AP42 Section: 11.1

Reference Number: 286

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

San Diego County Air Pollution, San Diego, CA,

October 20, 1992.

AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO



November 18, 1992

Attn: Ken Kindler
South Coast Asphalt Products Company
P.O. Box 586324
Oceanside, CA. 92058-6324

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 Velenosky
Senior Air Pollution Chemist

Enclosures

9150 Chesapeake Drive • San Diego • California 92123-1096 • (619) 694-3307
FAX (619) 694-2730 • Smoking Vehicle Hotline 1-800-28-SMOKE

South Carlsbad (unit #1) on 10/20/92 P.O.#926 TEST #92294.1

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 Carlsbad (Unit #1)
3701 Haymar Road
Carlsbad, CA 92088

TEST #: 92294.1 P.O.#: 926 TEST DATE: 10/20/92

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

UNIT TESTED: Hot Mix Asphalt Plant #1

EQUIPMENT: Barber-Greene model number 894, vented to Barber-Greene model CF-07 Baghouse Appl #1830

| | | |
|---|---|---|
| TESTED BY: | APCD: David Shina & Guy Allphin II | DATE: 10/20/92 |
| SITE PERSONNEL: | Ken Kindler | DATE: 10/20/92 |
| APCD ENGINEER: | Gary Smith | DATE: 10/20/92 |
| LAB ANALYSIS BY: | David N. Shina | DATE: 10/29/92 |
| REPORT BY: | David N. Shina | DATE: 10/29/92 |
| REVIEWED BY: | Guy Allphin II | DATE: 11/2/92 |
| APPROVED BY: | Robert Jelenosky | DATE: 11/3/92 |

ROBERT YELENOSKY, SENIOR AIR POLLUTION CHEMIST

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

## SDAPCD RULES

| TEST | LIMIT | MEASURED | EXCEEDANCE/NON-EXCEEDANCE |
|---|---|---|---|
| RULE 54 DUST & FUMES | 40 lbs/hr | 4.64 lbs/hr | NON-EXCEEDANCE |
| RULE 260.92 | 0.04 gr/dscf | 0.032 gr/dscf | NON-EXCEEDANCE |

## TEST RESULTS SUMMARY:

| ITEM | I | Cs | E |
|---|---|---|---|
| UNITS | % | gr/dscf | lbs/hr |
| VALUE | 107 | 0.0321 | 4.64 |

## ENGINEERING SUMMARY

| Qstd | Fuel | Rate | Asphalt Production |
|---|---|---|---|
| dscfm | ---- | tons/hr | tons |
| 16868 | Natural gas | 108.31 | 162.46 |

## TEST PARAMETERS:

### 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 utilized in these tests are based on EPA's 40 CFR, July 1, 1991, Part 60, Appendix A, Methods 1-5 inclusive. The sampling train was modified as follows: (1) Teflon tubing was run from the end of the probe to the first impinger in the cold box (the hot box was elim (2) A back-end filter was used instead of a front-end filter (for both modifications see fig. 1).

### CALCULATIONS

All equations are from the EPA's 40 CFR, July 1, 1991, Part 60, Appendix A, Methods 1-5 inclusive. All preliminary assumptions and calculations are based on data obtained from previous tests.

### PARTICULATE SAMPLING:

The test consisted of sampling at 20 traverse points, 10 from each of 2 sample ports (fig.2), collected from 54 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 rules 54 and 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 (40 CFR, July 1, 1991, Part 60, Appendix A, Methods 1-5 ).

| 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 | Temp. read out-Omega |
| Macrobalance-Sargent Welch | Beakers-Pyrex | Cold/Hot box-Napp | Aneroid Barometer-Taylor |
| Microbalance-Sartorious | Impingers-Ace | Pitobe tube-Napp | Press. devices-Dwyer magnehelic |

## FIELD DATA:

| Trav. Pt | Vm (ft^3) | ΔP (in H2O) | ΔH (in H2O) | Stack Temp (°F) | Box Temp (°F) | Imp Temp (°F) | t 1 (in) (°F) | t 2 (out) (°F) | velocity (ft/sec) |
|---|---|---|---|---|---|---|---|---|---|
| START | 214.943 | | | | | | | | |
| 1 | | 0.98 | 4.60 | 213 | | 46 | 74.00 | 094.00 | 065.03 |
| 2 | | 0.99 | 4.60 | 199 | | 48 | 73.50 | 090.00 | 064.36 |
| 3 | | 0.96 | 4.60 | 194 | | 47 | 72.00 | 092.00 | 063.78 |
| 4 | | 0.96 | 4.10 | 195 | | 51 | 74.00 | 094.00 | 060.48 |
| 5 | | 0.90 | 4.20 | 206 | | 49 | 74.00 | 095.00 | 061.77 |
| 6 | | 0.92 | 4.30 | 210 | | 49 | 74.00 | 096.00 | 062.83 |
| 7 | | 0.68 | 3.10 | 222 | | 45 | 75.00 | 096.00 | 054.26 |
| 8 | | 0.78 | 3.50 | 221 | | 46 | 75.00 | 097.00 | 058.07 |
| 9 | | 0.76 | 3.50 | 214 | | 40 | 75.00 | 098.00 | 057.02 |
| 10 | | 0.71 | 3.30 | 222 | | 45 | 75.00 | 099.00 | 055.45 |
| 1 | | 1.08 | 5.00 | 237 | | 52 | 74.00 | 095.00 | 069.12 |
| 2 | | 1.08 | 5.00 | 235 | | 51 | 75.00 | 096.00 | 069.87 |
| 3 | | 1.00 | 4.60 | 238 | | 56 | 76.50 | 099.00 | 066.56 |
| 4 | | 0.92 | 4.20 | 236 | | 56 | 76.50 | 099.00 | 063.94 |
| 5 | | 0.93 | 4.30 | 237 | | 56 | 76.50 | 099.00 | 064.14 |
| 6 | | 0.98 | 4.50 | 218 | | 57 | 78.00 | 100.50 | 064.99 |
| 7 | | 1.00 | 4.60 | 207 | | 57 | 79.00 | 101.00 | 065.07 |
| 8 | | 0.96 | 4.50 | 198 | | 51 | 79.00 | 101.00 | 064.03 |
| 9 | | 0.92 | 4.30 | 199 | | 50 | 79.50 | 101.50 | 062.03 |
| 10 | 281.630 | 0.92 | 4.26 | 223 | | 51 | 80.00 | 102.00 | 063.15 |

| | Vm ft^3 | ΔP (in H2O) | ΔH (in H2O) | ts (°F) | tbox (°F) | ti (°F) | t 1 (in) (°F) | t 2 (out) (°F) | vs (ft/sec) |
|---|---|---|---|---|---|---|---|---|---|
| Average: | 66.687 | 0.92 | 4.26 | 217 | N/A | 50 | 76.20 | 96.75 | 62.75 |

## DATA SUMMARY:

| LABORATORY DATA: | SAMPLING PARAMETERS: | SAMPLING DATA: |
|---|---|---|
| **IMPINGER CATCH:**<br>Silica gel ? = YES<br>Vlc = 262.17 ml | **METER BOX:**<br>Box ID = C138<br>ΔH@ = 1.8883<br>Y = 0.9924 | **VOLUME & TIME:**<br>Ø (total time) = 60.0 min<br>Final leak rate = 0.001 cfm<br>Pass/Fail = PASS<br>Vm = 66.687 ft^3 |
| **GAS ANALYSIS:**<br>CO2 = 2.20 %<br>O2 = 16.68 %<br>CO = 0.00 %<br>N2 = 81.12 % | **STACK DIMENSIONS:**<br>Circular ? = YES<br>Dia = 1.96 ft<br>Length = N/A ft<br>As = 6.87 ft^2 | **PRESSURES:**<br>Pbar = 29.87 in Hg<br>Pg = -0.75 in H2O<br>Vpw @ ts = 29.92 in Hg<br>Vpw @ ti = N/A in Hg |
| **PARTICULATE ANALYSIS:**<br>mn(front) = 0.063260 g<br>mn(back) = 0.070892 g<br>mn(total) = 0.13415 g | **NOZZLE & PROBE:**<br>Dn = 0.274 in<br>An = 0.0589 ft^2<br>Cp = 0.8400 | **TEMPERATURES:**<br>t1 = 76.20 °F ti = 50 °F<br>t2 = 96.75 °F tbox = N/A °F<br>tm = 86.48 °F ts = 217 °F |

# CALCULATIONS:

## TEMPERATURES:

| | | |
|---|---|---|
| 01) | ta = [Σ ta[i]]/total n'a | 217 °F |
| 02) | Ts = ta+460 | 677 °R |
| 03) | tms = [Σ[(t1n)+2(t2n)]/3]/total n'a=(t1+t2)/2 | 86 °F |
| 04) | Tm= (t1+t2)/2 + 460 | 546 °R |
| 05) | ts= [Σ ts[i]]/total n'a | 90 °F |
| 06) | Tstd | 528 °R |

## PRESSURES:

| | | |
|---|---|---|
| 07) | Pbar= [P @ S.L.]+[ft. above S.L.*(-0.1 in Hg/1000ft)] | 29.87 in Hg |
| 08) | Pg= read from preasure sensing device | -0.75 in H2O |
| 09) | Ps= Pbar + [Pg/13.6] | 29.81 in Hg |
| 10) | ΔH | 4.26 in H2O |
| 11) | Pm= Pbar+[ΔH/13.6] | 30.16 in Hg |
| 12) | Pstd | 29.92 in Hg |
| 13) | ΔP | 0.9166 in H2O |

## VOLUME:

| | | |
|---|---|---|
| 14) | Vm= Vmlend]-Vm[begin] | 66.627 ft^3 |
| 15) | Y | 0.9924 |
| 16) | Vm = Vm*Y | 66.160 ft^3 |
| 17) | Vm std = [Vm*(Tstd/Tm)*(Pm/Pstd)] | 64.505 ft^3 |
| 18) | Vlc= Σ Volume of impingers | 282.17 ml |
| 19) | ∂ | 0.002201 lb/ml |
| 20) | R | 21.85 in Hg-ft^3/°R-lb-mo |
| 21) | MwH2O | 18.00 g/g-mo |
| 22) | Vw std = [(Vlc*∂*R*Tstd)/(Pstd*MwH2O)] | 12.5403 ft^3 |

## MOISTURE:

| | | | |
|---|---|---|---|
| 23) | Bws(1) =(Vw std)/(Vw std+Vm std)100 | 16.06 % | |
| 24) | Vpw @ ts = from appendix | 29.92 in Hg | |
| 25) | Bws(2) =[(Vpw @ ts)/Ps]*100 | 100.35 % | |
| 26) | Bws = lower value of equation 24 or 26 | | 16.06 % |

## MOLECULAR WEIGHT:

| | | |
|---|---|---|
| 27) | %O2 | 16.68 % |
| 28) | %CO2 | 2.20 % |
| 29) | %N2+inerts+%CO | 81.12 % |
| 30) | Md=[0.440(%CO2)]+[0.320*(%O2)]+[0.280(%N2+inerts+%CO)] | 29.02 g/g*mole |
| 31) | Ms=Md*(1-Bws)+18.0*(Bws) | 27.25 g/g*mole |

## VELOCITY:

| | | |
|---|---|---|
| 32) | Cp | 0.840 |
| 33) | Ds= | 2.958 ft |
| 34) | Vs= 85.49*Cp*[(Ts*ΔP)/(Ps*Ms)]^.5] | 62.753 ft/sec |
| 35) | As=3.14*[(Ds)^2/4] | 6.869 ft^2 |
| 36) | Qa = Vs*As*60 | 25961 acfm |
| 37) | Qstd =17.64*Qa*(1-Bws)*Ps/Ts | 16868 dscfm |

## EMISSIONS:

### FRONT HALF

| | | |
|---|---|---|
| 38) | mn (front) | 0.06326 g |
| 39) | Cs (front) =15.43*mn(front)/Vm std | 0.01513 grains/dscf |
| 40) | 7000grains=1lb; 60min=1hr; 60min/hr/7000grains/lbs | 0.00857 lbs-min/grains-hr |
| 41) | E (front) = (0.00857)*(Qstd)*Cs (front) | 2.19 lbs/hr |

### BACK HALF

| | | |
|---|---|---|
| 42) | mn (back) | 0.07099 g |
| 43) | Cs (back) =15.43*mn(back)/Vm std | 0.01696 grains/dscf |
| 44) | 7000grains=1lb; 60min=1hr; 60min/hr/7000grains/lbs | 0.00857 lbs-min/grains-hr |
| 45) | E (back) = (0.00857)*(Qstd)*Cs (back) | 2.45 lbs/hr |

### TOTAL

| | | |
|---|---|---|
| 46) | mn (total) = mn(front)+mn(back) | 0.13425 g |
| 47) | Cs (total) =15.43*mn(total)/Vm std | 0.03209 grains/dscf |
| 48) | 7000grains=1lb; 60min=1hr; 60min/hr/7000grains/lbs | 0.00857 lbs-min/grains-hr |
| 49) | E (total) = (0.00857)*(Qstd)*Cs (total) | 4.64 lbs/hr |

## ISOKINETICS:

| | | | |
|---|---|---|---|
| 50) | Dn= | | 0.274 in |
| 51) | An=3.14*[(Dn)^2/4] | | 0.0589 in^2 |
| 52) | ∅ | | 60 min |
| 53) | I=.09450[Ts*Vm std/(Ps*vAn2(1-Bws)] | 106.98 % = | 107 % |

So. Coast Carlsbad (#1) on 10/20/92 P.O. #:926 TEST#92294.1

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

# PARTICULATE TEST LABORATORY ANALYSIS DATA SHEET

TEST SITE: South Coast Carlsbad (Unit #1)
3701 Haymar Road
Carlsbad, CA 92088

TEST #: 92294.1 P.O.#: 926 TEST DATE: 10/20/92

LAB ANALYSIS BY: David N. Shina DATE: 10/29/92

LAB REPORT BY: David N. Shina DATE: 10/29/92

REVIEWED BY: DATE:

## (1) IMPINGER VOLUMES

| | FINAL WGT. | | INIT WGT. | | NET WGT. |
|---|---|---|---|---|---|
| #1 | 777.14 g | - | 564.76 g | = | 212.38 g |
| #2 | 568.43 g | - | 543.53 g | = | 24.90 g |
| #3 | 471.49 g | - | 468.15 g | = | 3.34 g |
| #4 | 790.32 g | - | 768.77 g | = | 21.55 g |
| #5 | g | - | g | = | N/A g |
| #6 | g | - | g | = | N/A g |

Total impinger charge= 200.00 ml

Particulates from impinger charge
(Total impinger charge * H(water blank) = 0.00016 g

Total weight collected= 262.17 g

Total volume collected,Vlc= 262.17 ml

## (2) BLANKS

| A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AREA | SOLVENT | ID | END WGT g | INIT WGT g | NET WGT. (E-F) g | RINSES ml | g/ml (G/D) | % (H*100) | ppm (H*10^6) | PASS FAIL | LIMITS |
| BLANK | ACETONE | 92059 | 28.7701 | 28.7676 | 0.00250 | 250.00 | 0.0000100 | 0.0010000 | 10.0 | P | 0.0010%=10ppm |
| BLANK | WATER | 92046 | 29.0631 | 29.0629 | 0.00020 | 250.00 | 0.0000008 | 0.0000800 | 0.8 | P | 0.0004%=4ppm |
| BLANK | ORGANIC | N/A | | | | | | | | | |

## (3) WEIGHTS & RINSES

| a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA | SOLVENT | ID | END WGT g | INIT. WGT g | NET WGT. (e-f) g | RINSES ml | SOLV. WGT (g*H) g | WGT (corr) (f-h) g | Subtotal (mn (AREA)) (Σj) g | Total { mn (tot) } (Σj) g |
| F | ACETONE | 92074 | 29.1207 | 29.1131 | 0.0076 | 300.00 | 0.003000 | 0.00460 | | |
| R | WATER | 92036 | 49.5716 | 49.5127 | 0.0589 | 300.00 | 0.000240 | 0.05866 | | |
| O | ORGANIC | N/A | | | | | | | | |
| N | FILTER | N/A | | | | | | | | |
| T | | | | | | | | mn(front) = | 0.063250 g | |
| B | ACETONE | 92007 | 28.4900 | 28.4772 | 0.0128 | 290.00 | 0.002900 | 0.00990 | | |
| A | WATER ** | 92055 | 28.4169 | 28.3553 | 0.0616 | 560.00 | 0.000608 | 0.06099 | | |
| C | ORGANIC | N/A | | | | | | | | |
| K | FILTER | 91095 | 1.6085 | 1.6088 | *0.0000 | ------- | ---------- | 0.0000 | | |
| | | | | | | | | mn(back) = | 0.070892 g | |
| TOTAL | | | | | | | | | mn(total) = | 0.13415 g |

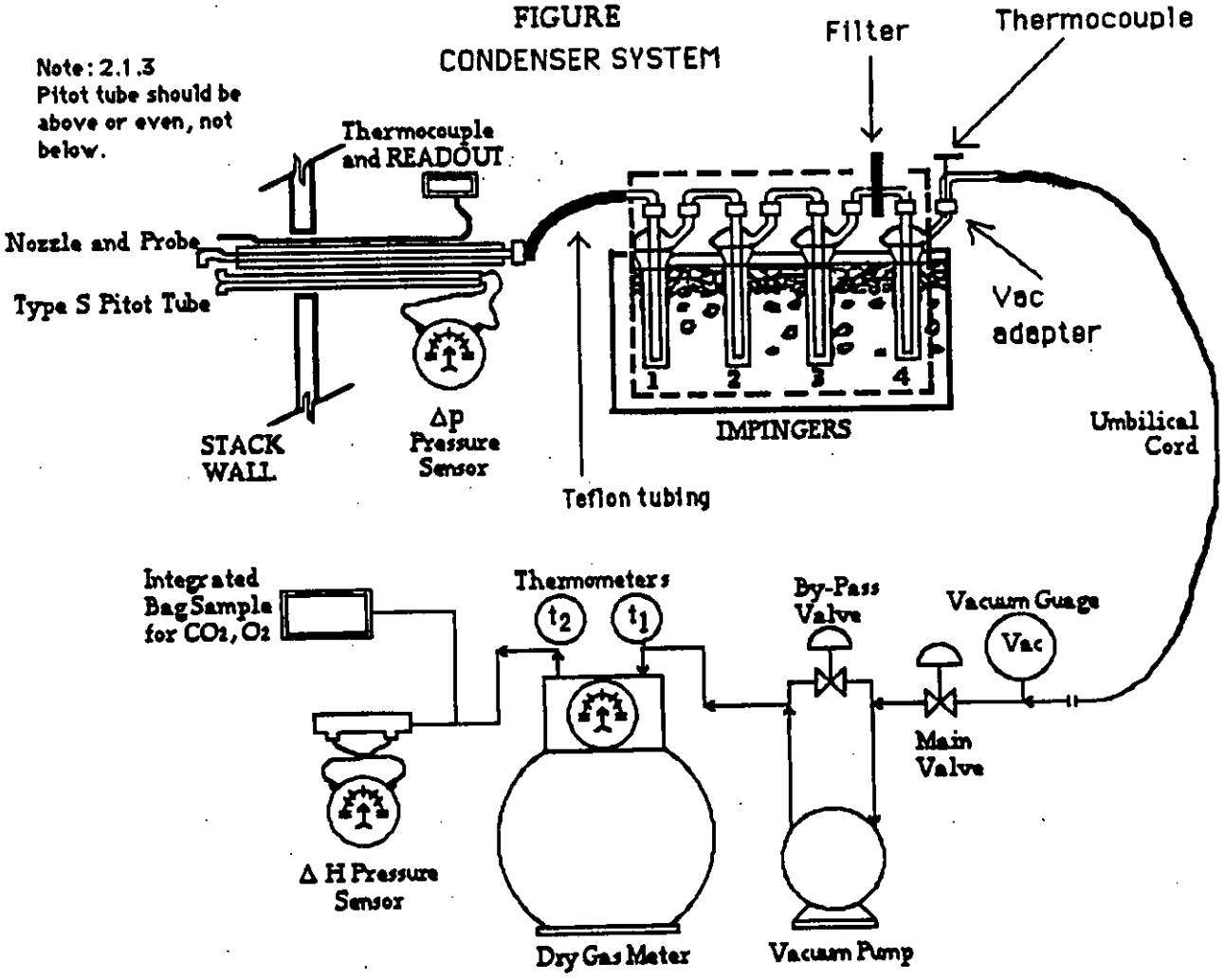
* The filter net weight is corrected to give 0.0000 g.

** The Back Water-SOLV.WGT is corrected for the initial impinger charge
{ [g(back water) * H(blank water)] + [Partiulates from impinger charge] }.

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- Silica gel

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

FIELD DATA ABBREVIATIONS

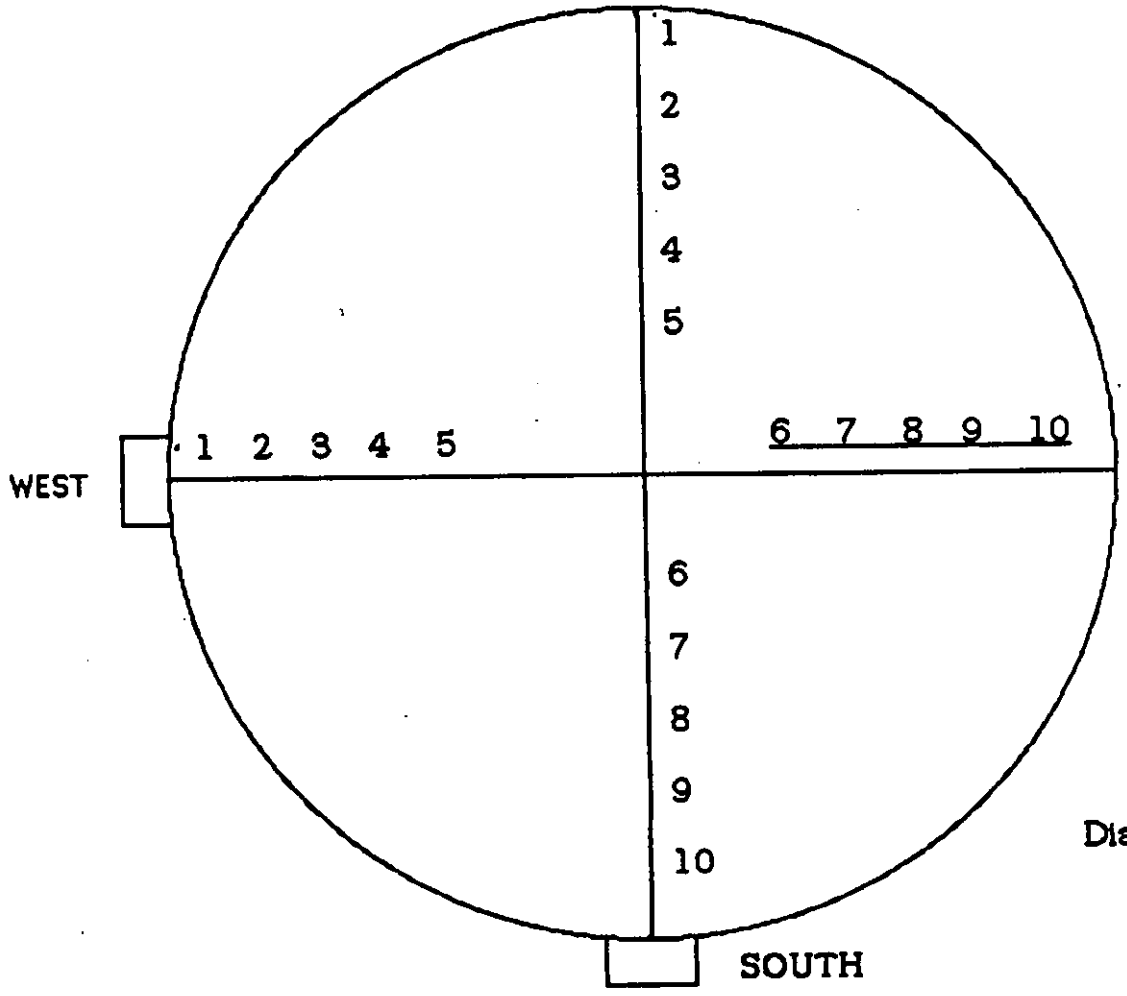
PT = Point Number
$T_s$ = Stack Temperature
$\Delta p$ = Pitot Tube Pressure Differential, in $H_2O$
$V_s$ = Stack Velocity, fps
$\Delta H$ = Orifice Meter Pressure Drop, in $H_2O$
$t_1$ = Meter Inlet Temperature, °F
$t_2$ = Meter Outlet Temperature, °F
Pm = Pump Vacuum, in Hg
ti = Impinger Temperature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

FIGURE : PARTICULATE MATTER SAMPLING TRAIN

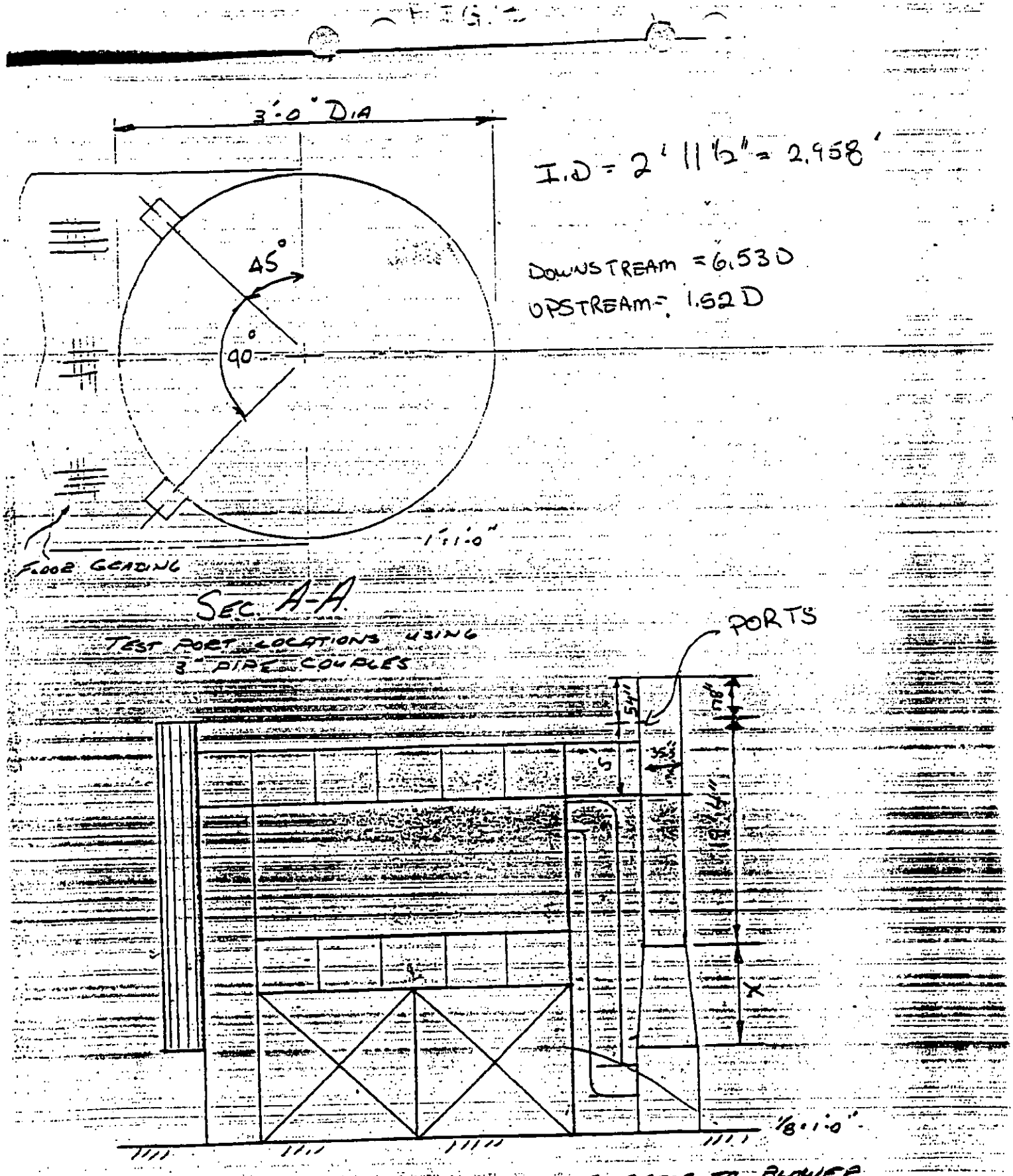
SAN DIEGO COUNTY AIR POLLUTION CONTROL DISTR

Figure

TRAVERSE POINTS




| POINT | DISTANCE |
|---|---|
| 1 | 1 inch |
| 2 | 2.91 |
| 3 | 5.18 |
| 4 | 8.02 |
| 5 | 12.14 |
| 6 | 23.36 |
| 7 | 27.48 |
| 8 | 30.32 |
| 9 | 32.59 |
| 10 | 34.50 |




X = DIMESION OF LAST RESTRICTOR TO BLOWER.
ESTIMATED TO BE 3'-0"

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** | | |
| 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*Ps*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*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 bt 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 | °R | dry gas meter outlet temp,corrected | t1 + temperature correction |
| t2 corr | °R | dry gas meter outlet temp,corrected | t2 + temperature correction |
| ø(theta) | min | sampling time/point | Ø/m |
| 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 |
| m | 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 |
| | **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 (60/7000) | see Lange's Handbook of Chemistry |
| 0.04707 | ft^3/ml | (∂*R*Tstd)/(Pstd*MW H2O) | 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 |

MECHANICAL ENGINEERING
SOURCE TEST REPORT
PERMIT RENEWAL TEST

TEST DATE: 20-Oct-92 ENGINEER: GARY SMITH
TEST CREW: DAVID SHINA, GUY ALPHIN

SOURCE: SOUTH COAST ASPHALT
3701 HAYMAR RD. CARLSBAD, CA 92008

PERMIT NUMBER: 926, HOT MIX ASPHALT BATCH PLANT

EQUIPMENT: ASPHALT BATCH PLANT, HOT-MIX (125 TONS/HR CAPACITY)

SITE PERSONNEL: KEN KINDLER, FOREMAN

VISIBLE EMISSIONS: A WATER PLUME WAS VISIBLE DURING SOME OF THE TEST PERIOD. OPACITY DID NOT EXCEED 20%. A WATER TRUCK WAS OBSERVED IN OPERATION DURING THE TEST. VISIBLE EMISSIONS FROM TRAFFIC WERE BELOW 20% OPACITY.

FUEL USAGE: THE GAS LINE FOR THIS EQUIPMENT DID NOT HAVE A DESIGNATED METER TO DETERMINE FUEL CONSUMPTION.

PRODUCTION: 162.46 TONS OF ASPHALT USING THE FOLLOWING MIX DESIGNS WERE PRODUCED DURING THE TEST PERIOD.

3/8 FINE: 27% BIN #2, 73% BIN #1, 6.0% OIL
1/2 MED: 15% BIN #3, 30% BIN #2, 55% BIN #1, 5.3% OIL
3/4 MED: 10% BIN #4, 20% BIN #3, 25% BIN #2, 45% BIN #1, 5.1% OIL
SCHOOL MIX: 25% BIN #2, 75% BIN #1, 6.2% OIL

| BIN #1 | BIN #2 | BIN #3 | BIN #4 |
|---|---|---|---|
| 25% SAND, 75% DUST | 3/8 INCH ROCK | 1/2 INCH ROCK | 3/4 INCH ROCK |

START TIME: 8:10 AM
END TIME: 9:40 AM
ELAPSED TIME: 90 MINUTES
IDLE TIME: 0 MINUTES
NET TIME: 90 MINUTES

PRODUCTION RATE: 108.31 TONS/HR