



CC: JB
CF
G. Fishman
(ACHD)

August 27, 2002

Project No 02-093

Mr. Nick Buchko
Shenango Group, Inc.
200 Neville Road
Pittsburgh, PA 15225

Re: Transmittal of May 29, 2002 Combustion Stack Analysis Program Results

Dear Mr. Buchko:

Attached please find 3 copies of the Diagnostic Testing Report for Shenango, Inc., Neville Island facility. Testing was conducted to determine the concentration and emission rate of hydrogen chloride (HCl) from the combustion stack.

Please feel free to call with any comments or questions at (412) 826-3636.

Sincerely,

AIR/COMPLIANCE CONSULTANTS, INC.

A handwritten signature in black ink that reads "Jill W. Merrill". The signature is written in a cursive style with a large, looped "J" and "M".

Jill Merrill
President

Attachments

1050 William Pitt Way
Pittsburgh, PA 15238
412-826-3636
412-826-3640 fax

**DIAGNOSTIC TESTING PROGRAM
SHENANGO STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA**

Testing Date: May 29, 2002

Prepared for:

Shenango Incorporated
200 Neville Road
Neville Island
Pittsburgh, Pennsylvania 15225-1690

Prepared by:

Air/Compliance Consultants, Inc.
1050 William Pitt Way
Pittsburgh, Pennsylvania 15238
(412) 826-3636

Project Number 02-093

**DIAGNOSTIC TESTING PROGRAM
SHENANGO STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA**

Testing Date: May 29, 2002

Prepared by Air/Compliance Consultants, Inc.



William Cowell
Project Engineer

gk.



Jill W. Merrill
President

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**DIAGNOSTIC TESTING PROGRAM
SHENANGO STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA**

TESTING SUMMARY

Air/Compliance Consultants, Inc. (ACCI) was contracted by the Shenango Group, Inc. (Shenango) to conduct a diagnostic test program on the Hydrogen Chloride emissions from the Combustion Stack. The tests were conducted on May 29, 2002 in accordance with United States Environmental Protection Agency (USEPA) Reference Method 26A for hydrochloric acid (HCl).

TEST PERSONNEL

Mr. William P. Cowell, Project Engineer, and Mr. Patrick Walters, Technician, of ACCI, conducted the testing on May 29, 2002.

TEST METHOD

HCl emissions were determined in accordance with USEPA Method 26A. The principal for Method 26A is to extract and filter an isokinetic sample from the source and collect the halides in a sulfuric acid solution. The hydrogen halides are solubilized in the acid solution and form chloride ions (Cl^-), which is analyzed by ion chromatography (IC).

The sampling train was leak-checked before and after each test run. Each test run was at least 60 minutes in duration and had a minimum sample volume of 40 dry standard cubic feet (DSCF).

Two chilled impingers, each contained 100 milliliter (ml) of 0.1N sulfuric acid (H_2SO_4), were connected in series, followed by silica gel and a dry gas used to collect the HCl. At the end of the testing period, the volume of liquid collected in the impinger contents were measured and transferred to a polyethylene sample storage container. The impingers and connecting glassware were rinsed three times with deionized water and combined with the impinger catch. These

hydrochloric acid samples were analyzed by IC by Air Quality Services, Inc in Pittsburgh, Pennsylvania.

RESULTS

Table 1 shows the results of the HCl testing on the combustion stack. No detectable Chloride was found in the impingers, so the results were reported at the detection limit.

Laboratory results are included as Appendix A. Field data sheets are included as Appendix B. Quality Assurance Data is contained in Appendix C.

Table 1. Hydrogen Chloride Test Results, Combustion Stack
Shenango Incorporated, Neville Island, Pennsylvania

Run # Date	Run 1 05/29/02	Run 2 05/29/02	Average
Flow Rate (ACFM)	146,877	143,115	144,996
Flow Rate (SCFM)	70,822	68,569	69,695
Flow Rate (DSCFM)	58,542	53,136	55,839
Stack Temperature (°F)	620.7	627.6	624.1
Percent Gas Moisture	17.3%	22.5%	19.9%
O ₂ Concentration (% volume)	7.0	8.0	7.5
CO ₂ Concentration (% volume)	6.0	6.0	6.0
Volume Sampled (DSCF)	45.57	42.12	43.85
Volume Sampled (DSCM)	1.29	1.19	1.24
F-Factor (DSCF/MMBtu)	7,755	7,755	7,755
HHV (Btu/DSCF)	542.2	542.2	542.2
HCl Mass Collected (mg)	< 0.004	< 0.003	< 0.004
HCl Mass Collected (grains)	< 0.00006	< 0.00005	< 0.00006
HCl sample concentration (mg/m ³)	< 0.003	< 0.003	< 0.003
Isokinetic Variation	99.7%	101.5%	100.6%

Results

HCl Concentration (gr/100 SCF stack gas)	< 0.0001	< 0.0001	< 0.0001
HCl Concentration (ppm _v)	< 0.0021	< 0.0018	< 0.0020
HCl Emission Rate (lb/hr)	< 0.0008	< 0.0007	< 0.0008
DSCF Stack Gas/SCF COG	6.32	6.81	6.5678
HCl Concentration (lb/MMCF-COG)	< 0.0001	< 0.0001	< 0.0001

ACFM	Actual cubic feet per minute.
SCFM	Standard cubic feet per minute.
DSCFM	Dry standard cubic feet per minute.
° F	Degrees Fahrenheit.
% volume	Percent by volume.
O ₂	Oxygen.
CO ₂	Carbon dioxide.
MMBtu	Million British Thermal Units
Btu/DSCF	British Thermal Units per dry standard cubic foot
HCl	Hydrogen Chloride.
mg	Milligrams.
mg/m ³	Milligrams per cubic meter.
gr/100 SCF	Grains per hundred standard cubic feet.
lb/MMCF	Pounds per million standard cubic feet.

APPENDIX A

Laboratory Results

AIR QUALITY SERVICES, INC.

4527 Clairton Boulevard
Pittsburgh, PA 15236
(412) 881-5630

TABLE II
ANALYSIS OF SAMPLES FOR HYDROGEN HALIDES AND HALOGENS
AIR COMPLIANCE CONSULTANTS, INC.
1050 WILLIAM PITT WAY
PITTSBURGH, PA 15238
PROJECT #02-096/00-037
SAMPLES RECEIVED: MAY 29, 2002

ACCI INC. SAMPLE ID	AQS LABORATORY NUMBER	SAMPLE VOLUME ML	SAMPLE pH	HALIDE HCL TOTAL MG	HALOGEN CHLORINE TOTAL MG
COMBUSTION STACK					
RUN #1	AQS-87132	410	1.85	NDA	NA
RUN #2	AQS-87133	330	1.78	NDA	NA

NDA = NO DETECTABLE AMOUNT
THE MOLECULAR WEIGHT OF 36.46 USED FOR THE HCL CALCULATION.

THE SAMPLES WERE ANALYZED BY ION CHROMATOGRAPHY BASED ON THE ENVIRONMENTAL PROTECTION AGENCY (EPA) METHOD 26A. THE LIMIT OF DETECTION FOR CHLORIDE IS 0.01 UG/ML.


AIR QUALITY SERVICES, INC.

JOB 7275
REPORTED: MAY 31, 2002

The presented data has been analyzed according to approved protocol and is certified to be complete and accurate.



Fast Turnaround for Sulfur Sample—Standard Turnaround for remaining analyses

g:\miscrfs\forms\field\COC-052902.xls

APPENDIX B

Field Data Sheets

Test Date
 Client Name
 Unit
 Test Location
 Unit Operation
 Note:

Test Run No
 Test Start
 Test Finish
 Plant ID
 Dimensions

Run 1
 08:30 AM
 09:30 AM
 Neville Island
 120" Dia., 42" Nipple

Shenango, Inc.

Run 1

Red is a cell reference or calculation.
 Blue is data entry.

Data Input Parameters

Meter Box #
 Barometric Pressure (Pb)
 Static Pressure (Ps)
 Water Collected (Vic)
 Test Time (Theta)
 O2 Content
 CO2 Content
 N2 Content
 Delta H Average
 Pilot Coefficient (Cp)
 Meter Temperature (Tm)
 Velocity Head (DPI)/2
 Duct Temperature (Ts)
 Volume Metered (Vm)
 Nozzle Diameter (Dn)
 Stack Diameter
 Area (As)
 Correction Factor (Yd)
 Calculator Multiplier

Calculated Results

Dust Pressure (Ps)
 Vol. Metered Stand (Vmsd)
 Vol. Metered Wet. Stand (Vwsd)
 Gas Moisture (Bwa)
 Below Sat?
 Dry Gas Mol Wt (Md)
 Wet Gas Mol Wt (Ns)
 Gas Velocity (Vs)
 Actual Gas Flowrate
 Standard Gas Flowrate
 Dry Standard Gas Flowrate
 Isokinetic Sampling Rate

Net Weights

29.54
 45.57
 9.559
 0.1734
 YES
 29.28
 27.3
 31.17
 146.877
 70.822
 58.542
 99.77%

ID Number

in Hg
 ft³
 ft³
 decimal
 lb/lb-mole
 lb/lb-mole
 ft/s
 acfm
 scfm
 dscfm

Point	Delta P	SQRT DP	Delta H	Stack Temp	Meter Temp
A-1	0.150	0.3873	2.316	630	73
A-2	0.140	0.3742	2.162	610	75
A-3	0.150	0.3873	2.316	618	75
A-4	0.130	0.3606	2.007	620	77
A-5	0.150	0.3873	2.316	622	78
A-6	0.150	0.3873	2.316	628	78
B-1	0.130	0.3606	2.007	615	79
B-2	0.140	0.3742	2.162	617	80
B-3	0.130	0.3606	2.007	620	80
B-4	0.140	0.3742	2.162	621	80
B-5	0.150	0.3873	2.316	624	81
B-6	0.130	0.3606	2.007	623	81
AVERAGES					78.1
					620.6667
					2.1745
					0.3751
					78.1

Initial meter vol
 Final meter vol
 Volume metered

Impinger 1
 Impinger 2
 Impinger 3
 Impinger 4

Initial
 Final
 Gain

Total Vlc =

Test/Run #: Method 5# 1082
 Nozzle Dia: .433
 Static Press, Ps: 21.5
 Barometric Press: 29.65
 Initial Meter Vol: 194.524
 Final Meter Vol: 241.629
 Reader: PW
 Delta H@: 0.990 1.892
 Meter Correction: 0.990
 Pitot Correction: 0.84
 Control Box #: Apex #
 Assumed Moisture: 1370
 K-factor (K_f): 15.44
 Stop Time: 9:30
 Sample Box #: 9'
 Probe #: 9'
 Pitot #: -
 Filter #: -
 Stack Diameter: 10'
 Ambient Temp: 70 °F

Point	Time	Metered Volume (dcl)	Velocity Head (ΔP) in. H ₂ O	Orifice Delta H in. H ₂ O		Meter Vacuum in. Hg	Probe Temp. T _s °F	Stack Temp. °F	Dry Gas Meter Temp. °F	Oven Temp. °F	Imp Out Temp °F	Aux. Line Temp. °F	Comments
A1	5	198.415	.15	2.3	2.3	1.5	250	630	73	242	52	248 ± 0.25°	
2	10	202.275	.14	2.1	2.1	1.5	248	610	75	260	53		
3	15	206.963	.15	2.3	2.3	1.5	248	608	75	258	52		
B1	20	210.352	.13	2.0	2.0	1.5	251	620	77	257	52		
2	25	214.450	.15	2.3	2.3	1.5	255	622	78	260	53		
3	30	218.660	.15	2.3	2.3	1.5	252	628	78	261	53		
L1	35	222.485	.13	2.0	2.0	1.5	250	615	79	262	54		ISO
2	40	226.331	.14	2.1	2.1	1.5	248	617	80	263	55		QA.7
3	45	232.220	.13	2.0	2.0	1.5	249	620	80	262	57		
D1	50	234.055	.14	2.1	2.1	1.5	250	621	80	261	57		
2	55	237.872	.15	2.3	2.3	1.5	252	624	81	262	58		
3	60	241.629	.13	2.0	2.0	1.5	253	623	81	262	58		
								620.666					

Sample Train Leak Check			Pilot Leak Check			Gas Analysis			Impinger			Contents			Grams Final	Grams Initial	Difference
(in. Hg)	Rate (ft ³ /m)		Red	Black	in. H ₂ O/min	1	2	Avg	1	2	3	4	1	2	3	4	
15"	0.00					CO ₂			6				100 mL	100 mL	100	100	69
15"	0.00					O ₂			8				100 mL	100 mL	100	100	37
						CO							Empty				
						N ₂							Silica				

Project/Fig: 4.4137
 Sheets/Apex/Apex M5 Data Sheet
 101

Test Date 05/29/02
Client Name Shenango, Inc
Unit Combustion Stack
Test Location Outlet
Unit Operation Normal
Note

Red is a cell reference or calculation
Blue is data entry

Test Run No
Test Start
Plant ID
Dimensions

Run 2
10 15 AM
11 18 AM
Neville Island
130" Dia. 42" Nipple

Shenango, Inc.

Run 2

Data Input Parameters

Meter Box # 2
Barometric Pressure (Pb) 29.65 in Hg
Static Pressure (Ps) -1.50 in H₂O
Water Collected (Vic) 259.90 8
Test Time (Thsa) 60 min
O₂ Content 8.00 %
CO₂ Content 6.00 %
N₂ Content 86.00 %
Delta H Average 2.03 in H₂O
Pilot Coefficient (Cp) 0.84 F
Meter Temperature (Tm) 85.0 in H₂O
Velocity Head (DP)_{1/2} 0.3604 F
Duct Temperature (Ts) 627.6 ft⁴
Volume Metered (Vm) 44.110 in
Nozzle Diameter (Dn) 0.433 in
Stack Diameter 120.0 ft⁴
Area (As) 78.54
Correction Factor (Yd) 0.99
Calculator Multiplier 15.62

Calculated Results

Duct Pressure (Pt) 29.54 in Hg
Vol. Metered Stand (Vmsd) 42.12 ft³
Vol. Metered Wet. Stand (Vwstd) 12.233 ft³
Gas Moisture (Bws) 0.2251 decimal
Below Sat? YES
Dry Gas Mol Wt. (M_d) 29.28 lb/lb-mole
Wet Gas Mol Wt. (M_w) 26.7 lb/lb-mole
Gas Velocity (Vs) 30.37 ft/s
Actual Gas Flowrate 143.115 acfm
Standard Gas Flowrate 68.369 scfm
Dry Standard Gas Flowrate 53.136 dscfm
Isokinetic Sampling Rate 101.5%

Net Weight

LD Number

in Hg

ft³

decimal

lb/lb-mole

ft/s

acfm

scfm

dscfm

Point	Delta P	SO ₂ DP	Delta H	Stack Temp	Meter Temp
A-1	0.140	0.3742	2.2	630	81
A-2	0.130	0.3606	2.0	633	82
A-3	0.130	0.3606	2.0	640	82
A-4	0.140	0.3742	2.2	624	83
A-5	0.120	0.3464	1.9	621	85
A-6	0.130	0.3606	2.0	625	86
B-1	0.120	0.3464	1.9	626	86
B-2	0.140	0.3742	2.2	630	86
B-3	0.130	0.3606	2.0	633	87
B-4	0.130	0.3606	2.0	622	87
B-5	0.120	0.3464	1.9	624	87
B-6	0.130	0.3606	2.0	633	88
AVERAGES	0.130	0.3604	2.0	627.6	85.0
Initial meter vol	241.720				
Final meter vol	285.830				
Volume metered	44.110				
Impinger 1	245.0				
Impinger 2	120.0				
Impinger 3	1.0				
Impinger 4	714.4				
Total Vol	259.9				

APPENDIX C

Quality Assurance Data

individual values from the average is ± 0.1

AIR COMPLIANCE/CONSULTANTS, INC.
TYPE S PITOT TUBE INSPECTION DATA

Apex 10' #2
Shenango

DATE 5/24/02
PITOT ID Apex 10' #2

IS TUBE ASSEMBLY LEVEL ? yes
ARE OPENINGS DAMAGED? no

$P_A = 0.539$ $P_B = 0.532$ $P_{avg} = 0.5355$
 $Dt = 0.377$ $A = 1.071$ $P_{avg}/Dt = 1.420424$
(1.05 < X < 1.5)

TRAVERSE AXIS (ALPHA 1) -1 (<10)
TRAVERSE AXIS (ALPHA 2) 2 (<10)

LONG AXIS (BETA 1) 1 (<05)
LONG AXIS (BETA 2) 0 (<05)

FRONT ANGLE (GAMMA) -0.5 -0.008727
SIDE ANGE (THETA) -1 -0.017453

ALIGN DISPLACEMENT Z -0.00935 <0.125 INCHES
ALIGN DISPLACEMENT W -0.01869 <0.03125 INCHES

CALIBRATION REQUIRED? NO
CALIBRATED BY ? ML

ALL PARAMETERS
MEET SPECS? YES

thermocouple calibration

bp in Hg	29.42			
ambient temp	72			
mercury in glass	yes			
		mercury	thermocouple	temperature difference(%)
reference point	32	35	36	-0.20%
	212	213	216	-0.45%
	300	295	299	-0.53%
difference must be less than or equal to	1.50%			

Pat Walters