639 Alpha Drive
Pittsburgh, Pennsylvania 15238
Telephone (412) 967-1900
FAX (412) 967-1911

ADVANCED TECHNOLOGY SYSTEMS, INC.

ATS Project No. 00-117-P

November 14, 2000

Mr. William C. Graeser
Manager – Environmental and Quality Assurance
U.S. Steel Clairton Works
400 State Street
Clairton, PA 15025

RE: LETTER REPORT – HYDROCHLORIC ACID, CHLORINE GAS AND AMMONIA GAS EMISISONS TESTING CONDUCTED AT NO. 20 BATTERY COMBUSTION STACK ON OCTOBER 11, 2000

Dear Mr. Graeser:

This letter, with attachments, constitutes the report that summarizes the results of the hydrochloric acid (HCl), chlorine gas (Cl_2) and ammonia gas (NH_3) emissions testing conducted at No. 20 Battery Combustion Stack by Advanced Technology Systems, Inc. (ATS). Three two-hour test runs were conducted on October 11, 2000 simultaneous with the compliance test program at this stack (particulate matter and visible emissions were measured as part of the compliance test program).

The test results have been summarized in the attached Table 1. Hydrochloric acid, chlorine gas and ammonia gas concentrations are listed in units of milligrams per dry standard cubic meter (mg/dscm). Hydrochloric acid, chlorine gas and ammonia gas mass emission rates are listed in units of pounds per hour (lb/hr). Table 1 also presents pertinent exhaust gas and sampling parameters including exhaust gas flow rates in units of actual cubic feet per minute (acfm), standard cubic feet per minute (scfm), and dry standard cubic feet per minute (dscfm), exhaust gas temperature (^{o}F), and moisture content of the exhaust gas (percent by volume), gas volume sampled for each test run in units of dry standard cubic feet (dscf) and the isokinetic variation value for each test run. The isokinetic variation value is equal to the ratio of the average linear gas velocity sampled through the probe nozzle to the average exhaust gas velocity. All isokinetic variation values are between 90 percent and 110 percent, which is the acceptable range of values. Actual test sampling times have also been included in Table 1.

Hydrochloric acid, chlorine gas and ammonia gas emission testing were performed in accordance with U.S. EPA Reference Methods 1 through 4 and 26A, U.S. EPA Conditional Test Method 027 and the requirements of the Pennsylvania Department of Environmental Protection (PA DEP) Source Testing Manual (Draft Revision 3.1, May 3, 1999). Detailed information regarding the procedures used to measure the exhaust gas stream velocity and volumetric flow rate (i.e., U.S. EPA Reference

Methods 1 through 4) can be found in the summary report for the compliance test program. Hydrochloric acid and chlorine gas sampling was performed in accordance with U.S. EPA Reference Method 26A. Ammonia gas sampling was performed, where possible, in accordance with U.S. EPA Conditional Test Method 027. (The test procedures specified in Method 027 were modified slightly for this test program based on the expected exhaust gas temperatures of 450°F. The modifications were made after ATS consulted with Ms. Rima Howell of the U.S. EPA, who is the pertinent contact for Method 027. It should also be noted that the U.S. EPA had not promulgated Method 027 at the time of this test program, however, this method was apparently the only test method available from the U.S. EPA designed for measuring ammonia gas emissions from stationary sources.) Process gas samples were withdrawn isokinetically from the stack, with particulate matter collected in a glass nozzle, a heated glass-lined probe, a heated Teflon-lined flexible probe, and on a heated quartz filter. Vapor phase hydrochloric acid, chlorine gas and ammonia gas were collected in a series of chilled impingers. The impinger type and sequence are listed below:

No.	Impinger Type	Contents
1.	Modified Greenburg-Smith	50 mL 0.1 N sulfuric acid (for HCl and NH_3 collection)
2.	Greenburg-Smith	100 mL 0.1 N sulfuric acid (for HCl & NH_3 collection)
3.	Greenburg-Smith	100 mL 0.1 N sulfuric acid (for HCl & NH_3 collection)
4.	Modified Greenburg-Smith	100 mL 0.1 N sodium hydroxide (for Cl_2 collection)
5.	Modified Greenburg-Smith	100 mL 0.1 N sodium hydroxide (for Cl_2 collection)
6.	Modified Greenburg-Smith	200 g Silica Gel

A gas volume greater than 50 dry standard cubic feet (dscf) – the minimum gas volume required by the PA DEP for the compliance test program - was sampled for each test run. The flow rate through each sample train was less than 1 dry standard cubic foot per minute as required by U.S. EPA Reference Method 26A.

Following each test run, the sample trains were processed in accordance with PA DEP requirements. Detailed information regarding the procedures used to recover the particulate matter catch (essentially U.S. EPA Reference Method 5 procedures) can be found in the summary report for the compliance test program. Following the gravimetric analysis of the impingers for moisture gain, the following four samples fractions were generated for each sample train:

Fraction	Description
A	Contents of Impinger Nos. 1 & 2 plus applicable distilled deionized water rinses (for HCl and NH_3)
B	Contents of Impinger No. 3 plus applicable distilled deionized water rinses (for HCl and NH_3)
C	Contents of Impinger No. 4 plus applicable distilled deionized water rinses (for Cl_2)
D	Contents of Impinger No. 5 plus applicable distilled deionized water rinses (for Cl_2)

For each sample train, each of the four fractions were analyzed separately as required by the PA DEP to allow for the calculation of the collection efficiency of the sample train for HCl, Cl_2 and NH_3 collection. The contents of Impinger No. 6 were discarded.

The actual test samples plus field blanks of the impinger scrubbing solutions (0.1 N sulfuric acid and 0.1 N sodium hydroxide) were submitted to the subcontract analytical laboratory for chloride ion analyses using ion chromatographic techniques in accordance with U.S. EPA Reference Method 26A. Sample Fractions A and B and the 0.1 N sulfuric acid solution field blank were also analyzed for ammonium ion concentration using specific ion electrode analysis techniques. The analytical laboratory results showed the following:

- The chloride ion concentrations of the field blanks were less than the analytical detection limit;
- For all three test runs, the HCl collection efficiency of the sample train was calculated to be greater than the minimum collection efficiency specified by the PA DEP (i.e., the chloride catch of the Sample Fraction B was at most 10 percent of the chloride catches from Sample Fraction A plus Sample Fraction B);
- For all three test runs, the Cl_2 collection efficiency of the sample train could not be calculated since the chloride catches of Sample Fractions C and D were less than the analytical detection limit;
- The ammonium ion concentration of the field blank was less than the analytical detection limit; and
- For the first and third test runs, the NH_3 collection efficiency of the sample train was calculated to be greater than the minimum collection efficiency specified by the PA DEP (i.e., the ammonium catch of the Sample Fraction B was at most 10 percent of the ammonium catches from Sample Fraction A plus Sample Fraction B). For the second test run, the NH_3 collection efficiency of the sample train could not be calculated since the ammonium catches in Sample Fractions A and B were very near the analytical detection limit.

Copies of the field data sheets, equipment calibration data, analytical laboratory results and emissions calculations are included in the appendix.

ATS appreciates the opportunity to provide U.S. Steel with process gas testing services.

If you have any questions regarding this letter report, please call Dr. Robinson Khosah or me at (412) 967-1900 or e-mail me at the following address: jshimshock@atsengineers.com.

Very truly yours,

John P. Shimshock

John P. Shimshock, Ph.D.
Senior Project Scientist

Approved by:

A. M. P. Khosah

Robinson P. Khosah, Ph.D.
Vice President
Science and Technology Division

JPS/blc
Enclosures

U.S. STEEL CLAIRTON WORKS
CLAIRTON, PENNSYLVANIA

TABLE 1

NO. 20 BATTERY COMBUSTION STACK
HYDROCHLORIC ACID, CHLORINE GAS AND AMMONIA GAS EMISSIONS DATA
OCTOBER 11, 2000

		Run 1	Run 2	Run 3	Average
Emissions Data					
Hydrochloric Acid (HCl)					
Concentration	(mg/dscm)	8.54E+00	9.11E+00	1.00E+01	9.22E+00
Mass Emission Rate	(lb/hr)	1.70E+00	1.98E+00	2.18E+00	1.95E+00
Chlorine Gas (Cl_2)					
Concentration	(mg/dscm)	< 1.12E-01	< 1.47E-01	< 7.23E-02	< 1.10E-01
Mass Emission Rate	(lb/hr)	< 2.22E-02	< 3.19E-02	< 1.58E-02	< 2.33E-02
Ammonia Gas (NH_3)					
Concentration	(mg/dscm)	3.18E-01	4.86E-02	1.53E+00	6.32E-01
Mass Emission Rate	(lb/hr)	6.32E-02	1.06E-02	3.34E-01	1.36E-01
Exhaust Stack Conditions					
Volumetric Flow Rate	(acfm)	1.17E+05	1.28E+05	1.28E+05	1.24E+05
	(scfm)	6.15E+04	6.74E+04	6.72E+04	6.54E+04
	(dscfm)	5.31E+04	5.81E+04	5.83E+04	5.65E+04
Temperature	(°F)	530	531	534	532
Moisture Content	(%)	13.6	13.8	13.3	13.6
Sampling Conditions					
Test Times	(EDT)	0752 to 1004	1037 to 1247	1326 to 1534	
Sampling Time - PM *	(minutes)	120	120	120	
Sample Volume - PM **	(dscf)	62.928	70.785	72.449	
Isokinetic Variation - PM ***	(%)	93.1	95.8	97.8	

mg / dscm = milligrams per dry standard cubic meter
*: Minimum required sampling time is 2 hours (120 minutes)
**: Minimum required sample volume is 50 dscf
***: Acceptable range of values is 90.0% <= Isokinetic Variation < = 110.0%

ATS
ADVANCED TECHNOLOGY SYSTEMS, INC.

U.S. STEEL CLAIRTON WORKS
CLAIRTON, PENNSYLVANIA

Hydrochloric Acid, Chlorine Gas and Ammonia Gas Emissions Testing Conducted at No. 20 Battery Combustion Stack on October 11, 2000

November 2000

APPENDIX

Field Data Sheets, Equipment Calibration Data, Analytical Laboratory Results and Emissions Calculations

ATS
ADVANCED TECHNOLOGY SYSTEMS, INC.

HIGH FLOW SOURCE SAMPLING DATA SHEET

Page 1 of 2

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2000	CONTROL BOX NO.	APEX- 4	HOT/COLD BOX NO.	7
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 1	ORIFICE FACTOR (ΔH@)	2.003	FILTER NO.	499
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y)	1.0023	PROBE NO.	10 - 1
TEST CREW	JL	STATIC P. (in. H2O)	-1.5	CALIBRATION DATE	9/20/99	NOZZLE DIA. (in.)	0.625
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE	4" Nipples	PITOT COEF.	0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
A	68.3	7:52	508.141	.01	.70	.70	6	165	558	47	47	211	46	5 min./pt.
	48.0		510	.02	1.45	1.45	10	175	522	50	47	206	46	
	34.0			.02	1.45	1.45	17.5	175	529	52	47	213	47	
	22.7			.02	1.45	1.45	15.5	185	537	51	48	214	51	
	12.9			.01	.71	.71	7	202	541	51	48	211	54	
	4.1		523.695	.01	.71	.71	6	257	534	55	48	215	52	
B	68.3	8:26	523.695	.01	.71	.71	5.5	230	502	52	48	227	51	
	48.0			.01	.71	.71	6	215	530	55	48	219	50	
	34.0			.02	1.43	1.43	10	159	538	57	48	215	50	
	22.7			.02	1.43	1.43	11	158	543	57	49	207	50	
	12.9			.015	1.07	1.07	10	169	543	57	49	215	52	
	4.1		538.351	.01	.71	.71	10	179	534	58	49	212	53	
	Page 1	Δ = 60	Δ = 30.210	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			
	Totals	min	dcf	0.014		1.015			534 (°F)		51 (°F)			Estimates:
	Test	Δ = 120	Δ = 61.632	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			MW = 27.5
	Totals	min	dcf	0.0145		1.07			530 (°F)		55 (°F)			%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2		
O2		
CO		
N2		

71.03

$$\left\{\frac{\Sigma\sqrt{\Delta P'}}{n}\right\}^2$$

System Leak Check (60 sec)

	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before	5.00	0.008	< 0.02
After	17.5	0.005	< 0.02

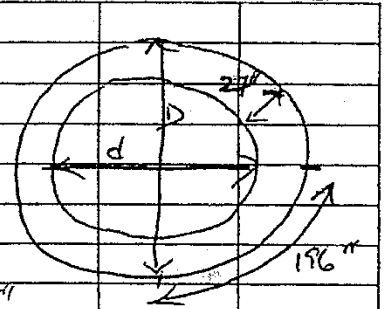
Pitot Leak Check (15 sec)

	Positive	Negative
Before	OK	OK
After	OK	OK

$\%H_2O = 13.6$

$\%.150 = 95.93$

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4			
2.	100 mL 0.1 N H2SO4			
3.	100 mL 0.1 N H2SO4			
4.	100 mL 0.1 N NaOH			
5.	100 mL 0.1 N NaOH			
6.	~ 200 g Silica Gel			
7.				
8.				



$\frac{\pi D}{4} = 196"$ $D = 249.5"$

$\Rightarrow d = 195.5"$ say 192"

HIGH FLOW SOURCE SAMPLING DATA SHEET

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2000	CONTROL BOX NO.	APEX-4	HOT/COLD BOX NO.	7
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 1	ORIFICE FACTOR (ΔH@)	2.003	FILTER NO.	499
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y)	1.0023	PROBE NO.	10 - 1
TEST CREW	JL	STATIC P. (in. H2O)	-1.5	CALIBRATION DATE	9/20/99	NOZZLE DIA. (in.)	0.625
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE	4" Nipples	PITOT COEF.	0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
C	68.3	9:00	538.351	.02	1.51	1.51	10	157	517	57	51	219	51	5 min./pt.
	48.0			.02	1.51	1.51	11.5	148	530	58	51	222	51	
	34.0			.015	1.13	1.13	11.5	120	539	59	52	224	54	
	22.7			.02	1.51	1.51	12	122	536	61	52	220	55	
	12.9			.015	1.13	1.13	12	135	522	62	53	224	56	
	4.1		554.785	.01	.76	.76	8	118	522	64	54	219	54	
D	68.3	9:34	554.785	.02	1.51	1.51	10	126	505	60	56	201	54	
	48.0			.02	1.51	1.51	10.5	123	534	63	56	214	53	
	34.0			.01	.72	.72	9	138	545	64	57	199	54	
	22.7			.015	1.09	1.09	9	153	550	66	57	215	56	
	12.9			.01	.72	.72	7	151	500	65	57	202	54	
	4.1	10:04	569.773	.01	.72	.77	7	179	511	66	57	200	54	
	Page 2	Δ = 60	Δ = 31.422	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			Estimates:
	Totals	min	dcf	0.015		1.13			526 (°F)		58 (°F)			MW = 27.5
														%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2	4.5%	
O2	11 %	
CO	0	
N2	84.5%	

$= \left\{ \frac{\Sigma \sqrt{\Delta x}}{n} \right\}^2$

System Leak Check (60 sec)

	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before			< 0.02
After			< 0.02

Pitot Leak Check (15 sec)

	Positive	Negative
Before		
After		

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4	538.1	455.6	82.5
2.	100 mL 0.1 N H2SO4	621.3	529.7	91.6
3.	100 mL 0.1 N H2SO4	714.7	562.9	151.8
4.	100 mL 0.1 N NaOH	434.6	508.0	-73.4
5.	100 mL 0.1 N NaOH	488.8	545.4	-56.6
6.	~200 g Silica Gel	647.9	633.2	14.7
7.				
8.			TOTAL	210.69

HIGH FLOW SOURCE SAMPLING DATA SHEET

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2000	CONTROL BOX NO. APEX-4	HOT/COLD BOX NO. 5
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 2	ORIFICE FACTOR (ΔH@) 2.003	FILTER NO. 500 QTZ
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y) 1.0023	PROBE NO. 10 - 1
TEST CREW	JL, JS, KA.	STATIC P. (in. H2O)	-1.50	CALIBRATION DATE 9/20/99	NOZZLE DIA. (in.) 0.625
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE 4" Nipples	PITOT COEF. 0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
1	68.3	1037	570.247	0.03	2.17	2.17	15	245	543	57	57	248	53	5 min./pt.
	48.0			0.03	2.17	2.17	15	245	547	58	57	248	53	
	34.0			0.03	2.17	2.17	15	245	556	60	57	248	53	
	22.7			0.03	2.14	2.14	15	244	525	62	58	245	53	
	12.9			0.02	1.48	1.48	13	244	523	65	59	245	52	
	4.1	1107	590.915	0.01	0.74	0.74	5	244	520	69	60	244	52	
3	68.3	1110	590.915	0.02	1.48	1.48	15	243	520	67	62	245	51	
	48.0			0.02	1.48	1.48	15	243	548	69	62	245	51	
	34.0			0.03	2.22	2.22	16	243	555	70	63	245	51	
	22.7			0.02	1.45	1.45	15	244	522	70	64	245	51	
	12.9			0.02	1.45	1.45	15	244	522	72	64	244	50	
	4.1	1140	610.660	0.02	1.45	1.45	15	243	524	74	65	244	50	
	Page 1	Δ = 60	Δ = 40.413	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			
	Totals	min	dcf	0.023		1.67			534 (°F)		64 (°F)			Estimates:
	Test	Δ = 120	Δ = 71.173	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			MW = 27.5
	Totals	min	dcf	0.0175		1.29			53[illegible] (°F)		69 (°F)			%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2	4.5%	
O2	11%	
CO	–	
N2	84.5%	

72.40

$= \left(\frac{\Sigma\sqrt{\Delta p}}{n}\right)^2$

System Leak Check (60 sec)

	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before	5.00	0.007	< 0.02
After	16.00	0.010	< 0.02

Pitot Leak Check (15 sec)

	Positive	Negative
Before	OK	OK
After	OK	OK

$\% H_2O = 13.8$

% ISO = 97%

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4	640.0	495.6	144.4
2.	100 mL 0.1 N H2SO4	581.4	513.4	68.0
3.	100 mL 0.1 N H2SO4	560.7	552.3	8.4
4.	100 mL 0.1 N NaOH	531.8	529.9	1.9
5.	100 mL 0.1 N NaOH	576.4	574.5	1.9
6.	~ 200 g Silica Gel	611.5	596.1	15.4
7.				
8.			TOTAL	240.0 g

HIGH FLOW SOURCE SAMPLING DATA SHEET

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2006	CONTROL BOX NO.	APEX-4	HOT/COLD BOX NO.	5
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 2	ORIFICE FACTOR (ΔH@)	2.003	FILTER NO.	500 QTZ
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y)	1.0023	PROBE NO.	10 - 1
TEST CREW	JL, JS, KA	STATIC P. (in. H2O)	-1.50	CALIBRATION DATE	9/20/99	NOZZLE DIA. (in.)	0.625
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE	4" Nipples	PITOT COEF.	0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
C	68.3	1144	610.660	0.01	0.74	0.74	5.0	243	535	72	66	244	51	5 min./pt.
	48.0			0.01	0.74	0.74	5.0	243	553	74	66	244	50	
	34.0			0.02	1.51	1.51	13.0	243	520	76	67	244	50	
	22.7			0.02	1.51	1.51	13.0	244	520	76	67	244	50	
	12.9			0.02	1.51	1.51	13.0	244	526	76	68	244	50	
	4.1	1214	627.534	0.01	0.74	0.74	5.0	243	520	77	69	244	50	
D	68.3	1217	627.534	0.01	0.74	0.74	5.0	244	514	73	69	245	51	
	48.0			0.01	0.74	0.74	5.0	243	541	75	69	245	51	
	34.0			0.01	0.74	0.74	5.0	243	520	77	70	244	50	
	22.7			0.01	0.74	0.74	5.0	244	526	78	70	244	50	
	12.9			0.01	0.74	0.74	5.0	244	530	78	70	244	50	
	4.1	1247	641.420	0.01	0.74	0.74	5.0	244	529	79	70	244	50	
	Page 2	Δ = 60	Δ = 30.760	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			Estimates:
	Totals	min	dcf	0.012		0.907			528 (°F)		72 (°F)			MW = 27.5
														%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2		
O2		
CO		
N2		

$= \left\{ \frac{\Sigma \sqrt{\Delta x'}}{n} \right\}$

System Leak Check (60 sec)

2	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before	PER PACE ONSITE		< 0.02
After			< 0.02

Pitot Leak Check (15 sec)

	Positive	Negative
Before	PER PACE ONSITE	
After		

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4			
2.	100 mL 0.1 N H2SO4			
3.	100 mL 0.1 N H2SO4			
4.	100 mL 0.1 N NaOH			
5.	100 mL 0.1 N NaOH			
6.	~ 200 g Silica Gel			
7.				
8.				

HIGH FLOW SOURCE SAMPLING DATA SHEET

Page 1 of 2

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2000	CONTROL BOX NO.	APEX-4	HOT/COLD BOX NO.	8
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 3	ORIFICE FACTOR (ΔH@)	2.003	FILTER NO.	571 ~~5001~~ QTZ
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y)	1.0023	PROBE NO.	10 - 1
TEST CREW	JL, JS, KA	STATIC P. (in. H2O)	-1.50	CALIBRATION DATE	9/20/99	NOZZLE DIA. (in.)	0.625
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE	4" Nipples	PITOT COEF.	0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
A	68.3	1326	644.465	0.03	2.26	2.26	12	245	525	76	70	245	60	5 min./pt.
	48.0			0.03	2.26	2.26	12	245	528	77	70	245	60	
	34.0			0.03	2.26	2.26	12	244	532	77	70	245	58	
	22.7			0.03	2.26	2.26	12	245	544	80	71	245	56	
	12.9			0.03	2.23	2.23	12	244	547	82	73	244	56	
	4.1	1356	668.178	0.03	2.23	2.23	12	245	531	83	74	245	56	
B	68.3	1358	668.178	0.03	2.28	2.28	12	244	522	80	75	244	54	
	48.0			0.03	2.28	2.28	12	244	530	83	75	244	54	
	34.0			0.02	1.52	1.52	12	245	538	84	77	243	52	
	22.7			0.02	1.52	1.52	12	245	543	85	77	243	52	
	12.9			0.02	1.52	1.52	12	244	549	87	77	243	52	
	4.1	1428	689.302	0.01	0.75	0.75	4	245	519	87	79	243	52	
	Page 1	Δ = 60	Δ = ~~689.302~~	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			
	Totals	min	~~dcf~~ 44.837 dcf	0.025		1.91			534 (°F)		78 (°F)			Estimates:
	Test	Δ = 120	Δ = 74.480	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			MW = 27.5
	Totals	min	dcf	0.018		1.39			534 (°F)		81 (°F)			%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2	4.5%	
O2	11.0%	
CO	—	
N2	84.5%	

$= \left[\frac{\sum\sqrt{\Delta P}}{n}\right]^2$

System Leak Check (60 sec)

2	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before	5.00	0.004	< 0.02
After	12.00	0.006	< 0.02

Pitot Leak Check (15 sec)

	Positive	Negative
Before	OK	OK
After	OK	OK

$\%H_2O = 13.3$

$\%ISO = 98$

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4	563.2	419.1	144.1
2.	100 mL 0.1 N H2SO4	575.0	491.9	83.1
3.	100 mL 0.1 N H2SO4	662.3	542.5	119.8
4.	100 mL 0.1 N NaOH	437.2	507.4	-70.2
5.	100 mL 0.1 N NaOH	508.1	549.6	-41.5
6.	~200 g Silica Gel	666.2	647.9	18.3
7.				
8.			TOTAL	235.5 g

HIGH FLOW SOURCE SAMPLING DATA SHEET

CLIENT	U.S. Steel Clairton Works	TEST DATE	October 11, 2000	CONTROL BOX NO.	APEX-4
PLANT SITE	Clairton, PA	TEST NO.	CLR - #20BS - M26A - 3	ORIFICE FACTOR (ΔH@)	2.003
TEST UNIT	No. 20 Battery Combustion Stack	B.P. (in. Hg)	29.65	METER CORR. (Y)	1.0023
TEST CREW	JL, JS, KA	STATIC P. (in. H2O)	-1.50	CALIBRATION DATE	9/20/99
PROJECT NO.	00 - 117 - P	STACK DIA. (in.)	192	PORT SIZE & TYPE	4" Nipples

HOT/COLD BOX NO.	8
FILTER NO.	541 ~~5001-0TZ~~
PROBE NO.	10 - 1
NOZZLE DIA. (in.)	0.625
PITOT COEF.	0.84

Test Port	Traverse Point (in.)	Time (EDT)	DGM Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Required (in. H2O)	Orifice ΔH Actual (in. H2O)	Vacuum (in. Hg)	Probe Temp. (°F)	Stack Temp. (°F)	Meter Temp. In (°F)	Meter Temp. Out (°F)	Filter Temp. (°F)	Exit Temp. (°F)	Comments
C	68.3	1433	689.302	0.01	0.75	0.75	5.0	242	530	83	78	245	50	5 min./pt.
	48.0			0.01	0.75	0.75	5.0	243	537	85	78	245	50	
	34.0			0.01	0.75	0.75	5.0	243	539	86	78	245	50	
	22.7			0.01	0.75	0.75	5.0	243	543	86	78	244	51	
	12.9			0.01	0.75	0.75	5.0	242	554	87	79	244	51	
	4.1	1503	703.166	0.01	0.75	0.75	5.0	242	521	88	79	244	50	
D	68.3	1504	703.166	0.01	0.75	0.75	5.0	243	519	85	80	243	50	
	48.0			0.01	0.77	0.77	5.0	243	524	86	80	243	52	
	34.0			0.02	1.53	1.53	10.0	244	530	86	80	243	52	
	22.7			0.02	1.53	1.53	10.0	244	547	88	81	243	52	
	12.9			0.01	0.77	0.77	5.0	243	538	88	81	244	52	
	4.1	1534	718.945	0.01	0.77	0.77	5.0	243	521	89	81	241	51	
														Estimates:
	Page 2	Δ = 60	Δ = 29.643	(ΔP) avg =	(ΔH) avg =				(Tstack) avg =		(Tmeter) avg =			MW = 27.5
	Totals	min	dcf	0.011		0.866			533 (°F)		83 (°F)			%H2O = 15

Dry Gas Composition

	Run 1	Run 2
CO2		
O2		
CO		
N2		

$= \left[\frac{\sum\sqrt{\Delta P}}{n}\right]^2$

System Leak Check (60 sec)

2	Vacuum (in. Hg)	DGM Rate (cfm)	Required (cfm)
Before	PER PAGE ONE		< 0.02
After			< 0.02

Pitot Leak Check (15 sec)

	Positive	Negative
Before	PER PAGE ONE	
After		

No.	Impinger Contents	Final	Initial	Δ (g)
1.	50 mL 0.1 N H2SO4			
2.	100 mL 0.1 N H2SO4			
3.	100 mL 0.1 N H2SO4			
4.	100 mL 0.1 N NaOH			
5.	100 mL 0.1 N NaOH			
6.	~200 g Silica Gel			
7.				
8.				

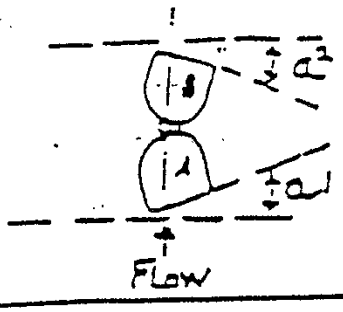
APEX GLASS NOZZLE CALIBRATION DATA SHEET Printed: 09/18/00

Nozzle No.	Size (inches)					Calibrated	
	Avg.		A	B	C	By	Date
52	0.440		0.440	0.440	0.440	KA	05/01/00
19	0.450		0.450	0.450	0.450	KA	04-14-98
36	0.490		0.490	0.490	0.490	KA	06-10-97
37	0.490		0.490	0.490	0.490	KA	07-05-96
38	0.495		0.495	0.495	0.495	KA	07-05-96
39	0.500		0.500	0.500	0.500	KA	09/18/00
46	0.625		0.625	0.625	0.625	KA	09/18/00
43	0.750		0.750	0.750	0.750	KA	01/05/00

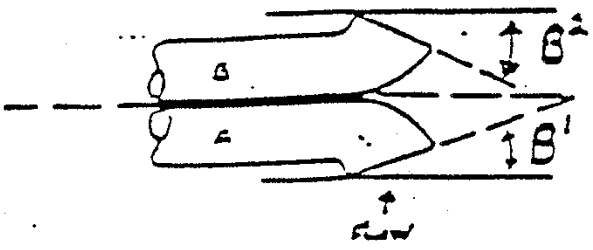
GEOMETRIC PITOT CALIBRATION

Caliper # XFS - 59
Precheck
Post Check

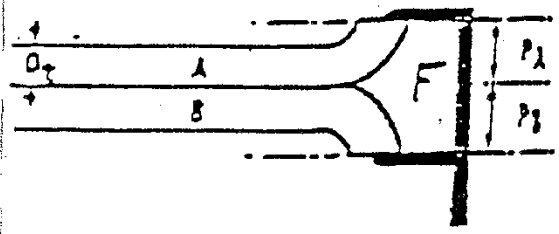
Probe # 10 - 1
Date 02 - 10 - 00
Initials KBH

① 

$a^1 = 1^0$
$a^2 = 2^0$ → $a^1, a^2 = <10°$
$B^1 = 1^0$
$B^2 = 1^0$ → $B^1, B^2 = <5°$
$F = 0.975"$

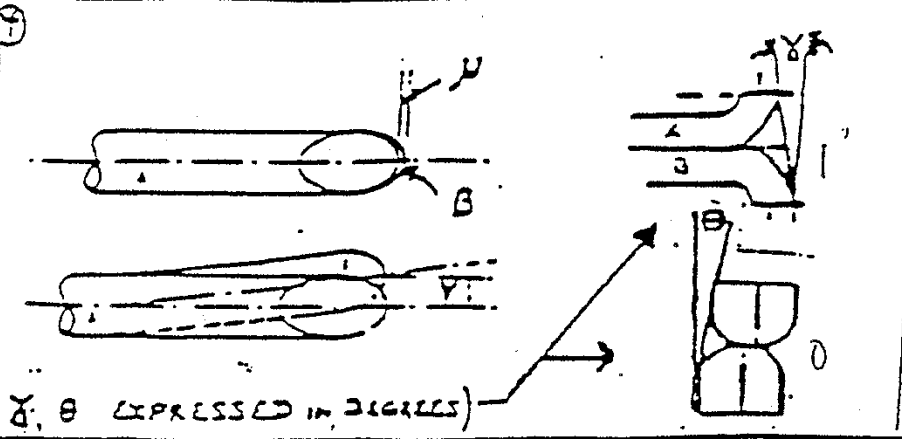
② 

$\mu = 0.017"$ — $\mu = \leq 0.1250"$ ($\gamma_{TAN} \times F = \mu$)
$V = 0.000"$ — $V = \leq 0.03125"$ ($\theta_{TAN} \times F = V$)
$W = 0.195"$ — $W \geq 0"$
$X = 0.321"$ — $X \geq 0.750"$ (3/4" using 1.0" nozzle)

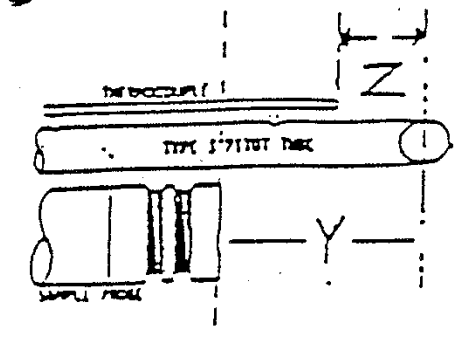
③ 

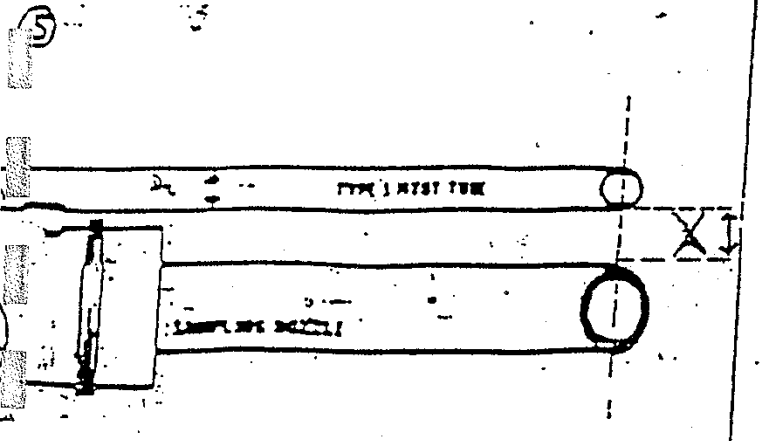
1.05 D_t < P_A < 1.50 D_t
$P_A = P_B$
2.10 D_t < P_B < 3.00 D_t

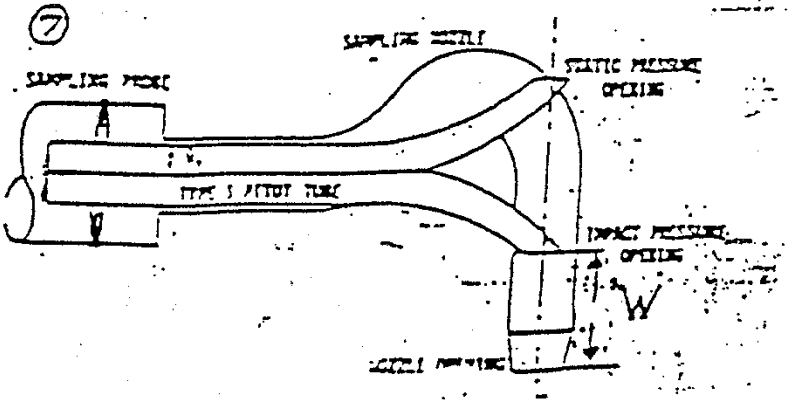
$Y = 6.215"$ — $Y \geq 3.0"$
$Z = 2.417"$ — $Z > 2.0"$
$D_t = 0.376"$ — $D_t > .1575"$

④ 

γ, θ EXPRESSED IN DEGREES

⑥ 

⑤ 

⑦ 

CERTIFICATE OF CALIBRATION

This certifies that your AL-20 AMERICAN WET TEST gas meter,
serial no. P-1146
has been calibrated with a bell prover.
AMERICAN 10 FOOT, # 3157
It is treaceable to the N.I.S.T., reference no. 1249811.

Calibration by Carl Poe Co., Inc.
99 Reinerman Houston, TX 77007
713-861-3816

2-8-96
Date

Mark Poe
Signature

DRY GAS METER CALIBRATION DATA SHEET

CONTROL BOX NO. Apex-4
CALIBRATION DATE 09-24-99
BAROMETRIC PRESSURE (in. Hg) 29.10

CHECK ONE: PRE-TEST ✓ POST-TEST
CALIBRATION OFFICER JPS

RUN NO.		WET TEST METER Gas Volume Vw (cf)	Elapsed Time (min.)	Meter Temp. Tw (°F)	DRY GAS METER Gas Volume Vd (dcf)	Inlet Temp. Ti (°F)	Outlet Temp. To (°F)	Orifice Diff. Pres. ΔH (in. H2O)	Vacuum (in. H2O)
1	START	0.000	0		318.382			1.0	8.0
	MIDWAY			71		88	78		
	STOP	5.000	9:20		323.417				
	DELTA *	5.000	9.33		5.115				
2	START	0.000	0		324.438			2.0	8.0
	MIDWAY			71		92	79		
	STOP	5.000	6:39		329.522				
	DELTA *	5.000	6.65		5.084				
3	START	0.000	0		331.556			3.0	8.0
	MIDWAY			71		95	80		
	STOP	5.000	5:25		336.644				
	DELTA *	5.000	5.42		5.094				
Dry Gas	START	0.056	0		336.713			0.0	1.0
Meter Leak	STOP	0.358	10:00		337.112				
Check	DELTA *	0.348	10.0		0.399				

{DELTA Vw (cf) - DELTA Vd (dcf)} / 10 (min.) = 0.0049 cfm <= 0.02 cfm

*: Express final elapsed time in decimal format

Differential Pressure Gauges (check one): ✓ Inclined Manometers _____ Magnehelic Gauges

	Run #1	Run #2	Run #3	Avg.
BP (in. Hg)	29.10	29.10	29.10	
Time (min)	9.33	6.65	5.42	
Tw (°F)	71	71	71	
Vw (cf)	5.000	5.000	5.000	
Ti (°F)	88	92	95	
To (°F)	78	79	80	
ΔH (in. H2O)	1.00	2.00	3.00	
Vm (dcf)	5.115	5.084	5.094	
ΔH@ (in. H2O)	1.988	2.016	2.005	2.003
Y (Pre-test)	0.9971	1.0053	1.0044	1.0023

$$\Delta H@ = \frac{0.0317 * \Delta H * [(Tw+460) * Time]^2}{BP * (To + 460) * (Vw)^2}$$

$$Y = \frac{Vw * BP * [(Ti+460+To+460)/2]}{Vm * [BP+(\Delta H/13.6)] * (Tw+460)}$$

DRY GAS METER CALIBRATION DATA SHEET

CONTROL BOX NO. Apex-4
CALIBRATION DATE 10-20-00
BAROMETRIC PRESSURE (in. Hg) 29.24

CHECK ONE: PRE-TEST ✓ POST-TEST
CALIBRATION OFFICER JPS

RUN NO.		WET TEST METER Gas Volume Vw (cf)	Elapsed Time (min.)	Meter Temp. Tw (°F)	DRY GAS METER Gas Volume Vd (dcf)	Inlet Temp. Ti (°F)	Outlet Temp. To (°F)	Orifice Diff. Pres. ΔH (in. H2O)	Vacuum (in. H2O)
1	START	0.000	0		752.023			1.5	18.0
	MIDWAY			67		83	74		
	STOP	5.000	7:43		757.099				
	DELTA *	5.000	7.72		5.076				
2	START	0.000	0		757.099			1.5	18.0
	MIDWAY			67		83	74		
	STOP	5.000	7:43		762.172				
	DELTA *	5.000	7.72		5.073				
3	START	0.000	0		762.172			1.5	18.0
	MIDWAY			67		83	75		
	STOP	5.000	7:43		767.253				
	DELTA *	5.000	7.72		5.081				
Dry Gas	START	0.130	0		767.398			0.0	18.6
Meter Leak	STOP	0.302	10:00		767.658				
Check	DELTA *	0.172	10.0		0.260				

{DELTA Vw (cf) - DELTA Vd (dcf)} / 10 (min.) = 0.0088 cfm <= 0.02 cfm

*: Express final elapsed time in decimal format

Differential Pressure Gauges (check one): ✓ Inclined Manometers _____ Magnehelic Gauges

	Run #1	Run #2	Run #3	Avg.
BP (in. Hg)	29.24	29.24	29.24	
Time (min)	7.72	7.72	7.72	
Tw (°F)	67	67	67	
Vw (cf)	5.000	5.000	5.000	
Ti (°F)	83	83	83	
To (°F)	74	74	75	
ΔH (in. H2O)	1.50	1.50	1.50	
Vm (dcf)	5.076	5.073	5.081	
Y (Pre-test)				1.0023
ΔH@ (in. H2O)	2.016	2.016	2.012	2.015
Y (Post-test)	1.0027	1.0033	1.0027	1.0029
ΔY (%)				0.1%

$$\Delta H@ = \frac{0.0317 * \Delta H * [(Tw+460) * Time]^2}{BP * (To + 460) * (Vw)^2}$$

$$Y = \frac{Vw * BP * [(Ti+460+To+460)/2]}{Vm * [BP+(\Delta H/13.6)] * (Tw+460)}$$

4000 Tech Center Drive
Monroeville, PA 15146
412 825 2400
fax: 412 825 2407
IH & Environmental Laboratory

UEC
USX Engineers
& Consultants, Inc.

RECEIVED NOV 16 2000

October 26, 2000

Advanced Technology Systems, Inc.
ATTN: Mr. John Shimshock
639 Alpha Drive
RIDC Park
Harmarville, PA 15238

Attached are the analytical result(s) of the analysis on sample(s) submitted to the UEC Laboratories on October 12, 2000. Should you have any questions regarding this report, please contact us. An invoice will be issued shortly.

These results are submitted persuant to USX Engineers & Consultants, Inc.'s current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions, and no responsibility or liability is assumed for the manner in which the results are used or interpreted.

The results were derived with the following methods.

ANALYTE	METHOD
CHLORIDE	EPA 26A

We appreciate the opportunity to be of service and look forward to our continued assistance to you.

NOTE: Samples will be stored for only one month following the report date.

Sincerely,

Stephanie A. Guilyard

Stephanie A. Guilyard, IHIT, Project Manager

Enclosures

USX Engineers & Consultants Inc.
IH & Environmental Laboratories
4000 Tech Center Drive
Monroeville, PA 15146
PHONE: (412)825-2400 FAX: (412)825-2407
AIHA Accreditation #322

REPORT OF TEST RESULTS

DATE - 10/19/2000

Customer: CD-002D	ATTENTION: Mr. John Shimshock
Advanced Technology Systems, Inc. 639 Alpha Drive RIDC Park Harmarville, PA 15238	Work Requested by : Mr. John Shimshock Phone No. : 412-967-1900 CUSTOMER P.O. # : 3872 SITE LOCATION : US STEEL CLAIRTON WORKS

TRACKING NUMBER: 4545 A

UEC ID	CLIENT ID	ANALYTE	DATE SAMPLED	SAMPLE TIME (min)	PUMP RATE (LPM)	AIR VOL. SAMPLED (L)	ANALYSIS DATE	mg/L	mg/Kg	PPM	µg/L	µg/Kg	pH	%	LOD	
39235	CLR-24BS-M26A-1A	CHLORIDE	10/11/00	*	*	*	10/18/00	33							2.0 mg/L	E
39236	CLR-24BS-M26A-1B	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39237	CLR-24BS-M26A-1C	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39238	CLR-24BS-M26A-1D	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39239	CLR-24BS-M26A-2A	CHLORIDE	10/11/00	*	*	*	10/18/00	41							2.0 mg/L	E
39240	CLR-24BS-M26A-2B	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39241	CLR-24BS-M26A-2C	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39242	CLR-24BS-M26A-2D	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39243	CLR-24BS-M26A-3A	CHLORIDE	10/11/00	*	*	*	10/18/00	47							2.0 mg/L	E
39244	CLR-24BS-M26A-3B	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39245	CLR-24BS-M26A-3C	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39246	CLR-24BS-M26A-3D	CHLORIDE	10/11/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E
39247	CLR-H2SO4-BLK	CHLORIDE	10/12/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E

COMMENTS: SAMPLES ARE BLANK CORRECTED.

NOTES: * = Information not supplied by client. < = less than. # = Information not requested by client. N/A = Not Applicable.
A - FILTER OR SINGLE STAGE MONITOR B - TUBE C - TUBE OR 2 STAGE MONITOR D - BULK MATERIALS OR WIPES E - LIQUIDS OR SOLIDS I - FILTER + TUBE J - FILTER + TUBE
Time, flow rate and/or sample volume data are based on client supplied information, unless otherwise noted.

USX Engineers & Consultants Inc.
IH & Environmental Laboratories
4000 Tech Center Drive
Monroeville, PA 15146
PHONE: (412)825-2400 FAX: (412)825-2407
AIHA Accreditation #322

REPORT OF TEST RESULTS

DATE - 10/19/2000

Customer: CD-002D	ATTENTION: Mr. John Shimshock
Advanced Technology Systems, Inc. 639 Alpha Drive RIDC Park Harmarville, PA 15238	Work Requested by : Mr. John Shimshock Phone No. : 412-967-1900 CUSTOMER P.O. # : 3872 SITE LOCATION : US STEEL CLAIRTON WORKS

TRACKING NUMBER: 4545 A

UEC ID	CLIENT ID	ANALYTE	DATE SAMPLED	SAMPLE TIME (min)	PUMP RATE (LPM)	AIR VOL. SAMPLED (L)	ANALYSIS DATE	mg/L	mg/Kg	PPM	µg/L	µg/Kg	pH	%	LOD	
39248	CLR-NAOH-BLK	CHLORIDE	10/12/00	*	*	*	10/18/00	<2.0							2.0 mg/L	E

COMMENTS: SAMPLES ARE BLANK CORRECTED.

ANALYST : N. Kethyal Date: 10-19-00

APPROVED: Stephanie A. Guilyard Date: 10/30/00

Stephanie A. Guilyard, IHIT, Project Manager

NOTES: * = Information not supplied by client. < = less than.
= Information not requested by client. N/A = Not Applicable.
Time, flow rate and/or sample volume data are based on client supplied information, unless otherwise noted.

A - FILTER OR SINGLE STAGE MONITOR
B - TUBE
C - TUBE OR 2 STAGE MONITOR
D - BULK MATERIALS OR WIPES
E - LIQUIDS OR SOLIDS
I - FILTER + TUBE
J - FILTER + TUBE

Monroeville, PA 15146
fax: 412 825 2407
IH & Environmental Laboratory

UEC
USX Engineers
& Consultants, Inc.

October 26, 2000

Advanced Technology Systems, Inc.
ATTN: Mr. John Shimshock
639 Alpha Drive
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Harmarville, PA 15238

Attached are the analytical result(s) of the analysis on sample(s) submitted to the UEC Laboratories on October 12, 2000. Should you have any questions regarding this report, please contact us. An invoice will be issued shortly.

These results are submitted persuant to USX Engineers & Consultants, Inc.'s current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions, and no responsibility or liability is assumed for the manner in which the results are used or interpreted.

The results were derived with the following methods.

ANALYTE	METHOD
AMMONIUM-WATER	EPA 350.2 (MOD)
CHLORIDE	EPA 26A

We appreciate the opportunity to be of service and look forward to our continued assistance to you.

NOTE: Samples will be stored for only one month following the report date.

Sincerely,

Stephanie A. Guilyard

Stephanie A. Guilyard, IHIT, Project Manager

Enclosures

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.
639 ALPHA DRIVE, R.I.D.C. PARK
PITTSBURGH, PA 15238
(412)967-1900 FAX (412)967-1911

*: Please add 25 mg Sodium Thiosulfate ($Na_2S_2O_3 \cdot 3.5H_2O$) prior to analysis

CHAIN OF CUSTODY RECORD

PROJECT NUMBER 00-117-P; P.O.# 3872
PROJECT NAME U.S. Steel Clairton Works
ANALYTICAL LAB URS IT and Environmental Laboratories
DELIVER TO Sample Receiving
COMMENTS
No. 2 & Battery Combustion Stack

SAMPLE IDENTIFICATION NUMBER	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	NUMBER OF CONTAINERS	COMPOSITE OR GRAB	Chloride ion via ion chromatography	Ammonium ion via wet chemistry method		REMARKS OR OBSERVATIONS
CLR-#2&BS-M26A-1A	10-11-00	0752 →	1	Comp.	✓	✓		A IN H_2SO_4 - Sample Volume = 448.7
CLR-#2&BS-M26A-1B	↓	1004 EDT	1	Comp.	✓	✓		A IN H_2SO_4 - Sample Volume = 305.7
* CLR-#2&BS-M26A-1C		↓	1	Comp.	✓		*	C IN NaOH - Sample Volume = 99.6
* CLR-#2&BS-M26A-1D			1	Comp.	✓		*	C IN NaOH - Sample Volume = 105.4
CLR-#2&BS-M26A-2A	10-11-00	1037 →	1	Comp.	✓	✓		A IN H_2SO_4 - Sample Volume = 433.4
CLR-#2&BS-M26A-2B	↓	1247 EDT	1	Comp.	✓	✓		A IN H_2SO_4 - Sample Volume = 165.0
* CLR-#2&BS-M26A-2C		↓	1	Comp.	✓		*	C IN NaOH - Sample Volume = 147.0
* CLR-#2&BS-M26A-2D			1	Comp.	✓		*	C IN NaOH - Sample Volume = 132.7

Legend:
A = Impingers 1+2
B = Impinger 3
C = Impinger 4
D = Impinger 5

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	ICE CHEST #
John P. Steinbrick	10-12-00	1111 EDT	[illegible]	10/12/00	1115	
			Dan Marone	10-12-00	12:15	CHEST TEMP.
[illegible]	10-13-00		James J. Miller	10-18-2000	1230	
						TAG #

ATS 10/98

USX Engineers & Consultants Inc.
IH & Environmental Laboratories
4000 Tech Center Drive
Monroeville, PA 15146
PHONE: (412)825-2400 FAX: (412)825-2407
AIHA Accreditation #322

REPORT OF TEST RESULTS

DATE - 10/20/2000

Customer: CD-002D	ATTENTION: Mr. John Shimshock
Advanced Technology Systems, Inc. 639 Alpha Drive RIDC Park Harmarville, PA 15238	Work Requested by : Mr. John Shimshock Phone No. : 412-967-1900 CUSTOMER P.O. # : 3872 SITE LOCATION : US STEEL CLAIRTON WORKS

TRACKING NUMBER: 4545

UEC ID	CLIENT ID	ANALYTE	DATE SAMPLED	SAMPLE TIME (min)	PUMP RATE (LPM)	AIR VOL. SAMPLED (L)	ANALYSIS DATE	mg/L	mg/Kg	PPM	µg/L	µg/Kg	pH	%	LOD	
39235	CLR-24BS-M26A-1A	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			1.2					0.1	E
39236	CLR-24BS-M26A-1B	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			0.2					0.1	E
39239	CLR-24BS-M26A-2A	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			0.2					0.1	E
39240	CLR-24BS-M26A-2B	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			0.1					0.1	E
39243	CLR-24BS-M26A-3A	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			7.7					0.1	E
39244	CLR-24BS-M26A-3B	AMMONIUM-WATER	10/11/00	*	*	*	10/19/00			0.2					0.1	E
39247	CLR-H2SO4-BLK	AMMONIUM-WATER	10/12/00	*	*	*	10/19/00			< 0.1					0.1	E

ANALYST: James D. Miller Date: 10-20-2000

APPROVED: Stephanie A Guilyard Date: 10/30/00
Stephanie A. Guilyard, IHIT. Project Manager

NOTES: * = Information not supplied by client. < = less than.
= Information not requested by client. N/A = Not Applicable.
Time, flow rate and/or sample volume data are based on client supplied information, unless otherwise noted.

A - FILTER OR SINGLE STAGE MONITOR
B - TUBE
C - TUBE OR 2 STAGE MONITOR
D - BULK MATERIALS OR WIPES
E - LIQUIDS OR SOLIDS
I - FILTER + TUBE
J - FILTER + TUBE

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.
639 ALPHA DRIVE, R.I.D.C. PARK
PITTSBURGH, PA 15238
(412)967-1900 FAX (412)967-1911

* Please add 25 mg Sodium Thiosulfate $Na_2S_2O_3 \cdot 3.5H_2O$ prior to analysis

CHAIN OF CUSTODY RECORD

PROJECT NUMBER 00-117-P ; P.O. # 3872
PROJECT NAME U.S. Steel Clairton Works
ANALYTICAL LAB CEC Int and Environmental Laboratories
DELIVER TO Sample Receiving
COMMENTS
No. 26 Battery Combustion Stack

Legend:
A = Impingers 1+2
B = Impinger 3
C = Impinger 4
D = Impinger 5

	SAMPLE IDENTIFICATION NUMBER	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	NUMBER OF CONTAINERS	COMPOSITE OR GRAB	ANALYSES TO BE CONDUCTED: Chloride ion Via Ion chromatography	Ammonium ion Via wet Chemistry method	REMARKS OR OBSERVATIONS
	CLR-#26BS-M26A-3A	10-11-00	1326 →	1	Comp.	✓	✓	0.1N H_2SO_4 - Sample Volume = 425.0
	CLR-#26BS-M26A-3B	↓	1534 EDT	1	Comp.	✓	✓	0.1N H_2SO_4 - Sample Volume = 265.0
*	CLR-#26BS-M26A-3C		↓	1	Comp.	✓		* 0.1N NaOH - Sample Volume = 74.2
*	CLR-#26BS-M26A-3D			1	Comp.	✓		* 0.1N NaOH - Sample Volume = 112.4
	CLR-H2SO4-BLK	10-12-00	1000 EDT	1	Grab	✓	✓	0.1N H_2SO_4
*	CLR-NAOH-BLK	↓	↓	1	Grab	✓		* 0.1N NaOH

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	ICE CHEST #
John P. Shemshock	10-12-00	1114 EDT	Kelly [illegible]	10/12/00	1115	
[illegible]			Doug Morrison	10-12-00	13:15	CHEST TEMP.
[illegible]	10-13-00		James J. Miller	10-12-00	1230	
						TAG #

ATS 10/98

U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
NO. 20 BATTERY COMBUSTION STACK
OCTOBER 11, 2000
U.S. EPA REFERENCE METHOD 26A SAMPLING
CALCULATION OF THE IMPINGER COLLECTION EFFICIENCIES

Test No.	Sample ID (CLR-#20BS -M26A-)	Sample Type	Chloride Conc. (mg / L)	Sample Volume (mL)	Chloride Catch (mg)	Collection Efficiency (%)
1	1A	0.1 N H2SO4 - Impingers 1 & 2	33	448.7	14.81	100.0
	1B	0.1 N H2SO4 - Impinger 3	< 2.0	305.7	< 0.61	
	1C	0.1 N NaOH - Impinger 4	< 2.0	99.6	< 0.20	NA
	1D	0.1 N NaOH - Impinger 5	< 2.0	105.4	< 0.21	
2	2A	0.1 N H2SO4 - Impingers 1 & 2	41	433.4	17.77	100.0
	2B	0.1 N H2SO4 - Impinger 3	< 2.0	165.0	< 0.33	
	2C	0.1 N NaOH - Impinger 4	< 2.0	147.0	< 0.29	NA
	2D	0.1 N NaOH - Impinger 5	< 2.0	132.7	< 0.27	
3	3A	0.1 N H2SO4 - Impingers 1 & 2	47	425.0	19.98	100.0
	3B	0.1 N H2SO4 - Impinger 3	< 2.0	265.0	< 0.53	
	3C	0.1 N NaOH - Impinger 4	< 2.0	74.2	< 0.15	NA
	3D	0.1 N NaOH - Impinger 5	< 2.0	112.4	< 0.22	
Blank	Blank	0.1 N H2SO4	< 2.0			
Blank	Blank	0.1 N NaOH	< 2.0			

<u>0.1 N H2SO4</u>
Collection Eff. = (%) 100 * {1 - [XB Chloride Catch (mg) / XA Chloride Catch (mg)] }
where X = 1, 2 or 3

<u>0.1 N NaOH</u>
Collection Eff. = (%) 100 * {1 - [XD Chloride Catch (mg) / XC Chloride Catch (mg)] }
where X = 1, 2 or 3

For chloride concentrations less than the analytical detection limit (< 2.0) ---->
Chloride catch = 0

U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
NO. 20 BATTERY COMBUSTION STACK
OCTOBER 11, 2000
U.S. EPA CONDITIONAL TEST METHOD 027 SAMPLING
CALCULATION OF THE IMPINGER COLLECTION EFFICIENCIES

Test No.	Sample ID (CLR-#20BS -M26A-)	Sample Type	Ammonium Conc. (mg / L)	Sample Volume (mL)	Ammonium Catch (mg)	Collection Efficiency (%)
1	1A	0.1 N H2SO4 - Impingers 1 & 2	1.2	448.7	0.54	88.6
	1B	0.1 N H2SO4 - Impinger 3	0.2	305.7	0.06	
2	2A	0.1 N H2SO4 - Impingers 1 & 2	0.2	433.4	0.09	81.0
	2B	0.1 N H2SO4 - Impinger 3	0.1	165.0	0.02	
3	3A	0.1 N H2SO4 - Impingers 1 & 2	7.7	425.0	3.27	98.4
	3B	0.1 N H2SO4 - Impinger 3	0.2	265.0	0.05	
Blank	Blank	0.1 N H2SO4	< 0.1			

<u>0.1 N H2SO4</u>

Collection Eff. = (%) 100 * {1 - [XB Ammonium Catch (mg) / XA Ammonium Catch (mg)] }
where X = 1, 2 or 3

For ammonium concentrations less than the analytical detection limit (< 0.1) ----->
Ammonium catch = 0

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT: U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
TEST DATE: 10/11/00
TEST SITE: NO. 20 BATTERY COMBUSTION STACK
TEST NO.: CLR- #20BS-M26A-1

Input Parameters (excluding analytical data)

A.	Barometric Pressure (in. Hg)	29.65	
B.	Process Gas Static Pressure (in. H2O)	-1.50	
C.	Pitot Tube Coefficient	0.84	
D.	Dry Gas Meter Calibration Factor	1.0023	
	»»»» Is the Duct Round (Y/N)?	Y	
E.	Duct Diameter (in.) - for round duct	192	
F.	Duct Width (in.) - for rectangular duct	0	
G.	Duct Depth (in.) - for rectangular duct	0	
H.	Nozzle Diameter (in.)	0.625	
I.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for flows	0.015	
J.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for isokinetic	0.015	
K.	Average ΔH (in. H2O) variation	1.07	
L.	Average Process Gas Temperature (°F)	530	
M.	Average Dry Gas Meter Temperature (°F)	55	
N.	Dry Gas Composition (should total to 100%)		
	Carbon Dioxide (%)	4.5	
	Oxygen (%)	11.0	
	Nitrogen (%)	84.5	
	Carbon Monoxide (%)	0.0	
	Hydrogen (%)	0.0	
	Methane (%)	0.0	
	Ethane (%)	0.0	
	Argon (%)	0.0	
O.	Sample Time (min)	120	
P.	Total H2O Mass Collected in Impingers (g)	210.6	
Q.	Metered Gas Volume (dcf)	61.632	

Calculated Parameters (excluding analytical data)

R.	Absolute Process Gas Pressure (in. Hg)	29.54	[A+(B/13.6)]
S.	Absolute Meter Pressure (in. Hg)	29.73	[A+(K/13.6)]
T.	Duct Area (ft.^2)	2.01E+02	[Pi*E²/(4*144) or F*G/144]
U.	Nozzle Area (ft.^2)	2.13E-03	[Pi*H²/(4*144)]
V.	Average Absolute Process Gas Temperature (R)	990	[L+460]
W.	Average Absolute Dry Gas Meter Temperature (R)	515	[M+460]
X.	Dry Gas Volume Sampled (dscf)	62.928	[Q*D*(528/W)*(S/29.92)]
Y.	H2O Vapor Condensed (scf)	9.930	[P*0.04715]
Z.	Calculated Percent H2O in Gas Stream (%)	13.6	[100*Y/(X+Y)]
AA.	Theoretical Maximum Percent H2O in Gas Stream (%) (empirical equation derived from EPA QA Handbook Vol. III, S3.3.6, T6.1A)	#N/A	[100*Saturated Water Vapor Pressure / Stack Pressure]
BB.	Actual Percent H2O in Gas Stream (%)	13.6	[Calculated %H2O <= Theoretical Max. %H2O]

CC. Process Gas Molecular Weight:

Gas	% Volume / 100	* (1 - %H2O/100)	* Mol. Weight	= Wt./Mol
H2O	0.136		18	2.453
CO2	0.045	0.864	44	1.710
O2	0.110	0.864	32	3.040
N2	0.845	0.864	28	20.435
CO	0.000	0.864	28	0.000
H2	0.000	0.864	2	0.000
CH4	0.000	0.864	16	0.000
C2H6	0.000	0.864	30	0.000
Ar	0.000	0.864	40	0.000

Process Gas Molecular Weight (lb/lb-mol) 27.64

DD.	Average Process Gas Velocity (ft/sec)	9.68E+00	[85.49*C*[(I*V)/(R*CC)]^0.5]
EE.	Process Gas Volumetric Flow Rate (acfm)	1.17E+05	[DD*T*60]
FF.	Process Gas Volumetric Flow Rate (scfm)	6.15E+04	[EE*(528/V)*(R/29.92)]
GG.	Process Gas Volumetric Flow Rate (dscfm)	5.31E+04	[FF*(1-(BB/100))]
HH.	Isokinetic Variation (%)	93.1	[100*V*{(0.002669*P)+(Q*D*S/W)}] /

Particulate Matter Results (corrected for blank)

II.	Filter Weight (g)	0.0076	
JJ.	Front-Half Residue Weight (g)	0.0213	
KK.	Back-Half H2O-Condensibles Weight (g)	0.0000	
LL.	Total Weight (g)	0.0289	[II+JJ+KK]
NN.	Concentration (gr/dscf)	0.0071	[(7000/454)*LL/X]
OO.	Mass Flow Rate (lb/hr)	3.23E+00	[NN*GG*60/7000]

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT: U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
TEST DATE: 10/11/00
TEST SITE: NO. 20 BATTERY COMBUSTION STACK
TEST NO.: CLR- #20BS-M26A-1

Hydrochloric Acid (corrected for blank)				
PP.	Total Catch (mg)		15.22	
QQ.	Concentration (mg/dscm)		8.54E+00	[PP/(X*0.02832)]
RR.	Mass Flow Rate (lb/hr)		1.70E+00	[QQ*0.02832*GG*60/454000]
Chlorine Gas Acid (corrected for blank)				
SS.	Total Catch (mg)	<	0.20	
TT.	Concentration (mg/dscm)	<	1.12E-01	[SS/(X*0.02832)]
UU.	Mass Flow Rate (lb/hr)	<	2.22E-02	[TT*0.02832*GG*60/454000]
Ammonia Gas Acid (corrected for blank)				
VV.	Total Catch (mg)		0.57	
WW.	Concentration (mg/dscm)		3.18E-01	[VV/(X*0.02832)]
XX.	Mass Flow Rate (lb/hr)		6.32E-02	[WW*0.02832*GG*60/454000]

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT: U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
TEST DATE: 10/11/00
TEST SITE: NO. 20 BATTERY COMBUSTION STACK
TEST NO.: CLR- #20BS-M26A-2

Input Parameters (excluding analytical data)

A.	Barometric Pressure (in. Hg)	29.65
B.	Process Gas Static Pressure (in. H2O)	-1.50
C.	Pitot Tube Coefficient	0.84
D.	Dry Gas Meter Calibration Factor	1.0023
	»»» Is the Duct Round (Y/N)?	Y
E.	Duct Diameter (in.) - for round duct	192
F.	Duct Width (in.) - for rectangular duct	0
G.	Duct Depth (in.) - for rectangular duct	0
H.	Nozzle Diameter (in.)	0.625
I.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for flows	0.018
J.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for isokinetic	0.018
K.	Average ΔH (in. H2O) variation	1.29
L.	Average Process Gas Temperature (°F)	531
M.	Average Dry Gas Meter Temperature (°F)	69
N.	Dry Gas Composition (should total to 100%)	
	Carbon Dioxide (%)	4.5
	Oxygen (%)	11.0
	Nitrogen (%)	84.5
	Carbon Monoxide (%)	0.0
	Hydrogen (%)	0.0
	Methane (%)	0.0
	Ethane (%)	0.0
	Argon (%)	0.0
O.	Sample Time (min)	120
P.	Total H2O Mass Collected in Impingers (g)	240.0
Q.	Metered Gas Volume (dcf)	71.173

Calculated Parameters (excluding analytical data)

R.	Absolute Process Gas Pressure (in. Hg)	29.54	[A+(B/13.6)]
S.	Absolute Meter Pressure (in. Hg)	29.74	[A+(K/13.6)]
T.	Duct Area (ft.^2)	2.01E+02	[Pi*E²/(4*144) or F*G/144]
U.	Nozzle Area (ft.^2)	2.13E-03	[Pi*H²/(4*144)]
V.	Average Absolute Process Gas Temperature (R)	991	[L+460]
W.	Average Absolute Dry Gas Meter Temperature (R)	529	[M+460]
X.	Dry Gas Volume Sampled (dscf)	70.785	[Q*D*(528/W)*(S/29.92)]
Y.	H2O Vapor Condensed (scf)	11.316	[P*0.04715]
Z.	Calculated Percent H2O in Gas Stream (%)	13.8	[100*Y/(X+Y)]
AA.	Theoretical Maximum Percent H2O in Gas Stream (%) (empirical equation derived from EPA QA Handbook Vol. III, S3.3.6, T6.1A)	#N/A	[100*Saturated Water Vapor Pressure / Stack Pressure]
BB.	Actual Percent H2O in Gas Stream (%)	13.8	[Calculated %H2O <= Theoretical Max. %H2O]
CC.	Process Gas Molecular Weight:		

Gas	% Volume / 100	* (1 - %H2O/100)	* Mol. Weight	= Wt./Mol
H2O	0.138		18	2.481
CO2	0.045	0.862	44	1.707
O2	0.110	0.862	32	3.035
N2	0.845	0.862	28	20.399
CO	0.000	0.862	28	0.000
H2	0.000	0.862	2	0.000
CH4	0.000	0.862	16	0.000
C2H6	0.000	0.862	30	0.000
Ar	0.000	0.862	40	0.000

Process Gas Molecular Weight (lb/lb-mol) 27.62

DD.	Average Process Gas Velocity (ft/sec)	1.06E+01	[85.49*C*[(I*V)/(R*CC)]^0.5]
EE.	Process Gas Volumetric Flow Rate (acfm)	1.28E+05	[DD*T*60]
FF.	Process Gas Volumetric Flow Rate (scfm)	6.74E+04	[EE*(528/V)*(R/29.92)]
GG.	Process Gas Volumetric Flow Rate (dscfm)	5.81E+04	[FF*(1-(BB/100))]
HH.	Isokinetic Variation (%)	95.8	[100*V*{(0.002669*P)+(Q*D*S/W)}] /

Particulate Matter Results (corrected for blank)

II.	Filter Weight (g)	0.0099	
JJ.	Front-Half Residue Weight (g)	0.0196	
KK.	Back-Half H2O-Condensibles Weight (g)	0.0000	
LL.	Total Weight (g)	0.0295	[II+JJ+KK]
NN.	Concentration (gr/dscf)	0.0064	[(7000/454)*LL/X]
OO.	Mass Flow Rate (lb/hr)	3.20E+00	[NN*GG*60/7000]

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT: U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA
TEST DATE: 10/11/00
TEST SITE: NO. 20 BATTERY COMBUSTION STACK
TEST NO.: CLR- #20BS-M26A-2

Hydrochloric Acid (corrected for blank)

PP.	Total Catch (mg)		18.27	
QQ.	Concentration (mg/dscm)		9.11E+00	[PP/(X*0.02832)]
RR.	Mass Flow Rate (lb/hr)		1.98E+00	[QQ*0.02832*GG*60/454000]

Chlorine Gas Acid (corrected for blank)

SS.	Total Catch (mg)	<	0.29	
TT.	Concentration (mg/dscm)	<	1.47E-01	[SS/(X*0.02832)]
UU.	Mass Flow Rate (lb/hr)	<	3.19E-02	[TT*0.02832*GG*60/454000]

Ammonia Gas Acid (corrected for blank)

VV.	Total Catch (mg)		0.10	
WW.	Concentration (mg/dscm)		4.86E-02	[VV/(X*0.02832)]
XX.	Mass Flow Rate (lb/hr)		1.06E-02	[WW*0.02832*GG*60/454000]

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT: U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA — TEST DATE: 10/11/00

TEST SITE: NO. 20 BATTERY COMBUSTION STACK — TEST NO.: CLR- #20BS-M26A-3

Input Parameters (excluding analytical data)

A.	Barometric Pressure (in. Hg)	29.65
B.	Process Gas Static Pressure (in. H2O)	-1.50
C.	Pitot Tube Coefficient	0.84
D.	Dry Gas Meter Calibration Factor	1.0023
	»»»» Is the Duct Round (Y/N)?	Y
E.	Duct Diameter (in.) - for round duct	192
F.	Duct Width (in.) - for rectangular duct	0
G.	Duct Depth (in.) - for rectangular duct	0
H.	Nozzle Diameter (in.)	0.625
I.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for flows	0.018
J.	Average ΔP (in. H2O) = [(ΔP^0.5)avg]^2 - for isokinetic	0.018
K.	Average ΔH (in. H2O) variation	1.39
L.	Average Process Gas Temperature (°F)	534
M.	Average Dry Gas Meter Temperature (°F)	81
N.	Dry Gas Composition (should total to 100%)	
	Carbon Dioxide (%)	4.5
	Oxygen (%)	11.0
	Nitrogen (%)	84.5
	Carbon Monoxide (%)	0.0
	Hydrogen (%)	0.0
	Methane (%)	0.0
	Ethane (%)	0.0
	Argon (%)	0.0
O.	Sample Time (min)	120
P.	Total H2O Mass Collected in Impingers (g)	235.5
Q.	Metered Gas Volume (dcf)	74.480

Calculated Parameters (excluding analytical data)

R.	Absolute Process Gas Pressure (in. Hg)	29.54	[A+(B/13.6)]
S.	Absolute Meter Pressure (in. Hg)	29.75	[A+(K/13.6)]
T.	Duct Area (ft.^2)	2.01E+02	[Pi*E²/(4*144) or F*G/144]
U.	Nozzle Area (ft.^2)	2.13E-03	[Pi*H²/(4*144)]
V.	Average Absolute Process Gas Temperature (R)	994	[L+460]
W.	Average Absolute Dry Gas Meter Temperature (R)	541	[M+460]
X.	Dry Gas Volume Sampled (dscf)	72.449	[Q*D*(528/W)*(S/29.92)]
Y.	H2O Vapor Condensed (scf)	11.104	[P*0.04715]
Z.	Calculated Percent H2O in Gas Stream (%)	13.3	[100*Y/(X+Y)]
AA.	Theoretical Maximum Percent H2O in Gas Stream (%) (empirical equation derived from EPA QA Handbook Vol. III, S3.3.6, T6.1A)	#N/A	[100*Saturated Water Vapor Pressure / Stack Pressure]
BB.	Actual Percent H2O in Gas Stream (%)	13.3	[Calculated %H2O <= Theoretical Max. %H2O]
CC.	Process Gas Molecular Weight:		

Gas	% Volume / 100	* (1 - %H2O/100)	* Mol. Weight	= Wt./Mol
H2O	0.133		18	2.392
CO2	0.045	0.867	44	1.717
O2	0.110	0.867	32	3.052
N2	0.845	0.867	28	20.516
CO	0.000	0.867	28	0.000
H2	0.000	0.867	2	0.000
CH4	0.000	0.867	16	0.000
C2H6	0.000	0.867	30	0.000
Ar	0.000	0.867	40	0.000

	Process Gas Molecular Weight (lb/lb-mol)	27.68	
DD.	Average Process Gas Velocity (ft/sec)	1.06E+01	[85.49*C*[(I*V)/(R*CC)]^0.5]
EE.	Process Gas Volumetric Flow Rate (acfm)	1.28E+05	[DD*T*60]
FF.	Process Gas Volumetric Flow Rate (scfm)	6.72E+04	[EE*(528/V)*(R/29.92)]
GG.	Process Gas Volumetric Flow Rate (dscfm)	5.83E+04	[FF*(1-(BB/100))]
HH.	Isokinetic Variation (%)	97.8	[100*V*{(0.002669*P)+(Q*D*S/W)}] /

Particulate Matter Results (corrected for blank)

II.	Filter Weight (g)	0.0050	
JJ.	Front-Half Residue Weight (g)	0.0240	
KK.	Back-Half H2O-Condensibles Weight (g)	0.0000	
LL.	Total Weight (g)	0.0290	[II+JJ+KK]
NN.	Concentration (gr/dscf)	0.0062	[(7000/454)*LL/X]
OO.	Mass Flow Rate (lb/hr)	3.08E+00	[NN*GG*60/7000]

PROCESS GAS TESTING CALCULATIONS - ISOKINETIC SAMPLING

CLIENT:	U.S. STEEL CLAIRTON WORKS - CLAIRTON, PA	TEST DATE:	10/11/00
TEST SITE:	NO. 20 BATTERY COMBUSTION STACK	TEST NO.: CLR-	#20BS-M26A-3

Hydrochloric Acid (corrected for blank)				
PP.	Total Catch (mg)		20.54	
QQ.	Concentration (mg/dscm)		1.00E+01	[PP/(X*0.02832)]
RR.	Mass Flow Rate (lb/hr)		2.18E+00	[QQ*0.02832*GG*60/454000]
Chlorine Gas Acid (corrected for blank)				
SS.	Total Catch (mg)	<	0.15	
TT.	Concentration (mg/dscm)	<	7.23E-02	[SS/(X*0.02832)]
UU.	Mass Flow Rate (lb/hr)	<	1.58E-02	[TT*0.02832*GG*60/454000]
Ammonia Gas Acid (corrected for blank)				
VV.	Total Catch (mg)		3.14	
WW.	Concentration (mg/dscm)		1.53E+00	[VV/(X*0.02832)]
XX.	Mass Flow Rate (lb/hr)		3.34E-01	[WW*0.02832*GG*60/454000]