AP42 Section: 11.1

Reference Number: 234

Title: Source Sampling For Particulate Emissions, I. A. Construction Corp.,San Diego, CA,

San Diego Air Pollution Control District, San Diego, CA,

July 21, 1991.

AP-42 Section 11.1
Reference
Report Sect. 4
Reference 234
Same as facility
Ref # 236
& 232-234

apcd

County of San Diego

R. J. Sommerville
Air Pollution Control Officer

September 2, 1992

Industrial Asphalt
Attention: District Manager
P.O. Box 7607
Van Nuys, CA. 91409

SUBJECT: **RENEWAL TEST REPORTS**

The enclosed test reports are the result of testing done at your facilities.

If you have any questions, please call me at (619) 694-3359.

Robert Yelenosky
Senior Air Pollution Chemist

Enclosures

INDUSTIRAL ASPHALT (Mission . .lley) on 7/21/92 P.O.#30431 TEST #92203

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

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Industrial Asphalt (Mission Valley)
8150 Friars Road
San Diego, CA 92108

TEST #: 92203 P.O.#: 30431 TEST DATE: 7/21/92

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

UNIT TESTED: Baghouse

EQUIPMENT: Hot Mix Asphalt Batch Plant

TESTED BY:	David N. Shina & Rick Hower	DATE: 7/21/92
SITE PERSONNEL:	Jeff Ordnes	DATE: 7/21/92
APCD ENGINEER:	Gary Smith	DATE: 7/21/92
LAB ANALYSIS BY:	David N. Shina	DATE: 7/21/92
REPORT BY:	David N. Shina	DATE: 8/4/92
REVIEWED BY:	Linda Twaddle	DATE: 8/4/92
APPROVED BY:	Robert Jelenosky	DATE: 9/1/92

ROBERT YELENOSKY, SENIOR AIR POLLUTION CHEMIST

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

SDAPCD RULES

TESTS	LIMIT	MEASURED	PASS/FAIL
54 DUST & FUMES	40 lbs/hr	1.1 lbs/hr	NON-EXCEEDANCE
260.92 PARTICULATE MATTER	0.04 gr/dscf	0.01 gr/dscf	NON-EXCEEDANCE

TEST RESULTS SUMMARY:

ITEM	I	Cs	E
UNITS	%	gr/dscf	lbs/hr
VALUE	100	0.0053	1.117

ENGINEERING SUMMARY

Qstd	Fuel	Fuel Rate	Asphalt Production
dscfm		CFH	tons/hr
24399	Natural Gas	68121	233

TEST PARAMETERS:

SYSTEM DESCRIPTION:

This asphalt plant combines crushed rock 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 40 CFR, July 1, 1991, Part 60, Appendix A, Methods 1-5 inclusive.

PARTICULATE SAMPLING:

The test consisted of sampling at 24 traverse points, 12 from one traverse, and 12 from the second (point 1 &2 and 11 & 12 were physicall physically combined, so a separate set of traverse points would not have to be made. But, sampling was twice as long at these adjusted points as per Method 1). It was done this way, because the stack was oblong by 2 inches. The sample ports (fig.2), were 66 inches below the top of 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 rules 54 & 260.92 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

INDUSTIRAL ASPHALT (Mission valley) on 7/21/92 P.O.#30431 TEST #92203

FIELD DATA & DATA SUMMARY:

Trav. Pt	Vm (ft^3)	ΔP	ΔH	Stack Temp	Box Temp	Imp Temp	t 1 (in)	t 2 (out)	velocity
	723.037	(in H2O)	(in H2O)	(°F)	(°F)	(°F)	(°F)	(°F)	(ft/sec)
1		1.800	2.400	163	71	68	85.00	100.00	084.86
2		1.800	2.200	164	137	68	86.00	103.00	084.93
3		2.000	2.500	163	140	68	85.00	100.00	089.45
4		1.800	2.200	166	143	68	87.00	100.00	085.06
5		2.200	2.700	169	185	68	85.00	101.00	094.27
6		2.200	2.700	169	220	68	85.00	100.00	094.27
7		1.900	2.300	170	206	68	85.00	103.00	087.67
8		1.700	2.100	170	180	68	84.00	102.00	082.93
9		1.580	2.000	168	167	68	86.00	099.00	079.82
10		1.500	1.800	166	156	68	85.00	100.00	077.65
11		1.400	1.700	168	143	68	84.00	100.00	075.14
12		1.400	1.700	166	136	68	84.00	099.00	075.02
1		1.700	2.100	168	114	68	85.00	094.00	082.90
2		1.600	2.000	165	107	68	85.00	096.00	080.13
3		1.700	2.000	163	107	68	85.00	096.00	082.47
4		1.300	1.600	156	107	68	84.00	103.00	071.71
5		1.230	1.500	155	103	68	84.00	101.00	069.70
6		1.400	1.700	157	106	68	85.00	095.00	074.48
7		1.650	2.000	164	98	68	85.00	097.00	081.31
8		1.450	1.800	169	98	68	85.00	097.00	076.53
9		1.370	1.700	170	99	68	85.00	096.00	074.45
10		1.200	1.500	170	100	68	85.00	097.00	069.67
11		1.320	1.600	166	102	68	85.00	098.00	072.94
12	769.970	1.580	2.000	169	106	68	85.00	099.00	079.89

	Vm	ΔP	ΔH	ts	tbox	ti	t 1 (in)	t 2 (out)	vs
Average:	46.933	1.605	1.992	166	131	68	84.92	99.00	80.29

METER BOX PARAMETERS:

Box ID = C138
ΔH@ = 1.8883
Y = 0.9924

NOZZLE & PROBE:

Dn = 0.204 in
An = 0.0327 in^2
Cp = 0.840

MISCELLANEOUS:

Maximum vacuum = 20.0 in. Hg.
Circular stack (Y/N) = YES
Silica gel (Y/N) = YES

VOLUME:

start leak rate = 0.000 cfm
Pass/Fail PASS
final leak rate = 0.001 cfm
Pass/Fail PASS
Vm 46.933 ft^3

PRESSURES:

Pbar= 29.81 in Hg
Pg= 1.13 in H2O
Vpw @ ts= 11.1200 in Hg
Vpw @ ti= N/A in Hg

LABORATORY DATA:

mn(front) = 0.00546 g CO2 = 2.10 %
mn(back) = 0.00998 g O2 = 17.10 %
mn(total)= 0.01544 g CO = 0.00 %
Vlc 229.73 ml N2 = 80.80 %

STACK PARAMETERS:

Ds = 3.000 & 3.167 ft
Length = N/A ft
As = 7.47 ft^2

TIME:

Ø = 60.0 min
tn = 24 points
ø = 2.5 min/pt

TEMPERATURES:

t1= 84.92 °F ti= 68 °F
t2= 99.00 °F tbox= 131 °F
tm= 91.96 °F ts= 166 °F

CALCULATIONS:

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=(t1+t2)/2	92	°F
04)	Tm= (t1+t2)/2 + 460	552	°R
05)	ti= (Σ ti(n))/total n's	68	°F
06)	Tstd	528	°R

PRESSURES:

07)	Pbar= {(P @ S.L.)+(ft. above S.L.*(-0.1 in Hg/100ft)]}	29.81	in Hg
08)	Pg= read from pressure sensing device	1.13	in H2O
09)	Ps= Pbar + (Pg/13.6)	29.89	in Hg
10)	ΔH	1.99	in H20
11)	Pm= Pbar+(ΔH/13.6)	29.96	in Hg
12)	Pstd	29.92	in Hg

VOLUME:

13)	Vm= Vm(end)-Vm(begin)	46.933	ft^3
14)	Y	0.9924	
15)	Vm'= Vm*Y	46.576	ft^3
16)	Vpw @ ti = from appendix	N/A	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}	44.609	ft^3
19)	Vlc= (Σ Volume of Impingers)	229.73	ml
20)	∂	0.002010	lb/ml
21)	R	21.85	in Hg-ft^3/°R-lb-mo
22)	MwH2O	18.00	g/g-mo
23)	Vw std = {[(Vlc*∂*R*Tstd)/(Pstd*MwH2O)]+corr Vwm}	10.8433	ft^3

MOISTURE:

24)	Bws(1) =(Vw std)/(Vw std+Vm std)100	19.55	%	
25)	Vpw @ ts = from appendix	11.12	in Hg	
26)	Bws(2) =[(Vpw @ ts)/Ps]*100	37.20	%	
27)	Bws = lower value of equation 24 or 26			19.55 %

MOLECULAR WEIGHT:

28)	%O2	17.10	%
29)	%CO2	2.10	%
30)	%N2+inerts+%CO	80.80	%
31)	Md=[0.440(%CO2)]+[0.320*(%O2)]+[0.280(%N2+inerts+%CO)]	29.02	g/g*mole
32)	Ms=Md*(1-Bws)+18.0*(Bws)	26.87	g/g*mole

FLOW:

33)	ΔP	1.6046	in H2O
34)	Cp	0.840	
35)	vs= 85.49*Cp*{[(Ts*ΔP)/(Ps*Ms)]^.5}	80.293	ft/sec
36)	As=3.14*[(Ds)^2/4]	7.469	ft^2
37)	Qs = (vs)*As*60	35982	acfm
38)	Qstd =17.64*Qs*(1-Bws)*Ps/Ts	24399	dscfm

EMISSIONS:

FRONT HALF

39)	mn (front)	0.00546	g
40)	Cs (front) =15.43*mn(front)/Vm std	0.00189	grains/dscf
41)	7000grains=1lb, 60min=1hr; 60min/hr/7000grains/lb=	0.00857	lbs-min/grains-hr
42)	E (front) = (0.00857)*(Qstd)*Cs (front)	0.39	lbs/hr

BACK HALF

43)	mn (back)	0.00998	g
44)	Cs (back) =15.43*mn(back)/Vm std	0.00345	grains/dscf
45)	7000grains=1lb, 60min=1hr; 60min/hr/7000grains/lb=	0.00857	lbs-min/grains-hr
46)	E (back) = (0.00857)*(Qstd)*Cs (back)	0.72	lbs/hr

TOTAL

47)	mn (total) = mn(front)+mn(back)	0.01544	g
48)	Cs (total) =15.43*mn(total)/Vm std	0.00534	grains/dscf
49)	7000grains=1lb, 60min=1hr; 60min/hr/7000grains/lb=	0.00857	lbs-min/grains-hr
50)	E (total) = (0.00857)*(Qstd)*Cs (total)	1.12	lbs/hr

ISOKINETICS:

51)	Dn=		0.204	in
52)	An=3.14*[(Dn)^2/4]		0.0327	in^2
53)	I=.09450(Ts*Vm std)/Ps*VsAnØ(1-Bws)	100.29 % =	100	%

Industrial Asphalt (Mission Valley) on 7/21/92 P.O. #:30431 TEST#: 92203

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

PARTICULATE TEST LABORATORY ANALYSIS DATA SHEET

TEST SITE: Industrial Asphalt (Mission Valley)
8150 Friars Road
San Diego, CA 92108

TEST #: 92203	P.O.#: 30431	TEST DATE: 7/21/92
LAB ANALYSIS BY: David N. Shina		DATE: 7/21/92
LAB REPORT BY: David N. Shina		DATE: 8/4/92
REVIEWED BY:		DATE:

(1) IMPINGER VOLUMES

	FINAL WGT.		INIT WGT.		NET WGT.
#1	728.63 g	-	539.63 g	=	189.00 g
#2	577.81 g	-	551.71 g	=	26.10 g
#3	452.88 g	-	450.96 g	=	1.92 g
#4	760.91 g	-	748.20 g	=	12.71 g
#5	g	-	g	=	g

Was silica gel used (Y/N) ?= y

Total impinger charge= 198.15 ml

Total weight collected= 229.73 g

Total volume collected, Vlc= 229.73 ml

(2) BLANKS

							STANDARDS				
A	B	C	D	E	F	G	H	I	J	K	L
LOCATION	SOLVENT	ID	END WGT g	INIT WGT g	WEIGHT (E-F) g	RINSES ml	g/ml (G/D)	% (H*100)	ppm (H*10^6)	PASS FAIL	LIMITS
BLANK	ACETONE	92045	28.7191	28.7165	0.00260	250.00	0.0000104	0.0010400	10	P	0.0010%=10ppm
BLANK	WATER	92085	29.0435	29.0424	0.00110	250.00	0.0000044	0.0004400	4	P	0.0004%=4ppm

(3) WEIGHTS & RINSES

a	b	c	d	e	f	g	h	i	j
LOCATION	SOLVENT	ID	END WGT g	INIT. WGT g	WEIGHT (e-f) g	RINSES ml	SOLV. WGT (g*H) g	WGT (corr) (f-h) g	Totals (WGT (corr)) (Σi) g
FRONT	ACETONE	92043	28.8766	28.8685	0.0081	300.00	0.003120	0.00498	
FRONT	WATER	92004	30.6576	30.6558	0.0018	300.00	0.001320	0.00048	
FRONT	FILTER				0.0000	N/A	N/A	0.000000	
FRONT							Subtotals (Σcolumn i)=		0.00546 g
BACK	ACETONE	92067	29.2541	29.2429	0.0112	320.00	0.003328	0.00787	
BACK	WATER	92082	29.1479	29.1425	0.0054	550.00	0.003292	0.00211	
BACK	FILTER	91097	1.6072	1.6072	0.0000	N/A	N/A	0.00000	
BACK							Subtotals (Σcolumn i)=		0.00998 g
TOTAL							Totals =(Σsubtotals= Σcolumn j(front & back))=		0.01544 g

MECHANICAL ENGINEERING
SOURCE TEST REPORT
PERMIT RENEWAL TEST

TEST DATE: JULY 21, 1992 ENGINEER: GARY SMITH
TEST CREW: METHOD 5: DAVID SHINA, LINDA TWADDLE, RICK HOWER, JOHN GERVASI, BOB YELENOSKY
METHOD 7: LINDA TWADDLE, RICK HOWER, JOHN GERVASI, BOB YELENOSKY

SOURCE: INDUSTRIAL ASPHALT, INC. 8150 FRIARS ROAD, SAN DIEGO, CA

PERMIT TO OPERATE: 030431, HOT MIX ASPHALT BATCH PLANT

EQUIPMENT DESCRIPTION: ASPHALT BATCH PLANT, HOT-MIX (350 TONS/HR CAPACITY)

SITE PERSONNEL: JEFF ORDONES, FOREMAN
JIM CHAPMAN, OPERATOR

VISIBLE EMISSIONS: A LARGE MOISTURE PLUME WAS VISIBLE DURING THE TEST. OPACITY WAS NOT DETERMINED.

FUEL USAGE: NATURAL GAS USAGE WAS MEASURED FOR 11 MINUTES, 51 SECONDS AT THE SITE GAS METER. THE METER READINGS, CORRECT ACCORDING TO THE METER, INDICATE A FLOW RATE OF 68,121 CFH WHICH WOULD BE APPROXIMATELY 71.5 MM BTU/HR

ASPHALT PRODUCTION: ASPHALT WAS PRODUCED IN THREE BATCHES

6:45 - 8:30	445 TONS @255 TPH
8:48 - 10:25	451 TONS @ 279 TPH
10:35 - 10:41	19 TONS @ 190 TPH

AVERAGE PRODUCTION: 233 TONS PER HOUR

TEST PERIOD
M-5 : 7:30 - 9:05
M-7: 9:05-10:41

A VARIETY OF DIFFERENT ASPHALT WAS PRODUCED. THE ASPHALT WAS 200 SERIES ASPHALT WHICH CONTAINS 15% RECYCLED ASPHALT. AGGREGATE TEMPERATURE AT THE DRYER DID NOT EXCEED 430 ° F. THIS IS WITHIN THE CONDITIONS ON THE MOST RECENT STARTUP AUTHORIZATION.

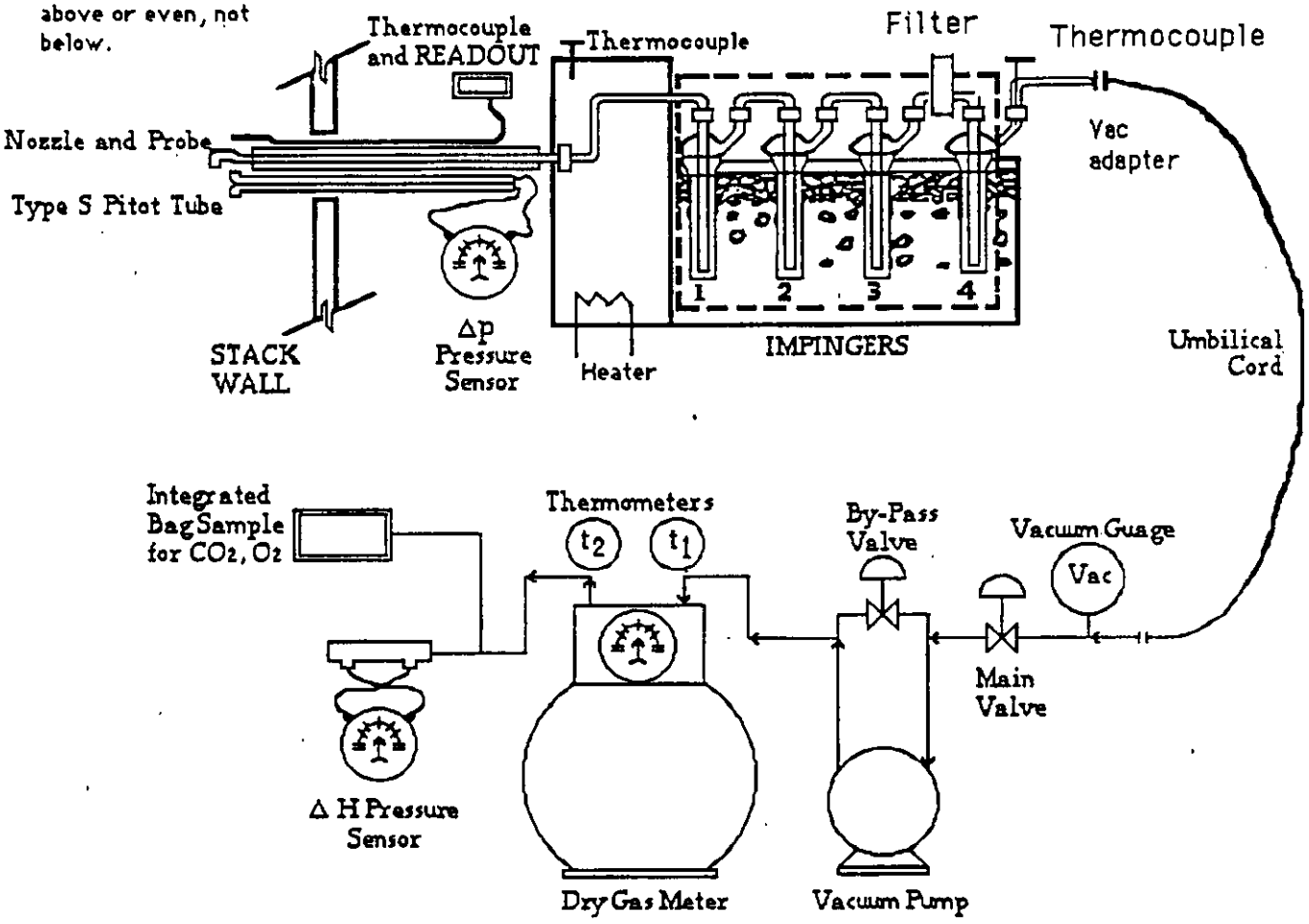
A WATER TRUCK WAS OBSERVED IN OPERATION AT THE SITE.

APPENDIX

SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT

FIGURE 1

CONDENSER SYSTEM



LEGEND

No. 1 Mod-100 ML Deionized Water

No. 2 Std - 100 ML Deionized Water

No. 3 Mod- Dry

No. 4 Mod- Silica gel

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

FIELD DATA ABBREVIATIONS

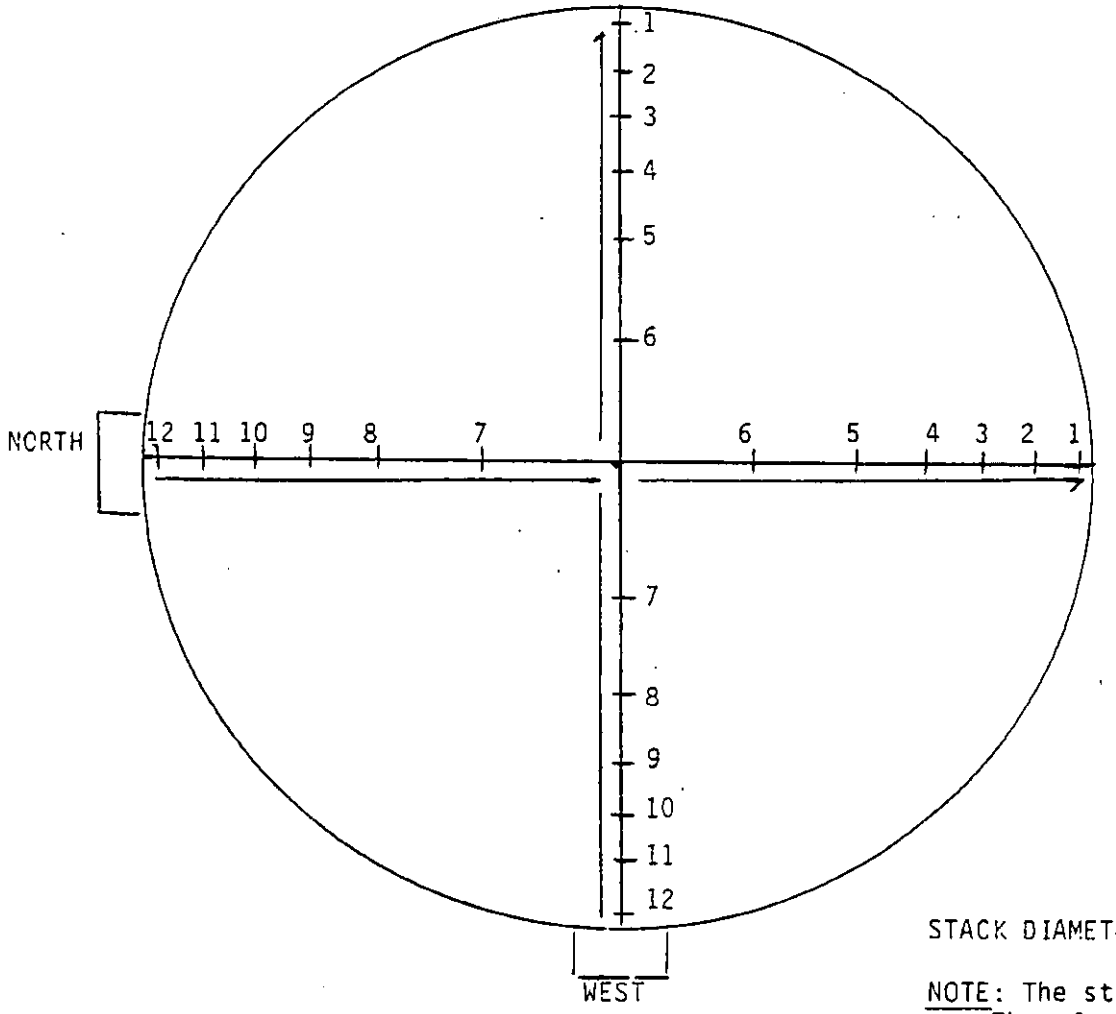
PT = Point Number
T_s = Stack Temperature
Δp = Pitot Tube Pressure Differential, in H_2O
V_s = Stack Velocity, fps
ΔH = Orifice Meter Pressure Drop, in H_2O
t_1 = Meter Inlet Temperature, °F
t_2 = Meter Outlet Temperature, °F
Pm = Pump Vacuum, in Hg
ti = Impinger Temperature
P_{bar} = Barometric Pressure

FIGURE 1 : PARTICULATE MATTER SAMPLING TRAIN

SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTRICT

INDUSTRIAL ASPHALT, MISSION VALLEY

TRAVERSE POINTS



STACK DIAMETER = 38"

NOTE: The stack is oblong by 2" Therefore, on E-W traverse points 1 & 2 and 11 & 12 were combined.

POINT #	DISTANCE INTO STACK
1	0.8 in.
2	2.5
3	4.5
4	6.7
5	9.5
6	13.5
7	24.5
8	28.5
9	31.3
10	33.5
11	35.5
12	37.2

FIGURE 1.

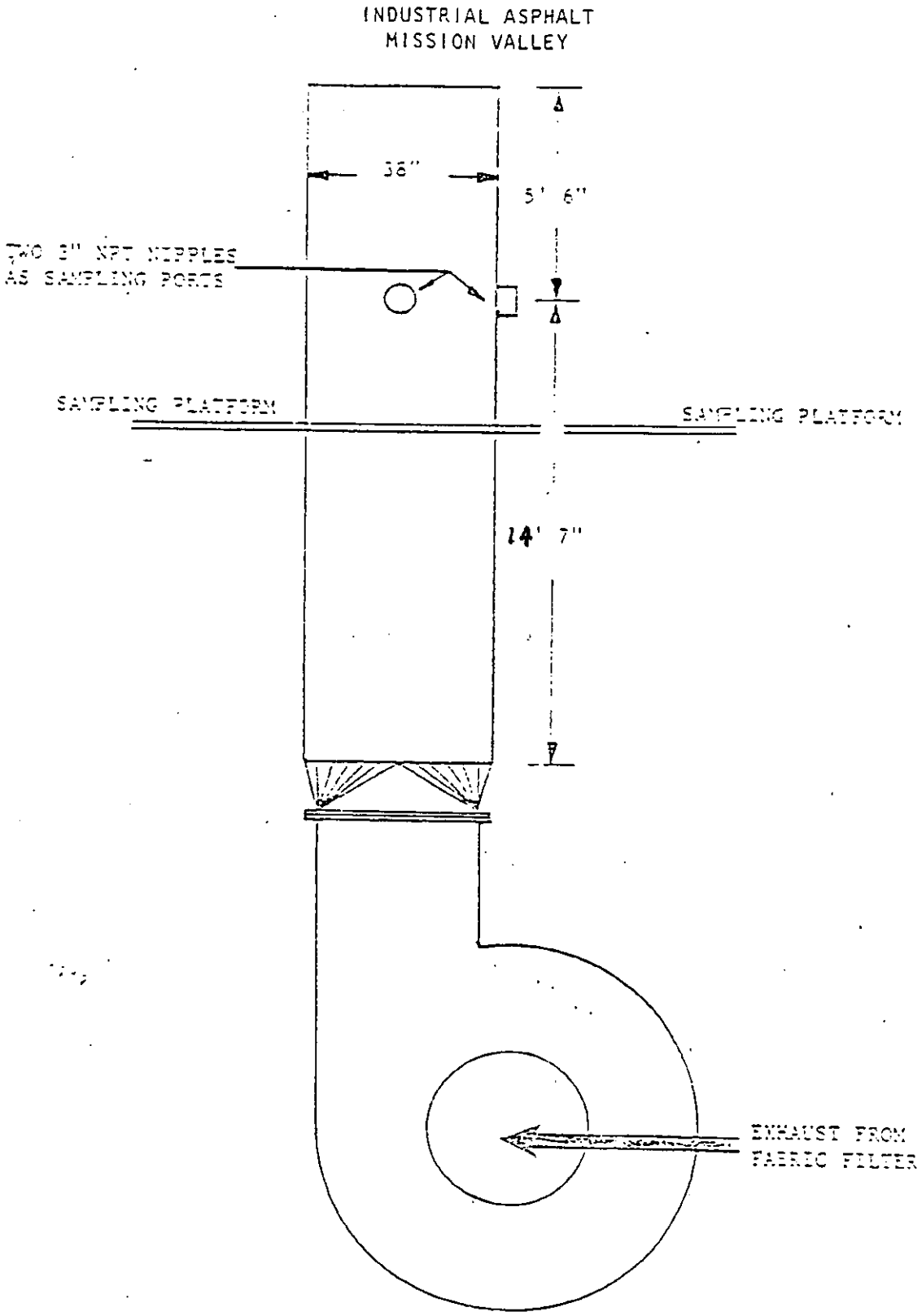


FIG:2 SITE DESCRIPTION

NOMENCLATURI

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		
CO	%	carbon monoxide	read from measuring device(0 for Asphalt plants)
CO2	%	carbon dioxide	read from measuring device
Corr Vwm	ft^3	correction for Vw w/o silica gel	((Vm*(Vpw@ti)/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)
Cs12(front, back,total)		same as Cs(front,back, total) except-corrected for grain loading at 12% CO2	(12/%CO2)*(15.43*mn(fr, back,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-.5%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*Ø*(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	3.14165 (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
ø(theta)	min	sampling time/point	Ø/tn
Ø(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
tn	none	ttl number or 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
	U		
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
	V		
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 (60/7000)	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
17.64	°R/in H2O	Tstd/Pstd (528/29.92)	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

RAW DATA SHEETS

DO SHIP
7/21/92

P.O. # 30431
Test # 92203 040

INDUSTRIAL ASPHALT (M.V.)

IMPINGERS:

Date	NO	Tare	charge	Tare	FDI	NET
7/21	1	412.89	94.33 water	534.63	728.63	189
7/21	2	425.10	98.82 water	551.71	577.81	26.10
7/21	3	321.36	———	450.96	452.88	1.92
7/21	4	642.33	Silica gel	748.20	760.91	12.71

GAS

				AVG
CO_2: ~~ANARAD AR400~~	Cal # = 23.6	Trial # 2.1%,	#2 = 2.1%	2.1%
O_2: Teledyne	= 20.8	#1 = 17.1%		17.1%

C2

SN538 : .84

WGTS & WASHINGS:

ACETONE:

		TARE
BLANK (92045)	; 200 + 50 = 250	28.7165
FRONT (92043)	; 250 + 50 = 300	28.8685
BACK (92067)	; 270 + 50 = 320	29.2424

WATER

BLANK (92085)	; 200 to = 250	29.0424
FRONT (92004)	; 250 + 50 = 300	30.6558
BACK (92082)	; 500 + 50 = 550	29.1425
FILTER (91097)	; ——— N/A ———	1.6072

WEIGHD

		AVG	–	TARE	NET
92045:	28.9189, .7189, .7192	28.7191	–	28.7165	.0026
29043:	28.8765, .8768, .8766	28.8766	–	28.8685	.0081
92067:	29.2540, .2543, .2540	29.2541	–	29.2424	.0112
92085:	29.0434, .0434, .0437	29.0435	–	29.0424	.0011
92004:	30.6574, .6577, .6576	30.6576	–	30.6558	.0018
92082:	29.1477, .1481, .1479	29.1479	–	29.1425	.0054
91097:	1.6079, 1.6072, 1.6072	1.6072	–	1.6072	0

DDD

METHOD 5 EQUIPMENT CHECKLIST

SITE: Two Asphalt TEST#: 92203 P.O.#: 30431 DATE: 7/20

MISCELLANEOUS
- _____ Camera & film
- _____ Ice chest
- _____ Ice
- _____ 3 Tedlar bags
- _____ Duct tape

CALCULATION EQUIP.
- _____ Source Test briefcase
- _____ Calib. notebook
- _____ Stopwatch
- _____ Nomograph
- _____ Calculator
- _____ Assorted pens
- _____ Tape measure
- _____ White out
- _____ Labels
- _____ Scissors
- _____ Teflon tape
- _____ L/S Box fuses

LAB/FIELD EQUIPMENT
- _____ Acetone
- _____ Foil
- _____ Parafilm
- _____ Distilled water
- _____ Kimwipes
- _____ Vac. grease
- _____ 100 ml grad. cylinder
- _____ Sample coll. bottles
- _____ Nozzle brush
- _____ Probe brush

SAMPLING EQUIPMENT (reserve)
- _____ L/S Box
  - ___ Pitot tube leak test equipment
  - ___ Umbilical cord
- _____ Cold/Hot box
  - ___ Impingers (Impingers 1-4)
  - ___ Imp-imp connections
  - ___ Imp-probe connections
  - ___ 100ml of water in 1st 2 imp.
  - ___ Impinger clips
  - ___ Silica gel imp. with vac. adapter
  - ___ Filter & Filter holder
  - ___ Heating coil

SAMPLING EQUIPMENT (main)
- _____ L/S Box
  - ___ Pitot tube leak test equipment
  - ___ Thermocouple read-out
  - ___ Electrical cords (50' & 100')
  - ___ Umbilical cord
- _____ Cold/Hot box
  - ___ Impingers (Impingers 1-4)
  - ___ Imp-imp connections
  - ___ Imp-probe connections
  - ___ Spare set of connections
  - ___ 100ml of water in 1st 2 imp.
  - ___ Impinger clips
  - ___ Silica gel imp. with vac. adapter
  - ___ Filter & Filter holder
  - ___ Spare filter & filter holder
  - ___ Heating coil
  - ___ Probe
  - ___ Spare probe
  - ___ Nozzle boxes with nuts

TOOL BOX
- _____ Assorted monkey wrenches
- _____ Assorted open-end wrenches
- _____ Assorted screwdrivers
- _____ 3' pipe wrench
- _____ Port (wire) brush
- _____ Tape measure

STACK EQUIPMENT
- _____ Unirail
  - _____ Port/nipple adapters
  - _____ 2 C -clamps
  - _____ 2 unirails with rollers
  - _____ Chains
  - _____ 2 nylon straps
- _____ Rope (25' and 50')
- _____ Pail
- _____ Gloves (leather)
- _____ Gloves (heat resistant)
- _____ Rags and diapers

MISCELLANEOUS EQUIPMENT
- _____ Nomograph-reserve
- _____ Calculator-reserve
- _____ Inclinometer-reserve (cyclonic flow)
- _____ Filter-reserve (high moisture)
- _____ Large pipe wrench
- _____ Cold/hot box rollers for SDG&E sites

SAFETY
- _____ First aid box
- _____ Ear plugs
- _____ Safety shoes and hat
- _____ Safety cones

EQUIPMENT DATA SHEET

	MAIN					RESERVE				
	TYPE	ID#	SIZE	CLEANED	CAL.DATE	TYPE	ID#	SIZE	CLEANED	CAL.DATE
Nozzle Dia.										
Pitot Tube										
Tedlar Bag										
L/S Box										
Stack Sensor										
Box Sensor										
Imp. Sensor										
ΔP Sensor										
ΔH Sensor										
Cold Box										
Hot Box										
Temp Disp.										

SIGNATURE:_____ DATE:_____ TIME:_____