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

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

AMMONIUM NITRATE
AP-42 Section 6.8
Reference Number
15

South Coast
AIR QUALITY MANAGEMENT DISTRICT
SOUTHERN ZONE
1610 E. BALL ROAD, ANAHEIM, CALIFORNIA 92805 (714) 991-7200

REPORT OF SOURCE TEST

conducted at

COLLIER CARBON AND CHEMICAL CORP.

2601 E. Imperial Highway
Brea, California

January 12, 1978

PARTICULATE MATTER EMISSION

from the

AMMONIUM NITRATE PRILL TOWER

Test Conducted By:

C. A. Anderson
W. E. Misa

Report By:

W. E. Misa
A.P. Engineer

January 18, 1978

Reviewed By:

W. G. Bope
Chief, Technical Services

January 20, 1978

Test No. SZ 78-3

INTRODUCTION

South Coast Air Quality Management District personnel conducted a source test on January 12, 1978 to determine the concentration and emission rate of particulate matter in the exhaust gases of the Ammonium Nitrate Prill Tower. The production rate was 9.6 tons/hr at the time the test was performed.

TEST RESULTS

Particulate Matter (One hour averaging time)

0.0182	grains per standard cubic foot (concentration)
0.0185	grains per standard dry cubic foot (concentration)
4.0	pounds per hour (emission rate)
102	% isokinetic sampling Rate

Stack Gas Flow Rate

27,500	actual cubic feet per minute at 102°F
25,600	standard cubic feet per minute
25,200	standard dry cubic feet per minute

EMISSION LIMITS

Rule 404 of the South Coast Air Quality Management District limits the concentration of particulate matter in exhaust gases to 0.0559 grains per standard dry cubic foot for a gas flow rate of 25,200 standard dry cubic feet per minute. Rule 405 of the District limits the emission rate of solid particulate matter to 11.6 pounds per hour for a production rate of 9.6 tons per hour.

REFERENCES

Rules and Regulations, South Coast Air Quality Management District
Source Testing Manual, L.A. APCD (1972)

Arrival at 9:00 AM; departure at 12:00 Noon
Company representative contacted: B. Anderson
SCAQMD personnel present: C. A. Anderson, W. E. Misa

DISCUSSION

A 16-point velocity traverse was made across the discharge side of the duct, located between the three exhaust fans and enclosed room, downstream of the spray nozzle bank (see Sketch II). An integrated particulate matter sample was taken using the wet impingement sampling train (Figure III) at the four traverse points located near the center of the duct. Probe and line washings and the impinger collections were evaporated to dryness in tared beakers at 105°C, overnight. The tared back-up filter was dried overnight in a desiccator with anhydrous silica gel.

Test No.

COLLIER CARBON
AMMONIUM NITRAT
PRILL TOWER
1-12-78

Volume of water collected:

$$\frac{(21 \text{ ml})(.00267)(520^\circ \text{ R})}{(29.92 \text{ in Hg})} = 0.97 \text{ SCF}$$

Volume of gas metered:

$$(60.16 \text{ CF})\left(\frac{520^\circ\text{R}}{533^\circ\text{R}}\right)\left(\frac{30.06 + \frac{1.7}{13.6}}{(29.92)}\right) = 59.21 \text{ SCF}$$

Total volume sampled: 0.97 + 59.21 = 60.18 SCF

Moisture content of stack gases:

$$\left(\frac{.97}{.97 + 59.21}\right)(100) = 1.61 \text{ \% water}$$

Average Molecular Weight of Stack Gases:

Constituent	mole fraction		Corr. to wet basis		M.W.	
~~CO_2~~ Dry Air	.964	x		x	28.95	= 28.0
O_2		x		x	32	=
N_2		x		x	28	=
H_2O	.016	x		x	18	= .29
				ΣM.W.		= 28.78

Velocity of stack gases:

$$v = (2.9)(1.00)(\sqrt{\Delta H})\sqrt{\frac{29.92}{30.06} \times \frac{28.95}{28.78}} \times \sqrt{\Delta H}$$

$$= 51.0 \text{ fps @ } 167^\circ \text{ F}$$

Total flow of stack gases:

$$Q_s = (A_s) \times (v) \times (60 \text{ sec/min})$$
$$= (9.0 \text{ ft}^2) \times (51 \text{ ft/sec}) \times (60 \text{ sec/min})$$
$$= 27{,}500 \text{ ACFM}$$

$$Q_{std} = Q_s \times \left(\frac{P_s}{P_{std}}\right) \times \left(\frac{T_{std}}{T_s}\right)$$
$$= 27{,}500 \times \left(\frac{30.06}{29.92}\right) \times \left(\frac{520}{532}\right)$$
$$= 25{,}800 \text{ SCFM}$$

$$Q_{std\ dry} = Q_{std} \times \frac{(100\% - \%\ H_2O)}{100\%}$$

$$= (25{,}600) \times (0.984)$$

$$= 25{,}200 \text{ SDCFM}$$

Concentration of Particulate Matter:

$$C_s = \frac{(W)\ (15.43\ gr/gm)}{(Vm,\ std)}$$

$$= \frac{(.0710\ g)\ (15.43)}{(60.18\ SCF)}$$

$$= .0182\ gr/SCF\ ;\ (.0185\ gr/SDCF)$$

Emission Rate (Pollutant Mass Rate):

$$PMR = \frac{(Cs)\ (SCFM)\ (60\ min/hr)}{(7000\ gr/lb)}$$

$$= 4.0 \text{ lb/hr}$$

% ISOKINETIC SAMPLING RATE:

$$= \frac{60.18}{\frac{\pi}{4}\left(\frac{.225}{12}\right)^2 63.7 \times 3600 \times \frac{30.06}{29.92} \times \frac{520}{532}}$$

$$= \frac{60.18}{58.86} = 102\%$$

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
SOUTHERN ZONE
GAS VELOCITY DATA

Company COLLIER
Test Date 1-12-7.
Time 9:[illegible] AM

Location of Measurements AMMONIUM NITRATE PRILL TOWER (BETWEEN TOP ROOM & FANS)

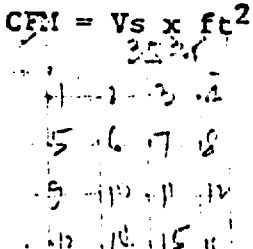
Sample Point	Δ h (in. W.C.)	T (°F)	$\sqrt{\Delta hT}$	Velocity (fps)
1	0.25	100	11.83	34.3
2	.75	100	20.49	59.5
3	.75	100	20.49	59.5
4	.30	100	12.96	37.6
5	.55	100	17.55	50.9
6	.90	100	22.45	65.1
7	.81	102	22.11	64.2
8	.55	102	17.58	51.0
9	.60	105	18.41	53.4
10	.78	105	20.99	60.9
11	.88	105	22.30	64.7
12	.55	105	17.63	51.2
13	.25	103	11.86	34.4
14	.40	102	14.99	43.5
15	.50	102	16.76	48.6
16	.30	102	12.98	37.7
		102	17.59	51.0

Pitot tube Factor 1.07 Stack Pressure -.05" H_2O + 30.06 = 30.06" Hg

Cross-section Area of Stack 35 3/4 WIDE X 36 1/4 HIGH = 9 Ft^2

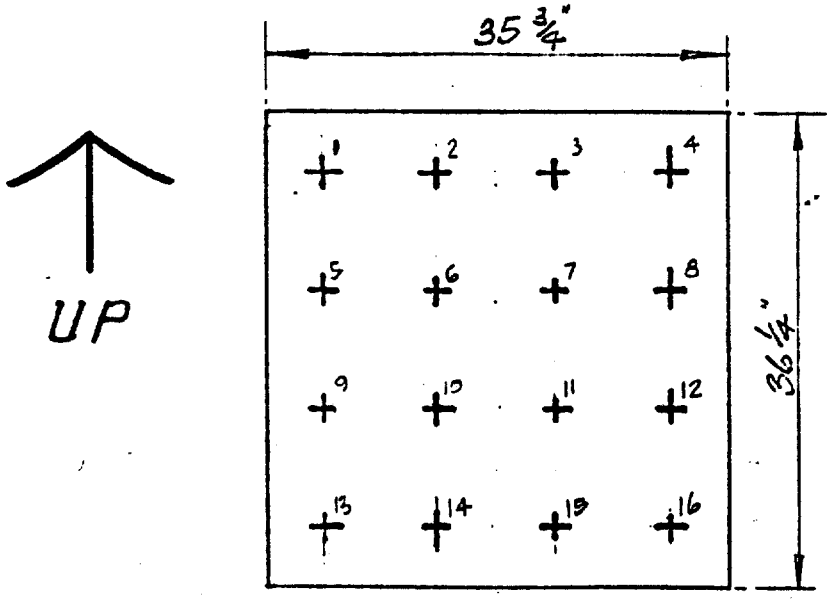
$$Vs = (2.9)(fp)\sqrt{\Delta h} \times Ts \times \frac{29.92}{Ps} \times \frac{28.95}{M.W.} =$$

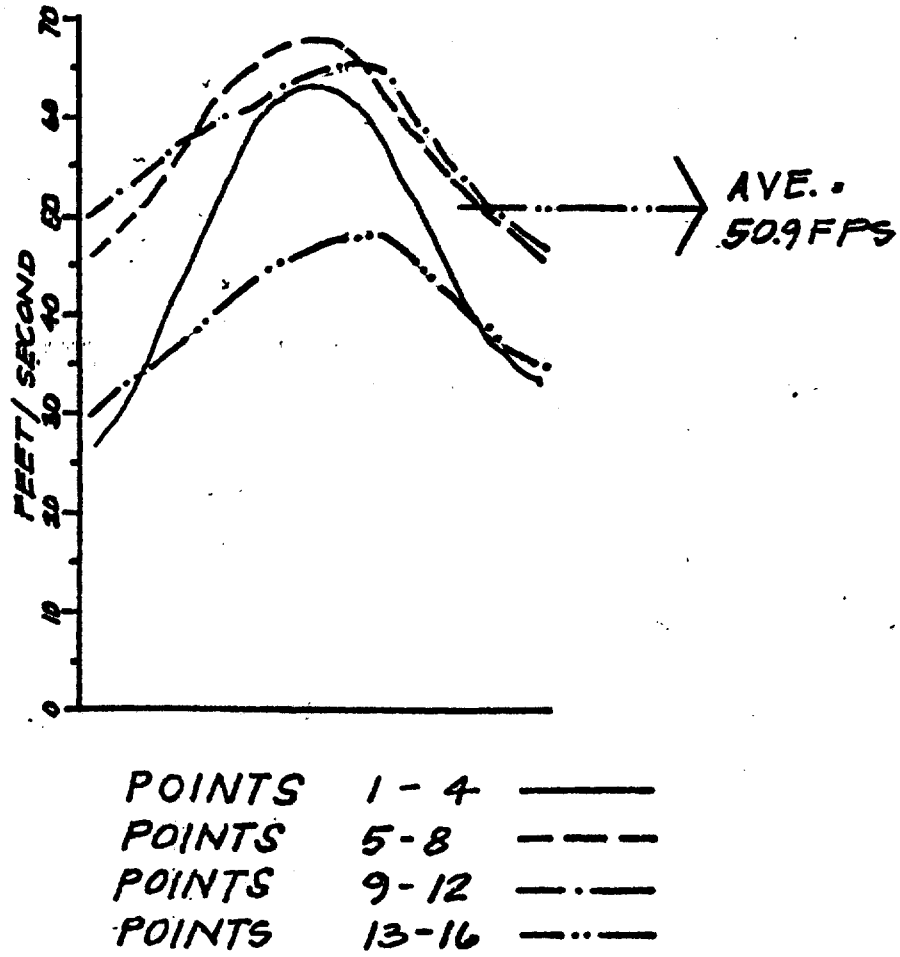
CFM = Vs x ft^2 x 60 sec./min =



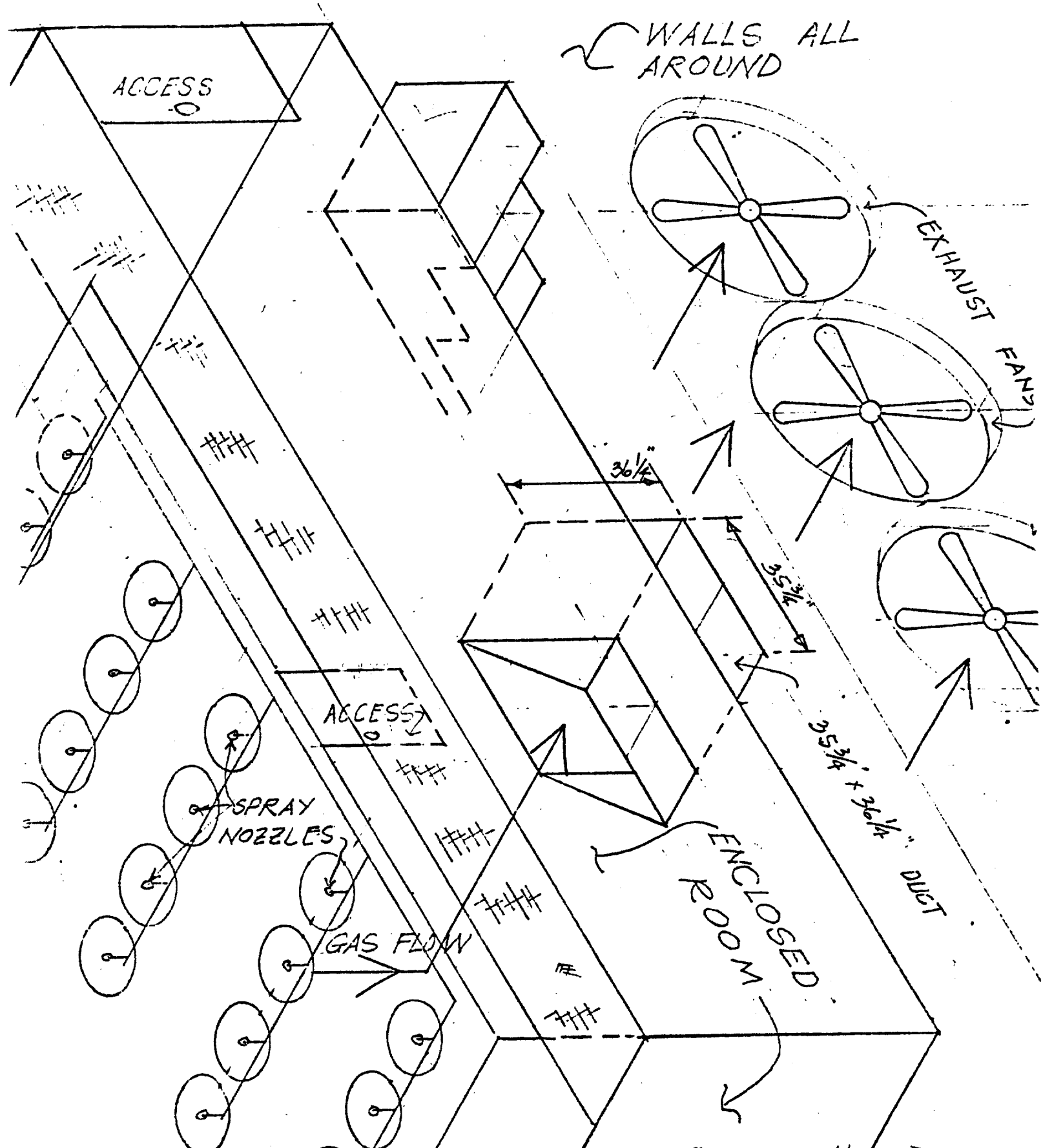
Measurements by ANDERSON, MISA

EXHAUST GAS VELOCITY PROFILE





COLLIER CARBON AMMONIUM NITRATE PRILL TOWER



SOUTHERN ZONE

FIELD DATA

Company Collins

Test Date 1-12-78

Sampling Location American Nitrate Prill Tower — Between Main Top Room & Exhaust Fans.

Sample Point	Time	Meter Reading (CF)	Velocity Head (Δh)	Orifice Differential (Δm) Desired	Orifice Differential (Δm) Actual	Stack Temp. (°F)	Gas Meter Temp. (°F) Inlet	Gas Meter Temp. (°F) Outlet	Pump Vacuum (in. Hg.)	Final Impinger Temp. (°F)	Filter Box Temp (°F)
6	10:37	0.00		1.75	1.75		72	65	15		
	10:42	9.00			1.75		74	66	15		
7	10:52	16.0		1.70	1.70		76	67	15		
	10:57	20.8			1.70		76	67	15		
	11:02	25.8			1.70		77	68	15		
10	11:07	30.5		1.65	1.65		78	68	15		
	11:12	35.8			1.65		80	69	15		
	11:17	40.6			1.65		82	70	15		
11	11:22	45.8		1.72	1.72		82	70	15		
	11:27	50.9			1.72		82	70	15		
	11:32	56.0			1.72		82	70	15		
	11:37	61.14									
					1.70						

73

Final metered volume 61.14 CF

Meter correction factor .984

Corrected metered volume 60.16 CF.

Sample collected by MISA

1225

Gravimetric Data

Company Collier Carbon - 1

Test Date

Sample Train Configuration WET IMPINGEMENT

Sample Type PARTICULATE

Filter

Filter No.	Weights
401	0.1398
	.1398
	.0000

Nozzle

Container No.	Weights

Probe & Line

Container No.	Weights
1	62.6160
	62.6072
	.0092

Knockout Bottle

Container No.	Weights
3	65.27
	65.2
	0.0

First Impinger

Container No.	Weights
5	63.2142
	63.1995
	0.0147
6	67.0486
	67.0442
	.0044

Second Impinger

Container No.	Weights
4	63.4167
	63.4148
	.0019
21	66.3562
	66.3550
	.0012

Moisture

Impingers	K.O.	1st
Final Volume	2	101
Initial Volume		100
Net Increase	2	1

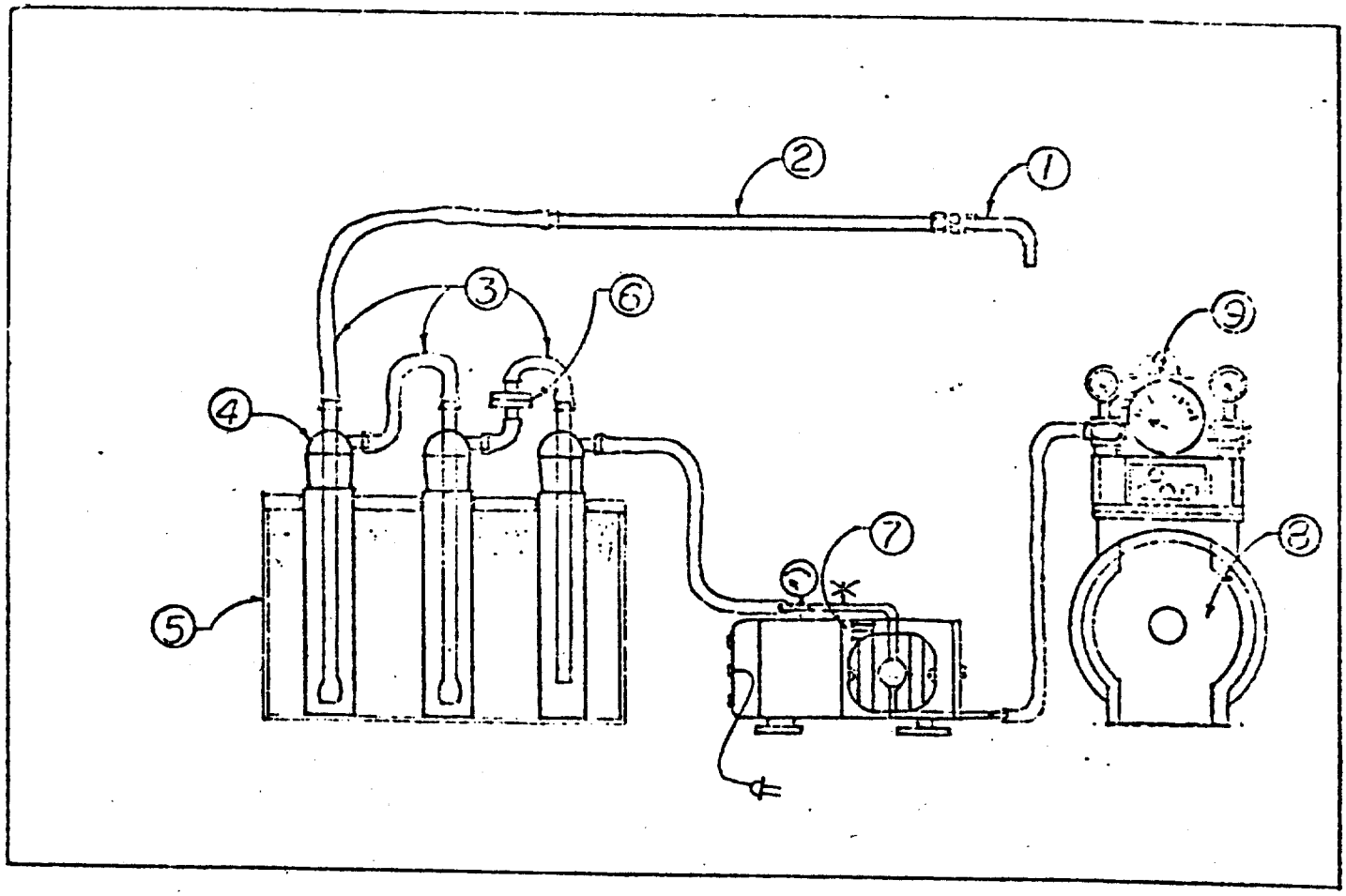
Silica Gel	
Final Weight	238 g
Initial Weight	220 g
Net Increase	18 g

Total Moisture 21

Probe .0092
K.O. — .0396
1st IMP — .0191
2nd IMP — .0031
.0710

Total Particulate Matter Collected .0710

WET IMPINGEMENT SAMPLING TRAIN



1. ISOKINETIC NOZZLE 0.225" I.D.
2. PROBE, STAINLESS STEEL
3. FLEXIBLE TUBING
4. GREENBURG-SMITH IMPINGERS: FIRST TWO WITH 100 ml DEIONIZED H_2O EACH, LAST WITH 200 G. SILICA GEL, 6-16 MESH, INDICATING.
5. ICE WATER BATH
6. BACKUP FILTER GELMAN A GLASS FIBER
7. VACUUM PUMP, DIAPHRAGM TYPE.
8. DRY GAS TEST METER
9. ORIFICE FLOWMETER AND DIFFERENTIAL PRESSURE GAUGE.

FIGURE III