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.

AP42 Section: 11.1

Reference Number: 289

Title: Source Sampling For Particulate Emissions, South Coast Carlsbad, Carlsbad, CA,

San Diego County Air Pollution, San Diego, CA,

September 19, 1991.

South Coast- Escondido on 9/91 P.O.#1207 TE!
SAN DIEGO AIR POLLUTION CONTROL DISTRICT, 9150 CHESAPEAKE DRIVE, SAN DIEGO, CA. 92123

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: South Coast-Escondido
500 Tulip St.
Escondido, CA 92025

TEST #: 91262.0 P.O.# 1207 TEST DATE: 9/19/91

Type of plant (Asphalt /Perlite / Combustion) : asphalt

UNIT TESTED: Baghouse

EQUIPMENT: Asphalt batch plant

TESTED BY:	David Shina, Gerald Hunter, Linda Twaddle	DATE: 9/19/91
SITE PERSONNEL:	Ken Kindler	DATE: 9/19/91
APCD ENGINEER:	none available †	DATE: 9/19/91
LAB ANALYSIS BY:	David Shina	DATE: 10/2/91
REPORT BY:	David Shina	DATE: 10/3/91 DM
REVIEWED BY:	Linda Twaddle	DATE: 10-17-91
APPROVED BY:	Robert Polansky for CWR	DATE: 10/21/91

C.W. RIDENOUR, SENIOR AIR POLLUTION CHEMIST

This report has been reviewed and found to be representative of the testing that was performed.

TEST	PERMIT LIMIT	MEASURED	PERFORMANCE
RULE 54 DUST & FUMES	40 lbs/hr	2.38 lbs/hr	PASSED

† No APCD enginner was available, so engineering data was provided by the site and interpreted by APCD staff.

SUMMARY:

ITEM	Vm	Bws	Cs	E	I	Qstd	ts	PROD RATE
UNITS	ft^3	%	gr/dscf	lbs/hr	%	dscfm	°F	tons/hr
VALUE	53.160	15.96	0.017	2.379	99	1.68E+04	166	190.50

SYSTEM DESCRIPTION:

This asphalt plant combines crushed rock and and sand with asphalt oil in batch loads of varying sizes. The rock and sand are heated in a rotary drum to dry them. The exhaust from this dryer is routed through a baghouse and finally to a stack. It is the emissions from this stack that are the subject of this report.

PROCEDURES:

The procedures and equipment utilized in these tests are based on EPA New Source Performance Standards Method 5. The sampling train was modified to utilize a back-end filter and 5th impinger filled with silica gel (fig. 1), as outlined by the SDAPCD QA manual.

CALCULATIONS

All preliminary assumptions and calculations are based on data obtained from previous tests. All equations are from EPA CFR 40, July 1, 1990, Parts 53-60, Appendix A, Methods 1-5 inclusive.

PARTICULATE SAMPLING:

The test consisted of sampling at 24 traverse points, 12 from each of 2 sample ports (fig.2), collected from 24 inches below the stack (fig.3). All field data was transferred to the computer printout. All calculations were done by the computer and the emissions were compared to rule 54 of the SDAPCD.

ANALYSES:

Gas: An integrated bag sample was collected during the test and analyzed at the APCD lab.
Particulate: All procedures follow EPA guidelines, except where noted in the SDAPCD QA manual.

EQUIPMENT:

All testing and analysis equipment was calibrated according to EPA guidelines.

Analysis:	*Collection:*	*Sampling:*	*Temp./Press.:*
CO2-Anarad AR400	Filter-Gelman	L/S Box-Napp	Thermocouples-Omega
O2-Teledyne Ryan 320 P4	Holder-Gelman	Umbilical cord-Napp	Read out-Omega
Macrobalance-Sargent Welch	Beakers-Pyrex	Cold/Hot box-Napp	Barometric-calc. by APCD
Microbalance-Sartorious	Impingers-Ace	Pitobe tube-Napp	L/S box-Dwyer magnehelic

South Coast- Escondido on [illegible]/91 P.O.#1207 TEST #91262

Trav. Pt	Vm (ft^3)	ΔP (in H2O)	ΔH (in H20)	t 1(unc) (°F)	t 2(unc) (°F)	Stack Temp (°F)	Imp Temp (°F)	velocity (ft/sec)
	411.435							
1		0.880	3.250	80.00	108.00	176.00	52	60.71
2		0.920	3.400	79.00	118.00	169.00	55	61.74
3		1.000	3.700	79.00	119.00	165.00	51	64.16
4		1.050	3.900	79.00	120.00	164.00	49	65.69
5		0.980	3.600	80.00	120.00	165.00	52	63.61
6		0.830	3.100	80.00	120.00	163.00	57	58.36
7		0.550	2.000	80.50	119.00	163.00	58	47.53
8		0.480	1.800	80.00	119.00	162.00	58	44.34
9		0.380	1.400	80.00	119.00	162.00	58	39.46
10		0.400	1.500	81.00	119.00	161.00	54	40.45
11		0.400	1.500	82.00	119.00	164.00	53	40.23
12		0.220	0.810	82.00	118.50	176.00	52	30.36
1		0.670	2.500	84.00	102.00	155.00	51	52.08
2		0.550	2.000	85.00	117.00	167.00	54	47.66
3		0.620	2.300	85.00	120.50	169.00	51	50.85
4		0.620	2.300	85.00	122.50	170.00	53	50.72
5		0.670	2.500	87.00	124.50	171.00	53	52.77
6		0.630	2.300	87.00	125.00	171.00	52	51.17
7		0.700	2.600	88.00	127.00	171.00	54	53.94
8		0.780	2.900	89.00	128.00	166.00	55	56.71
9		0.820	3.000	89.50	129.00	168.00	57	58.24
10		0.750	2.800	90.00	130.00	165.00	54	55.56
11		0.640	2.400	90.00	130.00	166.00	56	51.97
12	464.595	0.530	2.000	98.00	116.00	176.00	63	47.12

	Vm (ft*^3)	ΔP (in H2O)	ΔH (in H2O)	t 1 (°F)	t 2 (°F)	ts (°F)	ti (°F)	vs (ft/sec)
Average:	53.160	0.652	2.482	84.17	120.33	166	55	51.855

MISCELLANEOUS:

Ø = 72.0 min
tn = 24 points
ø = 3.0 min

NOZZLE & PROBE:

Dn = 0.240 in
An = 0.0452 in^2
Cp = 0.850

METER BOX PARAMETERS:

ΔH@ = 2.7254
Y = 0.9782
Box ID = D337

PRESSURES:

Pbar = 29.29 in Hg
Pg = 0.28 in H2O
Vpw @ ts 11.12 in Hg
Silica (yes/no) yes
Vpw @ ti = 0.4359 in Hg

VOLUME:

start leak rate = 0.000 cfm
Pass/Fail PASS
final leak rate = 0.000 cfm
Pass/Fail PASS
Vm 53.160 ft^3

TEMPERATURES:

t1 corr = 0.40 °F
t2 corr = 0.10 °F
tm = 103 °F
ts = 166 °F
ti = 55 °F

STACK PARAMETERS:

circular (yes/no) yes
Ds = 3.15 f t
Length = N/A
As = 7.79 ft^2

LAB DATA:

mn(front) = 0.02603 g
mn(back) = 0.02543 g
mn(total) = 0.0515 g
Vlc 193.49 ml

STACK GAS MEASUREMENTS:

CO2 = 2.90 %
O2 = 16.65 %
CO = 0.00 %
N2 = 80.45 %

TEMPERATURES:

01)	ts = (Σ ts(n))/total n's	166 °F
02)	Ts = ts+460	626 °R
03)	tm= (Σ {(t 1(n)+t 2t(n))/2)/total n's	103 °F
04)	Tm= (t1+t2)/2 + 460	563 °R
05)	ti= (Σ ti(n))/total n's	55 °F
06)	Tstd	528 °R

PRESSURES:

07)	Pbar= {(P @ S.L.)+[ft. above S.L.*(-0.1 in Hg/100ft)]}	29.29 in Hg
08)	Pg= read from pressure sensing device	0.28 in H2O
09)	Ps= Pbar + (Pg/13.6)	29.31 in Hg
10)	ΔH	2.48 in H20
11)	Pm= Pbar+(ΔH/13.6)	29.47 in Hg
12)	Pstd	29.92 in Hg

VOLUME:

13)	Vm= Vm(end)-Vm(begin)	53.160 ft^3
14)	Y	0.9782
15)	Vm'= Vm*Y	52.001 ft^3
16)	Vpw @ ti = from appendix	0.0000 in Hg
17)	corr Vwm = {[(Vm'*Vpw@imp/Ps)*Pm*Tstd]/(Tm*Pstd)}	0.0000 ft^3
18)	Vm std = {[Vm'*(Tstd/Tm)*(Pm/Pstd)]-corr Vwm}	48.082 ft^3
19)	Vlc= (Σ Volume of impingers)	193.49 ml
20)	∂	0.002201 lb/ml
21)	R	21.85 Hg-ft^3/°R-lb-mo
22)	MwH2O	18.00 g/g-mo
23)	Vw std = {[(Vlc*∂*R*Tstd)/(Pstd*MwH2O)]+corr Vwm}	9.1327 ft^3

CALCULATIONS:

MOISTURE-

24)	Bws(1) =(Vw std)/(Vw std+Vm std)100	15.96 %	
25)	Vpw @ ts = from appendix	11.12 in Hg	
26)	Bws(2) =[(Vpw @ ts)/Ps]*100	37.94 %	
27)	Bws = lower value of equation 24 or 26		15.96 %

MOLECULAR WEIGHT-

28)	%O2	16.65 %
29)	%CO2	2.90 %
30)	%N2+inerts+%CO	80.45 %
31)	Md=[0.440(%CO2)]+[0.320*(%O2)]+[0.280(%N2+inerts+%CO)]	29.13 g/g*mole
32)	Ms=Md*(1-Bws)+18.0*(Bws)	27.35 g/g*mole

FLOW-

33)	ΔP	0.652 in H2O
34)	Cp	0.850
35)	vs= 85.49*Cp*{[(Ts*ΔP)/(Ps*Ms)]^.5}	51.855 ft/s
36)	As=3.14*[(Ds)^2/4]	7.79 ft^2
37)	Qs = (vs)*As*60	2.42E+04 acfm
38)	Qstd =17.64*Qs*(1-Bws)*Ps/Ts	1.68E+04 dscfm

EMISSIONS-

FRONT HALF

39)	mn (front)		0.02603 g
40)	Cs (front) =15.43*mn(front)/Vm std	0.00835 gr/dscf=	0.008 grains/dscf
41)	E (front) = (0.00857)*(Qsd)*Cs (front)		1.20 lbs/hr

BACK HALF

42)	mn (back)		0.02543 g
43)	Cs (back) =15.43*mn(back)/Vm std	0.00816 gr/dscf=	0.008 grains/dscf
44)	E (back) = (0.00857)*(Qsd)*Cs (back)		1.18 lbs/hr

TOTAL

45)	mn (total) = mn(front)+mn(back)		0.05146 g
46)	Cs (total) =15.43*mn(total)/Vm std	0.01651 gr/dscf=	0.017 grains/dscf
47)	E (total) = (0.00857)*(Qsd)*Cs (total)		2.38 lbs/hr

ISOKINETICS:

48)	An=3.14*[(Dn)^2/4]		0.0452 in^2
49)	I=.09450(Ts*Vm std)/Ps*vsAnØ(1-Bws)	98.52 %=	99 %

APPENDIX

SAN DIEGO AIR POLLUTION CONTROL DISTRICT, 9150 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123

LABORATORY ANALYSIS OF PARTICULATE TEST

TEST SITE: South Coast-Escondido
500 Tulip St.
Escondido, CA 92025

TEST # 91262.0 P.O.# 1207 TEST DATE: 9/19/91

LAB ANALYSIS BY: David N. Shina DATE: 10/2/91

LAB REPORT BY: David N. Shina DATE: 10/3/91

REVIEWED BY: Linda Twaddle DATE: 10-17-91

(1) IMPINGER VOLUMES

	FINAL WEIGHT			INITIAL WEIGHT			NET WEIGHT	
#1	682.37	g	-	554.73	g	=	127.64	g
#2	579.72	g	-	543.27	g	=	36.45	g
#3	460.39	g	-	448.01	g	=	12.38	g
#4	459.54	g	-	453.13	g	=	6.41	g
SILICA GEL CONTAINER:								
#5	894.62	g	-	884.01	g	=	10.61	g

Tot. Vol. = 193.49 g

(2) BLANKS

STD = Net Wgt(solv) / Tot. Vol(solv. used)

	ACETONE:	WATER:	ORGANIC:
VOLUMES:			
BKR ID =	91006	91038	
Initial =	500.00 ml	250.00 ml	ml
tot. Rinses =	45.00 ml	45.00 ml	ml
Tot. Vol =	545.00 ml	295.00 ml	0.00 ml
WEIGHTS:			
final =	30.6856 g	28.6576 g	g
initial =	30.6845 g	28.6572 g	g
net =	0.0011 g	0.0004 g	0.0000 g
LIMIT:	0.001% = 10 ppm = 0.000010g/ml	4ppm = 4mg/L = 0.000004g/ml	0.001% = 10 ppm = 0.000010g/ml
STD =	2.01835E-06 g/ml	1.35593E-06 g/ml	N/A g/ml
	0.000202 %	0.000136 %	N/A %
=	2.02 ppm	1.36 ppm	N/A ppm
The Blank	PASSED	PASSED	N/A

(3) WEIGHT

FRONT HALF

ACETONE

WEIGHT (uncorrected):

BKR ID= 91005
final= 30.4909 g
initial= 30.4672 g Wgt. Ac= 0.0237 g

VOLUME:

Initial= 250.00 ml
tot. rinses= 50.00 ml
Sep funnel= _____ ml Tot. Vol= 300.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Acetone STD = 0.000606 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.023094 g

WATER:

WEIGHT (uncorrected):

BKR ID= 91048
final= 26.8523 g
initial= 26.8489 g Wgt. Water= 0.0034 g

VOLUMES:

initial= 200.00 ml
tot. Rinses= 45.00 ml
Tot. Vol = 245.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000498 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.002932 g

ORGANIC:

WEIGHT (uncorrected):

BKR ID= _____
final= _____ g
initial= _____ g Wgt. Org= 0.0000 g

VOLUMES:

tot. Rinses= _____ ml Tot. Vol= 0.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Organic STD = N/A g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= N/A g

FILTERS:

WEIGHT:

ID No.= _____
final= _____ g
initial= _____ g Wgt. Filter= 0.0000 g

BACK HALF

ACETONE

WEIGHT (uncorrected):

BKR ID= 91051
final= 28.6898 g
initial= 28.6839 g Wgt. Ac.= 0.0059 g

VOLUME:

Initial= 360.00 ml
tot. Rinses= 45.00 ml
Sep. funnel= _____ ml Tot. Vol= 405.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Acetone STD = 0.000817 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.005083 g

WATER:

WEIGHT (uncorrected):

BKR ID= 91043
final= 29.2708 g
initial= 29.2588 g Wgt. Water= 0.0212 g

VOLUMES:

initial= 350.00 ml
tot. Rinses= 50.00 ml
imp. change= 202.37 ml Tot. Vol= 602.37 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000867 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.020343 g

ORGANIC:

WEIGHT (uncorrected):

BKR ID= _____
final= _____ g
initial= _____ g Wgt. Org= 0.0000 g

VOLUMES:

tot. Rinses= _____ ml Tot. Vol= 0.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Organic STD = N/A g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= N/A g

FILTERS:

WEIGHT:

ID No.= 89066
final= 1.9105 g
initial= 1.9106 g Wgt. Filter= 0.0000 g

PARTICULATE COLLECTED (front half):

ΣWgt corrected + Wgt filter= mn (front)= 0.02603 g

PARTICULATE COLLECTED (back half):

ΣWgt corrected + Wgt filter= mn (back)= 0.02543 g

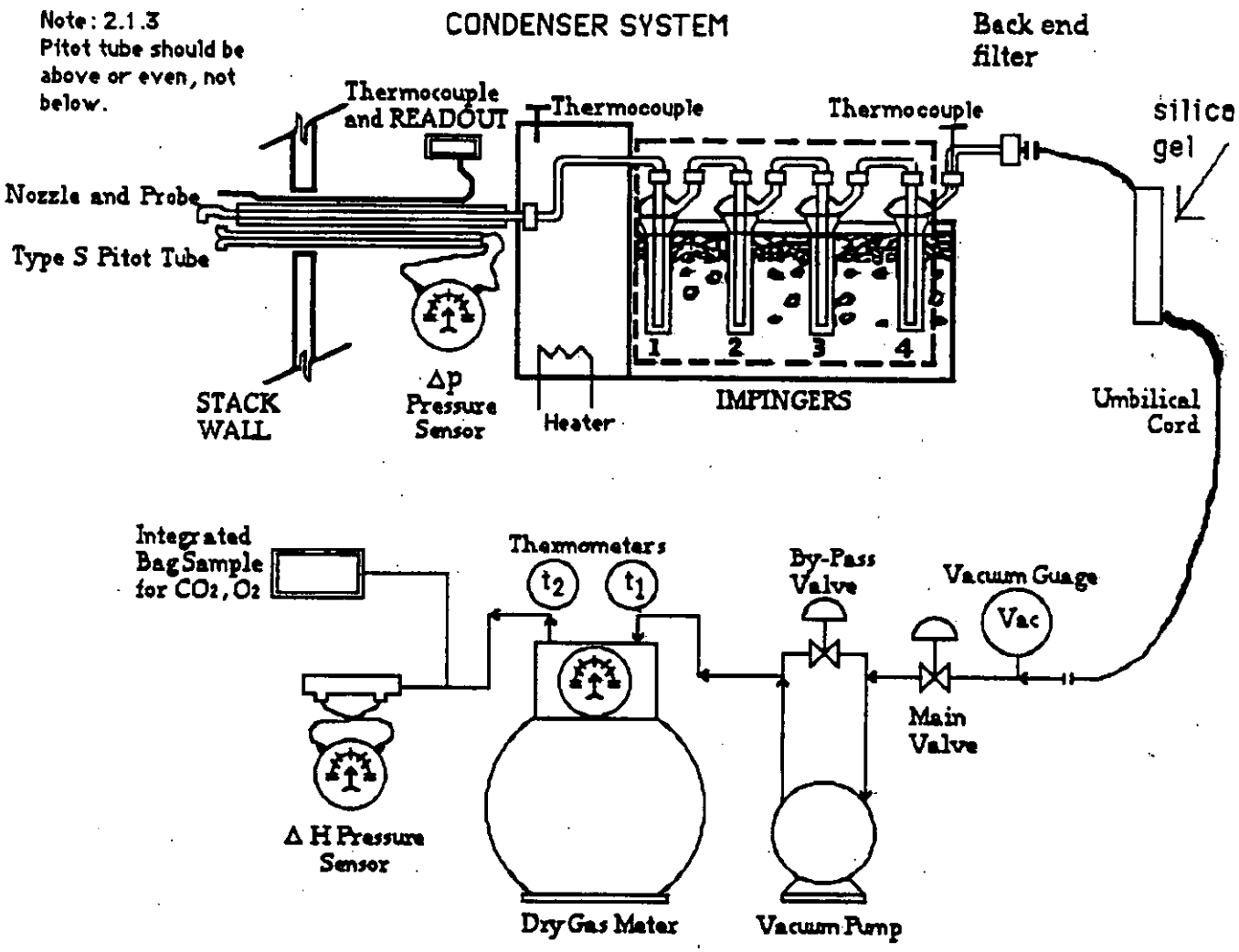
TOTAL PARTICULATE COLLECTED:

mn(front) + mn(back) = 0.05145 g

SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT

FIGURE

CONDENSER SYSTEM



LEGEND

No. 1 Mod- 100 ML Deionized Water

No. 2 Std - 100 ML Deionized Water

No. 3 Mod- Dry

No. 4 Mod- Dry

Mod - Modified Type Greenburg-Smith
Std - Standard Type " "

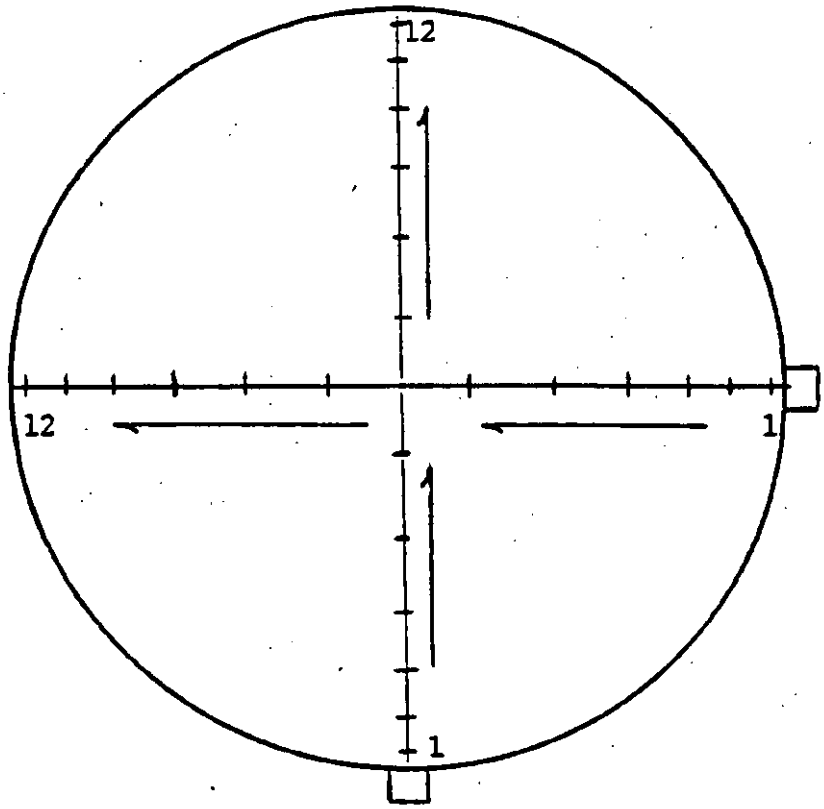
FIELD DATA ABBREVIATIONS

PT = Point Number
T_s = Stack Temperature
Δp = Pitot Tube Pressure Differential, in H_2O
V_s = Stack Velocity, fps
ΔH = Orifice Meter Pressure Drop, in H_2O
t_1 = Meter Inlet Temperature, °F
t_2 = Meter Outlet Temperature, °F
Pm = Pump Vacuum, in Hg
ti = Impinger Temperature
P_{bar} = Barometric Pressure

FIGURE 1 : PARTICULATE MATTER SAMPLING TRAIN

TRAVERSE POINTS

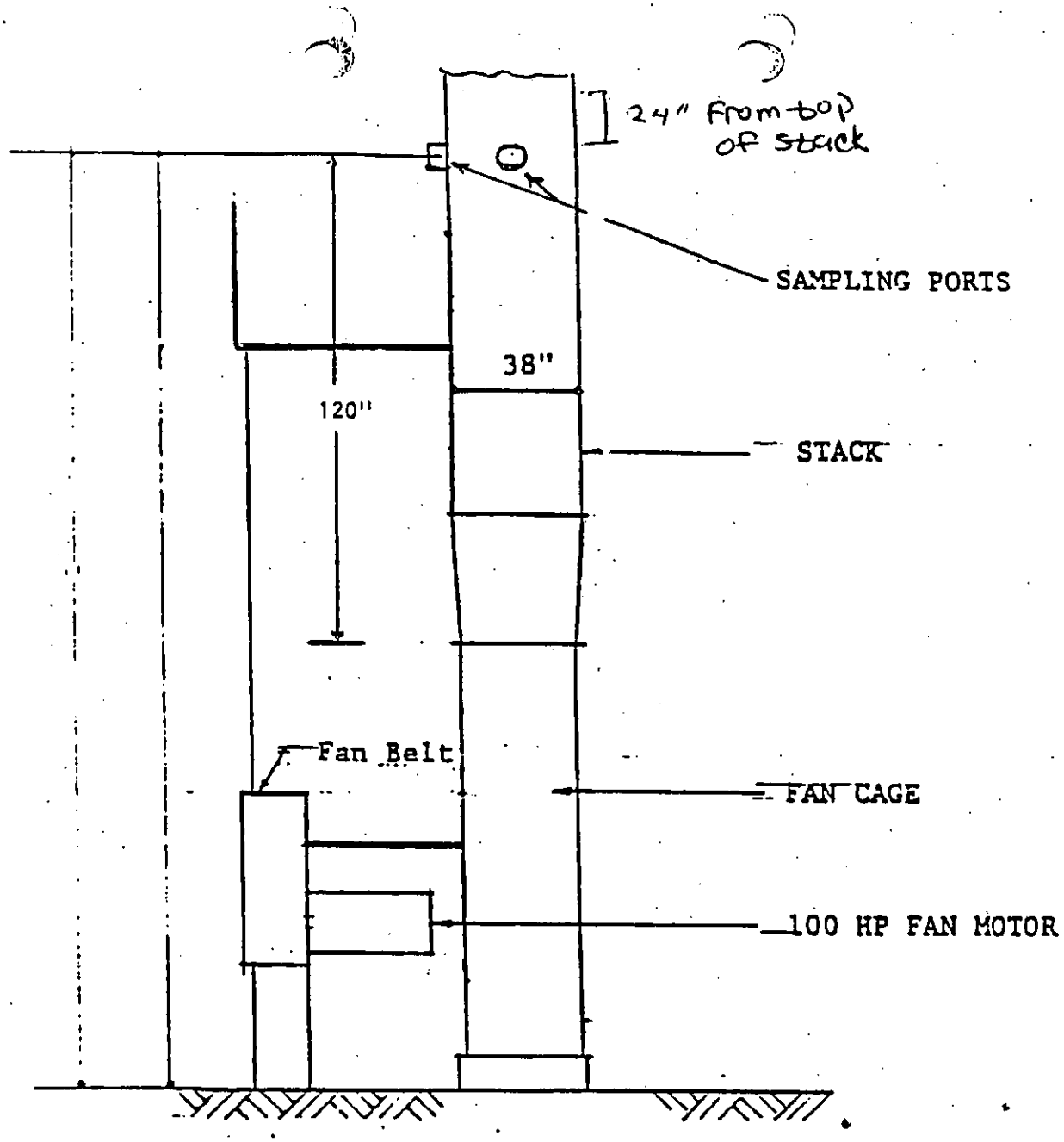
DIAMETER = 37.75"



POINT	PERCENT	DISTANCE	POINT	PERCENT	DISTANCE
1	2.1	1.00"	7	64.4	24.31"
2	6.7	2.53"	8	75.0	28.31"
3	11.8	4.45"	9	82.3	31.07"
4	17.7	6.68"	10	88.2	33.30"
5	25.0	9.44"	11	93.3	35.22"
6	35.6	13.44"	12	97.9	36.75"

SAN DIEGO AIR POLLUTION CONTROL DISTRICT P.O.# 1207

(Fig 2)



Side View - No Scale

SAN DIEGO AIR POLLUTION CONTROL DISTRICT P.O.# 1207

(Fig 3)

NOMENCLATURE

symbol	units	explanation	equation
	A		
An	in^2	nozzle area	π/4((Dn)^2)
As	ft^2	stack area	π/4((Ds)^2) or LxW
	B		
Bws(1)	%	fractional stack gas moisture-equ 1	((Vw std)/(Vw std+Vm std))100
Bws(2)	%	fractional stack gas moisture-equ 2	((Vpw @ ts)/Ps)100
Bws	%	water vapor in the gas stream	lower of Bws(1) and Bws(2)
	C		
C12	gr/dscf	corr for grain loading at 12% CO2	(12*Cs)/(%CO2)
CO	%	carbon monoxide	read from measuring device(s) for Asphalt plants
CO2	%	carbon dioxide	read from measuring device
Corr Vwm	ft^3	correction for Vw w/o silica gel	((Vm*(Vpw@ts)/Ps)*Pm*Tstd)/ (Tm*Pstd)
Cp	none	pitot tube correction factor	see EPA method 3
Cs(front)	gr/dscf	concentration of particulate in stack gas, corrected to STP-for front	(15.43*mn(front))/(Vm std)
Cs(back)	gr/dscf	concentration of particulate in stack gas, corrected to STP-for back	(15.43*mn(back))/(Vm std)
Cs(total)	gr/dscf	concentration of particulate in stack gas, corrected to STP-for total	(15.43*mn(total))/(Vm std)
	D		
∂ (density)	lb/ml	density of water at STP	0.002201 (see CRC)
Ds	in or ft	stack diameter	measure at site
Dn	in	nozzle diameter	avg of at least three measurements
	E		
E.A.	%	Excess air (for combustion)	((%O2-%CO)*100)/ (.264*%N2-%O2-.5*%CO)
E(front)	lbs/hr	part. emissions rate-front	(0.00857)(Qsd*Cs(front))
E(back)	lbs/hr	part. emissions rate-back	(0.00857)(Qsd*Cs(back))
E(total)	lbs/hr	part. emissions rate-total	(0.00857)(Qsd*Cs(total))
	H		
ΔH	in H2O	average differential pressure across the orifice meter	avg of the readings from the pressure measuring device
ΔH@	none	orifice pressure differential at STP	see EPA Method 5 Appendix
	I		
I	%	isokinetics	[0.09450*Ts*Vm std]/ [Ps*vs*Θ*(An/144)*(1-(Bws/100))]
	M		
Md	g/g-mole	dry stack gas molecular wgt	0.44(%CO2)+0.320(%O2)+0.280 (%N2+inerts+CO)
mn(back)	g	particulate in impingers	measurement from lab analysis
mn(front)	g	particulate in nozzle & probe	measurement from lab analysis
mn(total)	g	total particulate collected	measurement from lab analysis
Ms	g/g-mole	wet stack gas molecular wgt	Md(1-Bws)+18.0(Bws)
MW CO2	g/mole	mo. wgt of carbon dioxide	44 (see periodic table)
MW N2	g/mole	mo. wgt of nitrogen	28 (see periodic table)
MW O2	g/mole	mo. wgt of oxygen	32 (see periodic table)
MW H2O	g/mole	mo. wgt of water	18 (see periodic table)
	N		
N2	%	percent nitrogen	100-(%CO2+%O2+%CO+inerts)
	O		
O2	%	percent oxygen	read from measuring device

NOMENCLATURE (cont.)

NOMENCLATURE (concl.)

symbol	units	explanation	equation
	P		
ΔP	in H2O	pitot diff. press.-velocity head of stack gas	read from measuring device
Pbar	in Hg	barometric pressure at sampling pt.	read from press measuring device
π(pi)	none	the ratio of the circumference of a circle to its diameter	3.14159 (see CRC)
Pm	in Hg	absolute meter pressure	Pbar+(ΔH/13.6)
Ps	in Hg	absolute stack pressure	Pbar+(Pstatic/13.6)
Pg	in H2O	static pressure of stack	read from pressure sensing device
Pstd	in Hg	press at std conditions (29.92)	see CFR
	Q		
Qs	acfm	flow rate	vs*Ao*60
Qstd	dscfm	dry volumetric stack gas flow rate, corrected to STP	17.64*Qs(1-Bws)*(Ps/Ts)
	R		
R	in Hg-ft^3/°R-lb-mo	ideal gas constant	21.85 (see CRC)
	S		
S.L.	none	Sea Level	read from a relief map
	T		
t1	°F	dry gas meter inlet temp, uncorrected	read from temp sensing device
t2	°F	dry gas meter outlet temp, uncorrected	read from temp sensing device
t1 corr	°F	dry gas meter outlet temp,corrected	t1 + temperature correction
t2 corr	°F	dry gas meter outlet temp,corrected	t2 + temperature correction
θ(theta)	min	sampling time/point	Θ/in
Θ(Theta)	min	total sampling time	none
ti	°F	impinger outlet temp	read from temp sensing device
tm	°F	dry gas meter temp in F	(t1+t2)/2
Tm	°R	dry gas meter temp in R	tm+460
in	none	ttl number of traverse pts	summation of the traverse points
ts	°F	stack temp in F	read from temp sensing device
Ts	°R	stack temp in R	ts+460
Tstd	°R	temp at std conditions (528)	see CFR
	V		
Vlc	ml	water collected from impingers and the silica gel (if applicable)	from lab analysis
Vm	ft^3	sample gas volume, uncorrected	read from dry gas meter
Vm'	ft^3	sample gas volume, corrected	Vm*Y
Vm std	ft^3	volume of gas sample by the dry gas meter,corrected to STP	((Vm'*Tstd)Pm)/((Pstd*Tm)-corr Vm)
Vpw@ts	in Hg	vapor pressure of water at ts	see CRC water vapor press. tables
Vpw@ti	in Hg	vapor pressure of water at ti	see CRC water vapor press. tables
vs	ft/sec	stack gas velocity	85.49*Cp((Ts*ΔP)/(Ps*Ms))^0.5
Vw std	ft^3	Vol. of water vapor in gas sample, corrected to STP	(Vlc*∂*R*Tstd)/(Pstd*MW H2O)+corr Vwm
	Y		
Y	none	dry gas meter calibration factor	see CFR 40, parts 53-60

Conversion Factors

(multiply by the number)			
0.002669	in Hg-ft^3/°R-ml	conversion to get in Hg-ft^3/R	see CRC
0.00857	lb/gr-min/hr	conv from gr/min to lb/hr	see Lange's Handbook of Chemistry
0.04707	ft^3/ml	conversion from ml to ft^3	see Lange's Handbook of Chemistry
15.43	gr/g	conversion from g to gr	see Lange's Handbook of Chemistry
85.49	(ft/sec)-(lb-in Hg/lb-mo-°R-in H20))^.5	conversion factor to get velocity in ft/sec	see CRC
(divide by the number)			
144	in^2/ft^2	conversion from in^2 to ft^2	see CRC
13.6	in H20/in Hg	conversion from in H20 to in Hg	see CRC
(add to the number)			
460	°R/°F	conversion from F to R	see CRC