38 %	18.7 %
9/15/2010	15:34	1.37 %	18.5 %
9/15/2010	15:34	1.18 %	18.6 %
9/15/2010	15:35	1.46 %	18.7 %
9/15/2010	15:35	1.27 %	18.4 %
9/15/2010	15:36	1.33 %	18.6 %
9/15/2010	15:36	1.63 %	18.5 %
9/15/2010	15:37	1.48 %	18.3 %
9/15/2010	15:37	1.19 %	18.4 %
9/15/2010	15:38	1.12 %	18.8 %
9/15/2010	15:38	1.19 %	18.6 %
9/15/2010	15:39	1.2 %	18.7 %
9/15/2010	15:39	1.3 %	18.7 %
9/15/2010	15:40	1.15 %	18.6 %
9/15/2010	15:40	1.33 %	18.6 %
9/15/2010	15:41	1.4 %	18.5 %
9/15/2010	15:41	1.35 %	18.5 %
9/15/2010	15:42	1.24 %	18.6 %
9/15/2010	15:42	1.28 %	18.5 %
9/15/2010	15:43	1.29 %	18.6 %
9/15/2010	15:43	1.39 %	18.5 %
9/15/2010	15:44	1.35 %	18.5 %
9/15/2010	15:44	1.58 %	18.4 %
9/15/2010	15:45	1.36 %	18.4 %
9/15/2010	15:45	1.15 %	18.6 %
9/15/2010	15:46	1.26 %	18.7 %

9/15/2010 15:46	1.42 %	18.6 %
9/15/2010 15:47	1.18 %	18.5 %
9/15/2010 15:47	1.21 %	18.7 %
9/15/2010 15:48	1.24 %	18.6 %
9/15/2010 15:48	1.05 %	18.7 %
9/15/2010 15:49	1.35 %	18.7 %
9/15/2010 15:49	1.29 %	18.6 %
9/15/2010 15:50	1.04 %	18.6 %
9/15/2010 15:50	1.05 %	18.7 %
9/15/2010 15:51	1.04 %	18.8 %
9/15/2010 15:51	1.41 %	18.7 %
9/15/2010 15:52	1.08 %	18.6 %
9/15/2010 15:52	1.27 %	18.8 %
9/15/2010 15:53	1.09 %	18.7 %
9/15/2010 15:53	1.18 %	18.7 %
9/15/2010 15:54	1.16 %	18.7 %
9/15/2010 15:54	1.53 %	18.5 %
9/15/2010 15:55	1.27 %	18.4 %
9/15/2010 15:55	1.07 %	18.7 %
9/15/2010 15:56	1.01 %	18.8 %
9/15/2010 15:56	1.21 %	18.8 %
9/15/2010 15:57	1.42 %	18.7 %
9/15/2010 15:57	1.26 %	18.4 %
9/15/2010 15:58	1.11 %	18.7 %
9/15/2010 15:58	1.35 %	18.7 %
9/15/2010 15:59	1.42 %	18.5 %
9/15/2010 15:59	1.3 %	18.5 %
9/15/2010 16:00	1.14 %	18.7 %
9/15/2010 16:00	1.37 %	18.7 %
9/15/2010 16:01	1.22 %	18.6 %
9/15/2010 16:01	1.09 %	18.7 %
9/15/2010 16:02	1.24 %	18.8 %
9/15/2010 16:02	1.35 %	18.6 %
9/15/2010 16:03	1.3 %	18.6 %
9/15/2010 16:03	1.4 %	18.7 %
9/15/2010 16:04	1.44 %	18.5 %
9/15/2010 16:04	1.15 %	18.5 %
9/15/2010 16:05	1.2 %	18.7 %
9/15/2010 16:05	1.24 %	18.7 %
9/15/2010 16:06	1.38 %	18.6 %
9/15/2010 16:06	1.12 %	18.6 %
9/15/2010 16:07	1.31 %	18.7 %
9/15/2010 16:07	1.27 %	18.6 %
9/15/2010 16:08	1.21 %	18.7 %
9/15/2010 16:08	1.37 %	18.5 %
9/15/2010 16:09	1.46 %	18.6 %
9/15/2010 16:09	1.47 %	18.5 %
9/15/2010 16:10	1.24 %	18.5 %
9/15/2010 16:10	1.19 %	18.7 %
9/15/2010 16:11	1.06 %	18.8 %
9/15/2010 16:11	1.24 %	18.8 %
9/15/2010 16:12	1.26 %	18.7 %
9/15/2010 16:12	1.52 %	18.5 %
9/15/2010 16:13	1.28 %	18.5 %
9/15/2010 16:13	1.26 %	18.6 %
9/15/2010 16:14	1.28 %	18.7 %
9/15/2010 16:14	1.19 %	18.6 %
9/15/2010 16:15	1.04 %	18.8 %
9/15/2010 16:15	0.93 %	18.9 %
9/15/2010 16:16	0.94 %	19 %
9/15/2010 16:16	0.92 %	18.9 %
9/15/2010 16:17	0.99 %	19 %
9/15/2010 16:17	0.96 %	19 %
9/15/2010 16:18	1.08 %	19 %
9/15/2010 16:18	1.1 %	18.8 %
9/15/2010 16:19	1.13 %	18.8 %
9/15/2010 16:19	1.42 %	18.6 %
9/15/2010 16:20	1.14 %	18.6 %

9/15/2010 16:20	0.99 %	18.9 %
9/15/2010 16:21	1.15 %	18.9 %
9/15/2010 16:21	1.13 %	18.8 %
9/15/2010 16:22	1.14 %	18.8 %
9/15/2010 16:22	1.03 %	18.8 %
9/15/2010 16:23	1.31 %	18.9 %
9/15/2010 16:23	1.3 %	18.7 %
9/15/2010 16:24	1.13 %	18.7 %
9/15/2010 16:24	1.14 %	18.9 %
9/15/2010 16:25	1.32 %	18.8 %
9/15/2010 16:25	1.2 %	18.7 %
9/15/2010 16:26	1.24 %	18.8 %
9/15/2010 16:26	1.02 %	18.8 %
9/15/2010 16:27	1.24 %	18.8 %
9/15/2010 16:27	1.19 %	18.8 %
9/15/2010 16:28	1.16 %	18.8 %
9/15/2010 16:28	1.3 %	18.9 %
9/15/2010 16:29	1.25 %	18.8 %
9/15/2010 16:29	1.43 %	18.7 %
9/15/2010 16:30	1.45 %	18.7 %
9/15/2010 16:30	1.52 %	18.5 %
9/15/2010 16:31	1.59 %	18.5 %
9/15/2010 16:31	1.7 %	18.4 %
9/15/2010 16:32	1.32 %	18.6 %
9/15/2010 16:32	1.15 %	18.7 %
9/15/2010 16:33	1.31 %	18.8 %
9/15/2010 16:33	1.27 %	18.7 %
9/15/2010 16:34	1.18 %	18.9 %
9/15/2010 16:34	1.46 %	18.8 %
9/15/2010 16:35	1.26 %	18.6 %
9/15/2010 16:35	1.37 %	18.7 %
9/15/2010 16:36	1.22 %	18.7 %
9/15/2010 16:36	1.24 %	18.8 %
9/15/2010 16:37	1.07 %	18.8 %
9/15/2010 16:37	1.15 %	18.9 %
9/15/2010 16:38	1.07 %	18.9 %
9/15/2010 16:38	1.05 %	18.9 %
9/15/2010 16:39	1.09 %	19 %
9/15/2010 16:39	1.03 %	18.9 %
9/15/2010 16:40	1.1 %	19 %
9/15/2010 16:40	1.28 %	18.9 %
9/15/2010 16:53	1.21 %	18.9 %
9/15/2010 16:53	1.12 %	18.8 %
9/15/2010 16:54	1.15 %	18.8 %
9/15/2010 16:54	1.14 %	18.9 %
9/15/2010 16:55	1.26 %	18.8 %
9/15/2010 16:55	1.15 %	18.8 %
9/15/2010 16:56	1.19 %	18.9 %
9/15/2010 16:56	1.48 %	18.7 %
9/15/2010 16:57	1.28 %	18.6 %
9/15/2010 16:57	1.38 %	18.7 %
9/15/2010 16:58	1.46 %	18.6 %
9/15/2010 16:58	1.73 %	18.4 %
9/15/2010 16:59	1.25 %	18.6 %
9/15/2010 16:59	1.33 %	18.8 %
9/15/2010 17:00	1.11 %	18.8 %
9/15/2010 17:00	1.1 %	19 %
9/15/2010 17:01	1.25 %	18.9 %
9/15/2010 17:01	1.45 %	18.9 %

Run 2	1.255474 %	18.67684 %
Averages	O2	CO2

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
Run 3 - M29

Date time	O2	CO2
9/15/2010 17:10	1.23 %	18.7 %
9/15/2010 17:10	1.49 %	18.8 %
9/15/2010 17:11	1.3 %	18.7 %
9/15/2010 17:11	1.3 %	18.8 %
9/15/2010 17:12	1.37 %	18.8 %
9/15/2010 17:12	1.44 %	18.7 %
9/15/2010 17:13	1.28 %	18.7 %
9/15/2010 17:13	1.2 %	18.9 %
9/15/2010 17:14	1.25 %	18.9 %
9/15/2010 17:14	1.48 %	18.9 %
9/15/2010 17:15	1.44 %	18.6 %
9/15/2010 17:15	1.5 %	18.6 %
9/15/2010 17:16	1.38 %	18.7 %
9/15/2010 17:16	1.48 %	18.7 %
9/15/2010 17:17	1.28 %	18.8 %
9/15/2010 17:17	1.16 %	18.9 %
9/15/2010 17:18	1.21 %	19 %
9/15/2010 17:18	1.34 %	18.9 %
9/15/2010 17:19	1.43 %	18.8 %
9/15/2010 17:19	1.12 %	18.9 %
9/15/2010 17:20	0.98 %	19.1 %
9/15/2010 17:20	1.15 %	19.2 %
9/15/2010 17:21	1.28 %	19 %
9/15/2010 17:21	1.25 %	18.9 %
9/15/2010 17:22	1.07 %	19 %
9/15/2010 17:22	1.33 %	19 %
9/15/2010 17:23	1.29 %	18.9 %
9/15/2010 17:23	1.35 %	18.9 %
9/15/2010 17:24	1.34 %	18.8 %
9/15/2010 17:24	1.3 %	18.8 %
9/15/2010 17:25	1.44 %	18.9 %
9/15/2010 17:25	1.51 %	18.7 %
9/15/2010 17:26	1.69 %	18.7 %
9/15/2010 17:26	1.37 %	18.6 %
9/15/2010 17:27	1.35 %	18.9 %
9/15/2010 17:27	1.15 %	18.9 %
9/15/2010 17:28	1.04 %	19 %
9/15/2010 17:28	1.15 %	19.2 %
9/15/2010 17:29	1.15 %	19 %
9/15/2010 17:29	1.29 %	19 %
9/15/2010 17:30	1.34 %	18.8 %
9/15/2010 17:30	1.39 %	18.9 %
9/15/2010 17:31	1.68 %	18.7 %
9/15/2010 17:31	1.58 %	18.5 %
9/15/2010 17:32	1.35 %	18.7 %
9/15/2010 17:32	1.18 %	18.8 %
9/15/2010 17:33	1.26 %	19 %
9/15/2010 17:33	1.32 %	18.9 %
9/15/2010 17:34	1.28 %	18.9 %
9/15/2010 17:34	1.36 %	18.9 %
9/15/2010 17:35	1.38 %	18.8 %
9/15/2010 17:35	1.29 %	18.9 %
9/15/2010 17:36	1.28 %	18.9 %
9/15/2010 17:36	1.34 %	18.8 %
9/15/2010 17:37	1.18 %	18.9 %
9/15/2010 17:37	1.13 %	19.1 %
9/15/2010 17:38	1.31 %	19 %
9/15/2010 17:38	1.3 %	18.9 %
9/15/2010 17:39	1.52 %	18.8 %
9/15/2010 17:39	1.56 %	18.7 %
9/15/2010 17:40	1.35 %	18.8 %
9/15/2010 17:40	1.32 %	18.9 %

9/15/2010 17:41	1.45 %	18.8 %
9/15/2010 17:41	1.28 %	18.9 %
9/15/2010 17:42	1.23 %	18.9 %
9/15/2010 17:42	1.24 %	19 %
9/15/2010 17:43	1.49 %	18.9 %
9/15/2010 17:43	1.65 %	18.8 %
9/15/2010 17:44	1.4 %	18.7 %
9/15/2010 17:44	1.4 %	18.8 %
9/15/2010 17:45	1.42 %	18.8 %
9/15/2010 17:45	1.25 %	18.8 %
9/15/2010 17:46	1.25 %	19 %
9/15/2010 17:46	1.28 %	19 %
9/15/2010 17:47	1.34 %	19 %
9/15/2010 17:47	1.39 %	18.9 %
9/15/2010 17:48	1.53 %	18.7 %
9/15/2010 17:48	1.41 %	18.8 %
9/15/2010 17:49	1.6 %	18.8 %
9/15/2010 17:49	1.53 %	18.7 %
9/15/2010 17:50	1.36 %	18.7 %
9/15/2010 17:50	1.38 %	18.9 %
9/15/2010 17:51	1.24 %	19 %
9/15/2010 17:51	1.35 %	18.9 %
9/15/2010 17:52	1.27 %	18.9 %
9/15/2010 17:52	1.21 %	19 %
9/15/2010 17:53	1.32 %	19 %
9/15/2010 17:53	1.23 %	18.9 %
9/15/2010 17:54	1.35 %	19 %
9/15/2010 17:54	1.29 %	18.9 %
9/15/2010 17:55	1.23 %	19 %
9/15/2010 17:55	1.24 %	19 %
9/15/2010 17:56	1.36 %	19 %
9/15/2010 17:56	1.32 %	18.9 %
9/15/2010 17:57	1.2 %	19 %
9/15/2010 17:57	1.11 %	19 %
9/15/2010 17:58	1.4 %	19.1 %
9/15/2010 17:58	1.13 %	18.9 %
9/15/2010 17:59	1.18 %	19 %
9/15/2010 17:59	1.05 %	19.1 %
9/15/2010 18:00	1.17 %	19.2 %
9/15/2010 18:00	1.09 %	19.1 %
9/15/2010 18:01	1.15 %	19.1 %
9/15/2010 18:01	1.64 %	18.9 %
9/15/2010 18:02	1.39 %	18.7 %
9/15/2010 18:02	1.26 %	18.8 %
9/15/2010 18:03	1.18 %	19 %
9/15/2010 18:03	1.2 %	19.1 %
9/15/2010 18:04	1.28 %	19 %
9/15/2010 18:04	1.14 %	19 %
9/15/2010 18:05	1.11 %	19.1 %
9/15/2010 18:05	1.16 %	19.1 %
9/15/2010 18:06	1.29 %	19.1 %
9/15/2010 18:06	1.34 %	18.9 %
9/15/2010 18:07	1.32 %	18.9 %
9/15/2010 18:07	1.33 %	18.9 %
9/15/2010 18:08	1.14 %	18.9 %
9/15/2010 18:08	1.18 %	19 %
9/15/2010 18:09	1.09 %	19.1 %
9/15/2010 18:09	1.24 %	19.1 %
9/15/2010 18:10	1.39 %	19 %
9/15/2010 18:10	1.27 %	18.9 %
9/15/2010 18:11	1.35 %	19 %
9/15/2010 18:11	1.26 %	18.9 %
9/15/2010 18:12	1.13 %	19 %
9/15/2010 18:12	1.32 %	19 %
9/15/2010 18:13	1.32 %	18.9 %
9/15/2010 18:13	1.35 %	18.9 %
9/15/2010 18:14	1.3 %	18.9 %

9/15/2010 18:14	1.54 %	18.9 %
9/15/2010 18:15	1.51 %	18.7 %
9/15/2010 18:15	1.47 %	18.8 %
9/15/2010 18:16	1.55 %	18.8 %
9/15/2010 18:16	1.41 %	18.7 %
9/15/2010 18:17	1.32 %	18.9 %
9/15/2010 18:17	1.39 %	18.8 %
9/15/2010 18:18	1.19 %	18.8 %
9/15/2010 18:18	1.05 %	19.1 %
9/15/2010 18:19	1.08 %	19.1 %
9/15/2010 18:19	1.19 %	19.1 %
9/15/2010 18:20	1.17 %	18.9 %
9/15/2010 18:20	1.11 %	19.1 %
9/15/2010 18:21	1.13 %	19.1 %
9/15/2010 18:21	1.09 %	19.1 %
9/15/2010 18:22	1.19 %	19.1 %
9/15/2010 18:22	1.31 %	18.9 %
9/15/2010 18:23	1.31 %	18.9 %
9/15/2010 18:23	1.43 %	18.9 %
9/15/2010 18:24	1.31 %	18.7 %
9/15/2010 18:24	1.23 %	19 %
9/15/2010 18:25	1.37 %	18.9 %
9/15/2010 18:25	1.34 %	18.8 %
9/15/2010 18:26	1.37 %	18.9 %
9/15/2010 18:26	1.27 %	18.9 %
9/15/2010 18:27	1.29 %	18.9 %
9/15/2010 18:27	1.4 %	18.8 %
9/15/2010 18:28	1.19 %	18.9 %
9/15/2010 18:28	1.38 %	18.9 %
9/15/2010 18:29	1.08 %	18.9 %
9/15/2010 18:29	1.18 %	19.1 %
9/15/2010 18:30	1.18 %	19 %
9/15/2010 18:30	1.37 %	19 %
9/15/2010 18:31	1.38 %	18.7 %
9/15/2010 18:31	1.14 %	18.9 %
9/15/2010 18:32	1.2 %	19 %
9/15/2010 18:32	1.25 %	19 %
9/15/2010 18:33	1.19 %	19 %
9/15/2010 18:33	1.4 %	19 %
9/15/2010 18:34	1.39 %	18.8 %
9/15/2010 18:34	1.21 %	18.8 %
9/15/2010 18:35	1.16 %	19 %
9/15/2010 18:35	0.98 %	19 %
9/15/2010 18:36	0.96 %	19.2 %
9/15/2010 18:36	1.13 %	19.2 %
9/15/2010 18:37	1.3 %	19.1 %
9/15/2010 18:37	1.38 %	18.9 %
9/15/2010 18:38	1.27 %	18.9 %
9/15/2010 18:38	1.35 %	18.9 %
9/15/2010 18:39	1.17 %	18.9 %
9/15/2010 18:39	1.3 %	19 %
9/15/2010 18:40	1.39 %	18.9 %
9/15/2010 18:40	1.28 %	18.9 %
9/15/2010 18:41	1.18 %	18.9 %
9/15/2010 18:41	1.27 %	19 %
9/15/2010 18:42	1.2 %	18.9 %
9/15/2010 18:42	1.3 %	19 %
9/15/2010 18:43	1.14 %	18.9 %
9/15/2010 18:43	1.3 %	19 %
9/15/2010 18:44	1.28 %	19 %
9/15/2010 18:44	1.28 %	18.9 %
9/15/2010 18:45	1.21 %	18.9 %
9/15/2010 18:45	1.48 %	19 %
9/15/2010 18:46	1.51 %	18.8 %
9/15/2010 18:46	1.5 %	18.7 %
9/15/2010 18:47	1.51 %	18.7 %
9/15/2010 18:47	1.31 %	18.7 %

9/15/2010 18:48	1.44 %	18.9 %
9/15/2010 18:48	1.39 %	18.8 %
9/15/2010 18:49	1.17 %	18.9 %
9/15/2010 18:49	1.16 %	19 %
9/15/2010 18:50	1.29 %	19 %
9/15/2010 18:50	1.44 %	18.8 %
9/15/2010 18:51	1.42 %	18.8 %
9/15/2010 18:51	1.2 %	18.9 %
9/15/2010 18:52	1.28 %	19 %
9/15/2010 18:52	1.26 %	18.9 %
9/15/2010 18:53	1.15 %	18.9 %
9/15/2010 18:53	1.25 %	19 %

Run3	1.297 %	18.907 %
Averages	O2	CO2
FCCU - Wet Gas Scrubber		

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 3 - M8

Date time	O2	CO2
9/15/2010 19:15	1.28 %	18.9 %
9/15/2010 19:15	1.44 %	18.8 %
9/15/2010 19:16	1.45 %	18.7 %
9/15/2010 19:16	1.3 %	18.7 %
9/15/2010 19:17	1.37 %	18.8 %
9/15/2010 19:17	1.07 %	18.8 %
9/15/2010 19:18	1.15 %	19.1 %
9/15/2010 19:18	1.19 %	18.9 %
9/15/2010 19:19	1.17 %	18.9 %
9/15/2010 19:19	0.83 %	19 %
9/15/2010 19:20	1.08 %	19 %
9/15/2010 19:20	1.07 %	19 %
9/15/2010 19:21	1.09 %	18.9 %
9/15/2010 19:21	1.24 %	19 %
9/15/2010 19:22	1.18 %	18.9 %
9/15/2010 19:22	1.35 %	18.9 %
9/15/2010 19:23	1.09 %	19 %
9/15/2010 19:23	1.15 %	19 %
9/15/2010 19:24	1.42 %	18.9 %
9/15/2010 19:24	1.29 %	18.7 %
9/15/2010 19:25	1.14 %	18.8 %
9/15/2010 19:25	1.25 %	19.1 %
9/15/2010 19:26	1.35 %	18.8 %
9/15/2010 19:26	1.33 %	18.8 %
9/15/2010 19:27	1.33 %	18.8 %
9/15/2010 19:27	1.39 %	18.7 %
9/15/2010 19:28	1.29 %	18.7 %
9/15/2010 19:28	1.28 %	18.9 %
9/15/2010 19:29	1.16 %	18.9 %
9/15/2010 19:29	1.24 %	18.9 %
9/15/2010 19:30	1.46 %	18.8 %
9/15/2010 19:30	1.42 %	18.6 %
9/15/2010 19:31	1.16 %	18.7 %
9/15/2010 19:31	1.2 %	18.9 %
9/15/2010 19:32	1.47 %	18.9 %
9/15/2010 19:32	1.37 %	18.8 %
9/15/2010 19:33	1.23 %	18.7 %
9/15/2010 19:33	1.3 %	18.8 %
9/15/2010 19:34	1.52 %	18.7 %
9/15/2010 19:34	1.22 %	18.7 %
9/15/2010 19:35	1.35 %	18.7 %
9/15/2010 19:35	1.27 %	18.7 %
9/15/2010 19:36	1.44 %	18.8 %
9/15/2010 19:36	1.38 %	18.6 %
9/15/2010 19:37	1.5 %	18.8 %
9/15/2010 19:37	1.34 %	18.7 %
9/15/2010 19:38	1.3 %	18.8 %
9/15/2010 19:38	1.22 %	18.9 %
9/15/2010 19:39	1.26 %	18.9 %
9/15/2010 19:39	1.23 %	18.8 %
9/15/2010 19:40	1.04 %	18.8 %
9/15/2010 19:40	1.31 %	19 %
9/15/2010 19:41	1.17 %	18.8 %
9/15/2010 19:41	1.43 %	18.8 %
9/15/2010 19:42	1.16 %	18.8 %
9/15/2010 19:42	1.23 %	18.9 %
9/15/2010 19:43	1.44 %	18.8 %
9/15/2010 19:43	1.46 %	18.5 %
9/15/2010 19:44	1.35 %	18.6 %
9/15/2010 19:44	1.43 %	18.8 %
9/15/2010 19:45	1.39 %	18.7 %
9/15/2010 19:45	1.62 %	18.7 %

9/15/2010 19:46	1.55 %	18.4 %
9/15/2010 19:46	1.44 %	18.5 %
9/15/2010 19:47	1.14 %	18.7 %
9/15/2010 19:47	1.17 %	18.8 %
9/15/2010 19:48	0.99 %	18.9 %
9/15/2010 19:48	1.31 %	18.9 %
9/15/2010 19:49	1.09 %	18.9 %
9/15/2010 19:49	1.14 %	19 %
9/15/2010 19:50	1.16 %	18.9 %
9/15/2010 19:50	1.35 %	18.8 %
9/15/2010 19:51	1.28 %	18.8 %
9/15/2010 19:51	1.26 %	18.7 %
9/15/2010 19:52	1.12 %	18.9 %
9/15/2010 19:52	1.41 %	18.8 %
9/15/2010 19:53	1.47 %	18.7 %
9/15/2010 19:53	1.54 %	18.6 %
9/15/2010 19:54	1.44 %	18.6 %
9/15/2010 19:54	1.24 %	18.7 %
9/15/2010 19:55	1.31 %	18.8 %
9/15/2010 19:55	1.35 %	18.7 %
9/15/2010 19:56	1.22 %	18.8 %
9/15/2010 19:56	1.3 %	18.8 %
9/15/2010 19:57	1.24 %	18.8 %
9/15/2010 19:57	1.38 %	18.8 %
9/15/2010 19:58	1.63 %	18.7 %
9/15/2010 19:58	1.51 %	18.4 %
9/15/2010 19:59	1.15 %	18.6 %
9/15/2010 19:59	1.22 %	18.8 %
9/15/2010 20:00	1.16 %	18.8 %
9/15/2010 20:00	1.06 %	18.9 %
9/15/2010 20:01	1.1 %	18.9 %
9/15/2010 20:01	1.32 %	18.9 %
9/15/2010 20:02	1.33 %	18.7 %
9/15/2010 20:02	1.09 %	18.8 %
9/15/2010 20:03	1.04 %	18.9 %
9/15/2010 20:03	1.14 %	19 %
9/15/2010 20:04	1.12 %	18.9 %
9/15/2010 20:04	1.16 %	18.9 %
9/15/2010 20:05	1.2 %	18.9 %
9/15/2010 20:05	1.17 %	18.8 %
9/15/2010 20:06	1.27 %	18.8 %
9/15/2010 20:06	1.3 %	18.8 %
9/15/2010 20:07	1.36 %	18.7 %
9/15/2010 20:07	1.22 %	18.7 %
9/15/2010 20:08	1.24 %	18.8 %
9/15/2010 20:08	1.12 %	18.8 %
9/15/2010 20:09	1.08 %	18.9 %
9/15/2010 20:09	1.55 %	18.8 %
9/15/2010 20:10	1.33 %	18.6 %
9/15/2010 20:10	1.3 %	18.7 %
9/15/2010 20:11	1.14 %	18.8 %
9/15/2010 20:11	1.16 %	18.7 %
9/15/2010 20:12	1.54 %	18.8 %
9/15/2010 20:12	1.4 %	18.4 %
9/15/2010 20:13	1.27 %	18.8 %
9/15/2010 20:13	1.21 %	18.7 %
9/15/2010 20:14	1 %	18.8 %
9/15/2010 20:14	1.24 %	18.9 %
9/15/2010 20:15	1.19 %	18.8 %
9/15/2010 20:15	1.15 %	18.9 %
9/15/2010 20:16	1.4 %	18.8 %
9/15/2010 20:16	1.33 %	18.7 %
9/15/2010 20:17	1.46 %	18.7 %
9/15/2010 20:17	1.43 %	18.5 %
9/15/2010 20:18	1.19 %	18.7 %
9/15/2010 20:18	1.33 %	18.8 %
9/15/2010 20:19	1.21 %	18.7 %

9/15/2010 20:19	1.21 %	18.8 %
9/15/2010 20:20	1.36 %	18.7 %
9/15/2010 20:20	1.31 %	18.7 %
9/15/2010 20:21	1.33 %	18.7 %
9/15/2010 20:21	1.56 %	18.6 %
9/15/2010 20:22	1.34 %	18.5 %
9/15/2010 20:22	1.32 %	18.7 %
9/15/2010 20:23	1.1 %	18.7 %
9/15/2010 20:23	1.2 %	18.9 %
9/15/2010 20:24	1.33 %	18.8 %
9/15/2010 20:24	1.29 %	18.7 %
9/15/2010 20:25	1.3 %	18.7 %
9/15/2010 20:25	1.27 %	18.7 %
9/15/2010 20:26	1.19 %	18.7 %
9/15/2010 20:26	1.23 %	18.8 %
9/15/2010 20:27	1.24 %	18.8 %
9/15/2010 20:27	1.23 %	18.7 %
9/15/2010 20:28	1.16 %	18.9 %
9/15/2010 20:28	1.24 %	18.8 %
9/15/2010 20:29	1.25 %	18.8 %
9/15/2010 20:29	1.09 %	18.8 %
9/15/2010 20:30	1.28 %	18.8 %
9/15/2010 20:30	1.22 %	18.7 %
9/15/2010 20:31	1.3 %	18.8 %
9/15/2010 20:31	1.33 %	18.7 %

Run3	1.273 %	18.783 %
Averages	O2	CO2
FCCU - Wet Gas Scrubber		

Plant: Hess Corp.
Unit: FCCU
Location: Outlet
Parameter Ammonia

Molar Masses (P)
(A)
18.04
17.03
Analyzed and reported by lab as NH4 (ammonium).
Emissions are calculated as NH3.

Run	1	2	3
Date	9/16/10	9/16/10	9/17/10
Condition	Full	Full	Full

Stack Flowrate (DSCFM) (B)	138,343	130,230	129,993
Stack Moisture (%) (C)	20.20	20.09	20.31
Meter Volume (DSCF) (D)	41.319	38.282	38.587

Sample Concentration (ug) (G)	1,800	2,300	2,200
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Emissions:

Pounds / hour (H)	0.7510	0.9750	0.9235
Parts/million (dry) (J)	2.06	2.84	2.70
Parts/million (wet) (K)	1.64	2.27	2.15
Oxygen (%) (L)	1.3	1.3	1.2
Parts/million (dry) @15% O2 (M)	0.62	0.85	0.81

Equations:

(G) = mass, ug, as reported by lab
(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds)/ microgram)(A/P) / (D)
(J) = (G)*(A/P)*(0.8528) / (A x D)
(K) = (J)/((100 - C) / 100)
(M) = (J)(5.9/(20.9-L))

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/16/10
Sampling Location:	Outlet
Run No.:	1
Run Times:	1327-1433
	FCCU
	CTM-027 ammonia

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	41.990
Total Water Caught (grams) [Wc]:	221.7
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	29.96
Carbon Dioxide (%) [CO2]:	18.7
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	60

Port Ext 5.5"

Output Data:	
Metered Volume (dry cubic feet @stp) [Vms]:	41.319
Water Volume (cubic feet @ stp) [Vws]:	10.458
Moisture (%) [Bws]:	20.20
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.044
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.41
Absolute Stack Pressure ("Hg) [Pa]:	30.02
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	71.80
Stack - @ stp [Vss]:	63.97
Nozzle - Actual [Vn]:	65.96
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	194565
@ stp [SCFM]:	173357
Dry @ stp [DSCFM]:	138343
Sample Isokinetics (%) [I]:	103.1

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	1.400	1.61	70	70	134	1.18322
2	1.600	1.84	70	70	135	1.26491
3	1.600	1.84	71	71	134	1.26491
4	1.700	1.96	72	72	134	1.30384
5	1.650	1.90	73	73	135	1.28452
6	1.600	1.84	74	74	135	1.26491
7	1.700	1.96	75	75	134	1.30384
8	1.550	1.78	76	76	135	1.24499
9	1.500	1.73	76	76	135	1.22474
10	1.400	1.61	80	80	134	1.18322
11	0.910	1.05	77	77	134	0.95394
12	0.680	0.78	78	78	134	0.82462
13	1.100	1.27	78	78	135	1.04881
14	1.200	1.38	78	78	135	1.09545
15	1.400	1.61	78	78	135	1.18322
16	1.500	1.73	79	79	135	1.22474
17	1.600	1.84	80	80	135	1.26491
18	1.700	1.96	80	80	135	1.30384
19	1.750	2.01	81	81	135	1.32288
20	1.900	2.19	81	81	135	1.37840
21	2.000	2.30	82	82	135	1.41421
22	1.400	1.61	82	82	135	1.18322
23	1.400	1.61	82	82	134	1.18322
24	0.7	0.81	83	83	134	0.83666
25						0.00000
Averages:	1.456	1.67	77.3		135	1.19755
		[H]	[Tm]		[Ts]	[dP]

This Spreadsheet Uses The Following Equations/Calculations:

$Vms = (Vm)(Y)((17.647)/((H / 13.6) + (Pb)) / (Tm + 460))$
 $Vws = (Wc) / 21.2$
 $Bws = (100)(Vws) / (Vws + Vms)$
 $MWd = ((0.44)(CO2)) + ((0.32)(O2)) + ((0.28)(100 - (CO2 + O2)))$
 $MWw = (0.18)(Bws) + ((100 - Bws)(MWd) / 100)$
 $Pa = Pb + ((Ps) / 13.6)$
 $Vsa = (85.48)(Cp)(dP) / ((Ts + 460) / ((MWw)(Pa)))^{0.5}$
 $Vss = (17.647)(Vsa)(Pa) / ((Ts) + 460)$
 $ACFM = (Vsa)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = (SCFM)(100 - (Bws) / 100)$
 $Vn = (Vms + Vws) / (((Dn / 2)^2)(3.14 / 144)(min)(60))$
 $I = (Vn / Vss)(100)$

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/16/10
Sampling Location:	Outlet
Run No.:	2
Run Times:	1500-1603
	FCCU
	CTM-027 ammonia

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	39.705
Total Water Caught (grams) [Wc]:	204.1
Stack Static Pressure ("H2O) [Ps]:	0.88
Barometric Pressure ("Hg) [Pb]:	29.89
Carbon Dioxide (%) [CO2]:	18.8
Oxygen (%) [O2]:	1.3
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	60

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	38.282
Water Volume (cubic feet @ stp) [Vws]:	9.627
Moisture (%) [Bws]:	20.09
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.06
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.44
Absolute Stack Pressure ("Hg) [Pa]:	29.95
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	67.74
Stack - @ stp [Vss]:	60.14
Nozzle - Actual [Vn]:	61.03
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	183566
@ stp [SCFM]:	162981
Dry @ stp [DSCFM]:	130230
Sample Isokinetics (%) [I]:	101.5

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.890	1.02	82	82	135	0.94340
2	1.100	1.27	82	82	135	1.04881
3	1.200	1.38	82	82	135	1.09545
4	1.400	1.61	83	83	135	1.18322
5	1.550	1.78	84	84	135	1.24499
6	1.550	1.78	84	84	136	1.24499
7	1.550	1.78	85	85	135	1.24499
8	1.550	1.78	85	85	135	1.24499
9	1.450	1.67	86	86	135	1.20416
10	1.300	1.50	87	87	136	1.14018
11	0.900	1.04	87	87	135	0.94868
12	0.580	0.67	87	87	134	0.76158
13	1.300	1.50	87	87	135	1.14018
14	1.550	1.78	87	87	135	1.24499
15	1.550	1.78	88	88	136	1.24499
16	1.550	1.78	89	89	136	1.24499
17	1.550	1.78	89	89	136	1.24499
18	1.500	1.73	89	89	136	1.22474
19	1.500	1.73	90	90	136	1.22474
20	1.500	1.73	90	90	136	1.22474
21	1.300	1.50	90	90	136	1.14018
22	1.150	1.32	90	90	136	1.07238
23	0.880	1.01	91	91	135	0.93808
24	0.690	0.79	91	91	135	0.83066
25						
		[H]	[Tm]		[Ts]	[dP]
Averages:	1.293	1.49	86.9		135	1.12838

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)((H / 13.6)+(Pb))/((Tm + 460))$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$ $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	Hess Corp. Perth Amboy, NJ
Date:	9/17/10
Sampling Location:	Outlet
Run No.:	3
Run Times:	0836-0940
	FCCU
	CTM-027 ammonia

Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	39.207
Total Water Caught (grams) [Wc]:	208.5
Stack Static Pressure ("H2O) [Ps]:	0.85
Barometric Pressure ("Hg) [Pb]:	29.86
Carbon Dioxide (%) [CO2]:	18.5
Oxygen (%) [O2]:	1.2
Nozzle Diameter (inches) [Dn]:	0.200
Pitot Tube Factor [Cp]:	0.84
Meter Correction Factor [Y]:	0.996
Stack Cross-Section Area (Square Feet) [CSA]:	45.1658
Total Sample Time (minutes) [min]:	60

Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	38.587
Water Volume (cubic feet @ stp) [Vws]:	9.835
Moisture (%) [Bws]:	20.31
Dry Molecular Weight (lb/lb-mol) [MWd]:	31.008
Wet Molecular Weight (lb/lb-mol) [MWw]:	28.37
Absolute Stack Pressure ("Hg) [Pa]:	29.92
Gas Velocities (feet/second)	
Stack - Actual [Vsa]:	67.83
Stack - @ stp [Vss]:	60.19
Nozzle - Actual [Vn]:	61.68
Stack Flowrate (cubic feet/ minute)	
Actual [ACFM]:	183810
@ stp [SCFM]:	163125
Dry @ stp [DSCFM]:	129993
Sample Isokinetics (%) [I]:	102.5

stp = Standard Conditions = 68 deg. F, 29.92 "Hg

Traverse Point No.	Delta-P ("H2O)	Delta-H ("H2O)	Gas Meter Temps.		Stack Temp. (deg. F)	Square Root of Delta-P
			Inlet (deg. F)	Outlet (deg. F)		
1	0.880	1.01	69	69	135	0.93808
2	1.100	1.27	70	70	135	1.04881
3	1.250	1.44	71	71	136	1.11803
4	1.350	1.55	72	72	135	1.16190
5	1.500	1.73	72	72	135	1.22474
6	1.550	1.78	73	73	135	1.24499
7	1.550	1.78	73	73	135	1.24499
8	1.550	1.78	74	74	135	1.24499
9	1.500	1.73	75	75	135	1.22474
10	1.300	1.50	75	75	135	1.14018
11	0.990	1.14	75	75	135	0.99499
12	0.720	0.83	76	76	134	0.84853
13	1.400	1.61	76	76	135	1.18322
14	1.500	1.73	76	76	135	1.22474
15	1.500	1.73	77	77	135	1.22474
16	1.550	1.78	77	77	135	1.24499
17	1.550	1.78	78	78	136	1.24499
18	1.500	1.73	78	78	135	1.22474
19	1.450	1.67	78	78	135	1.20416
20	1.400	1.61	78	78	135	1.18322
21	1.300	1.50	78	78	135	1.14018
22	1.100	1.27	78	78	135	1.04881
23	0.880	1.01	78	78	135	0.93808
24	0.610	0.70	78	78	134	0.78102
25						
Averages:	1.291	1.48	75.2		135	1.12824

This Spreadsheet Uses The Following Equations/Calculations:	
$Vms = (Vm)(Y)(17.647)/((H / 13.6)+(Pb))/((Tm + 460))$ $Vws = (Wc) / 21.2$ $Bws = (100)(Vws)/(Vws + Vms)$ $MWd = ((0.44)(CO2))+((0.32)(O2))+((0.28)(100-(CO2 + O2)))$ $MWw = (0.18)(Bws)+((100 - Bws)(MWd) / 100)$ $Pa = Pb + ((Ps) / 13.6)$ $Vsa = (85.48)(Cp)(dP)/((Ts+460)/((MWw)(Pa)))^{0.5}$ $Vss = (17.647)(Vsa)(Pa)/((Ts) + 460)$ $ACFM = (Vsa)(CSA)(60)$ $SCFM = (Vss)(CSA)(60)$ $DSCFM = (SCFM)(100 - (Bws) / 100)$ $Vn = (Vms + Vws)/(((Dn / 2)^2)(3.14 / 144)(min)(60))$ $I = (Vn / Vss)(100)$	

Project Name: Hess Corporation
Perth Amboy, NJ

Source: FCCU

Condition: normal production

Test Date: 9/16 & 17/10 CTM - 027

GAS TESTED	SAMPLE RUN ID	CONCENTRATIONS (% O ₂ & CO ₂ ; PPM ALL OTHERS)										STACK FLOW RATE (dscfm)	Mass Emissions	
		CERTIFIED STANDARD	PRE-TEST RESPONSE	POST-TEST RESPONSE	PRE-TEST ZERO	POST-TEST ZERO	RAW AVERAGE	BIAS CORRECTED AVERAGE	FROM WET TO DRY AVERAGES	@ 7% O ₂	(J)		(K)	
O ₂	1	2.5	2.5	2.4	0.1	0.0	1.31	1.307	N/A					
O ₂	2	2.5	2.4	2.4	0.0	0.0	1.29	1.343	N/A					
O ₂	3	2.4	2.5	2.4	0.1	0.0	1.28	1.232	N/A					
CO ₂	1	22.1	21.8	21.8	0.1	0.3	18.51	18.738	N/A					
CO ₂	2	22.1	21.8	21.8	0.3	0.4	18.62	18.826	N/A					
CO ₂	3	22.1	21.8	22.1	0.2	0.2	18.43	18.523	N/A					

The Following Calculations are Used In This Spreadsheet:

$$G = (F - ((D+E)/2)) \times (A/((B+C)/2) - ((D+E)/2))$$

$$H = (13.9/(20.9-G_{O_2})) \times G$$

$$J = I \times 0.15505 \times 10^{-6} \times G \times MW_{GAS}$$

$$K = (20.9/(20.9-G_{O_2})) \times G \times A_{CO} \text{ or } NO_x \times B_{fuel}$$

Where --

$$A_{CO} = 7.2678E-08$$

$$A_{NOx} = 1.1940E-07$$

$$A_{THC} = 4.1530E-08$$

$$L = (100/(100-M)) \times G_{THC}$$

And...

$$B_{nat. gas} = 8710$$

$$B_{nat. gas} = N/A$$

$$B_{fuel oil} = 9190$$

Hess Corporation, Perth Amboy, NJ
FCCU
Run 1, CTM - 027

Date	time	O2	CO2
9/16/2010	13:25	1.44 %	18.4 %
9/16/2010	13:25	1.39 %	18.5 %
9/16/2010	13:26	1.25 %	18.4 %
9/16/2010	13:26	1.15 %	18.5 %
9/16/2010	13:27	1.45 %	18.4 %
9/16/2010	13:27	1.21 %	18.3 %
9/16/2010	13:28	0.99 %	18.6 %
9/16/2010	13:28	1.42 %	18.6 %
9/16/2010	13:29	1.37 %	18.2 %
9/16/2010	13:29	1.35 %	18.4 %
9/16/2010	13:30	1.31 %	18.4 %
9/16/2010	13:30	1.06 %	18.5 %
9/16/2010	13:31	1.09 %	18.7 %
9/16/2010	13:31	1.56 %	18.5 %
9/16/2010	13:32	1.3 %	18.4 %
9/16/2010	13:32	1.42 %	18.5 %
9/16/2010	13:33	1.46 %	18.4 %
9/16/2010	13:33	1.68 %	18.2 %
9/16/2010	13:34	1.48 %	18.3 %
9/16/2010	13:34	1.23 %	18.5 %
9/16/2010	13:35	1.14 %	18.6 %
9/16/2010	13:35	1.14 %	18.6 %
9/16/2010	13:36	1.3 %	18.6 %
9/16/2010	13:36	1.25 %	18.4 %
9/16/2010	13:37	1.25 %	18.5 %
9/16/2010	13:37	1.28 %	18.5 %
9/16/2010	13:38	1.24 %	18.6 %
9/16/2010	13:38	1.25 %	18.5 %
9/16/2010	13:39	1.37 %	18.6 %
9/16/2010	13:39	1.21 %	18.5 %
9/16/2010	13:40	1.26 %	18.7 %
9/16/2010	13:40	1.38 %	18.4 %
9/16/2010	13:41	1.42 %	18.4 %
9/16/2010	13:41	1.39 %	18.5 %
9/16/2010	13:42	1.4 %	18.3 %
9/16/2010	13:42	1.44 %	18.2 %
9/16/2010	13:43	1.25 %	18.5 %
9/16/2010	13:43	1.55 %	18.5 %
9/16/2010	13:44	1.19 %	18.4 %
9/16/2010	13:44	1.33 %	18.5 %
9/16/2010	13:45	1.16 %	18.6 %
9/16/2010	13:45	1.34 %	18.5 %
9/16/2010	13:46	1.29 %	18.4 %
9/16/2010	13:46	1.54 %	18.5 %
9/16/2010	13:47	1.24 %	18.4 %
9/16/2010	13:47	1.23 %	18.6 %
9/16/2010	13:48	1.12 %	18.6 %
9/16/2010	13:48	1.21 %	18.6 %
9/16/2010	13:49	1.35 %	18.6 %
9/16/2010	13:49	1.49 %	18.4 %
9/16/2010	13:50	1.49 %	18.4 %
9/16/2010	13:50	1.21 %	18.5 %
9/16/2010	13:51	1.27 %	18.5 %
9/16/2010	13:51	1.35 %	18.5 %
9/16/2010	13:52	1.29 %	18.5 %
9/16/2010	13:52	1.36 %	18.4 %
9/16/2010	13:53	1.41 %	18.4 %
9/16/2010	13:53	1.34 %	18.4 %
9/16/2010	13:54	1.4 %	18.4 %
9/16/2010	13:54	1.24 %	18.5 %
9/16/2010	13:55	1.13 %	18.5 %
9/16/2010	13:55	1.23 %	18.6 %
9/16/2010	13:56	1.1 %	18.7 %
9/16/2010	13:56	1.19 %	18.6 %
9/16/2010	13:57	1.26 %	18.6 %
9/16/2010	13:57	1.32 %	18.5 %
9/16/2010	13:58	1.5 %	18.5 %
9/16/2010	13:58	1.23 %	18.5 %
9/16/2010	13:59	1.27 %	18.6 %

9/16/2010 13:59	1.05 %	18.6 %
9/16/2010 14:00	1.34 %	18.7 %
9/16/2010 14:00	1.25 %	18.6 %
9/16/2010 14:01	1.25 %	18.6 %
9/16/2010 14:01	1.39 %	18.6 %
9/16/2010 14:02	1.39 %	18.4 %
9/16/2010 14:02	1.22 %	18.5 %
9/16/2010 14:03	1.17 %	18.6 %
9/16/2010 14:03	1.23 %	18.7 %
9/16/2010 14:04	1.24 %	18.6 %
9/16/2010 14:04	1.29 %	18.6 %
9/16/2010 14:05	1.28 %	18.5 %
9/16/2010 14:05	1.36 %	18.6 %
9/16/2010 14:06	1.21 %	18.4 %
9/16/2010 14:06	1.12 %	18.6 %
9/16/2010 14:07	1.29 %	18.7 %
9/16/2010 14:07	1.22 %	18.6 %
9/16/2010 14:08	1.23 %	18.5 %
9/16/2010 14:08	1.38 %	18.5 %
9/16/2010 14:09	1.49 %	18.5 %
9/16/2010 14:09	1.34 %	18.3 %
9/16/2010 14:10	1.39 %	18.5 %
9/16/2010 14:10	1.15 %	18.6 %
9/16/2010 14:11	1.15 %	18.6 %
9/16/2010 14:11	1.32 %	18.5 %
9/16/2010 14:12	1.25 %	18.7 %
9/16/2010 14:12	1.56 %	18.4 %
9/16/2010 14:13	1.51 %	18.4 %
9/16/2010 14:13	1.39 %	18.4 %
9/16/2010 14:14	1.4 %	18.5 %
9/16/2010 14:14	1.26 %	18.5 %
9/16/2010 14:15	1.33 %	18.6 %
9/16/2010 14:15	1.26 %	18.5 %
9/16/2010 14:16	1.21 %	18.7 %
9/16/2010 14:16	1.16 %	18.7 %
9/16/2010 14:17	1.04 %	18.6 %
9/16/2010 14:17	1.41 %	18.6 %
9/16/2010 14:18	1.45 %	18.5 %
9/16/2010 14:18	1.19 %	18.6 %
9/16/2010 14:19	1.11 %	18.7 %
9/16/2010 14:19	1.25 %	18.7 %
9/16/2010 14:20	1.22 %	18.7 %
9/16/2010 14:20	1.35 %	18.7 %
9/16/2010 14:21	1.52 %	18.4 %
9/16/2010 14:21	1.31 %	18.4 %
9/16/2010 14:22	1.34 %	18.6 %
9/16/2010 14:22	1.35 %	18.5 %
9/16/2010 14:23	1.37 %	18.7 %
9/16/2010 14:23	1.73 %	18.3 %
9/16/2010 14:24	1.7 %	18.2 %
9/16/2010 14:24	1.44 %	18.4 %
9/16/2010 14:25	1.58 %	18.3 %
9/16/2010 14:25	1.29 %	18.4 %
9/16/2010 14:26	1.44 %	18.5 %
9/16/2010 14:26	1.09 %	18.7 %
9/16/2010 14:27	1.07 %	18.8 %
9/16/2010 14:27	1.46 %	18.5 %
9/16/2010 14:28	1.38 %	18.5 %
9/16/2010 14:28	1.81 %	18.4 %
9/16/2010 14:29	1.35 %	18.4 %
9/16/2010 14:29	1.24 %	18.6 %
9/16/2010 14:30	1.21 %	18.6 %
9/16/2010 14:30	1.22 %	18.5 %
9/16/2010 14:31	1.05 %	18.6 %
9/16/2010 14:31	1.08 %	18.8 %
9/16/2010 14:32	1.35 %	18.6 %
9/16/2010 14:32	1.42 %	18.6 %
9/16/2010 14:33	1.39 %	18.5 %
9/16/2010 14:33	1.28 %	18.4 %

Run 1	1.310 %	18.514 %
Averages	O2	CO2
FCCU		

Hess Corporation, Perth Amboy, NJ

FCCU

Run 2, CTM - 027

Date	time	O2	CO2
9/16/2010	15:00	1.36 %	18.6 %
9/16/2010	15:00	1.48 %	18.5 %
9/16/2010	15:01	1.31 %	18.4 %
9/16/2010	15:01	1.27 %	18.5 %
9/16/2010	15:02	1.12 %	18.7 %
9/16/2010	15:02	1.19 %	18.7 %
9/16/2010	15:03	1.4 %	18.5 %
9/16/2010	15:03	1.4 %	18.4 %
9/16/2010	15:04	1.43 %	18.4 %
9/16/2010	15:04	1.4 %	18.3 %
9/16/2010	15:05	1.3 %	18.5 %
9/16/2010	15:05	1.13 %	18.8 %
9/16/2010	15:06	1.55 %	18.5 %
9/16/2010	15:06	1.24 %	18.5 %
9/16/2010	15:07	1.37 %	18.6 %
9/16/2010	15:07	1.32 %	18.4 %
9/16/2010	15:08	1.36 %	18.6 %
9/16/2010	15:08	1.56 %	18.5 %
9/16/2010	15:09	1.29 %	18.4 %
9/16/2010	15:09	1.15 %	18.6 %
9/16/2010	15:10	0.98 %	18.9 %
9/16/2010	15:10	1.05 %	18.9 %
9/16/2010	15:11	1.31 %	18.7 %
9/16/2010	15:11	1.22 %	18.7 %
9/16/2010	15:12	1.51 %	18.6 %
9/16/2010	15:12	1.29 %	18.4 %
9/16/2010	15:13	1.42 %	18.6 %
9/16/2010	15:13	1.23 %	18.6 %
9/16/2010	15:14	1.16 %	18.6 %
9/16/2010	15:14	1.08 %	18.7 %
9/16/2010	15:15	1.12 %	18.9 %
9/16/2010	15:15	1.22 %	18.7 %
9/16/2010	15:16	1.33 %	18.7 %
9/16/2010	15:16	1.35 %	18.5 %
9/16/2010	15:17	1.26 %	18.6 %
9/16/2010	15:17	1.31 %	18.6 %
9/16/2010	15:18	1.18 %	18.6 %
9/16/2010	15:18	1.38 %	18.7 %
9/16/2010	15:19	1.42 %	18.6 %
9/16/2010	15:19	1.28 %	18.6 %
9/16/2010	15:20	1.26 %	18.6 %
9/16/2010	15:20	1.55 %	18.6 %
9/16/2010	15:21	1.8 %	18.3 %
9/16/2010	15:21	1.53 %	18.3 %
9/16/2010	15:22	1.59 %	18.4 %
9/16/2010	15:22	1.4 %	18.4 %
9/16/2010	15:23	1.37 %	18.5 %
9/16/2010	15:23	1.63 %	18.5 %
9/16/2010	15:24	1.36 %	18.3 %
9/16/2010	15:24	1.25 %	18.6 %
9/16/2010	15:25	1.36 %	18.7 %
9/16/2010	15:25	1.49 %	18.5 %
9/16/2010	15:26	1.33 %	18.5 %
9/16/2010	15:26	1.31 %	18.6 %
9/16/2010	15:27	1.34 %	18.7 %
9/16/2010	15:27	1.26 %	18.5 %
9/16/2010	15:28	1.5 %	18.4 %
9/16/2010	15:28	1.27 %	18.6 %
9/16/2010	15:29	0.98 %	18.9 %
9/16/2010	15:29	1.09 %	18.9 %
9/16/2010	15:30	1.12 %	18.7 %
9/16/2010	15:30	1.2 %	18.8 %
9/16/2010	15:31	1.22 %	18.6 %
9/16/2010	15:31	1.01 %	18.7 %

9/16/2010 15:32	1.3 %	18.8 %
9/16/2010 15:32	0.97 %	18.8 %
9/16/2010 15:33	0.99 %	18.8 %
9/16/2010 15:33	1.17 %	18.8 %
9/16/2010 15:34	1.15 %	18.7 %
9/16/2010 15:34	1.17 %	18.7 %
9/16/2010 15:35	1.5 %	18.6 %
9/16/2010 15:35	1.37 %	18.5 %
9/16/2010 15:36	1.24 %	18.6 %
9/16/2010 15:36	1.66 %	18.5 %
9/16/2010 15:37	1.58 %	18.4 %
9/16/2010 15:37	1.63 %	18.3 %
9/16/2010 15:38	1.33 %	18.6 %
9/16/2010 15:38	1.18 %	18.7 %
9/16/2010 15:39	1.26 %	18.7 %
9/16/2010 15:39	1.41 %	18.5 %
9/16/2010 15:40	1.19 %	18.6 %
9/16/2010 15:40	1.14 %	18.8 %
9/16/2010 15:41	0.98 %	18.8 %
9/16/2010 15:41	1.2 %	18.9 %
9/16/2010 15:42	1.01 %	18.7 %
9/16/2010 15:42	0.95 %	19 %
9/16/2010 15:43	1.14 %	19 %
9/16/2010 15:43	1.13 %	18.7 %
9/16/2010 15:44	1.04 %	18.8 %
9/16/2010 15:44	1.26 %	18.9 %
9/16/2010 15:45	1.09 %	18.6 %
9/16/2010 15:45	1.29 %	18.8 %
9/16/2010 15:46	1.36 %	18.7 %
9/16/2010 15:46	1.27 %	18.6 %
9/16/2010 15:47	1.27 %	18.7 %
9/16/2010 15:47	1.37 %	18.7 %
9/16/2010 15:48	1.54 %	18.6 %
9/16/2010 15:48	1.38 %	18.4 %
9/16/2010 15:49	1.39 %	18.7 %
9/16/2010 15:49	1.37 %	18.5 %
9/16/2010 15:50	1.32 %	18.6 %
9/16/2010 15:50	1.57 %	18.4 %
9/16/2010 15:51	1.55 %	18.3 %
9/16/2010 15:51	1.49 %	18.5 %
9/16/2010 15:52	1.42 %	18.5 %
9/16/2010 15:52	1.36 %	18.6 %
9/16/2010 15:53	1.26 %	18.6 %
9/16/2010 15:53	1.26 %	18.7 %
9/16/2010 15:54	1.07 %	18.7 %
9/16/2010 15:54	1.35 %	18.7 %
9/16/2010 15:55	1.13 %	18.7 %
9/16/2010 15:55	1.06 %	18.8 %
9/16/2010 15:56	1.12 %	18.8 %
9/16/2010 15:56	1.18 %	18.9 %
9/16/2010 15:57	1.2 %	18.8 %
9/16/2010 15:57	1.41 %	18.7 %
9/16/2010 15:58	1.52 %	18.5 %
9/16/2010 15:58	1.24 %	18.6 %
9/16/2010 15:59	1.12 %	18.7 %
9/16/2010 15:59	1.24 %	18.7 %
9/16/2010 16:00	1.62 %	18.6 %
9/16/2010 16:00	1.28 %	18.6 %
9/16/2010 16:01	1.35 %	18.6 %
9/16/2010 16:01	1.32 %	18.6 %
9/16/2010 16:02	1.23 %	18.7 %
9/16/2010 16:02	1.2 %	18.8 %
9/16/2010 16:03	1.35 %	18.5 %
9/16/2010 16:03	1.27 %	18.7 %

Run2	1.295 %	18.622 %
Averages	O2	CO2
FCCU		

Hess Corporation, Perth Amboy, NJ
FCCU
Run 3, CTM - 027

Date	time	O2	CO2
9/17/2010	8:36	1.29 %	18.4 %
9/17/2010	8:36	1.24 %	18.3 %
9/17/2010	8:37	1.22 %	18.3 %
9/17/2010	8:37	1.13 %	18.4 %
9/17/2010	8:38	1.02 %	18.6 %
9/17/2010	8:38	0.91 %	18.6 %
9/17/2010	8:39	1.14 %	18.6 %
9/17/2010	8:39	0.91 %	18.5 %
9/17/2010	8:40	1.02 %	18.6 %
9/17/2010	8:40	1.05 %	18.6 %
9/17/2010	8:41	1.09 %	18.5 %
9/17/2010	8:41	1.24 %	18.5 %
9/17/2010	8:42	1.27 %	18.3 %
9/17/2010	8:42	1.17 %	18.4 %
9/17/2010	8:43	1.11 %	18.5 %
9/17/2010	8:43	1.43 %	18.5 %
9/17/2010	8:44	1.17 %	18.3 %
9/17/2010	8:44	1.21 %	18.4 %
9/17/2010	8:45	1.1 %	18.5 %
9/17/2010	8:45	1.36 %	18.5 %
9/17/2010	8:46	1.38 %	18.3 %
9/17/2010	8:46	1.09 %	18.3 %
9/17/2010	8:47	1.2 %	18.5 %
9/17/2010	8:47	1.22 %	18.4 %
9/17/2010	8:48	1.25 %	18.4 %
9/17/2010	8:48	1.13 %	18.5 %
9/17/2010	8:49	1.11 %	18.5 %
9/17/2010	8:49	1.13 %	18.6 %
9/17/2010	8:50	1.06 %	18.5 %
9/17/2010	8:50	1.09 %	18.6 %
9/17/2010	8:51	1.3 %	18.5 %
9/17/2010	8:51	1.44 %	18.4 %
9/17/2010	8:52	1.54 %	18.3 %
9/17/2010	8:52	1.31 %	18.3 %
9/17/2010	8:53	1.53 %	18.3 %
9/17/2010	8:53	1.49 %	18.1 %
9/17/2010	8:54	1.57 %	18.2 %
9/17/2010	8:54	1.51 %	18.2 %
9/17/2010	8:55	1.43 %	18.2 %
9/17/2010	8:55	1.45 %	18.3 %
9/17/2010	8:56	1.4 %	18.2 %
9/17/2010	8:56	1.3 %	18.3 %
9/17/2010	8:57	1.29 %	18.4 %
9/17/2010	8:57	1.26 %	18.4 %
9/17/2010	8:58	1.19 %	18.4 %
9/17/2010	8:58	1.25 %	18.5 %
9/17/2010	8:59	1.28 %	18.4 %
9/17/2010	8:59	1.21 %	18.5 %
9/17/2010	9:00	1.2 %	18.4 %
9/17/2010	9:00	1.43 %	18.4 %
9/17/2010	9:01	1.26 %	18.3 %
9/17/2010	9:01	1.27 %	18.4 %
9/17/2010	9:02	1.22 %	18.4 %
9/17/2010	9:02	1.31 %	18.4 %
9/17/2010	9:03	1.3 %	18.4 %
9/17/2010	9:03	1.36 %	18.4 %
9/17/2010	9:04	1.49 %	18.3 %
9/17/2010	9:04	1.37 %	18.2 %
9/17/2010	9:05	1.28 %	18.4 %
9/17/2010	9:05	1.26 %	18.4 %
9/17/2010	9:06	1.28 %	18.4 %
9/17/2010	9:06	1.18 %	18.5 %
9/17/2010	9:07	1.18 %	18.5 %
9/17/2010	9:07	1.17 %	18.5 %
9/17/2010	9:08	1.15 %	18.6 %

9/17/2010 9:08	1.03 %	18.6 %
9/17/2010 9:09	1 %	18.7 %
9/17/2010 9:09	0.98 %	18.6 %
9/17/2010 9:10	0.97 %	18.7 %
9/17/2010 9:10	1.2 %	18.7 %
9/17/2010 9:11	1.19 %	18.4 %
9/17/2010 9:11	1.36 %	18.4 %
9/17/2010 9:12	1.32 %	18.4 %
9/17/2010 9:12	1.29 %	18.4 %
9/17/2010 9:13	1.03 %	18.5 %
9/17/2010 9:13	0.91 %	18.6 %
9/17/2010 9:14	0.96 %	18.8 %
9/17/2010 9:14	1.07 %	18.7 %
9/17/2010 9:15	1.12 %	18.6 %
9/17/2010 9:15	1.09 %	18.7 %
9/17/2010 9:16	1.13 %	18.7 %
9/17/2010 9:16	1.11 %	18.6 %
9/17/2010 9:17	1.32 %	18.5 %
9/17/2010 9:17	1.28 %	18.4 %
9/17/2010 9:18	1.31 %	18.5 %
9/17/2010 9:18	1.36 %	18.4 %
9/17/2010 9:19	1.51 %	18.3 %
9/17/2010 9:19	1.39 %	18.3 %
9/17/2010 9:20	1.22 %	18.5 %
9/17/2010 9:20	1.39 %	18.4 %
9/17/2010 9:21	1.39 %	18.3 %
9/17/2010 9:21	1.29 %	18.4 %
9/17/2010 9:22	1.12 %	18.5 %
9/17/2010 9:22	1.22 %	18.5 %
9/17/2010 9:23	1.23 %	18.5 %
9/17/2010 9:23	1.24 %	18.5 %
9/17/2010 9:24	1.13 %	18.5 %
9/17/2010 9:24	1.17 %	18.6 %
9/17/2010 9:25	1.13 %	18.6 %
9/17/2010 9:25	1.36 %	18.6 %
9/17/2010 9:26	1.51 %	18.4 %
9/17/2010 9:26	1.52 %	18.2 %
9/17/2010 9:27	1.55 %	18.3 %
9/17/2010 9:27	1.56 %	18.2 %
9/17/2010 9:28	1.31 %	18.2 %
9/17/2010 9:28	1.6 %	18.4 %
9/17/2010 9:29	1.53 %	18.1 %
9/17/2010 9:29	1.26 %	18.3 %
9/17/2010 9:30	1.31 %	18.5 %
9/17/2010 9:30	1.34 %	18.4 %
9/17/2010 9:31	1.27 %	18.5 %
9/17/2010 9:31	1.25 %	18.5 %
9/17/2010 9:32	1.25 %	18.5 %
9/17/2010 9:32	1.22 %	18.5 %
9/17/2010 9:33	1.36 %	18.5 %
9/17/2010 9:33	1.41 %	18.5 %
9/17/2010 9:34	1.63 %	18.3 %
9/17/2010 9:34	1.62 %	18.1 %
9/17/2010 9:35	1.45 %	18.2 %
9/17/2010 9:35	1.5 %	18.4 %
9/17/2010 9:36	1.41 %	18.3 %
9/17/2010 9:36	1.37 %	18.4 %
9/17/2010 9:37	1.63 %	18.4 %
9/17/2010 9:37	1.44 %	18.4 %
9/17/2010 9:38	1.51 %	18.3 %
9/17/2010 9:38	1.39 %	18.4 %
9/17/2010 9:39	1.59 %	18.4 %
9/17/2010 9:39	1.39 %	18.3 %
9/17/2010 9:40	1.37 %	18.4 %
9/17/2010 9:40	1.4 %	18.4 %

Run 3	1.277 %	18.429 %
Averages	O2	CO2
FCCU		

Facility: Hess Corp.
 Plant: Port Reading Refinery
 Location: FCCU
 Parameter benzene

RM18 summary
Not Spiked Train

(A) MW: 78.11 benzene

Run	1	2	3
Date	9/17/10	9/17/10	9/17/10
Time	1145-1245	1335-1435	1524-1624
Stack Flowrate (DSCFM) (B)	134,657	134,094	133,588
Sampling Flowrate liters/min	0.807	0.802	0.798
RM 18 Sampled Volume (DSCF) (D)	1.743	1.771	1.712
Temp (F)	78	90	75
sampling duration (min)	60	60	60
Sample results			
micrograms - condensate (G_1)	0.65	0.65	0.65
micrograms - tubes (G_2)	3.30	4.70	3.70
micrograms total (G)	3.9500	5.3500	4.3500
results reported as < are entered as 1/2 the detection limit.			
R	1.1338	1.1338	1.1338
R*total micrograms (\bar{G})	4.47851	6.06583	4.93203
<u>Benzene Emissions:</u>			
Pounds / hour (H)	0.0457	0.0606	0.0508
Parts/million (dry) (J)	0.03	0.04	0.03

Equations:

(G_1) and (G_2) = values as reported by lab

$$(G) = (G_1) + (G_2)$$

$$(H) = (\bar{G})(B)(60 \text{ min} / \text{hour})(2.2 \times 10^{-9} \text{ pounds} / \text{microgram}) / (D)$$

$$(J) = (\bar{G})(0.8528) / (A \times D)$$

$$(K) = (J)((100 - C) / 100)$$

$$(D) = \text{lpm} * \text{sample duration min.} * (\text{Temp}+460)/(460+68) * 1 \text{ ft}^3/28.317 \text{ liters}$$

Facility: Hess Corp.
 Plant: Port Reading Refinery
 Location: FCCU
 Parameter benzene

RM18 summary
Not Spiked Train

(A) MW: 78.11 benzene

Run	1	2	3
Date	9/17/10	9/17/10	9/17/10
Time	1145-1245	1335-1435	1524-1624
Stack Flowrate (DSCFM) (B)	134,657	134,094	133,588
Sampling Flowrate liters/min	0.807	0.802	0.798
RM 18 Sampled Volume (DSCF) (D)	1.743	1.771	1.712
Temp (F)	78	90	75
sampling duration (min)	60	60	60
Sample results			
micrograms - condensate (G ₁)	0	0	0
micrograms - tubes (G ₂)	2.8	4.2	3.1
micrograms total (G)	2.8000	4.2000	3.1000
	results reported as < are entered as 0.		
R	1.13285131	1.13285131	1.13285131
R*total micrograms (\bar{G})	3.17198367	4.7579755	3.51183906

Benzene Emissions:

Pounds / hour (H)	0.0323	0.0476	0.0362
Parts/million (dry) (J)	0.02	0.03	0.02

Equations:

(G₁) and (G₂) = values as reported by lab

$$(G) = (G_1) + (G_2)$$

$$(H) = (\bar{G})(B)(60 \text{ min} / \text{hour})(2.2 \times 10^{-9} \text{ pounds} / \text{microgram}) / (D)$$

$$(J) = (\bar{G})(0.8528) / (A \times D)$$

$$(K) = (J)((100 - C) / 100)$$

$$(D) = \text{lpn} * \text{sample duration min.} * (\text{Temp} + 460) / (460 + 68) * 1 \text{ ft}^3 / 28.317 \text{ liters}$$

spike amt	spiked result	unspiked	Mv	r
30	35	2.8	18.4835415	1.0741349
30	31	4.2	15.094046	0.89102301
30	46	3	25.1109809	1.43339602

1.13285131 R = avg of r
 0.7 < R < 1.3

1.743 1.771 1.712 spiked train volumes
 1.758493666 1.742192491 1.713547302 unspiked train volumes

Facility: Hess Corp.
 Plant: Port Reading Refinery
 Location: FCCU
 Parameter benzene

RM18 summary
Spiked Train

(A) MW: 78.11 benzene

Run	1	2	3
Date	9/17/10	9/17/10	9/17/10
Time	1145-1245	1335-1435	1524-1624
Stack Flowrate (DSCFM) (B)	134,657	134,094	133,588
Sampling Flowrate liters/min	0.815	0.795	0.802
RM 18 Sampled Volume (DSCF) (D)	1.758	1.742	1.714
Temp (F)	78	86	72
sampling duration (min)	60	60	60
Sample results			
micrograms - condensate (G ₁)	0	0	0
micrograms - tube (G ₂)	5	1	16
micrograms total (G)	5.0000	1.0000	16.0000
results reported as < are entered as 0.			
<u>Benzene Emissions:</u>			
Pounds / hour (H)	0.0505	0.0102	0.1647
Parts/million (dry) (J)	0.03	0.01	0.10

tube catch (G₂) entered as analytical value less the spike of 30 ug.

Equations:

(G₁) and (G₂) = values as reported by lab

(G) = (G₁) + (G₂)

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(D) = lpm * sample duration min. * (Temp+460)/(460+68) * 1 ft³/28.317 liters

Facility: Hess Corp.
 Plant: Port Reading Refinery
 Location: FCCU
 Parameter benzene

RM18 summary
Spiked Train

(A) MW: 78.11 benzene

Run	1	2	3
Date	9/17/10	9/17/10	9/17/10
Time	1145-1245	1335-1435	1524-1624
Stack Flowrate (DSCFM) (B)	134,657	134,094	133,588
Sampling Flowrate liters/min	0.815	0.795	0.802
RM 18 Sampled Volume (DSCF) (D)	1.758	1.742	1.714
Temp (F)	78	86	72
sampling duration (min)	60	60	60
Sample results			
micrograms - condensate (G ₁)	1	1	1
micrograms - tube (G ₂)	6	2	17
micrograms total (G)	7.3000	3.3000	18.3000
results reported as < are entered as 0.			
Microgram adjusted for R			

Benzene Emissions:

Pounds / hour (H)	0.0738	0.0335	0.1883
Parts/million (dry) (J)	0.05	0.02	0.12

tube catch (G₂) entered as analytical value less the spike of 30 ug.

Equations:

(G₁) and (G₂) = values as reported by lab

(G) = (G₁) + (G₂)

(H) = (G)(B)(60 min / hour)(2.2 x 10⁻⁹ pounds / microgram) / (D)

(J) = (G)(0.8528) / (A x D)

(K) = (J)((100 - C) / 100)

(D) = lpm * sample duration min. * (Temp+460)/(460+68) * 1 ft³/28.317 liters

spike amt	spiked result	unspiked	r
30	35	2.8	1.07333333
30	31	4.2	0.89333333
30	46	3	1.43333333
			1.13333333 R=avg of r

Stack Flowrate Calculator

Company	Hess Corp.	Date	9/17/10
Unit	PCCU	Time	1145-1245
Location	Outlet	Run No.	1
Input Data			
Meter Volume (cubic feet) [V _m]	32.57		
Water Caught (grams) [W _c]	155.50		
Stack Pressures ("H ₂ O)			
Pre-test [Psi]	0.85		
Post-test [Psi]	0.84		
Barometric Pressure ("HG) [Pb]	29.95		
Carbon Dioxide (%) [CO ₂]	18.60		
Oxygen (%) [O ₂]	1.40		
Delta H ("H ₂ O) [H]	1.00		
Pitot Tube Factor [Cp]	0.84		
Meter Correction Factor [Y]	1.00		
Stack Cross-Section (square feet) [CSA]	45.17		
91 id			
Output Data			
Meter Volume (Dry cubic feet @stp) [V _{ms}]	32.310		
Moisture Volume (cubic feet @stp) [V _{ws}]	7.335		
Moisture (%) [Bws]	18.50		
Dry Molecular Weight (lb/lb-Mol) [MW _d]	31.03		
Wet Molecular Weight (lb/lb-Mol) [MW _w]	28.62		
Absolute Stack Pressure ("Hg) [Pa]	30.01		
Stack Velocities (feet/second)			
Pre-test Actual [V _{sa1}]	68.24		
Post-Test Actual [V _{sa2}]	68.77		
Average Actual [V _{sa} -avg]	68.51		
Standard Average [V _{ss}]	60.97		
Stack Flowrate (cubic feet/minute)			
Average Actual [ACFM]	185654		
Standard Average [SCFM]	165226		
Dry, Standard Avg [DSCFM]	134657		

Equations:

$$V_{ms} = (17.647) (Y) (V_m) ((H / 13.6) + D) / (T_m + 460))$$

$$V_{ws} = W_c / 21.2$$

$$B_{ws} = (100) (V_{ws}) / (V_{ms} + V_{ws})$$

$$MW_d = (CO_2) (0.44) + (O_2) (0.32) + (100 - (CO_2 + O_2)) (.28)$$

$$MW_w = (B_{ws}) (0.18) + ((MW_d) (100 - B_{ws}) / 100)$$

$$P_a = P_b + ((P_{s1} + P_{s2}) / 2) / 13.6$$

$$V_{sa1} = (((Ts1 + 460) / (((Ps1 / 13.6) + Pb) (MW_w)))^{0.5} (Cp) (dP1) (85.48)$$

$$V_{sa2} = (((Ts2 + 460) / (((Ps2 / 13.6) + Pb) (MW_w)))^{0.5} (Cp) (dP2) (85.48)$$

$$V_{sa-avg} = (V_{sa1} + V_{sa2}) / 2$$

$$V_{ss} = (((V_{sa1}) (((Ps1 / 13.6) + Pb) / (Ts1 + 460))) + ((V_{sa2}) (((Ps2 / 13.6) + Pb) / (Ts2 + 460)))) (17.647 / 2)$$

$$ACFM = (V_{sa-avg}) (CSA) (60)$$

$$SCFM = (V_{ss}) (CSA) (60)$$

$$DSCFM = ((100 - B_{ws}) / 100) (SCFM)$$

stp = Standard Conditions = 68 deg F, 29.92" Hg

Pre-test Traverse				Post-test Traverse			
POINT	Delta P ("H ₂ O)	Temp (Deg F)	Square Root Delta P	Gas Meter Temps (deg F) In	Out	Delta P ("H ₂ O)	Square Root Delta P
1	0.930	134	0.964	71	71	0.980	0.990
2	1.200	135	1.095	71	71	1.250	1.118
3	1.350	135	1.162	71	71	1.400	1.183
4	1.400	135	1.183	71	71	1.400	1.183
5	1.450	135	1.204	71	71	1.500	1.225
6	1.550	135	1.245	72	72	1.550	1.245
7	1.550	135	1.245	72	72	1.500	1.225
8	1.600	135	1.265	72	72	1.500	1.225
9	1.550	135	1.245	73	73	1.450	1.204
10	1.350	135	1.162	73	73	1.300	1.140
11	1.000	125	1.000	73	73	0.970	0.985
12	0.760	135	0.872	74	74	0.720	0.849
13	1.100	135	1.049			1.100	1.049
14	1.400	135	1.183			1.500	1.225
15	1.400	135	1.183			1.500	1.225
16	1.400	136	1.183			1.500	1.225
17	1.500	135	1.225			1.500	1.225
18	1.550	136	1.245			1.550	1.245
19	1.550	136	1.245			1.600	1.265
20	1.550	135	1.245			1.600	1.265
21	1.450	135	1.204			1.500	1.225
22	1.300	136	1.140			1.400	1.183
23	0.950	135	0.975			1.000	1.000
24	0.800	135	0.894			0.820	0.906
25			0.000				0.000
AVG.	1.318	135	1.142		72.0	1.337	1.150
		[Ts1]	[dP1]		[Tm]		[dP2]

Stack Flowrate Calculator

Company Hess
 Unit FCCU
 Location Outlet
 Date 9/17/10
 Time 1335-1435
 Run No. 2

Input Data

Meter Volume (cubic feet) [Vm]
 Water Caught (grams) [Wc]
 Stack Pressures ("H2O)
 Pre-test [Ps1]
 Post-test [Ps2]
 Barometric Pressure ("HG) [Pb]
 Carbon Dioxide (%) [CO2]
 Oxygen (%) [O2]
 Delta H ("H2O) [H]
 Pitot Tube Factor [Cp]
 Meter Correction Factor [Y]
 Stack Cross-Section (square feet) [CSA]
 91" id

Output Data

Meter Volume (Dry cubic feet @stp) [Vms]
 Moisture Volume (cubic feet @stp) [Vws]
 Moisture (%) [Bws]
 Dry Molecular Weight (lb/lb-Mol) [MWd]
 Wet Molecular Weight (lb/lb-Mol) [MWw]
 Absolute Stack Pressure ("Hg) [Pa]
 Stack Velocities (feet/second)
 Pre-test Actual [Vsa1]
 Post-Test Actual [Vsa2]
 Average Actual [Vsa-avg]
 Standard Average [Vss]
 Stack Flowrate (cubic feet/minute)
 Average Actual [ACFM]
 Standard Average [SCFM]
 Dry, Standard Avg [DSCFM]

Equations:

$Vms = (17.647)(Y)(Vm)((H / 13.6) + D) / (Tm + 460)$
 $Vws = Wc / 21.2$
 $Bws = (100)(Vws) / (Vms + Vws)$
 $MWd = (CO2)(0.44) + (O2)(0.32) + (100 - (CO2 + O2))(1.28)$
 $MWw = (Bws)(0.18) + (MWd)(100 - Bws) / 100$
 $Pa = Pb + ((Ps1 + Ps2) / 2) / 13.6$
 $Vsa1 = (((Ts1 + 460) / ((Ps1 / 13.6) + Pb)(MWw)))^{0.5}(Cp)(dp1)(85.48)$
 $Vsa2 = (((Ts2 + 460) / ((Ps2 / 13.6) + Pb)(MWw)))^{0.5}(Cp)(dp2)(85.48)$
 $Vsa-avg = (Vsa1 + Vsa2) / 2$
 $Vss = (((Vsa1)((Ps1 / 13.6) + Pb) / (Ts1 + 460)) + ((Vsa2)((Ps2 / 13.6) + Pb) / (Ts2 + 460))) / ((17.647 / 2))$
 $ACFM = (Vsa-avg)(CSA)(60)$
 $SCFM = (Vss)(CSA)(60)$
 $DSCFM = ((100 - Bws) / 100)(SCFM)$

Pre-test Traverse				Post-test Traverse			
POINT	Delta P ("H2O)	Temp (Deg F)	Square Root Delta P	Delta P ("H2O)	Temp (Deg F)	Square Root Delta P	
1	0.980	135	0.990	0.970	134	0.985	
2	1.250	136	1.118	1.300	134	1.140	
3	1.400	136	1.183	1.450	134	1.204	
4	1.400	136	1.183	1.500	135	1.225	
5	1.500	136	1.225	1.500	134	1.225	
6	1.550	135	1.245	1.600	134	1.265	
7	1.500	135	1.225	1.600	134	1.265	
8	1.500	135	1.225	1.600	134	1.265	
9	1.450	135	1.204	1.500	134	1.225	
10	1.300	135	1.140	1.400	134	1.183	
11	0.970	135	0.985	1.200	134	1.095	
12	0.720	135	0.849	0.830	134	0.911	
13	1.100	135	1.049	1.200	135	1.095	
14	1.500	135	1.225	1.300	135	1.140	
15	1.500	136	1.225	1.350	135	1.162	
16	1.500	136	1.225	1.400	135	1.183	
17	1.500	136	1.225	1.400	135	1.183	
18	1.550	136	1.245	1.500	135	1.225	
19	1.600	136	1.265	1.500	135	1.225	
20	1.600	136	1.265	1.400	135	1.183	
21	1.500	136	1.225	1.450	135	1.204	
22	1.400	136	1.183	1.300	135	1.140	
23	1.000	135	1.000	0.970	135	0.985	
24	0.820	135	0.906	0.820	135	0.906	
25			0.000			0.000	
AVG.	1.337	136	1.150	1.335	135	1.151	
		[Ts1]	[dp1]		[Ts2]	[dp2]	

stp = Standard Conditions = 68 deg F, 29.92" Hg

Stack Flowrate Calculator

Company Hess
Unit FCCU
Location Outlet
Date Time 9/17/10
Run No. 3

Input Data

Meter Volume (cubic feet) [V_m] 32.92
Water Caught (grams) [W_c] 171.00
Stack Pressures ("H₂O)
Pre-test [P_{s1}] 0.84
Post-test [P_{s2}] 0.81
Barometric Pressure ("HG) [P_b] 29.99
Carbon Dioxide (%) [CO₂] 18.80
Oxygen (%) [O₂] 1.30
Delta H ("H₂O) [H] 1.00
Pitot Tube Factor [C_p] 0.84
Meter Correction Factor [Y] 1.00
Stack Cross-Section (square feet) [CSA] 45.17

Output Data

Meter Volume (Dry cubic feet @stp) [V_{ms}] 32.552
Moisture Volume (cubic feet @stp) [V_{ws}] 8.066
Moisture (%) [B_{ws}] 19.86
Dry Molecular Weight (lb/lb-Mol) [MW_d] 31.06
Wet Molecular Weight (lb/lb-Mol) [MW_w] 28.47
Absolute Stack Pressure ("HG) [P_a] 30.05
Stack Velocities (feet/second)
Pre-test Actual [V_{s1}] 68.89
Post-Test Actual [V_{s2}] 69.09
Average Actual [V_{sa}-avg] 68.99
Standard Average [V_{ss}] 61.51
Stack Flowrate (cubic feet/minute)
Average Actual [ACFM] 186953
Standard Average [SCFM] 166690
Dry, Standard Avg [DSCFM] 133588

Equations:

$$\begin{aligned} V_{ms} &= (17.647) (Y) (V_m) (((H / 13.6) + D) / (T_m + 460)) \\ V_{ws} &= W_c / 21.2 \\ B_{ws} &= (100) (V_{ws}) / (V_{ms} + V_{ws}) \\ MW_d &= (CO_2) (0.44) + (O_2) (0.32) + (100 - (CO_2 + O_2)) (.28) \\ MW_w &= (B_{ws}) (0.18) + ((MW_d) (100 - B_{ws}) / 100) \\ P_a &= P_b + ((P_{s1} + P_{s2}) / 2) / 13.6 \\ V_{s1} &= (((T_{s1} + 460) / (((P_{s1} / 13.6) + P_b) (MW_w)))^{0.5}) (C_p) (dp1) (85.48) \\ V_{s2} &= (((T_{s2} + 460) / (((P_{s2} / 13.6) + P_b) (MW_w)))^{0.5}) (C_p) (dp2) (85.48) \\ V_{sa-avg} &= (V_{s1} + V_{s2}) / 2 \\ V_{ss} &= (((V_{s1}) / (((P_{s1} / 13.6) + P_b) / (T_{s1} + 460))) + ((V_{s2}) / (((P_{s2} / 13.6) + P_b) / (T_{s2} + 460)))) (17.647 / 2) \\ ACFM &= (V_{sa-avg}) (CSA) (60) \\ SCFM &= (V_{ss}) (CSA) (60) \\ DSCFM &= ((100 - B_{ws}) / 100) (SCFM) \end{aligned}$$

Pre-test Traverse					Post-test Traverse				
POINT	Delta P ("H ₂ O)	Stack Temp (Deg F)	Square Root Delta P	Gas Meter T emps (deg F)	Delta P ("H ₂ O)	Stack Temp (Deg F)	Square Root Delta P		
1	0.970	134	0.985	74	0.950	136	0.975		
2	1.300	134	1.140	73	1.300	136	1.140		
3	1.450	134	1.204	73	1.400	135	1.183		
4	1.500	135	1.225	73	1.400	135	1.183		
5	1.500	134	1.225	73	1.450	135	1.204		
6	1.600	134	1.265	73	1.500	135	1.225		
7	1.600	134	1.265	73	1.600	135	1.265		
8	1.600	134	1.265	75	1.600	135	1.265		
9	1.500	134	1.225	76	1.550	135	1.245		
10	1.400	134	1.183	76	1.400	135	1.183		
11	1.200	134	1.095	76	1.100	135	1.049		
12	0.830	134	0.911	77	0.830	135	0.911		
13	1.200	135	1.095		1.200	135	1.095		
14	1.300	135	1.140		1.400	135	1.183		
15	1.350	135	1.162		1.350	135	1.162		
16	1.400	135	1.183		1.400	134	1.183		
17	1.400	135	1.183		1.500	134	1.225		
18	1.500	135	1.225		1.500	135	1.225		
19	1.500	135	1.225		1.550	135	1.245		
20	1.400	135	1.183		1.600	135	1.265		
21	1.450	135	1.204		1.450	135	1.204		
22	1.300	135	1.140		1.350	135	1.162		
23	0.970	135	0.985		0.990	135	0.995		
24	0.820	135	0.906		0.840	135	0.917		
25			0.000				0.000		
AVG.	1.335	135	1.151		1.342	135	1.154		
				[T _{s1}]					[T _{s2}]
									[dp2]

stp = Standard Conditions = 68 deg F, 29.92" Hg

Project Name: Hess Corporation
Perth Amboy, NJ

Source: FCCU
Condition: normal production

Test Date: 9/17/10 M18

GAS TESTED	SAMPLE RUN ID	CONCENTRATIONS (% O ₂ & CO ₂ ; PPM ALL OTHERS)										STACK FLOW RATE (dscfm)	Mass Emissions	
		CERTIFIED STANDARD	PRE-TEST RESPONSE	POST-TEST RESPONSE	PRE-TEST ZERO	POST-TEST ZERO	RAW AVERAGE	BIAS CORRECTED AVERAGE	FROM WET TO DRY AVERAGES	@ 7% O ₂	(I)		(J)	(K)
O ₂	1	2.5	2.4	2.4	0.0	0.0	1.34	1.387	N/A					
	2	2.5	2.4	2.4	0.0	0.0	1.37	1.412	N/A					
	3	2.4	2.5	2.4	0.0	0.0	1.33	1.318	N/A					
CO ₂	1	22.1	22.1	22.1	0.4	0.4	18.65	18.582	N/A					
	2	22.1	22.1	22.1	0.4	0.4	18.73	18.655	N/A					
	3	22.1	22.1	22.0	0.2	0.4	18.78	18.774	N/A					

The Following Calculations are Used In This Spreadsheet:

$$G = (F - ((D+E)/2)) \times A / ((B+C)/2) - ((D+E)/2)$$

$$H = (13.9 / (20.9 - G_{O_2})) \times G$$

$$J = I \times 0.15505 \times 10^{-6} \times G \times MW_{GAS}$$

$$K = (20.9 / (20.9 - G_{O_2})) \times G \times A_{CO \text{ or } NO_x} \times B_{fuel}$$

Where --

$$A_{CO} = 7.2678E-08$$

$$A_{NO_x} = 1.1940E-07$$

$$A_{THC} = 4.1530E-08$$

$$L = (100 / (100 - M)) \times G_{THC}$$

And...

$$B_{nat. gas} =$$

$$B_{nat. gas} =$$

$$B_{fuel oil} =$$

8710

N/A

9190

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 1, M18

Date	time	O2	CO2
9/17/2010	11:45	1.35 %	18.6 %
9/17/2010	11:45	1.37 %	18.6 %
9/17/2010	11:46	1.54 %	18.6 %
9/17/2010	11:46	1.5 %	18.5 %
9/17/2010	11:47	1.29 %	18.5 %
9/17/2010	11:47	1.57 %	18.6 %
9/17/2010	11:48	1.28 %	18.5 %
9/17/2010	11:48	1.17 %	18.7 %
9/17/2010	11:49	1.39 %	18.8 %
9/17/2010	11:49	1.27 %	18.6 %
9/17/2010	11:50	1.33 %	18.7 %
9/17/2010	11:50	1.39 %	18.6 %
9/17/2010	11:51	1.34 %	18.7 %
9/17/2010	11:51	1.38 %	18.6 %
9/17/2010	11:52	1.51 %	18.5 %
9/17/2010	11:52	1.28 %	18.6 %
9/17/2010	11:53	1.41 %	18.7 %
9/17/2010	11:53	1.55 %	18.6 %
9/17/2010	11:54	1.6 %	18.5 %
9/17/2010	11:54	1.45 %	18.4 %
9/17/2010	11:55	1.83 %	18.5 %
9/17/2010	11:55	1.64 %	18.2 %
9/17/2010	11:56	1.5 %	18.4 %
9/17/2010	11:56	1.64 %	18.5 %
9/17/2010	11:57	1.54 %	18.3 %
9/17/2010	11:57	1.54 %	18.4 %
9/17/2010	11:58	1.49 %	18.4 %
9/17/2010	11:58	1.62 %	18.5 %
9/17/2010	11:59	1.39 %	18.5 %
9/17/2010	11:59	1.38 %	18.6 %
9/17/2010	12:00	1.44 %	18.6 %
9/17/2010	12:00	1.4 %	18.5 %
9/17/2010	12:01	1.5 %	18.6 %
9/17/2010	12:01	1.34 %	18.5 %
9/17/2010	12:02	1.12 %	18.7 %
9/17/2010	12:02	0.91 %	18.9 %
9/17/2010	12:03	1.07 %	19 %
9/17/2010	12:03	1.17 %	18.8 %
9/17/2010	12:04	1.21 %	18.8 %
9/17/2010	12:04	1.27 %	18.7 %
9/17/2010	12:05	1.22 %	18.7 %
9/17/2010	12:05	1.23 %	18.8 %
9/17/2010	12:06	1.2 %	18.8 %
9/17/2010	12:06	1.36 %	18.7 %
9/17/2010	12:07	1.34 %	18.6 %
9/17/2010	12:07	1.33 %	18.6 %
9/17/2010	12:08	1.27 %	18.7 %
9/17/2010	12:08	1.39 %	18.7 %
9/17/2010	12:18	1.25 %	18.7 %
9/17/2010	12:18	1.27 %	18.7 %
9/17/2010	12:19	1.26 %	18.7 %
9/17/2010	12:19	1.36 %	18.7 %
9/17/2010	12:20	1.33 %	18.6 %
9/17/2010	12:20	1.39 %	18.6 %
9/17/2010	12:21	1.2 %	18.6 %
9/17/2010	12:21	1.34 %	18.7 %
9/17/2010	12:22	1.24 %	18.6 %
9/17/2010	12:22	1.25 %	18.7 %
9/17/2010	12:23	1.35 %	18.7 %
9/17/2010	12:23	1.54 %	18.6 %
9/17/2010	12:24	1.31 %	18.5 %
9/17/2010	12:24	1.2 %	18.6 %
9/17/2010	12:25	1.24 %	18.7 %

9/17/2010 12:25	1.23 %	18.7 %
9/17/2010 12:26	1.38 %	18.7 %
9/17/2010 12:26	1.17 %	18.6 %
9/17/2010 12:27	1.06 %	18.8 %
9/17/2010 12:27	1.1 %	18.9 %
9/17/2010 12:28	1.13 %	18.9 %
9/17/2010 12:28	1.2 %	18.8 %
9/17/2010 12:29	1.28 %	18.8 %
9/17/2010 12:29	1.17 %	18.7 %
9/17/2010 12:30	1.26 %	18.8 %
9/17/2010 12:30	1.24 %	18.7 %
9/17/2010 12:31	1.31 %	18.7 %
9/17/2010 12:31	1.46 %	18.7 %
9/17/2010 12:32	1.55 %	18.5 %
9/17/2010 12:32	1.23 %	18.6 %
9/17/2010 12:33	1.34 %	18.8 %
9/17/2010 12:33	1.34 %	18.7 %
9/17/2010 12:34	1.31 %	18.7 %
9/17/2010 12:34	1.37 %	18.7 %
9/17/2010 12:35	1.52 %	18.6 %
9/17/2010 12:35	1.45 %	18.5 %
9/17/2010 12:36	1.41 %	18.6 %
9/17/2010 12:36	1.37 %	18.6 %
9/17/2010 12:37	1.23 %	18.7 %
9/17/2010 12:37	1.21 %	18.8 %
9/17/2010 12:38	1.27 %	18.8 %
9/17/2010 12:38	1.29 %	18.7 %
9/17/2010 12:39	1.13 %	18.7 %
9/17/2010 12:39	1.29 %	18.9 %
9/17/2010 12:40	1.29 %	18.8 %
9/17/2010 12:40	1.52 %	18.7 %
9/17/2010 12:41	1.57 %	18.5 %
9/17/2010 12:41	1.46 %	18.5 %
9/17/2010 12:42	1.36 %	18.6 %
9/17/2010 12:42	1.26 %	18.7 %
9/17/2010 12:43	1.3 %	18.7 %
9/17/2010 12:43	1.47 %	18.7 %
9/17/2010 12:44	1.2 %	18.6 %
9/17/2010 12:44	1.31 %	18.8 %

Run 1	1.342 %	18.646 %
Averages	O2	CO2
FCCU		

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 2, M18

Date	time	O2	CO2
9/17/2010	13:35	1.34 %	18.9 %
9/17/2010	13:35	1.24 %	18.8 %
9/17/2010	13:36	1.34 %	18.9 %
9/17/2010	13:36	1.3 %	18.8 %
9/17/2010	13:37	1.3 %	18.8 %
9/17/2010	13:37	1.3 %	18.8 %
9/17/2010	13:38	1.26 %	18.8 %
9/17/2010	13:38	1.22 %	18.9 %
9/17/2010	13:39	1.24 %	18.9 %
9/17/2010	13:39	1.36 %	18.9 %
9/17/2010	13:40	1.38 %	18.8 %
9/17/2010	13:40	1.48 %	18.7 %
9/17/2010	13:41	1.32 %	18.7 %
9/17/2010	13:41	1.23 %	18.8 %
9/17/2010	13:42	1.23 %	18.9 %
9/17/2010	13:42	1.34 %	18.9 %
9/17/2010	13:43	1.28 %	18.8 %
9/17/2010	13:43	1.43 %	18.8 %
9/17/2010	13:44	1.46 %	18.7 %
9/17/2010	13:44	1.58 %	18.7 %
9/17/2010	13:54	1.32 %	19.5 %
9/17/2010	13:54	1.56 %	18.8 %
9/17/2010	13:55	1.53 %	18.5 %
9/17/2010	13:55	1.43 %	18.6 %
9/17/2010	13:56	1.46 %	18.6 %
9/17/2010	13:56	1.53 %	18.6 %
9/17/2010	13:57	1.5 %	18.6 %
9/17/2010	13:57	1.5 %	18.6 %
9/17/2010	13:58	1.7 %	18.6 %
9/17/2010	13:58	1.58 %	18.4 %
9/17/2010	13:59	1.4 %	18.5 %
9/17/2010	13:59	1.36 %	18.6 %
9/17/2010	14:00	1.43 %	18.7 %
9/17/2010	14:00	1.39 %	18.6 %
9/17/2010	14:01	1.51 %	18.7 %
9/17/2010	14:01	1.5 %	18.6 %
9/17/2010	14:02	1.58 %	18.6 %
9/17/2010	14:02	1.58 %	18.5 %
9/17/2010	14:03	1.41 %	18.5 %
9/17/2010	14:03	1.52 %	18.6 %
9/17/2010	14:04	1.57 %	18.6 %
9/17/2010	14:04	1.57 %	18.5 %
9/17/2010	14:05	1.55 %	18.5 %
9/17/2010	14:05	1.5 %	18.5 %
9/17/2010	14:06	1.4 %	18.6 %
9/17/2010	14:06	1.28 %	18.7 %
9/17/2010	14:07	1.38 %	18.8 %
9/17/2010	14:07	1.32 %	18.7 %
9/17/2010	14:08	1.22 %	18.7 %
9/17/2010	14:08	1.35 %	18.8 %
9/17/2010	14:09	1.28 %	18.7 %
9/17/2010	14:09	1.19 %	18.8 %
9/17/2010	14:10	1.25 %	18.8 %
9/17/2010	14:10	1.28 %	18.8 %
9/17/2010	14:11	1.4 %	18.8 %
9/17/2010	14:11	1.27 %	18.7 %
9/17/2010	14:12	1.3 %	18.8 %
9/17/2010	14:12	1.32 %	18.8 %
9/17/2010	14:13	1.38 %	18.8 %
9/17/2010	14:13	1.49 %	18.7 %
9/17/2010	14:14	1.52 %	18.6 %
9/17/2010	14:14	1.54 %	18.5 %
9/17/2010	14:15	1.45 %	18.5 %

9/17/2010 14:15	1.35 %	18.6 %
9/17/2010 14:16	1.35 %	18.7 %
9/17/2010 14:16	1.2 %	18.7 %
9/17/2010 14:17	1.37 %	18.8 %
9/17/2010 14:17	1.38 %	18.7 %
9/17/2010 14:18	1.41 %	18.7 %
9/17/2010 14:18	1.25 %	18.7 %
9/17/2010 14:19	1.24 %	18.8 %
9/17/2010 14:19	1.26 %	18.8 %
9/17/2010 14:20	1.23 %	18.8 %
9/17/2010 14:20	1.29 %	18.8 %
9/17/2010 14:21	1.31 %	18.8 %
9/17/2010 14:21	1.26 %	18.8 %
9/17/2010 14:22	1.43 %	18.8 %
9/17/2010 14:22	1.31 %	18.7 %
9/17/2010 14:23	1.45 %	18.7 %
9/17/2010 14:23	1.3 %	18.7 %
9/17/2010 14:24	1.32 %	18.8 %
9/17/2010 14:24	1.21 %	18.7 %
9/17/2010 14:25	1.33 %	18.8 %
9/17/2010 14:25	1.37 %	18.8 %
9/17/2010 14:26	1.25 %	18.7 %
9/17/2010 14:26	1.39 %	18.8 %
9/17/2010 14:27	1.27 %	18.7 %
9/17/2010 14:27	1.19 %	18.8 %
9/17/2010 14:28	1.31 %	18.9 %
9/17/2010 14:28	1.33 %	18.8 %
9/17/2010 14:29	1.45 %	18.7 %
9/17/2010 14:29	1.26 %	18.7 %
9/17/2010 14:30	1.27 %	18.8 %
9/17/2010 14:30	1.28 %	18.8 %
9/17/2010 14:31	1.37 %	18.8 %
9/17/2010 14:31	1.23 %	18.7 %
9/17/2010 14:32	1.42 %	18.8 %
9/17/2010 14:32	1.41 %	18.7 %
9/17/2010 14:33	1.38 %	18.7 %
9/17/2010 14:33	1.39 %	18.7 %
9/17/2010 14:34	1.2 %	18.7 %
9/17/2010 14:34	1.16 %	18.8 %
Run2	1.367 %	18.725 %
Averages	O2	CO2
FCCU		

Hess Corporation, Perth Amboy, NJ
FCCU - Wet Gas Scrubber
 Run 3, CTM - 027

Date time	O2	CO2
9/17/2010 15:24	1.3 %	18.7 %
9/17/2010 15:24	1.37 %	18.8 %
9/17/2010 15:25	1.56 %	18.8 %
9/17/2010 15:25	1.4 %	18.6 %
9/17/2010 15:26	1.29 %	18.7 %
9/17/2010 15:26	1.34 %	18.8 %
9/17/2010 15:27	1.19 %	18.8 %
9/17/2010 15:27	1.28 %	18.9 %
9/17/2010 15:28	1.24 %	18.8 %
9/17/2010 15:28	1.29 %	18.9 %
9/17/2010 15:29	1.3 %	18.8 %
9/17/2010 15:29	1.38 %	18.8 %
9/17/2010 15:30	1.32 %	18.8 %
9/17/2010 15:30	1.19 %	18.8 %
9/17/2010 15:31	1.34 %	18.9 %
9/17/2010 15:31	1.21 %	18.8 %
9/17/2010 15:32	1.29 %	18.9 %
9/17/2010 15:32	1.29 %	18.8 %
9/17/2010 15:33	1.2 %	18.8 %
9/17/2010 15:33	1.46 %	18.9 %
9/17/2010 15:34	1.53 %	18.7 %
9/17/2010 15:34	1.5 %	18.6 %
9/17/2010 15:35	1.52 %	18.6 %
9/17/2010 15:35	1.33 %	18.6 %
9/17/2010 15:36	1.58 %	18.7 %
9/17/2010 15:36	1.53 %	18.6 %
9/17/2010 15:37	1.35 %	18.6 %
9/17/2010 15:37	1.32 %	18.7 %
9/17/2010 15:38	1.34 %	18.8 %
9/17/2010 15:38	1.24 %	18.8 %
9/17/2010 15:39	1.22 %	18.8 %
9/17/2010 15:39	1.26 %	18.9 %
9/17/2010 15:40	1.37 %	18.9 %
9/17/2010 15:40	1.37 %	18.8 %
9/17/2010 15:41	1.36 %	18.7 %
9/17/2010 15:41	1.34 %	18.8 %
9/17/2010 15:42	1.25 %	18.8 %
9/17/2010 15:42	1.27 %	18.8 %
9/17/2010 15:43	1.37 %	18.8 %
9/17/2010 15:43	1.4 %	18.8 %
9/17/2010 15:44	1.37 %	18.7 %
9/17/2010 15:44	1.25 %	18.7 %
9/17/2010 15:45	1.3 %	18.8 %
9/17/2010 15:45	1.32 %	18.8 %
9/17/2010 15:46	1.37 %	18.8 %
9/17/2010 15:46	1.2 %	18.8 %
9/17/2010 15:47	1.31 %	18.9 %
9/17/2010 15:47	1.29 %	18.8 %
9/17/2010 15:48	1.12 %	18.8 %
9/17/2010 15:48	1.03 %	19 %
9/17/2010 15:49	1.17 %	19 %
9/17/2010 15:49	1.07 %	18.9 %
9/17/2010 15:50	1.11 %	19 %
9/17/2010 15:50	1.2 %	19 %
9/17/2010 15:51	1.2 %	18.9 %
9/17/2010 15:51	1.42 %	18.8 %
9/17/2010 15:52	1.27 %	18.6 %
9/17/2010 15:52	1.3 %	18.9 %
9/17/2010 15:53	1.39 %	18.8 %
9/17/2010 15:53	1.2 %	18.8 %
9/17/2010 15:54	1.3 %	18.9 %
9/17/2010 15:54	1.2 %	18.8 %

9/17/2010 15:55	1.23 %	18.9 %
9/17/2010 15:55	1.33 %	18.9 %
9/17/2010 15:56	1.38 %	18.8 %
9/17/2010 15:56	1.42 %	18.7 %
9/17/2010 15:57	1.28 %	18.7 %
9/17/2010 15:57	1.35 %	18.8 %
9/17/2010 15:58	1.39 %	18.7 %
9/17/2010 15:58	1.4 %	18.7 %
9/17/2010 15:59	1.58 %	18.7 %
9/17/2010 15:59	1.32 %	18.8 %
9/17/2010 16:00	1.38 %	18.8 %
9/17/2010 16:00	1.2 %	18.8 %
9/17/2010 16:01	1.26 %	18.9 %
9/17/2010 16:01	1.28 %	18.8 %
9/17/2010 16:02	1.21 %	18.9 %
9/17/2010 16:02	1.31 %	18.9 %
9/17/2010 16:03	1.54 %	18.8 %
9/17/2010 16:03	1.41 %	18.6 %
9/17/2010 16:04	1.35 %	18.7 %
9/17/2010 16:04	1.39 %	18.8 %
9/17/2010 16:05	1.25 %	18.8 %
9/17/2010 16:05	1.33 %	18.8 %
9/17/2010 16:06	1.45 %	18.8 %
9/17/2010 16:06	1.64 %	18.7 %
9/17/2010 16:07	1.54 %	18.6 %
9/17/2010 16:07	1.47 %	18.7 %
9/17/2010 16:08	1.26 %	18.7 %
9/17/2010 16:08	1.5 %	18.8 %
9/17/2010 16:09	1.72 %	18.5 %
9/17/2010 16:09	1.53 %	18.4 %
9/17/2010 16:10	1.5 %	18.6 %
9/17/2010 16:10	1.39 %	18.7 %
9/17/2010 16:11	1.43 %	18.7 %
9/17/2010 16:11	1.37 %	18.7 %
9/17/2010 16:12	1.31 %	18.8 %
9/17/2010 16:12	1.43 %	18.7 %
9/17/2010 16:13	1.24 %	18.8 %
9/17/2010 16:13	1.33 %	18.9 %
9/17/2010 16:14	1.31 %	18.8 %
9/17/2010 16:14	1.39 %	18.8 %
9/17/2010 16:15	1.25 %	18.7 %
9/17/2010 16:15	1.39 %	18.9 %
9/17/2010 16:16	1.74 %	18.6 %
9/17/2010 16:16	1.59 %	18.4 %
9/17/2010 16:17	1.69 %	18.4 %
9/17/2010 16:17	1.38 %	18.5 %
9/17/2010 16:18	1.39 %	18.7 %
9/17/2010 16:18	1.26 %	18.7 %
9/17/2010 16:19	1.44 %	18.8 %
9/17/2010 16:19	1.21 %	18.7 %
9/17/2010 16:20	1.31 %	18.8 %
9/17/2010 16:20	1.36 %	18.8 %
9/17/2010 16:21	1.19 %	18.7 %
9/17/2010 16:21	1.11 %	19 %
9/17/2010 16:22	1.01 %	19 %
9/17/2010 16:22	1.13 %	19.1 %
9/17/2010 16:23	1.1 %	19 %
9/17/2010 16:23	1.09 %	19 %

Run 3	1.334 %	18.777 %
Averages	O2	CO2
FCCU		