Background Report Reference

AP-42 Section Number: 12.11

Background Chapter: 2

Reference Number: 27

Title: Source Test Report for Schuylkill Metals Corporation at Cannon Hollow Facility, Forest City, MO

Burnes & McDonnell

November 1990

#2 of 2

AP-42 section: 2nd lead 7.11 Ref #: 2

Date: 6/10/92 Rating:

Firm/company: Schuylkill Metals Corp. (Baton Rouge)

Tested by: Burns & McDonnell

Test date: Nov. 10, 11 & 12 1990

Special Process: Smelting Process (Blast furnace)

SO_2 cutrol (wet scrubber)

Test conditions: Usual ☐, Unusual ☑

Sampling method: 12

Sampling location and Velocity Method: 1 → 6

Calibration Info: Yes ☐, No ☑

PARAMETER:		Run #1	Run #2	Run #3	Avg.
11/11/90	Lead	gr/dscf 5.408×10^{-5} (0.0273 lb/hr)	5.23×10^{-5} (0.0246 lb/hr)	7.401×10^{-5} (0.034 lb/hr)	6.01×10^{-5} (0.0286 lb/hr)
	Particulate	gr/dscf 2.07×10^{-2} (10.457)	2.33×10^{-2} (10.976)	1.706×10^{-2} (7.869)	2.04×10^{-2} (9.767)
	Sulfur Dioxide (ppm)	0.5	2	3.5	2
	% CO_2	0.6 %	1.85 %	1 %	

no Ea Heo excavation given.

Production Data: 11/10/90 18588 lbs/hr

11/11/90 20530 lbs/hr

11/12/90 19480 lbs/hr

$E.R = 5.41\times10^{-4}$ gr/dscf $\times$ 1.429 lb/gr $\times10^{-4}$ $\times$ 3535437 dscf/hr

$= 0.0273$ lb/hr

$E.F_{lead} = \frac{2.86\times10^{-2}\ lb/hr}{20530\ \frac{lb}{hr}\times 5\times10^{-4}\ \frac{ton}{lb}}$

$= 0.00278$ lb/ton

$E.F_{partic} = \frac{9.767\ lb/hr}{20530\ \frac{lb}{hr}\times 5\times10^{-4}\ \frac{ton}{lb}}$

$= 0.952$ lb/ton

Emission Factors: $Q_1 = 3535437$ dscfh

$Q_2 = 3296680$ dscfh

$Q_3 = 3227704$ dscfh

SCHUYLKILL METALS CORPORATION

HOME OFFICE

P.O. Box 74040
BATON ROUGE, LA. 70874
504—775-3040

CANON HOLLOW BRANCH

P.O. Box 156
FOREST CITY, MO. 64451
816—446-3321

June 11, 1992

Mr. Brahim Richani, PH.D.
Environmental Engineer
Pacific Environmental Services
3708 Mayfair Street
Suite 202
Durham, North Carolina 27707

Dear Mr. Richani:

Attached are the stack tests I promised you.

Yours truly,
SCHUYLKILL METALS CORPORATION

Glen E. Hasse
Vice President

GEH:ll-611-3

SO_2 Monitor Relative Accuracy Certification
Particulate, Sulfur Dioxide, Lead,
Arsenic, Antimony, Benzene,
Toluene, Thiophene Emissions Test Report
for
SCHUYLKILL METALS CORPORATION
at their
Canon Hollow Facility
Secondary Lead Smelter

lbs Charged to Furnace

11/10/90 18588 lbs/Hr

11/11/90 20530 lbs/Hr

11/12/90 19480 lbs/Hr

I. Introduction

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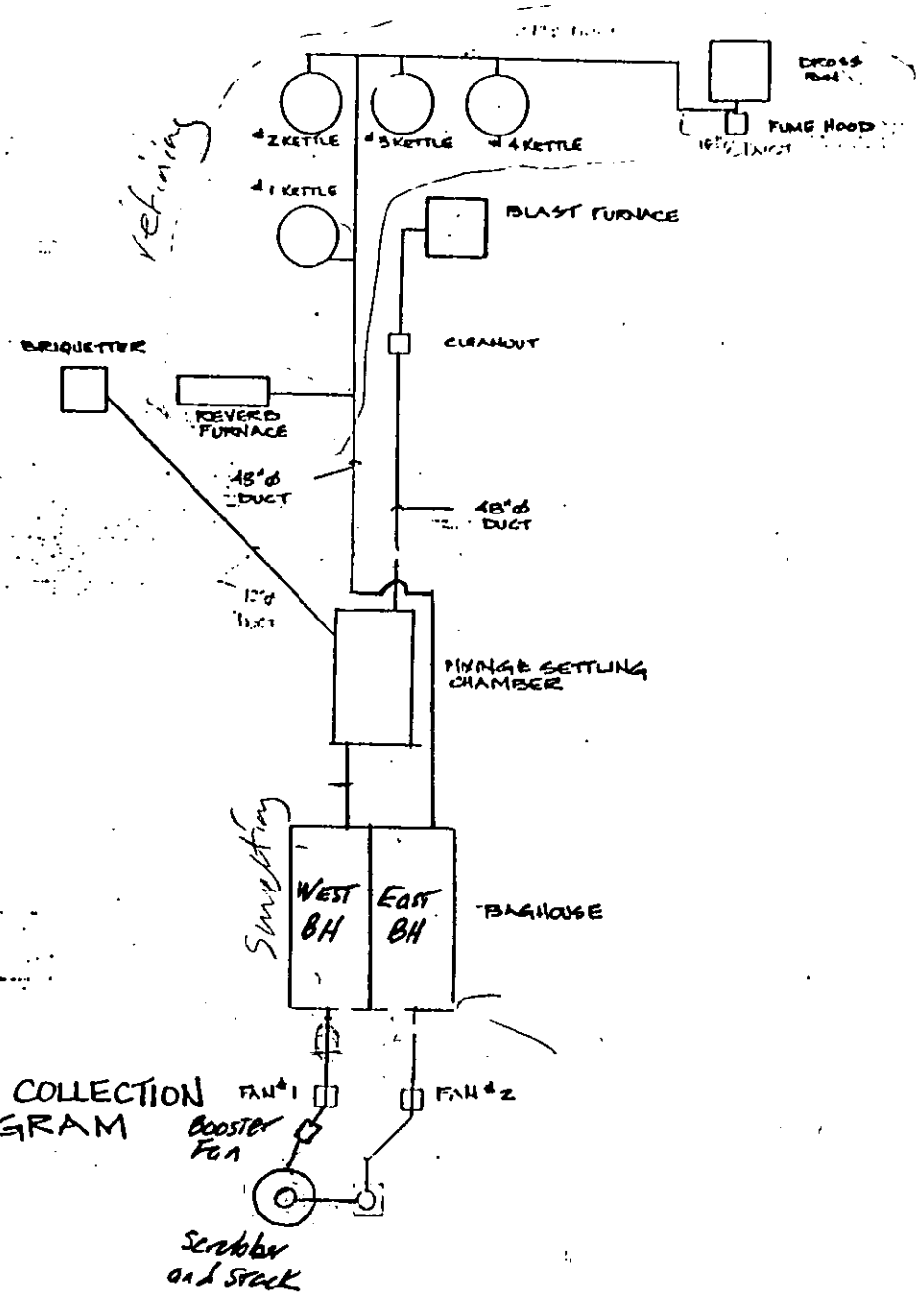

BAGHOUSE COLLECTION FLOW DIAGRAM

LOCATION OF SO_2 MONITOR PROBE.
REF. DWG. NO.: CH-BH3 & CH-BH3B
After Scrubber, before (East) baghouse exit junction.

SCHUYLKILL METALS CORP.
FOREST CITY, MO.
CAHON HOLLOW PLANT

DEC. 1986
DWG. NO. CH-BH3A

P.B. ROY

FIGURE 1

I. Introduction

This report presents the results of the air emission tests performed for Schuylkill Metals Corporation at the Canon Hollow Secondary lead smelter facility located near Forest City, Missouri.

The purpose of these tests was to determine the emission rates of the following pollutants, which Schuylkill was notified to test for under Order No. 90-AP-008, by the Missouri Air Conservation Commission. The air emission testing consisted of testing for sulfur dioxide, total particulate matter, lead, arsenic, and antimony compounds. The organics, benzene, thiophene and toluene were also included in the order. Schulykills SO_2 continuous monitor was also recertified by performing SO_2 relative accuracy tests in accordance with the "order" and performance specifications 2 of Appendix B.

The results of the testing can be found in the summary section of the report. The emission testing was performed by Burns & McDonnell Engineering Company whose main office is located at 4800 East 63rd Street, Kansas City, Missouri.

The testing was performed on November 10, 11, & 12, 1990. The testing was performed in accordance with EPA Reference Methods 1, 2, 3, 4, 5, 6, and 12 as published in the 1990 Code of Federal Regulations, Title 40, Part 60, Subpart L and Appendix A. "Methodology for the Determination of Metals Emissions" in Appendix A was used to determine the arsenic and antimony compounds. Method 0030 Volatile Organic Sampling Train (VOST) was utilized to sample the organics, benzene, toluene, and thiophene. The SO_2 monitor certifications tests were performed in accordance with Appendix B, Specification 2 in the 1990 Code of Federal Regulation, Title 40, Part 60.

The testing equipment, sampling procedures and analytical procedures are described in Section IV of the report. The raw field data, plant data, equipment calibration, correspondence lab, analysis reports, and equations determining the final results are presented in the Appendix.

The test crew consisted of Richard Howes, Luke Corkill and Gary Cline. Mr. Joe Arello from the U.S. EPA, Region 7, and Mr. Doug Elley from the Missouri Department of Natural Resources, were present to observe the air emissions testing.

The following is a brief synopsis of the testing performed.

The SO_2 "high accretion" tests were performed prior to November 10, 1990. On November 8, 1990, two SO_2 samples (1 Run) was completed. This test was completed prior to the tube leak that occurred to the furnace. The SO_2 emission rates for the two samples averaged 3 ppm, during this "accretion" testing. The results are included in the summary section. When testing resumed on November 10, 1990, after the furnace had been repaired, the SO_2 compliance testing commenced. The SO_2 compliance testing originally was going to be performed in conjunction with the SO_2 monitor certification tests. Since the scrubber removal nearly all SO_2 emissions, the monitor certifications test could not be performed simultaneously with the SO_2 compliance tests. Therefore, the pH in the scrubber was lowered to raise the SO_2 emissions during the monitor certification tests. Sample numbers 1, 2, 6, 7, 8, & 9 were used as the 3 runs to determine SO_2 compliance. These 3 runs were taken when the scrubber was operating under "normal" pH conditions. The monitor certification tests for relative accuracy were made when the pH of the scrubber was lowered to allow higher SO_2 concentrations. This was done so that a real comparison of accuracy could be determined between the SO_2 monitor and the SO_2 reference method test. Sample numbers 3, 4, 5, 10, 11, 12, 13, 14, and 15 were made on November 10, 1990. Sample #3 was spilled during retrieving and washing out and therefore was void. Sample # 12, 14, and 15 were thrown out of the relative accuracy tests because of low correlation with the SO_2 monitor. Three additional SO_2 samples were taken on November 11, 1990, which is the maximum allowed in accordance with Appendix B, Performance Specification 2. The 3 additional SO_2 relative accuracy samples used to make up the 9 sets were samples 17, 18, and 19. The 9 sets consisted of samples 4, 5, 10, 11, 13, 16, 17, 18 and 19.

On which process

On November 11, 3 test runs for particulate, lead, arsenic, and antimony compounds were also performed. These were performed prior to the 3 additional SO_2 relative accuracy tests. The metals and particulate tests were performed while the furnace was in normal operation.

On November 12, 1990, one additional run was made for particulate, lead, arsenic, and antimony. This run was made while the furnace was operating during a "high antimony" batch. At the completion of this test, VOST sampling for the organics, benzene, toluene and thiophene commenced. Two VOST trains were utilized simultaneously. Both samples were taken by Burns & McDonnell personnel. One set of samples were given to Joe Arello of the USEPA for analyzing by the EPA. The other set of samples were analyzed by Triangle Laboratory. Three runs were made with each run consisting of 5 pairs of tenax, tenax/charcoal sorbent tube.

II. Summary of Test Results

Summary of Test Results

The following chart shows the test results of the particulate, lead, arsenic, and antimony emissions tests performed at Schulykill Metals Corporation Canon Hollow Facility.

Emission Rates (grains/dscf)

Date	Run #	Particulate	Lead	Arsenic	Antimony
11/11	1	.0207233	.00005408	0	0
11/11	2	.0233429	.00005230	0	0
11/11	3	.0170635	.00007401	0	0
11/12	*4	.0102844	.00005942	0	0
(Average of 3)		.0203765	.00006013	0	0
(Average of 4)		.0178535	.00005995	0	0

* Indicates High Antimony Test Trial

Allowable for particulate = .022 grains/dscf
Allowable for lead = .00044 grains/dscf
There are no source standards for arsenic or antimony.
Zero readings for arsenic and antimony indicate that they were not detected by the laboratory.

Summary of Test Results

The following is a summary of the SO_2 compliance testing performed at Schulykill Metals Corporation, Canon Hollow secondary Lead Smelter Facility. The SO_2 high accretions testing was performed on November 8, 1990. One run was completed prior to the furnace tube leak.

Date	Sample #	SO_2 ppm (dry)
11/8/90	1 HA	3
	2 HA	3
	Average	3 ppm

The following are the results of the 3 SO_2 Compliance Test runs.

Date	Run	Sample #	SO_2 ppm (dry
11/10/90	1	1	0
		2	1
	2	6	2
		7	2
	3	8	2
		9	5
	Average		2
	Allowable		500 ppm

The computer printouts showing all the test data along with the calculations are on the following pages.

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMC-HA
Client : SCHULYKILL METALS
Project : 90-356-3
SO2 HIGH ACCRETIONS TESTS

Date 01/15/91

	Sample Identification		1-HA	2-HA
	Test Date		11/08/90	11/08/90
VM	Volume Sampled	(CF)	1.224	1.017
MC	Meter Correction Factor		1.0129	1.0100
PB	Barometric Pressure	(in Hg)	29.20	29.20
TM	Meter Temperature	(F)	36.20	41.60
VMS	Corrected Volume Sampled	(DSCF)	1.286983	1.054791
VT	Volume Titrated	(ml)	0.20	0.15
VTB	Blank Volume Titrated	(ml)	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000005	0.0000005
PPM	Parts/Million SO2	(ppm)	3	3
F	F Factor	(DSCF/MBtu)	0	0
O2	Percent O2	(%)	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMC
Client : SCHUYLKILL METALS
Project : 90-356-3
SO2 COMPLIANCE TEST RESULTS

Date 01/07/91

	Sample Identification		1	2	6
	Test Date		11/10/90	11/10/90	11/10/90
VM	Volume Sampled	(CF)	1.120	1.137	1.126
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	44.60	51.00	71.00
VMS	Corrected Volume Sampled	(DSCF)	1.152734	1.155575	1.101292
VT	Volume Titrated	(ml)	0.01	0.05	0.10
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000000	0.0000001	0.0000003
PPM	Parts/Million SO2	(ppm)	0	1	2
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMC
Client : SCHUYLKILL METALS
Project : 90-356-3
SO2 COMPLIANCE TEST RESULTS

Date 01/07/91

	Sample Identification		7	8	9
	Test Date		11/10/90	11/10/90	11/10/90
VM	Volume Sampled	(CF)	1.107	1.100	1.113
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	71.20	74.20	73.60
VMS	Corrected Volume Sampled	(DSCF)	1.082301	1.069418	1.083273
VT	Volume Titrated	(ml)	0.10	0.10	0.25
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000003	0.0000003	0.0000008
PPM	Parts/Million SO2	(ppm)	2	2	5
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

Summary of Test Results

The following is a summary of the SO_2 monitor Recertification Relative Accuracy Tests. The nine samples used in calculating the relative accuracy tests were sample numbers 4, 5, 10, 11, 13, 16, 17, 18 & 19. Samples 12, 14, and 15 were thrown out due to lack of close correlation with the monitor. A moisture determination of 5 percent was made during the SO_2 testing to calculate the reference method to a wet basis to correspond to the monitor on a wet basis.

Parameter	Specification	SO_2 Test Results
Field Relative Accuracy	* 20%	13.56%
Field Relative Accuracy	* 10%	5.746%

* using mean reference method test value of 211.88 ppm.
** using the applicable standard allowable of 500 ppm.

SO_2 Field Relative Accuracy

Run #	Data Set	di	di^2
4	1	+14.75	216.83
5	2	-47.65	2270.52
10	3	- 8.60	73.96
11	4	+35.25	1242.56
13	5	+30.15	909.03
16	6	-43.70	1909.69
17	7	- .15	.0225
18	8	-32.05	1027.20
19	9	+ 8.25	68.06
		di=43.75	di^2=7717.87

Arithmetic Mean

$$\bar{d} = \frac{1}{n} \sum_{di=1}^{n} di = \left(\frac{1}{9}\right) (43.75)$$

$$\bar{d} = 4.861$$

Standard Deviation

$$Sd = \left[\frac{7717.87 - \frac{(43.75)^2}{9}}{9-1}\right]^{1/2}$$

Sd = 30.629

Confidence Coefficient $= \left(2.306\right)\left(\frac{30.629}{\sqrt{9}}\right) = 23.5436$

Relative Accuracy

*R.A. $= \frac{4.861 + 23.5436}{211.88} \times 100$

R.A. = 13.56

**$\frac{4.861 + 23.5436}{500} \times 100$

R.A. = 5.746

* Mean Reference Method Test Value = 211.88 ppm Allowable RA = 20%

** Applicable Standard = 500 ppm Allowable RA = 10%

ACCURACY DETERMINATION

Client Schuylkill Metals Corp. Made by Rick Howes

Project No. 90-356-3 Date _____ Checked by _____

Sampling Location Canon Hollow Plant Stack outlet

Monitor SO_2 DuPont Analyzer model # 460 Serial # 5382

	Test No.	Date *Time	Reference Method Samples: SO_2 ppm Dry	% moisture	SO_2 ppm wet	Monitor Avg. (ppm): Account for 7 ppm offset	wet SO_2 ppm	Difference (ppm): Xi	Xi²
4	1	11-10-90	205	5%	194.75	209.5	216.5	+14.75	216.83
5	2	11-10-90	307	5%	291.65	244	251	-47.65	2270.52
10	3	11-10-90	298	5%	283.1	274.5	281.5	-8.6	73.96
11	4	11-10-90	495	5%	470.25	505.5	512.5	+35.25	1242.56
13	5	11-10-90	303	5%	287.85	318	325	+30.15	909.03
16	6	11-10-90	166	5%	157.7	114	121	-43.7	1909.69
17	7	11-11-90	117	5%	111.15	111	118	-.15	.0225
18	8	11-11-90	179	5%	170.05	138	145	-32.05	1027.20
19	9	11-11-90	211	5%	200.45	208.7	215.7	+8.25	68.06
omit *12	10	11-10-90	179	5%	170.05	303	310	+132.95	17675.70
*14	11	11-10-90	312	5%	296.4	399	406	+102.6	10526.76
*15	12	11-10-90	192	5%	182.4	243	250	+60.6	3672.36

omit

Mean ref. method test value 211.88 211.88 = Avg

Mean of the differences $\Sigma Xi = \frac{43.75}{9}$ $\Sigma Xi^2 = 7717.87$

$\bar{X} = 4.861$

95% Confidence intervals = : 23.8708

Mean of the differences	+ 95% confidence interval
Accuracies = Mean reference method value	X 100 = _____

Allowable RA = 20% – Relative Accuracy = 13.56% (using the mean reference method test value 211.88 ppm)

Allowable RA = 10% – Relative Accuracy = 5.746% (using the applicable Standard of 500 ppm)

Listed below are the values we obtained from the monitor strip charts. These were read from the strip chart recordings for each relative accuracy run number and time integrated over a 20-minute time period.

RA#4
175 x 4 min.
210 x 10 min.
255 x 2 min..
255 x 4 min.
4330 ÷ 20 = 216.5

RA#5
255 x 5 min.
300 x 2 min.
285 x 10 min.
100 x 3 min.
5025 ÷ 20 = 251

RA#10
180 x 10 min.
320 x 1 min.
390 x 9 min.
5630 ÷ 20 = 281.5

RA#11
445 x 1 min.
350 x 1 min.
370 x 10 min.
575 x 1 min.
740 x 7 min.
10250 ÷ 20 = 512.5

RA#13
350 x 10 min.
300 x 10 min.
6500 ÷ 20 = 325

RA#16
175 x 3 min.
110 x 10 min.
70 x 2 min.
130 x 5 min.
2415 ÷ 20 = 121

RA#17
100 x 10 min.
140 x 2 min.
135 x 8 min.
2360 ÷ 20 = 118

RA#18
125 x 10 min.
155 x 3 min.
170 x 7 min.
2905 ÷ 20 = 145

RA#19
200 x 10 min.
135 x 1 min.
242 x 9 min.
4313 ÷ 20 = 215.7

The monitor tracks for approximately 4-5 minutes and then goes into a holding period for approximately 10 minutes, and then came out of hold and begins to track again. Due to this type of monitor recording, some relative accuracy samples didn't correlate with the reference method samples. Three samples were thrown out and not included in the relative accuracy calculation. RA runs # 12, 14, & 15 were thrown out.

Listed below are the monitor strip chart values we obtained for these 3 RA samples.

RA#12
565 x 10 min.
55 x 10 min.
6200 ÷ 20 = 310

RA#14
490 x 10 min.
315 x 5 min.
330 x 5 min.
8125 ÷ 20 = 406

RA#15

330 x 10 min.
275 x 2 min.
168 x 1 min.
140 x 7 min.
4998 + 20 = 250

It should also be noted that the scrubber was spoiled purposely to allow higher SO_2 concentrations in order to determine the SO_2 monitor certification tests. In doing this, the SO_2 varied greatly during the test runs.

The SO_2 values for the monitor were taken from the strip charts. We estimated that the strip chart was offset approximately +7 ppm. This value of 7 ppm was deducted in calculating the relative accuracy of the SO_2 monitor.

The strip charts were time integrated to obtain the SO_2 values. Listed below are the values that we obtained from the strip charts for the SO_2 R.A. runs. Seven ppm is deducted for the offset.

Data Set	RA Run#	SO_2 Monitor Strip Chart Value Obtained (wet basis)
1	4	216.5 - 7 = 209.5
2	5	251.0 - 7 = 244.0
3	10	281.5 - 7 = 274.5
4	11	512.5 - 7 = 505.5
5	13	325.0 - 7 = 318.0
6	16	121.0 - 7 = 114.0
7	17	118.0 - 7 = 111.0
8	18	145.0 - 7 = 138.0
9	19	215.7 - 7 = 208.7

Runs 12, 14, & 15 were not included in calculating the relative accuracy of the monitor.

The reference test method was made on a dry basis, therefore, a moisture run was determined to obtain the moisture content of the flue gas. The moisture was determined to be 5 percent, therefore, the necessary calculations were made to compare the monitor results with the SO_2 reference method test samples.

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMCRA
Client : SCHULYKILL METALS
Project : 90-356-3
SO2 RELATIVE ACCURACY MONITOR TESTS

Date 01/14/91

	Sample Identification		04	05	10
	Test Date		11/10/90	11/10/90	11/10/90
VM	Volume Sampled	(CF)	1.099	1.120	1.095
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	61.00	70.20	67.00
VMS	Corrected Volume Sampled	(DSCF)	1.095515	1.097076	1.079101
VT	Volume Titrated	(ml)	10.70	16.00	7.65
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	10.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000341	0.0000509	0.0000495
PPM	Parts/Million SO2	(ppm)	205	307	298
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMCRA
Client : SCHULYKILL METALS
Project : 90-356-3
SO2 RELATIVE ACCURACY MONITOR TESTS

Date 01/14/91

	Sample Identification		11	13	16
	Test Date		11/10/90	11/10/90	11/10/90
VM	Volume Sampled	(CF)	1.104	1.116	1.078
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	67.60	71.80	69.00
VMS	Corrected Volume Sampled	(DSCF)	1.086733	1.089869	1.058331
VT	Volume Titrated	(ml)	25.55	15.65	8.35
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(Cl04)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000821	0.0000502	0.0000275
PPM	Parts/Million SO2	(ppm)	495	303	166
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMCRA
Client : SCHULYKILL METALS
Project : 90-356-3
SO2 RELATIVE ACCURACY MONITOR TESTS

Date 01/14/91

	Sample Identification		17	18	19
	Test Date		11/11/90	11/11/90	11/11/90
VM	Volume Sampled	(CF)	1.112	1.111	1.114
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	66.00	67.80	69.25
VMS	Corrected Volume Sampled	(DSCF)	1.097937	1.093209	1.093158
VT	Volume Titrated	(ml)	6.10	9.30	10.95
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000194	0.0000297	0.0000350
PPM	Parts/Million SO2	(ppm)	117	179	211
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants

Test ID : SMCRA
Client : SCHULYKILL METALS
Project : 90-356-3
SO2 RELATIVE ACCURACY MONITOR TESTS

Date 01/14/91

	Sample Identification		12-OMIT	14-OMIT	15-OMIT
	Test Date		11/10/90	11/10/90	11/10/90
VM	Volume Sampled	(CF)	1.111	1.079	1.073
MC	Meter Correction Factor		1.0100	1.0100	1.0100
PB	Barometric Pressure	(in Hg)	29.15	29.15	29.15
TM	Meter Temperature	(F)	69.80	71.20	69.40
VMS	Corrected Volume Sampled	(DSCF)	1.089082	1.054926	1.052626
VT	Volume Titrated	(ml)	9.25	15.65	9.60
VTB	Blank Volume Titrated	(ml)	0.01	0.01	0.01
N	Normality of Ba(ClO4)	(eq/l)	0.0099	0.0099	0.0099
VS	Volume of Sample	(ml)	100	100	100
VA	Volume of Aliquote	(ml)	20.00	20.00	20.00
CSO2	Concentration of SO2	(lbs/DSCF)	0.0000297	0.0000518	0.0000318
PPM	Parts/Million SO2	(ppm)	179	312	192
F	F Factor	(DSCF/MBtu)	0	0	0
O2	Percent O2	(%)	0.00	0.00	0.00
ESO2	Emission of SO2 O2 Basis	(lbs/MBtu)	0.00	0.00	0.00

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants
DUST - Particulate Emissions Program
Version 4.0 - 03/90

Test ID: SMC
SCHULYKILL METALS CORP.
90-356-3
PARTICULATE & METALS TESTS

Date 01/07/91
Time 10:26:00

	Sample Identification		1	2
	Test Date		11/11/90	11/11/90
PC	Pitot Coefficient	(CF)	0.770	0.770
AF	Flue Area		28.274	28.274
PB	Barometric Pressure	(in Hg)	29.300	29.300
VL	Volume of Condensate	(ml)	49.1000	44.6000
TF	Flue Temperature	(F)	99.410	106.400
SDP	Square Root of Delta P		0.731	0.686
PS	Static Pressure	(in H2O)	-0.500	-0.500
DH	Orifice Pressure Diff.	(in H2O)	1.360	1.350
TM	Meter Temperature	(F)	55.600	68.250
VM	Volume Sampled	(CF)	46.721	46.372
MC	Meter Correction Factor		1.008	1.008
DN	Nozzle Diameter	(in)	0.248	0.248
T	Time Sampled	(min)	72	72
CO2	Percent CO2	(%)	0.600	1.850
O2	Percent O2	(%)	20.200	18.950
CO	Percent CO	(%)	0.000	0.000
N2	Percent N2	(%)	79.20	79.20
MW	Molecular Weight	lb/lb-m	28.40	28.57
	Filter Number		205	210
	Wash Number		1A	2A
WG	Total Particulate Matter	(G)	0.0636000	0.0694000
PF	Absolute Flue Pressure	(in Hg)	29.26	29.26
VW	Volume of Water Vapor	SCF	2.31	2.10
VMS	Volume of Metered Gas	DSCF	47.37	45.89
M	Moisture in Flue Gas	(%)	4.65	4.38
VG	Velocity of Flue Gas	FPS	39.48	37.16
VO	Volume of Flue Gas	ACFM	66970	63047
VOS	Volume of Flue Gas	DSCFH	3535437	3296680
VT	Volume of Flue Gas	ACF	53.84	52.66
WD	Dust Concentration	lb/DSCF	0.0000030	0.0000033
WH	Dust Concentration	lb/hr	10.47	10.99
WA	Dust Concentration	grs/acf	0.0182326	0.0203429
WS	Dust Concentration	grs/dscf	0.0207233	0.0233429
I	Isokinetic Sampling	(%)	94.13	97.79

.88 lbs SO2 /HR

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants
DUST - Particulate Emissions Program
Version 4.0 - 03/90

Test ID: SMC
SCHULYKILL METALS CORP.
90-356-3
PARTICULATE & METALS TESTS

Date 01/07/91
Time 10:26:04

Sample Identification		1	2
Test Date		11/11/90	11/11/90
Filter Number		205	210
Final Weight	(G)	1.0832000	1.0912000
Tare Weight	(G)	1.0787000	1.0839000
Wash Number		1A	2A
Wash Residue		59.1000	62.1000
Wash Volume		185.0000	185.0000
Blank Residue		0.0000	0.0000
Blank Volume		100.0000	100.0000
Total Particulate Matter		0.0636000	0.0694000
Liquid Collected		40.0000	37.0000
Initial Silica Gel Weight		200.0000	200.0000
Final Silica Gel Weight		209.1000	207.6000
Total Condensate		49.1000	44.6000

B U R N S & M C D O N N E L L
Engineers-Architects-Consultants
DUST - Particulate Emissions Program
Version 4.0 - 03/90

Test ID: SMC
SCHULYKILL METALS CORP.
90-356-3
PARTICULATE & METALS TESTS

Date 01/07/91
Time 10:26:06

	Sample Identification		3	4
	Test Date		11/11/90	11/12/90
PC	Pitot Coefficient	(CF)	0.770	0.770
AF	Flue Area		28.274	28.274
PB	Barometric Pressure	(in Hg)	29.300	29.500
VL	Volume of Condensate	(ml)	47.8000	44.2000
TF	Flue Temperature	(F)	106.600	97.080
SDP	Square Root of Delta P		0.671	0.699
PS	Static Pressure	(in H2O)	-0.500	-0.500
DH	Orifice Pressure Diff.	(in H2O)	1.520	1.341
TM	Meter Temperature	(F)	73.400	48.060
VM	Volume Sampled	(CF)	49.359	46.652
MC	Meter Correction Factor		1.008	1.008
DN	Nozzle Diameter	(in)	0.248	0.248
T	Time Sampled	(min)	72	72
CO2	Percent CO2	(%)	1.000	1.200
O2	Percent O2	(%)	19.800	19.600
CO	Percent CO	(%)	0.000	0.000
N2	Percent N2	(%)	79.20	79.20
MW	Molecular Weight	lb/lb-m	28.47	28.52
	Filter Number		186	222
	Wash Number		3A	4A
WG	Total Particulate Matter	(G)	0.0535000	0.0322000
PF	Absolute Flue Pressure	(in Hg)	29.26	29.46
VW	Volume of Water Vapor	SCF	2.25	2.08
VMS	Volume of Metered Gas	DSCF	48.39	48.33
M	Moisture in Flue Gas	(%)	4.44	4.13
VG	Velocity of Flue Gas	FPS	36.42	37.46
VO	Volume of Flue Gas	ACFM	61792	63546
VOS	Volume of Flue Gas	DSCFH	3227704	3410381
VT	Volume of Flue Gas	ACF	55.59	54.03
WD	Dust Concentration	lb/DSCF	0.0000024	0.0000015
WH	Dust Concentration	lb/hr	7.87	5.01
WA	Dust Concentration	grs/acf	0.0148547	0.0091986
WS	Dust Concentration	grs/dscf	0.0170635	0.0102844
I	Isokinetic Sampling	(%)	105.33	99.55

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Version 4.0 - 03/90

Test ID: SMC
SCHULYKILL METALS CORP.
90-356-3
PARTICULATE & METALS TESTS

Date 01/07/91
Time 10:26:09

Sample Identification		3	4
Test Date		11/11/90	11/12/90
Filter Number		186	222
Final Weight	(G)	1.1130000	1.0966000
Tare Weight	(G)	1.0939000	1.0814000
Wash Number		3A	4A
Wash Residue		34.4000	17.0000
Wash Volume		234.0000	260.0000
Blank Residue		0.0000	0.0000
Blank Volume		100.0000	100.0000
Total Particulate Matter		0.0535000	0.0322000
Liquid Collected		40.0000	37.0000
Initial Silica Gel Weight		200.0000	200.0000
Final Silica Gel Weight		207.8000	207.2000
Total Condensate		47.8000	44.2000

Laboratory Results

Liquid Samples

MDL ug/l	Parameter	Blank	Run Number 1	2	3	4
50 ug/l	Arsenic	ND	ND	ND	ND	ND
20 ug/l	Lead	ND	0.28	0.27	0.34	0.24
30 ug/l	Antimony	ND	ND	ND	ND	ND
Liquid volumes (ml)		200	565	545	665	520

Filter Samples

MDL ug/kg						
50 ug	Arsenic	ND	ND	ND	ND	ND
20 ug	Lead	ND	7.1	7.6	5.4	55
30 ug	Antimony	ND	ND	ND	ND	ND

To calculate mg per sample for the liquid; take the actual liquid sample volumes divided by 1000 and multiply by the laboratory results quantities shown as mg/liter. Run #1 for lead is shown below as an example.

.28 mg/liter x 565 ml/1000 ml = .1582 mg

The following chart shows the calculated mg/sample for the liquid sample.

Run # (mg/liquid sample)

Parameter	1	2	3	4
Arsenic	0	0	0	0
Lead	0.1582	0.14715	0.2261	0.1248
Antimony	0	0	0	0

All 3 of the metals analyzed for in the liquid blank were not detectable, therefore, no blanks are deducted from the liquid samples.

The following equation was used to calculate the total mg/filter for the sample filters for each of the 3 metals analyzed.

$$\frac{1.10 + \text{sample weight gain}}{1000} \times \text{mg/kg} = \text{mg/filter}$$

The blank filter weighed weighed 1.10 grams.

Run #	Filter Weight Gain
1	0.0045 grams
2	0.0073 grams
3	0.0191 grams
4	0.0152 grams

The 3 metals analyzed for in the filter blank were all nondetectable, therefore, no blanks need to be deducted from the filter samples.

The following chart shows the calculated results of the metals analysis for the sample filters in mg/filter.

Filter Samples
Run Number

	1	2	3	4
Arsenic	0.0	0.0	0.0	0.0
Lead	0.00784195	0.00841548	0.00604314	0.061336
Antimony	0.0	0.0	0.0	0.0

The following chart represnets the total milligrams of each metal analyzed, by adding the liquids and filters together.

Total Milligrams
Run Number

Parameter	1	2	3	4
Arsenic	0.0	0.0	0.0	0.0
Lead	0.16604195	0.15556548	0.23214314	0.186136
Antimony	0.0	0.0	0.0	0.0

To convert this data into lbs per hour, the following conversions and equations are used.

To convert mg to grams (divide by 1000).

To convert grams to pounds: 1 pound = 453.6 grams 1/453.6 = .002205.

Thus far we have mg/1000 x .002205 = pounds.

To calculate pounds per dry standard cubic feet simply divide pounds by the number of dry standard cubic feet sampled (from computer printout listed).

To calculate pounds per hour simply multiply pounds per dry standard cubic feet by the volume of flue gas corrected to dry standard cubic feet per hour (from computer printouts listed).

Run 1 for lead is shown as an example calculation:

$$\frac{(.16604195/1000) \times (.002205)}{47.37} \times 3{,}535{,}437 = .0273 \text{ lbs/hour} \quad 5.408 \text{ E-05 gr/dscf}$$

Run Number (lbs/hour)

	1	2	3	4
Arsenic	0.0	0.0	0.0	0.0
Lead	0.0273	0.0246	0.0341	0.0289
Antimony	0.0	0.0	0.0	0.0

gr/dscf

	1	2	3	4
Arsenic	0.0	0.0	0.0	0.0
Lead	5.40808E-05	5.23027E-05	7.401667E-05	5.94214E-05
Antimony	0.0	0.0	0.0	0.0

Summary of Test Results

The chart on the following page is a summary of the organics, benzene, toluene, and thiophene. As mentioned in the introduction, 2 VOST trains were utilized. In one of the trains, the samples were taken and given to the Environmental Protection Agency for analysis. The other VOST train samples were analyzed by Triangle Laboratories, Inc. at Research Triangle Park, N.C. The laboratory reports indicated that the levels of benzene, toluene, and thiophene were found to be higher than the 0.1 to 1.0 microgram calibration range of the analysis. These quantitation amounts listed on the summary sheets should to be considered minimum estimated amounts only. The case narrative report from Triangle Laboratory can be found in the Laboratory Reports section of this report.

There were 4 pairs of the 15 paired sorbent traps that were held out from being analyzed because the samples exceeded the calibration range of the Gas Chromatograph/Mass Spectrophotometer detector. It may be possible to analyze these 4 pairs of traps by utilizing another method different from the Method 5040 and Method 8240. We are awaiting a decision from the Missouri Department of Natural Resources to determine if these 4 pairs of samples should be analyzed. An addendum to the report will be forthcoming if this is deemed necessary.

SUMMARY OF VOST TRAIN RESULTS

			Benzene			Toluene			Thiophene		
Run #	Test #	Sample #	ug	ug/m³	ppm	ug	ug/m³	ppm	ug	ug/m³	ppm
(1)	1	001,002	8.854	440.29	.1377	3.973	197.57	.052	5.896	293.19	.085
	2	003,004	10.456	517.67	.162	3.720	184.18	.049	5.263	260.57	.076
	3	005,006	13.055	658.87	.206	7.722	389.72	.103	7.330	369.94	.107
	4	007,008	13.134	657.07	.205	5.640	282.16	.075	5.883	294.32	.085
	5	009.010	20.003	971.35	.304	13.719	666.20	.177	17.852	866.90	.252
	Average			649.05	.203		343.97	.091		416.98	.121
(2)	6	013,014	16.569	839.22	.262	13.329	675.12	.179	12.499	633.07	.184
	7	015,016	17.668	889.23	.278	8.690	437.37	.116	15.294	769.75	.224
	8	017,018	8.319	411.09	.129	2.566	126.81	.034	4.955	244.86	.071
	9	019,020	13.947	689.25	.216	6.923	346.59	.092	10.339	517.62	.150
	10	021,022	16.260	807.42	.253	8.022	398.35	.106	13.576	674.14	.196
	Average			727.24	.227		396.84	.105		567.88	.165
(3)	11	023,024	32.116	1621.31	.507	1.307	65.98	.017	11.037	557.18	.162
	* 12	023,024									
	* 13	025,026									
	* 14	027,028									
	* 15	029,030									
	Average										
	Blank	113,114	.001 ug			.003 ug			.001 ug		

* Test number 12, 13, 14 & 15 were not analyzed because all previous samples up to that point had exceeded the calibration range of the detector.

/rjs.334

III. Description of Tested Facility

III. Description of Facility Tested

The Canon Hollow secondary lead smelter plant, located near Forest City in Holt County, Missouri, is owned and operated by the Schuylkill Metals Corporation of Baton Rouge, Louisiana. The Canon Hollow Plant recycles, primarily, used automobile battery plates and other miscellaneous lead scrap.

There are three types of smelter furnaces at the Canon Hollow Plant. All were designed and constructed by the Schuylkill Metals Corporation. The three furnace types are blast, reverberatory and pot. There are seven furnaces total at this plant; one of each of the blast and reverberatory type and five of the pot type. The reverberatory furnace has not been operating for several months. The scrubber pot type furnace is used as a drossing kettle. Natural gas is consumed as the fuel in the reverberatory (when operated) and pot furnaces, while coke is the fuel for the blast furnaces. At this plant, the average monthly fuel consumption is 6100 MCF of natural gas and 600,000 pounds of coke.

The furnaces have rated capacities as follows:

5 tons per hour for the blast furnace,
100 tons per batch for the pot furnaces;

while the normal production rates are:

4 tons per hour for the blast furnace,
25 tons per hour for the pot furnace.

The Canon Hollow Plant operates continuously throughout the year with maintenance performed periodically and as required.

The exhaust from the blast furnace is run through a spark arrester section and then into one of the ~~six compartment~~ baghouses designed and manufactured by the Air Pollution Control Division of Wheelabrator-Frye, Inc. The exhaust from the pot furnace and hygiene work area is run directly into the other ~~six~~ compartment baghouse.

Each baghouse is equipped with its induced draft fan to draw the exhaust gases through the baghouses. The blast furnace baghouse is equipped with a booster fan to improve the pressure drop of the scrubber. The exhaust gas enters the bags through the bottom and the particulate is separated from the gas and collected on the inside surfaces of the cloth filter bags. A timer automatically cycles the shut-down of each compartment for cleanup, using a sonic horn shaker mechanism. The baghouse system is described by Wheelabrator-Frye as two, continuous automatic dustube dust collectors, each containing six modules (compartments), size 1224, Model 171, series 55, suction type, each module containing 5,530 square feet of cloth area.

Each baghouse is designed to handle 40,000 acfm of 250°F, lead-dust-laden air having a gross air-to-cloth ratio of 1.5 (with all modules on-line) and a net ac ratio of 1.8 (with one module off-line).

Baghouse maintenance is performed daily and as required.

Sulfur Dioxide Emissions are monitored by a DuPont Continuous Emission Monitor System (CEMS).

A Flakt Lime Slurry SO_2 scrubber is utilized to Control Sulfur Dioxide Emissions.

* * * * *