CONFIDENTIAL

PARTICULATE EMISSION TEST REPORT

M-504 DRYER SYSTEM

CONOCO CHEMICALS COMPANY

A DIVISION OF CONOCO INC.

5200 SOUTHEAST 59TH ST.

OKLAHOMA CITY, OKLAHOMA 73155

APRIL 30, 1981

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I. Introduction

The following report pertains to the particulate emissions test conducted at the Conoco Chemicals PVC Plant during the period from April 28, 1981, to April 29, 1981. This particulate emissions test is being submitted in conjunction with the operating permit application for the new M-504 dryer system.

Mr. James Milner of the Oklahoma City-County Health Department served as the Administrator during the emissions test.

A pre-test meeting was conducted on April 21, 1981, to review sampling procedures and requirements.

A. Source Information

1. Identification/Location

Conoco Chemicals Company PVC Plant
5200 Southeast 59th Street
Post Office Box 15360
Oklahoma City, Oklahoma 73155

2. Contact/Submitter

Mark C. Manion, Process Engineer
Telephone No. (405)-672-4551

B. Testing Information

1. Personnel Conducting Tests

CONOCO

M. C. Manion

E. E. Dawes

Oklahoma City-County Health Department

Observers	Test Run Numbers
James Milner	504 - 1, 2, and 3
David Davison	504 - 1, 2, and 3
Don Soule	504 - 1, 2, and 3

2. Dates of Tests

Date	Run Number
April 28, 1981	504-1
April 28, 1981	504-2
April 29, 1981	504-3

3. Location of Tests

Conoco Chemicals Company PVC Plant
5200 Southeast 59th Street
Oklahoma City, Oklahoma 73155

C. Process Information

1. Plant Process Description

Vinyl chloride monomer is received at the Plant site in railroad tank cars and is transferred by pump and compressor to the VCM storage tanks. The VCM is then pumped to fresh VCM batch tanks which are located in the reactor area.

PVC is produced batchwise from the vinyl chloride monomer. The reactor is first evacuated to remove inerts and then is charged with VCM, water and a suspension agent. The reaction is initiated with a perioxide-type catalyst. When the polymerization is complete, the unreacted VCM is removed from the reactor in the recovery sequence.

The recovery system is designed to recycle unreacted VCM. The recovery system utilizes pressure and vacuum phases. During the pressure recovery phase, VCM vapors are pulled from the reactor, compressed, condensed, and liquefied. The liquefied VCM is routed to the recovered monomer tanks. When the reactor pressure approaches atmospheric pressure, vacuum pumps are started and the pressure is reduced further. These VCM vapors are also compressed and condensed and the liquefied VCM routed to the recovered monomer tanks. The recovered monomer is subsequently charged to the reactor along with fresh VCM. As a part of the recovery operation steam is injected into the reactor to aid in the removal of residual VCM in the slurry. In the latter stage of this steam stripping/recovery step, the stripping vapors are routed to the EPA recovery system. The majority of the VCM is recovered and recycled. The inerts which eventually build up in the system are vented to an incinerator.

When the recovery step is complete, the PVC/water slurry is dumped through a slurry screen which removes oversize material. The slurry is then pumped to blend tanks. After product dumping, the reactor is rinsed to complete the reaction batch cycle. The rinse solution is sprayed into the reactor and discharged from the reactor through a screen to separate entrained PVC.

The PVC/water slurry is pumped to a centrifuge in the drying area, and extracted water is discharged to the process sewer. Wet cake

is fed to a dryer and dried with hot air. The air and dry resin leave the dryer and enter a baghouse. The baghouse separates the PVC resin from the exhaust gases. An induced draft fan exhausts the drying air to the atmosphere.

The dried resin flows to a product sifter where oversize material is again separated and collected. Some resin is then pneumatically conveyed to a plastic pipe plant. The remaining resin is transferred from railroad silos to rail hopper cars or bulk trucks for shipment.

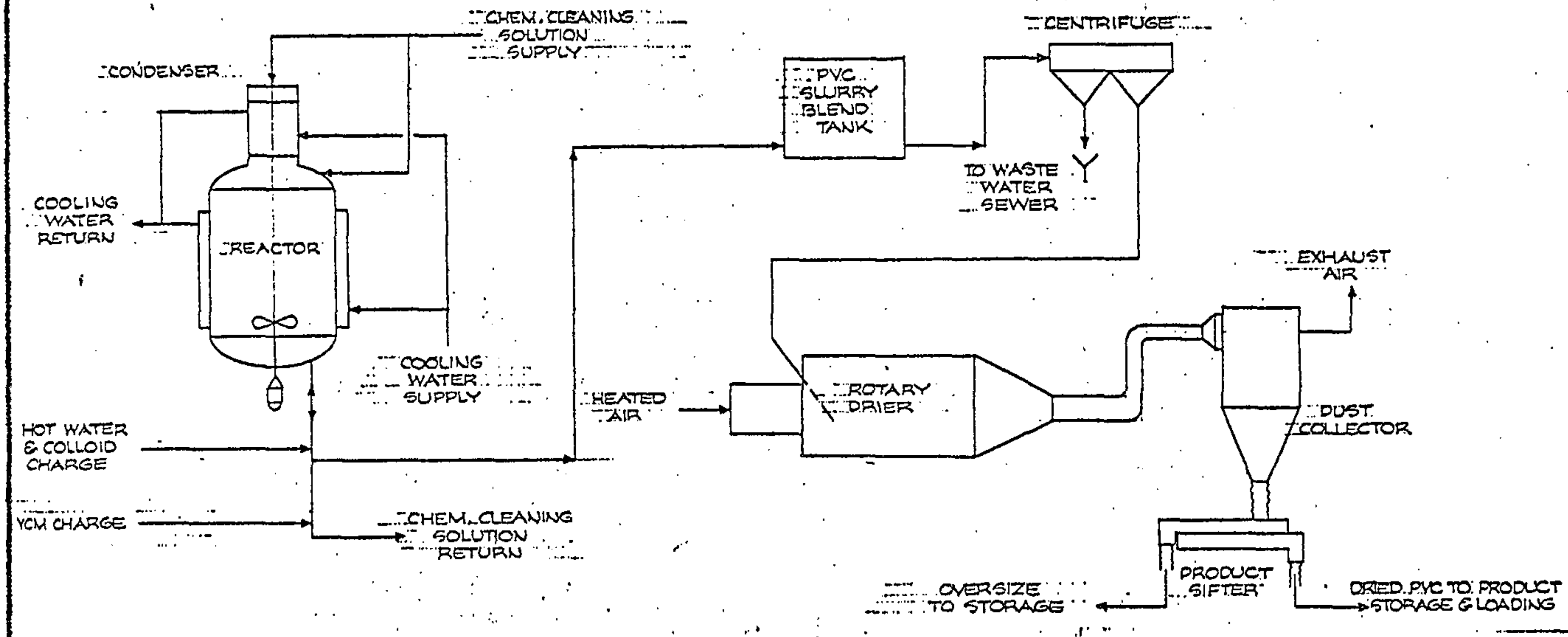
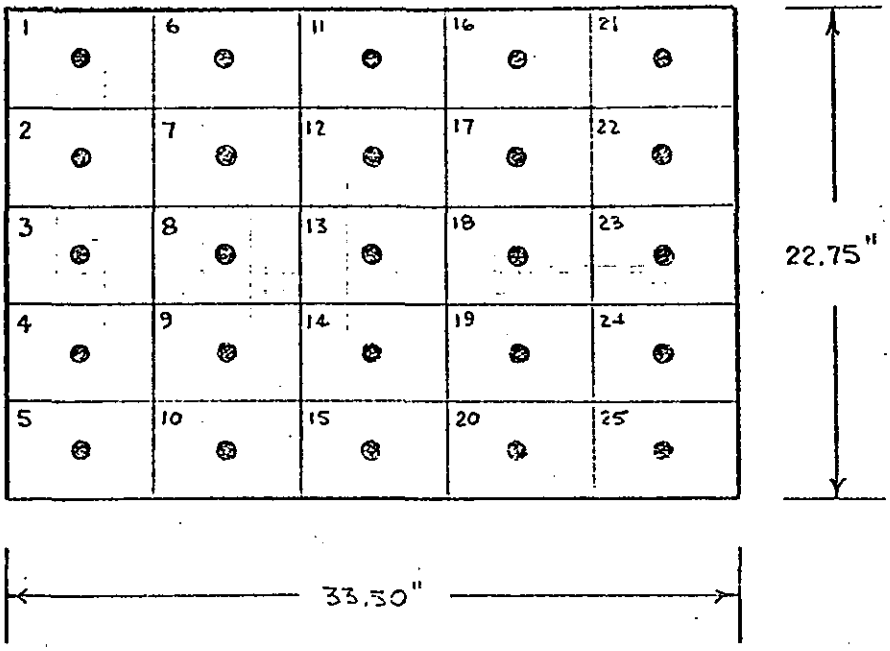
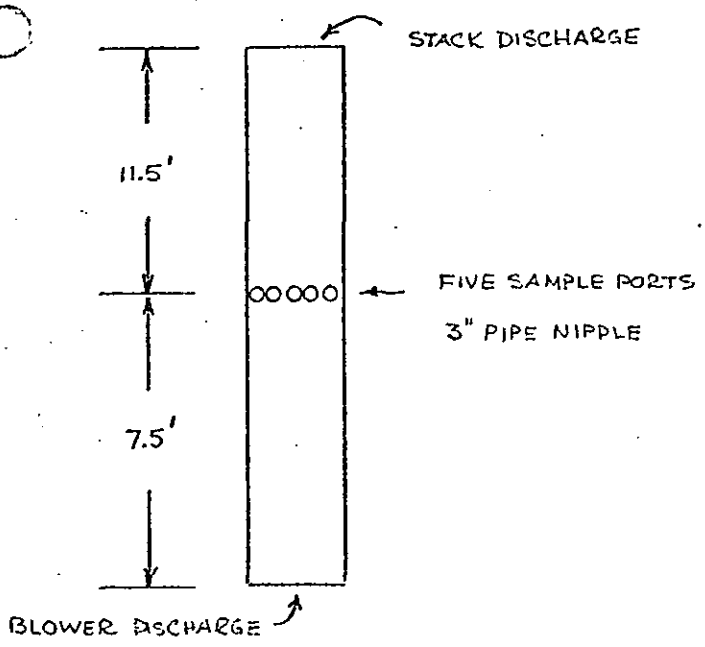


FIGURE 1
SIMPLIFIED PROCESS FLOW DIAGRAM
PVC PRODUCTION
OKLAHOMA CITY, OKLA.

CONFIDENTIAL

TRAVERSE POINTS





STACK AREA = 5.293 SQUARE FT.

EQUIVALENT DIAMETER = 2.258 FT.

FIGURE 2

STACK DIMENSIONS

DRYER M-504

OKLAHOMA CITY PVC PLANT

CONOCO CHEMICALS CO.

ABD00263462

1½ week till
sock job.

Pg 11

8137

6128
8274

right
before
bend

funnel
&
jar

stack
sampling

on top
of duct

deeper

CO
W
I

FROM THE DESK OF:
Charles McDonald

RE:

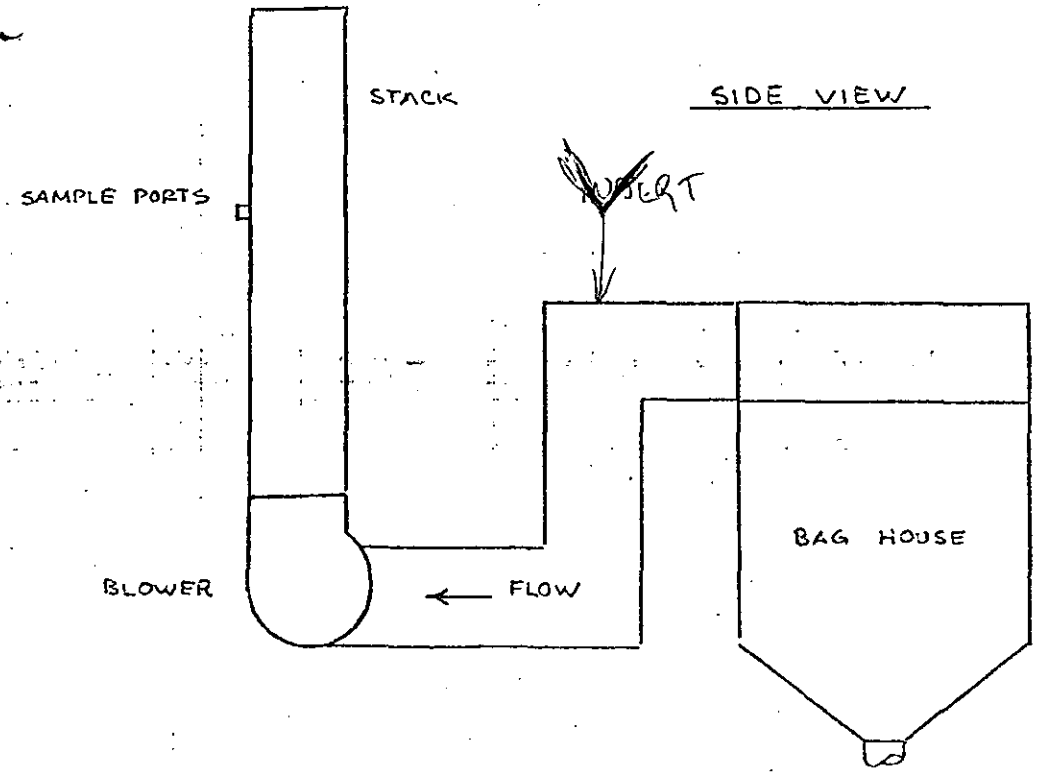
6.A.S

FTLTCTAJ

Everyday's a holiday at ____

Ron Hula

Date _____



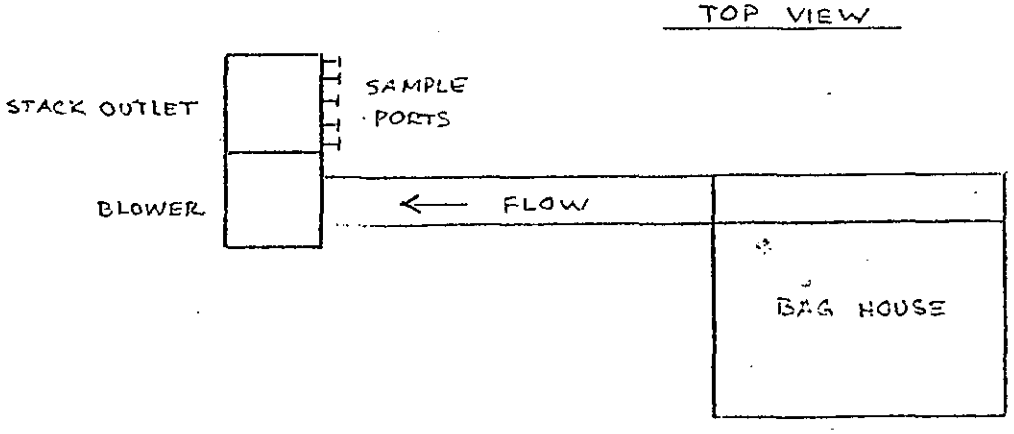


FIGURE 3

DRYER EXHAUST DIAGRAM

OKLAHOMA CITY PVC PLANT

CONOCO CHEMICALS CO

II. Emission Test Results

The results of the particulate emission tests are tabulated in Table I. The concentration of particulates in the stack gases are less than the maximum allowable level specified in Article II - Sec. 28-45 (Table 3) of the Oklahoma City Code. The post-leak and isokinetic sampling checks were all within the limits as specified by EPA in Method 5 (Federal Register, Vol. 42, No. 160-Thursday, August 18, 1977).

TABLE I

SUMMARY OF TEST RUN DATA

DRYER M-504

Description	Test Run No. 1	2	3
Volume of Gas Sample, DSCF	38.99	39.60	38.37
Volumetric Fraction of Water	0.0690	0.0593	0.0711
Stack Gas Molecular Weight, lb/lb-mole	28.20	28.30	28.17
Stack Pressure, in. Hg.	29.88	29.87	29.89
Stack Temperature, °F	160.5	164.0	161.2
Stack Velocity, ft/sec	81.71	83.46	80.99
Percent of Isokinetic Sampling	106.4	105.4	106.0
Post-Leak Check, CFM	0.017	0.018	0.020
Concentration of Particulates, g/DSCF	0.00020	0.00016	0.00020
Average		0.00019	
Volumetric Stack Gas Flow, DSCFM	20,533	21,064	20,284
Average		20,627	
*Maximum Allowable Emission, g/DSCF		0.07051	

*As defined by Oklahoma City Code, Article II - Sec. 28-45 (Table 3)

III. Sampling Procedures

The sampling procedures followed were those set in EPA's Test Method 5. Before performing the emission test, a preliminary velocity survey was made on the stack to be sampled. Barometic pressure, stack temperature, and moisture content of the stack gases were collected. With this information, and measurements of minimum, maximum, and average velocity pressure drops, the appropriate sampling nozzle size was determined .

Stack gas analytical data from previous particulate emissions tests were utilized for the determination of molecular weight. The volume percents of the gaseous components were determined by gas chromatography (see Appendix A).

The dry gas meter and flow orifice calibrations were made against a calibrated wet test meter. The S type pitot tube was not calibrated. This calibration was waived because the pitot tube construction met the specifications set forth by EPA in Test Method 2 (See Appendix B). A pitot tube correction factor of 0.84 was used in the subsequent calculations.

The glass fiber filters were kept in a desiccator for at least twenty-four hours. Fresh silica gel was used for each test.
The filter and silica gel were then weighed before transferring them to the sampling train. Normally, about 250 grams of silica gel per run were used. The silica gel and impinger were weighed as one unit. The glass filter was weighed in a petri dish with the gasket.

The sampling train was assembled and clamped together tightly to prevent leaks. The nozzle was capped and a pre-leak check was made by starting the vacuum pump. The pre-leak test was performed to assure that the post-leak test would be less than 0.02 CFM.

After the sampling probe was located at the desired point and the probe and box temperature became stabilized, the proper orifice pressure drop for isokinetic conditions was calculated. The selected pressure drop was then set by adjusting the vacuum pump controls.

Two flasks were installed to the pitot tube hoses to dampen the pressure drop fluctuations.

Each traverse point was sampled for three minutes. This yielded over thirty dry standard cubic feet of sample gas per run. The probe was moved from point to point within a given sampling port without stopping the pump. The sampling rate was adjusted as quickly as possible to

return to isokinetic conditions after each move. At each traverse point the appropriate data were recorded.

At the end of the sampling period, the sampling train was checked for leaks. The sampling train was then transported to the laboratory for analytical work. This entire process was repeated for each test. A total of three runs were conducted.

TEST METHODS

Equipment

1. Sampling Train - Lear Seigler Manual Stack Sampler. (Model PM-100, meets EPA's specifications)
2. Probe Nozzle - 316 S.S. nozzle with tapered leading edge. (Size - 3/16")
3. Probe Liner - 3 foot heated pyrex liner with thermocouple.
4. Pitot Tube, Type S, 316 S.S.
5. Differential Pressure Gauges, Dwyer Airflow Manometer, Model 400-5L & 10L
6. Thermocouple Meter, DIGIMITE (Model B-1160)

IV. Analytical Technique

Analytical reagent grade acetone was used to wash the probe and nozzle. A blank volume of acetone was poured into a tared beaker. The acetone evaporated and the beaker was weighed on an analytical balance to within ± 0.0001 grams. There was no contaminants or residue in the acetone. Hence, the correction factor for the acetone blank concentration was zero.

All containers used for determining the weight of particulates collected were handled with rubber gloves and weighed on a Mettler Analytical Balance to the nearest 0.0001 grams. The water and silica gel impingers were weighed on a Mettler Balance to the nearest 0.1 grams.

Prior to assembling the sampling train, the glass fiber filter and the gasket for the holder was weighed on a petri dish. Two impingers were filled with 100 ml. of water. These impingers, an empty impinger and the silica gel impinger were weighed separately.

At the end of the sampling run, the sampling train was returned to the laboratory for cleanup. The filter and gasket were cooled in a desiccator - prior to weighing them. The nozzle, probe and glass holder top piece were carefully washed with acetone. The probe liner was cleaned with a bristle brush. The wash acetone was collected in a tared beaker and allowed to evaporate in a closed ventilation hood. The combined weight of resin from the acetone wash and the resin on the filter was the total amount of particulates collected.

V. Data and Calculations

RAW FIELD & ANALYTICAL TEST DATA

PLANT CONOCO CHEMICALS - OKC PVC

RUN NO. #1

LOCATION M-504

DATE 4-28-81

OPERATOR MCM & EED

SAMPLE BOX NO. —

METER BOX NO. —

CONFIDENTIAL

LEAK TESTS

① INITIAL = 0.070 - 0.086 @ 10" Hg
= 0.016

② FINAL = 0.052 - 0.069 @ 10" Hg
= 0.017

AMBIENT TEMP, °F 64

BAR. PRESS. IN. Hg 29.930

ASSUMED MOISTURE % 7.0

HEATER BOX SETTING °F —

PROBE TIP DIA., IN. —

PROBE LENGTH 5 ft

PROBE HEATER SETTING 6

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft³	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O		t_m DRY GAS TEMP, °F		PUMP VACUUM IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	P_s STACK PRESS - IN. H_2O	t_s STAC TEMP °F
				REQUIRED	ACTUAL	INLET	OUTLET					
	0	635.42										
1	3	636.83	1.35	0.56	0.56	79	75	3.5	270	60	0.44	154
2	6	638.30	1.40	0.61	0.61	94	76	3.5	270	56	0.44	154
3	9	639.82	1.50	0.65	0.65	99	76	4.0	270	57	0.47	155
4	12	641.39	1.60	0.69	0.69	104	77	4.0	275	57	0.53	157
5	15	642.94	1.55	0.67	0.67	106	78	4.0	275	58	0.46	160
6	18	644.41	1.40	0.61	0.61	108	79	3.5	285	59	0.45	162
7	21	645.95	1.45	0.63	0.63	109	79	4.0	285	60	0.45	164
8	24	647.53	1.65	0.72	0.72	110	80	4.0	285	60	0.53	163
9	27	649.18	1.75	0.77	0.77	112	80	4.5	285	60	0.64	157
10	30	650.87	1.90	0.84	0.84	113	80	5.0	275	60	0.67	160
11	33	652.55	1.70	0.74	0.74	113	80	4.5	275	60	0.56	162
12	36	654.18	1.70	0.74	0.74	113	81	4.5	285	60	0.63	162
13	39	655.93	2.00	0.87	0.87	113	81	5.0	280	60	0.75	162
14	42	657.75	2.15	0.94	0.94	114	82	5.5	275	60	0.82	161
15	45	659.55	2.05	0.90	0.90	113	82	5.0	280	60	0.74	158
16	48	661.30	1.75	0.77	0.77	113	82	4.5	285	60	0.63	160
17	51	662.96	1.95	0.85	0.85	114	82	5.0	290	61	0.76	161
18	54	664.77	2.10	0.92	0.92	114	82	5.5	295	61	0.77	163
19	57	666.57	2.10	0.92	0.92	114	83	5.5	295	61	0.77	166
20	60	668.22	1.65	0.73	0.73	114	83	4.5	295	61	0.57	160
21	63	669.85	1.65	0.73	0.73	114	83	4.5	295	62	0.65	160
22	66	671.55	1.85	0.81	0.81	115	84	5.0	300	62	0.70	162
23	69	673.34	2.05	0.90	0.90	116	84	5.5	300	63	0.80	164
24	72	675.14	2.05	0.90	0.90	116	84	5.5	285	63	0.79	163
TOTAL						Avg.	Avg.					
AVG.						Avg.						

PLANT Conoco Chemicals - OKC PVC

RUN NO. #1 (continued)

LOCATION M-504

DATE 4-28-87

OPERATOR MCM/GED

SAMPLE BOX NO. —

METER BOX NO. —

CONFIDENTIAL

AMBIENT TEMP. °F 64

BAR. PRESS. IN. Hg 29.930

ASSUMED MOISTURE % 7.0

HEATER BOX SETTING °F —

PROBE TIP DIA., IN. —

PROBE LENGTH 5 ft

PROBE HEATER SETTING 6

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft³	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O REQUIRED	ΔH ORIFICE IN. H_2O ACTUAL	t_m DRY GAS TEMP. °F INLET	t_m DRY GAS TEMP. °F OUTLET	PUMP VACUUM IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	P_s STACK PRESS −IN. H_2O	t_s STACK TEMP °F
1 25	75	676.80	1.65	0.72	0.72	115	84	4.5	285	63	0.62	160
2												
3												
4												
5												
6		41.38	1.758	0.768	0.768	109.8	80.7	4.6	283.8	60.2	0.626	164
7												
8												
9							95 75					
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
TOTAL						Avg.	Avg.					
Average							Avg.					

14

CONFIDENTIAL

ANALYTICAL DATA
RUN # 1

DATE: 4-28-81
TIME: 9:00AM

(A)

IMPINGER	EMPTY (GM)	FULL (GM)	AFTER (GM)	ΔW (GM)
1		516.58	562.01	45.43
2		523.15	530.80	7.65
3		439.06	440.14	1.08
4		673.90	681.10	7.20
TOTAL				61.36

(B) PETRI DISH + CLEAN FILTER 112.8614
PETRI DISH 103.1463
CLEAN FILTER 9.7151

(C) EMPTY FLASK + PARTIC + ACETONE 123.3817
EMPTY FLASK 103.3771
PARTIC + ACETONE 20.0046

(D) EMPTY FLASK + PARTIC. 103.3773
EMPTY FLASK 103.3771
PARTIC. 0.0002

(E) PETRI DISH + DIRTY FILTER 42.6867
PETRI DISH 32.9713
DIRTY FILTER 9.7154

(F) DIRTY FILTER 9.7154
CLEAN FILTER 9.7151
PARTIC 0.0003

(G) TOTAL PARTICULATE = 0.0003 + 0.0002
= 0.0005 GMS

PLANT CONOCO CHEMICALS · OKC-PVC

RUN NO. #2

LOCATION M-504

DATE 4-28-81

OPERATOR MCM FEED

SAMPLE BOX NO. —

METER BOX NO. —

CONFIDENTIAL

LEAK TESTS

① INITIAL = 0.050-0.070 @ 10" Hg
= 0.02

② FINAL = 0.028-0.046 @ 10" Hg
= 0.018

AMBIENT TEMP, °F 64

BAR. PRESS. IN. Hg 29.93

ASSUMED MOISTURE % 7

HEATER BOX SETTING °F —

PROBE TIP DIA., IN. —

PROBE LENGTH 5 ft

PROBE HEATER SETTING 6½

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft³	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O		t_m DRY GAS TEMP, °F		PUMP VACUUM IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	p_s STACK PRESS - IN. H_2O	t_s STAC TEMP °F
				REQUIRED	ACTUAL	INLET	OUTLET					
	0	677.30										
1	3	678.87	1.55	0.67	0.67	88	86	4.0	175	65	0.58	150
2	6	680.50	1.55	0.68	0.68	98	99	4.0	250	66	0.64	161
3	9	682.12	1.65	0.72	0.72	110	94	4.0	270	64	0.74	166
4	12	683.77	1.75	0.76	0.76	116	94	4.5	285	62	0.68	170
5	15	685.42	1.65	0.73	0.73	119	94	4.0	290	62	0.61	169
6	18	687.00	1.50	0.66	0.66	121	94	4.0	295	63	0.61	169
7	21	688.58	1.55	0.68	0.68	122	94	4.0	290	63	0.66	169
8	24	690.25	1.75	0.77	0.77	123	93	4.5	290	61	0.72	167
9	27	692.00	1.95	0.86	0.86	123	93	5.0	275	60	0.84	169
10	30	693.80	2.00	0.88	0.88	123	93	5.0	250	60	0.81	167
11	33	695.46	1.65	0.73	0.73	123	93	4.0	265	58	0.65	163
12	36	697.15	1.80	0.80	0.80	123	93	4.5	273	60	0.74	164
13	39	698.94	2.05	0.91	0.91	124	93	5.0	268	60	0.90	165
14	42	700.82	2.25	1.00	1.00	124	93	5.5	263	60	0.99	164
15	45	702.62	1.95	0.87	0.87	122	93	5.0	250	60	0.77	163
16	48	704.34	1.80	0.80	0.80	123	93	4.5	250	61	0.74	161
17	51	706.12	2.00	0.89	0.89	124	93	5.0	275	61	0.84	162
18	54	707.95	2.15	0.96	0.96	124	93	5.0	270	61	0.82	164
19	57	709.82	2.15	0.96	0.96	123	93	5.0	270	61	0.88	165
20	60	711.54	1.75	0.78	0.78	123	93	4.5	275	61	0.74	164
21	63	713.17	1.65	0.73	0.73	123	93	4.0	285	62	0.69	163
22	66	714.87	1.80	0.80	0.80	124	93	4.5	293	63	0.79	163
23	69	716.66	2.05	0.91	0.91	124	93	5.0	290	62	0.88	161
24	72	718.46	2.05	0.91	0.91	123	93	5.0	285	62	0.88	163
AVG						Avg.	Avg.					
						Avg.						

PLANT Conoco Chemicals-OKC PVC

RUN NO. #2 (continued)

LOCATION M-SO4-

DATE 1-28-81

OPERATOR MCM & EED

SAMPLE BOX NO. —

METER BOX NO. —

CONFIDENTIAL

AMBIENT TEMP. °F 64

BAR. PRESS. IN. Hg 29.95

ASSUMED MOISTURE % 7

HEATER BOX SETTING °F —

PROBE TIP DIA., IN. —

PROBE LENGTH 5 ft

PROBE HEATER SETTING 6 1/2

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft³	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O REQUIRED	ΔH ORIFICE IN. H_2O ACTUAL	t_m DRY GAS TEMP. °F INLET	t_m DRY GAS TEMP. °F OUTLET	PUMP VACUUM. IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	P_s STACK PRESS IN. H_2O	STA TE
4	85	720.17	1.75	0.78	0.78	123	93	4.5	280	64	0.74	16
9		42.87	1.830	0.810	0.810	119.7	73.2	4.6	270.5	61.7	0.760	16
11						106.45						
TOTAL						Avg.	Avg.					
						Avg.						

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ABB00263475

CONFIDENTIAL

ANALYTICAL DATA

RUN #2

DATE: 4-28-81

TIME: 3:30 PM

(A)

IMPINGER	EMPTY (GM)	FULL (GM)	AFTER (GM)	ΔW (GM)
1		517.36	555.73	38.37
2		524.38	530.97	6.59
3		439.96	440.88	0.92
4		679.61	686.79	7.18
TOTAL				53.06

(B)

PETRI DISH + CLEAN FILTER	42.6804
PETRI DISH	32.9720
CLEAN FILTER	9.7084

(C)

EMPTY FLASK + PARTIC + ACETONE	127.2069
EMPTY FLASK	103.1042
PARTIC + ACETONE	24.1027

(D)

EMPTY FLASK + PARTIC.	103.1045
EMPTY FLASK	103.1042
PARTIC.	0.0003

(E)

PETRI DISH + DIRTY FILTER	42.6802
PETRI DISH	32.9717
DIRTY FILTER	9.7085

(F)

DIRTY FILTER	9.7085
CLEAN FILTER	9.7084
PARTIC	0.0001

(G) TOTAL PARTICULATES = 0.0001 + 0.0003

= 0.0004

PLANT CONOCO CHEMICALS - OKC PVC

RUN NO. #3

LOCATION M-504

DATE 4-29-81

OPERATOR MCM & EED

SAMPLE BOX NO. -

METER BOX NO. -

CONFIDENTIAL

LEAK TESTS

① INITIAL = 0.039-0.058 @ 10" Hg
= 0.019

② FINAL = 0.001-0.021 @ 10" Hg
= 0.020

AMBIENT TEMP. °F 72

BAR. PRESS. IN. Hg 29.91

ASSUMED MOISTURE % 7.0

HEATER BOX SETTING °F -

PROBE TIP DIA., IN. -

PROBE LENGTH 5ft

PROBE HEATER SETTING 6

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft³	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O REQUIRED	ΔH ORIFICE IN. H_2O ACTUAL	t_m DRY GAS TEMP. °F INLET	t_m DRY GAS TEMP. °F OUTLET	PUMP VACUUM IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	P_s STACK PRESS - IN. H_2O	t_s STACK TEMP °F
	0	720.50										
1	3	722.00	1.45	0.61	0.61	79	78	2.5	300	64	0.45	155
2	6	723.97	1.40	0.60	0.60	93	81	2.5	295	59	0.45	1
3	9	725.00	1.50	0.65	0.65	101	81	2.5	300	58	0.53	1
4	12	726.56	1.60	0.69	0.69	104	81	3.0	295	59	0.54	1
5	15	728.11	1.55	0.67	0.67	107	80	3.0	285	59	0.47	1
6	18	729.60	1.40	0.61	0.61	109	80	2.5	290	59	0.42	1
7	21	731.10	1.45	0.63	0.63	110	81	2.5	295	60	0.47	1
8	24	732.64	1.55	0.68	0.68	112	81	3.0	295	62	0.54	163
9	27	734.24	1.75	0.76	0.76	113	81	3.0	270	61	0.66	164
10	30	735.93	1.75	0.76	0.76	114	81	3.0	275	62	0.63	163
11	33	737.52	1.60	0.70	0.70	114	82	3.0	285	62	0.60	164
12	36	739.16	1.75	0.77	0.70	115	82	3.0	285	62	0.61	164
13	39	740.90	2.00	0.89	0.88	116	82	3.5	285	61	0.77	164
14	42	742.73	2.20	0.97	0.97	117	83	3.5	290	61	0.89	167
15	45	744.43	1.80	0.79	0.79	116	83	3.0	280	60	0.68	167
16	48	746.08	1.75	0.77	0.77	116	83	3.0	285	61	0.62	167
17	51	747.77	1.85	0.81	0.81	117	83	3.0	285	62	0.71	167
18	54	749.53	2.05	0.90	0.90	117	83	3.0	285	62	0.79	167
19	57	751.35	2.15	0.95	0.95	118	83	3.5	280	60	0.81	158
20	60	753.01	1.70	0.75	0.75	118	83	3.0	280	60	0.60	158
21	63	754.60	1.55	0.69	0.69	117	84	3.0	285	60	0.61	166
22	66	756.25	1.75	0.77	0.77	117	84	3.0	290	60	0.67	163
23	69	757.98	1.95	0.86	0.84	118	84	3.0	270	59	0.73	16
24	72	759.73	1.95	0.86	0.86	119	84	3.0	275	59	0.74	162
TOTAL						Avg.	Avg.					
						Avg.						

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ANALYTICAL DATA
RUN #3

DATE: 4-29-81
TIME: 9:00 AM

(A)

IMPINGER	EMPTY (GM)	FULL (GM)	AFTER (GM)	ΔW (GM)
1		516.97	561.58	44.61
2		523.11	532.94	9.83
3		439.15	440.34	1.19
4		674.84	681.64	6.80
TOTAL				62.43

(B)

PETRI DISH + CLEAN FILTER	42.6843
PETRI DISH	32.9716
CLEAN FILTER	9.7127

(C)

EMPTY FLASK + PARTIC + ACETONE	129.3345
EMPTY FLASK	103.1044
PARTIC + ACETONE	26.2301

(D)

EMPTY FLASK + PARTIC.	103.1047
EMPTY FLASK	103.1044
PARTIC.	0.0003

(E)

PETRI DISH + DIRTY FILTER	44.3472
PETRI DISH	34.6343
DIRTY FILTER	9.7129

(F)

DIRTY FILTER	9.7129
CLEAN FILTER	9.7127
PARTIC	0.0002

(G) TOTAL PARTICULATES = 0.0002 + 0.0003

= 0.0005

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CALIBRATION CORRECTION FACTORS FOR DRY GAS METER AND ORIFICE METER

CONFIDENTIAL

DATE 3-17-81

BOX NO. _____

BAROMETRIC PRESSURE, P_b 28.185

DRY GAS METER NO. 83

Orifice Manometer Setting, ΔH_o In. H_2O	Gas Volume Wet Test Meter Q_w, Ft^3	Gas Volume Dry Gas Q_d, Ft^3	Temperature				Time θ, Min.	γ	$\Delta H@$ K_o
			Wet Test	Dry Gas Meter					
			Meter t_w, °F	Inlet t_{di}, °F	Outlet t_{do}, °F	Average t_d, °F			
0.5	5.000	5.190	75	101	78	89.5	11.8417	0.988	1.643
1.0	5.000	5.260	75	114	79	96.5	8.3833	0.986	1.626
2.0	10.000	10.540	75	124	80	102.0	12.0833	0.992	1.673
3.0	10.000	10.600	75	130	83	106.5	9.9500	0.991	1.688
4.0	10.000	10.620	75	134	86	110.0	8.7167	0.993	1.716
5.0	10 000	10.720	75	136	87	111.5	7.9500	0.984	1.780
							Average	0.989	1.688

Defining Equations:

$$\gamma = \frac{Q_w P_b (t_d + 460)}{Q_d (P_b + \Delta H_o/13.6)(t_w + 460)}$$

$$K_o = \frac{Q_w}{\theta_i} \left[\frac{P_m (MW)_a}{(t_{d_o} + 460)(\Delta H_o)} \right]^{1/2}$$

$$\Delta H@ = \frac{0.9209}{K_o^2}$$

SAMPLE CALCULATIONS

CONFIDENTIAL

LEGEND

A - Stack cross-sectional area, sq. ft.

A_n - Cross-sectional area of nozzle, sq. ft.

B_w - Volume fraction of water vapor in the stack gases.

C_p - Pitot tube coefficient, 0.84

C_s - Concentration of particulate matter in stack gases, gr/DSCF

ΔH - Average pressure drop across the orifice meter, in. H_2O

I - Percent of isokinetic sampling

M_a - Total amount of particulates collected.

M_d - Average molecular weight of dry stack gases lb/lb-mole

M_s - Average molecular weight of stack gases lb/lb-mole.

ΔP - Average of the square roots of the observed velocity pressure drop, square root of in. H_2O

P_b - Barometic pressure, in. Hg

P_g - Stack pressure, in. H_2O

P_s - Absolute stack pressure, in. Hg

P_{st} - Standard absolute pressure, 29.92 in. Hg

Q_s - Volumetric stack gas rate at standard conditions (68°F & 29.92 in. Hq - dry basis), DSCFM

T_i - Total sampling time, min.

T_m - Average dry gas meter temperature, °R

T_s - Stack gas temperature, °R

T_{st} - Standard temperature, 528 °R

V_l - Total volume of liquid collected in impingers and silica gel, ml.

V_m - Volume of gas sample as measured by the dry gas meter, cu. ft.

V_{ms} - Volume of gas sample as measured by the dry gas meter at standard conditions, DSCF

V_s - Average stack gas velocity, ft/sec

V_{ws} - Volume of water vapor in the gas sample at standard conditions, cu. ft.

Y - Dry gas meter correction factor,

The following equations were obtained from EPA's Test Methods 2 and 5 for Standards of Performance for New Stationary Sources as published in the Federal Register (Vol. 42, No. 160 - Thursday, August 18, 1977).

Dryer M-504
Test Run No. 1

1. $V_{ms} = (17.64) * V_m * Y * \frac{(P_b + \Delta H/13.6)}{T_m}$ (Eq. 5-1)

$V_{ms} = (17.64) * (41.38) * (0.989) * \frac{(29.93 + 0.768/13.6)}{(460 + 95.25)}$

$V_{ms} = \underline{38.99}$ DSCF

2. $V_{ws} = 0.04707 * V_1$ (Eq. 5-2)

$= 0.04707 * 61.36 = \underline{2.888}$ SCF

3. $B_w = V_{ws} / (V_{ws} + V_{ms})$ (Eq. 5-3)

$B_w = 2.888/(2.888 + 38.99) = \underline{0.0690}$

4. $M_s = M_d (1-B_w) + 18.02 * B_w$ (Eq. 2-5)

$M_s = 28.95 (1 - 0.0690) + 18.02 * (0.0690)$

$M_s = \underline{28.20}$ lb/lb-mole

5. $P_s = P_b + (P_g/13.6)$ (Eq. 2-6)

$P_s = 29.93 + (-0.626/13.6) = \underline{29.88}$ in. Hg

6. $V_s = 85.49 * C_p * \Delta P^{1/2} * (T_s/(P_s * M_s))^{1/2}$ (Eq. 2-9)

$V_s = (85.49) * (0.84) * (1.758)^{1/2} * \left[\frac{(160.5 + 460)}{(29.88 * 28.20)}\right]^{1/2}$

$V_s = \underline{81.71}$ ft/sec

7. $I = \dfrac{0.0945 * T_s * V_{ms}}{P_s * V_s * A_n * T_i * (1-B_w)}$ (Eq. 5-8)

$I = \dfrac{0.0945 * (620.5) * (38.99)}{(29.88) * (81.71) * (0.000126) * (75) * (1-0.0690)}$

$I = \underline{106.4}$

8. $Q_s = 60\,(1-B_w) * V_s * A * \dfrac{T_{st} * P_s}{T_s * P_{st}}$ (Eq. 2-10)

$Q_s = 60\,(1-0.0690) * (81.71) * (5.293) * \dfrac{(528) * (29.88)}{(620.5) * (29.92)}$

$Q_s = \underline{20,533}$ DSCFM

9. $C_s = 15.43 * M_a/V_{ms}$ (Eq. 5-6)

$C_s = 15.43 * \dfrac{(0.0005)}{(38.99)} = \underline{0.000198}$ gr/DSCF

VI. Appendices

GAS CHROMATOGRAPH RESULTS FOR STACK GAS COMPONENTS

CONFIDENTIAL

SEPARATIONS ANALYSIS GROUP
ANALYSIS REPORT FORM

AD 00263489

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1. TO Lee Hoffman
2. SAMPLE M-500 & M-503 ANAL. NO. 19575 - 19576 DATE 4-25-79

3. CLYSIS TYPE:
X-Ray___, GLC X, GPC___, LC___, TLC___, Free Oil___, Prep GC___,
IR___, PYRGC___, SA___, PV___, RI___, Coul___, % Active___,
Other___

4. ANALYSIS CONDITIONS:
Log Book 2100 A
Run # 1294-1297

RESULTS: QUAL___, QUANT___, SEMI-QUANT___
___% CONF. LIMIT

Component	Vol %	Conf. Interval
M-500		
O_2+A	20.20	
N_2	79.47	
CO_2	0.33	
M-503		
O_2+A	20.15	
N_2	79.52	
CO_2	0.33	

5. REMARKS:

ANALYZED BY Bill Pamatichy APPROVED BY Jane L Florea

KEY TO ANALYSIS TYPE

X-Ray – self explanatory
GLC – gas-liquid chromatography
GPC – gel permeation chromatography
LC – liquid chromatography
TLC – thin-layer chromatography
Prep GC – preparative gas chromatography
PYRGC – pyrolysis gas chromatography
SA – surface area
PV – pore volume
RI – refractive index
Coul – coulometry
IR – infrared
Other – self-explanatory

5-56X3, 10-70

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PITOT TUBE & SAMPLING NOZZLE CONFIGURATION

COMPANY CONOCO ABD00263491 DATE 10 S/N 33

SC 3203 PROBE LENGTH 3 FT

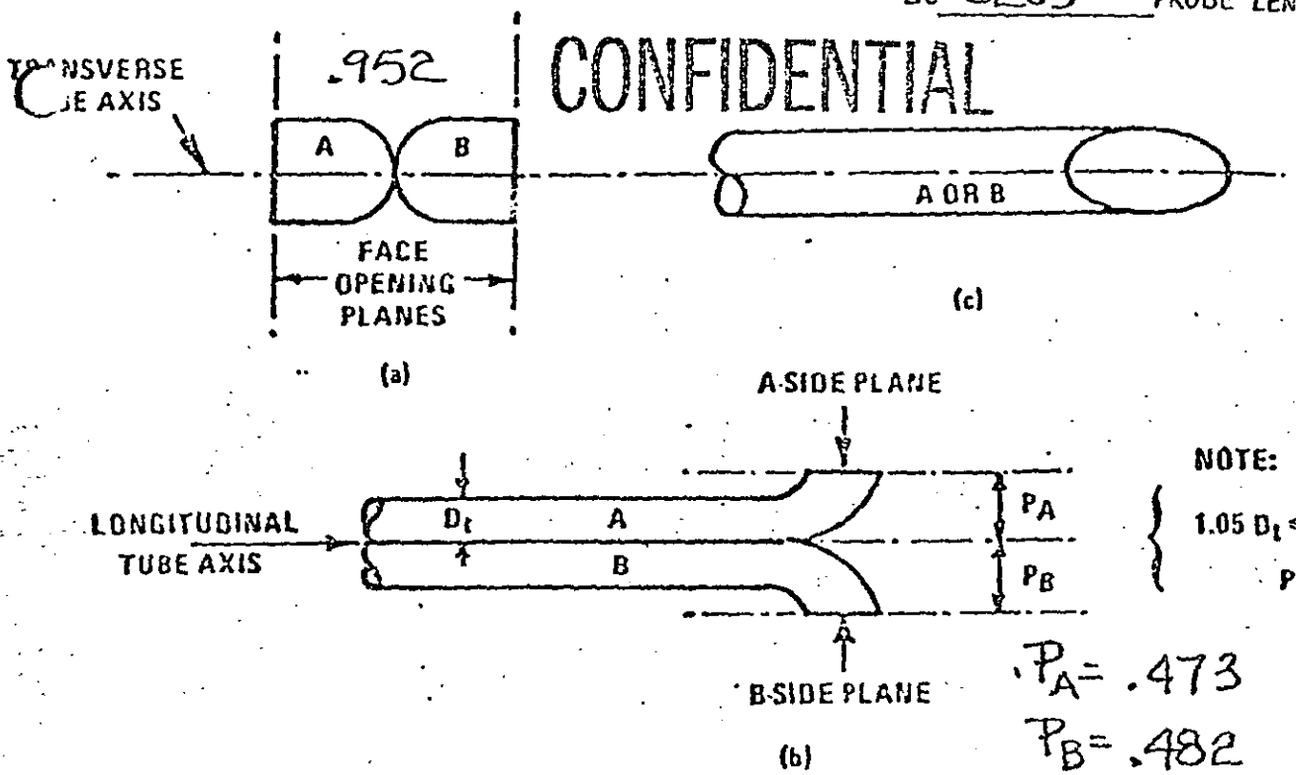
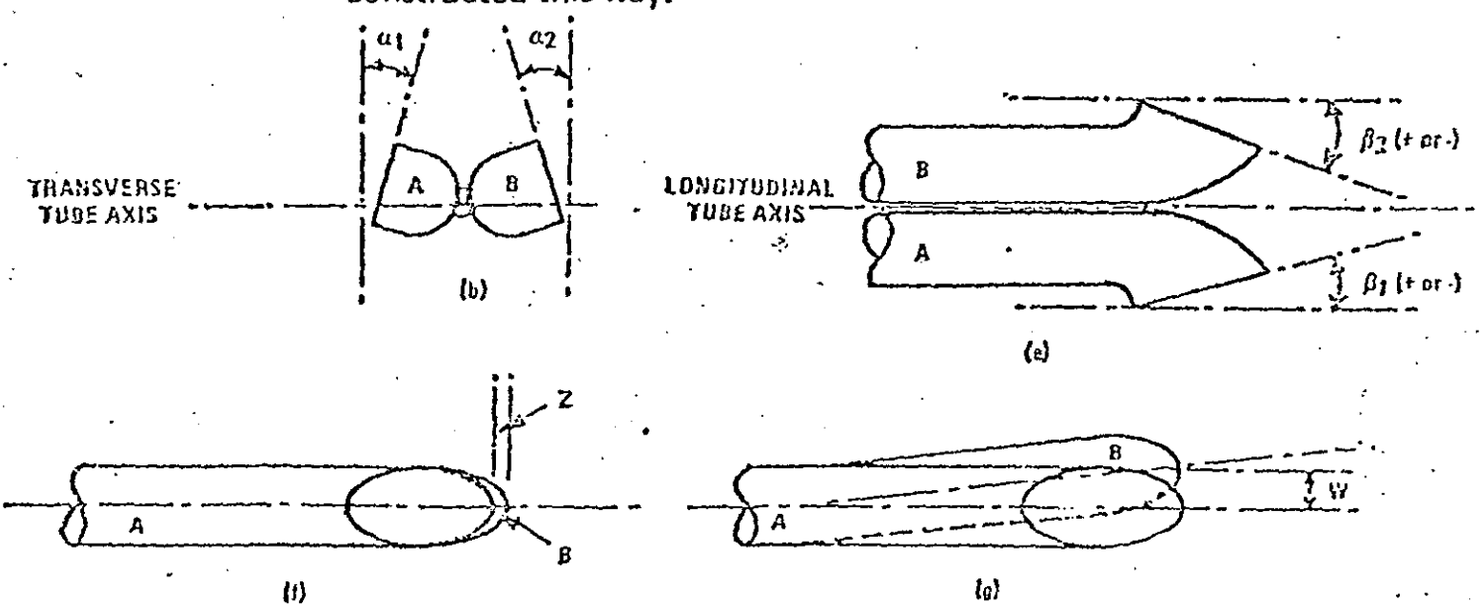


Figure 2-2. Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.



a_1 3° LESS THAN 10°

a_2 1°

b_1 1.5° LESS THAN 5°

b_2 0.0°

z .014 LESS THAN .32cm (1/8") w .03 LESS THAN .08cm (1/32")

Figure 2-3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect the baseline value of $C_p(s)$ so long as α_1 and $\alpha_2 < 10°$, β_1 and $\beta_2 < 5°$, $z < 0.32$ cm (1/8 in.) and $w < 0.08$ cm (1/32 in.) (citation 11 in Section 6).

3.6 *Determine the stack gas dry molecular weight.* For combustion processes or processes that emit essentially CO_2, O_2, CO, and N_2, use Method 3. For processes emitting essentially air, an analysis need not be conducted; use a dry molecular weight of 29.0. For other processes, other methods, subject to the approval of the Administrator, must be used.

3.7 Obtain the moisture content from Reference Method 4 (or equivalent) or from Method 5.

3.8 Determine the cross-sectional area of the stack or duct at the sampling location. Whenever possible, physically measure the stack dimensions rather than using blueprints.

4. *Calibration*

4.1 *Type S Pitot Tube.* Before its initial use, carefully examine the Type S pitot tube in top, side, and end views to verify that the face openings of the tube are aligned within the specifications illustrated in Figure 2-2 or 2-3. The pitot tube shall not be used if it fails to meet these alignment specifications.

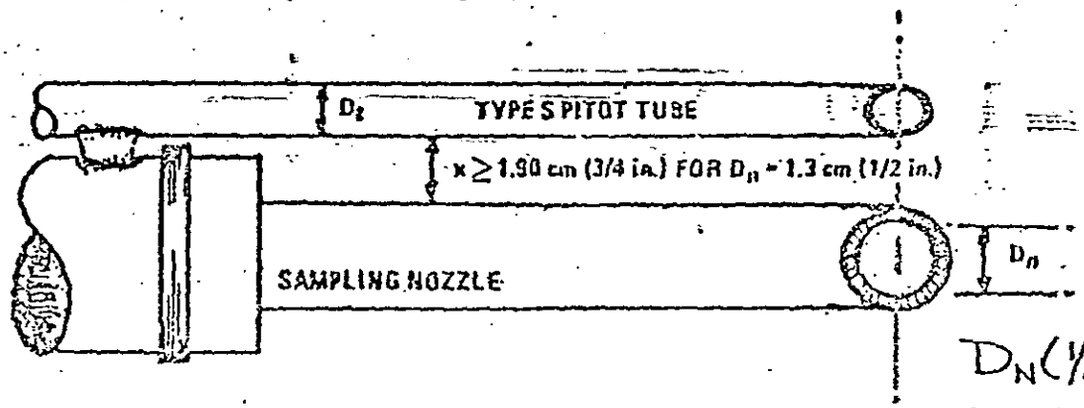
After verifying the face opening alignment, measure and record the following dimensions of the pitot tube: (a) the external tubing diameter (dimension D_t, Figure 2-2b); and (b) the base-to-opening plane distances (dimensions P_A and P_B, Figure 2-2b). If D_t is between 0.48 and 0.95 cm (3/16 and 3/8 in.) and if P_A and P_B are equal and between 1.05 and 1.50 D_t, there are two possible options: (1) the pitot tube may be calibrated according to the procedure outlined in Sections 4.1.2 through 4.1.5 below, or (2) a baseline (standard) coefficient value of 0.99 may be assigned to the pitot tube. Note, however, that if the pitot tube is part of an assembly, calibration may still be required, despite knowledge of the baseline coefficient value (see Section 4.1.1).

If D_t, P_A, and P_B are outside the specified limits, the pitot tube must be calibrated as outlined in 4.1.2 through 4.1.5 below.

4.1.1 *Type S Pitot Tube Assemblies.* During sample and velocity traverses, the location Type S pitot tube is not always used; in many instances, the pitot tube is used in combination with other source-sampling components (thermocouple, sampling probe, nozzle) as part of an "assembly." The presence of other sampling components can sometimes affect the baseline value of the Type S pitot tube coefficient (Citation 9 in Section 6); therefore an assigned (or otherwise known) baseline coefficient value may or may not be valid for a given assembly. The baseline and assembly coefficient values will be identical only when the relative placement of the components in the assembly is such that aerodynamic interference effects are eliminated. Figures 2-6 through 2-8 illustrate interference-free component arrangements for Type S pitot tubes having external tubing diameters between 0.48 and 0.95 cm (3/16 and 3/8 in.). Type S pitot tube assemblies that fail to meet any or all of the specifications of Figures 2-6 through 2-8 shall be calibrated according to the procedure outlined in Sections 4.1.2 through 4.1.5 below, and prior to calibration, the values of the intercomponent spacings (pitot-nozzle, pitot-thermocouple, pitot-probe sheath) shall be measured and recorded.

NOTE.—Do not use any Type S pitot tube assembly which is constructed such that the impact pressure opening plane of the pitot tube is below the entry plane of the nozzle (see Figure 2-6b).

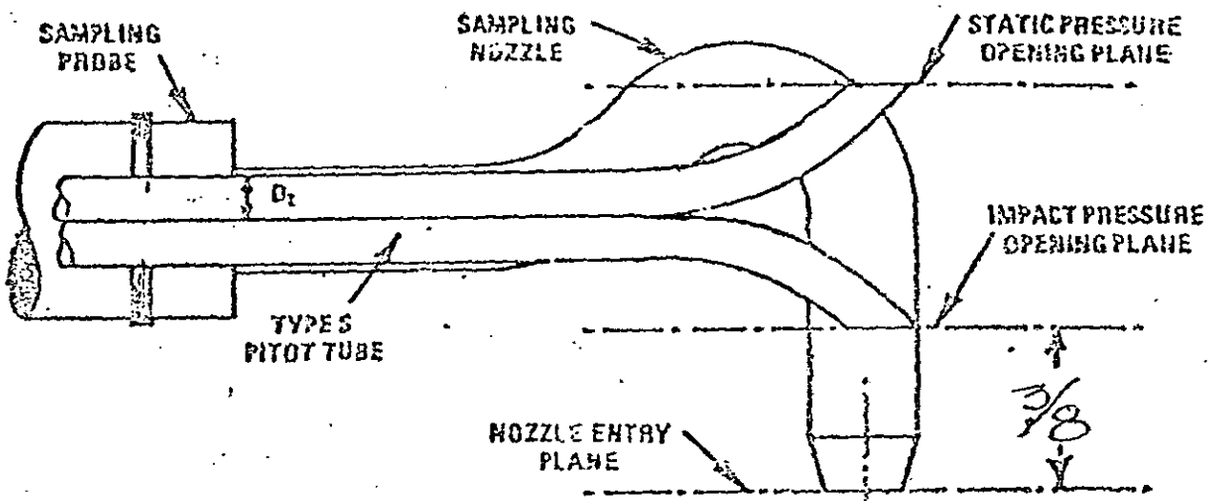
4.1.2 *Calibration Setup.* If the Type S pitot tube is to be calibrated, one leg of the tube shall be permanently marked A, and the other, B. Calibration shall be done in a flow system having the following essential design features:



$D_N(1/2)\ x = .860$

$D_N(5/8)\ x = .780$

A. BOTTOM VIEW; SHOWING MINIMUM PITOT-NOZZLE SEPARATION.



B. SIDE VIEW; TO PREVENT PITOT TUBE FROM INTERFERING WITH GAS FLOW STREAMLINES APPROACHING THE NOZZLE, THE IMPACT PRESSURE OPENING PLANE OF THE PITOT TUBE SHALL BE EVEN WITH OR ABOVE THE NOZZLE ENTRY PLANE.

Figure 2-6. Proper pitot tube - sampling nozzle configuration to prevent aerodynamic interference; buttonhook - type nozzle; centers of nozzle and pitot opening aligned; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

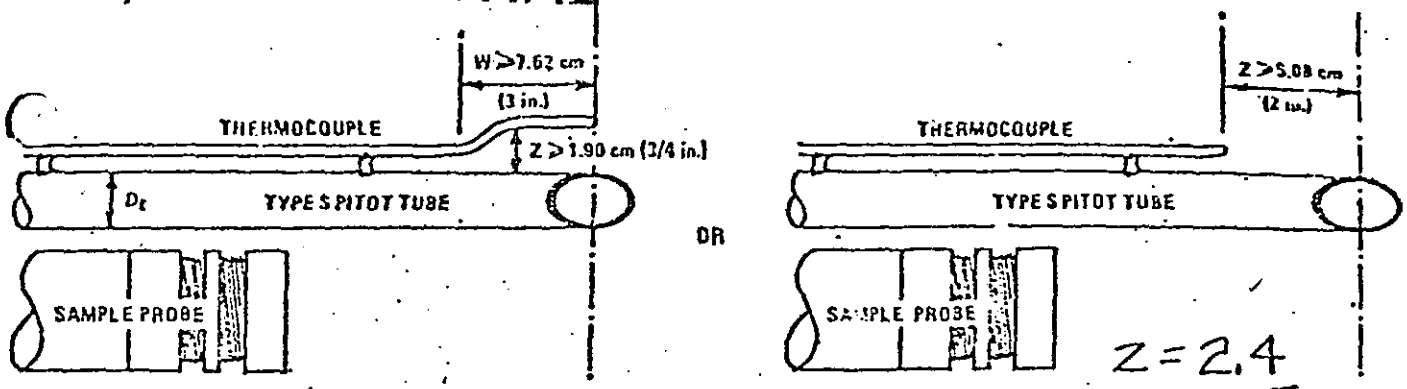


Figure 2-7. Proper thermocouple placement to prevent interference; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

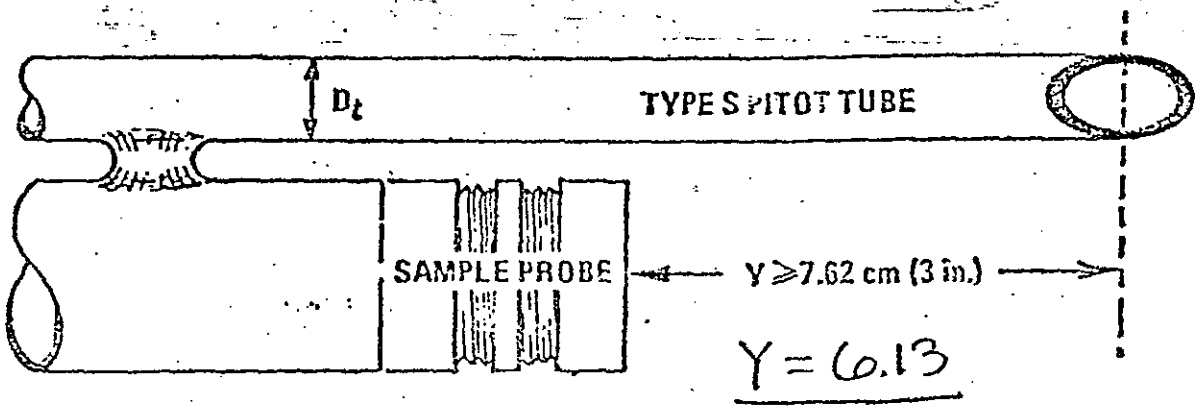


Figure 2-8. Minimum pitot-sample probe separation needed to prevent interference; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

4.1.2.1 The flowing gas stream must be confined to a duct of definite cross-sectional area, either circular or rectangular. For circular cross-sections, the minimum *duct diameter* shall be 30.5 cm (12 in.); for rectangular cross-sections, the width (shorter side) shall be at least 25.4 cm (10 in.).

4.1.2.2 The cross-sectional area of the calibration duct must be constant over a distance of 10 or more duct diameters. For a rectangular cross-section, use an equivalent diameter, calculated from the following equation, to determine the number of duct diameters:

$$D_e = \frac{2LW}{(L+W)}$$

Equation 2-1

Where:
D_e = Equivalent diameter
L = Length
W = Width

To ensure the presence of stable, *fully developed flow* patterns at the calibration site, or "test section," the site must be located at least eight diameters downstream and two diameters upstream from the nearest disturbances.

Note.—The eight- and two-diameter criteria are not absolute; other test section locations may be used (subject to approval of the Administrator), provided that the flow at the test site is stable and demonstrably parallel to the duct axis.

4.1.2.3 The flow system shall have the capacity to generate a test-section velocity around 915 m/min (3,000 ft/min). This velocity must be constant with time to guarantee *steady flow during calibration. Note* that Type S pitot tube coefficients obtained by single-velocity calibration at 915 m/min (3,000 ft/min) will generally be valid to within ±3 percent for the measurement of velocities above 305 m/min (1,000 ft/min) and to within ±5 to 6 percent for the measurement of velocities between 180 and 305 m/min (600 and 1,000 ft/min). If a more precise correlation between C_p and velocity is desired, the *flow system shall have the capacity* to generate at least four distinct, time-invariant test-section velocities covering the velocity range from 180 to 1,525 m/min (600 to 5,000 ft/min), and calibration data shall be taken at regular velocity intervals over this range (see Citations 9 and 14 in Section 6 for details).

4.1.2.4 Two entry ports, one each for the standard and Type S pitot tubes, shall be cut in the test section; the *standard pitot entry port* shall be located slightly downstream of the Type S port, so that the standard and Type S impact openings will lie in the same cross-sectional plane during *calibration. To facilitate alignment* of the pitot tubes during calibration, it is advisable that the test section be constructed of plexiglas or some other transparent material.

4.1.3 Calibration Procedure. Note that this procedure is a general one and must not be used without first referring to the special considerations presented in Section 4.1.5. Note also that this procedure applies only to *single-velocity calibration.* To obtain calibration data for the A and B sides of the Type S pitot tube, proceed as follows:

4.1.3.1 *Make sure that the manometer is properly* filled and that the oil is free from contamination and is of the proper density. Inspect and leak-check all pitot lines; repair or replace if necessary.

4.1.3.2 Level and zero the manometer. Turn on the fan and allow the flow to stabilize. Seal the Type S entry port.

4.1.3.3 Ensure that the manometer is level and zeroed. Position the *standard pitot tube* at the calibration point (determined as outlined in Section 4.1.3.1), and align the tube so that its tip is pointed directly into the flow. Particular care should be taken in aligning the tube to avoid yaw and pitch angles. Make sure that the entry port surrounding the tube is properly sealed.

4.1.3.4 Read Δp_{std} and record its value in a data table similar to the one shown in Figure 2-9. Remove the *standard pitot tube* from the duct and disconnect it from the manometer. Seal the standard entry port.

4.1.3.5 Connect the Type S pitot tube to the manometer. Open the Type S *entry port. Check the manometer* level and zero. Insert and align the Type S pitot tube so that its A side impact opening is at the same point as was the standard pitot tube and is pointed directly into the flow. Make sure that the entry port surrounding the *tube* is properly sealed.

4.1.3.6 Read Δp and enter its value in the data table. Remove the Type S pitot tube from the duct and *disconnect it from the manometer.*

4.1.3.7 Repeat steps 4.1.3.3 through 4.1.3.6 above until three pairs of Δp readings have been obtained.

4.1.3.8 *Repeat steps 4.1.3.3 through 4.1.3.7 above for* the B side of the Type S pitot tube.

4.1.3.9 Perform calculations, as described in Section 4.1.4 below.

4.1.4 Calculations.

4.1.4.1 For each of the six pairs of Δp readings (i.e., three from side A and three from side B) obtained in Section 4.1.3 above, calculate the value of the Type S *pitot tube coefficient as follows:*

SUMMARY OF TEST VARIABLES

CONFIDENTIAL

SOURCE NAME CONOCO CHEMICALS PVC PLANT
DATE OF TEST April 28, 1981 RUN NO. 504-1

PITOT TUBE, COEF.	0.84	DIMENSIONLESS
VELOCITY HEAD	1.76	INCHES OF H20
MOLECULAR WEIGHT OF STACK GAS (WET)	28.20	LB/LB-MOLE
AVG. PRESSURE ACROSS METER	0.77	INCHES OF H20
BAROMETRIC PRESSURE	29.93	INCHES OF HG
ABSOLUTE TEMPERATURE AT METER	555.3	RANKIN
TOTAL PARTICULATE MATTER COLLECTED	0.5	MILLIGRAMS
TOTAL VOLUME OF LIQUID COLLECTED	61.4	MILLILITERS
STACK PRESSURE	29.88	INCHES OF HG
ABSOLUTE STACK TEMPERATURE	620.5	RANKIN
TIME SAMPLED	75	MINUTES
VOLUME AT THE METER	41.38	CUBIC FEET
PROBE DIAMETER	0.152	INCHES
STACK AREA	5.293	SQUARE FEET
AVG STACK VELOCITY (STACK CONDITIONS)	81.71	FT/SEC
VOLUME OF H20 VAPOR (STANDARD CONDITIONS)	2.388	CUBIC FT
DRY GAS VOLUME (STANDARD CONDITIONS)	38.99	CUBIC FT
% H20 VAPOR	6.90	
CONCENTRATION OF PARTICULATE IN STACK GAS	0.000198	GR/FT3, DRY
CONCENTRATION OF PARTICULATE IN STACK GAS	2.82×10^{-8}	LBS/FT3, DRY
EMISSION RATE	0.035	LBS/HR
% ISOKINETIC	106.4	

CONFIDENTIAL

SOURCE NAME CONOCO CHEMICALS PVC PLANT
DATE OF TEST April 28, 1981 RUN NO. 504-2

PITOT TUBE, COEF.	0.84	DIMENSIONLESS
VELOCITY HEAD	1.83	INCHES OF H2O
MOLECULAR WEIGHT OF STACK GAS (WET)	28.30	LB/LB-MOLE
AVG. PRESSURE ACROSS METER	0.81	INCHES OF H2O
BAROMETRIC PRESSURE	29.93	INCHES OF HG
ABSOLUTE TEMPERATURE AT METER	566.5	RANKIN
TOTAL PARTICULATE MATTER COLLECTED	0.4	MILLIGRAMS
TOTAL VOLUME OF LIQUID COLLECTED	53.1	MILLILITERS
STACK PRESSURE	29.87	INCHES OF HG
ABSOLUTE STACK TEMPERATURE	624.0	RANKIN
TIME SAMPLED	75	MINUTES
VOLUME AT THE METER	42.87	CUBIC FEET
PROBE DIAMETER	0.152	INCHES
STACK AREA	5.293	SQUARE FEET
AVG STACK VELOCITY (STACK CONDITIONS)	83.46	FT/SEC
VOLUME OF H2O VAPOR (STANDARD CONDITIONS)	2.498	CUBIC FT
DRY GAS VOLUME (STANDARD CONDITIONS)	39.60	CUBIC FT
% H2O VAPOR	5.93	
CONCENTRATION OF PARTICULATE IN STACK GAS	0.00016	GR/FT3, DRY
CONCENTRATION OF PARTICULATE IN STACK GAS	2.23×10^{-8}	LBS/FT3, DRY
EMISSION RATE	0.028	LBS/HR
% ISOKINETIC	105.4	

CONFIDENTIAL

SOURCE NAME CONOCO CHEMICALS PVC PLANT
DATE OF TEST April 28, 1981 RUN NO. 504-3

PITOT TUBE, COEF.	0.84	DIMENSIONLESS
VELOCITY HEAD	1.72	INCHES OF H2O
MOLECULAR WEIGHT OF STACK GAS (WET)	28.17	LB/LB-MOLE
AVG. PRESSURE ACROSS METER	0.75	INCHES OF H2O
BAROMETRIC PRESSURE	29.93	INCHES OF HG
ABSOLUTE TEMPERATURE AT METER	557.0	RANKIN
TOTAL PARTICULATE MATTER COLLECTED	0.5	MILLIGRAMS
TOTAL VOLUME OF LIQUID COLLECTED	62.4	MILLILITERS
STACK PRESSURE	29.89	INCHES OF HG
ABSOLUTE STACK TEMPERATURE	521.2	RANKIN
TIME SAMPLED	75	MINUTES
VOLUME AT THE METER	40.85	CUBIC FEET
PROBE DIAMETER	0.152	INCHES
STACK AREA	5.293	SQUARE FEET
AVG STACK VELOCITY (STACK CONDITIONS)	80.99	FT/SEC
VOLUME OF H2O VAPOR (STANDARD CONDITIONS)	2.939	CUBIC FT
DRY GAS VOLUME (STANDARD CONDITIONS)	38.37	CUBIC FT
% H2O VAPOR	7.11	
CONCENTRATION OF PARTICULATE IN STACK GAS	0.00020	GR/FT3, DRY
CONCENTRATION OF PARTICULATE IN STACK GAS	2.87×10^{-8}	LBS/FT3, DRY
EMISSION RATE	0.035	LBS/HR
% ISOKINETIC	106.0	

PLANT Condeo Chemicals-Orc PVC

RUN NO. #3 (Continued)

LOCATION M-504

DATE 4-29-81

OPERATOR McMeed

SAMPLE BOX NO. -

METER BOX NO. -

CONFIDENTIAL

AMBIENT TEMP. °F 72

BAR. PRESS. IN. Hg 29.93

ASSUMED MOISTURE % 7.0

HEATER BOX SETTING °F

PROBE TIP DIA., IN.

PROBE LENGTH 5 ft

PROBE HEATER SETTING 6

POINT	θ CLOCK TIME	V_m DRY GAS METER, Ft^3	Δp test PITOT IN. H_2O	ΔH ORIFICE IN. H_2O		t_m DRY GAS TEMP. °F		PUMP VACUUM IN. Hg GAUGE	BOX TEMP °F	t_c IMPINGER TEMP °F	p_s STACK PRESS - IN. H_2O	t_s STA TEM °F
				REQUIRED	ACTUAL	INLET	OUTLET					
# 25	75	761.35	1.65	0.72	0.72	119	84	3.0	285	59	0.56	163
2												
3												
4												
5												
6												
7												
8		(40.85)	(1.724)	(0.754)	(0.754)	(111.2)	(82.1)	(3.0)	(285.8)	(60.4)	(0.616)	(161.)
9												
10						(97.0)						
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
TOTAL						Avg.	Avg.					
						Avg.						

20

ABB 0026348