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

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Asphalt Inc.
12560 Highway 67 & Slaughterhouse Cyn
Lakeside, CA

MAILING ADDRESS: Asphalt Inc.
P.O. Box 1356
El Cajon, CA 92022

TEST #: 91219 P.O.# 115 TEST DATE: 8/7/91

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

UNIT TESTED: Baghouse

EQUIPMENT: Asphalt batch plant

TESTED BY: David Shina & Gary Smith	DATE: 8/7/91
SITE PERSONNEL:	DATE:
APCD ENGINEER: Dean Carlson	DATE: 8/7/91
LAB ANALYSIS BY: David Shina	DATE: 8/14/91
REPORT BY: David Shina	DATE: 8/29/91
REVIEWED BY: Linda Twaddle	DATE: 10-10-91
APPROVED BY: Robert Jelenosky for CWR	DATE: 10/14/91

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	17.95 lbs/hr	PASSED

SUMMARY:

ITEM	Vm	Bws	Cs	E	I	Qstd	ts	PROD RATE
UNITS	ft^3	%	gr/dscf	lbs/hr	%	dscfm	°F	tons/hr
VALUE	50.308	14.50	0.081	17.948	93	2.57E+04	157	218.00

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 (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 32 traverse points, 4 from each of 8 sample ports (fig.2), collected from 18 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

Asphalt Inc. on 8/7/91 — P.O.#115 TEST #91219

Trav. Pt	Vm (ft^3)	ΔP	ΔH	t 1(unc)	t 2(unc)	Stack Temp	Imp Temp	velocity
	38.619	(in H2O)	(in H2O)	(°F)	(°F)	(°F)	(°F)	(ft/sec)
H1		0.800	2.150	78.00	100.00	139.00	57	55.11
H2		0.700	1.750	76.00	108.00	150.00	54	52.02
H3		0.630	1.800	76.00	111.00	148.00	53	49.27
H4		0.500	1.250	76.00	111.00	147.00	53	43.86
G1		1.000	2.500	76.00	108.00	149.00	53	62.13
G2		0.800	2.000	76.00	112.00	151.00	50	55.66
G3		0.750	1.900	76.00	113.00	150.00	49	53.86
G4		0.600	1.500	76.00	114.00	150.00	51	48.16
F1		1.050	2.600	76.00	108.00	150.00	51	63.71
F2		0.880	2.200	76.00	113.00	155.00	49	58.57
F3		0.700	1.750	76.00	114.00	157.00	49	52.32
F4		0.550	1.250	76.00	113.00	156.00	50	46.34
E1		1.000	2.500	80.00	94.00	152.00	48	62.26
E2		0.950	2.400	78.00	108.00	157.00	51	60.95
E3		0.750	1.900	77.00	110.00	157.00	47	54.15
E4		0.500	1.250	76.00	110.00	161.00	47	44.36
D1		0.900	2.300	77.00	108.00	161.00	48	59.52
D2		0.890	2.200	77.00	112.00	162.00	49	59.23
D3		0.750	1.900	77.00	113.00	162.00	49	54.37
D4		0.550	1.400	76.00	112.00	158.00	49	46.41
C1		0.830	2.100	79.00	96.00	162.00	49	56.74
C2		0.800	2.000	77.00	110.00	162.00	53	56.16
C3		0.780	1.950	77.00	112.00	163.00	49	55.49
C4		0.650	1.600	78.00	112.00	162.00	49	50.62
B1		0.680	1.700	78.00	108.00	160.00	49	51.69
B2		0.620	1.550	79.00	113.00	163.00	52	49.48
B3		0.680	1.700	80.00	115.00	164.00	50	51.86
B4		0.710	1.750	80.00	116.00	163.00	51	52.95
A1		0.550	1.400	82.00	113.00	154.00	52	46.26
A2		0.500	1.250	81.00	113.00	164.00	55	44.47
A3		0.500	1.250	81.00	114.00	165.00	52	44.50
A4	88.927	0.550	1.400	81.00	115.00	165.00	52	46.67

	Vm (ft*^3)	ΔP (in H2O)	ΔH (in H2O)	t 1 (°F)	t 2 (°F)	ts (°F)	ti (°F)	vs (ft/sec)
Average:	50.308	0.713	1.811	77.59	110.25	157	51	52.79

MISCELLANEOUS:

Ø = 80.0 min
tn = 32 points
ø = 2.5 min

NOZZLE & PROBE:

Dn = 0.223 in
An = 0.0391 in^2
Cp = 0.840

METER BOX PARAMETERS:

ΔH@ = 2.7254
Y = 0.9782
Box ID = d337

PRESSURES:

Pbar = 29.52 in Hg
Pg = -0.42 in H2O
Silica gel(yes/no) = no
Vpw @ ts = 8.98 in Hg
Vpw @ ti = 0.3764 in Hg

VOLUME:

start leak rate = 0.000 cfm
Pass/Fail = PASS
final leak rate = 0.007 cfm
Pass/Fail = PASS
Vm = 50.308 ft^3

TEMPERATURES:

t1 corr = 0.40 °F
t2 corr = 0.10 °F
tm = 94 °F
ts = 157 °F
ti = 51 °F

STACK PARAMETERS:

circular (yes/no) = no
Width = 2.25 f t
Length = 5.00 f t
As = 11.25 ft^2

LAB DATA:

mn(front) = 0.13291 g
mn(back) = 0.10940 g
mn(total) = 0.24231 g
Vlc = 152.26 ml

STACK GAS MEASUREMENTS:

CO2 = 3.60 %
O2 = 16.10 %
CO = 0.00 %
N2 = 80.30 %

TEMPERATURES:

01)	ts = (Σ ts(n))/total n's	157 °F
02)	Ts = ts+460	617 °R
03)	tm= (Σ {(t 1(n)+t 2t(n))/2}/total n's	94 °F
04)	Tm= (t1+t2)/2 + 460	554 °R
05)	ti= (Σ ti(n))/total n's	51 °F
06)	Tstd	528 °R

PRESSURES:

07)	Pbar= {(P @ S.L.)+[ft. above S.L.*(-0.1 in Hg/100ft)]}	29.52 in Hg
08)	Pg= read from pressure sensing device	-0.42 in H2O
09)	Ps= Pbar + (Pg/13.6)	29.49 in Hg
10)	ΔH	1.81 in H20
11)	Pm= Pbar+(ΔH/13.6)	29.65 in Hg
12)	Pstd	29.92 in Hg

VOLUME:

13)	Vm= Vm(end)-Vm(begin)	50.308 ft^3
14)	Y	0.9782
15)	Vm'= Vm*Y	49.211 ft^3
16)	Vpw @ ti = from appendix	0.3764 in Hg
17)	corr Vwm = {[(Vm'*Vpw@imp/Ps)*Pm*Tstd]/(Tm*Pstd)}	0.5933 ft^3
18)	Vm std = {[Vm'*(Tstd/Tm)*(Pm/Pstd)]-corr Vwm}	45.890 ft^3
19)	Vlc= (Σ Volume of impingers)	152.26 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}	7.7800 ft^3

CALCULATIONS:

MOISTURE-

24)	Bws(1) =(Vw std)/(Vw std+Vm std)100	14.50 %	
25)	Vpw @ ts = from appendix	8.98 in Hg	
26)	Bws(2) =[(Vpw @ ts)/Ps]*100	30.45 %	
27)	Bws = lower value of equation 24 or 26		14.50 %

MOLECULAR WEIGHT-

28)	%O2	16.10 %
29)	%CO2	3.60 %
30)	%N2+inerts+%CO	80.30 %
31)	Md=[0.440(%CO2)]+[0.320*(%O2)]+[0.280(%N2+inerts+%CO)]	29.22 g/g*mole
32)	Ms=Md*(1-Bws)+18.0*(Bws)	27.59 g/g*mole

FLOW-

33)	ΔP	0.713 in H2O
34)	Cp	0.840
35)	vs= 85.49*Cp*{[(Ts*ΔP)/(Ps*Ms)]^.5}	52.786 ft/s
36)	As=3.14*[(Ds)^2/4]	11.25 ft^2
37)	Qs = (vs)*As*60	3.56E+04 acfm
38)	Qstd =17.64*Qs*(1-Bws)*Ps/Ts	2.57E+04 dscfm

EMISSIONS-

FRONT HALF

39)	mn (front)		0.13291 g
40)	Cs (front) =15.43*mn(front)/Vm std	0.0447	0.045 grains/dscf
41)	E (front) = (0.00857)*(Qstd)*Cs (front)		9.84 lbs/hr

BACK HALF

42)	mn (back)		0.10940 g
43)	Cs (back) =15.43*mn(back)/Vm std	0.0368	0.037 grains/dscf
44)	E (back) = (0.00857)*(Qstd)*Cs (back)		8.10 lbs/hr

TOTAL

45)	mn (total) = mn(front)+mn(back)		0.24231 g
46)	Cs (total) =15.43*mn(total)/Vm std	0.0815	0.081 grains/dscf
47)	E (total) = (0.00857)*(Qstd)*Cs (total)		17.95 lbs/hr

ISOKINETICS:

48)	An=3.14*[(Dn)^2/4]		0.0391 in^2
49)	I=.09450(Ts*Vm std)/Ps*vsAnØ(1-Bws)	92.58 %=	93 %

APPENDIX

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

LABORATORY ANALYSIS OF PARTICULATE TEST

TEST SITE: Aspahlt Inc.
12560 Highway 67
Lakeside, CA

MAILING ADDRESS: Asphalt Inc.
P.O. Box 1356
El Cajon, CA 92022

TEST # 91219 P.O.# 115 TEST DATE: 8/7/91

LAB ANALYSIS BY: David Shina DATE: 8/14/91

LAB REPORT BY: David Shina DATE: 8/29/91

REVIEWED BY: ~~Gary Smith~~ LINDA TWADDLE DATE: 10-9-91

(1) IMPINGER VOLUMES

	FINAL WEIGHT			INITIAL WEIGHT		NET WEIGHT
#1	682.65 g	-		543.05 g	=	139.60 g
#2	550.75 g	-		540.08 g	=	10.67 g
#3	466.80 g	-		465.37 g	=	1.43 g
#4	441.31 g	-		440.75 g	=	0.56 g
SILICA GEL CONTAINER:						
#5	_____ g	-		_____ g	=	_____ g

Total Volume Collected= 152.26 g

(2) BLANKS

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

VOLUMES: **ACETONE:**	*VOLUMES:* **WATER:**	*VOLUMES:* **ORGANIC:**
BKR ID = 91013	BKR ID = 91016	BKR ID = _____
Initial= 200.00 ml	Initial= 200.00 ml	Initial= _____ ml
tot. Rinses= 30.00 ml	tot. Rinses= 50.00 ml	tot. Rinses= _____ ml
Tot. Vol= 230.00 ml	Tot. Vol= 250.00 ml	Tot. Vol= 0.00 ml
WEIGHTS:	*WEIGHTS:*	*WEIGHTS:*
final= 29.1564 g	final= 29.2213 g	final= _____ g
initial= 29.1546 g	initial= 29.2212 g	initial= _____ g
net= 0.0018 g	net= 0.0001 g	net= 0.0000 g
LIMIT: 0.001% = 10 ppm = 0.000010g/ml	LIMIT: 4ppm = 4mg/L = 0.000004g/ml	LIMIT: 0.001% = 10 ppm = 0.000010g/ml
STD = 7.82609E-06 g/ml	STD = 4.00000E-07 g/ml	STD = N/A g/ml
0.000783 %	0.000040 %	N/A %
= 7.83 ppm	0.40 ppm	N/A ppm
The Blank **PASSED**	The Blank **PASSED**	The Blank **N/A**

(3) WEIGHT

FRONT HALF

WEIGHT (uncorrected) **ACETONE**

BKR ID= 91036
final= 29.4013 g
initial= 29.2680 g
Wgt. Ac= 0.1333 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 = 0.002348 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvents= 0.130952 g

WEIGHT (uncorrected) **WATER:**

BKR ID= 91003
final= 30.2357 g
initial= 30.2336 g
Wgt.Water= 0.0021 g

VOLUMES:

Initial= 300.00 ml
tot. Rinses= 50.00 ml
Tot. Vol. = 350.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000140 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt. from solvents= 0.001960 g

WEIGHT (uncorrected) **ORGANIC:**

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

VOLUMES:

tot. Rinses= _____ ml
Tot. Vol= 0.0000 ml

WEIGHT FROM SOLVENT:

Total Vol * Organic STD = N/A g

WEIGHT (corrected):

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

WEIGHT: **FILTERS:**

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

PARTICULATE COLLECTED (front half)

ΣWgt corrected +Wgt filter= mn (front)= 0.13291 g

BACK HALF

WEIGHT (uncorrected) **ACETONE**

BKR ID= 91019
final= 28.7542 g
initial= 28.7484 g
Wgt. Ac.= 0.0058 g

VOLUME:

Initial= 500.00 ml
tot. Rinses= 50.00 ml
Sep. funnel= _____ ml
Tot. Vol= 550.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Acetone STD = 0.004304 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.001496 g

WEIGHT (uncorrected) **WATER:**

BKR ID= 91083
final= 49.4432 g
initial= 49.3357 g
Wgt.Water= 0.1075 g

VOLUMES:

Initial= 500.00 ml
tot. Rinses= 50.00 ml
Impingers= 198.04 ml
Tot. Vol.= 748.04 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000299 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.107201 g

WEIGHT (uncorrected) **ORGANIC:**

BKR ID= _____
final= _____ g
initial= _____ g
Wgt= 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

WEIGHT: **FILTERS:**

ID No.= 89077
final= 1.6085 g
initial= 1.6078 g
Wgt. Filt.= 0.0007 g

PARTICULATE COLLECTED (back half)

ΣWgt corrected +Wgt filter= mn (back)= 0.10940 g

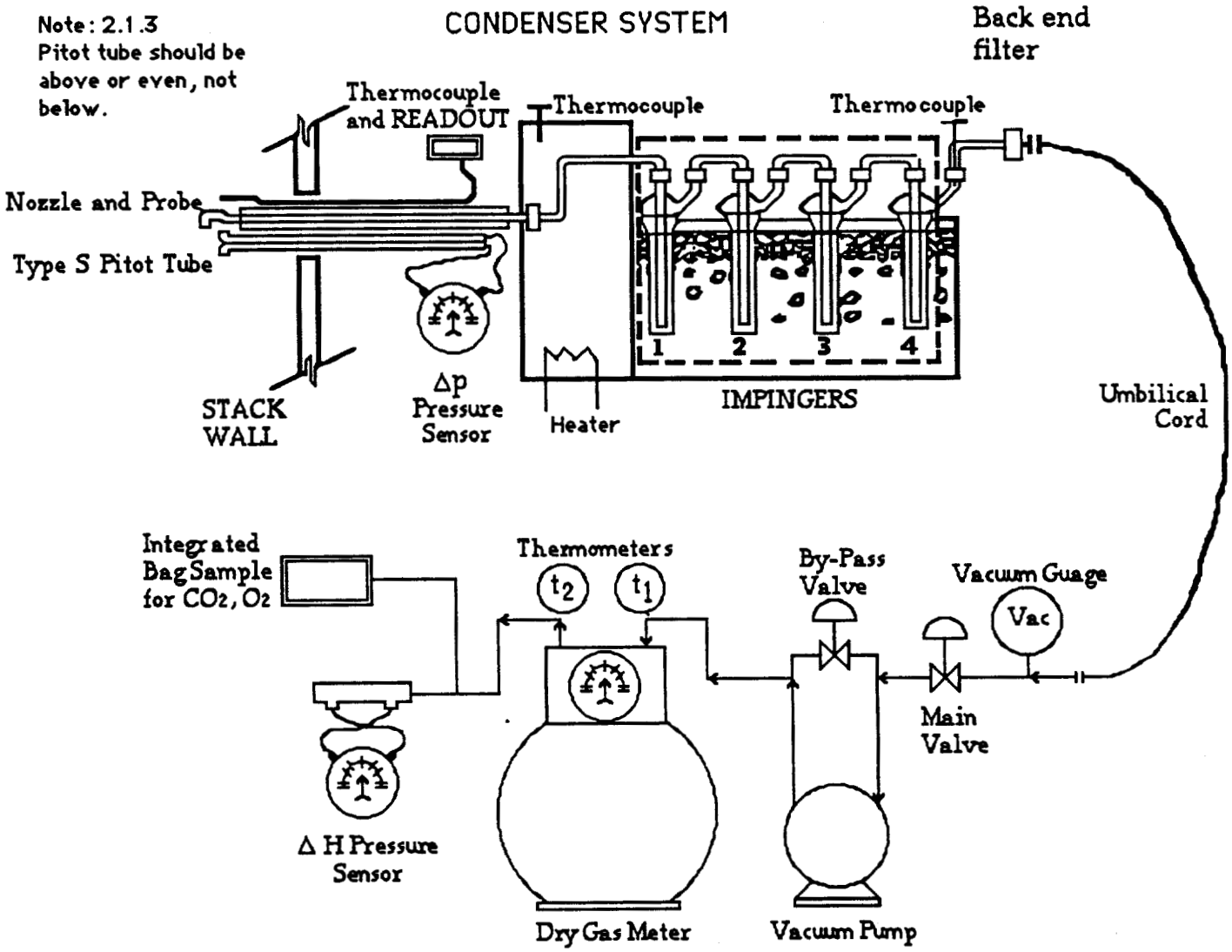
TOTAL PARTICULATE COLLECTED

mn(front) + mn(back) = 0.24231 g

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- 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

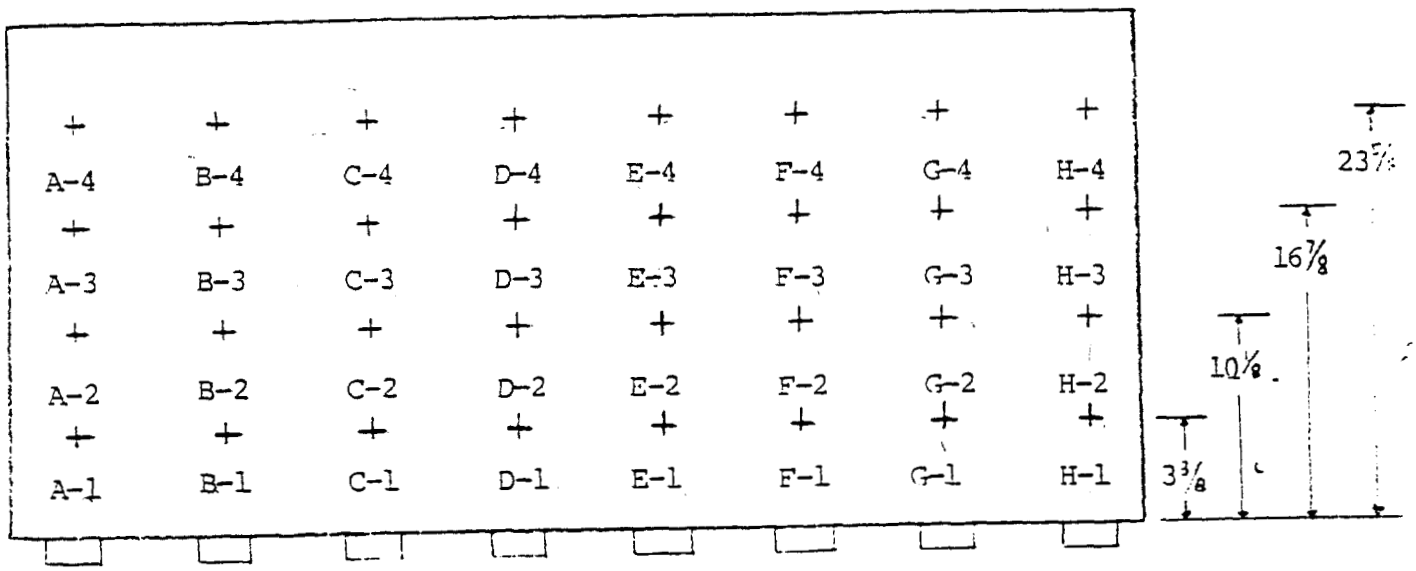
FIGURE 1 : PARTICULATE MATTER SAMPLING TRAIN

SAN [illegible]GO AIR POLLUTION CONTROL DIST[illegible]

TRAVERSE POINTS

ASPHALT INC.

BAGHOUSE EXHAUST DUCT



DUCT MEASURES 27" BY 60"

NOT TO SCALE

Figure 2

SIT—DESCRIPTION

ASPHALT INC.

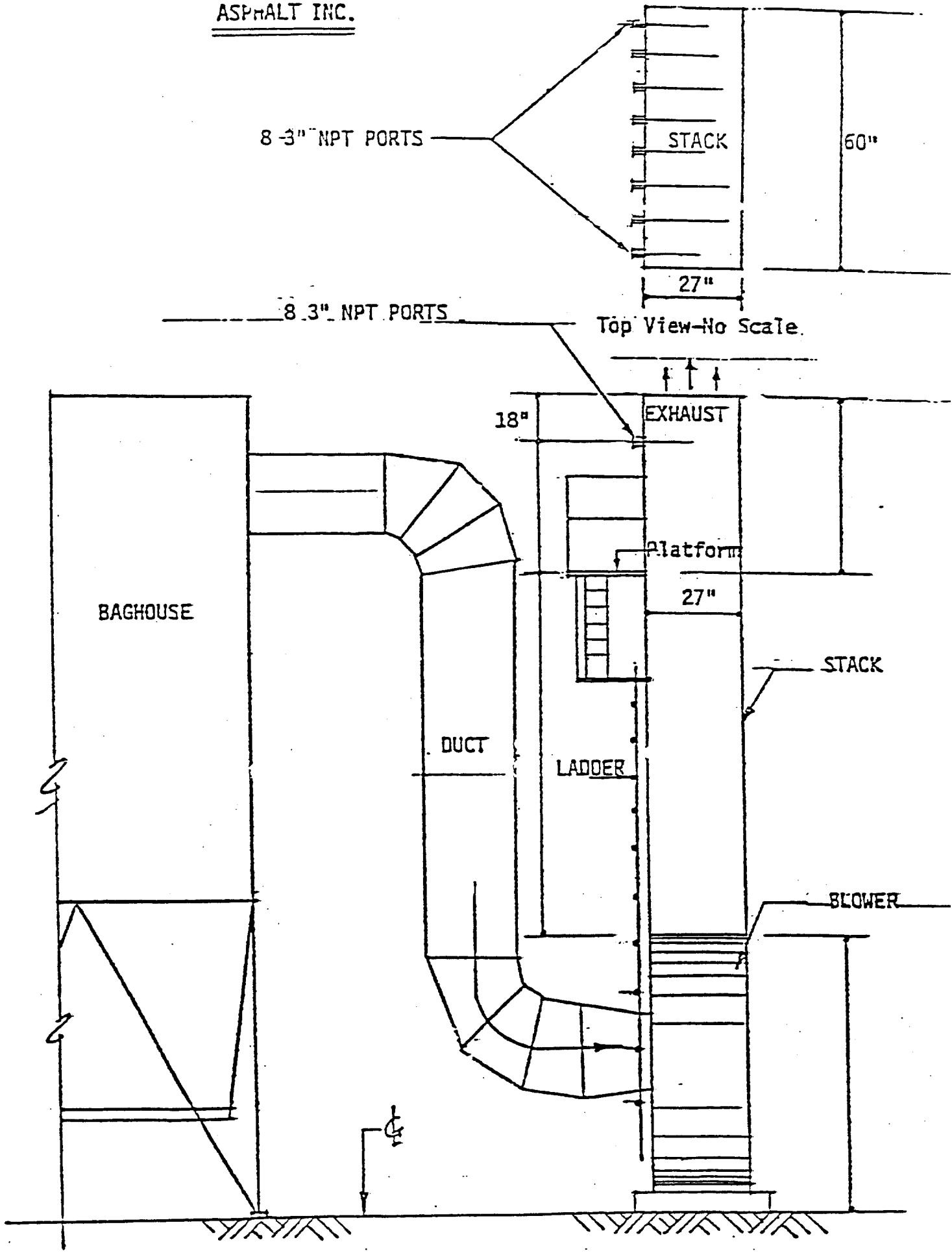


Figure 3 Side View— No Scale.

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(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)
	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*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

NOMENCLATRE (cont.)

NOMENCLATRE (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	absoulte meter presenre	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
	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

APCD Engineering Test Witness Report

8/7/91 Asphalt Inc., Lakeside P/O # 0115

Asphalt Composition per 3 ton batch:

	½" Medium Mix
Bin #1 Sand & Dust	2740 lbs
Bin #2 3/8" Rock	1690
Bin #3 ½" Rock	1130
Baghouse Dust	84
Asphalt Oil (AR 4000)	356
	6000 lbs

Time	°F Material Temp	°F Baghouse Inlet	in H_2O Bag ΔP	PSIG Fuel press	Comment
7:24 am	346°	110°	4.8	28	Start Test
7:53	352	110	5.0	28	
8:23	352	110	4.8	28	
8:48	349	110	4.8	22	
9:12	349	110	4.8	22	End Test

Production Time: 0724 - 0912 = 1.8 hrs

Production = 378 Tons - ½" Mix + 14 Tons - Berm Mix = 392T

Average Production Rate = $\frac{392T}{1.8hr}$ = 218 T/hr

Notes:

1) Test conducted by the SDAPCD Source Test Team - David Shina and Gary Smith.
2) All of the asphalt was transferred to 3 storage silos by conveyor. The silo conveyor had a 10-20% V.E. "white smoke"; looked like mainly steam.
3) Silo truck drop had 'blue smoke' V.E. of 40-50% for 15-20 seconds while loading. Truck loading averaged one every 15 minutes; therefore no violation of Rule 50 occured.
4) The baghouse exhaust stack had an attached steam plume at the start of the test. Near the end of the test period, the plume became detached and the V.E. was 10%.
5) The rotary dryer was fired with diesel fuel. A sample was taken to check for sulfur content. There were no V.E. at the dryer rotary seals.

Dean Carlson

RAW DATA SHEETS

PO # 0115

BSL # 91219

Asphalt Inc

0092

VOL

Date	Imp	Pre	Post	Net	comments Charge = 99.41 + 98.63
8/7	1	~~543.03 410.64~~	682.65	139.60	
	2	540.08	550.75	10.67	
	3	465.37	466.80	1.43	
	4	440.75	441.31	0.56	

total = 152.26 mL

Bkr No.	Ent wgt	Loc	WGT #1	WGT # 2	WGT #3	WGT #4	Final wgt.
	Acetone						
24.2680	91036	FROM	29.4018	.4015	.4012	.4013	29.4013
26.7484	91019	BRK	26.7540	.7543	.7542	.7542	26.7542
29.1546	91013	BUNK	29.1564	.1562	.1564		29.1564
	Water						
91003	30.2336	FR	30.2357	.2357	.2357	.2357	30.2357
91083	49.3357	BK	49.4433	49.4431	49.4431	.4432	49.4432
91016	29.2212	BL	29.2215	.2215	.2215	.2213	29.2213
8	Filter						
89077	1.6078	BK	1.6085	1.6085	1.6085	1.6085	1.6085

GAS

CO_2: Anarad. cal gas = 5.2% CO_2, Cal # = 29.1

3.6%, 3.6%, 3.6%

AVG = 3.6%

O_2: Teledyne cal gas = Oxygen, Cal # = 28.1

16.1, 16.1, 16.1

AVG = 16.1

PO # 115

#91214

Asphalt Inc

0093

ACETONE (FRONT)

DATE	RINSE	VOL	LABEL	COMMENTS
8/7	Init	250	Ac-Fr	
8/9	1°	50	91036	brown ppt
	2°	—	—	

total = 250 mL 300 DUs 10/10/91

ACETONE (BACK)

Date	Rinse	Vol	Label	Comments
8/7	Init	500	Ac-Bk	.
8/9	1°	50	91039	Very little brown ppt
	2°	—	—	

total = 550 mL

Acetone Blank (See pg 81)

Date	Rinse	Vol	Label	Comments
	Init	200	Ac-Bk	
	1°	30	91013	no ppt
	2°	—	—	

total = 230 mL

P.O. # 115

9219

Asphalt Fire

0094

WATER (FRONT)

DATE	RINSE	VOL	Label	COMMENTS
8/7	INIT	300	WAT-FR	
8/8	1°	50	9083	light br ppt ; some white specs
	2°	—	—	

total = 350 mL

(water back)

DATE	RINSE	VOL	Label	COMMENTS
8/7	INIT	500	WA-BK	
8/8	1°	50	9083	black ppt
	2°	—	—	

total = 550 mL

DATE	RINSE	VOL	Label	COMMENTS
8/7	INIT	200	WA-BL	
8/8	1°	50	9086	clear
	2°	—	—	

total = 250 mL

water blank ~~(samples 8/7)~~ 8/8

Asphal Inc

DLR 8/7/91

METHOD 5 EQUIPMENT CHECKLIST

IMPINGERS:

Spare filter	_____
Filter No.	_____
DI water	_____
"C" Tube	_____
"S" Tube	_____
"V" Tube	_____
100 ml Grad Cyl	_____
Acetone	_____
Spare clips (Imp)	_____
Kimwipes	_____
Stopcock Grease	_____
Spare Imp	_____

TOOLS:

Chain 8'	_____
Rope 40'	_____
Rope 2'	_____
Bailing Wire	_____
Tool Box	_____
Wrenches 8"	_____
Pipe Wrench	_____
Tape Measure	_____

SAFETY

First Aid Box	_____
Hard Hat	_____
Ear Protection	_____
Gloves (Leather)	_____
Gloves (Heat Resistant)	_____
Filter Mask	_____
Safety Belt	_____
Safety Cones	_____

MISC

Tadlar Bag	_____
Fuses	_____
Camera & Film	_____
Ice Chest/Scoop	_____
Masking Tape	_____
Pens & Markers	_____
Duct Tape	_____
Calculator	_____
Scissors	_____
Rags & Diapers	_____
Stop Watch	_____
Monorail w/rollers	_____
"S" Hook	_____
Nozzle Nut	_____
Probe Brush	_____
TC Extension	_____
Nomograph	_____
Extension Cords	_____

FIGURE 5-3B

EQUIPMENT DATA SHEET

SITE: | TEST#: | P.O.# | DATE:

EQUIPMENT CHECK:

MAIN:	TYPE	ID#	SIZE	UNITS	CLEANED	CHECKED	CAL. DATE
Nozzle Dia.	Nupp	~~223~~	.223	in	DW	DW	
Pitot Tube	Napp	None	3-Pt	Pt	DW	DW	—
Tedlar Bag					GDS	DNS	
L/S Box	Napp	D337					LT/6/91
Stack Temp Sensor	✓				GDS		6/91
Box Temp Sensor	✓				✓		↓
Imp. Temp Sensor	✓				✓		↓
ΔP Sensor							
ΔH Sensor							
Cold Box	Green 2				DNS	DNS	
Hot Box	Blue 3				DNS	DNS	
Thermoc. Display	✓						

RESERVE							
Nozzle Dia.							
Pitot Tube	Napp	SN2	3	Pt	GDS	GDS	6/91
Tedlar Bag		None					
L/S Box	NAPP	C138					LT/6/91
Stack Temp Sensor	✓				GDS	GDS	6/91
Box Temp Sensor					↓	↓	↓
Imp. Temp Sensor					↓	↓	↓
ΔP Sensor							
ΔH Sensor							
Cold Box	Blue #4						
Hot Box	Blue #4						
Thermoc. Display							

SIGNATURE: DW DATE: 8/6/91 TIME: 4pm

PRESTEST CHECKS:
Sample Time at Traverse Point:_____ Traverse Points Marked DNS
Ports Cleaned: DNS Port Size____
Tedlar Bag Leak Checked DNS
Temperature Sensors (at ambient temperature)
ts_____ tbox_____ ti_____

PRETEST LEAK CHECKS:
Meter Orifice Check Pass
Sample Line Pass _____cfm _____min Limit: 0.02 cfm
Pitot Tubes High_____in H2O _____sec Pass
Low _____in H2O _____sec Pass

SAMPLING CHECKS:
Hot Box Heater On:_____ Probe Heater On: DNS Impingers Iced: DNS
Static Pressure:_____

POSTTEST LEAK CHEKS
Meter Orifice Check Pass
Sample Line 2 cfm _____min Limit: 0.02 cfm
Pitot Tubes High_____in H2O _____sec Pass
Low _____in H2O _____sec Pass

DNS 8(7)(c)

FIELD DATA SHEET #1

Sample No. _____

Impinger No	Soution Used	Amount of Solution (ml)	Imp. Tip Configuration	Weight (grams)
1	water	99.41g	G-S	Final 682.65 Initial 543.05 Wt. Gain 139.60
2	Water	98.63g	mod G-S	Final 550.75 Initial 540.08 Wt. Gain 10.67
3	–	Ø	G-S	Final 466.80 Initial 465.37 Wt. Gain 1.43
4	–	Ø	G-S	Final 441.31 Initial 440.75 Wt. Gain .56
5				Final Initial Wt. Gain
6				Final Initial Wt. Gain
Filter	89077			Final Initial Wt. Gain

TOTAL WEIGHT GAIN OF IMPINGERS (grams) 156.26 ~~g~~

152.26 DW

10/10/91

Date 8/7

Signature Dus

GAS ANALYSIS RESULTS

Gas Fractional Part

CO2 Instrument I.D.# Anarad

O2 Instrument I.D.# Teledyne

CO2 3.6, 3.6, 3.6

O2 16.1, 16.1, 16.1

CO _____

N2 _____

Date 8/7

Time _____

Signature Dus

Figure 5-5

SAN DIEGO AIR POLLUTION CONTROL DISTRICT

Y = .9782

ORIFICE CHECK

Yc = (Ø*(0.0319*Tm/bar)^0.5)/Vm (run at ∂H@ for Ø minutes)

Pre-test check

2/5 0337

	TIME	T1	T2	VM	PBar
start:	Ø	75.4	106.1	985.630	assume 29.61
finish:	5	77.4	112.1	989.50	
average:		76.4	109.1		
net:	5	+460 552.75		3.88	

Yc= .9944 Ym= .9782 Yc/Ym= 1.0166

(0.97 ≤ Yc/Ym ≤ 1.03) Pass

Post test check

	TIME	T1	T2	VM	PBar
start:	Ø	80.4	112.1	92.050	
finish:	5	80.4	118.1	95.928	
average:					assume
net:	5	+460 557.25		3.878	29.62

Yc= .9988 Ym= .9782 Yc/Ym= 1.0211

(0.97 ≤ Yc/Ym ≤ 1.03) Pass

Fig 5-6

Nomograph Calculations

TEST #: _____ DATE: _____

SITE _____ P.O. # _____

Pm, absolute	29.7
Ps, absolute	29.5
Tm, absolute	95
∂H@ across meter	2.7254
% moisture	19
correction factor	1.19
Ts, absolute	1.50
∂P stack	.7 − 1.1 = .90
ideal nozzle diam	.207
nozzle used	.223
test differential pressure	k = 2.5

$\frac{50 \text{ min}}{.7185 \text{ ft}^3/\text{min}} \approx 70 \text{ min} / 32 \text{ pts} \approx 2.5 \text{ min/pt}$

Figure 5-8

SITE: | TEST#: | P.O#: | DATE:

PIT (ΔP end) in. H2O − (ΔP start) in. H2O = (ΔP calc = 0 to Pass): (15 sec min.) in H2O

PRE(+):	24.28	24.28	Ø	in 15 sec	(P)	F
PRE(-):	.75	.75	Ø	in 15 sec	(P)	F
POST(+):	3.45	3.45	Ø	in 15 sec	(P)	F
POST(-):	4.45	4.45	Ø	in 15 sec	(P)	F

VAC (Vend) ft^3 − (Vstart) ft^3 = (Vcalc =< 0.02 cfm) ft^3 @ (vac) in. Hg. in 1 min

PRE:	38,580	38,580	Ø	@ 15 in	1 min (P)	F
POST:	88,980	88,987	.007	@ 5 in	1 min (P)	F

OPER:

T1 corr: +1.4 °F T2 corr: +1.1 °F

Pbar 29.62 in Hg Ds: 27" x 60" ft

Ps: −.42 in H2O T amb: °F

Probe ID: none L/S box: D337

Probe len: 3 ft ft ΔH@: 2.7254

Cp: .840 Y: .9782

Dn: .223 in C. box: green 2

K= 2.5 time/pt= 2.5 min

TRA PT ND	SAMPLING TIME min	GAS METER ft3, Vm Vm	PRESS DIFF ACROSS PIT TUBES, in H2O ΔP	PRESS DIFF. ACROSS THE ORIFICE, in H2O ΔH DESIRED	ΔH ACTUAL	STACK TEMP, °F °F th I	BOX TEMP, °F °F th II	IMPINGER TEMP, °F °F th III	DRY GAS METER TEMP, °F INLET (T1)	DRY GAS METER TEMP, °F OUTLET (T2)	PUMP VAC in. Hg	CLOCK TIME Hr:min
	0	38,619										7:25 start
H4	2.5	39	.8	2.12	2.15	134	67	57	76	100	1	
			.75	1.875	1.9							
H3	5.0	41,690	.7	1.75	1.75	150	68	54	76	108	1	
		43,168	.65	1.63	1.65							
H2	7.5	~~41,690~~ 44,495	.63	1.57	1.6	148	68	53	76	111	1	
		44,495	.60	1.5	1.5							
H1	10.0	~~43,168~~	.50	1.25	1.25	147	68	53	76	111	.7	7:35 stop
G1	2.5	46,285	1.0	2.5	2.5	149	68	50	76	108	2	7:36 start
G2	5.0	47,940	.8	2.0	2.0	151	71	49	76	112	1	
G3	7.5	49,579	.75	1.87	1.9	150	70	51	76	113	1.1	
G4	10	51,030	.6	1.5	1.5	150	71	51	76	114	1.1	7:46 Stop
F1	2.5	52,940	1.05	2.63	2.6	150	70	49	76	109	2	7:47 start
F2	5.0	54,711	.88	2.2	2.2	155	70	49	76	113	1.9	
F3	7.5	56,285	.70	1.75	1.75	157	72	50	76	114	1	
F4	10.0	57,622	.55	1.25	1.25	156	71	48	76	113	.7	7:57 stop
E1	2.5	59,395	1.0	2.5	2.5	152	71	51	80	94	1.5	8:07 start
E2	5.0	61,224	.95	2.37	2.4	157	72	47	78	108	1.9	
E3	7.5	62,900	.75	1.87	1.9	157	72	47	77	110	1.2	
E4	10.0	64,292	.5	1.25	1.25	161	73	48	76	110	.8	8:17 stop
D1	2.5	66,060	.9	2.3	2.3	161	73	49	77	106	1.9	8:18 start
D2	5.0	67,805	.89	2.22	2.2	162	74	49	77	112	1.5	
D3	7.5	69,472	.75	1.87	1.9	162	74	49	77	113	1.5	
D4	10.0	70,918	.55	1.37	1.4	158	74	49	76	112	1.0	8:28 Stop

SITE: | TEST#: | P.O#: | DATE:

PIT (ΔP end) in. H2O - (ΔP start) in. H2O = (ΔP calc = 0 to Pass); (15 sec. min.) in H2O

PRE(+): ____ - ____ = ____ in ____ sec P F

PRE(-): ____ - ____ = ____ in ____ sec P F

POST(+): ____ - ____ = ____ in ____ sec P F

POST(-): ____ - ____ = ____ in ____ sec P F

VAC (Vend) ft^3 - (Vstart) ft^3 = (Vcalc =< 0.02 cfm) ft^3 @ (vac) in. Hg in 1 min

PRE : ____ - ____ = ____ @ ____ in ____ min P F

POST : ____ - ____ = ____ @ ____ in ____ min P F

OPER: ____

T1 corr: ____ °F T2 corr: ____ °F

Pbar ____ in Hg Ds: ____ ft

Ps: ____ in H2O T amb: ____ °F

Probe ID: ____ L/S box: ____

Probe len: ____ ft ΔH@: ____

Cp: ____ Y: ____

Dn: ____ in C. box: ____

K= 2.5 time/pt= 2.5 min

TRA PT NO	SAMPLING TIME min	GAS METER ft3, Vm Vm	PRESS DIFF ACROSS PIT TUBES, in H2O ΔP	PRESS DIFF. ACROSS THE ORIFICE, in H2O ΔH DESIRED	ΔH ACTUAL	STACK TEMP, °F °F th I	BOX TEMP, °F °F th II	IMPINGER TEMP, °F °F th III	DRY GAS METER TEMP, °F INLET (T1)	DRY GAS METER TEMP, °F OUTLET (T2)	PUMP VAC in. Hg	CLOCK TIME Hr:min
		70,418										8:36 start
C1	2.5	72,575	.83	2.07	2.1	152	76	53	79	96	1.2	
C2	5.0	74.853	.8	2	2	162	95	49	77	110	1.5	
							CURVATION		heater→slight water buildup			
C3	7.5	75.901	.78	1.95	1.95	168	145	49	77	112	1.3	
C4	10.0	77,436	.65	1.63	1.6	162	197	49	78	112	1.0	8:46 stop
B1	2.5	78,434	.67	1.7	1.7	160	222	52	78	108	1.0	8:47 start
B2	5.0	80,421	.62	1.55	1.55	163	243	50	79	113	1.0	
B3	7.5	81.438	.68	1.7	1.7	164	264	51	80	115	1.0	
B4	10.0	83.516	.71	1.77	1.75	163	281	52	80	116	1.1	8:57 stop
A1	2.5	84,929	.55	1.38	1.4	154	231	55	82	113	.9	9:00 start
A2	5.0	86.240	.5	1.25	1.25	164	256	52	81	113	.7	
A3	7.5	87.548	.5	1.25	1.25	165	268	52	81	114	.7	
A4	10.0	88.927	.55	1.37	1.4	165	283	52	81	115	.9	9:10 END

88.927 - 38.619 = 50.308

BAROMETRIC PRESSURE REQUEST

SITE: Asphalt Inc | TEST#: | P.O.# 0115 | DATE: 8/7

TO: Don | OF: Met | DATE: 8/7

FROM: David S | OF: Mon | DATE: 8/7

ADDRESS: Highway 67, Slaughterhouse Canyon RD, Lakeside

TEST DATE: _____ | TEST TIME: 6am - 2pm

I need an hourly breakdown

GRADE LEVEL: 520 Feet above MSL

+ — Feet above Grade

ALTITUDE: 520 Feet above MSL

7:30 - 9:

CALCULATIONS:

PDT	
0600	29.48 - (ESTIMATED)
0700	29.50
0800	29.52
0900	29.52
1000	29.52
1100	29.51
1200	29.49
1300	29.48
1400	29.47
1500	29.47

29.51 / 29.52 — 29.52
29.52
29.52

SIGNATURE: _____ | DATE: _____ | TIME: _____

??SITE NAME?? on ??TEST D..E?? P.O.#????? TEST #?????

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

SOURCE TEST OF PARTICULATE EMISSIONS TO THE ATMOSPHERE

TEST SITE: Asphalt Inc.

TEST #: 91219 P.O.# 115 TEST DATE: 8/7/91

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

UNIT TESTED: Baghouse

EQUIPMENT: Asphalt Plant

TESTED BY: D. Shina & G. Smith DATE:

SITE PERSONNEL: DATE:

APCD ENGINEER: D. Carlson DATE:

LAB ANALYSIS BY: D. Shina DATE:

REPORT BY: D. Shina DATE:

REVIEWED BY: L. Twaddle DATE: 10/9/91

APPROVED BY: DATE:

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	17.95 lbs/hr	PASSED

SUMMARY:

ITEM	Vm	Bws	Cs	E	I	Qstd	ts	PROD RATE
UNITS	ft^3	%	gr/dscf	lbs/hr	%	dscfm	°F	tons/hr
VALUE	50.308	14.50	0.081	17.950	93	2.57E+04	157	218

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 (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 32 traverse points, 4 from each of 8 sample ports (fig.2), collected from 18 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:
- CO2-Anarad AR400
- O2-Teledyne Ryan 320 P4
- Macrobalance-Sargent Welch
- Microbalance-Sartorious

Collection:
- Filter-Gelman
- Holder-Gelman
- Beakers-Pyrex
- Impingers-Ace

Sampling:
- L/S Box-Napp
- Umbilical cord-Napp
- Cold/Hot box-Napp
- Pitobe tube-Napp

Temp./Press.:
- Thermocouples-Omega
- Read out-Omega
- Barometric-calc. by APCD
- L/S box-Dwyer magnehelic

??SITE NAME?? on ??TEST D..E?? P.O.#????? TEST #?????

Trav. Pt	Vm (ft^3)	ΔP	ΔH	t 1(unc)	t 2(unc)	Stack Temp	Imp Temp	velocity
	38.619	(in H2O)	(in H20)	(°F)	(°F)	(°F)	(°F)	(ft/sec)
H1		0.800	2.150	78.00	100.00	139.00	57	55.11
H2		0.700	1.750	76.00	108.00	150.00	54	52.02
H3		0.630	1.600	78.00	111.00	148.00	53	49.27
H4		0.500	1.250	76.00	111.00	147.00	53	43.86
G1		1.000	2.500	78.00	108.00	149.00	50	62.13
G2		0.800	2.000	76.00	112.00	151.00	49	55.66
G3		0.750	1.900	78.00	113.00	150.00	51	53.85
G4		0.600	1.500	76.00	114.00	150.00	51	48.16
F1		1.050	2.600	78.00	109.00	150.00	49	63.71
F2		0.880	2.200	76.00	113.00	155.00	49	58.57
F3		0.700	1.750	78.00	114.00	157.00	50	52.32
F4		0.550	1.250	76.00	113.00	156.00	48	46.34
E1		1.000	2.500	80.00	94.00	152.00	51	62.28
E2		0.950	2.400	78.00	108.00	157.00	47	60.95
E3		0.750	1.900	77.00	110.00	157.00	47	54.15
E4		0.500	1.250	76.00	110.00	161.00	48	44.36
D1		0.900	2.300	77.00	106.00	161.00	49	59.52
D2		0.890	2.200	77.00	112.00	162.00	49	59.23
D3		0.750	1.900	77.00	113.00	162.00	49	54.37
D4		0.550	1.400	76.00	112.00	158.00	49	46.41
C1		0.830	2.100	79.00	96.00	152.00	53	56.74
C2		0.800	2.000	77.00	110.00	162.00	49	56.16
C3		0.780	1.950	77.00	112.00	168.00	49	55.72
C4		0.650	1.600	78.00	112.00	162.00	49	50.62
B1		0.660	1.700	78.00	108.00	160.00	52	51.69
B2		0.620	1.550	79.00	113.00	163.00	50	49.48
B3		0.680	1.700	80.00	116.00	164.00	51	51.86
B4		0.710	1.750	80.00	116.00	163.00	52	52.95
A1		0.560	1.400	82.00	113.00	164.00	55	48.26
A2		0.500	1.250	81.00	113.00	164.00	52	44.47
A3		0.500	1.250	81.00	114.00	165.00	52	44.50
A4	88.927	0.550	1.400	81.00	115.00	165.00	52	46.68

	Vm (ft*^3)	ΔP (in H2O)	ΔH (in H2O)	t 1 (°F)	t 2 (°F)	ts (°F)	ti (°F)	vs (ft/sec)
Average:	50.308	0.713	1.811	77.59	110.25	157	51	52.79

MISCELLANEOUS:

Ø = 80.0 min
tn = 32 points
ø = 2.5 min

NOZZLE & PROBE:

Dn = 0.223 in
An = 0.0391 in^2
Cp = 0.840

METER BOX PARAMETERS:

ΔH@ = 2.7254
Y = 0.9782
Box ID = d337

PRESSURES:

Pbar = 29.52 in Hg
Pg = -0.42 in H2O
Silica gel(yes/no) = no
Vpw @ ts = 8.98 in Hg
Vpw @ ti = 0.3764 in Hg

VOLUME:

start leak rate = 0.000 cfm
Pass/Fail = PASS
final leak rate = 0.007 cfm
Pass/Fail = PASS
Vm = 50.308 ft^3

TEMPERATURES:

t1 corr = 0.40 °F
t2 corr = 0.10 °F
tm = 94 °F
ts = 157 °F
ti = 51 °F

STACK PARAMETERS:

circular (yes/no) = no
Width = 2.25 f t
Length = 5.00 f t
As = 11.25 ft^2

LAB DATA:

mn(front) = 0.13291 g
mn(back) = 0.10940 g
mn(total) = 0.24231 g
Vlc = 152.26 ml

STACK GAS MEASUREMENTS:

CO2 = 3.60 %
O2 = 16.10 %
CO = 0.00 %
N2 = 80.30 %

QC

??SITE NAME?? on ??TEST DA..E?? P.O.#????? TEST #?????

TEMPERATURES:

01)	ts = (Σ ts(n))/total n's	157 °F
02)	Ts = ts+460	617 °R
03)	tm= (Σ {(t 1(n)+t 2t(n))/2}/total n's	94 °F
04)	Tm= (t1+t2)/2 + 460	554 °R
05)	ti= (Σ ti(n))/total n's	51 °F
06)	Tstd	528 °R

PRESSURES:

07)	Pbar= {(P @ S.L.)+[ft. above S.L.*(-0.1 in Hg/100ft)]}	29.52 in Hg
08)	Pg= read from pressure sensing device	-0.42 in H2O
09)	Ps= Pbar + (Pg/13.6)	29.49 in Hg
10)	ΔH	1.81 in H20
11)	Pm= Pbar+(ΔH/13.6)	29.65 in Hg
12)	Pstd	29.92 in Hg

VOLUME:

13)	Vm= Vm(end)-Vm(begin)	50.308 ft^3
14)	Y	0.9782
15)	Vm'= Vm*Y	49.211 ft^3
16)	Vpw @ ti = from appendix	0.3764 in Hg
17)	corr Vwm = {[(Vm'*Vpw@imp/Ps)*Pm*Tstd]/(Tm*Pstd)}	0.5931 ft^3
18)	Vm std = {[Vm'*(Tstd/Tm)*(Pm/Pstd)]-corr Vwm}	45.876 ft^3
19)	Vlc= (Σ Volume of impingers)	152.26 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}	7.7798 ft^3

CALCULATIONS:

MOISTURE-

24)	Bws(1) =(Vw std)/(Vw std+Vm std)100	14.50 %	
25)	Vpw @ ts = from appendix	8.98 in Hg	
26)	Bws(2) =[(Vpw @ ts)/Ps]*100	30.45 %	
27)	Bws = lower value of equation 24 or 26		14.50 %

MOLECULAR WEIGHT-

28)	%O2	16.10 %
29)	%CO2	3.60 %
30)	%N2+inerts+%CO	80.30 %
31)	Md=[0.440(%CO2)]+[0.320*(%O2)]+[0.280(%N2+inerts+%CO)]	29.22 g/g*mole
32)	Ms=Md*(1-Bws)+18.0*(Bws)	27.59 g/g*mole

FLOW-

33)	ΔP	0.713 in H2O
34)	Cp	0.840
35)	vs= 85.49*Cp*{[(Ts*ΔP)/(Ps*Ms)]^.5}	52.793 ft/s
36)	As=3.14*[(Ds)^2/4]	11.25 ft^2
37)	Qs = (vs)*As*60	3.56E+04 acfm
38)	Qstd =17.64*Qs*(1-Bws)*Ps/Ts	2.57E+04 dscfm

EMISSIONS-

FRONT HALF

39)	mn (front)		0.13291 g
40)	Cs (front) =15.43*mn(front)/Vm std	0.0447	0.045 grains/dscf
41)	E (front) = (0.00857)*(Qstd)*Cs (front)		9.85 lbs/hr

BACK HALF

42)	mn (back)		0.10940 g
43)	Cs (back) =15.43*mn(back)/Vm std	0.0368	0.037 grains/dscf
44)	E (back) = (0.00857)*(Qstd)*Cs (back)		8.10 lbs/hr

TOTAL

45)	mn (total) = mn(front)+mn(back)		0.24231 g
46)	Cs (total) =15.43*mn(total)/Vm std	0.0815	0.081 grains/dscf
47)	E (total) = (0.00857)*(Qstd)*Cs (total)		17.95 lbs/hr

ISOKINETICS:

48)	An=3.14*[(Dn)^2/4]		0.0391 in^2
49)	I=.09450(Ts*Vm std)/Ps*vsAnØ(1-Bws)	92.57 %=	93 %

QC

?? SITE NAME?? on ??TEST DAT. P.O.#?????? TEST#??????

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

LABORATORY ANALYSIS OF PARTICULATE TEST

TEST SITE: Asphalt Inc.

TEST # 91219.0	P.O.# 115	TEST DATE: 8/7/91
LAB ANALYSIS BY:	D. Shina	DATE: 8/14/91
LAB REPORT BY:	D. Shina	DATE: 8/29/91
REVIEWED BY:	L. Twaddle	DATE: 10/9/91

(1) IMPINGER VOLUMES

	FINAL WEIGHT		INITIAL WEIGHT		NET WEIGHT	
#1	682.65 g	-	543.05 g	=	139.60 g	
#2	550.75 g	-	540.08 g	=	10.67 g	
#3	466.80 g	-	465.37 g	=	1.43 g	
#4	441.31 g	-	440.75 g	=	0.56 g	
SILICA GEL CONTAINER:						
#5	____ g	-	____ g	=	0.00 g	

Tot. Vol.= 152.26 g

(2) BLANKS

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

ACETONE:

VOLUMES:

BKR ID = 91013
Initial= 200.00 ml
tot. Rinses= 30.00 ml
Tot. Vol= 230.00 ml

WEIGHTS:

final= 29.1564 g
initial= 29.1546 g
net= 0.0018 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = 7.82609E-06 g/ml
0.000783 %
= 7.83 ppm
The Blank PASSED

WATER:

VOLUMES:

BKR ID = 91016
Initial= 200.00 ml
tot. Rinses= 50.00 ml
Tot. Vol= 250.00 ml

WEIGHTS:

final= 29.2213 g
initial= 29.2212 g
net= 0.0001 g

LIMIT: 4ppm = 4mg/L = 0.000004g/ml

STD = 4.00000E-07 g/ml
0.000040 %
0.40 ppm
The Blank PASSED

ORGANIC:

VOLUMES:

BKR ID = ____
Initial= ____ ml
tot. Rinses= ____ ml
Tot. Vol= 0.00 ml

WEIGHTS:

final= ____ g
initial= ____ g
net= 0.0000 g

LIMIT: 0.001% = 10 ppm = 0.000010g/ml

STD = N/A g/ml
N/A %
N/A ppm
The Blank N/A

?? SITE NAME?? on ??TEST DATE

P.O.#?????? TEST#??????

QC

(3) WEIGHT

FRONT HALF

ACETONE

WEIGHT (uncorrected):

BKR ID= 91036

final= 29.4013 g

initial= 29.2680 g

Wgt. Ac= 0.1333 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 = 0.002348 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.130952 g

WATER:

WEIGHT (uncorrected):

BKR ID= 91003

final= 30.2357 g

initial= 30.2336 g

Wgt. Water= 0.0021 g

VOLUMES:

initial= 300.00 ml

tot. Rinses= 50.00 ml

Tot. Vol = 350.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000140 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt. from solvent= 0.001960 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= 91019

final= 28.7542 g

initial= 28.7484 g

Wgt. Ac.= 0.0058 g

VOLUME:

Initial= 500.00 ml

tot. Rinses= 50.00 ml

Sep. funnel= _____ ml

Tot. Vol= 550.00 ml

WEIGHT FROM SOLVENT:

Total Vol * Acetone STD = 0.004304 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.001496 g

WATER:

WEIGHT (uncorrected):

BKR ID= 91083

final= 49.4432 g

initial= 49.3357 g

Wgt. Water= 0.1075 g

VOLUMES:

initial= 500.00 ml

tot. Rinses= 50.00 ml

imp. charge= 198.04 ml

Tot. Vol= 748.04 ml

WEIGHT FROM SOLVENT:

Total Vol * Water STD = 0.000299 g

WEIGHT (corrected):

Wgt(corr)= Wgt(unc)-Wgt from solvent= 0.107201 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.= 89077

final= 1.6085 g

initial= 1.6078 g

Wgt. Filter= 0.0007 g

PARTICULATE COLLECTED (front half):

ΣWgt corrected + Wgt filter= mn (front)= 0.13291 g

PARTICULATE COLLECTED (back half):

ΣWgt corrected + Wgt filter= mn (back)= 0.10940 g

TOTAL PARTICULATE COLLECTED:

mn(front) + mn(back) = 0.24231 g