AP42 Section:	12.2
Reference:	90
Title:	Emission Evaluation of Pusher Coke Oven Baghouse for Keystone Coke Company, Conshohocken, Pennsylvania, Betz, Converse, Murdoch, Inc., Plymouth Meeting, Pennsylvania, February 1980.

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 90

EMISSION EVALUATION
OF THE
PUSHER COKE OVEN BAGHOUSE

FOR

KEYSTONE COKE COMPANY
RIVER ROAD
CONSHOHOCKEN, PENNSYLVANIA

Only 1 test run
Do Not Use
SJS

FEBRUARY 1980

BCM PROJECT NO. 00-4989-10

PREPARED BY

JAMES F. ANTONIK
SCIENTIST I

APPROVED BY

PETER R. CHARRINGTON, P.E.
ASSISTANT VICE PRESIDENT

BETZ•CONVERSE•MURDOCH•INC
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

REPORT

Keystone Coke Company
Conshohocken, Pennsylvania

Emission Evaluation of the Pusher Coke Oven Baghouse

1/15/81

BCM Betz • Converse • Murdoch • Inc.
Consulting Engineers, Planners and Computer Scientists

CONTENTS

1.0 INTRODUCTION

Keystone Coke Company retained Betz·Converse·Murdoch·Inc. (BCM) to conduct an emission evaluation of its new pusher coke oven baghouse at their Conshohocken facility. On January 15, 1981, BCM conducted a particulate emission survey. During this survey, BCM collected emissions from 16 coke oven pushes.

The results of the testing program indicate that the pusher coke oven baghouse stack emission rate complies with Pennsylvania Department of Environmental Resources (DER) air pollution regulations. The emission rate was 0.155 lbs/push, which is 9% of the allowable 1.71 lbs/push based on 0.02 grains/DSCF.

2.0 SCOPE AND OBJECTIVES

The scope of the project was defined in BCM Proposal No. 18-8328-41 (see Appendix 1). The objective of the sampling was to determine the following parameters:

- Gas flow - ACFM and SCFM
- Gas temperature - °F
- Moisture - % by volume
- Particulate loading - G/DSCF and lbs/hr
- Combustion gas analysis - % by volume CO_2, O_2, CO, and N_2 (by difference)

3.0 PROCEDURES

3.1 Field Work

The field testing was conducted on January 15, 1981. The sampling team consisted of the following personnel:

Geoff Rogalsky - Engineer I
James Antonik - Scientist I
Ed Blanar - Engineer I

Mr. William Hitchcock, Keystone Coke, acted as liaison between BCM and Keystone Coke and ensured that the processes were operating normally during the test period. Mr. Tom McGinley from the DER witnessed the testing program.

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

1. Sampling and traverse locations were determined in accordance with Method One of the Federal Register, Volume 42, Number 160, August 18, 1977 (see Appendix 2).

2. Gas flow, gas temperature and static pressure measurements were made in accordance with Method Two of the Federal Register, Volume 42, Number 160, August 18, 1977 (see Appendix 2).

3. Particulate sampling was conducted in accordance with Method Five of the Federal Register, Volume 42, Number 160, August 18, 1977 (see Appendix 2).

4. A Fisher-type B No. 10-605 Orsat gas analyzer was used to determine the molecular weight of the flue gas. The following parameters were measured to calculate the molecular weight of the dry flue gas: volume percent carbon dioxide, oxygen, and carbon monoxide. The volume percent nitrogen was determined by difference. The specific procedure is outlined in Appendix 2.

5. Moisture content sampling was conducted in accordance with Method Four of the Federal Register, Volume 42, Number 160, August 18, 1977; the methodology is outlined in Appendix 2.

3.2 Equipment Calibration

In accordance with the accepted procedures published by the U.S. Environmental Protection Agency (EPA), all gas velocity measuring equipment, volume metering equipment, temperature measuring equipment, and flow rate metering equipment had been calibrated within 60 days of the actual test date. Calibration data are included in Appendix 4.

3.3 Analytical Methods

All samples generated during the sampling program were returned to the BCM Laboratory, Norristown, Pennsylvania for analyses. Laboratory data are reported in Appendix 3.

3.4 Calculations

All particulate concentrations, moisture content, gas flow, and molecular weight calculations were performed using a computer. Raw data generated from the field sampling program and the results of the laboratory analyses

were introduced into equations presented in Methods Two, Three, Four, and Five of the Federal Register, Volume 42, Number 160, August 18, 1977. Computer input and all other data appear in Appendix 3.

4.0 SUMMARY OF RESULTS

The parameters evaluated by the DER method are contained in Appendix 3. Pertinent test results compared to applicable standards are listed below.

Run Number	Emission Concentration (lbs/push)	Allowable Emission Rate* (lbs/push)
1	0.155	1.71

• Based on Pennyslvania DER Regulations, Chapter 123.13 (b)(1)(ii)

5.0 DISCUSSION OF RESULTS

5.1 General

The testing program at Keystone Coke Company was comprised of one particulate test on the pusher coke oven baghouse exhaust stack.

5.2 Particulate Testing

The particulate emission value was 0.155 lbs/push. This value is well below the allowable limit of 1.71 lbs/push as calculated using current DER regulations. The above allowable limit is based on 0.02 grains/DSCF. The methodology used to calculate the allowable limits appears in Appendix 5.

APPENDIX 1

BCM PROPOSAL

Betz • Converse • Murdoch • Inc.

PROPOSAL

TO

KEYSTONE COKE COMPANY
RIVER ROAD
CONSHOHOCKEN, PA 19428

FOR

SOURCE SAMPLING PROGRAM
COKE OVEN PUSHING EMISSION CONTROL SYSTEM

BCM PROPOSAL NO. 18-8328-41

APRIL 17, 1980

PREPARED BY:

PETER R. CHARRINGTON, P.E.
ASSISTANT VICE PRESIDENT, AIR QUALITY

BETZ•CONVERSE•MURDOCH•INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

TECHNICAL PROJECT SCOPE

GENERAL

Keystone Coke Company will start-up a coke oven pushing emission control facility at its Conshohocken, Pennsylvania facility during September 1980. A PA DER particulate testing program is required to determine compliance with the current state air quality regulations. This proposal presents Betz•Converse•Murdoch•Inc.'s (BCM) approach to fulfilling Keystone's request.

SCOPE OF WORK

Our proposed scope of work has been divided into the following steps:

1.0 Project Planning

The BCM Manager of the Air Quality Section or the field engineer will contact Keystone personnel two weeks before sampling begins to accomplish the following:

- Establish lines of communication
- Discuss the project scope and objectives to ensure that Keystone and BCM are in agreement
- Ensure that sampling requirements have been or will be completed by the scheduled testing date (refer to section on Client Responsibility)

2.0 Field Testing Program

BCM will provide two men for three days to complete the particulate sampling of the outlet from the baghouse system. Testing methodologies will be as outlined in Chapter 139 of the Pennsylvania DER air quality regulations. Three particulate runs will be performed. The following minimum data will be available for each 1-1/2 hour run:

- Gas Flow - ACFM & SCFM
- Gas Temperature - °F
- Moisture - % by Volume
- Particulate Concentration - G/DSCF & Lbs/Hr
- Combustion Gas Analysis - % by Volume, CO_2, O_2, CO and N_2

The length of the testing program is based on the requirements set for Bethlehem Steel, Bethlehem, PA for their 1979 pushing emission control system testing. Each test run will include sixteen ovens (approximately 2 minutes per oven). If DER decides to change the requirements, BCM will adjust the cost accordingly.

3.0 Data Evaluation and Report Preparation

BCM personnel will review all testing data and will incorporate into their written report all pertinent operating data supplied by Keystone. The report will include, but will not be limited to, the following:

- Description of work undertaken
- Discussion of the sampling and analytical techniques employed
- Tabulation of all field and laboratory data
- All calibration sheets for each item used in the program
- All operational data for each system

Keystone will receive five copies of the report.

BUSINESS SCOPE

COMPENSATION

We propose that the outlined project scope be performed on a Lump Sum basis. This fee is firm and cannot be changed unless it is mutually agreed that the scope of the work has changed from what is outlined in this proposal.

LUMP SUM. . . .

Each additional hour (as per Delay/Overtime paragraph below) will be billed for the 2-man crew.

INVOICES

Invoices will be submitted monthly for work completed, with terms net thirty (30) days with past-due balances subject to interest at the rate of one and one-quarter percent (1-1/4%) per month, effective forty-five (45) days after date of invoice. This represents an annual interest charge of fifteen percent (15%).

WORK SCHEDULE

Work on this project can be started within 14 calendar days of your authorization to proceed and can be completed within 30 days thereafter. This schedule is our best estimate based on our anticipated laboratory and engineering workload. At the time of your authorization to proceed, it may be possible to improve this schedule if necessary. On the other hand, an unexpected increase in our laboratory and engineering workload may cause a few days' delay in starting the project.

DELAYS/OVERTIME

Delays caused by conditions beyond BCM's control, such as partial or complete process shutdowns or irregularities, strikes, floods or fires which delay the project's completion, constitute a Change-of-Scope. Also, unfavorable weather conditions which BCM's Field Project Engineer considers a threat to crew safety and/or sample quality, constitute a Change-of-Scope and will be charged at the delay/overtime rate. In addition, the field work is based on a 10-hour day (excluding travel). Any hours necessary for the successful completion of the project in excess of 10 per day will be charged at the delay/overtime rate described in the compensation section. Any expenses incurred as a result of project delays/overtime will be billed at cost plus 10%. The BCM Field Project Engineer will notify you of such Changes of Scope. At your request, BCM will outline the type of shelter, as required, to minimize weather delays.

VALIDITY

This proposal is valid for 60 days. Subsequent to that date, BCM may review the basis of payment to allow for changing costs and adjust starting and completion dates to conform to our workload.

INSURANCE

BCM will maintain insurance coverage in the following amounts and, upon request of the client, will provide a Certificate of Insurance so indicating:

Type of Policy	Limits of Liability
(a) Standard Worker's Compensation & Employer's Liability	Statutory
(b) General Liability Bodily Injury	$500,000 Each Occurrence and Aggregate
Property Damage	$500,000 Each Occurrence and Aggregate
(c) Automobile Liability Combined Single Limit (Bodily Injury & Property Damage)	$1,000,000 Each Occurrence

SAFETY

BCM personnel always endeavor to conduct field activities in such a manner as to protect themselves and others from accidents and injury. When special safety equipment is required, the client should so specify. BCM personnel use their own safety equipment (hard hats, goggles) unless otherwise instructed.

PROJECT MANAGEMENT

BCM will assign key personnel to the project who are experienced in conducting similar studies. Their duties are briefly described below.

Project Manager

Mr. Doug Mueller, Project Scientist - Air Quality, is responsible for all field testing activities involving the Air Quality Section. Mr. Mueller will be the primary plant contact.

Field Project Engineer

Mr. Geoff Rogalsky has experience in both source and ambient industrial plant surveys. Mr. Rogalsky will be in charge of the survey team and will coordinate all field activities.

Assistant project engineers and technicians will be assigned as needed for the survey.

CLIENT RESPONSIBILITY

To ensure that the proposed project is completed successfully, it will be the responsibility of Keystone to provide the following:

1. Plant liaison for the BCM field team for the duration of the program
2. Safe access to all sampling locations and electric power (110 V, 20 amp service) to within 50 feet of each sampling location
3. Operating data for source tested
4. Access to the ducts and/or stacks

APPENDIX 2

FIELD SAMPLING PROGRAM

APPENDIX 2

FIELD SAMPLING PROGRAM

1.0 SAMPLING PROCEDURES

1.1 Test Station and Traverse Locations - Particulate Testing

The locations of the sampling stations and traverse points are critical to the performance of the project. An explanation of the sampling points used during the project follows.

The internal diameter of the pusher coke oven baghouse exhaust stack was 88 inches. Two test ports were located 90 degrees apart for optimum sampling. Sixteen traverse points were selected (eight per port) to account for each of the 16 coke oven pushes.

1.2 Gas Flow and Gas Temperature Determinations

The gas flow rate and temperature profile were measured at each location by conducting a simultaneous velocity and temperature traverse. Gas velocity heads were measured with a calibrated "S"-type pitot tube which was connected to an inclined manometer. A Chromel-Alumel thermocouple connected to a potentiometer was used to determine the gas temperature.

1.3 Cyclonic Flow Determinations

A check for the presence of cyclonic flow in the outlet stack of the baghouse was performed using an "S"-type pitot, an inclined portable manometer, and a precision protractor. The direction parallel to the duct walls was assigned a reference value of zero and the deviation of the stack gas flow, in ± degrees from zero, was recorded for each traverse point. The absolute values of these angles were then averaged and compared to the maximum allowable deviation of 10 degrees. Field data sheets, which are contained in this appendix, indicate an acceptable cyclonic flow for this source.

1.4 Moisture Content

Sampling was conducted employing the principles presented in EPA Method Four, and concurrently with particulate sampling. The parameters evaluated to determine the gas stream's moisture content were: sample gas volume, sample gas temperature, sample gas pressure, impinger moisture gain, and silica gel moisture gain. Some minor modifications were made

to the Method Four train to allow for the concurrent sampling of particulate and moisture content. These modifications did not deviate from sampling principles.

Such modifications as the substitution of a glass fiber filter for Pyrex wool as a filtering medium, and the substitution of a calibrated orifice for a rotameter as a flow metering device, were incorporated.

1.5 Particulate Sampling

The sampling procedures and sampling equipment employed were those outlined in Method Five of the Federal Register, Volume 42, Number 160, August 18, 1977. This methodology also complied with the Pennsylvania DER testing regulations.

The size of the nozzle required to maintain isokinetic sampling was calculated from the results of the previously completed velocity and temperature traverses. The sampling train used a glass-lined stainless steel probe, heated to 250°F by an internal heating element. A nozzle of the calculated size was attached to the end of the probe which was inserted into the stack. A calibrated "S"-type pitot tube and a Chromel-Alumel thermocouple were clamped to the probe and were used to monitor the velocity head and the temperature at the traverse points during the sampling period. Sampled gas passed through the nozzle and the probe to the glass fiber filter for the removal of the suspended particulates. The filter was housed in a heated chamber whose temperature was maintained at 248°F ±25 degrees. From the filter, the stack gas passed to the impinger train. The first two impingers each contained 150 ml of deionized water. The third impinger contained no reagents and was a knockout impinger. The fourth impinger contained approximately 200 grams of coarse silica gel which collected any moisture and/or vapors which had not been captured in the preceding impingers.

The second impinger was a 500 ml Greenburg-Smith impinger, while the first, third, and fourth were 500 ml impingers of the Greenburg-Smith design, modified by replacing the tip with a 1/2-inch ID glass tube. The impinger train was immersed in an ice bath for the entire test period so that the exit gas temperature would not exceed 68°F.

From the impinger train, the gas was conducted through an umbilical cord to the control console, a Model 2343 RAC Stak Samplr, which contained the following pieces of equipment (listed in the order in which sampled gas passed through them): a main valve, a bypass valve for flow adjustment, an airtight vacuum pump, a dry gas meter, and a calibrated orifice. The orifice was equipped with pressure taps which were connected across the

inclined manometer used to ensure that isokinetic conditions were being maintained. A schematic diagram of the sampling train appears at the end of this appendix.

The sampling train was checked for leaks prior to, and after, each sample run. Leak checks were also performed on the entire system after every port change. The inlet of the nozzle was plugged and the pump vacuum was held at the highest vacuum attained during that period of testing. In all cases, the leakage rate was minimal and did not exceed the maximum allowable leakage rate of 0.02 cfm.

Upon completion of a test, the soiled glass fiber filter was removed from its filter holder and placed in a Petri dish which was subsequently sealed. The glass-lined probe and nozzle were washed internally first with distilled water and then with acetone. The particulate matter remaining in the probe was removed with a nylon brush attached to a polyethylene line. The front half of the glass filter holder was also rinsed with distilled water and acetone. The washings which were obtained were added to those collected from the nozzle and the probe. All distilled water and acetone washings were stored in separate sealed polyethylene sample bottles for transfer to the laboratory. The silica gel used in the fourth impinger was removed and stored in a sealed sample bottle. The contents of the first, second, and third impingers were combined, measured volumetrically, and stored in a sealed sample bottle. A distilled water wash of the impingers was added to this same bottle. A final acetone rinse of impingers was conducted and the washings were stored in a separate sealed sample bottle.

Blanks of the distilled water and acetone were taken to be analyzed for residue at BCM's laboratory in Norristown, Pennsylvania.

1.6 Molecular Weight Determinations

A Fisher-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: volume percent carbon monoxide (CO), volume percent carbon dioxide (CO_2), and volume percent oxygen (O_2); the volume percentage of nitrogen (N_2) was determined by difference. These parameters were measured using the principle of gas absorption in specific absorbing solutions. A 100 ml flue gas sample was drawn from the stack through the glass manifold by the use of the leveling bottle following aspiration of the sampling lines. The system was then closed by adjusting the stopcock at the inlet of the manifold. The sample was bubbled through three absorbing solutions which selectively collected different gaseous components of the flue gas in the following manner: carbon dioxide was collected by a potassium hydroxide solution in the

first absorber, oxygen was collected by a potassium pyrogallate solution in the second absorber, and carbon monoxide was collected by a cupric chloride solution in the third absorber. The volume of a specific gaseous component collected in an individual absorbing solution was determined by the change in volume of sample gas in the sample chamber after the bubbling process through that solution was complete. Because the original sample volume was 100 ml, any change in volume was also the percentage of the specific gaseous component found in the stack gas stream. Temperature effects in the sample chamber were minimized by a water jacket which surrounded it, maintaining the temperature at a constant level throughout the duration of the Orsat analysis.

2.0 FIELD DATA SHEETS

The flue gas velocity head, flue gas temperature, inlet and outlet dry gas meter temperatures, orifice pressure differential, sample volume, sampling time, pump vacuum, filter temperature, and the impinger train outlet gas temperature were recorded during the sampling program. The field data sheets generated during the program follow.

Betz • Converse • Murdoch • Inc.. BCM

NOMOGRAPH DATA

PLANT KEYSTONE COKE

DATE 1-15-81

SAMPLING LOCATION QUENCH SYSTEM

815

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.6
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	50°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2 %
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.99
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in. H_2O)	P_s	30.03
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	50
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.1
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR		825
CALCULATED NOZZLE DIAMETER, in.		
ACTUAL NOZZLE DIAMETER, in.		.188
REFERENCE Δp, in. H_2O		1.55

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TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Keystone Coke
DATE 10/23/80
SAMPLING LOCATION Keystone coke oven baghouse
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE A) 7'7½" 0
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE B) 3½"
STACK I.D., (DISTANCE A - DISTANCE B) 7'4" → 88"
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR C. Ciccione

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.032	88"	2 7/8	3½"	6¼
2	.105		9¼		12¾
3	.194		17 1/8		20 5/8
4	.323		28 3/8		32
5	.677		59 5/8		63¼
6	.806		70 7/8		74 3/8
7	.895		78¾		82¼
8	.968	↓	85 1/8	↓	88 5/8

Betz • Converse • Murdoch • Inc. BCM

VELOCITY DETERMINATIONS

Client: Keystone cdhz. Sample Port Location: 7'7½" - 3½" Nipp = 7'4" I.D. 88"

Location: Fishin cdhz. dryer Baghouse

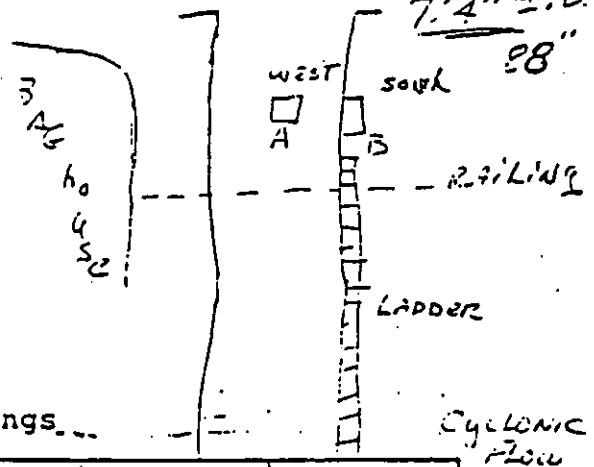
Date: 10/23/80

Stack Pressure: +.71

Barometric Pressure: 30.

Pitot Factor: 9-2 .8

Engineer: EAC/JFA



Pitot/Temperature Readings

Cyclonic Flow Check "A"	Point No.	Distance (Inches) To outside	Port A ΔP	Port A T	Port B ΔP	Port B T	Port__ ΔP	Port__ T	Port__ ΔP	Port__ T	Port__ ΔP	Port__ T	Cyclonic Flow Check "B"
15°	1	6½" Pipe	1.05		1.00								2°
8	2	12¾"	1.00	70	1.00	70							0°
5°	3	20⅝"	1.10		.93								1°
5°	4	32"	1.20		.95								3°
5°	5	63⅛"	1.10		.98								1°
0°	6	74⅜"	.95		.98								1°
0°	7	82¼"	1.00		1.00								4°
10°	8	88⅝"	.97		.98								6°
TOTAL													
AVG.													

Betz • Converse • Murdoch • Inc. BCM

VELOCITY DETERMINATIONS

Client: KEYSTONE COKE

Location: QUENCH SYSTEM

Date: 1-13-81

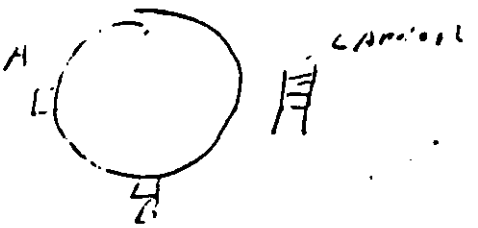
Stack Pressure: .5"

Barometric Pressure: _____

Pitot Factor: _____

Engineer: JFA / GAR

Sample Port Location:



Pitot/Temperature Readings

Point No.	Distance (Inches)	Port A		Port __		Port B		Port __		Port __	
		ΔP	T	ΔP	T	ΔP	T	ΔP	T	ΔP	T
1		1.0	45								
2		1.8	36								
3		1.0	35								
4		.99	35								
5		1.1	35								
6		1.2	35								
7		1.4	35								
8		1.3	35								
TOTAL											
AVG.		1.16									

PLANT KEYSTONE COKE

DATE 1-15-81

SAMPLING LOCATION QUENCH SYSTEM

SAMPLE TYPE PART.

RUN NUMBER 1 OPERATOR JFA

BAROMETRIC PRESSURE 29.95 STATIC PRESSURE +.60

FILTER NUMBER(S)

GEL NUMBER(S)

THIMBLE NUMBER PLATE NUMBER

H_2O PICKUP (ml) Sat.

Pitot tube ID = .641 cm

BCM

FIELD DATA SHEET

ORSAT:

CO_2 0.2

O_2 19.4

N_2 80.4

PYROMETER NUMBER

THERMOCOUPLE NUMBER

PROBE NUMBER TYPE 10' GLASS

NOZZLE NUMBER #6 I.D. .185

METER BOX NUMBER 4 $\Delta H_@$ 1.6

PITOT NUMBER 9- C_p

SAMPLE BOX NUMBER(S)

ASSUMED MOISTURE (%) 7

ASSUMED METER TEMPERATURE 50

C FACTOR .826 REFERENCE Δp 1.51

READ AND RECORD ALL DATA EVERY 4 MINUTES

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		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	0 / 1220	~~687.648~~ ~~687.748~~										
B-1	4 / 1224	691.333	1.2	1.45	1.45	55	35	35	6.0	225	36	PUSH 1
B-2	8 / 1231	693.864	1.3	1.55	1.55	55	42	36	5.0	230	36	PUSH 2
B-3	12 / 1303	696.506	1.3	1.55	1.55	55	40	37	5.0	240	37	PUSH 3
B-4	16 / 1331	698.913	.90	1.05	1.05	55	42	38	4.0	250	38	PUSH 4
B-5	20 / 1400	701.564	1.2	1.45	1.45	55	43	39	5.0	245	38	PUSH 5
B-6	24 / 1410	704.370	1.5	1.8	1.8	50	46	40	6.0	230	39	PUSH 6
B-7	28 / 1433	707.077	1.2	1.45	1.45	53	46	41	5.0	230	37	PUSH 7
B-8	32 / 1445	709.725	1.2	1.45	1.45	60	50	42	6.0	220	38	PUSH 8
		709.725										
		709.775										

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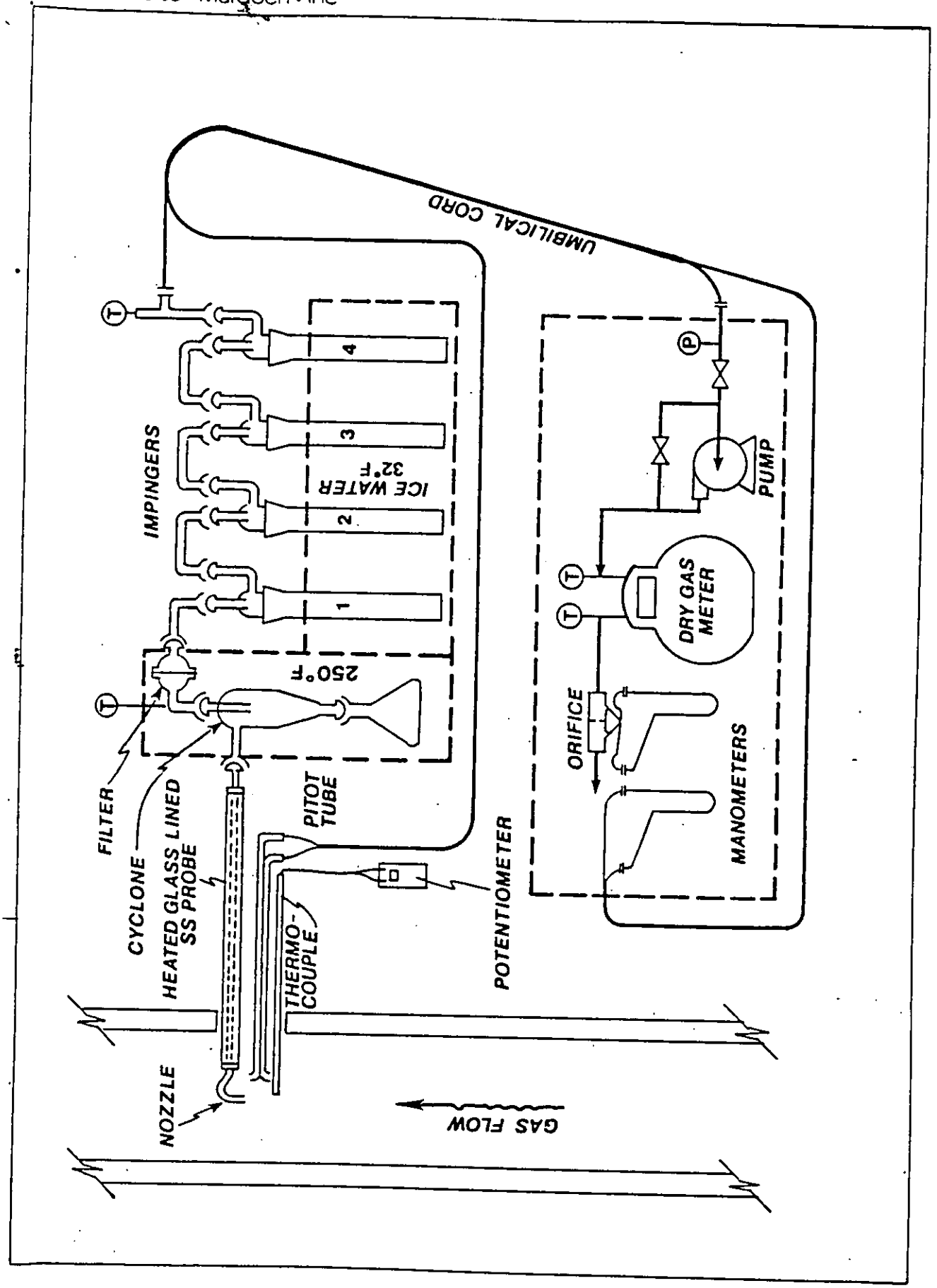
PLANT _____ DATE _____ RUN NUMBER _____

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)		STACK TEMPERATURE (T_s, °F)	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE, °F	
				DESIRED	ACTUAL		INLET ($T_{m\,in}$, °F	OUTLET ($T_{m\,out}$, °F				
	1553	709.725										
A-1	56	712.191	1.0	1.2	1.2	50	41	39	5.0	240	35	PUSH 9
A-2	40 1604	714.688	1.1	1.3	1.3	50	43	40	5.0	230	35	PUSH
A-3	44 1610	717.068	.95	1.15	1.15	50	44	40	5.0	225	37	PUSH
A-4	48 1644	719.415	.90	1.05	1.05	50	40	39	5.0	225	36	PUSH
A-5	53 1655	721.933	1.05	1.25	1.25	45	45	40	5.0	225	37	PUSH 13
A-6	56 1705	724.800	1.1	1.30	1.30	50	47	40	5.0	230	39	PUSH 14
A-7	60 1712	727.158	1.25	1.5	1.5	50	49	41	5.0	235	41	PUSH 15
A-8	64 1738	729.857	1.25	1.5	1.5	50	50	42	5.0	230	40	PUSH 16
	Leak check @ 7.0" = .016 cfm											
		41.159	1.0648		1.375	51.875		41.625				


UMBILICAL CORD
IMPINGERS
ICE WATER
32°F
250°F
FILTER
CYCLONE
HEATED GLASS LINED SS PROBE
PITOT TUBE
THERMO-COUPLE
POTENTIOMETER
NOZZLE
GAS FLOW
ORIFICE
DRY GAS METER
PUMP
MANOMETERS

EPA METHOD 5

APPENDIX 3

LABORATORY ANALYSIS AND DATA REDUCTION

APPENDIX 3

LABORATORY ANALYSIS AND DATA REDUCTION

1.0 ANALYTICAL METHODS

All samples generated during the test program were analyzed at BCM's laboratory in Norristown, Pennsylvania. The following discussions describe the analytical methods employed.

1.1 Particulate Samples - Pusher Coke Oven Baghouse

Prior to their use in the field, all glass fiber filters used in the sampling program had been tare-weighed following a 24-hour desiccation period. Upon their return to the laboratory, they were desiccated and reweighed. The weight difference was the amount of sample collected.

Nozzle, probe, and filter holder distilled water washings and acetone washings were evaporated to dryness in separated tared beakers. The residue was desiccated and the beakers were reweighed to a constant weight. The weight difference was the amount of particulate matter collected at these locations in the sampling train. Impinger solutions were filtered through a 0.22 micron filter to determine the insoluble back-half particulate.

The filtrate and the acetone wash of the impingers were dried separately to determine the soluble back-half particulate.

Acetone and distilled water blanks were evaporated to dryness in tared beakers, and were desiccated and reweighed. Any residue which remained was a contaminant in the reagent and was considered a blank weight used as a correction factor in subsequent calculations. The laboratory results of the particulate sampling program are listed in Tables 3-1 and 3-2.

2.0 COMPUTER INPUT SHEET

The reduced data calculated from the field data sheets were combined with the laboratory results on the computer input data sheet to facilitate programming. The computer input data sheet follows page 3-3.

TABLE 3-1

PARTICULATE LABORATORY RESULTS
FRONT-HALF PARTICULATE CATCH (mg)

Run Number	Filter	P&C Water Wash*	P&C Acetone Wash*	Total Catch
1	-1.9**	2.5	4.6	5.2

* Blank corrected

** Negative weight due to portion of filter adhering to gasket which was subsequently washed into the P & C washes.

TABLE 3-2

PARTICULATE LABORATORY RESULTS
BACK HALF PARTICULATE CATCH (mg)

Run Number	Insoluble Back Half	Impingers and Water Wash*	Impinger Acetone Wash*	Total Catch
1	0.0	14.7	4.2	18.9

* Blank corrected

3.0 CALCULATIONS

The equations used to calculate the results of the particulate test program follow the computer input data sheet.

4.0 TEST RESULTS

The complete result of the computer analysis and data reduction of the input generated from the particulate sampling program follow the Equations for Particulate, Moisture, and Flow Calculations.

10	Number of Tests	1																
20	Test Identification	KC-1																
30	Stack Area, IN^2	6082.1																
40	Stack Temperature, °F	519																
50	Sample Volume, Dry, CF	41.16																
60	Avg. Meter Temperature, °F	41.6																
70	Avg. Orifice (Δ H) IN H_2O	1.38																
80	Nozzle, Dia. IN	.188																
90	Duration of Test, Min.	64																
100	CO_2	0.2																
110	CO	0.0																
120	O_2	19.4																
130	N_2	80.4																
140	Stack Pressure, IN Hg	30.63																
150	Barometric Pressure, IN Hg	29.99																
160	Pitot Correction Factor	.815																
170	Pitot Traverse (Avg.$\sqrt{\Delta P}$) IN H_2O	1.07																
180	Volume, H_2O Collected, ml	8.0																
190	Ml, SO_3	—																
200	Ml, SO_2	—																
210	Total Collected Weight, mg	5.2																
220	Normality of SO_3	—																
230	Normality of SO_2	—																
240	Meter Calibration Factor	1.01																

CLIENT: _____

LOCATION: _____

JOB NO.: _____

NAME OF FILE: KEYUNN under 4416-01

AIRPOL 1 INPUT DATA SHEET

EQUATIONS FOR PARTICULATE, MOISTURE AND FLOW CALCULATIONS
(Based on Standard Conditions of 68°F and 29.92 inches Hg)

1. $V_{w(std)} = 0.0471\ V_{wc}$

2. $V_{m(std)} = 17.64\ V_m \left[\frac{P_{bar} + \left(.07355\ \Delta H\right)}{T_m + 460} \right]_Y$

3. $B_{wo} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$

4. $M_d = 0.44(\%CO_2) + 0.28(\%CO) + 0.32(\%O_2) + 0.28(\%N_2)$

5. $M_s = M_d\ (1 - B_{wo}) + 18\ B_{wo}$

6. $EA = \left[\frac{(\%O_2) - 0.5(\%CO)}{0.264(\%N_2) - (\%O_2) + 0.5(\%CO)} \right] 100$

7. $V_s = (85.49)(60)(C_p) \sqrt{\Delta P} \sqrt{\frac{T_s + 460}{(P_s)(M_s)}}$

8. $Q_s = \frac{(V_s)(A_s)}{144}$

9. $Q_{s(std)} = Q_s(1 - B_{wo})\ 17.64\ \frac{P_s}{T_s + 460}$

10. $C'_s = 0.0154\ \frac{W_t}{V_{m(std)}}$

11. $C'_w = 0.0154\ \frac{W_t}{V_{m(std)} + V_{w(std)}}$

12. $C'_c = 12\ C'_s$
$\%CO_2$

13. $C'_a = W_w\ \frac{(T_s + 460)(29.92)}{(528)(P_s)}$

14. $E = 0.00857\ Q_{s(std)}\ C'_s$

15. $A_n = \frac{(\pi)(D_n)^2}{(144)(4)}$

16. $I = \frac{(60)(1.667)(T_s + 460)(0.00267\ V_{wc} + V_{m(std)}/17.64)}{(\theta)(V_s)(P_s)(A_n)}$

LEGEND

A_n = Area of nozzle, ft^2

A_s = Area of stack, in^2

B_{wo} = Moisture content of gas stream, dimensionless

C_p = Pitot correction factor, dimensionless

C'_a = Particulate concentration (stack conditions), gr/ft^3

C'_c = Particulate concentration at 12% CO_s (dry), gr/dscf

C'_s = Particulate concentration (dry), gr/dscf

C'_w = Particulate concentration (wet), gr/scf

D_n = Diameter of nozzle, inches

E = Particulate emission rate, lb/hr

EA = Excess air, percent

ΔH = Orifice pressure drop, in. H_2O

I = Isokinetic ratio, percent

M_d = Dry molecular weight of stack gas, lb/lb-mole

M_s = Molecular weight of stack gas, lb/lb-mole

P_{bar} = Barometric pressure, in. Hg

P_s = Stack pressure (absolute), in. Hg

$\overline{\sqrt{\Delta P}}$ = Average of square roots of Pitot pressure differential, in. H_2O

Q_s = Stack gas flow, acfm

$Q_{s(std)}$ = Stack gas flow, scfm

T_m = Average dry gas meter temperature, °F

T_s = Average stack temperature, °F

V_m = Dry sample volume (meter conditions), ft^3

$V_{m(std)}$ = Dry sample volume (standard conditions), ft^3

V_s = Stack velocity, ft/min

V_{wc} = Volume of liquid collected in impingers and silica gel, ml

$V_{w(std)}$ = Volume of liquid collected, ft^3

W_t = Total weight of particulates collected, mg

θ = Duration of test, minutes

PARAMETERS		KC1
AREA OF BREECHING	(SQ IN)	6082.10
SAMPLE VOLUME(DRY)	(STD CU FT)	43.99
MOISTURE	(%)	.8492
MOLECULAR WEIGHT	STACK GASES	28.72
GAS TEMPERATURE	(F)	52
GAS VELOCITY	(FPM)	3446
GAS VOLUME	(SCFM)(DRY)	149413
GAS VOLUME	(ACFM)	145563
PARTICULATE CONC :		
GRAINS/STD CU.	FOOT (DRY BASIS)	.0018
GRAINS/STD CU.	FOOT (WET BASIS)	.0018
GRAINS/STD CU.	FOOT 12% CO2	.1092
GRAINS/CU.	FOOT (STK COND)	.0019
POUNDS/HOUR		2.3308
ORSAT ANALYSIS :		
CARBON DIOXIDE	(VOL %)	.20
CARBON MONOXIDE	(VOL %)	.00
OXYGEN	(VOL %)	19.40
NITROGEN	(VOL %)	80.40
EXCESS AIR	(%)	1062.67
ISOKINETIC	(%)	100.86

APPENDIX 4

EQUIPMENT CALIBRATION

PITOT CALIBRATION

The Pitot tubes were calibrated by measuring the velocity head in a duct with both an "S" type Pitot and a standard Pitot with a known coefficient. This calibration was performed at several different velocities. The Pitot tube coefficient can be calculated as follows:

$$C_{p(test)} = C_{p(std)} \sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$$

where:

$C_{p(test)}$ = Pitot tube coefficient of "S" type Pitot

$C_{p(std)}$ = Pitot tube coefficient of standard Pitot

ΔP_{test} = Velocity head measured by "S" type Pitot

ΔP_{std} = Velocity head measured by standard Pitot

Coefficients were determined for each leg of the "S" type Pitot. No C_p may deviate more than ± 0.01 from the average C_p, and the difference between the average C_p for each leg must be ≤ 0.01.

DRY GAS METER AND ORIFICE METER

The dry gas meter and orifice were calibrated using a wet test meter. Gases were moved through the dry gas meter at orifice pressure differentials (ΔH) of 0.5, 1.0, and 2.0 inches of water. With the information obtained, γ, the ratio of the accuracy of the wet test meter to dry test meter, and $\Delta H_@$, the orifice pressure differential yielding 0.75 cfm of air at 68°F and 29.92 inches of mercury, were calculated. The γ has a tolerance of 1.00 ±0.01, and the $\Delta H_@$ has a tolerance of 1.84 + 0.26 - 0.24. The γ and $\Delta H_@$ are determined as follows:

$$\gamma = \frac{V_w P_b (t_d + 460)}{V_d [P_b + .07353(\Delta H)] (t_w + 460)}$$

$$\Delta H_@ = \frac{0.0317 (\Delta H)}{P_b (t_d + 460)} \left(\frac{(T_w + 460)^\theta}{V_w} \right)^2$$

where:

ΔH = Orifice pressure differential, in H_2O

P_b = Barometric pressure, in Hg

t_d = Average temperature of dry gas meter, °F

t_w = Average temperature of wet test meter, °F

θ = Duration of test, minutes

V_d = Dry gas meter volume, ft^3

V_w = Wet test meter volume, ft^3

POTENTIOMETER CALIBRATION

The Thermo-Electron potentiometers were calibrated by using a known voltage source as an input to the potentiometer.

PROBE CALIBRATION

The probes were calibrated by measuring the outlet temperatures at variable transformer settings while passing air through the probes at approximately 0.75 cubic feet per minute.

BCM

METER BOX CALIBRATION SHEET

Date 1-12-81 Box No. 4 Inspector JFA

Pump OK Oil Changed Wick Changed Pump Serial No. 1073

Manometers OK Knobs OK Oil OK Tubing OK

Quick Connects OK Vacuum Gage OK Valves OK

Dry Gas Meter OK Volume 666.3 ft³ Serial No. JAL 31635

Thermometers OK In 65 °F Out 65 °F Ambient 64 °F

Amphenol OK Lights OK Switches OK Variac OK

Leak Check - Max. Vacuum 26 in. Hg Leak Rate .000 CFM

Remarks

Man. Orifice	CF_w	CF_d	T_w	IT_d	OT_d	T_d	Time θ
0.5	5.000	5.013	61.5	70.4	65.2	67.8	12.02
1.0	5.002	5.062	61.9	79.8	69.5	74.7	8.6
2.0	10.002	10.257	62	87	73.6	80.3	13.04

Tolerances: $1.6 \leq \Delta H_@ \leq 2.1$ $\quad 0.99 \leq Y \leq 1.01$

$\Delta H_@ =$	$\frac{(0.0317)(\Delta H)}{(P_b)(OT_d+460)}\left[\frac{(T_w+460)(\theta)}{(CF_w)}\right]^2$	$Y =$	$\frac{(CF_w)(P_b)(T_d+460)}{(CF_d)(P_b+\Delta H/13.6)(T_w+460)}$
1.75	$\frac{(0.0317)(0.5)}{(29.93)(\frac{29.93}{65.2}+460)}\left[\frac{(61.5+460)(12.02)}{(5.000)}\right]^2$	1.01	$\frac{(5.000)(29.93)(67.8+460)}{(5.013)(29.93+0.0368)(61.5+460)}$
1.61	$\frac{(0.0317)(1.0)}{(29.93)(\frac{29.93}{69.5}+460)}\left[\frac{(61.9+460)(8.6)}{(5.002)}\right]^2$	1.01	$\frac{(5.002)(29.93)(74.7+460)}{(5.062)(29.93+0.0737)(61.9+460)}$
1.84	$\frac{(0.0317)(2.0)}{(29.93)(\frac{29.93}{72.6}+460)}\left[\frac{(62+460)(13.04)}{(10.002)}\right]^2$	1.00	$\frac{(10.002)(29.93)(80.3+460)}{(10.257)(29.93+0.147)(62+460)}$

PITOT CALIBRATION

Pitot No. C-#2 Date 1-12-80 Engineer BA

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	.025	.035	.836	0	.035	.836	.018	
	2	.025	.035	.836	0	.035	.836	.018	
	3	.025	.035	.836	0	.040	.782	.036	
	AVG.			.836			.818		
2	1	.22	.30	.848	0	.30	.848	0	
	2	.22	.30	.848	0	.30	.848	0	
	3	.22	.30	.848	0	.30	.848	0	
	AVG.			.848			.848		
3	1	.46	.65	.832	0	.64	.839	0	
	2	.46	.65	.832	0	.64	.839	0	
	3	.46	.65	.832	0	.64	.839	0	
	AVG.			.832			.839		
4	1	.61	.84	.844	0	.81	.859	.002	
	2	.61	.84	.844	0	.82	.853	.004	
	3	.61	.84	.844	0	.81	.859	.002	
	AVG.			.844					
5	1	.88	1.3	.815	0	1.3	.815	0	
	2	.88	1.3	.815	0	1.3	.815	0	
	3	.88	1.3	.815	0	1.3	.815	0	
	AVG.			.815			.815		
6	1	1.2	1.7	.831	0	1.7	.831	0	
	2	1.2	1.7	.831	0	1.7	.831	0	
	3	1.2	1.7	.831	0	1.7	.831	0	
	AVG.			.831			.831		
7	1	1.5	2.0	.857	0	1.9	.879	.015	
	2	1.5	2.0	.857	0	2.0	.857	.007	
	3	1.5	2.0	.857	0	2.0	.857	.007	
	AVG.			.857			.864		

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

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. 6 Date 12-11-80 Inspector JFA

Nominal Size	Micrometer Readings				Comments
	1	2	3	Ave.	
0.125	.132	.130	.133	.132	
0.1875	.192	.183	.190	.188	
0.250	.266	.258	.262	.262	
0.3125	.306	.307	.300	.304	
0.375	.375	.380	.373	.376	
0.500	.500	.498	.500	.499	

POST-TEST

Set No. _____ Date _____ Inspector _____

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

APPENDIX 5

PERTINENT REGULATIONS

BCM

COMPUTATION SHEET

Sheet Number 1 of 1
Date 1-27-81
J. O. Number 00 - 4989 - 10
Computed by JFA / PRC
Checked by

Name of Client KEYSTONE COKE
Project PUSH EMISSION SCRUBBER
Description ALLOWABLE LIMITS CALCULATIONS

The following methodology was utilized to determine the allowable limits for the Keystone Pushing operations.

TOTAL TEST PERIOD - 4 HOURS 10 MINUTES
TOTAL PUSHES - 16
NUMBER OF PUSHES PER HOUR - 3.84
TONS OF COKE PER PUSH - 8.75

$A = 0.76 E^{0.42}$
E = 33.60 TONS OF COKE PUSHED / HOUR
A = 3.33 LB / HOUR ALLOWABLE
A = 0.87 LB. / PUSH ALLOWABLE

USING 0.02 GRAINS / DSCF

$$A = \frac{.02 \text{ GR}}{\text{DSCF}} \times \frac{149413 \text{ DSCF}}{\text{MIN}} \times \frac{\text{60 MIN}}{\text{HR}} \times \frac{\text{1 LB}}{7000 \text{ GR.}}$$

$$= 25.61 \text{ LB/HR}$$

$$A = \frac{25.61 \text{ LB}}{\text{HR}} \times \frac{1 \text{ HR}}{\text{60 MIN}} \times \frac{64 \text{ MIN}}{\text{TEST}} \times \frac{1 \text{ TEST}}{16 \text{ PUSHES}}$$

A = 1.71 LB / PUSH

Since P.A. DER regulations state whichever is greater, then 1.71 LB./PUSH is the allowable.

RUN 1

2.35 LB/HR 3.84 PUSH/HR.
2.45 LB/TEST
0.15 LB/PUSH - ACTUAL

1.71 LB/PUSH BASED ON 0.02 GR./DSCF

.87 LB/PUSH BASED ON EQUATION ($A = 0.76E^{.42}$)

APPENDIX 5

PERTINENT REGULATIONS

quirements of § 129.15(c) of this Title (relating to coke pushing operation) have been satisfied. Upon such demonstration, the Department will issue a determination, in writing, either as an operating permit condition, for those sources subject to permit requirements under the act, or as an order containing appropriate conditions and limitations.

(c) Any person responsible for any source specified in items (1) through (7) or (9) of subsection (a) of this section shall take all reasonable actions to prevent particulate matter from becoming airborne. Such actions shall include, but not be limited to, the following:

(1) Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads, or the clearing of land.

(2) Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles, and other surfaces which may give rise to airborne dusts.

(3) Paving and maintenance of roadways.

(4) Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

(d) The requirements contained in subsection (a) of this section and § 123.2 of this Title (relating to fugitive particulate matter) shall not apply to fugitive emissions arising from the production of agricultural commodities in their unmanufactured state on the premises of the farm operation.

§123.2. Fugitive particulate matter.

No person shall cause, suffer, or permit fugitive particulate matter to be emitted into the outdoor atmosphere from any source or sources specified in items (1) through (9) of §123.1(a) of this Title (relating to prohibition of certain emissions) if such emissions are:

(1) either visible, at any time, at the point such emissions pass outside the person's property, irrespective of the concentration of particulate matter in such emissions; or

(2) not visible at the point such emissions pass outside the person's property and the average concentration, above background, of three samples, of such emissions at any point outside the person's property, exceeds 150 particles per cubic centimeter.

PARTICULATE MATTER EMISSIONS

§123.11. Combustion units.

(a) No person shall cause, suffer, or permit the emission into the outdoor atmosphere of particulate matter, at any time, from any combustion unit in excess of:

(1) The rate of 0.4 lbs. per million B.t.u. of heat input, when the heat input to the combustion unit in millions of B.t.u's per hour is greater than 2.5 but less than 50.

(2) The rate determined by the formula:

$A = 3.6E^{-0.56}$

where:

A = Allowable emissions in pounds per million B.t.u. of heat input, and

E = Heat input to the combustion unit in millions of B.t.u.'s per hour,

when E is equal to or greater than 50 but less than 600.

(3) The rate of 0.1 pounds per million B.t.u. of heat input when the heat input to the combustion unit in millions of B.t.u.'s per hour is equal to or greater than 600.

(b) Allowable emissions under subsection (a) of this section are graphically indicated in Appendix A to this Chapter.

§123.12. Incinerators.

No person shall cause, suffer, or permit the emission to the outdoor atmosphere of particulate matter from any incinerator, at any time, in such a manner that the particulate matter concentration in the effluent gas exceeds 0.1 grain per dry standard cubic foot, corrected to 12% carbon dioxide.

§123.13. Processes.

(a) The provisions of subsections (b) and (c) of this section shall apply to all processes except combustion units and incinerators.

(b) No person shall cause, suffer, or permit the emission into the outdoor atmosphere of particulate matter from any process listed in the following table, at any time, either in excess of the rate calculated by the formula set forth in paragraph (2) of this subsection or in such a manner that the concentration of particulate matter in the effluent gas exceeds 0.02 grains per dry standard cubic foot, whichever is greater:

(1) *Table*

TABLE 1

Process	*Process Factor, F*
1. Carbon black mfg.	500 lbs./ton of product
2. Charcoal mfg.	400 lbs./ton of product
3. Crushers or grinders or screens	20 lbs./ton of feed
4. Paint mfg.	0.05 lbs./ton of pigment handled
5. Phosphoric acid mfg.	6 lbs./ton of phosphorous burned
6. Detergent drying	30 lbs./ton of product
7. Alfalfa dehydration	30 lbs./ton of product
8. Grain elevators: Loading or unloading	90 lbs./ton of grain
9. Grain screening and cleaning	300 lbs./ton of grain
10. Grain drying	200 lbs./ton of product
11. Meat smoking	0.01 lbs./ton of meat
12. Ammonium nitrate mfg. Granulator	0.1 lbs./ton of product
13. Ferroalloy production furnace	0.3 lbs./ton of product
14. Primary iron and/or steel making:	
Iron production	100 lbs./ton of product
Sintering: windbox	20 lbs./ton of dry solids feed
Steel production	40 lbs./ton of product
Scarfing	20 lbs./ton of product
15. Primary lead production:	
Roasting	0.004 lbs./ton of ore feed
Sintering: windbox	0.2 lbs./ton of sinter
Lead reduction	0.5 lbs./ton of product

16. Primary zinc production:	
Roasting	3 lbs./ton of ore feed
Sintering: windbox	2 lbs./ton of product
Zinc reduction	10 lbs./ton of product
17. Secondary aluminum production:	
Sweating	50 lbs./ton of aluminum product
Melting and refining	10 lbs./ton of aluminum feed
18. Brass and bronze production:	
Melting and refining	20 lbs./ton of product
19. Iron foundry:	
Melting:	
5T./hr. and less	150 lbs./ton of iron
More than 5T./hr.	50 lbs./ton of iron
Sand handling	20 lbs./ton of sand
Shake-out	20 lbs./ton of sand
20. Secondary lead smelting	0.5 lbs./ton of product
21. Secondary magnesium smelting	0.2 lbs./ton of product
22. Secondary zinc smelting:	
Sweating	0.01 lbs./ton of product
Refining	0.3 lbs./ton of product
23. Asphaltic concrete production	6 lbs./ton of aggregate feed
24. Asphalt roofing mfg:	
Felt saturation	0.6 lbs./ton of asphalt used
25. Portland cement mfg:	
Clinker production	150 lbs./ton of dry solids feed
Clinker cooling	50 lbs./ton of product
26. Coal dry-cleaning	2 lbs./ton of product
27. Lime calcining	200 lbs./ton of product
28. Petroleum refining:	
Catalytic cracking	40 lbs./ton of liquid feed
29. Pressed, blown and spun glass, glass production melting furnaces.	50.lbs./ton of full
(30) By product coke production: pushing operation.	1 (lb./ton coke pushed)

(2) *Formula*

$A = 0.76E^{0.42}$ where:

A = Allowable emissions in lbs./hr

E = Emission index = F x W lbs./hr.

F = Process factor in lbs./unit, and

W = Production or charging rate in units/hr.

The factor F shall be obtained from the table in paragraph (1) of this subsection. The units for F and W shall be compatible.

(3) *Allowable emissions.* Allowable emissions under this subsection are graphically indicated in Appendix B to this chapter.

(c) For processes not listed in subsection (b)(1) of this section including but not limited to coke oven battery waste heat stacks and autogeneous zinc coker waste heat stacks, the following shall apply:

(1) *Prohibited emissions.* No person shall cause, suffer, or permit the emission into the outdoor atmosphere of particulate matter from any process not listed in subsection (b)(1) of this section in such a manner that the concentration of particulate matter in the effluent gas, at any time, exceeds any of the following:

(i) 0.04 grains per dry standard cubic foot, when the effluent gas volume is less than 150,000 dry standard cubic feet per minute.

(ii) The rate determined by the formula:

$A = 6000E^{-1}$, where:

A = Allowable emissions in grains per dry standard cubic foot, and

E = Effluent gas volume in dry standard cubic feet per minute,

when E is equal to or greater than 150,000 but less than 300,000.

(iii) 0.02 grains per dry standard cubic foot; when the effluent gas volume is greater than 300,000 dry standard cubic feet per minute.

(2) *Allowable emissions.* Allowable emissions under this subsection are graphically indicated in Appendix C to this Chapter.

SULFUR COMPOUND EMISSIONS

§123.21. General.

(a) This section shall apply to all sources except those subject to other provisions of this Article, with respect to the control of sulfur compound emissions.

(b) No person shall cause, suffer, or permit the emission into the outdoor atmosphere of sulfur oxides, from any source, in such a manner that the concentration, at any time, of the sulfur oxides, expressed as SO_2, in the effluent gas exceeds 500 parts per million, by volume (dry basis).

§123.22. Combustion units.

(a) *Non-air basin areas.*

(1) *General provision.* No person shall cause, suffer, or permit the emission into the outdoor atmosphere of sulfur oxides, expressed as SO^2, from any combustion unit, at any time, in excess of the rate of four pounds per million B.t.u. of heat input over any one-hour period except as provided for in paragraph (4) of this subsection.

(2) *Commercial fuel oil.* No person shall, at any time, offer for sale, deliver for use, exchange in trade, cause the use of, suffer the use of, or permit the use of commercial fuel oil in non-air basin areas which contains sulfur in excess of the applicable percentage by weight set forth in the following table:

Grades Commercial Fuel Oil	*% Sulfur*
No. 2 and Lighter (viscosity less than or equal to 5.820cSt)	0.5
No. 4, No. 5, No. 6, and heavier (viscosity greater than 5.82cSt)	2.8

(3) *Equivalency provision.* Paragraph (2) of this subsection shall not apply to those persons or installations where equipment or processes are used to reduce the emissions from the burning of fuels with a higher sulfur content than that specified in paragraph (2) of this subsection. Such emissions shall not exceed those which would result from the use of the fuels specified in paragraph (2) of this subsection.

SOTDAT/STEEL LIBRARY SYSTEM

Report Title: —

Plant and Location: Keystone Coke, Conshohocken, PA

SCC: 30300303

Testing Date(s): 1/15/81

By Whom: BCM

Stack Test Review Attached: no

Reviewed by:

Problems Seen by Reviewer:

Confidentiality Status:

If status is confidential, list confidential pages or sections:

Source of Determination of the Confidentiality Status:

Report Encoded by:

Date Encoded:

Form Numbers:

Comments:

ALABAMA BY-PRODUCTS CORPORATION

FOUNDRY COKE • COAL • COAL CHEMICALS

GENERAL OFFICES:
FIRST NATIONAL-SOUTHERN NATURAL BUILDING
P. O. BOX 10246 BIRMINGHAM, ALABAMA 35202

PHONE (205) 252-5171
TELEX NO. 59-810

MOYER B. EDWARDS
DIRECTOR ENVIRONMENTAL CONTROL

February 13, 1981

Mr. N. Rao Kona
Regional Air Pollution Engineer
Pennsylvania Department of Environmental Resources
1875 New Hope Street
Norristown, Pennsylvania 19401

U. S. Environmental Protection Agency
Second Floor, Curtis Building
Philadelphia, Pennsylvania 19106

Attn: Director, Enforcement Division (3EN00)

Gentlemen:

We are submitting copies of the Baghouse stack test results for the Keystone Coke Company. These tests were performed during the month of January, 1981.

If there are any questions please do not hesitate to contact me.

Sincerely,

Moyer B. Edwards
Director Environmental Control

MBE:rl
Attachment - Two (2) copies to DER
One (1) copy to EPA