Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 119

SOTDAT/STEEL LIBRARY SYSTEM

Report Title: –

Plant and Location: BSC Bethlehem, PA

SCC: 30300303

Testing Date(s): 3/6-9/79

By Whom: BCM

Stack Test Review Attached: No obs. by DER attached.

Reviewed by:

Problems Seen by Reviewer:

Confidentiality Status: ND

If status is confidential, list confidential pages or sections:

Source of Determination of the Confidentiality Status:

Report Encoded by:

Date Encoded:

Form Numbers:

Comments:

Bethlehem Steel Corporation

BETHLEHEM PLANT
BETHLEHEM, PA 18016

F. C. HARVEY, JR.
GENERAL MANAGER
D. A. BARKER
A. T. RICKETTS
H. C. SMITH
ASSISTANT GENERAL MANAGERS

May 22, 1979

Mr. John E. McGrogan, P.E.
Department of Environmental Resources
Bureau of Air Quality Control
Reading Regional Office
Wernersville, Pennsylvania 19565

Dear Mr. McGrogan:

Attached please find the results of particulate emission tests conducted on the Envirotech/Chemico hooded quench car at the Bethlehem Coke Plant's No. 5 Battery from March 6 through 9, 1979.

From the Summary of Results (Appendix E), you will note that the actual particulate emission rates for the three tests averaged 2.94 lbs./hr., with an allowable emission rate of 3.77 lbs./hr.

Attachments to this letter include:

1. Appendix A (test procedure).
2. Appendix B (letter of February 20, 1979 from R. St. Louis to A. T. Ricketts concerning the waiver of the DER requirement of 25 dscf test sample volume).
3. Appendix C (back half sample weights).
4. Appendix D (exhaust gas Orsat analyses).
5. Appendix E (calculation of allowable emission rate and calculation of actual emission rates during the compliance tests).
6. Appendix F (operating and test data collected during the compliance tests).
7. Betz·Converse·Murdock, Incorporated's Compliance Report.

If you have any questions, please call the Office of the Superintendent of Environmental Control at (215) 694-7450.

Very truly yours,

BETHLEHEM STEEL CORPORATION

A. T. Ricketts
Assistant General Manager

Appendix A

COMPLIANCE TEST PROCEDURE
ENVIROTECH/CHEMICO ENCLOSED
QUENCH CAR SYSTEM

I. TEST METHOD

A. For the purposes of this test a push shall be defined as starting with movement of coke from the oven and ending two minutes thereafter.

B. The results of the average of three complete test runs, as described in Item IIA below, may be considered by the Department as having demonstrated that the gas cleaning system has achieved compliance with 25 Pa. Code Section 123.13(b).

C. The test method will conform, except for minimum sample volume, to Chapter 139 of the DER's Rules and Regulations.

D. The sampling equipment will consist of a nozzle, heated probe, heated out-of-stack glass fiber filter, impingers, airtight pump, dry test meter and orifice arranged as shown schematically in Figure I. The probe and filter will be maintained at temperature of 250 ± 25°F.

E. All tests will be conducted utilizing a trailer car similar in configuration to that shown on the attached drawing.

F. All testing procedures, calculations and analyses not described herein will be conducted in accordance with good engineering and laboratory practice.

II. TEST PROCEDURE

A. A minimum of three tests will be performed. A compliance determination will be made based upon an average of three tests. The Department reserves the right to request additional tests if necessary after review of the initial three tests.

One (1) test will consist of four four-point sampling traverses. Each point will be sampled during a single push at two minutes per push and a minimum volume of 25 dry standard cubic feet (DSCF) per test. The effluent concentration will be determined by including the weight of particulate collected in each of the sampling train components (i.e., nozzle, probe, filter holder, filter, impingers and connecting glassware).

II. TEST PROCEDURE (Cont'd.)

B. Sampling will be conducted at ports located on a dust extension as shown in the attached drawing. Preliminary velocity traverses will be performed using a Type-S pilot tube. Preliminary moisture and temperature determinations will also be conducted. During the test sampling rate will be adjusted by the pitot tube/nomograph/orifice method.

C. At the conclusion of the test after all final readings have been taken, the following procedure will be followed:

i. Remove the probe from the stack and disconnect it from the train.

ii. Drain the ice bath and purge the remaining part of the train in the impingers and desiccant.

D. Moisture content will be determined from the condensate collected in the impingers and desiccant. Duct gas analysis for CO, CO_2 and O_2 will be determined.

III. SAMPLE ANALYSIS

A. Front Half: The filter will be air dried by 24-hour desiccation and weighted (accurate to 0.1 mg), prior to and after sampling. Nozzle and probe washings will be evaporated to dryness and desiccated in a preweighed container and the residue weight will be included with the net filter weight.

B. Back Half: Impinger water and washings will be filtered with a preweighed 0.2 micron pore size Millipore Filter. This filter will then be air dried by 24-hour desiccation and reweighed immediately. The filtrate will be evaporated to dryness at 160 - 180°F in a preweighed container and reweighed to determine the residue weight. The dry filtrate will be analyzed for sulfate content according to the Turbidimetric Method outlined on Page 496 in the Fourteenth Edition of Standard Methods, and this determination will be included in the report.[1] The weight of the sulfate as determined above will be subtracted from the back half weight.

IV. OPERATING DATA

A. The following parameters will be recorded during the test and shall be included in the final report:

---

1. The Department reserves the right to amend the plan approval of which this Compliance Test Procedure is a part, to require the permittee to employ a more accurate, reliable or precise analytical method for measuring the sulfate content of the dry filtrate.

IV. OPERATING DATA (Cont'd.)

1. Average scrubber water consumption.

2. Average scrubber water temperature.

3. Average liquid to gas ratio.

4. Average total suspended and total dissolved solids concentrations in scrubber water supply.

B. The following data will be included in the final report:

1. Average weight of coal charged.

2. Average coal moisture.

3. Coking time of each push.

4. Any abnormalities in the Plant with regard to coking that occured over the previous 24 hours.

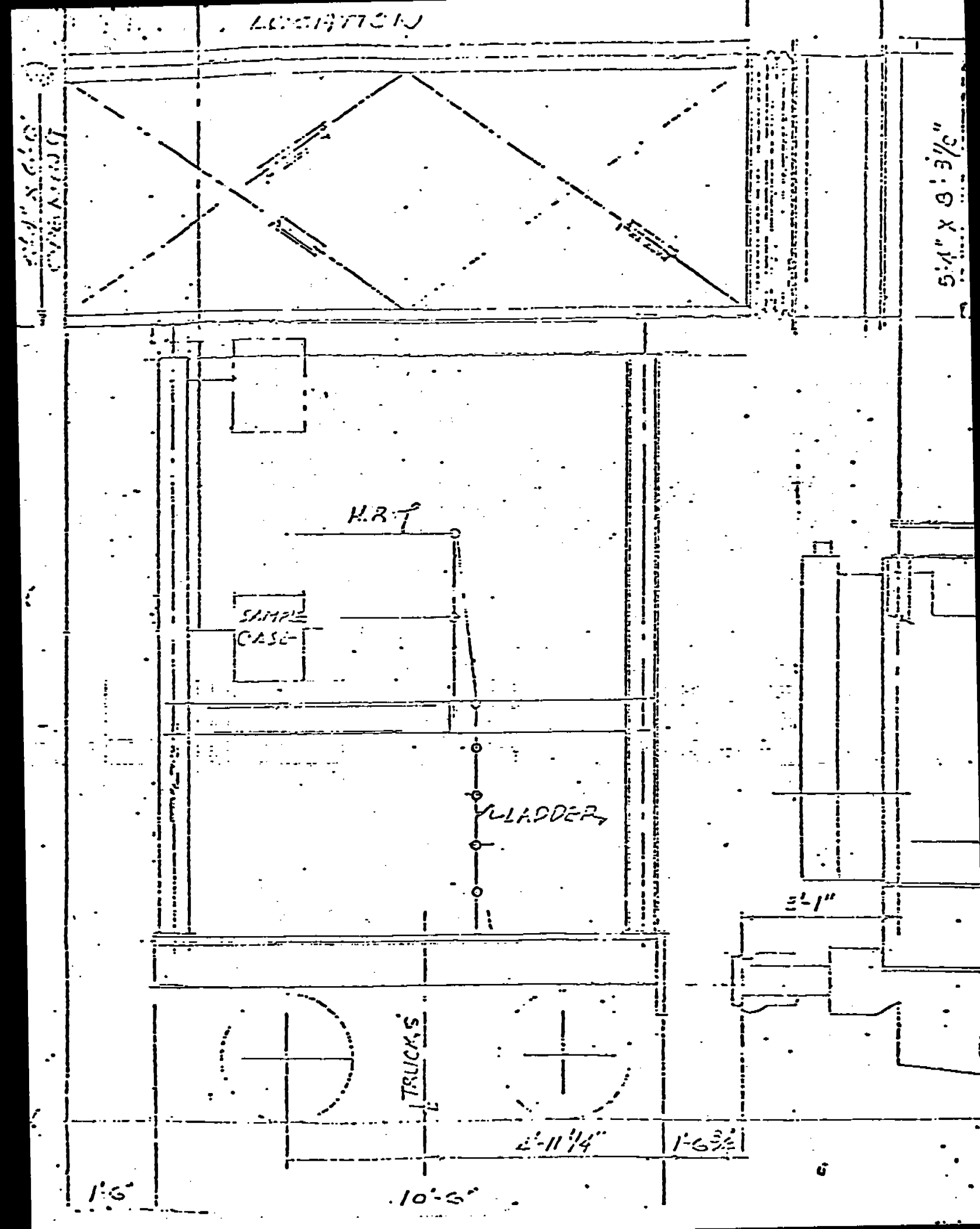
5. Average percent low volatile coal inthe coal mix charged.

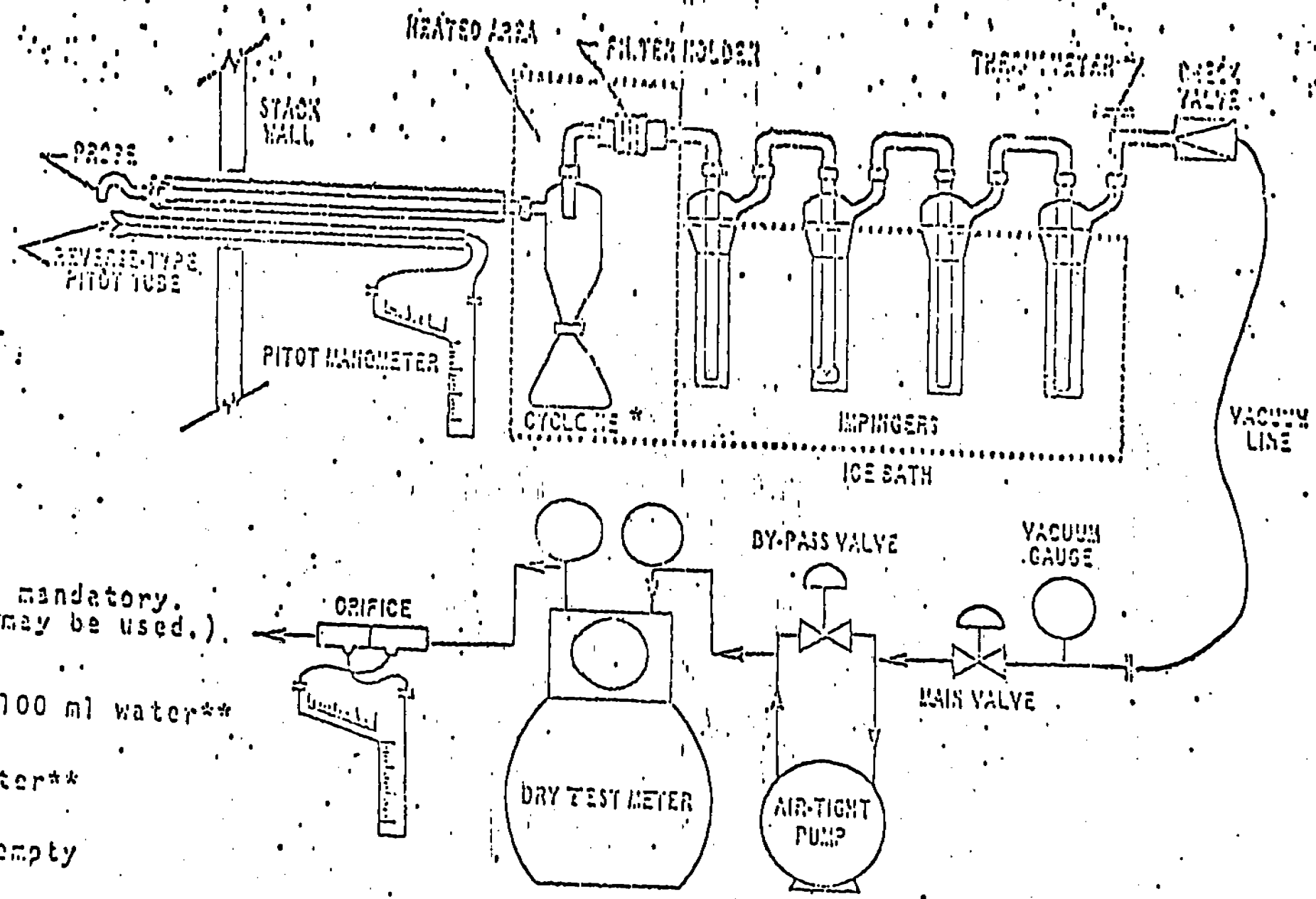
6. Average percent volatile matter in the coal mix charged.

7. The standard calculation used by Bethlehem for estimating the amount of coke pushed from each oven.

V. NOTIFICATION PROVISIONS

Bethlehem will provide the Department with a minimum of ten (10) days notice of the commencement date for each compliance test program.


LOCATION
H.R.T
SAMPLE CASE
LADDER
TRUCKS
3'-1"
2'-11 1/4"
1'-6 3/4"
1'-6"
10'-6"
5'-4" X 8'-3 1/2"



e is not mandatory.
bypass may be used.)

#1
dified. 100 ml water**

#2
0 ml water**

#3
dified empty

#4
dified about 200 gm of
gel weighed within 1 gm.

** half is included as a particulate catch, the water should
tilled and deionized. Set aside a portion of the water as
for analysis, 100 ml minimum.

Appendix B

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES
POST OFFICE BOX 2063
HARRISBURG, PENNSYLVANIA 17120

February 20, 1979

CERTIFIED MAIL #989791

Mr. A. T. Ricketts
Assistant General Manager
Bethlehem Steel Corporation
701 East Third Street
Bethlehem, PA 18016

Dear Mr. Ricketts:

The purpose of this letter is to confirm with you the telephone conversation of February 13, 1979, between Mr. Robert Harvey and myself in which we agreed upon the gas sampled volume of 13-14 dscf per test (16 pushes) for the Envirotech/Chemico Quench Car testing program. As we had previously agreed, a minimum of three tests will be performed and the Department reserves the right to request additional testing if deemed necessary.

In addition to the Envirotech/Chemico Quench Car, I have scheduled the source testing for Precipitator Nos. 1 and 2 at the Sinter Plant for the week of March 5, 1979. During this week, I would also like to retest the exhaust stack on the coal crushing plant. I will contact Mr. Harvey on or about March 1, 1979, to confirm the testing date.

If you should have any questions concerning this matter, please feel free to contact me.

Very truly yours,

Richard St. Louis

Richard St. Louis
Air Pollution Control Engineer
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Appendix C

#5 Battery

One-Spot Car Compliance Tests
Back Half Particulate Catch (mg)*

Test # & Date	Water Soluble	Acetone Soluble	Water Insoluble	Sulfates
#1 3/07/79	25.01	0.0	0.0	Questionable Sample Result
#2 3/08/79	74.57	0.0	0.0	43.78
#3 3/09/79	95.59	0.0	0.0	65.6

* All results blank corrected.

Appendix D

#5 Battery

One-Spot Car Compliance Tests
Orsat Flue Gas Analyses

Test # & Date	% Constituents (By Volume)			
	CO_2	O_2	CO	N_2
#1 3/07/79	1.6	19.1	0.3	79.0
#2 3/08/79	1.8	18.0	0.2	80.0
#3 3/09/79	1.8	18.0	0.2	80.0

APPENDIX E

#5 Battery
Compliance Testing
Pushing

Run No.	gr/SCFD	SCFMD
C1	.0423	75861
C2	.0295	74830
C3	.0319	72642
Average	.0346	74444

Average coking time during this 3-day period was 20 hours which equates to 4 pushes per hour on an 80 oven battery.

$$\text{Actual Emission Rate} = .0346 \frac{gr}{SCFD} \times \frac{1}{7000} \frac{lb}{gr} \times 74444 \frac{SCFD}{Min} \times 2 \frac{min}{push} \times 4 \frac{push}{hour} = \underline{2.94 \text{ lb. per hour}}$$

$$\text{Allowable Emission Rate} = 0.76E^{0.42}$$

$E = F \times W$

$F = 1$ #/ton coke

$W = 11.33$ ton coke/push x 4 push/hour = 45.32 tons coke/hour

$$A = 0.76 \left[45.32 \frac{\text{Ton Coke}}{\text{Hr.}} \times 1 \frac{\text{Lb.}}{\text{Ton Coke}}\right]^{0.42} = \underline{3.77 \text{ lb. per hour}}$$

NOTE: The average 22.1 lb./hour emission rate in Table II of the Betz report is an <u>instantaneous</u> rate.

Appendix F

#5 Battery

One-Spot Car Compliance Tests
Operating Data Summaries (Averages)

	CONTROL CAR DATA					BATTERY DATA			
est # Date	Scrubber Water Flow (gpm)*	Scrubber Water Temp. (°F)	l/g Ratio (By Weight)	Scrubber Water TSS (ppm)	Scrubber Water Dis.Sol. (ppm)	Coal Moisture (%)	Low Volatile (%)	Volatile (%)	Abnormalities
1 /07/79	393(p) 192(t)	393 395	0.78 0.38	6.8	76.3	7.4	24.3	31.2	-
2 /08/79	395(p) 190(t)	382 385	0.81 0.40	13.6	98.5	8.1	27.2	30.0	-
3 /09/79	404(p) 198(t)	387 387	0.82 0.41	8.0	162.5	7.4	31.7	31.4	-
verage	397(p) 193(t)	387 389	0.80 0.40	9.5	112.4	7.6	27.7	30.9	-

The average weight of coal charged per oven is 30,700 lbs. on a dry basis. This is based on an average dry coal bulk density of 45.5 lb/ft^3 and the volume of the oven.

The present factor for determining the tonnage of coke produced per oven is 1.0 tons of dry furnace coke for each 1.43 tons of dry coal charged. This is derived from Lowry's formula using an average volatile matter of 30.9 % to get a yield of 73.81 % run-of-oven coke.

$$\frac{30,700\ \#}{2,000\ \#/N.T.}\ (.7381) = 11.33\ N.T./Oven$$

*(p) = push mode; (t) = travel mode

Appendix F-2

#5 Battery

One-Spot Car Compliance Tests
Coking Times

Test #1 (3/07/79)		Test #2 (3/08/79)		Test #3 (3/09/79)	
Oven #	Coking Time	Oven #	Coking Time	Oven #	Coking Time
40	20:15	27	19:31	9	19:19
50	19:47	37	19:33	19	19:21
60	19:46	47	18:43	29	19:07
2	19:48	57	19:41	49	19:34
12	19:54	67	20:00	69	19:40
22	19:56	4	20:10	11	20:02
32	19:56	14	20:15	21	20:10
42	20:21	24	19:38	31	20:12
52	20:23	34	20:36	41	20:15
62	20:30	44	20:57	51	20:22
72	20:43	54	21:01	61	19:47
1	19:27	64	21:07	71	19:47
11	19:29	74	21:17	6	19:51
21	19:27	9	20:26	16	19:59
31	19:37	19	20:28	26	19:45
41	19:37	29	20:33	36	19:09
Average	19:56		20:15		19:42

PARTICULATE EMISSION EVALUATION OF THE
ENVIROTECH/CHEMICO ONE SPOT QUENCH CAR SYSTEM
AT THE NO. 5 COKE OVEN BATTERY OF
BETHLEHEM STEEL CORPORATION
(COMPLIANCE REPORT)

CONDUCTED FOR
BETHLEHEM STEEL CORPORATION
BETHLEHEM, PA.

MARCH 6-9, 1979
B•C•M PROJECT NO. 00-4021-06

Submitted by: Patrick J. Ford
Patrick J. Ford
Scientist

Approved by: Peter R Charrington
Peter R. Charrington, P.E.
Section Manager
Air Quality

William P. May, Jr., P.E.
Assistant Vice President
Concept Design & Operations
Department

Betz • Converse • Murdoch • Inc. BCM

Consulting Engineers, Planners and Architects

Betz•Converse•Murdoch•Inc.

TABLE OF CONTENTS

	Page No.
ABSTRACT	i
1.0 INTRODUCTION	1
2.0 SCOPE AND OBJECTIVES	1
3.0 PROCEDURES	2
3.1 Field Work	2
3.2 Equipment Calibration	2
3.3 Analytical Methods	3
4.0 SUMMARY OF RESULTS	3
5.0 DISCUSSION OF RESULTS	5

APPENDICES

A. FIELD DATA SHEETS

B. CALIBRATION DATA

ABSTRACT

On March 6-9, 1979, an emission evaluation was conducted at the BETHLEHEM STEEL CORPORATION'S No. 5 Coke Oven Battery on the exhaust from the Envirotech/Chemico one spot Quench Car System. Results computed from the front half and insoluble backhalf particulate catch indicate an average emission rate of 0.035 Grains/DSCF or 22.1 lbs./hr.

Betz•Converse•Murdoch•Inc.

ONE SPOT QUENCH CAR SYSTEM EMISSION EVALUATION

1.0 INTRODUCTION

The BETHLEHEM STEEL CORPORATION retained BETZ•CONVERSE• MURDOCH•INC. (B•C•M) to conduct a compliance particulate emission evaluation of their One Spot Quench Car System located at the No. 5 coke oven battery of BETHLEHEM STEEL CORPORATION in Bethlehem, Pennsylvania. The tests were performed in accordance with the procedures and requirements established by the UNITED STATES ENVIRONMENTAL PROTECTION AGENCY and the PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES.

2.0 SCOPE AND OBJECTIVES

In summary, sampling was conducted to determine the following parameters:

1. Gas Flow - ACFM & SCFM
2. Gas Temperature - ^{o}F
3. Gas Molecular Weight - Orsat Analysis - (CO_2, O_2, CO and N_2 by difference) - % by volume
4. Moisture content - % by volume
5. Particulate Concentration - gr/DSCF, lb/hr (front-half and insoluble backhalf)

3.0 PROCEDURES

3.1 Field Work

The field testing was conducted on the exhaust from the one spot quench car system on March 6 thru 9, 1979.

The B•C•M sampling team consisted of the following personnel:

Patrick J. Ford - Scientist
William Bainton - Technician IV

Mr. Robert Alpago, Mr. Stuart Hermann and Ms. Pat Kadar of BETHLEHEM STEEL CORPORATION were present to observe testing procedures and inform the test team of process conditions.

The following methods of field sampling were employed in the test program:

1. Gas flow, gas temperature and static pressure measurements were made as per Method Two of the Federal Register, Volume 42, No. 160, August 18, 1977.

2. Particulate sampling was conducted as per Method Five of the Federal Register, Volume 42, No. 160, August 18, 1977.

3. A Fischer - type B No. 10-605 Orsat gas analyzer was used to determine the molecular weight of the flue gas. The following parameters were measured in order to calculate molecular weight of the dry flue gas: volume % nitrogen was determined by difference.

3.2 Equipment Calibration

In accordance with accepted procedures established by the UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (E.P.A.) and the Pennsylvania Department of Environmental Resources, all gas velocity measuring equipment, volume metering equipment, temperature measuring equipment, and flow rate metering equipment had been calibrated immediately prior to the actual test date. Calibration data is listed in Appendix D.

3.3 Analytical Methods

All samples generated during the sampling program were returned to B•C•M LABORATORIES, Plymouth Meeting, Pennsylvania for analysis.

4.0 SUMMARY OF RESULTS

A summary of pertinent test results for each test is presented in Tables I, II and III.

TABLE I

EXHAUST GAS CONDITIONS

Run	Gas Temp. °F	Velocity ft/min	ACFM	SCFM	% Moisture
Push Mode					
C1	150	3,968	125,985	89,523	-
C2	150	3,843	122,016	88,335	-
C3	150	3,843	122,004	86,270	-
Travel Mode					
C1	139	2,701	85,755	62,001	
C2	140	2,618	83,106	61,136	
C3	140	2,578	81,853	58,752	
Push and Travel Modes					
C1	144	3,336	105,842	75,861	17.8
C2	145	3,230	102,542	74,830	16.2
C3	145	3,212	101,984	72,642	18.9

TABLE II

PARTICULATE EMISSION RESULTS*

Front Half & Insoluble Backhalf

Run	Date	Emission Rate Grains/DSCF	Emission Rate LB/HR
C1	3/7/79	0.0423	27.5
C2	3/8/79	0.0295	18.9
C3	3/9/79	0.0319	19.9

* All results blank corrected.

TABLE III

PARTICULATE LABORATORY RESULTS (mg)*

Run No.	Filter	P & C (Water Soluble)	P & C (Acetone Soluble)	Insoluble Backhalf	Total
C-1	2.6	5.5	26.12	0.0	34.22
C-2	3.3	8.23	12.17	0.0	23.7
C-3	5.3	9.85	9.52	0.0	24.67

* All results blank corrected

5.0 DISCUSSION OF RESULTS

Testing of the one-spot quench car system exhaust was performed on March 6-9, 1979. Three sixteen (16) push tests were completed during a three day period, the results of which were used to calculate the particulate emission concentration from the source.

The average emissions from the three tests conducted, based on front half and insoluble backhalf, were 0.035 Grains/DSCF or 22.1 LBS/HR.

Isokinetic sampling parameters during the entire testing program were maintained within the prescribed 100± 10%.

FIELD DATA SHEETS

APPENDIX A

1.0 FIELD DATA

The gas velocity head, gas temperature, inlet and outlet dry gas meter temperatures, elapsed time, orifice pressure, and the sample gas volume were recorded during the testing program. The field data sheets for the sample runs follow:

Betz • Converse • Murdoch • Inc. BCM

VELOCITY DETERMINATIONS

Client: Bethlehem Steel

Location: on spot quench car

Date: 3/6/79

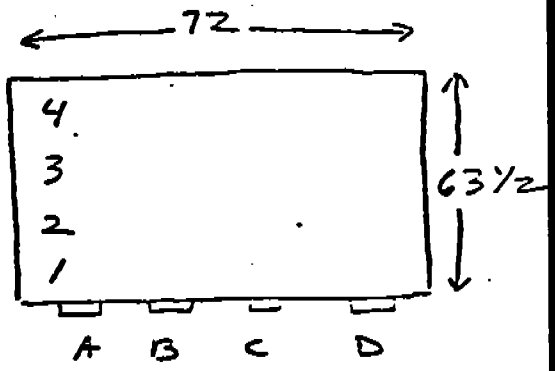
Stack Pressure: push - 0.58" H_2O
travel - 0.50" H_2O

Barometric Pressure: _____

Pitot Factor: 6.2 .812

Engineer: PJF, GWB

Sample Port Location:



31.75 ft²

Pitot/Temperature Readings

Point No.		Distance (Inches)	Port A		Port B		Port C		Port D		Port	
			ΔP	T	ΔP	T	ΔP	T	ΔP	T	ΔP	T
1	P		3.0	144	3.5	135	3.5	140	2.5	140		
	T		1.4	141	1.8	147	3.0	150	1.4	148		
2	P		1.2	149	2.2	143	1.4	145	.92	145		
	T		.65	140	.75	136	1.0	145	.55	143		
3	P		.64	155	.95	154	.7	147	.75	154		
	T		.38	137	.38	136	.15	141	.3	140		
4	P		.47	151	.52	152	.45	152	.38	140		
	T		.25	140	.23	136	.15	138	.15	142		
TOTAL			35.62	4606								
AVG.			1.113	144								

Betz • Converse • Murdoch • Inc. BCM

NOMOGRAPH DATA

PLANT Beth Steel

DATE 3/7/79

SAMPLING LOCATION One Spot QCAS

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	22
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.97
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s / P_m	
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	144
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.113
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	3.5
C FACTOR	.68	
CALCULATED NOZZLE DIAMETER, in.	.175	
ACTUAL NOZZLE DIAMETER, in.	.175	
REFERENCE Δp, in. H_2O	2.9	

BCM

FIELD DATA SHEET

PLANT: Beth Steel
DATE: 3/7/79
SAMPLING LOCATION: one spot QCAR
SAMPLE TYPE: Part
RUN NUMBER: C-1 OPERATOR: PJF
BAROMETRIC PRESSURE: 29.91 STATIC PRESSURE: -.54
FILTER NUMBER(S): F 081
GEL NUMBER(S): CB78
THIMBLE NUMBER: — PLATE NUMBER: —
H_2O PICKUP (ml): 45

ORSAT:
CO_2: 1.6
O_2: 19.1
CO: 0.3

PYROMETER NUMBER: D-1
THERMOCOUPLE NUMBER: 6.6
PROBE NUMBER: 6' TYPE: SS
NOZZLE NUMBER: spare 0 I.D.: .175
METER BOX NUMBER: 7 $\Delta H_@$: 1.84
PITOT NUMBER: 6.4 C_p: .809
SAMPLE BOX NUMBER(S): 7
ASSUMED MOISTURE (%): 22
ASSUMED METER TEMPERATURE: 60
C FACTOR: .68 REFERENCE Δp: 2.9

READ AND RECORD ALL DATA EVERY 1 MINUTES Point travel

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($t_{m\,in}$), °F	OUTLET ($t_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	00 — 0730	521.861									
A1 P	01	522.0	2.4	1.6	1.6	144	50	50	10	275	50
T	02	523.04	1.5	1.0	1.0	130	50	50	7	275	50
A2 P	03	523.5	1.6	1.0	1.0	149	52	52	8	275	50
T	04	523.9	.95	.6	.6	137	52	52	5	275	50
A3 P	05	524.2	.7	.45	.45	150	53	53	5	290	50
T	06	524.5	.5	.3	.3	139	53	53	4	290	50
A4 P	07	524.7	.45	.27	.27	161	54	54	4	300	51
T	08		.25	.15	.15	143	55	55	3	300	52
	0900	Change pm 15									
B1 P	09	525.5	3.5	2.2	2.2	148	56	56	10	290	54
T	10	526.2	1.9	1.2	1.2	135	56	56	8	290	54
B2 P	11	526.8	2.3	1.5	1.5	157	58	57	10	295	55
T	12	527.3	1.3	.82	.82	141	58	57	7	295	56
B3 P	13	527.7	.85	.53	.53	151	60	58	5	290	52
T	14	527.9	.35	.22	.22	144	60	58	4	290	57
B4 P	15	528.1	.65	.41	.41	141	60	58	6	275	58
T	16	528.4	.2	.12	.12	134	60	58	3	275	58
		Change pm 15									
C1 P	17	529.1	3.0	1.9	1.9	151	60	60	12	275	58
T	18	529.5	1.1	.7	.7	142	60	60	6	275	58

PLANT Beth. St. DATE 3/7/79 RUN NUMBER C-1

TRAVERSE POINT NUMBER	SAMPLING TIME min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	18 1025	529.521									
C2 P	19	530.0	1.5	.94	.94	148	60	60	7	280	56
T	20	530.3	.4	.25	.25	140	60	60	4	280	56
C3 P	21	530.5	.53	.38	.38	150	60	60	4	280	57
T	22 1110	530.7	.16	.1	.1	142	60	60	3	280	57
		OFF	Breakdown due to leak in gas recycle system								
	1630	ON									
C4 P	23	531.0	.43	.3	.3	147	66	66	4	280	65
T	24	531.21	.16	.1	.1	137	66	66	3	280	65
		Change ports									
D1 P	25	531.8	2.7	1.9	1.9	147	66	66	12	290	70
T	26	532.3	1.1	.74	.74	136	66	66	6	290	70
D2 P	27	532.8	1.1	.74	.74	152	68	68	6	270	68
T	28	533.1	.5	.34	.34	143	68	68	4	270	68
D3 P	29	533.3	.45	.31	.31	148	70	70	3	290	68
T	30	533.5	.25	.17	.17	138	70	70	3	290	68
D4 P	31	533.7	.23	.16	.16	150	70	70	3	290	68
T	32 1745	534.000	.16	.11	.11	143	70	70	3	290	68
			END			leak check	0.011 c/m				
		12.139 ft³									
		purge									
	initial	534.513									
	end	549.615									

BCM

FIELD DATA SHEET

PLANT: Bethlehem Steel
DATE: 3/8/79
SAMPLING LOCATION: one spot quench car
SAMPLE TYPE: particulate
RUN NUMBER: C-2 OPERATOR: PJF
BAROMETRIC PRESSURE: 29.88 STATIC PRESSURE: -.54" H.O.
FILTER NUMBER(S): E 032
GEL NUMBER(S): C 854
THIMBLE NUMBER: PLATE NUMBER:
H_2O PICKUP (ml): 40 ml

ORSAT:
CO_2: 1.8
O_2: 18.0
CO: .2

PYROMETER NUMBER: D-1
THERMOCOUPLE NUMBER:
PROBE NUMBER: 6' TYPE: stainless
NOZZLE NUMBER: special I.D.: .175
METER BOX NUMBER: .7 $\Delta H_@$: 1.84
PITOT NUMBER: 6.4 C_p: .809
SAMPLE BOX NUMBER(S):
ASSUMED MOISTURE (%): 22
ASSUMED METER TEMPERATURE: 70
C FACTOR: .68 REFERENCE Δp: 2.8

READ AND RECORD ALL DATA EVERY 1 MINUTES push and travel

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	00 0725	550.557									
A1 P	01	551.2	2.5	1.7	1.7	145	48	48	10	250	46
T	02	551.8	1.5	.98	.98	135	48	48	7	250	46
A2 P	03	552.2	1.5	.98	.98	149	48	49	7	250	47
T	04	552.6	.65	.41	.41	136	48	49	4	250	47
A3 P	05	552.8	.4	.25	.25	153	50	50	4	270	47
T	06	553.1	.25	.16	.16	141	50	50	3	270	47
A4 P	07	553.3	.35	.22	.22	155	52	52	4	275	48
T	08 0815	553.5	.25	.16	.16	145	52	52	3	275	48
	0830		Change points								
B1 P	09	554.2	3.8	2.4	2.4	149	52	53	12	280	48
T	10	554.7	1.7	1.1	1.1	138	52	53	7	280	48
B2 P	11	555.9	2.0	1.3	1.3	148	54	54	7	250	49
T	12	555.7	.8	.5	.5	135	54	54	4	260	50
B3 P	13	556.0	.45	.28	.28	151	54	54	4	275	51
T	14	556.21	.25	.16	.16	143	54	54	3	275	52
B4 P	15	556.4	.3	.19	.19	152	54	54	3	275	52
T	16	556.6	.2	.13	.13	146	54	54	3	275	52
			Change points								
C1 P	17	557.3	3.0	2.0	2.0	150	55	55	12	275	52
T	18	557.8	1.4	.9	.9	137	55	55	6	275	52

PLANT Beth. St. DATE 3/8/79 RUN NUMBER C-2

TRAVERSE POINT NUMBER	SAMPLING TIME min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m, ft^3)	VELOCITY HEAD (Δp_s, in H_2O)	ORIFICE PRESSURE DIFFERENTIAL (ΔH, in. H_2O) DESIRED	ACTUAL	STACK TEMPERATURE (T_s, °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$, °F	OUTLET ($T_{m\,out}$, °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	18 10:10	557.8									
C2 P	19	558.4	1.7	1.1	1.1	146	56	56	8	280	56
T	20	558.7	.45	.28	.28	136	56	56	4	280	56
C3 P	21	558.9	.45	.28	.28	152	56	57	4	290	56
T	22	559.1	.2	.13	.13	143	56	57	4	290	56
C4 P	23	559.3	.3	.19	.19	153	56	57	4	270	55
T	24 1115	559.551	.25	.15	.15	143	56	57	4	270	55
		559.661	Change parts - leak check 0.008 c/m								
D1 P	25	560.3	2.5	1.6	1.6	141	58	58	11	275	55
T	26	560.7	1.0	.63	.63	129	58	58	5	275	55
D2 P	27	561.2	1.2	.76	.76	153	58	58	6	275	56
T	28	561.5	.55	.35	.35	145	58	58	4	280	56
D3 P	29	561.9	.75	.48	.48	150	59	59	4	290	58
T	30	562.1	.33	.21	.21	146	59	59	5	290	60
D4 P	31	562.4	.5	.31	.31	150	59	60	5	290	60
T	32 1220	562.611	.2	.13	.13	143	59	60	4	290	60
			END			leak rate = 0.004 c/m					
		purge									
BOX8	initial	904.115									
	finish	920.795									

BCM

FIELD DATA SHEET

PLANT: Bethlehem Steel
DATE: 3/9/79
SAMPLING LOCATION: One spot quench car
SAMPLE TYPE: particulate
RUN NUMBER: C-3 OPERATOR: PJF
BAROMETRIC PRESSURE: 30.15 STATIC PRESSURE: -.54" H_2O
FILTER NUMBER(S): F 033
GEL NUMBER(S): C 846
THIMBLE NUMBER: PLATE NUMBER:
H_2O PICKUP (ml): 45 ml

ORSAT:
CO_2: 1.8
O_2: 18
CO: .2

PYROMETER NUMBER: D-1
THERMOCOUPLE NUMBER: 6-6
PROBE NUMBER: 6' TYPE: stainless
NOZZLE NUMBER: special I.D.: .175
METER BOX NUMBER: 7 $\Delta H_@$: 1.84
PITOT NUMBER: S-1 C_p: .864
SAMPLE BOX NUMBER(S): 7
ASSUMED MOISTURE (%): 22
ASSUMED METER TEMPERATURE: 60
C FACTOR: .75 REFERENCE Δp: 2.6

READ AND RECORD ALL DATA EVERY 1 MINUTES push & travel

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	00	0725	562.811									
A1 P	01		563.4	2.5	1.8	1.8	148	40	40	8	260	40
T	02		563.9	.9	.64	.64	138	40	40	5	260	40
A2 P	03		564.2	1.0	.72	.72	148	42	42	5	250	42
T	04		564.6	.68	.48	.48	135	42	42	4	250	42
A3 P	05		564.8	.3	.2	.2	145	44	44	4	270	42
T	06		565.1	.3	.2	.2	138	44	44	4	270	42
A4 P	07		565.3	.2	.14	.14	149	45	45	3	275	43
T	08		565.5	.15	.1	.1	141	45	45	3	275	43
				Change ports								
B1 P	09	0910	566.2	3.0	2.2	2.2	150	48	48	10	270	45
T	10		566.22	1.5	1.1	1.1	138	48	48	7	270	45
B2 P	11	1000	567.3	1.8	1.3	1.3	149	55	55	7	260	48
T	12		567.7	.8	.56	.56	135	55	55	5	260	48
B3 P	13		568.0	.75	.53	.53	153	57	57	5	275	49
T	14		568.3	.35	.24	.24	144	57	57	4	275	49
B4 P	15		568.4	.15	.1	.1	150	59	59	3	275	50
T	16		568.6	.15	.1	.1	143	59	59	3	275	50
				Change ports								
C1 P	17		569.3	2.8	2.0	2.0	150	59	59	10	275	50
T	18		569.8	1.2	.86	.86	140	59	59	6	275	50

PLANT Beth. St. DATE 3/9/79 RUN NUMBER C-3

TRAVERSE POINT NUMBER	SAMPLING TIME min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m) ft^3	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s) °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	18	569.8									
C2 P	19	570.3	1.3	.93	.93	155	59	59	6	280	50
T	20	570.5	.3	.21	.21	143	59	59	4	280	50
C3 P	21	570.8	.5	.35	.35	152	59	59	5	290	53
T	22	571.0	.2	.14	.14	145	59	59	4	290	53
C4 P	23	571.3	.44	.31	.31	151	60	60	3	275	53
T	24	571.5	.15	.1	.1	141	60	60	3	275	53
			Change	points							
D1 P	25	572.0	2.5	1.8	1.8	148	60	60	7	290	54
T	26	572.5	.9	.62	.62	142	60	60	5	290	54
D2 P	27	572.9	1.2	.88	.88	150	63	63	6	280	56
T	28	573.3	.5	.35	.35	140	64	64	4	280	56
D3 P	29	573.5	.58	.39	.39	152	65	65	4	270	58
T	30	573.8	.25	.17	.17	145	65	65	4	270	58
D4 P	31	574.0	.25	.1	.1	145	65	65	4	280	60
T	32	574.198	.15	.1	.1	139	65	65	3	280	60
		END	leak rate			0.00	8 c/m				
		Purge									
	initial	574.3									
	stop	589.5									

CALIBRATION DATA

APPENDIX B

STAKSAMPLER CALIBRATION SHEET

Man Orifice	CF w	CF d	T W	IT d	OT d	Td Avg.	Time
0.5	5	5.006	68.5	78.50	73.50	77.00	13.561
1.0	5	4.993	68.5	77.75	73.50	76.625	9.07
2.0	10	9.956	69.0	74.50	68.75	71.625	13.25
4.0	10						
6.0	10						
8.0	10						

Date 2/26/77 Box No. 7 Inspector [illegible]

Pump OK Oil OK Wick OK Pump Serial No. 0574

Manometers OK Knobs OK Oil OK Tubing OK

Quick Connects OK Vacuum Gage OK Valves OK

Dry Gas Meter OK Volume ____ ft³ Serial No. 673625

Thermometers OK In 67 °F Out 67 °F Ambient 68 °F

Amphenol OK Lights OK Switches OK Variac OK

Leak Check - Max. Vacuum 24 in. Hg Leak Rate .015 CFM

Remarks 1 KNOB MISSING

Pb 29.674

Tolerances:

Y = 0.99 - 1.00 - 1.01

ΔH@ = 1.6 - 1.84 - 2.1

$0.0317\ (\text{Man. orifice})\ (T_w + 460)^t$ / $P_b\ (OT_d + 460)\ CF_w$	Man.	$\Delta H_@$	$CF_w\ P_b\ (T_d\ \text{avg.} + 460)$ / Man. orifice $CF_d\ (P_b + 13.6\ (T_w + 460)$	Man.	Y
0.01585 (68.5 + 460) 13.561² / 29.67 (755 + 460) 5	.5	2.04	5.00 X 29.67 (537 + 460) / 5.006 (29.67 + 0.0368) (68.5 + 460)	.5	1.01
0.0317 (68.5 + 460) 9.07² / 29.67 (73.50 + 460) 5	1.0	1.84	5.00 X 29.67 (76.625 + 460) / 4.993 (29.67 + 0.0737) (68.5 + 460)	1.0	1.01
0.0634 (69 + 460) 13.25² / 29.67 (68.75 + 460) 10	2.0	2.1	10.00 X 29.67 (71.625 + 460) / 9.956 (29.67 + 0.147) (69 + 460)	2.0	1.00

PITOT CALIBRATION

Pitot No. 6-4 Date 2/23/79 Engineer MAC

Range	Run No.	ΔP_{std}	A SIDE ΔP	A SIDE C_p	A SIDE DEV.	B SIDE ΔP	B SIDE C_p	B SIDE DEV.	DIF.
1	1	.04	.06	.707	.033	.06	.708	.033	
	2	.045	.06	.857	.016	.06	.857	.016	
	3	.045	.06	.857	.016	.06	.857	.016	
	AVG.			.841			.841		0
2	1	.21	.30	.828	0	.30	.828	0	
	2	.21	.30	.828	0	.30	.828	0	
	3	.21	.30	.828	0	.30	.828	0	
	AVG.			.828			.828		0
3	1	.44	.65	.814	0	.65	.814	0	
	2	.44	.65	.814	0	.65	.814	0	
	3	.44	.65	.814	0	.65	.814	0	
	AVG.			.814			.814		0
4	1	.59	.87	.815	0	.88	.811	.003	
	2	.59	.87	.815	0	.87	.815	.001	
	3	.59	.87	.815	0	.87	.815	.001	
	AVG.			.815			.814		.001
5	1	.78	1.2	.793	.006	1.2	.793	.006	
	2	.78	1.2	.799	.006	1.15	.815	.001	
	3	.78	1.15	.815	.011	1.2	.799	.006	
	AVG.			.804			.804		0
6	1	1.0	1.5	.808	0	1.5	.808	0	
	2	1.0	1.5	.808	0	1.5	.808	0	
	3	1.0	1.5	.808	0	1.5	.808	0	
	AVG.			.808			.808		0
7	1	1.1	1.7	.796	0	1.7	.796	0	
	2	1.1	1.7	.796	0	1.7	.796	0	
	3	1.1	1.7	.796	0	1.7	.796	0	
	AVG.			.796			.796		0

$$C_p = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{-S-}}}$$

DEV. $= |C_p - \overline{C_p}|$

DEV. ≤ 0.01

DIF. $= |\overline{C_{p(A)}} - \overline{C_{p(B)}}|$

DIF. ≤ 0.01

PITOT CALIBRATION

Pitot No. [illegible]-1 Date [illegible] Engineer [illegible]

Range	Run No.	ΔP_{std}	A SIDE ΔP	A SIDE C_p	A SIDE DEV.	B SIDE ΔP	B SIDE C_p	B SIDE DEV.	DIF.
1	1								
	2								
	3								
	AVG.								
2	1								
	2								
	3								
	AVG.								
3	1	.47	.72	.948	.002	.75	.936	-.004	
	2	.47	.75	.946	.002	.74	.942	.002	
	3	.47	.74	.942	-.004	.74	.942	.002	
	AVG.			.946			.940		.006
4	1	.77	.99	.873	-.007	1.[illegible]	.879	-.003	
	2	.78	.98	.883	.003	1.0	.874	.002	
	3	.78	.98	.883	.003	1.0	.874	.002	
	AVG.			.880			.872		.008
5	1	.9	1.45	.780	.001	1.50	.767	.001	
	2	.95	1.45	.771	-.001	1.5	.765	-.001	
	3	.9	1.45	.780	.001	1.5	.767	.001	
	AVG.			.779			.766		.013
6	1								
	2								
	3								
	AVG.								
7	1								
	2								
	3								
	AVG.								

$$C_p = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{-S-}}}$$

DEV. = $C_p - \overline{C_p}$

DEV. ≤ 0.01

DIF. = $\overline{C_{p(A)}} - \overline{C_{p(B)}}$

DIF. ≤ 0.01

NOZZLE DIAMETER CALIBRATION SHEET

PRE-TEST

Set No. 7 Date 12/7/78 Inspector [illegible]

Nominal Size	Micrometer Readings 1	2	3	Ave.	Comments
0.125	.120	.121	.121	.121	
0.1875	.190	.189	.191	.190	
0.250	.255	.257	.255	.256	
0.3125	.310	.308	.308	.309	
0.375	.371	.373	.374	.373	
0.500	.495	.494	.495	.495	
Special *	.175	.175	.175	.175	

* Special nozzle calibrated 2/26/79

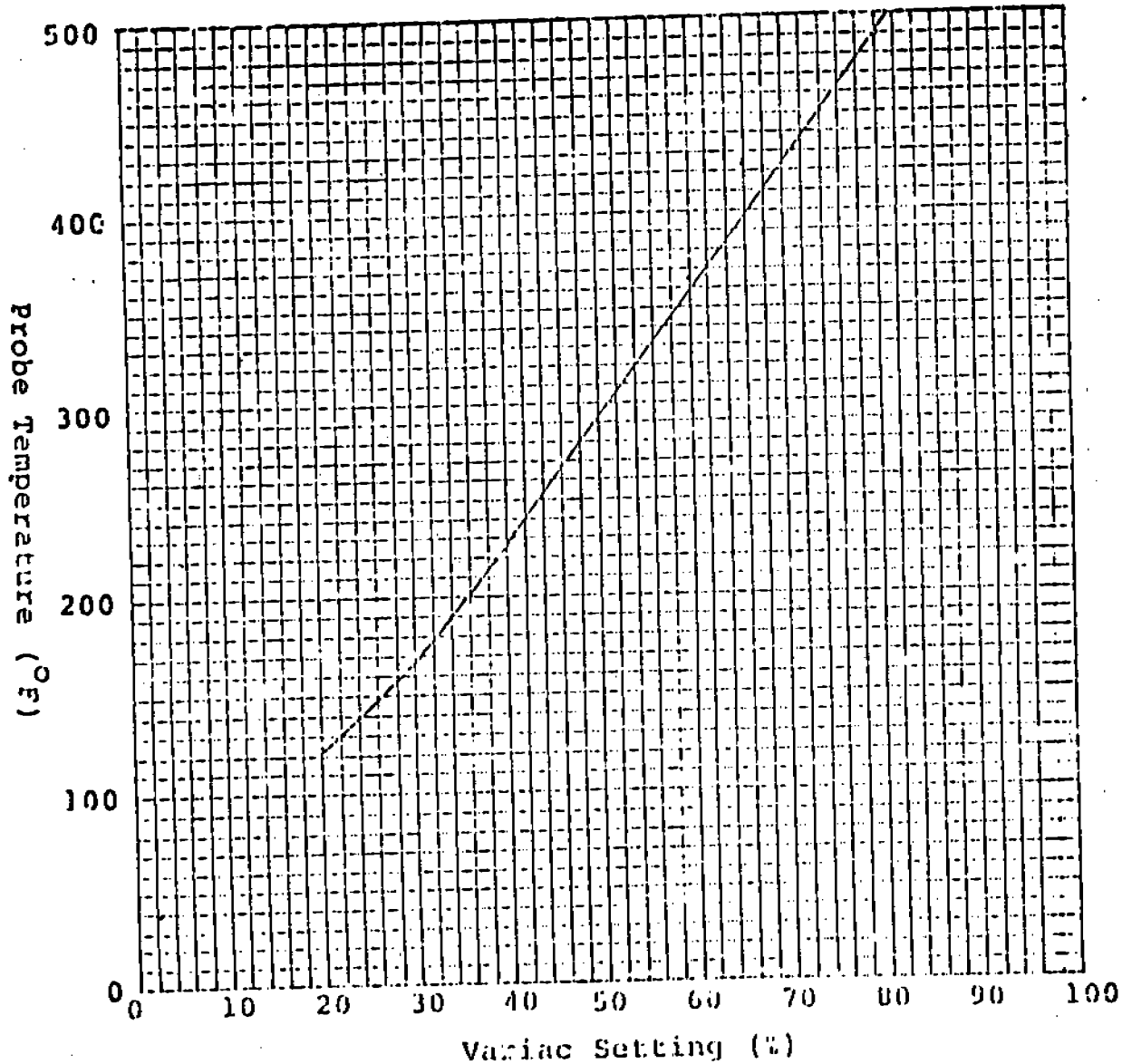
POST-TEST

Set No. 7 Date 3/12/79 Inspector PJF

Nominal Size	Micrometer Readings 1	2	3	Ave.	Comments
0.125					
0.1875					
0.250					
0.3125					
0.375					
0.500					
Special *	.175	.175	.175	.175	

PROBE CALIBRATION

Probe No. 6-2 Date [illegible] Inspector [illegible]



Flow at 0.75 CFM
(Meter box at H_2O)

15 minutes warm up
at each variac setting

Temperature read at
outlet of probe

DO NOT LET TEMPERATURE
GO ABOVE 500°F

Variac (%)	Temp. (°F)
20	122
40	222
60	366
80	490
100	—

COMMONWEALTH OF PENNSYLVANIA

March 27, 1979

CA-501 12-67

SUBJECT: Bethlehem Steel Corporation
Coke Oven Battery 5
Bethlehem Plant

File #48-501-00002 (Battery 5)

Thru: Thomas A. DiLazaro
District Supervisor
Bethlehem Office

TAD

TO:

FROM: Ronald D. Mordosky RDM
Air Quality Specialist
Bethlehem Office

On March 8 and 9, 1979, the writer was present during stack tests which were conducted by a team from Betz Converse Murdoch, Inc., on the HOOD OF the Chemico one spot car serving Coke Oven Battery 5.

Mr. Robert Alpago, Pollution Control Engineer, was the company official contacted. For each test a total of 16 pushes were sampled. On both days the Battery was producing 20 hour coke (32 ovens pushed per shift).

On March 8, 1979, 11 pushes were observed during the test (test pushes 6 to 16) and four pushes were observed after the test was over. On March 8, 1979, there were 36 seconds of fugitive emissions equal to or greater than 20% opacity during 15 pushes for an average of 2.4 seconds of emissions per push. Company officials stated that due to valve problems, the car was not operating properly. It was determined that full exhaust volume was not achieved until 14 seconds after the start of the push cycle. A delay of 5 seconds is normal. The valves on the car will be adjusted before the test on March 9, 1979.

On March 9, 1979, a total of 16 pushes were observed. Thirteen of the 16 pushes were sampled (test pushes 4 to 16). The other three pushes were not sampled. For the 16 pushes there were a total of 35 seconds of fugitive emissions equal to or greater than 20% opacity for an average of 2.2 seconds per push.

On March 8, 1979, five out of 15 pushes had no fugitive emissions equal to or greater than 20% opacity while on March 9, 1979, eight out of 16 pushes had no pushes equal to or greater than 20% opacity.

Over-all performance is as follows: During 31 pushes there were total of 71 seconds of emissions equal to or greater than 20% opacity for average time of emissions per push of 2.3 seconds. Of this 2.3 seconds o emissions, 1.5 seconds is pushing emissions and 0.8 seconds is transport emissions. It should be noted that the transport emissions may not be representative due to the testing because the one spot car had to stop a each push to let off the test crew prior to entering the quench tower. should also be noted that 13 of the 31 pushes observed (42%) did not hav fugitive emissions in excess of 20% opacity.

No further follow-ups are planned.

WE
CLOUD COVE
PERATURE
ND SPEED
RECTION
VISIBIL

ENVIROTECH

CHEMICO AIR POLLUTION CONTROL

BSC, BETH

I.C
CR

To: Distribution

Date: May 22, 1979

☐ Action required

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From: S. Sawyer

Subject: Performance Tests for Particulate - [redacted] HQS [redacted]-W

The performance tests for outlet particulate on the HQS at [redacted] were run on March 6-9. The results of the tests and additional chemical analyses of the samples taken are summarized below:

1. The front half particulate loading values were 0.0423, 0.0295 and 0.0319 gr/SCFD, averaging 0.0346 gr/SCFD.

2. The insoluble back half was zero. Thus, BSC performance as far as Pennsylvania DER is concerned is 0.0346 gr/SCFD, which meets the consent decree requirement of 0.04 gr/SCFD.

3. Significant acid mist was collected in the front half of the sampling train. The values after sulfate correction were 0.0364, 0.0164 and 0.0160 gr/SCFD, which average 0.0229 gr/SCFD. Further front half analyses could not be run, but on future samples additional analyses would be desirable such as for sodium, ammonia, chloride and water.

4. The back half organic particulate was low and appeared not to contain any stop cock grease as previoulsy experienced. The loadings were 0.0070, 0.0009 and 0.0072 gr/SCFD averaging 0.005 gr/SCFD. The organics were identified as sulfonated compounds, organic acid and cyclohexane sulfate. The samples were too small for more specific identification.

The amount of water present in the water soluble portion of the backhalf samples No. C2 and C3 was determined by knowing the amount of sodium added to the sample before the sulfate determination and the amount of residue remaining after the evaporation of that sample.

Steve, I feel we have acquired a better knowledge of the properties of the samples and possibly with better precautions, this "unknown" value can be significantly reduced. If there are any further questions concerning these analyses, please feel free to contact me.

Very truly yours,

Peter R Charrington

Peter R. Charrington, P.E.
Section Manager

PRC/rw
cc: P. J. Ford
R. K. Rathmell
Enclosure

Betz·Converse·Murdoch·Inc.

PARTICULATE LABORATORY RESULTS

FRONT HALF (mg)

Run No.	Filter		P+C Wash (Water Wash)		P+C (Acetone Wash)		Total Sample	
	SO_4	Total	SO_4	Total	SO_4	Total	SO_4	Total
C-1	2.2	2.6	2.4	5.5	0.0	26.12	4.6	34.22
C-2	1.8	3.3	4.8	8.23	3.9	12.17	10.5	23.7
C-3	1.2	5.3	4.5	9.85	6.6	9.52	12.3	24.67

PARTICULATE LABORATORY RESULTS*

BACK HALF (mg)

Run No.	Total Water Insoluble	Organic Water Soluble	Sulfate Water Soluble	Na,K,Li,Boron Water Soluble				Water Water Soluble	Unknown Water Soluble	Total Water Soluble
				Na	K	Li	Boron			
C-1	0.0	5.68	28.8	-	-	-	-	-	-	25.01
C-2	0.0	0.74	43.78	4.77	.69	.01	.02	11.5	13.06	74.57
C-3	0.0	5.60	65.6	2.34	.06	.01	.02	17.6	4.76	95.59

*All results blank corrected.

CA-501 12-67

COMMONWEALTH OF PENNSYLVANIA

March 27, 1979

SUBJECT: Bethlehem Steel Corporation
Coke Oven Battery 5
Bethlehem Plant

TO: File #48-501-00002 (Battery 5)

Thru: Thomas A. DiLazaro
District Supervisor
Bethlehem Office

FROM: Ronald D. Mordosky
Air Quality Specialist
Bethlehem Office

On March 8 and 9, 1979, the writer was present during stack tests which were conducted by a team from Betz Converse Murdoch, Inc., on the the Chemico one spot car serving Coke Oven Battery 5.

Mr. Robert Alpago, Pollution Control Engineer, was the company official contacted. For each test a total of 16 pushes were sampled. On both days the Battery was producing 20 hour coke (32 ovens pushed per shift).

On March 8, 1979, 11 pushes were observed during the test (test pushes 6 to 16) and four pushes were observed after the test was over. On March 8, 1979, there were 36 seconds of fugitive emissions equal to or greater than 20% opacity during 15 pushes for an average of 2.4 seconds of emissions per push. Company officials stated that due to valve problems, the car was not operating properly. It was determined that full exhaust volume was not achieved until 14 seconds after the start of the push cycle. A delay of 5 seconds is normal. The valves on the car will be adjusted before the test on March 9, 1979.

On March 9, 1979, a total of 16 pushes were observed. Thirteen of the 16 pushes were sampled (test pushes 4 to 16). The other three pushes were not sampled. For the 16 pushes there were a total of 35 seconds of fugitive emissions equal to or greater than 20% opacity for an average of 2.2 seconds per push.

On March 8, 1979, five out of 15 pushes had no fugitive emissions equal to or greater than 20% opacity while on March 9, 1979, eight out of 16 pushes had no pushes equal to or greater than 20% opacity.

Over-all performance is as follows: During 31 pushes there were a total of 71 seconds of emissions equal to or greater than 20% opacity for an average time of emissions per push of 2.3 seconds. Of this 2.3 seconds of emissions, 1.5 seconds is pushing emissions and 0.8 seconds is transport emissions. It should be noted that the transport emissions may not be representative due to the testing because the one spot car had to stop after each push to let off the test crew prior to entering the quench tower. It should also be noted that 13 of the 31 pushes observed (42%) did not have fugitive emissions in excess of 20% opacity.

No further follow-ups are planned.

Bethlehem Steel Corporation

Bethle

ERY: Batter - One Spot Car

DATE: 03/08/79

R. Mordosky

OVEN NO.	TIME START	TIME ≥ 20% min.		PEAK OPACITY
4	9:20	0.03-P	0.01-T	25
14	9:35	0.03-P	0.00-T	60 *
24	9:47	0.01-P	0.00-T	35
34	10:02	0.00-P	0.00-T	
44	10:35	0.01-P	0.00-T	20
54	10:48	0.00-P	0.00-T	
64	11:03	0.01-P	0.00-T	20
74	11:21	0.00-P	0.00-T	
9	11:40	0.11-P	0.00-T	75 Δ
19	11:54	0.01-P	0.00-T	60
29	12:04	0.00-P	0.00-T	

WEATHER CONDITIONS

CLOUD COVER 40

MPERATURE 35-45

ND SPEED 10-20 mph

RECTION Northwest

VISIBLE YES X NO ____ OCC. ____

TIME START: 8:50 a.m.

TIME END: 12:10 p.m.

ACCUMULATED
TIME ≥ 20% OPACITY
PUSHING 21 & TRANSPORT 1 = TOTAL 22

COMMENTS

* Malfunction of bypass valve caused reduced flow to jet nozzles.

Δ Green Push

Stack Test #2 - One Spot Car
P - Pushing Emissions
T - Transport Emissions

Bethlehem Steel Corporation

Bethlehem

TTERY: No. 5 - One Spot Car

DATE: 03/08/79

OBSERVER: R. Mordosky

OVEN NO.	TIME START	TIME ≥ 20% ____ min. ____ sec.	PEAK OPACITY
21	1:50	0.00-P 0.02-T	25
31	2:00	0.00-P 0.00-T	
41	2:10	0.05-P 0.00-T	70 *
51	2:30	0.02-P 0.05-T	40

WEATHER CONDITIONS

LOUD COVER 40

PERATURE 50

D SPEED 10-20 mph

ECTION Northwest

VISIBLE YES X NO ____ OCC. ____

TIME START: 1:50 p.m.

TIME END: 2:30 p.m.

ACCUMULATED TIME ≥ 20% OPACITY

PUSHING 7 + TRANSPORT 7 = TOTAL 14

COMMENTS

* Green Push
P - Pushing Emissions
T - Transport Emissions

Bethlehem Steel Corporation

Bethlehe

TERY: #5

DATE: 03/09/79

OBSERVER: R. Nordosky

OVEN NO.	TIME START	TIME ≥ 20% ____ min. ____ sec.	PEAK OPACITY
) 49	8:38	0.00-P 0.00-T	
59	8:55	0.01-P 0.00-T	25
) 69	9:07	0.00-P 0.00-T	
79	9:20	0.00-P 0.00-T	
) 11	10:03	0.01-P 0.00-T	20
) 21	10:14	0.00-P 0.02-T	20
) 31	10:27	0.00-P 0.00-T	
) 41	10:42	0.00-P 0.00-T	
) 51	10:53	0.06-P 0.03-T	70 Δ
) 61	11:07	0.04-P 0.02-T	50
) 71	11:20	0.00-P 0.00-T	
) 6	11:34	0.02-P 0.10-T	65
) 16	11:47	0.00-p 0.00-T	
) 26	12:00	0.02-P 0.00-T	25
) 36	12:14	0.00-P 0.00-T	
46	12:28	0.02-P 0.00-T	30

WEATHER CONDITIONS

LOUD COVER 0

PERATURE 35-45

D SPEED 0-10 mph

ECTION North

VISIBLE YES X NO ____ OCC. ____

TIME START: 8:38 a.m.

TIME END: 12:28 p.m.

ACCUMULATED
TIME ≥ 20% OPACITY

PUSHING 18 & TRANSPORT 17 = TOTAL 35

COMMENTS

No. 5 Battery One Spot Car Test #3

Δ - Green Push
P - Pushing Emissions
T - Transport Emissions

Dept. of Environmental Resources

July 2, 1979

St . . Test Review
Bethlehem Steel Corporation
Bethlehem, PA
No. 5 Battery Pushing Emission System

Lab File 23.0777

Thru: Chief, Source Testing and Monitoring Section

Richard St. Louis
Air Pollution Control Engineer
Division of Technical Services and Monitoring
Bureau of Air Quality Control

The three stack tests performed on the Chemico-Envirotech Quench car are acceptable to the Department. The tests were performed according to a pre-approved test procedure. The results appear to be valid and the calculations are correct.

The following results were extracted from the test report:

Run No.	C-1	C-2	C-3
Concentration gr/dscf	0.0423	0.0295	0.0319
Volumetric Flow Rate SCFMD	75,861	74,830	72,642
*Averaged Emission Rate	2.94 lb. per hour		
Allowable Emission Rate	3.77 lb. per hour		

*Includes front half particulate plus back half insoluble particulate. If soluble back half particulate is added, the resultant average emission rate is 9.58 lb. per hour.

RSL:tkn

cc: Jack McGrogan, RAPCE, Reading
48-305-009
Bethlehem Office ✓