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Air

Hot Mix Asphalt Plants Kiln Dryer Stack Manual Methods Testing

Asphalt Plant A Clayton, North Carolina Volume 1 of 2

FINAL REPORT

EMISSIONS TEST AT AN ASPHALT CONCRETE PRODUCTION PLANT: ASPHALT PLANT "A" - CLAYTON, NORTH CAROLINA

VOLUME I OF II
REPORT TEXT
APPENDICES A & B

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1.0 INTRODUCTION

The United States Environmental Protection Agency (USEPA) is investigating the asphalt concrete production source category to identify and quantify emissions of hazardous air pollutants (HAPs) from rotary aggregate dryers used at these facilities. There are two types of rotary drum dryers in use at asphalt concrete production plants; parallel flow, wherein the direction of travel of the drying aggregate is the same as the direction of travel of the burner exhaust gases, and counter flow, wherein the aggregate and exhaust gas flows are opposite to each other. On May 7, 1997, a work assignment was issued by EPA's Office of Air Quality Planning and Standards, Emissions Measurement Center, (OAQPS, EMC) to Pacific Environmental Services, Inc. (PES), of Research Triangle Park, North Carolina. The work assignment specified that emissions testing for HAPs be conducted on one of each type of aggregate dryer. Two candidate facilities were therefore identified and selected as host facilities for the testing program.

This document describes the test procedures, results, and quality assurance procedures that were employed during the testing of a counter flow rotary drum aggregate dryer, which was located at Asphalt Plant "A" in Clayton, North Carolina. The facility was identified as a candidate by EPA due to its location close to EPA facilities in Research Triangle Park, North Carolina, and because it is typical of counter flow rotary dryers in the asphalt production source category. The results of the emissions testing program conducted at a facility employing a parallel flow rotary aggregate dryer are presented in a separate report.

The scope of the work assignment was to plan and conduct an air emissions testing program to quantify emission rates of HAPs from the rotary aggregate drier located at Asphalt Plant "A". The planning and testing phase of the program was conducted under EPA Contract No. 68D20162, Work Assignment No. 4-13. Because the period of performance of the contract expired on September 30, 1997, PES was issued a second work assignment to complete the data reduction, a portion of the analysis, and the preparation of the draft report, which was completed under EPA Contract No. 68D70002, Work Assignment No. 0-005. This final report incorporates comments from EPA and the National Asphalt Pavement Association, and includes a process description and process data collected by EPA's Emission Standards Division (ESD) contractor. The final report was prepared under EPA Contract No. 68D70069, Work Assignment No. 2-09.

The primary objective of the test program was to obtain data on the controlled and uncontrolled emissions of polychlorinated dibenzo-*p*-dioxins (PCDDs or "dioxins") and polychlorinated dibenzofurans (PCDFs or "furans"), particulate matter (PM), and metallic HAP and non-HAP compounds from rotary drum dryers. A secondary objective of the test program was to observe and record plume opacity. The data will be used by ESD to determine whether

HAPs are emitted at levels that would justify regulation under the Maximum Achievable Control Technology (MACT) program.

The test program at Asphalt Plant "A" was completed during the week of August 18, 1997. The basic test methods that were employed were EPA Test Methods 1 (sample point location), 2 (gas velocity), 3 (gas molecular weight), 4 (gas moisture volume content), 5 (particulate matter concentration), 9 (plume opacity), 23 (dioxin and furan concentration) and 29 (metals concentrations). PM concentrations were determined by using tared filters in the Method 29 sampling train. The work assignment issued by EMC called for testing to be conducted during the production of asphalt with Reclaimed Asphalt Pavement, or RAP. At the request of EPA, an additional sampling run was conducted while the makeup material consisted solely of virgin aggregate. The results of all four of the test runs are presented in Section 2.0 of this report. The work assignment also specified testing to quantify both controlled and uncontrolled emissions. However, during the initial stages of testing of the uncontrolled dryer exhaust, sampling had to be discontinued due to extremely high grain loading conditions which far exceeded the sampling capacity of the Method 23 and Method 29 sampling trains. After telephone consultations with personnel from ESD and EMC, testing activities of the uncontrolled emissions were deleted from the scope of work.

PES used three subcontractors to assist in the completion of this testing effort. Deeco, Inc. (DEECO) of Raleigh, North Carolina; Triangle Laboratories, Inc. (TLI) of Durham, North Carolina, and Atlantic Technical Services, Inc. (ATS) of Chapel Hill, North Carolina. DEECO provided source testing support at the inlet locations (prior to cancellation of these testing activities), visual emissions observations of controlled emissions, and sample recovery support. TLI provided analytical services for the quantification of PCDDs/PCDFs and metals in the collected samples, and ATS provided on-site sampling support as well as support during preparation of the site test plan, draft report and calculation of the emissions test results.

The test program organization and major lines of communication are presented in Figure 1.1. The PES Project Manager communicated directly with the EPA Work Assignment Manager (WAM) and coordinated all of the on-site testing activities. The sampling locations at Asphalt Plant "A" are shown in Figure 1.2.

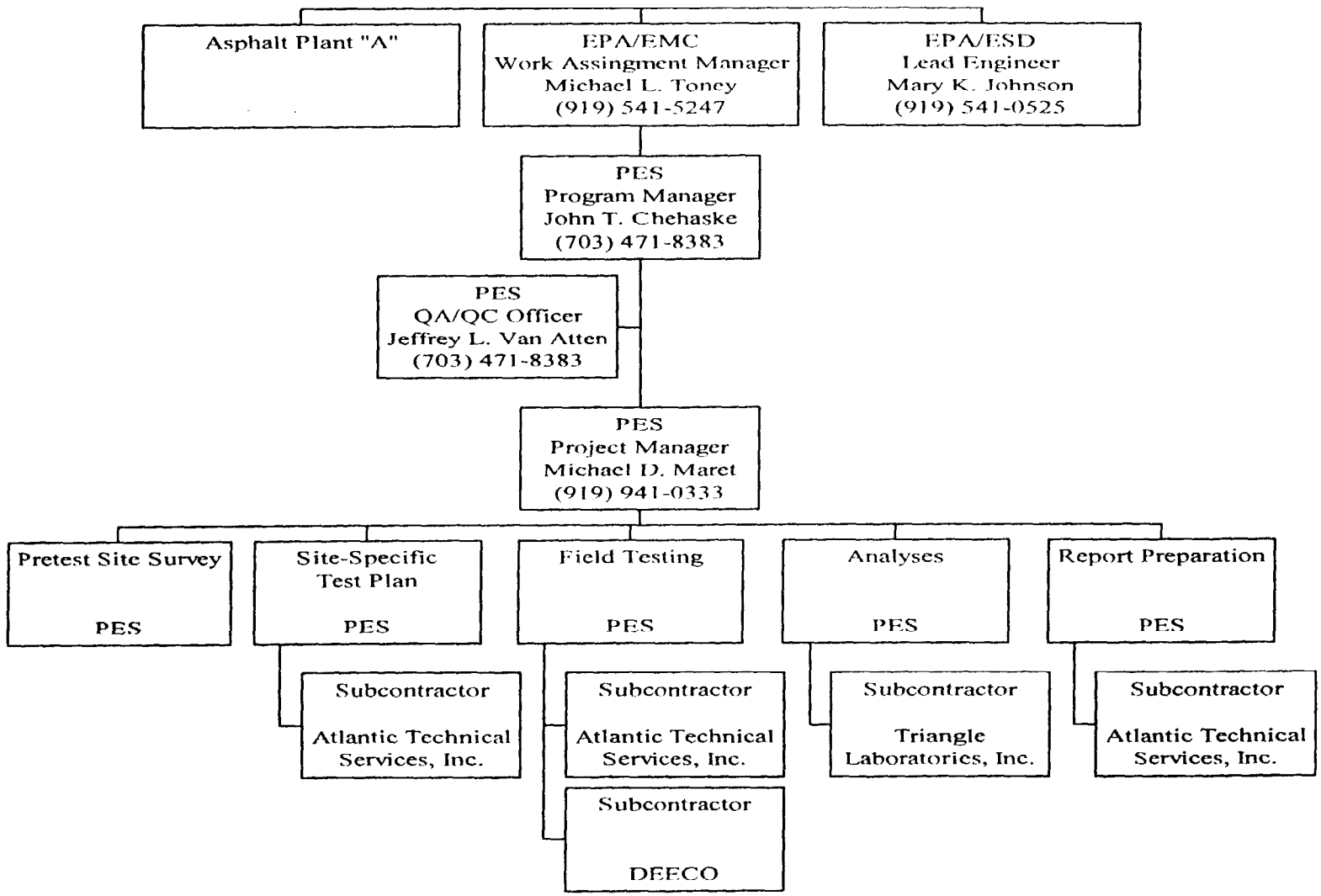


Figure 1.1 Key Personnel and Responsibility for Testing - Asphalt Plant "A", Clayton, NC

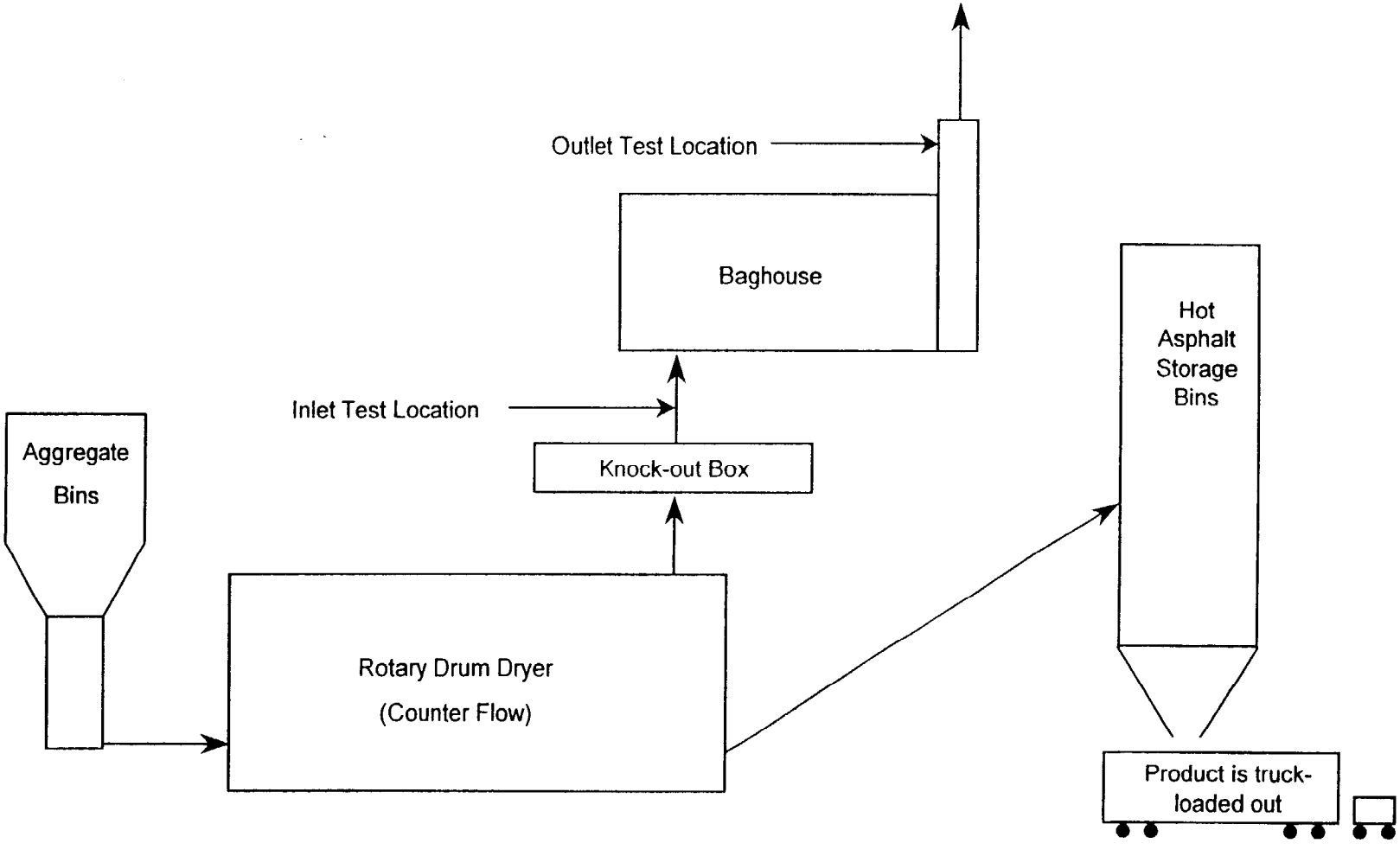


Figure 1.2 Sampling Locations - Asphalt Plant "A", Clayton, NC

2.0 SUMMARY OF RESULTS

This section summarizes the results of the testing program at the Asphalt Plant "A". The following pages present the times and durations of each of the sampling runs that were conducted, the sampling parameters during each run, the effluent gas parameters, and the concentrations and mass emission rates of the target HAPs. Sampling of emissions was conducted on three consecutive days from August 19, 1997 through August 21, 1997, during which time four sampling runs for both dioxins and furans (PCDDs/PCDFs) and metals were conducted. Table 2.1 presents the "Emissions Test Log" which summarizes clock times, target pollutants, and downtime due to filter and port changes for each of the Method 23 and Method 29 sampling runs attempted. The results of the PCDDs/PCDFs sampling during asphalt production with RAP are presented in Tables 2.2 through 2.7, and the results of the PCDDs/PCDFs sampling conducted during production with virgin aggregate are presented in Tables 2.8 through 2.10. The results of the particulate matter (PM) and metals sampling runs conducted during RAP addition are presented in Tables 2.11 through 2.16, and the results of the PM and metals runs conducted during asphalt production with virgin aggregate are presented in Tables 2.17 through 2.19.

2.1 OXYGEN AND CARBON DIOXIDE MEASUREMENTS

Concurrent with the Method 23 and Method 29 sampling at the baghouse outlet, bag samples of the effluent gas were collected and analyzed using an Orsat® apparatus to determine oxygen (O_2) and carbon dioxide (CO_2) concentrations for the purpose of calculating stack gas molecular weight. The O_2 and CO_2 concentrations presented for the first sampling run are the average of the O_2 and CO_2 concentrations measured during runs two and three. The diluent concentrations are presented in this manner because the results of the analyses from the first run were misplaced during the field testing portion of the test program and were not recovered. The diluent concentrations measured during the second and third runs should be representative of the concentrations during the first run, because the operating conditions were essentially unchanged.

2.2 PCDDs/PCDFs MEASUREMENTS

PCDDs/PCDFs results are presented as 1) actual concentrations and mass emission rates, 2) concentrations adjusted to 7 % O_2, and 3) concentrations adjusted to 7 % O_2 and 2378 tetra-chlorinated dibenzo-*p*-dioxin (TCDD) toxic equivalent basis. Adjustment of the congeners to a 2378 toxic equivalent basis was accomplished using the Toxic Equivalency Factor (TEF) values developed by the NATO Committee on the Challenges of Modern Society, August 1988.

TABLE 2.1

EMISSIONS SAMPLING TEST LOG
ASPHALT PLANT "A" - CLAYTON, NC

Run ID	Date	Target Pollutant	Run Time (24-hr clock)	Down Period(s)	Comment
Baghouse Inlet					
S-M23-I-1*	8/19/97	PCDDs/PCDFs	0915-1010	0930-1005	Probe & filter plug
S-M29-I-1*	8/19/97	PM & Metals	0915-1010	0930-1005	Probe & filter plug
Baghouse Outlet					
S-M23-O-1	8/19/97	PCDDs/PCDFs	0915-1456	0930-1104	Inlet sampling issues
S-M29-O-1	8/19/97	PM & Metals	0915-1454	0930-1104	Inlet sampling issues
S-M23-O-2	8/20/97	PCDDs/PCDFs	0822-1240	0902-0904 0946-0952 1031-1042 1114-1119 1201-1206	Port change Port change Port change Port change Port change
S-M29-O-2	8/20/97	PM & Metals	0822-1240	0904-0909 0946-0951 1031-1036 1114-1119 1200-1205	Port change Port change Port change Port change Port change
S-M23-O-3	8/20/97	PCDDs/PCDFs	1405-1730	1447-1452 1527-1529 1604-1613 1648-1655	Port change Port change Port change Port change
				Run stopped due to lightning	
S-M29-O-3	8/20/97	PM & Metals	1405-1735	1447-1452 1529-1534 1613-1618 1655-1700	Port change Port change Port change Port change
				Run stopped due to lightning	

TABLE 2.1 (Concluded)

EMISSIONS SAMPLING TEST LOG
ASPHALT PLANT "A" - CLAYTON, NC

Run ID	Date	Target Pollutant	Run Time (24-hr clock)	Down Period(s)	Comment
S-M23-O-4	8/21/97	PCDDs/PCDFs	0741-1148	0821-0823 0903-0905 0945-0948 1028-1030 1110-1113	Port change Port change Port change Port change Port change
S-M29-O-4	8/21/97	PM & Metals	0741-1153	0823-0828 0905-0910 0948-0953 1030-1035 1113-1118	Port change Port change Port change Port change Port change

* Test runs were aborted due to high grain loading conditions at the baghouse inlet sampling location. Subsequent test runs canceled.

The Method 23 sample fractions consisted of a sample train front-half solvent rinse, a particulate filter, a back-half solvent rinse, and an XAD®-2 sorbent resin module. During analysis, each of the sample fractions was extracted, concentrated, combined, and analyzed using a Gas Chromatograph with a Mass Spectrometer detector (GC/MS), according the procedures outlined in Method 23. During analysis, the combined sample extract was separated with a DB-5 capillary column. Where the results of that analysis indicated the presence of 2378 TCDF congeners, the analysis was repeated using a DB-225 capillary column so that the TCDF congeners could be more readily separated and quantified.

The results of the analyses indicated the presence of several congeners that were qualified as Estimated Maximum Possible Concentrations, or EMPCs. From time to time during the Method 23 analyses, a peak elutes at the position expected for a particular congener, but the peak fails validation based on the theoretical split of chlorine isotopes. That is to say that the number of Cl^{35} isotopes and the number of Cl^{37} isotopes attached to the PCDDs/PCDFs congeners should agree with the Cl^{35}/Cl^{37} ratio found in nature. For each congener, this ratio must agree within 15%. If the mass ratio of chlorine isotopes does not agree with the natural chlorine isotope ratio, then the peak is flagged as an EMPC.

The values presented as "Total PCDDs" are the sum of the "12346789 OCDD" polychlorinated dibenzo-p-dioxin and all of the dioxins labeled "Total"; "Total PCDFs" values are the sum of the "12346789 OCDF" polychlorinated dibenzofuran and all of the furans labeled

"Total". "Total PCDDs + Total PCDFs" values are the sum of the "Total PCDDs" and "Total PCDFs" values. Values that have been qualified as being EMPC have been included in the sums. Concentrations and emission rates based on or including EMPC values are denoted by braces ({ }).

2.2.1 Baghouse Inlet - Asphalt Production with RAP

Table 2.2 summarizes the PCDDs/PCDFs emissions sampling and stack gas parameters at the baghouse inlet. For reasons stated previously, only one sampling run was conducted at this location. Sampling was aborted approximately 10 minutes into the sample run when the isokinetic sampling rate could not be maintained due to blockage of the sampling nozzle and the probe liner with particulate matter. Sampling was halted at both the inlet and the outlet locations, the sample train was disassembled, and large amounts of particulate matter were removed from the sample nozzle, glass liner, and front half of the filter housing into a pre-cleaned glass sample jar. The sample train was then reassembled, leak checked, and the attempt was made to continue sampling. After approximately 10 more minutes of sampling, the sample train plugged again, and the decision was made by the EPA WAM to cancel testing of the uncontrolled dryer emissions.

Although the test cannot be considered to be valid due to the low sample volume of 10.94 dry standard cubic feet (dscf), which is equivalent to 0.310 dry standard cubic meters (dscm), PES, at the direction of EPA, recovered the sample fractions and submitted them for analysis by the subcontracting laboratory. The inlet gas temperature was 230°F and contained 5.3% by volume CO_2, 13.1% by volume O_2, and 26.5% by volume moisture. The inlet gas volumetric flow rate was 30,119 actual cubic feet per minute (acfm) which is equivalent to 16,819 dry standard cubic feet per minute (dscfm) or 476.3 dry standard cubic meters per minute (dscmm).

Table 2.3 presents the PCDDs/PCDFs concentrations of the baghouse inlet gas stream. The concentration of total PCDDs was 151 nanograms per dry standard cubic meter (ng/dscm), and the concentration of total PCDFs was 2.9 ng/dscm. The concentration of total PCDDs/PCDFs was 154 ng/dscm. The total PCDDs mass emission rate was 4,305 micrograms per hour (µg/hr) and the total PCDFs mass emission rate was 83.9 µg/hr. The mass emission rate of total PCDDs/PCDFs was 4,389 µg/hr.

The PCDDs/PCDFs 2378 toxic equivalent concentrations at the baghouse inlet are presented in Table 2.4. Each PCDDs/PCDFs congener has been corrected to a reference O_2 concentration of 7%, and then multiplied by the appropriate NATO 2378 TCDD toxic equivalent factor. Because the measured oxygen concentration was 13.1% by volume, the corrected concentrations are greater than the actual concentrations. The concentration of total PCDDs was 268 ng/dscm, corrected to 7% O_2 and the concentration of total PCDFs was 5.23 ng/dscm corrected to 7% O_2, therefore the total PCDDs/PCDFs concentration was 274 ng/dscm, corrected to 7% O_2. The total PCDDs concentration was 0.398 ng/dscm corrected to 7% O_2 and 2378-TCDD equivalents, and the total concentration of PCDFs was 0.143 ng/dscm corrected to 7% O_2 and 2378-TCDD equivalents. The concentration of total PCDDs/PCDFs corrected to 7%

TABLE 2.2

PCDDs/PCDFs EMISSIONS SAMPLING AND INLET GAS PARAMETERS ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M23-I-1
Date	8/19/97
Time	0915-1010
Total Sampling Duration, minutes	20
Average Sampling Rate, dscfm[a]	0.55
Sample Volume:	
dscf[b]	10.94
dscm[c]	0.310
Inlet Gas Temperature, °F	230
O_2 Concentration, % by volume	13.1
CO_2 Concentration, % by volume	5.3
Moisture, % by volume	26.5
Inlet Gas Volumetric Flow Rate:	
acfm[d]	30,119
dscfm[a]	16,819
dscmm[e]Isokinetic Sampling Ratio, %	476.3
	77.0

[a] Dry standard cubic feet per minute at 68°F and 1 atm
[b] Dry standard cubic feet at 68°F and 1 atm
[c] Dry standard cubic meters at 20°C and 1 atm
[d] Actual cubic feet per minute
[e] Dry standard cubic meters per minute at 20°C and 1 atm

TABLE 2.3

PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE INLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION[a] ng/dscm, as measured	EMISSION RATE[b] μg/hr
	S-M23-I-1	S-M23-I-1
Dioxins		
2378 TCDD	{0.0129}	{0.369}
Total TCDD	0.161	4.61
12378 PeCDD	0.0161	0.461
Total PeCDD	0.226	6.46
123478 HxCDD	0.0646	1.84
123678 HxCDD	0.129	3.69
123789 HxCDD	0.161	4.61
Total HxCDD	1.45	41.5
1234678 HpCDD	2.32	66.4
Total HpCDD	5.16	148
Octa CDD	144	4,105
Total CDD	151	4,305
Furans		
2378 TCDF	{0.0646}	{1.84}
Total TCDF	0.452	12.9
12378 PeCDF	0.0258	0.738
23478 PeCDF	0.0646	1.84
Total PeCDF	0.387	11.1
123478 HxCDF	0.194	5.53
123678 HxCDF	0.0646	1.84
234678 HxCDF	{0.0646}	{1.84}
123789 HxCDF	0.0226	0.646
Total HxCDF	0.613	17.5
1234678 HpCDF	0.387	11.1
1234789 HpCDF	0.129	3.69
Total HpCDF	0.968	27.7
Octa CDF	0.516	14.8
Total CDF	2.94	83.9
Total PCDDs + PCDFs	154	4,389

[a] Nanogram per dry standard cubic meter at 20°C and 1 atm.

[b] Micrograms per hour.

{ } Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

TABLE 2.4

PCDDs/PCDFs CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS ADJUSTED TO 7 PERCENT OXYGEN ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION[a] ng/dscm, adjusted to 7% O_2	2378-TCDD[b] Toxic Equivalent Factor	2378 TOXIC EQUIVALENTS ng/dscm, adjusted to 7% O_2
	S-M23-I-1		S-M23-I-1
Dioxins			
2378 TCDD	{0.0230}	1.00	{0.0230}
Total TCDD	0.288		
12378 PeCDD	0.0288	0.500	0.0144
Total PeCDD	0.403		
123478 HxCDD	0.115	0.100	0.0115
123678 HxCDD	0.230	0.100	0.0230
123789 HxCDD	0.288	0.100	0.0288
Total HxCDD	2.59		
1234678 HpCDD	4.14	0.010	0.0414
Total HpCDD	9.20		
Octa CDD	256	0.001	0.256
Total PCDD	268		{0.398}
Furans			
2378 TCDF	{0.115}	0.100	{0.0115}
Total TCDF	0.805		
12378 PeCDF	0.0460	0.050	0.00230
23478 PeCDF	0.115	0.500	0.0575
Total PeCDF	0.690		
123478 HxCDF	0.345	0.100	0.0345
123678 HxCDF	0.115	0.100	0.0115
234678 HxCDF	{0.115}	0.100	{0.0115}
123789 HxCDF	0.0403	0.100	0.00403
Total HxCDF	1.09		
1234678 HpCDF	0.690	0.010	0.00690
1234789 HpCDF	0.230	0.010	0.00230
Total HpCDF	1.73		
Octa CDF	0.920	0.001	0.000920
Total CDF	5.23		{0.143}
Total PCDDs + PCDFs	274		{0.541}

[a] Nanogram per dry standard cubic meter adjusted to 7% oxygen at 20°C and 1 atm.

[b] North Atlantic Treaty Organization, Committee on the Challenges of Modern Society. Pilot study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I-TEF) Methods of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds. Report No. 176, August 1988.

{ } Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

O_2 and 2378-TCDD equivalents at the baghouse inlet gas stream was 0.541 ng/dscm. The reader is reminded that assumptions made on the basis of the results of testing at inlet location should be made with care, due to the low sample volume and because only one sampling run was conducted at the inlet location instead of the three normally preferred.

2.2.2 Baghouse Outlet - Asphalt Production with RAP

PES conducted three Method 23 sampling runs at the baghouse outlet during the production of asphalt concrete with RAP. Table 2.5 summarizes the PCDDs/PCDFs sampling and exhaust gas parameters. Each sampling run was 240 minutes in duration, with the exception of the third test run which was 200 minutes. The third test run was stopped early at the direction of the EPA WAM due to storms and lightning in the vicinity of the test location. The (3-run) average sample volume was 153.390 dscf or 4.344 dscm. The (3-run) average stack gas temperature was 206°F and contained 5.3 % CO_2 by volume, 13.1 % O_2 by volume, and 21.6% moisture by volume. The (3-run) average stack gas volumetric flow rate was 36,596 acfm or 22,533 dscfm or 638.1 dscmm.

Table 2.6 presents the PCDDs/PCDFs concentrations and emission rates at the baghouse exhaust. The (3-run) average concentration of total PCDDs was 0.127 ng/dscm, and the (3-run) average concentration of total PCDF in the stack gas was 0.0796 ng/dscm. The (3-run) average concentration of total PCDDs/PCDFs was 0.207 ng/dscm. These values corresponded to average emission rates of 4.69 µg/hr for total PCDDs, 3.04 µg/hr for total PCDFs, and 7.72 µg/hr for total PCDDs/PCDFs compounds.

Table 2.7 presents the PCDDs/PCDFs concentrations adjusted to a reference diluent concentration of 7% O_2. Since the oxygen concentration of the effluent gas was greater than 7% for every sampling run, the adjusted PCDDs/PCDFs values are greater than the actual values. The (3-run) average adjusted concentration of total PCDDs was 0.227 ng/dscm @ 7% O_2, the (3-run) average adjusted concentration of total PCDFs was 0.142 ng/dscm @ 7% O_2, and the (3-run) average adjusted concentration of total PCDDs/PCDFs was 0.369 ng/dscm @ 7% O_2. Also presented in Table 2.7 are the PCDDs and PCDFs concentrations at 7 % O_2, adjusted to a toxicity equivalent to that of 2378 TCDD. The (3-run) average concentration of PCDDs was 0.000240 ng/dscm when presented on a 2378-TCDD toxic equivalent basis, the (3-run) average concentration of PCDFs was 0.00590 ng/dscm when presented on a 2378-TCDD toxic equivalent basis, and the concentration of total PCDDs/PCDFs compounds was 0.00830 ng/dscm, corrected to a 2378-TCDD toxic equivalent basis, at a reference diluent concentration of 7% O_2.

2.2.3 Baghouse Outlet - Asphalt Production without RAP

At the request of EPA, PES conducted one test run at the baghouse outlet during the production of asphalt concrete without the addition of RAP. Table 2.8 summarizes the PCDDs/PCDFs emissions sampling. The total sampling time for the test run was 240 minutes. The sample volume was 165.621 dscf or 4.690 dscm. The stack gas temperature was 180 °F and contained 3.2 % CO_2, 10.8 % O_2, and 18.9 % moisture. The stack gas volumetric flow rate was 37,027 acfm or 24,580 dscfm or 696.0 dscmm.

TABLE 2.5

PCDDs/PCDFs EMISSIONS SAMPLING AND STACK GAS PARAMETERS
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M23-O-1	S-M23-O-2	S-M23-O-3	Average
Date	8/19/97	8/20/97	8/20/97	
Time	0915-1456	0822-1240	1405-1730	
Sampling Duration, minutes	240	240	200	227
Average Sampling Rate, dscfm[a]	0.524	0.774	0.743	0.680
Sample Volume:				
dscf[b]	125.786	185.768	148.617	153.390
dscm[c]	3.562	5.260	4.208	4.344
Stack Gas Temperature, °F	185	223	209	206
O_2 Concentration, % by volume	13.1	13.1	13.1	13.1
CO_2 Concentration, % by volume	5.3	5.5	5.1	5.3
Moisture, % by volume	18.4	24.1	22.4	21.6
Stack Gas Volumetric Flow Rate:				
acfm[d]	30,291	41,402	38,097	36,596
dscfm[a]	20,210	24,166	23,222	22,533
dscmm[e]	572.3	684.3	657.6	638.1
Isokinetic Sampling Ratio, %	94.6	106.8	106.7	102.7

[a] Dry standard cubic feet per minute at 68°F and 1 atm
[b] Dry standard cubic feet at 68°F and 1 atm
[c] Dry standard cubic meters at 20°C and 1 atm
[d] Actual cubic feet per minute at stack conditions
[e] Dry standard cubic meters per minute at 20°C and 1 atm

TABLE 2.6

PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION [a] ng/dscm, as measured				EMISSION RATE [b] μg/hr			
	S-M23-O-1	S-M23-O-2	S-M23-O-3	Average	S-M23-O-1	S-M23-O-2	S-M23-O-3	Average
Dioxins								
2378 TCDD	ND	ND	{0.000713}	{0.000238}	ND	ND	{0.0281}	{0.00938}
Total TCDD	0.00197	0.00380	0.00238	0.00271	0.0675	0.156	0.0938	0.106
12378 PeCDD	ND	ND	0.00119	0.000396	ND	ND	0.0469	0.0156
Total PeCDD	{0.0112}	0.00570	0.00713	{0.00802}	{0.386}	0.234	0.281	{0.300}
123478 HxCDD	ND	ND	0.00190	0.00634	ND	ND	0.0750	0.0250
123678 HxCDD	0.00281	{0.00380}	0.00475	{0.00379}	0.0964	{0.156}	0.188	{0.147}
123789 HxCDD	0.00562	ND	{0.00238}	{0.00266}	0.193	ND	{0.0938}	{0.0955}
Total HxCDD	0.0337	0.0152	0.0356	0.0282	1.16	0.624	1.41	1.06
1234678 HpCDD	0.0168	{0.00760}	0.0143	{0.0129}	0.578	{0.312}	0.563	{0.484}
Total HpCDD	0.0281	0.00760	0.0143	0.0166	0.964	0.312	0.563	0.613
Octa CDD	0.149	0.0361	0.0309	0.0719	5.11	1.48	1.22	2.60
Total PCDD	{0.224}	0.0684	0.0903	0.127	{7.68}	2.81	3.56	4.69
Furans								
2378 TCDF	{0.00225}	ND	0.00475	{0.00233}	{0.0771}	ND	0.188	{0.0882}
Total TCDF	0.00842	0.00760	0.00713	0.00772	0.289	0.312	0.281	0.294
12378 PeCDF	{0.00168}	ND	0.00166	{0.00112}	{0.0578}	ND	0.066	{0.0412}
23478 PeCDF	{0.00281}	ND	0.00238	{0.00173}	{0.0964}	ND	0.0938	{0.063}
Total PeCDF	0.0140	ND	0.0143	0.00943	0.482	ND	0.563	0.348
123478 HxCDF	0.0112	0.00760	0.0143	0.0110	0.386	0.312	0.563	0.420
123678 HxCDF	0.00281	0.00190	0.00475	0.00315	0.0964	0.0781	0.188	0.121
234678 HxCDF	0.00562	0.00380	0.00475	0.00472	0.193	0.156	0.188	0.179
123789 HxCDF	ND	ND	ND	0.00	ND	ND	ND	0.00
Total HxCDF	0.0337	0.0209	0.0404	0.0317	1.16	0.859	1.59	1.20
1234678 HpCDF	{0.0197}	0.0133	0.0214	{0.0181}	{0.675}	0.546	0.844	{0.688}
1234789 HpCDF	0.0112	0.00380	{0.00713}	{0.00739}	0.386	0.156	{0.281}	{0.274}
Total HpCDF	0.0112	0.0228	0.0214	0.0185	0.386	0.937	0.844	0.722
Octa CDF	0.0112	0.0114	0.0143	0.0123	0.386	0.468	0.563	0.472
Total PCDF	0.0786	0.0627	0.0974	0.0796	2.70	2.58	3.84	3.04
Total PCDD + PCDF	{0.302}	0.131	0.188	{0.207}	{10.4}	5.39	7.41	{7.72}

[a] Nanogram per dry standard cubic meter at 20°C and 1 atm.

[b] Micrograms per hour.

ND Non Detectable - Results are below target analyte detection limits. ND values are counted as zero in totals and averages.

{ } Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

TABLE 2.7

PCDDs/PCDFs STACK GAS CONCENTRATIONS AND 2378 TOXIC EQUIVALENT STACK GAS CONCENTRATIONS ADJUSTED TO 7 PERCENT OXYGEN ROTARY DRUM DRYER BAGHOUSE OUTLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION[a] ng/dscm, adjusted to 7 percent O_2				2378-TCDD TEF[b]	2378 TOXIC EQUIVALENTS ng/dscm, adjusted to 7 percent O_2			
	S-M23-O-1	S-M23-O-2	S-M23-O-3	Average		S-M23-O-1	S-M23-O-2	S-M23-O-3	Average
Dioxins									
2378 TCDD	ND	ND	{0.00127}	{0.000423}	1.0	ND	ND	{0.00127}	{0.000423}
Total TCDD	0.00350	0.00678	0.00423	0.00484					
12378 PeCDD	ND	ND	0.00212	0.00706	0.50	ND	ND	0.00106	0.000353
Total PeCDD	{0.0200}	0.0102	0.0127	{0.0143}					
123478 HxCDD	ND	ND	0.00339	0.00113	0.10	ND	ND	0.000339	0.000113
123678 HxCDD	0.00500	{0.00678}	0.00847	0.00675	0.10	0.000500	{0.000678}	0.000847	{0.000675}
123789 HxCDD	0.0100	ND	{0.00423}	{0.00475}	0.10	0.00100	ND	{0.000423}	{0.000475}
Total HxCDD	0.0600	0.0271	0.0635	0.0502					
1234678 HpCDD	0.0300	{0.0136}	0.0254	{0.0230}	0.01	0.000300	{0.000136}	0.000254	{0.000230}
Total HpCDD	0.0500	0.0136	0.0254	0.0297					
Octa CDD	0.265	0.0644	0.0550	0.128	0.001	0.000265	0.0000644	0.0000550	0.000128
Total CDD	{0.399}	0.122	0.161	{0.227}		0.00207	{0.0000877}	{0.00425}	{0.000240}
Furans									
2378 TCDF	{0.00400}	ND	0.00847	{0.00416}	0.10	{0.000400}	ND	0.000847	{0.000416}
Total TCDF	0.0150	0.0136	0.0127	0.0138					
12378 PeCDF	{0.00300}	ND	0.00296	{0.00199}	0.05	{0.000150}	ND	0.000148	0.0000994
23478 PeCDF	{0.00500}	ND	0.00423	{0.00308}	0.50	{0.00250}	ND	0.00212	{0.00154}
Total PeCDF	0.0250	ND	0.0254	0.0168					
123478 HxCDF	0.0200	0.0136	0.0254	0.0197	0.10	0.00200	0.00136	0.00254	0.00197
123678 HxCDF	0.00500	0.00339	0.00847	0.00562	0.10	0.000500	0.000339	0.000847	0.000562
234678 HxCDF	0.0100	0.00678	0.00847	0.00842	0.10	0.00100	0.000678	0.000847	0.000842
123789 HxCDF	ND	ND	ND	0.00	0.10	ND	ND	ND	0.00
Total HxCDF	0.0600	0.0373	0.0720	0.0564					
1234678 HpCDF	{0.0350}	0.0237	0.0381	{0.0323}	0.01	{0.000350}	0.000237	0.000381	{0.000323}
1234789 HpCDF	0.0200	0.00678	{0.0127}	{0.0132}	0.01	0.000200	0.0000678	{0.000127}	{0.000132}
Total HpCDF	0.0200	0.0407	0.0381	0.0329					
Octa CDF	0.0200	0.0203	0.0254	0.0219	0.001	0.0000200	0.0000203	0.0000254	0.0000219
Total CDF	0.140	0.112	0.174	0.142		{0.00712}	0.00270	0.00788	{0.00590}
Total CDD + CDF	{0.539}	0.234	0.335	{0.369}		{0.00919}	{0.00357}	{0.0121}	{0.00830}

[a] Nanogram per dry standard cubic meter adjusted to 7 percent oxygen at 20°C and 1 atm.

[b] North Atlantic Treaty Organization, Committee on the Challenges of Modern Society. Pilot study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I-TEF) Methods of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds. Report No. 176, August 1988.

ND Non Detectable - Results are below target analyte detection limits. ND values are counted as zero in totals and averages.

{ } Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

TABLE 2.8

PCDDs/PCDFs EMISSIONS SAMPLING AND STACK GAS PARAMETERS
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITHOUT RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M23-O-4
Date	8/21/97
Time	0741-1148
Sampling Duration, minutes	240
Average Sampling Rate, dscfm[a]	0.690
Sample Volume:	
dscf[b]	165.621
dscm[c]	4.690
Stack Gas Temperature, °F	180
O_2 Concentration, % by volume	10.8
CO_2 Concentration, % by volume	3.2
Moisture, % by volume	18.9
Stack Gas Volumetric Flow Rate:	
acfm[d]	37,027
dscfm[a]	24,580
dscmm[e]	696.0
Isokinetic Sampling Ratio %	93.7

[a] Dry standard cubic feet per minute at 68°F and 1 atm
[b] Dry standard cubic feet at 68°F and 1 atm
[c] Dry standard cubic meters at 20°C and 1 atm
[d] Actual cubic feet per minute at stack conditions
[e] Dry standard cubic meters per minute at 20°C and 1 atm

Table 2.9 presents the PCDDs/PCDFs stack gas concentrations and emission rates. The concentration of total PCDDs was 0.0527 ng/dscm, and the concentration of PCDFs was 0.0576 ng/dscm. The concentration of total PCDDs/PCDFs was 0.110 ng/dscm. These values corresponded to emission rates of 2.20 µg/hr for PCDDs, 2.40 µg/hr for PCDFs and a total emission rate of 4.60 µg/hr for all PCDDs/PCDFs. Table 2.10 presents the PCDDs/PCDFs concentrations adjusted to 7% O_2. The measured stack gas O_2 concentration was 10.8 %. Therefore, the adjusted PCDDs/PCDFs concentrations were greater than the actual concentrations. The adjusted concentration of total PCDDs was 0.725 ng/dscm @ 7 % O_2, and 0.0792 ng/dscm @ 7 %O_2 for PCDFs. The adjusted concentration of total PCDDs/PCDFs was 0.152 ng/dscm @ 7 % O_2. Table 2.10 also presents the adjusted concentrations in 2378 toxic equivalents. The TEF concentration for total PCDDs/PCDFs was 0.004 µg/dscm.

2.3 PARTICULATE MATTER AND METALS MEASUREMENTS

2.3.1 Baghouse Inlet - Asphalt Production with RAP

As stated previously, only one sampling test run was attempted at the baghouse inlet. Table 2.11 summarizes the particulate matter/metals emissions sampling and gas parameters at the baghouse inlet. The total sampling time was 20 minutes. The sample volume was 10.491 dscf or 0.297 dscm. The exhaust gas temperature was 230 °F and contained 5.3% CO_2, 13.1% O_2, and 26.1% moisture. The exhaust gas volumetric flow rate was 23,773 acfm or 13,353 dscfm or 378 dscmm. Although the test was not valid due to a low sample volume, the sample was recovered, extracted, and analyzed at the instruction of the EPA WAM to determine particulate matter and metals catch weights.

Table 2.12 summarizes the exhaust gas particulate matter concentrations and emission rates at the baghouse inlet. The concentration was 63.7 grains per dry standard cubic foot (gr/dscf) or 146 grams per dry standard cubic meter (g/dscm). The concentrations are also shown adjusted to 7% O_2. The average mass emission rate was 7,296 pounds per hour (lb/hr) or 3,310 kilograms per hour (kg/hr).

Table 2.13 summarizes the exhaust gas metals concentrations and emission rates. Most of the target metals were found to be present in the sample. Concentrations ranged from 11,944 micrograms per dry standard cubic meter (µg/dscm) for phosphorus to 3.26 µg/dscm for selenium.

TABLE 2.9

PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITHOUT RAP
ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION[a] ng/dscm, as measured	EMISSION RATE[b] μg/hr
	S-M23-O-4	S-M23-O-4
Dioxins		
2378 TCDD	ND	ND
Total TCDD	{0.00149}	{0.0623}
12378 PeCDD	ND	ND
Total PeCDD	0.00213	0.0890
123478 HxCDD	ND	ND
123678 HxCDD	0.00213	0.0809
123789 HxCDD	ND	ND
Total HxCDD	0.0149	0.623
1234678 HpCDD	{0.00853}	{0.356}
Total HpCDD	{0.0149}	{0.623}
Octa CDD	0.0192	0.801
Total PCDD	{0.0527}	{2.20}
Furans		
2378 TCDF	ND	ND
Total TCDF	0.00640	0.267
12378 PeCDF	ND	ND
23478 PeCDF	{0.00213}	{0.0890}
Total PeCDF	0.00213	0.0890
123478 HxCDF	0.00640	0.267
123678 HxCDF	0.00213	0.0890
234678 HxCDF	0.00426	0.178
123789 HxCDF	ND	ND
Total HxCDF	0.0192	0.801
1234678 HpCDF	0.0107	0.445
1234789 HpCDF	0.00426	0.178
Total HpCDF	0.0192	0.801
Octa CDF	0.0107	0.445
Total PCDF	0.0576	2.40
Total PCDDs+ PCDFs	{0.110}	{4.60}

[a] Nanogram per dry standard cubic meter at 20°C and 1 atm.

[b] Micrograms per hour.

ND Non Detectable - Results are below target analyte detection limits. ND values are counted as zero in totals and averages.

{ } Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

TABLE 2.10

PCDDs/PCDFs CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS ADJUSTED TO 7 PERCENT OXYGEN ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT CONCRETE PRODUCTION WITHOUT RAP ASPHALT PLANT "A" - CLAYTON, NC

CONGENER	CONCENTRATION[a] ng/dscm, adjusted to 7 % O_2	2378-TCDD[b] Toxic Equiv. Factor	2378 TOXIC EQUIVALENTS ng/dscm, adjusted to 7 % O_2
	S-M23-O-4		S-M23-O-4
Dioxins			
2378 TCDD	ND	1.000	ND
Total TCDD	{0.00205}		
12378 PeCDD	ND	0.500	ND
Total PeCDD	0.00293		
123478 HxCDD	ND	0.100	ND
123678 HxCDD	0.00293	0.100	0.000293
123789 HxCDD	ND	0.100	ND
Total HxCDD	0.0205		
1234678 HpCDD	{0.0117}	0.010	{0.000117}
Total HpCDD	{0.0205}		
Octa CDD	0.0264	0.001	0.0000264
Total CDD	{0.725}		{0.000437}
Furans			
2378 TCDF	ND	0.100	ND
Total TCDF	0.00880		
12378 PeCDF	ND	0.050	ND
23478 PeCDF	{0.00293}	0.500	{0.00147}
Total PeCDF	0.00293		
123478 HxCDF	0.00880	0.100	0.000880
123678 HxCDF	0.00293	0.100	0.000293
234678 HxCDF	0.00587	0.100	0.000587
123789 HxCDF	ND	0.100	ND
Total HxCDF	0.0264		
1234678 HpCDF	0.0147	0.010	0.000147
1234789 HpCDF	0.00587	0.010	0.0000587
Total HpCDF	0.0264		
Octa CDF	0.0147	0.001	0.0000147
Total CDF	0.0792		{0.000345}
Total PCDDs + PCDFs	{0.152}		{0.000389}

[a] Nanogram per dry standard cubic meter adjusted to 7 percent oxygen at 20°C and 1 atm.

[b] North Atlantic Treaty Organization, Committee on the Challenges of Modern Society. Pilot study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I-TEF) Methods of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds. Report No. 176, August 1988.

ND Non Detectable - Results are below target analyte detection limits. ND values are counted as zero in totals and averages.

{ }Estimated Maximum Possible Concentration. EMPC values are counted in totals and averages.

TABLE 2.11

PARTICULATE/METALS EMISSIONS SAMPLING AND INLET GAS PARAMETERS ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-I-1
Date	8/19/97
Time	0915-1010
Sampling Duration, minutes	20
Average Sampling Rate, dscfm[a]	0.525
Sample Volume:	
dscf[b]	10.491
dscm[c]	0.297
Inlet Gas Temperature, °F	230
O_2 Concentration, % by volume	13.1
CO_2 Concentration, % by volume	5.3
Moisture, % by volume	26.1
Exhaust Gas Volumetric Flow Rate:	
acfm[d]	23,773
dscfm[a]	13,353
dscmm[e]	378
Isokinetic Sampling Ratio, %	93.6

[a] Dry standard cubic feet per minute at 68°F and 1 atm.
[b] Dry standard cubic feet at 68°F and 1 atm.
[c] Dry standard cubic meters at 20°C and 1 atm.
[d] Actual cubic feet per minute at inlet gas conditions.
[e] Dry standard cubic meters per minute at 20°C and 1 atm.

TABLE 2.12

PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE INLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-I-1
Date	8/19/97
Time	0915-1010
Particulate Matter Concentration:	
gr/dscf [a]	63.7
gr/dscf @ 7% O_2 [b]	114
g/dscm [c]	146
g/dscm @ 7% O_2 [d]	260
Particulate Matter Emission Rate:	
lb/hr [e]	7,296
kg/hr [f]	3,310

[a] Grains per dry standard cubic foot at 68°F and 1 atm.
[b] Grains per dry standard cubic foot at 68°F and 1 atm adjusted to 7 percent O_2.
[c] Grams per dry standard cubic meter at 20°C and 1 atm.
[d] Grams per dry standard cubic meter at 20°C and 1 atm adjusted to 7 percent O_2.
[e] Pounds per hour.
[f] Kilograms per hour.

TABLE 2.13

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE INLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-I-1
Date	8/19/97
Clock Time, 24-hr Clock	0915-1010
Antimony (Sb)	
µg/dscm[a]	ND
µg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Arsenic (As)	
µg/dscm[a]	51.2
µg/dscm @ 7% O_2[b]	91.2
g/hr[c]	1.16
Barium (Ba)	
µg/dscm[a]	2,063
µg/dscm @ 7% O_2[b]	3,677
g/hr[c]	46.8
Beryllium (Be)	
µg/dscm[a]	ND
µg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Cadmium (Cd)	
µg/dscm[a]	22.5
µg/dscm @ 7% O_2[b]	40.1
g/hr[c]	0.511
Chromium (Cr)	
µg/dscm[a]	91.7
µg/dscm @ 7% O_2[b]	163
g/hr[c]	2.08
Cobalt (Co)	
µg/dscm[a]	89.2
µg/dscm @ 7% O_2[b]	159
g/hr[c]	2.02
Copper (Cu)	
µg/dscm[a]	417
µg/dscm @ 7% O_2[b]	743
g/hr[c]	9.46

[a] Micrograms per dry standard cubic meter @ 20°C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.
ND - Not detected.

TABLE 2.13 (Concluded)

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE INLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-I-1
Lead (Pb)	
µg/dscm[a]	170
µg/dscm @ 7% O_2[b]	302
g/hr[c]	3.85
Manganese (Mn)	
µg/dscm[a]	3,946
µg/dscm @ 7% O_2[b]	7,032
g/hr[c]	89.5
Mercury (Hg)	
µg/dscm[a]	ND
µg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Nickel (Ni)	
µg/dscm[a]	39.8
µg/dscm @ 7% O_2[b]	70.9
g/hr[c]	0.903
Phosphorus (P)	
µg/dscm[a]	11,934
µg/dscm @ 7% O_2[b]	21,267
g/hr[c]	271
Silver (Ag)	
µg/dscm[a]	ND
µg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Selenium (Se)	
µg/dscm[a]	3.26
µg/dscm @ 7% O_2[b]	5.81
g/hr[c]	0.0740
Thallium (Tl)	
µg/dscm[a]	9.76
µg/dscm @ 7% O_2[b]	17.4
g/hr[c]	0.221
Zinc (Zn)	
µg/dscm[a]	1,752
µg/dscm @ 7% O_2[b]	3,123
g/hr[c]	39.8

[a] Micrograms per dry standard cubic meter @ 20°C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.
ND - Not detected.

2.3.2 Baghouse Outlet - Asphalt Production with RAP

Table 2.14 summarizes the particulate matter/metals emissions sampling and stack gas parameters. The total sampling time for each test run was 240 minutes, except the third test run which was 200 minutes. The average sample volume was 166.137 dscf or 4.704 dscm. The average stack gas temperature was 203°F and contained 5.3% CO_2, 13.1% O_2, and 20.2% moisture. The average stack gas volumetric flow rate was 37,437 acfm or 23,661 dscfm or 670 dscmm.

Table 2.15 summarizes the stack gas particulate matter concentrations and emission rates. The average concentration was 0.0176 gr/dscf or 0.0402 g/dscm. The concentrations are also shown adjusted to 7% O_2. The average emission rate was 3.43 lb/hr or 1.56 kg/hr.

Table 2.16 summarizes the stack gas metals concentrations and emission rates. Most of the target metals were found to be present in all three samples. Average concentrations ranged from 0.0231 µg/dscm for antimony to 45.5 µg/dscm for phosphorus. Beryllium was not detected during any of the sampling runs, cobalt was only detected during the first run, and silver and thallium were only detected during two of the sampling runs. There were two instances where the target metal was detected, but was present at a concentration less than the concentration detected in the reagent blank samples. In these two cases (antimony during the third run and silver during the second run) a value of 0.00 has been reported.

2.3.3 Baghouse Outlet - Asphalt Production without RAP

PES conducted one test run at the baghouse outlet during asphalt production without RAP. Table 2.17 summarizes the particulate matter/metals emissions sampling and stack gas parameters. The total sampling time for the test run was 240 minutes. The sample volume was 168.390 dscf or 4.768 dscm. The stack gas temperature was 180°F and contained 3.2 % CO_2, 10.8 % O_2, and 18.7 % moisture. The stack gas volumetric flow rate was 36,415 acfm or 24,240 dscfm or 686 dscmm.

Table 2.18 summarizes the stack gas particulate matter concentrations and emission rates. The concentration was 0.00122 gr/dscf or 0.00279 g/dscm. The concentrations are also shown adjusted to 7% O_2. The average PM emission rate was 0.253 lb/hr or 0.115 kg/hr.

Table 2.19 summarizes the stack gas metals concentrations and emission rates. Most of the target metals were present in the sample. Concentrations ranged from 0.0436 µg/dscm for silver to 15.2 µg/dscm for phosphorus. In general, the emissions of metals during production without RAP was less that emissions during production with RAP. In the cases of antimony, silver, and selenium, the quantities detected in the sample were less than the quantities detected in the reagent blanks. For these three targets, values of 0.00 have been reported.

TABLE 2.14

PARTICULATE/METALS EMISSIONS SAMPLING AND STACK GAS PARAMETERS ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-1	S-M29-O-2	S-M29-O-3	Average
Date	8/19/97	8/20/97	8/20/97	
Time	0915-1454	0822-1240	1405-1735	
Sampling Duration, minute	240	240	200	227
Average Sampling Rate, dscfm[a]	0.644	0.830	0.723	0.732
Sample Volume:				
dscf[b]	154.579	199.270	144.561	166.137
dscm[c]	4.377	5.643	4.094	4.704
Stack Gas Temperature, °F	179	222	207	203
O_2 Concentration, % by volume	13.1	13.1	13.1	13.1
CO_2 Concentration, % by volume	5.3	5.5	5.1	5.3
Moisture, % by volume	17.4	19.0	24.2	20.2
Volumetric Flow Rate:				
acfm[d]	32,964	42,043	37,305	37,437
dscfm[a]	22,478	26,229	22,276	23,661
dscmm[e]	637	743	631	670
Isokinetic Sampling Ratio, %	95.6	103.9	106.5	102.0
Stack Gas Opacity:				
Average Opacity, %	< 5	< 5	< 5	< 5
Calculated Average, %	2.15	1.21	0.702	1.35
Max. Single Reading, %	15	20	15	-
Max. 6-min. Block Avg., %	6.25	2.62	1.67	-
Max. 6-min Rolling Avg., %	6.46	2.75	2.17	-

[a] Dry standard cubic feet per minute at 68°F and 1 atm.
[b] Dry standard cubic feet at 68°F and 1 atm.
[c] Dry standard cubic meters at 20°C and 1 atm.
[d] Actual cubic feet per minute at stack conditions.
[e] Dry standard cubic meters per minute at 20°C and 1 atm.

TABLE 2.15

PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-1	S-M29-O-2	S-M29-O-3	Average
Date	8/19/97	8/20/97	8/20/97	
Time	0915-1454	0822-1240	1405-1735	
Particulate Matter Concentration:				
gr/dscf[a]	0.0449	0.00482	0.00292	0.0176
gr/dscf @ 7% O_2[b]	0.0800	0.00858	0.00521	0.0313
g/dscm[c]	0.103	0.0110	0.00669	0.0402
g/dscm @ 7% O_2[d]	0.183	0.0196	0.0119	0.0716
Particulate Matter Emission Rate:				
lb/hr[e]	8.65	1.08	0.558	3.43
kg/hr[f]	3.93	0.491	0.253	1.56

[a] Grains per dry standard cubic foot at 68°F and 1 atm.
[b] Grains per dry standard cubic foot at 68°F and 1 atm adjusted to 7 percent O_2.
[c] Grams per dry standard cubic meter at 20°C and 1 atm.
[d] Grams per dry standard cubic meter at 20°C and 1 atm adjusted to 7 percent O_2.
[e] Pounds per hour.
[f] Kilograms per hour.

TABLE 2.16

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-1	S-M29-O-2	S-M29-O-3	Average
Date	8/19/97	8/20/97	8/20/97	
Time	0915-1454	0822-1240	1405-1735	
Antimony (Sb)				
µg/dscm[a]	0.0640	0.00532	0.00	0.0231
µg/dscm @ 7% O_2[b]	0.114	0.00947	0.00	0.0412
g/hr[c]	0.00244	0.000237	0.00	0.000893
Arsenic (As)				
µg/dscm[a]	0.608	0.133	0.188	0.310
µg/dscm @ 7% O_2[b]	1.08	0.238	0.334	0.552
g/hr[c]	0.0232	0.00594	0.00712	0.0121
Barium (Ba)				
µg/dscm[a]	49.9	8.37	4.39	20.9
µg/dscm @ 7% O_2[b]	89.0	14.9	7.82	37.2
g/hr[c]	1.91	0.373	0.166	0.815
Beryllium (Be)				
µg/dscm[a]	ND	ND	ND	ND
µg/dscm @ 7% O_2[b]	ND	ND	ND	ND
g/hr[c]	ND	ND	ND	ND
Cadmium (Cd)				
µg/dscm[a]	0.199	0.395	0.440	0.345
µg/dscm @ 7% O_2[b]	0.355	0.704	0.784	0.614
g/hr[c]	0.00759	0.0176	0.0166	0.0139
Chromium (Cr)				
µg/dscm[a]	1.47	0.161	0.125	0.584
µg/dscm @ 7% O_2[b]	2.61	0.287	0.222	1.04
g/hr[c]	0.0560	0.00719	0.00472	0.0226
Cobalt (Co)				
µg/dscm[a]	0.416	ND	ND	0.139
µg/dscm @ 7% O_2[b]	0.741	ND	ND	0.247
g/hr[c]	0.0159	ND	ND	0.00529
Copper (Cu)				
µg/dscm[a]	4.05	0.77	1.68	2.16
µg/dscm @ 7% O_2[b]	7.21	1.37	2.99	3.86
g/hr[c]	0.155	0.0342	0.0635	0.0841
Lead (Pb)				
µg/dscm[a]	6.07	1.41	26.6	11.4
µg/dscm @ 7% O_2[b]	10.8	2.51	47.4	20.2
g/hr[c]	0.232	0.0628	1.01	0.434

[a] Micrograms per dry standard cubic meter @ 20° C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.
ND - Not Detected.

TABLE 2.16 (Concluded)

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITH RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-1	S-M29-O-2	S-M29-O-3	Average
Manganese (Mn)				
µg/dscm[a]	47.1	5.88	3.46	18.8
µg/dscm @ 7% O_2[b]	83.9	10.5	6.17	33.5
g/hr[c]	1.80	0.262	0.131	0.731
Mercury (Hg)				
µg/dscm[a]	0.500	0.431	3.78	1.57
µg/dscm @ 7% O_2[b]	0.892	0.767	6.74	2.80
g/hr[c]	0.0191	0.0192	0.143	0.0605
Nickel (Ni)				
µg/dscm[a]	0.868	0.298	0.784	0.650
µg/dscm @ 7% O_2[b]	1.55	0.53	1.40	1.16
g/hr[c]	0.0332	0.0133	0.0297	0.0254
Phosphorus (P)				
µg/dscm[a]	90.9	20.4	25.3	45.5
µg/dscm @ 7% O_2[b]	162	36.3	45.1	81.2
g/hr[c]	3.47	0.909	0.959	1.78
Silver (Ag)				
µg/dscm[a]	ND	0.00	0.151	0.0505
µg/dscm @ 7% O_2[b]	ND	0.00	0.270	0.0900
g/hr[c]	ND	0.00	0.00573	0.00191
Selenium (Se)				
µg/dscm[a]	0.139	0.0603	2.32	0.840
µg/dscm @ 7% O_2[b]	0.248	0.107	4.13	1.50
g/hr[c]	0.00532	0.00269	0.0877	0.0319
Thallium (Tl)				
µg/dscm[a]	ND	0.0372	0.0562	0.0311
µg/dscm @ 7% O_2[b]	ND	0.0663	0.100	0.0555
g/hr[c]	ND	0.00166	0.00213	0.00126
Zinc (Zn)				
µg/dscm[a]	32.3	10.4	9.22	17.3
µg/dscm @ 7% O_2[b]	57.5	18.6	16.4	30.8
g/hr[c]	1.23	0.464	0.349	0.682

[a] Micrograms per dry standard cubic meter @ 20°C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.
ND - Not detected

TABLE 2.17

PARTICULATE/METALS EMISSIONS SAMPLING AND STACK GAS PARAMETERS ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITHOUT RAP ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-4
Date	8/21/97
Time	0741-1153
Sampling Duration, minutes	240
Average Sampling Rate, dscfm[a]	0.702
Sample Volume:	
dscf[b]	168.390
dscm[c]	4.768
Stack Gas Temperature, °F	180
O_2 Concentration, % by volume	10.8
CO_2 Concentration, % by volume	3.2
Moisture, % by volume	18.7
Stack Gas Volumetric Flow Rate:	
acfm[d]	36,415
dscfm[a]	24,240
dscmm[e]	686
Isokinetic Sampling Ratio, %	95.0
Stack Gas Opacity:	
Average Opacity, %	< 5
Calculated Average, %	0.104
Max. Single Reading, %	5
Max. 6-min. Block Avg., %	0.42
Max. 6-min Rolling Avg., %	0.42

[a] Dry standard cubic feet per minute at 68°F and 1 atm.
[b] Dry standard cubic feet at 68°F and 1 atm.
[c] Dry standard cubic meters at 20°C and 1 atm.
[d] Actual cubic feet per minute at stack conditions.
[e] Dry standard cubic meters per minute at 20°C and 1 atm.

TABLE 2.18

PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITHOUT RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-4
Date	8/21/97
Time	0741-1153
Particulate Matter Concentration:	
gr/dscf[a]	0.00122
gr/dscf @ 7% O_2[b]	0.00168
g/dscm[c]	0.00279
g/dscm @ 7% O_2[d]	0.00384
Particulate Matter Emission Rate:	
lb/hr[e]	0.253
kg/hr[f]	0.115

[a] Grains per dry standard cubic foot at 68°F and 1 atm.
[b] Grains per dry standard cubic foot at 68°F and 1 atm adjusted to 7 percent O_2.
[c] Grams per dry standard cubic meter at 20°C and 1 atm.
[d] Grams per dry standard cubic meter at 20°C and 1 atm adjusted to 7 percent O_2.
[e] Pounds per hour.
[f] Kilograms per hour.

TABLE 2.19

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER BAGHOUSE OUTLET
ASPHALT PRODUCTION WITHOUT RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-4
Date	8/21/97
Time	0741-1153
Antimony (Sb)	
μg/dscm[a]	0.00
μg/dscm @ 7% O_2[b]	0.00
g/hr[c]	0.00
Arsenic (As)	
μg/dscm[a]	ND
μg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Barium (Ba)	
μg/dscm[a]	2.06
μg/dscm @ 7% O_2[b]	2.84
g/hr[c]	0.0849
Beryllium (Be)	
μg/dscm[a]	ND
μg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Cadmium (Cd)	
μg/dscm[a]	ND
μg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Chromium (Cr)	
μg/dscm[a]	0.00881
μg/dscm @ 7% O_2[b]	0.0121
g/hr[c]	0.000363
Cobalt (Co)	
μg/dscm[a]	ND
μg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Copper (Cu)	
μg/dscm[a]	0.277
μg/dscm @ 7% O_2[b]	0.381
g/hr[c]	0.0114
Lead (Pb)	
μg/dscm[a]	0.371
μg/dscm @ 7% O_2[b]	0.511
g/hr[c]	0.0153

[a] Micrograms per dry standard cubic meter @ 20°C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.

TABLE 2.19 (Concluded)

METALS CONCENTRATIONS AND EMISSION RATES
ROTARY DRUM DRYER - BAGHOUSE OUTLET
ASPHALT PRODUCTION WITHOUT RAP
ASPHALT PLANT "A" - CLAYTON, NC

Run Number	S-M29-O-4
Manganese (Mn)	
μg/dscm[a]	14.8
μg/dscm @ 7% O_2[b]	20.4
g/hr[c]	0.611
Mercury (Hg)	
μg/dscm[a]	0.438
μg/dscm @ 7% O_2[b]	0.603
g/hr[c]	0.0181
Nickel (Ni)	
μg/dscm[a]	0.0778
μg/dscm @ 7% O_2[b]	0.107
g/hr[c]	0.00320
Phosphorus (P)	
μg/dscm[a]	15.2
μg/dscm @ 7% O_2[b]	20.9
g/hr[c]	0.624
Silver (Ag)	
μg/dscm[a]	0.00
μg/dscm @ 7% O_2[b]	0.00
g/hr[c]	0.00
Selenium (Se)	
μg/dscm[a]	0.00
μg/dscm @ 7% O_2[b]	0.00
g/hr[c]	0.00
Thallium (Tl)	
μg/dscm[a]	ND
μg/dscm @ 7% O_2[b]	ND
g/hr[c]	ND
Zinc (Zn)	
μg/dscm[a]	4.80
μg/dscm @ 7% O_2[b]	6.61
g/hr[c]	0.198

[a] Micrograms per dry standard cubic meter @ 20° C and 1 atm.
[b] Micrograms per dry standard cubic meter @ 20°C and 1 atm, adjusted to 7% O_2.
[c] Grams per hour.

2.4 DETERMINATION OF VISIBLE EMISSIONS

Visible Emissions Observations (VEOs) of the stack exhaust were made during the testing by a certified observer. Observations were made simultaneously with the testing, except during the first run when VEOs were suspended during the period from 1207 to 1304 when the location of the sun was directly over the observer. The average opacity during asphalt production with RAP is presented along with the outlet stack gas parameters in Table 2.14. For each run the calculated average opacities were 2.15, 1.21, and 0.702%. Since VEO observations are recorded in 5% increments, the average opacity during these runs is more properly reported as less than 5% opacity. Also presented are the maximum single opacity observed, the maximum 6-minute block average, and the maximum 6-minute rolling average during each test run. During the production of asphalt without RAP, the the calculated average opacity of the outlet gas stream was 0.104%; however, this result is more properly reported as an average opacity of < 5 %. The opacity data during production with RAP are presented along with the stack gas parameters in Table 2.17.

3.0 PROCESS DESCRIPTION

The Asphalt Plant "A" concrete production facility in Clayton, North Carolina, has been in operation since 1989. It is a counter flow, continuous drum mix process. The dryer/mixer is an ASTEC double-barrel drum, a variation of the drum mixer, with a rated capacity of 400 tons per hour (tph). The plant has the capability of producing up to 15 asphalt mix types, with or without the use of RAP.

Asphalt concrete, called "hot mix asphalt" (HMA) by the industry, is a mixture of well-graded, high quality aggregate that is heated and mixed with liquid asphalt cement to produce paving material. The characteristics of the asphalt concrete are determined by the relative amounts and types of aggregate (and RAP) used. In the asphalt reclamation process, old asphalt pavement is removed from the road surface, transported to the plant, and crushed and screened to the appropriate size for further processing.

In the counter flow continuous double-barrel drum mix process, virgin aggregate of various sizes is fed to the drum by cold feed controls in proportions dictated by the final mix specifications. Aggregate is delivered by conveyor belt to the inner drum, entering at the opposite end of the burner (hence, the descriptor "counter" flow). The aggregate moves toward the burner within the inner drum and is dried. The hot aggregate falls to the outer drum through holes at the burner end of the inner drum. As the hot aggregate moves along the outer drum, liquid asphalt cement and conditioner are delivered to the drum mixer by a variable flow pump that is electronically linked to the aggregate feed weigh scales. Recycled dust from the control system and RAP (if used) are also added into the outer drum. The resulting asphalt concrete mixture is discharged from the outer drum and conveyed to storage silos for delivery to trucks.

There are five cold storage bins and three hot mix storage silos at Asphalt Plant "A". The hot mix storage silo capacity is 200 tons each, for a total of 600 tons. There are three screens for aggregate sizing and one 52,000 gallon (130 ton) heated asphalt cement storage vessel. The plant uses virgin and recycled No. 2 fuel oil, supplied by Noble Oil Services, Inc., for all its process fuel needs. A fuel assay report is presented in Appendix A. Virgin fuel oil is used during extremely cold weather and/or if there is a fuel-related problem with the burner. Therefore, virgin fuel is usually only used during the winter months (January/February). The amount of energy needed from the fuel for the asphalt production process is 225,600 BTU per ton of asphalt produced. The hot gas contact time with the aggregate is approximately one minute, and the process time from the beginning of the drum to the coater is approximately six minutes.

Asphalt Plant "A" uses an asphalt cement (AC) called AC-20, obtained from Citgo of Wilmington, North Carolina. An anti-strip conditioner, called Perma-Tac (from Arr-Maz), is sometimes used; antistrip is required for all North Carolina Department of Transportation jobs. For PM control, the Asphalt Plant "A" facility uses a fabric filter. The fabric filter is an ASTEC Pulse-Jet, equipped with 1,024 14-ounce Nomex bags and is operated with an air-to-cloth ratio of 5.54:1 feet per minute. The process exits the drum and coater and proceeds into the fabric filter, where it is exhausted through a stack. As mentioned above, the dust collected by the PM control devices is recycled to the process.

Data were taken at 15-minute intervals during the entire "test period" (i.e., the time period when at least one manual and both instrumental tests were running). According to plant personnel, the plant was operating under normal conditions during the tests.

The average asphalt concrete production rates during the four test runs were 171, 276, 240, and 185 tph, respectively, corresponding to total production of 735, 1,187, 840, and 778 tons. During the first three test runs (August 19 and August 20), a surface asphalt coating that included RAP was produced. During the fourth test run (August 21), a surface coating (accounting for 75 % of the total asphalt concrete produced) and a binder coating (accounting for 25 % of total production) were produced, both without RAP. Recycled No. 2 fuel oil was used for fuel in the production process during the tests. Conditioner was used during the four test runs at a rate of 0.25 % of the asphalt cement used, for a total of 186, 302, 220, and 200 pounds, respectively, during the four test runs.

Table 3.1 summarizes the operating conditions observed during the EPA source test periods at Asphalt Plant "A". Tables 3.2 and 3.3 describe the asphalt mixes produced and the fuel used, respectively, during the tests. Table 3.4 describes the specifics of plant operation during the tests. Appendix A shows all the data recorded during the tests, along with the results of statistical analyses.

TABLE 3.1

PLANT OPERATING CONDITIONS
ASPHALT PLANT "A" - CLAYTON, NC

Process Data	Test Run			
	S-M23-O-1 S-M29-O-1 8/19/97 0915-1456	**S-M23-O-2 S-M29-O-2 8/20/97 0822-1240**	**S-M23-O-3 S-M29-O-3 8/20/97 1405-1735**	**S-M23-O-4 S-M29-O-4 8/21/97 0741-1153**
Product Type(s)[a]	surface mix, with RAP (BCSC, Type RDS)	surface mix, with RAP (BCSC, Type RDS)	surface mix, with RAP (BCSC, Type RDS)	surface mix, no RAP (BCSC, Type HDS); and binder (BCBC, Type H)
Asphalt Concrete				
Production Rate, tph				
Average[b]	171	276	240	185
Range	146-254	223-302	152-254	150-204
Total Produced, tons	735	1,187	840	778
Mix Temperature, °F				
Average[b]	305	312	310	308
Range	295-315	303-346	299-322	271-351
Raw Material (Virgin Aggregate)				
Use Rate, tph				
Average[b]	145	236	205	176
Range	126-213	191-255	138-215	142-194
Total Used, tons	622	1,013	718	740
RAP				
Use rate, tph				
Average[b]	18	28	24	
Range	13-27	21-32	17-27	none
Total Used, tons	76	119	85	
Asphalt Cement				
Use rate, tph				
Average[b]	8.7	14.0	12.3	9.2
Range	7.5-12.6	11.4-15.5	7.8-13.0	7.8-10.6
Total Used, tons	37	60	43	39
Conditioner (lb)[c]	186	302	216	200

TABLE 3.1 (Concluded)

PLANT OPERATING CONDITIONS
ASPHALT PLANT "A" - CLAYTON, NC

Process Data	Test Run			
	S-M23-O-1 S-M29-O-1 8/19/97 0915-1456	**S-M23-O-2 S-M29-O-2 8/20/97 0822-1240**	**S-M23-O-3 S-M29-O-3 8/20/97 1405-1735**	**S-M23-O-4 S-M29-O-4 8/21/97 0741-1153**
Fabric Filter Operation[b]				
Temperature, °F				
Inlet	193	255	232	201
Outlet	170	214	195	175
Pressure Drop inches water				
Average[b]	1.8	3.3	2.5	1.9
Range	1.5-2.9	2.1-4.0	1.8-2.9	1.8-2.0
Fuel				
Use Rate,[d] gal/hr	214	410	334	280
Total Used, gal	920	1,762	1,168	1,117

[a] BCSC, Type HDS = bituminous concrete, surface coarse, type high density surface
BCSC, Type RDS = bituminous concrete, surface coarse, type high density surface with RAP
BCBC, Type H = bituminous concrete, binder coarse (type H)
(See Table 3.2 for more detail on product specifications)

[b] As a straight average of the 15-minute interval data shown in Appendix A.
[c] The amount of conditioner used was calculated as 0.25 percent of the asphalt cement.
[d] Fuel use rate was calculated from the total fuel used during the time interval.

TABLE 3.2

ASPHALT MIX SPECIFICATIONS
ASPHALT PLANT "A" - CLAYTON, NC

Product	Material	Amount
Surface Coating (BCSC, Type HDS)	78-M screenings sand asphalt cement conditioner	50% aggregate 30% aggregate 20% aggregate 5.2% mix 0.25% cement
Surface Coating, with RAP (BCSC, Type RDS)	78-M dry screenings natural sand RAP Asphalt cement total additional from RAP conditioner	43% aggregate 27% aggregate 20% aggregate 10% aggregate 5.1% mix 4.6% mix 0.5% mix 0.25% cement
Binder (BCBC, Type H)	78-M #67 screenings sand asphalt cement conditioner	16% aggregate 46% aggregate 20% aggregate 18% aggregate 4.5% mix 0.25% cement

TABLE 3.3

FUEL SPECIFICATIONS
ASPHALT PLANT "A" - CLAYTON, NC

Fuel Type	Characteristics		Descriptor(s)
OIL	flash point lead sulfur	150°F 28 mg/kg 3590 mg/kg (0.36%)	recycled no. 2 diesel fuel

TABLE 3.4

SPECIFICS OF PLANT OPERATION
ASPHALT PLANT "A" - CLAYTON, NC

Parameter	Test Run			
	S-M23-O-1 S-M29-O-1 8/19/97 0915-1456	**S-M23-O-2 S-M29-O-2 8/20/97 0822-1240**	**S-M23-O-3 S-M29-O-3 8/20/97 1405-1735**	**S-M23-O-4 S-M29-O-4 8/21/97 0741-1153**
Plant Shut Downs[a] (with approximate duration)	none	0930 (14 min)	none	none
Plant Production Rate Change(s)	1115-1145: mix rate slowed from nominally 250 to 200 tph 1200-1500: mix rate slowed from nominally 200 to 150 tph	0945-1245: mix rate increased from nominally 225 to 300 tpy	1715-1745: mix rate decreased from nominally 250 to 150 tph	1030-1200: mix rate increased from nominally 180 to 200 tph
Produce Changes	none	none	none	0730-0815, 0900-0915, 1015-1115: HDS produced (600 tons) 0830-0900, 0915-1000, 1155-1200: binder produced 195 tons)

[a] Shutdown occurred because the RAP feed went down.

4.0 SAMPLING LOCATIONS

Isokinetic sampling runs were attempted at both the baghouse inlet and outlet sampling locations, but sampling was canceled at the baghouse inlet at the direction of the EPA WAM. Detailed descriptions of the sampling locations and traverse point layouts follow.

4.1 BAGHOUSE INLET SAMPLING LOCATION

The baghouse inlet location consisted of a 48-1/2-inch diameter round duct which connected the outlet of the drier to the baghouse. A schematic diagram of the inlet sampling location is presented in Figure 4.1. The duct exited the drier vertically, made a 90° bend for the run over to the baghouse, and made a second 90° bend prior to running down into the baghouse. In order to enable for the extraction of gas samples at the baghouse inlet, plant personnel installed two four-inch sample ports 25 inches upstream of the entrance to the baghouse. The nearest upstream disturbance to the sample port was a downward turning elbow, which was located 28 inches (0.58 diameters) from the sample ports. The nearest disturbance downstream of the sample ports was the entrance into the baghouse, which was located 25 inches (0.52 diameters) from the sample ports. Based upon the criteria outlined in Method 1, this sample location was not suitable for isokinetic source sampling. However, after consultation with EPA EMC and EPA ESD personnel, the location was selected because an alternate location with better stack geometry did not exist.

To conduct isokinetic sampling at this location, PES selected the maximum number of sample points for particulate traverses as specified in Method 1, which was 24. The 24-point sampling matrix (which is presented in Figure 4.2) consisted of two twelve-point sample traverses on diameters offset 90° to each other. Prior to the initiation of isokinetic sampling activities at this location, a cyclonic flow check using a Type-S pitot tube was conducted. The results of the cyclonic flow check indicated an average rotation angle from null (α) of 7.2°. Since this angle was less than 20° as specified in Method 1, the sampling location was considered acceptable for isokinetic sampling without modification to the duct or the sampling method.

4.2 BAGHOUSE OUTLET SAMPLING LOCATION

The baghouse outlet sampling location consisted of a square stack attached to the opposite end of the baghouse from the inlet duct. The stack was 49-3/4 inches deep by 33 inches wide, and the equivalent duct diameter was 39.7 inches. Six sample ports were located in the

49-3/4 inch wall. The nearest downstream disturbance from the sample ports was the stack exit, which was located 24 inches (0.60 equivalent duct diameters) from the sample ports. The nearest upstream disturbance to the sample ports was the baghouse ID fan, which was located 88 inches (2.2 equivalent duct diameters) from the sample ports. For this sample location, the minimum number of sample points specified by Method 1 was 24. Accordingly, PES used a 24-point sampling matrix consisting of six four-point sample traverses. Figure 4.3 presents a schematic diagram of the baghouse outlet sampling location. Figure 4.4 presents the baghouse outlet sample traverse point locations.

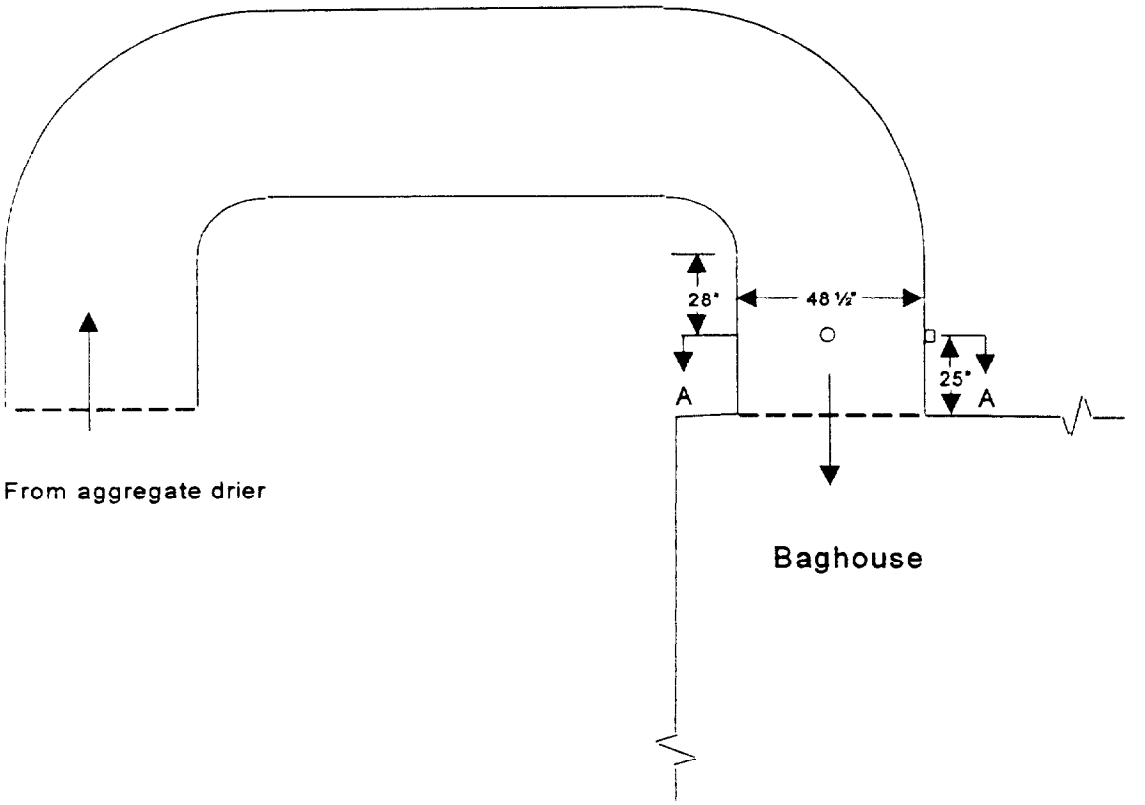
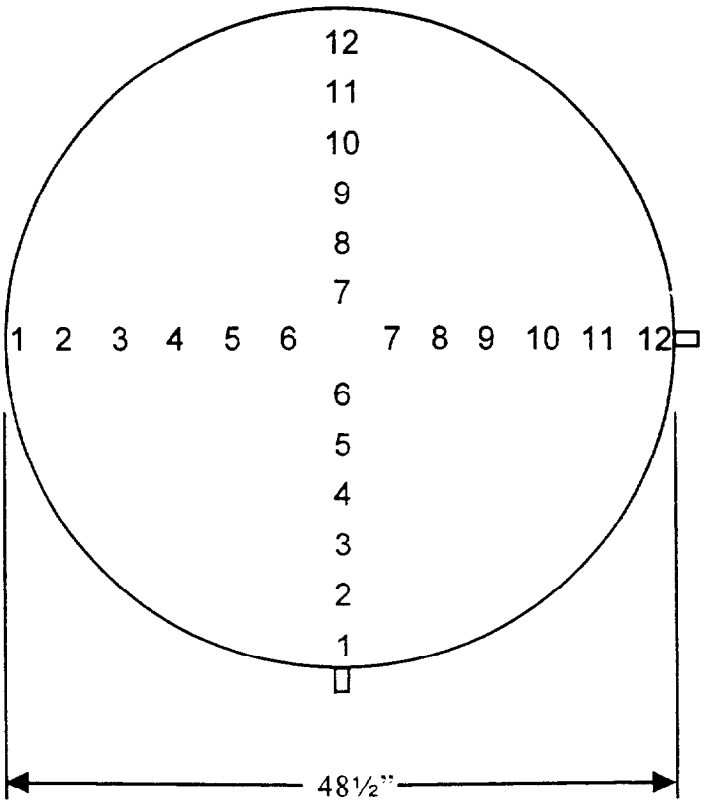


Figure 4.1 Baghouse Inlet Sampling Location - Asphalt Plant "A", Clayton, NC



Section A

Traverse Point Number	Distance from inside wall inches
1	1.02
2	3.25
3	5.72
4	8.58
5	12.1
6	17.3
7	31.2
8	36.4
9	39.9
10	42.8
11	45.3
12	47.5

Figure 4.2 Baghouse Inlet Point Locations - Asphalt Plant "A", Clayton, NC

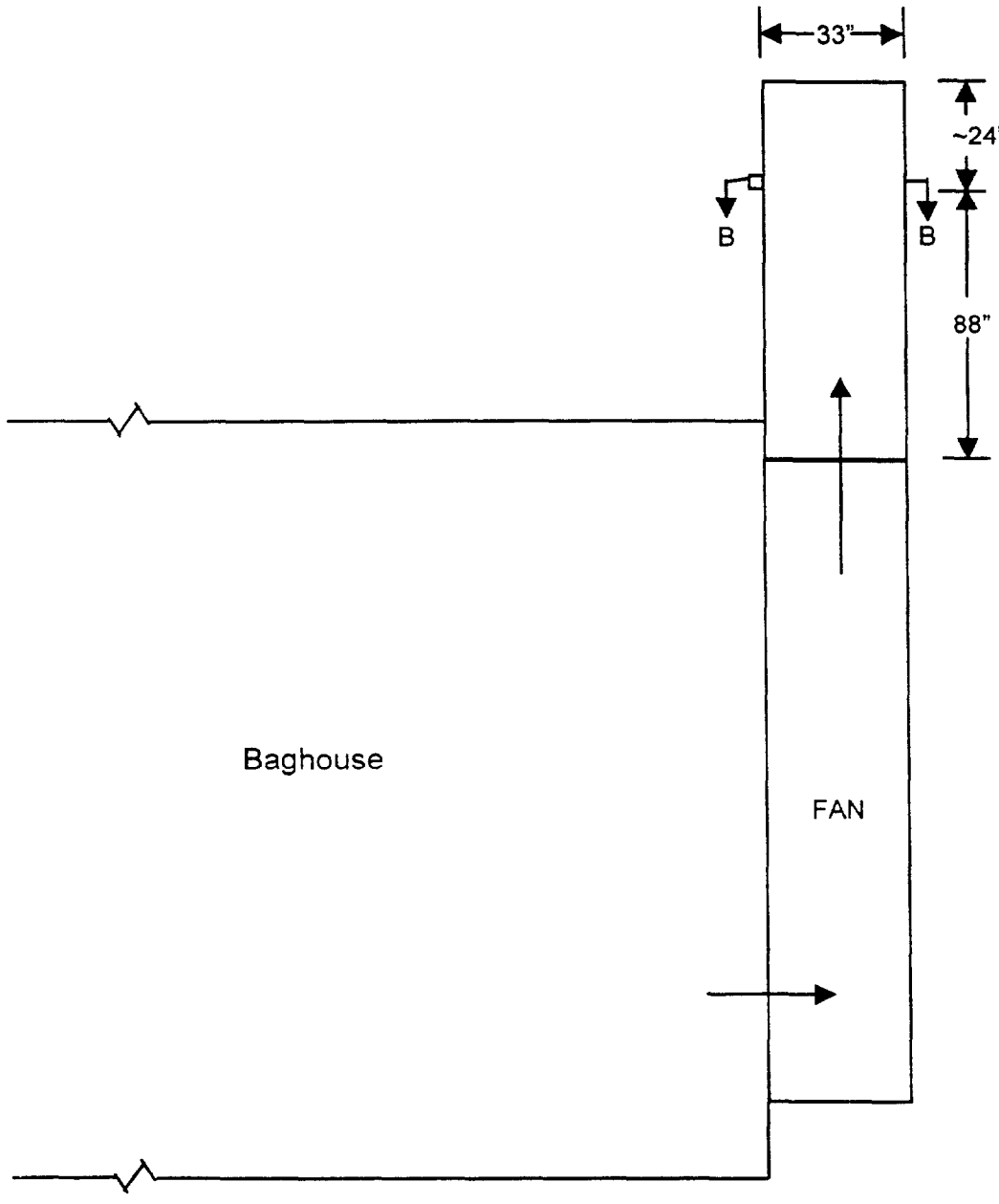
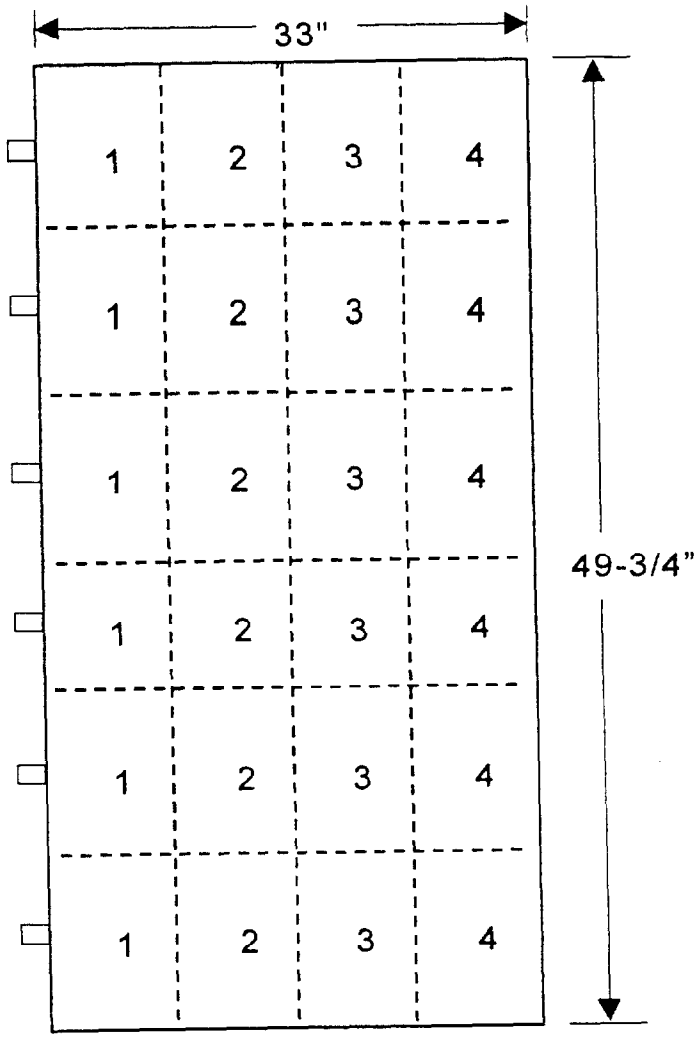


Figure 4.3 Baghouse Outlet Sampling Location - Asphalt Plant "A", Clayton, NC



Section B

Traverse Point Number	Distance from Inside wall (inches)
1	4.1
2	12.4
3	20.6
4	28.9

Figure 4.4 Baghouse Outlet Point Locations - Asphalt Plant "A", Clayton, NC

5.0 SAMPLING AND ANALYSIS PROCEDURES

Table 5.1 summarizes the sampling locations, test parameters, test methods, number of tests, and net run time of each test event. Brief descriptions of each method follow:

5.1 LOCATION OF MEASUREMENT SITES AND SAMPLE/VELOCITY TRAVERSE POINTS

EPA Method 1, "Sample and Velocity Traverses for Stationary Sources," was used to select the measurement site at the baghouse outlet, and as a guideline for the selection of the measurement site at the baghouse inlet. The cyclonic flow check procedure outlined in Method 1 was used to evaluate the suitability of the inlet location for isokinetic sampling. The sample traverse locations at both the inlet and the outlet sampling locations were determined using Method 1 procedures. The measurement sites are discussed in Section 4.0.

5.2 DETERMINATION OF STACK GAS VOLUMETRIC FLOW RATE

EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)," was used to determine gas volumetric flow rate at the baghouse inlet and outlet. A Type S pitot tube, constructed according to Method 2 criteria and having an assigned coefficient of 0.84, was connected to an inclined-vertical manometer and used to measure velocity pressure. A Type K thermocouple attached directly to the pitot tube was used to measure gas temperature. For each sampling run, the gas velocity was calculated from the average of the square roots of the velocity pressure readings, the average gas temperature, the molecular weight, and the stack static pressure. The volumetric flow rate was calculated as the product of the average gas velocity and the duct cross-sectional area.

5.3 DETERMINATION OF DRY MOLECULAR WEIGHT AND EMISSION CORRECTION FACTORS

EPA Method 3B, "Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air," was used to measure CO_2 and O_2 content of the stack gases. Gas samples were extracted from the baghouse outlet using the integrated, single-point bag sampling technique. The bag contents were analyzed onsite within four hours after sample collection using an Orsat® analyzer to determine concentrations of CO_2 and O_2. The Orsat® analyzer used for gas analysis had 0.2 % subdivisions.

TABLE 5.1

SAMPLING LOCATIONS, TEST PARAMETERS, AND
TEST METHODS SUMMARY
ASPHALT PLANT "A" - CLAYTON, NC

Sampling Location	Parameter	Test Methods	No. of Tests	Net Run Time, Minutes
Baghouse Inlet	Flow Rate	EPA 1 & 2	1	20
	O_2/CO_2	EPA 3	1	20
	Moisture	EPA 4	1	20
	PCDDs/PCDFs	EPA 23	1	20
	PM/Metals	EPA 29	1	20
Baghouse Outlet	Flow Rate	EPA 1 & 2	3	240
	O_2/CO_2	EPA 3	3	240
	Moisture	EPA 4	3	240
	PCDDs/PCDFs	EPA 23	3	240
	PM/Metals	EPA 29	3	240

5.4 DETERMINATION OF STACK GAS MOISTURE CONTENT

EPA Method 4, "Determination of Moisture Content in Stack Gases," was used to determine gas moisture content. The quantity of condensate collected during each sampling run was determined gravimetrically as the difference of the pre- and post-test impinger weights. The gas moisture volume was then calculated as the ratio of the moisture volume (assuming a conversion factor of 0.0415 grams per cubic foot) to the sum of the moisture volume and the dry gas volume as indicated by the dry gas meter. The Method 4 procedure was conducted simultaneously with each Method 23 and Method 29 sampling run.

5.5 DETERMINATION OF POLYCHLORINATED DIBENZO-P-DIOXINS AND POLYCHLORINATED DIBENZOFURANS

EPA Method 23, "Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans From Stationary Sources" was used to determine PCDDs and PCDFs at the baghouse inlet and outlet. A schematic of the Method 23 sampling train is shown in Figure 5.1. Gas samples were extracted from the gas streams isokinetically, and passed through a glass nozzle, heated glass-lined sample probe, a heated glass fiber filter, a coil

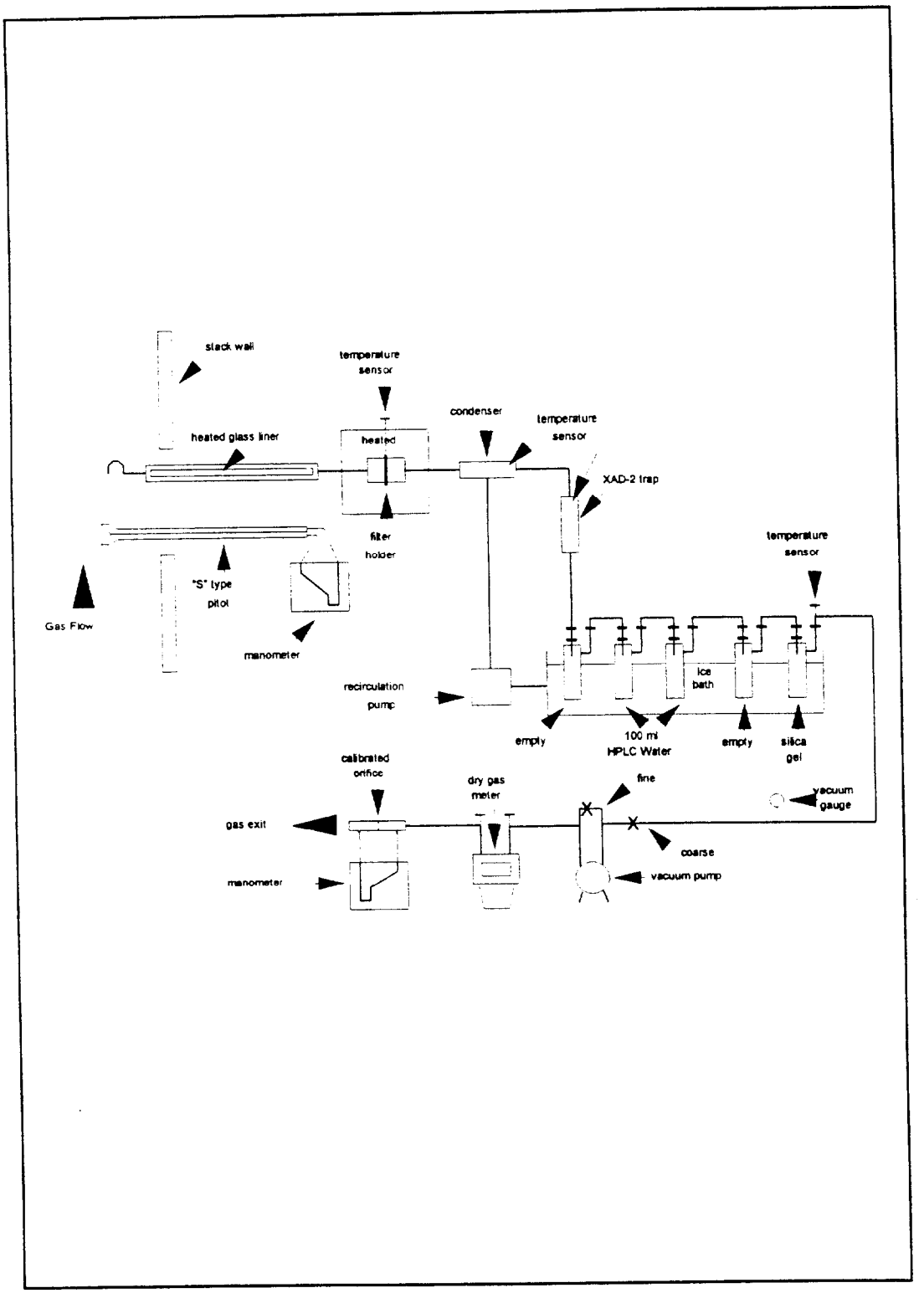


Figure 5.1 Method 23 Sample Train Schematic - Asphalt Plant "A", Clayton NC

condenser, and a sorbent resin trap containing approximately 40 grams of spiked XAD®-2 sorbent resin. Ice water from the impinger bath was continuously recirculated through water jackets on the coil condenser and the XAD®-2 sorbent resin trap to cool the sample gas and facilitate absorption of PCDDs and PCDFs onto the XAD®-2 resin. At the conclusion of each sample run, the sample train components (except the sorbent trap) were rinsed the with pesticide-grade acetone, methylene chloride, and toluene.

Upon receipt by the subcontract laboratory, TLI, the samples were concentrated combined, and analyzed using a GC/MS. Sample aliquots were initially separated using a DB-5 capillary column. In cases where the results of the analyses using the DB-5 column indicated the presence of 2378 PCDFs; the sample was re-analyzed using a DB-225 capillary column, and the results of the DB-225 analysis were used for the subsequent calculations of emission rate and toxic equivalency for the 2378 PCDFs congener.

5.6 DETERMINATION OF PARTICULATE MATTER AND METALS

EPA Method 29, "Determination of Metals Emissions From Stationary Sources," was used to determine filterable PM and metals at the baghouse inlet and baghouse outlet locations. The target metals included: Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Phosphorus (P), Silver (Ag), Selenium (Se), Thallium (Tl), and Zinc (Zn). A Method 29 sampling train schematic is presented in Figure 5.2.

Gas samples were withdrawn from the gas streams isokinetically and through a glass nozzle, heated glass-lined sample probe, a heated quartz fiber filter, and an impinger train containing reagents for the absorption of metals. The first impinger in the train was empty, the second and third impingers each contained 100 milliliters (ml) of a 5 % nitric acid (HNO_3)/10 % hydrogen peroxide (H_2O_2) solution, the fourth impinger was empty, the fifth and sixth impingers each contained 100 ml of a 4 % potassium permanganate ($KMnO_4$)/10 % sulfuric acid (H_2SO_4) solution, and the last impinger contained a known quantity of silica gel.

The sample recovery scheme for metals is shown in Figures 5.3 and 5.4. At the conclusion of each sampling run, the front half of the sampling train (i.e., in front of the tared quartz fiber filter) was rinsed with acetone followed by a solution of 0.1 N HNO_3. The first three impingers were quantitatively recovered and rinsed with 100 ml of HNO_3 solution; the impinger contents and the rinses were collected in a pre-cleaned glass sample bottle. The contents of the fourth and fifth impingers were recovered and impingers rinsed with 100 ml of fresh acidified potassium permanganate solution, followed by a rinse with 100 ml of deionized water into a pre-cleaned glass sample bottle. The fourth and fifth impingers were then rinsed with 25 ml of 8 N HCL solution, which was collected in pre-cleaned glass sample jar containing 200 ml of deionized water.

Analyses for the determination of PM concentrations and emission rates were conducted at PES' facilities in Research Triangle Park, NC. The acetone and nitric acid probe rinses and the filters were transferred to pre-cleaned, tared beakers, evaporated to dryness, desiccated, and

weighed to constant weight. At the conclusion of the PM analysis, the beakers were sealed with Parafilm™ and transported to the subcontract laboratory, TLI, for determination of the target metals content. Each sample run generated two fractions for the analysis of all target metals except mercury, and five fractions for analysis of mercury. Analysis for the target metals was conducted according to the sample analysis scheme presented in Figures 5.3 and 5.4. Except for mercury, analyses of the target metals were conducted using the analytical method which resulted in the lowest detection for each metal; either graphite furnace atomic absorption spectroscopy (GFAAS), or inductively coupled argon plasma (ICP) emission spectroscopy. Analysis for mercury content was determined using cold vapor atomic absorption spectroscopy (CVAAS).

5.7 DETERMINATION OF PLUME OPACITY

EPA Method 9, "Visual Determination of the Opacity of Emissions from Stationary Sources" was used to quantify visible emissions from the baghouse outlet stack. DEECO, PES' subcontractor, provided a certified VEO. The observer was certified to read plume opacities at a field training session held in Raleigh, North Carolina by Eastern Technical Associates of Raleigh, North Carolina on March 12, 1997 (Certificate No. 257158).

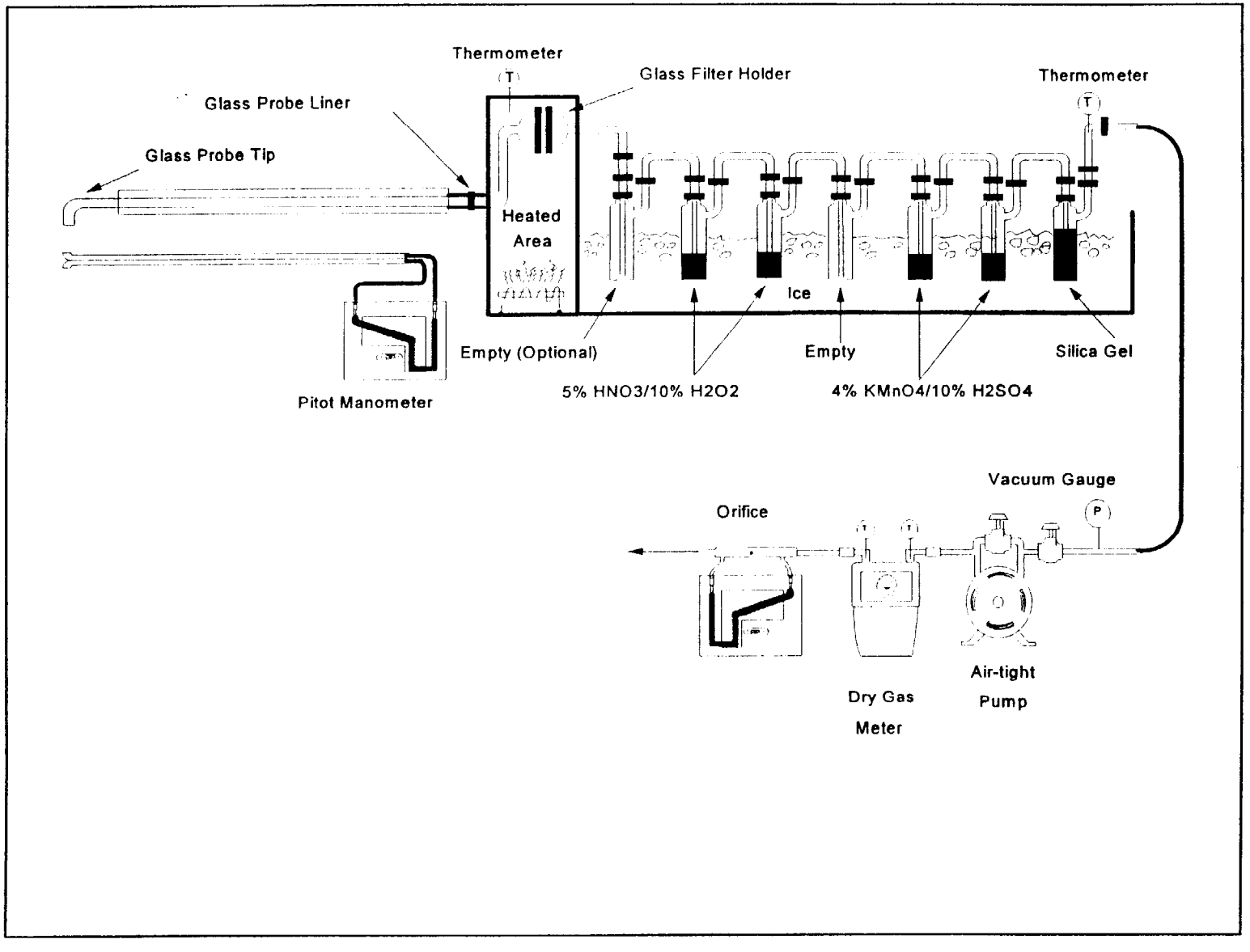


Figure 5.2 Method 29 Sample Train Schematic - Asphalt Plant "A", Clayton NC

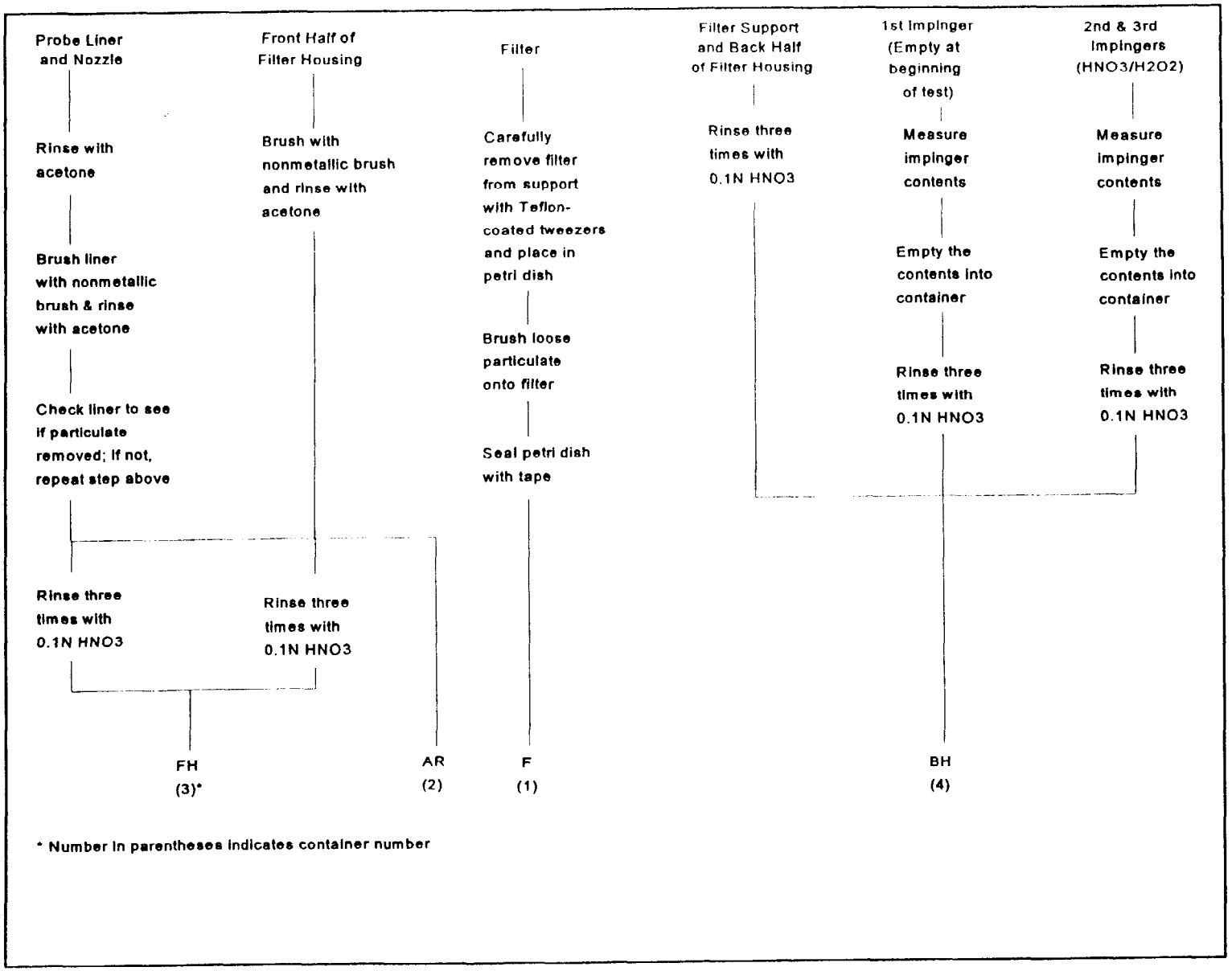


Figure 5.3 Method 29 Sample Recovery Scheme (Sample Fractions 1-4) Asphalt Plant "A", Clayton NC

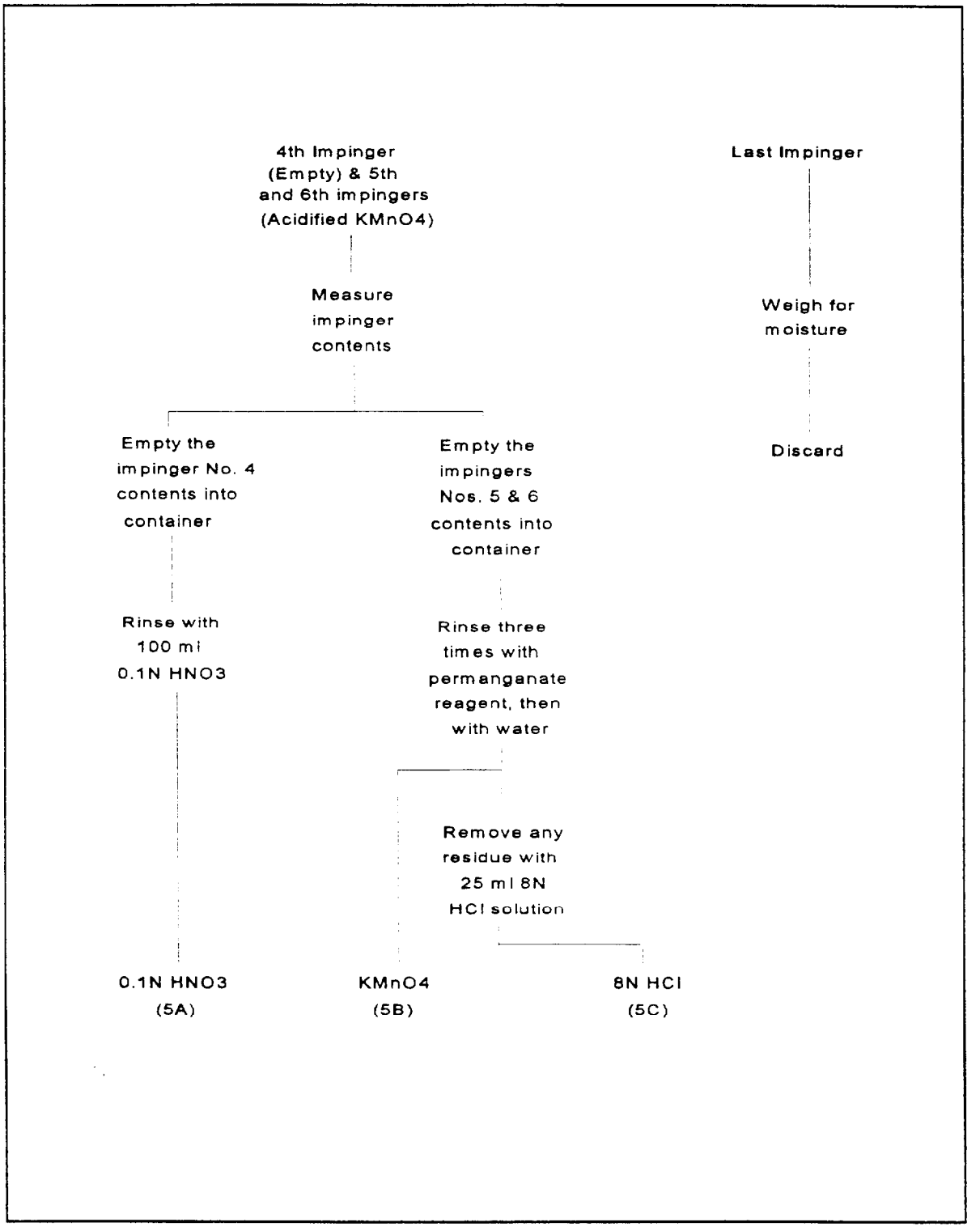


Figure 5.4 Method 29 Sample Recovery Scheme (Sample Fraction 5) Asphalt Plant "A", Clayton NC

6.0 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES AND RESULTS

This section describes the specific QA/QC procedures employed by PES during the performance of this source testing program. PES' quality assurance program was based upon the procedures and guidelines contained in the "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods," EPA/600/R-94/038c, as well as in the test methods to ensure the collection, analysis, and reporting of reliable source test data.

6.1 CALIBRATION OF APPARATUS

Since no mechanism exists for an independent measurement of emissions from the source, careful preparation, checkout, and calibration of the source testing sampling and analysis equipment is essential to ensure the collection of data of high quality. PES maintains a comprehensive schedule for preventative maintenance, calibration, and preparation of the source testing equipment.

6.1.1 Barometers

PES used aneroid barometers which were calibrated against a station pressure value reported by a nearby National Weather Service Station, and corrected for elevation.

6.1.2 Temperature Sensors

The responses of the Type K thermocouples used in the field testing program were checked using Calibration Procedure 2e as described in the Quality Assurance Handbook. The response of each temperature sensor was recorded when immersed in an ice water bath, at ambient temperature, and in a boiling water bath; each response was checked against an ASTM 3F reference thermometer. Table 6.1 summarizes the results of the thermocouple checks and the acceptable levels of variance. Digital temperature readouts were checked for calibration using a thermocouple simulator having a range of 0-2400 °F.

6.1.3 Pitot Tubes

For the measurement of velocity pressure in the gas streams, PES used Type S pitot tubes constructed according to EPA Method 2 specifications. Pitot tubes meeting these geometric specifications are assigned a baseline pitot coefficient (C_p) of 0.84 and need not be

TABLE 6.1

SUMMARY OF TEMPERATURE SENSOR CALIBRATION DATA
ASPHALT PLANT "A" - CLAYTON, NC

Temp. Sensor I.D.	Usage	Temperature, °R		Absolute Difference %	EPA Criteria %
		Reference	Sensor		
5C	Stack Gas	498	498	0	$< \pm 1.5$
		562	561	0.17	$< \pm 1.5$
		628	629	0.16	$< \pm 1.5$
5B	Stack Gas	496	499	0.60	$< \pm 1.5$
		553	559	1.0	$< \pm 1.5$
		596	596	0	$< \pm 1.5$
RT3	Stack Gas	501	501	0	$< \pm 1.5$
		532	532	0	$< \pm 1.5$
		670	672	0.30	$< \pm 1.5$
RT20	Stack Gas	492	493	0.20	$< \pm 1.5$
		534	532	0.37	$< \pm 1.5$
		672	671	0.15	$< \pm 1.5$
RT11	Impinger Exit	496	495	0.20	$< \pm 1.5$
		532	534	0.37	$< \pm 1.5$
		670	670	0	$< \pm 1.5$
SH4	Impinger Exit	497	496	0.20	$< \pm 1.5$
		532	535	0.56	$< \pm 1.5$
		670	669	0.15	$< \pm 1.5$

subjected to a wind tunnel calibration. PES performs, at a minimum, annual calibration checks of pitots using Calibration Procedure 2 as found in the Quality Assurance Handbook. The results of the dimensional checks for each pitot tube used in this test program are summarized in Table 6.2.

6.1.4 Differential Pressure Gauges

PES uses Dwyer inclined/vertical manometers to measure differential pressures. These include velocity pressure, static pressure, and meter orifice pressure. Manometers are selected with sufficient sensitivity to accurately measure pressures over the entire range of expected values. Manometers are primary standards and require no calibration.

6.1.5 Dry Gas Meter and Orifice

The Method 23 and 29 dry gas meters and orifices were calibrated in accordance with Calibration Procedure 5 in the Quality Assurance Handbook. This procedure involves direct comparison of the dry gas meter to a reference dry test meter. The reference dry test meter is calibrated annually against a wet test meter. Before its initial use in the field, the metering system was calibrated at several flow rates over the normal operating range of the metering system. For the initial calibration to be considered valid, the results of individual meter calibration factors (γ), cannot differ from the average by more than 0.02, and the results of individual meter orifice factors ($\Delta H_@$), cannot differ from the average by more that 0.20. After field use, the metering system calibration was checked at the average flow rate and highest vacuum observed during the test period. The results of the post-test meter correction factor check cannot differ by more that 5% from the average meter correction factor obtained during the initial, or thereafter, the annual calibration. Table 6.3 presents the results of the dry gas meter and orifice calibrations. All dry gas meters and orifices used in this test program met the method calibration requirements.

6.2 ON-SITE MEASUREMENTS

The on-site QA/QC activities include:

6.2.1 Measurement Sites

Prior to sampling, the stack was checked dimensionally to determine the suitability of the measurement site locations with respect to the Method 1 criteria. Distances to upstream and downstream disturbances, test port locations, and inside stack dimensions were checked to evaluate the uniformity of the stack cross sectional area. The inside stack dimensions, stack wall thickness, and sample port lengths were measured to the nearest 0.1 inch.

TABLE 6.2

SUMMARY OF PITOT TUBE DIMENSIONAL DATA
ASPHALT PLANT "A" - CLAYTON, NC

Measure-ment	Criteria	RESULTS		
		Pitot Tube Identification		
		5C	5B	RP-20
α_1	$-10° \le a_1 \le 10°$	2.5	2	2
α_2	$-10° \le a_1 \le 10°$	-2.5	-1	1
β_1	$-5° \le a_1 \le 5°°$	1	2	0
β_2	$-5° \le a_1 \le 5°$	-1	0	1
γ	-	2.5	1	0.5
θ	-	0	0.5	0
A	-	1.013	0.990	1.0065
$Z = A \tan \gamma$	≤ 0.125 in.	0.044	0.017	0.009
$W = A \tan \theta$	≤ 0.03125 in.	0	0.009	0
D_t	$0.1875" \le D_t \le 0.375"$	0.370	0.383	0.375
$A/2D_t$	$1.05\ D_t \le P \le 1.50\ D_t$	$0.389 \le 0.55 \le 0.555$	$0.402 \le 0.5 \le 0.575$	$0.394 \le 0.503 \le 0.563$
	Acceptable	Yes	Yes	Yes
	Assigned Coefficient	0.84	0.84	0.84

6.2.2 Velocity Measurements

All velocity measurement apparatus were assembled, leveled, zeroed, and leak-checked prior to and at the end of each sampling run. The stack static pressure was determined at a single point within the stack corresponding to the average velocity pressure as obtained during the pre-test velocity traverse.

TABLE 6.3

SUMMARY OF DRY GAS METER AND ORIFICE CALIBRATION DATA
ASPHALT PLANT "A" - CLAYTON, NC

Meter Box No.	Dry Gas Meter Correction Factor (γ)				Meter Orifice Coefficient ($\Delta H_@$)		
	Pre-test	Post-test	% Diff.	EPA Criteria	Average	Range	EPA Criteria
M5-4	1.021	1.046	2.5	<5%	1.818	1.740 - 1.869	1.618 - 2.018
M5-9	1.016	1.016	0.0	<5%	1.776	1.708 - 1.823	1.576 - 1.976
MB-11	0.987	1.008	2.1	<5%	1.93	1.873 - 1.970	1.730 - 2.130
MB-10	0.965	0.979	1.45	<5%	1.747	1.683 - 1.820	1.547 - 1.947

6.2.3 Flue Gas Sampling

Integrated flue gas samples were collected in Tedlar® gas bags from the baghouse exhaust. Prior to their initial use, the bags were leak checked and purged with nitrogen to ensure cleanliness. Prior to and after completion of each sampling run, the stack gas molecular weight sampling system was leak checked. The bag samples were analyzed on-site using an Orsat® analyzer. Prior to use the Orsat® analyzer was assembled and replenished with fresh reagents and leak checked as per the manufacturer's procedures.

6.2.4 Moisture

During sampling, the exit gas temperature of the last impinger in each sampling train was maintained below 68°F to ensure condensation of stack gas water vapor. The moisture gain in the impinger train due to flue gas moisture was determined gravimetrically using a digital top-loading electronic balance with a resolution of 0.1 g. For subsequent calculations of the flue gas moisture volume, the calculated moisture volume due to the impinger weight gain was compared to the stack gas saturation volume at the average stack gas temperature. If the calculated moisture volume due to impinger weight gain exceeds the saturation volume, the assumption is made that moisture droplets entered to sampling system, and the saturation volume is used to

calculate stack gas molecular weight. The lower moisture value obtained using the reference method and saturation method was subsequently used in all Method 23 and Method 29 calculations.

6.2.5 Method 23/Method 29

The QA/QC activities for the for Method 23 and Method 29 sampling trains were similar. Prior to field testing, all glassware used was pre-cleaned according to the guidelines presented in Methods 23 and 29. The Method 23 glassware was cleaned based upon procedures presented in Section 3A of "The Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples." The Method 29 sampling train glassware was prepared by first rinsing with hot tap and then water and then washed in hot soapy water. Next, all glassware was rinsed three times with tap water, followed by three additional rinses with water. Then all glassware was soaked in a 10 percent (V/V) nitric acid solution for a minimum of 4 hours, rinsed three times with water, then rinsed a final time with acetone, and allowed to air dry. On all of the Method 23 and Method 29 glassware, openings where contamination could occur were covered with Parafilm™ or Teflon® tape until the trains were assembled for sampling.

Table 6.4 summarizes the results of the post-test sample train leak checks for the Method 23 and Method 29 sampling trains, as well as the isokinetic sampling ratios for each of the sampling runs attempted. It should be noted that the Method 23 and Method 29 sampling runs at the baghouse inlet were aborted after approximately 20 minutes of sampling. Although the Method 29 isokinetic sampling ratio was within the required tolerance, the Method 23 ratio was not. This was due to the significant pressure drop across the train from the collected particulate matter and the XAD®-2 sorbent resin trap, which made it impossible to collect a gas at the flow rate required by the isokinetic rate equation. All pre- and post-test sample train leak checks met the acceptance criteria.

In order to evaluate the effectiveness of the on-site cleanup procedures, field blank samples of the Method 23 and Method 29 sample trains were collected during the field test program. The sample trains were assembled in same manner as the trains prepared for actual sampling runs and were transported to the baghouse outlet sampling location. The sample trains were each leak-checked and allowed to heat to the normal operating temperature. They were then leak-checked again and transported to the on-site field laboratory for recovery. The samples generated from the field blank trains were handled and analyzed in the same manner as the other samples generated during actual test runs.

In order to evaluate contamination levels in the sampling reagents, blank samples of all reagents used for both the Method 23 and Method 29 sampling were collected. These sample blanks were submitted for analysis along with the run samples and field blank samples for analysis.

TABLE 6.4

SUMMARY OF METHOD 23/ METHOD 29 FIELD SAMPLING QA/QC DATA
ASPHALT PLANT "A" - CLAYTON, NC

Date	Site	Run No.	Post-Test Leak Rate (cfm)	EPA Criteria	Percent Isokinetic	EPA Criteria
8/19/97	Baghouse Inlet	S-M23-I-1*	0.003	<0.02 cfm	77.0	90-110%
		S-M29-I-1*	0.007	<0.02 cfm	93.6	90-110%
	Baghouse Outlet	S-M23-O-1	0.002	<0.02 cfm	94.6	90-110%
		S-M29-O-1	0.004	<0.02 cfm	95.6	90-110%
8/20/97	Baghouse Outlet	S-M23-O-2	0.002	<0.02 cfm	106.8	90-110%
		S-M29-O-2	0.005	<0.02 cfm	103.9	90-110%
		S-M23-O-3	0.009	<0.02 cfm	106.7	90-110%
		S-M29-O-3	0.009	<0.02 cfm	106.5	90-110%
8/21/97	Baghouse Outlet	S-M23-O-4	0.001	<0.02 cfm	93.7	90-110%
		S-M29-O-4	0.008	<0.02 cfm	95.0	90-110%

* Run aborted due to high grain loading at baghouse inlet location.

6.3 ANALYSES

Table 6.5 presents the results of the recoveries of the internal standards in the PCDDs/PCDFs samples. The recoveries for run S-M23-O-4 are elevated because an insufficient amount of recovery standard was added to the sample. Due to the nature of the error, the measured amounts of PCDDs/PCDFs congeners in the sample are not biased. Analysis of method, field, and reagent blanks showed background levels of the congeners less that the target detection limits for each congener.

The results of QA/QC analyses for Method 29 are presented in Tables 6.6 through 6.13. Table 6.6 presents the results of the TLI Lab Control Spike. All lab control spike recoveries were within 10 percent of the spiked amount. The post digestion matrix spike (Table 6.7) indicated recoveries outside of the QC criteria (75%-125%) for Ag, Be, P, Pb, and Se on the front-half spikes, and As, and Mn, on the back-half spikes. The results of the spikes indicate matrix effects specific to these analytes in the native sample matrix. The results of the duplicate analysis performed are presented in Table 6.8. A duplicate analysis is not reported for Tl since graphite furnace atomic absorption (GFAA) was used after analysis by inductively coupled plasma emission spectroscopy (ICP) indicated high negative values. The GFAA apparatus takes two separate aliquots sample of the and averages the result. The ICP takes a continuous aliquot, performs three analyses, and averages the result. Since the analysis for most of the target metals was less than 10 times the reporting detection limit (RDL), the duplicate analysis should not be considered a valid qualifier for those analytes. These cases are noted as "<RDL". For duplicate analyses which are reported the QC criteria is ± 20%.

Table 6.9 presents the results of the serial dilution analyses. Serial dilution analyses are not considered valid when the analyte concentration is less that 10 times RDL for ICP analyses, and 5 times RDL for GFAA analyses. The quality control relative percent deviation (RPD) for serial dilutions is ± 10%. For results that exceed the QA limits matrix interferences are suspected. All analytes in the method blank (MB) shown in Table 6.10 were detected at levels less than or equal to the reporting detection limit (RDL), with the exception of lead (Pb). TLI used RDLs of 1-10 times the instrument detection limit (IDL) for reporting purposes. IDLs for metallic analytes range from 0.2 - 8 ppb. Lead was detected in the method blank at concentrations of 2.82 micrograms per liter (µg/L), which is slightly greater than the RDL of 2 µg/L for Pb. Lead results for run S-M29-O-2 are likely due to laboratory contamination. Lead results for runs S-M29-I-1 and S-M29-O-1 should be considered estimated, and Pb results for run S-M29-O-3 should be considered valid. Table 6.11 presents the results of the field blank and reagent blank analysis. Reagent blanks were collected to quantify the presence of contamination in the reagents used for the sampling program. A field blank train was assembled transported to the sampling location, leak checked, returned to the field lab and recovered. The field blank provides a check on the recovery efficiency from the sample trains. The results of the field and reagent blank analyses indicate that bias of the results due to cross contamination between field glassware trains and contamination of the reagents used for sampling is negligible.

Table 6.12 presents results mercury spike analyses. Lab control spikes performed for mercury indicate recoveries within the QC criteria of ± 20 %. Pre-digestion matrix spikes for mercury indicate recoveries in excess of the QC limits, which indicate an interference for

TABLE 6.5

SUMMARY OF METHOD 23 STANDARDS RECOVERY EFFICIENCIES ASPHALT PLANT "A" - CLAYTON, NC

	Percent Recovery								
	TLI Blank	S-M23-I-1	S-M23-O-1	S-M23-O-2	S-M23-O-3	S-M23-O-4	S-M23-O-FB	S-M23-O-RB	QC LIMITS
FULL SCREEN ANALYSIS									
Internal Standards									
2,3,7,8-TCDF	92.5	98.5	69.4	62.4	184	120	49.5	88.5	40-130%
2,3,7,8-TCDD	80.9	89.0	63.2	55.6	163	98.7	34.3	76.4	40-130%
1,2,3,7,8-PeCDF	92.4	95.5	67.1	57.6	161	107	44.9	89.1	40-130%
1,2,3,7,8-PeCDD	100	103	68.2	60.5	170	112	54.8	99.3	40-130%
1,2,3,6,7,8-HxCDF	92.8	102	68.8	65.7	187	113	34.7	74.0	40-130%
1,2,3,6,7,8-HxCDD	83.6	93.6	65.4	58.8	173	103	40.1	78.2	40-130%
1,2,3,4,6,7,8-HpCDF	72.2	71.1	42.3	41.3	105	88.5	32.7	56.7	25-130%
1,2,3,4,6,7,8-HpCDD	85.0	78.3	50.4	44.9	109	90.1	38.2	61.3	25-130%
OCDD	67.5	60.5	36.0	27.5	65.1	68.8	36.9	60.9	25-130%
Surrogate Standards									
2,3,7,8-TCDD	105	97.6	96.1	98.8	98.4	106	123	107	70-140%
2,3,4,7,8-PeCDF	87.7	93.2	86.1	85.1	88.6	93.4	112	102	70-140%
1,2,3,4,7,8-HxCDF	93.9	94.6	87.3	92.1	98.2	97.6	91.1	90.2	70-140%
1,2,3,4,7,8-HxCDD	89.6	88.0	81.0	91.9	87.9	85.9	82.4	91.6	70-140%
1,2,3,4,7,8,9-HpCDF	107	83.6	88.7	84.9	91.3	98.7	85.4	89.0	70-140%
Alternate Standards									
1,2,3,7,8,9-HxCDF	97.3	91.3	58.1	54.3	120	117	32.2	66.8	40-130%
2,3,4,6,7,8-HxCDF	84.8	99.0	61.4	62.0	173	107	34.1	76.9	40-130%
CONFIRMATION ANALYSIS									
Internal Standards									
2,3,7,8-TCDF	72.7	73.7	59.8	52.4	148	104		67.7	40-130%

* Confirmation analysis was not necessary on S-M23-0-FB because no TCDF were detected in the full screen analysis.

TABLE 6.6

SUMMARY OF METHOD 29 ANALYSIS QC DATA
LAB CONTROL SPIKES
ASPHALT PLANT "A" - CLAYTON, NC

Analyte	Spike Amount (µg)	Recovered Amount (µg)	Recovery (%)
Ag	50	45.11	90
As	50	45.25	90
Ba	50	49.05	98
Be	50	47.58	95
Cd	50	48.64	97
Co	50	49.24	98
Cr	50	48.24	96
Cu	50	49.07	98
Mn	50	48.63	97
Ni	50	47.19	94
P	1000	981.55	98
Pb	50	46.89	94
Sb	50	48.51	97
Se	50	47.66	95
Tl	50	45.00	90
Zn	200	199.45	100

TABLE 6.7

SUMMARY OF METHOD 29 ANALYSIS QC DATA
POST DIGESTION MATRIX SPIKES RUN NO. S-M29-O-1
ASPHALT PLANT "A" - CLAYTON, NC

Analyte	Front Half		Back Half	
	Recovered Amount (µg/L)	Recovery (%)	Recovered Amount (µg/L)	Recovery (%)
Ag	37.13	74	41.57	83
As	66.21	79	36.64	73
Ba	2207.64	LS	60.46	80
Be	31.50	63	45.63	91
Cd	44.31	84	52.79	94
Co	60.73	85	46.23	92
Cr	187.14	80	55.26	88
Cu	216.04	86	69.47	95
Mn	2026.71	LS	68.47	47
Ni	112.31	79	61.16	90
P	4053.51	74	1409.02	79
Pb	231.32	68	108.50	89
Sb	83.39	78	47.69	95
Se	80.62	74	46.09	82
Tl	N/A	N/A	20.6	82
Zn	1289.01	LS	456.69	88

LS - Low spike; % Recovery is not considered valid when spike amount is less than 20% of recovered amount

N/A - QC analysis not reported since method of standard additions (MSA) was performed.

TABLE 6.8

METHOD 29 DUPLICATE ANALYSIS QC DATA RUN NO. S-M29-O-2
ASPHALT PLANT "A" - CLAYTON, NC

Analyte	Front Half			Back Half		
	Sample (μg)	Duplicate (μg)	RPD (%)	Sample (μg)	Duplicate (μg)	RPD (%)
Ag	0.173	0.188	<RDL	<0.106	<0.106	<RDL
As	0.592	0.913	<RDL	<0.532	<0.532	<RDL
Ba	51.1	50.8	0.589	0.914	0.915	<RDL
Be	<0.100	<0.100	<RDL	<0.106	<0.106	<RDL
Cd	2.13	2.11	0.943	<0.106	0.108	<RDL
Co	<0.100	<0.100	<RDL	<0.106	<0.106	<RDL
Cr	9.97	10.1	1.30	0.435	0.427	<RDL
Cu	4.43	4.37	1.36	2.03	1.94	<RDL
Mn	33.4	33.4	0.00	1.70	1.70	<RDL
Ni	6.09	6.15	0.98	0.846	0.853	<RDL
P	60.4	59.5	1.50	58.3	57.7	1.03
Pb	5.78	5.60	3.16	2.52	2.53	0.396
Sb	4.15	4.26	2.62	<0.426	<0.426	<RDL
Se	3.96	4.06	2.49	0.336	<0.319	<RDL
Tl	0.210	N/A	N/A	<0.213	N/A	N/A
Zn	46.7	46.7	0.00	15.6	15.7	0.639

Note: Duplicate analysis not reported for elements analyzed by GFAA. Tl was analyzed by GFAA

TABLE 6.9

METHOD 29 SERIAL DILUTION ANALYSIS QC DATA
ASPHALT PLANT "A" - CLAYTON, NC

Serial Dilution, Run No. S-M29-O-1			
Analyte	**Sample μg**	**Serial Dilution μg**	**RPD ***
Ag	<0.100	<0.500	<RDL
As	2.66	<2.50	<RDL
Ba	221	242	9.07%
Be	<0.100	<0.500	<RDL
Cd	0.218	<0.500	<RDL
Co	1.82	1.95	<RDL
Cr	14.7	18.2	21.3%
Cu	17.3	18.1	4.52%
Mn	203	226	10.7%
Ni	7.26	8.72	<RDL
P	332	385	14.8%
Pb	19.7	23.0	15.5%
Sb	4.46	4.91	<RDL
Se	4.39	5.40	<RDL
Tl	<0.200	N/A	N/A
Zn	114	130	13.1%

* < 10 RDL / 5 RDL - Serial dilution analyte results are not considered valid when the concentration in the analyte is less than 10 times the Reported Detection Limit (RDL) for ICP analysis and 5 times the RDL for GFAA analysis. RPD = Relative percent deviation.

TABLE 6.10

METHOD 29 METHOD BLANK ANALYSIS QC DATA
ASPHALT PLANT "A" - CLAYTON, NC

Analyte	Reporting Detection Limit (μg/L)	Recovered Amount (μg/L)	Pass or Fail *
Ag	1	0.13	Pass
As	5	2.09	Pass
Ba	2	0.20	Pass
Be	1	0.01	Pass
Cd	1	0.44	Pass
Co	1	0.19	Pass
Cr	2	1.08	Pass
Cu	2	0.22	Pass
Mn	2	0.19	Pass
Ni	3	1.00	Pass
P	30	0.70	Pass
Pb	2	2.82	Fail
Sb	4	1.10	Pass
Se	3	1.14	Pass
Tl	2	0.10	Pass
Zn	12	7.27	Pass

* Method Blank considered "Pass" when recovered amount is less than the reporting detection limit (RDL).

The RDL is used instead of the instrument detection limit (IDL). IDL ranges from 0.2 0-8 ppb for many analytes. TLI used RDL values of 1-10 times IDL for reporting purposes.

TABLE 6.11

METHOD 29 FIELD AND REAGENT BLANK ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC

Analyte	Field Blank		Reagent Blank	
	Front Half (μg)	Back Half (μg)	(Front Half) μg	Back Half (μg)
Ag	0.107	<0.100	0.270	<0.100
As	0.627	<0.500	<0.500	<0.500
Ba	4.66	0.237	4.33	0.326
Be	<0.100	<0.100	<0.100	<0.100
Cd	<0.100	0.130	<0.100	<0.100
Co	<0.100	<0.100	<0.100	<0.100
Cr	9.5	0.376	9.33	0.222
Cu	1.05	0.624	1.06	1.44
Mn	1.09	7.17	0.911	34.7
Ni	4.82	<0.300	4.68	0.606
P	<3.00	12.1	<3.00	55.3
Pb	<0.200	6.59	<0.200	0.265
Sb	4.91	<0.400	4.18	<0.400
Se	4.27	0.421	4.35	<0.300
Tl	<0.200	<0.200	<0.200	<0.200
Zn	3.02	2.96	2.60	2.03

TABLE 6.12

METHOD 29 MERCURY SPIKE ANALYSIS QC DATA
ASPHALT PLANT "A" - CLAYTON, NC

Sample ID	Spike Amt μg	Recovery	Recovery Limits
Lab Control Spikes			
LCS 1	5	106%	80-120%
LCS 1 Dup	5	100%	80-120%
LCS 2	5	100%	80-120%
LCS 2 Dup	5	95%	80-120%
Matrix Spikes (Pre-Digestion)			
O-M29-1	5	170%	80-120%
O-M29-1 Dup	5	170%	80-120%
O-M29-3	5	168%	80-120%
O-M29-3 Dup	5	160%	80-120%
O-M29-4	5	155%	80-120%
O-M29-4 Dup	5	152%	80-120%
I-M29-1	5	88%	80-120%
I-M29-1 Dup	5	103%	80-120%

mercury due to a matrix effect present in the native sample. Results for mercury should be considered biased low. Method blanks, field blanks, and reagent blanks for mercury indicated that the sample results for mercury were not biased due to mercury contamination in the reagents, of due to cross contamination in the sampling apparatus. Mercury blank results are presented in Table 6.13.

TABLE 6.13

METHOD 29 MERCURY BLANK ANALYSIS QC DATA
ASPHALT PLANT "A" - CLAYTON, NC

Sample ID	Detection Limit μg/L	Recovered Amount μg/L
Method Blank		
MB-1	0.02	0.008
MB-1 Dup	0.02	0.016
MB-2	0.02	0.003
MB-2 Dup	0.02	0.003
Field Blank and Reagent Blank		
FH	<0.400	<0.400
FH - Dup	<0.400	<0.400
BH	<0.60	<1.20
BH- Dup	<0.60	<1.20
HNO3	<0.224	<0.400
HNO3 - Dup	<0.224	<0.400
KMnO4	<0.62	<1.16
KMnO4 - Dup	<0.62	<1.16
HCL		<0.376
HCL - Dup		<0.376

APPENDIX A

PROCESS DATA

Appendix A: Process Data
ASPHALT PLANT "A"
Test Run 1
Test Date: August 19, 1997
Total Test Time: 4.3 hrs

Time	Event	Product Type	Asphalt Concrete Production		Asphalt Temp. (oF)	Aggregate Use		RAP Use		Asphalt Cement Use		Calculated Conditioner Use	
			Rate (TPH)	Total (tons)		Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)
0915	*	RDS	250		315	213		26		12.5		0.03	
1100		RDS	254		304	211		27		12.6		0.03	
1115	*	RDS	202		295	171		22		10.2		0.03	
1130		RDS	202		311	170		21		10.0		0.03	
1145		RDS	200		304	168		21		10.0		0.03	
1200	*	RDS	150		299	127		15		7.8		0.02	
1215		RDS	152		306	126		16		7.5		0.02	
1230		RDS	149		306	127		16		7.7		0.02	
1245		RDS	150		300	127		15		7.7		0.02	
1300		RDS	152		300	128		16		7.6		0.02	
1315		RDS	150		300	127		16		7.8		0.02	
1330		RDS	150		310	128		15		7.6		0.02	
1345		RDS	149		301	127		15		7.7		0.02	
1415		RDS	147		313	127		13		7.6		0.02	
1430		RDS	146		307	127		15		7.5		0.02	
1445		RDS	150		305	128		15		7.7		0.02	
1456		RDS	151		304	129		15		7.7		0.02	
Total**				735			622		76		37		0.093
Mean			171		305	145		18		8.7		0.02	
St. Dev			35		5	29		4		1.7		0.004	
Min			146		295	126		13		7.5		0.02	
Max			254		315	213		27		12.6		0.03	

* See Table 4 for a description of these events.
** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 1

Test Date: August 19, 1997

Total Test Time: 4.3 hrs

Time	Event	Product Type	Fabric Filter			Fuel Use		Visible Emissions
			Inlet Temp. (oF)	Outlet Temp. (oF)	Pressure Drop (in. H2O)	Rate (GPM)	Total (gal)	
0915	*	RDS	245	200	2.9	5	80	none
1100		RDS	240	200	2.5	5	1693	none
1115	*	RDS	220	195	2.5	5	1817	none
1130		RDS	205	185	2.0	5	1855	none
1145		RDS	205	180	2.0	3	1911	none
1200	*	RDS	180	170	1.8	3	1994	none
1215		RDS	175	160	1.5	3	2036	none
1230		RDS	185	160	1.5	3	2092	none
1245		RDS	180	160	1.8	3	2136	none
1300		RDS	180	160	1.5	3	2192	none
1315		RDS	185	160	1.5	3	2234	none
1330		RDS	185	160	1.5	3	2274	none
1345		RDS	182	160	1.7	3	2336	none
1415		RDS	180	160	1.5	3	2388	none
1430		RDS	180	160	1.5	3	2441	none
1445		RDS	180	160	1.5	3	2489	none
1456		RDS	170	160	1.5	3	2533	none
Total**							920	
Mean			193	170	1.8	3.5		
St. Dev			22	15	0.4	0.9		
Min			170	160	1.5	3.0		
Max			245	200	2.9	5.3		

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 2

Test Date: August 20, 1997 a.m.

Total Test Time: 4.3 hrs

Time	Event	Product Type	Asphalt Concrete Production		Asphalt Temp. (oF)	Aggregate Use		RAP Use		Asphalt Cement Use		Calculated Conditioner Use	
			Rate (TPH)	Total (tons)		Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)
0822		RDS	225		306	192		21		11.5		0.03	
0845		RDS	226		304	191		24		11.5		0.03	
0900		RDS	223		316	192		22		11.5		0.03	
0915		RDS	225		306	191		23		11.4		0.03	
0930	*	RDS	223		346	214		24		11.5		0.03	
0945	*	RDS	249		308	213		25		12.7		0.03	
0100		RDS	298		312	254		30		15.3		0.04	
1015		RDS	299		314	254		30		15.5		0.04	
1030		RDS	301		308	255		30		15.3		0.04	
1045		RDS	300		314	254		31		15.2		0.04	
1100		RDS	300		303	255		26		15		0.04	
1115		RDS	301		314	253		32		15		0.04	
1130		RDS	302		309	255		31		15		0.04	
1145		RDS	300		311	255		31		15.4		0.04	
1200		RDS	300		317	254		30		15.3		0.04	
1215		RDS	300		307	252		31		15		0.04	
1230		RDS	298		313	255		29		15		0.04	
1240		RDS	299		310	253		30		15		0.04	
Total**				1,187			1,013		119		60		0.151
Mean			276		312	236		28		14.0		0.04	
St. Dev			34		9	27		4		1.7		0.00	
Min			223		303	191		21		11.4		0.03	
Max			302		346	255		32		15.5		0.04	

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 2

Test Date: August 20, 1997 a.m.

Total Test Time: 4.3 hrs

Time	Event	Product Type	Fabric Filter			Fuel Use		Visible Emissions
			Inlet Temp. (oF)	Outlet Temp. (oF)	Pressure Drop (in. H2O)	Rate (GPM)	Total (gal)	
0822		RDS	230	185	2.1	5	324	none
0845		RDS	230	192	2.6	5	427	none
0900		RDS	230	190	2.8	5	512	none
0915		RDS	235	197	2.8	5	592	none
0930	*	RDS	195	200	2.1	3	704	none
0945	*	RDS	260	205	2.8	7	760	none
0100		RDS	270	215	3.2	7	869	none
1015		RDS	270	225	3.1	7	984	none
1030		RDS	270	230	3.8	7	1118	none
1045		RDS	271	228	3.6	7	1200	none
1100		RDS	269	225	3.5	7	1335	none
1115		RDS	262	220	3.8	7	1440	none
1130		RDS	270	225	4.0	7	1539	none
1145		RDS	270	225	3.8	8	1663	none
1200		RDS	270	230	3.5	7	1757	none
1215		RDS	265	225	3.9	7	1881	none
1230		RDS	268	220	3.8	7	1993	none
1240		RDS	260	220	3.8	6	2086	none
Total**							1,762	
Mean			255	214	3.3	6.3		
St. Dev			21	15	0.6	1.2		
Min			195	185	2.1	3.0		
Max			271	230	4.0	8.0		

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 3

Test Date: August 20, 1997 p.m.

Total Test Time: 3.5 hrs

Time	Event	Product Type	Asphalt Concrete Production		Asphalt Temp. (oF)	Aggregate Use		RAP Use		Asphalt Cement Use		Calculated Conditioner Use	
			Rate (TPH)	Total (tons)		Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)
1405		RDS	250		309	214		25		12.6		0.03	
1415		RDS	251		303	211		27		13.0		0.03	
1430		RDS	251		312	212		27		13.0		0.03	
1445		RDS	252		311	212		26		13.0		0.03	
1500		RDS	245		305	212		25		12.8		0.03	
1515		RDS	245		320	212		22		12.5		0.03	
1530		RDS	254		310	215		26		12.8		0.03	
1545		RDS	250		307	213		25		12.9		0.03	
1600		RDS	249		307	211		24		13.0		0.03	
1615		RDS	247		322	215		23		12.7		0.03	
1630		RDS	252		312	214		25		12.6		0.03	
1645		RDS	250		316	213		24		12.8		0.03	
1700		RDS	249		315	213		25		12.8		0.03	
1715	*	RDS	205		307	172		24		10.5		0.03	
1735		RDS	152		299	138		17		7.8		0.02	
Total**				840			718		85		43		0.108
Mean			240		310	205		24		12.3		0.03	
St. Dev			26		6	21		2		1.3		0.003	
Min			152		299	138		17		7.8		0.02	
Max			254		322	215		27		13.0		0.03	

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 3

Test Date: August 20, 1997 p.m.

Total Test Time: 3.5 hrs

Time	Event	Product Type	Fabric Filter			Fuel Use		Visible Emissions
			Inlet Temp. (oF)	Outlet Temp. (oF)	Pressure Drop (in. H2O)	Rate (GPM)	Total (gal)	
1405		RDS	240	200	2.8	6	2560	none
1415		RDS	238	200	2.9	5	2630	none
1430		RDS	232	200	2.5	5	2731	none
1445		RDS	235	195	2.5	5	2823	none
1500		RDS	230	195	2.5	5	2873	none
1515		RDS	240	195	2.8	6	2992	none
1530		RDS	235	195	2.5	6	3071	none
1545		RDS	240	195	2.5	5	3162	none
1600		RDS	245	200	2.5	6	3248	none
1615		RDS	235	200	2.5	5	3333	none
1630		RDS	240	200	2.5	6	3415	none
1645		RDS	240	200	2.5	6	3488	none
1700		RDS	240	200	2.5	6	3602	none
1715	*	RDS	210	190	2.0	5	3656	none
1735		RDS	180	165	1.8	3	3728	none
Total**							1,168	
Mean			232	195	2.5	5.3		
St. Dev			16	9	0.3	0.8		
Min			180	165	1.8	3.0		
Max			245	200	2.9	6.0		

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 4

Test Date: August 21, 1997

Total Test Time: 4.2 hrs

Time	Event	Product Type	Asphalt Concrete Production		Asphalt Temp. (oF)	Aggregate Use		RAP Use		Asphalt Cement Use		Calculated Conditioner Use	
			Rate (TPH)	Total (tons)		Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)	Rate (TPH)	Total (tons)
0741		HDS	150		315	142		0		7.8		0.02	
0745		HDS	179		306	169		0		9.2		0.02	
0800		HDS	177		302	169		0		9.2		0.02	
0815		HDS	177		335	168		0		9.3		0.02	
0830		Binder	178		300	171		0		8.1		0.02	
0845		Binder	179		300	171		0		8.2		0.02	
0900		HDS	184		351	174		0		9.0		0.02	
0915		Binder	179		283	167		0		9.1		0.02	
0930		Binder	181		297	172		0		8.5		0.02	
0945		Binder	178		319	172		0		8.0		0.02	
1000		Binder	177		320	171		0		7.8		0.02	
1015		HDS	176		350	167		0		9.3		0.02	
1030	*	HDS	200		271	191		0		10.4		0.03	
1045		HDS	200		303	190		0		10.6		0.03	
1100		HDS	200		282	189		0		10.4		0.03	
1115		HDS	200		310	190		0		10.5		0.03	
1130		HDS	200		289	191		0		10.3		0.03	
1145		HDS	200		318	189		0		10.6		0.03	
1153		Binder/ HDS	204		297	194		0		8.9		0.02	
Total**				778			740		0		39		0.10
Mean			185		308	176		0		9.2		0.02	
St. Dev			13		21	13		0		1.0		0.00	
Min			150		271	142		0		7.8		0.02	
Max			204		351	194		0		10.6		0.03	

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

Appendix A: Process Data

ASPHALT PLANT "A"

Test Run 4

Test Date: August 21, 1997

Total Test Time: 4.2 hrs

Time	Event	Product Type	Fabric Filter			Fuel Use		Visible Emissions
			Inlet Temp. (oF)	Outlet Temp. (oF)	Pressure Drop (in. H2O)	Rate (GPM)	Total (gal)	
0741		HDS	195	168	2.0	5	146	none
0745		HDS	203	178	2.0	4	216	none
0800		HDS	203	177	2.0	4	288	none
0815		HDS	205	178	2.0	4	363	none
0830		Binder	195	170	2.0	4	440	none
0845		Binder	200	170	2.0	3	474	none
0900		HDS	210	180	2.0	4	560	none
0915		Binder	200	180	1.8	3	626	none
0930		Binder	195	170	2.0	4	669	none
0945		Binder	195	175	1.9	4	743	none
1000		Binder	190	168	1.9	4	812	none
1015		HDS	192	170	1.8	4	871	none
1030		HDS	205	170	1.9	5	932	none
1045	*	HDS	210	180	2.0	5	1004	none
1100		HDS	205	175	1.9	5	1063	none
1115		HDS	200	180	1.8	4	1133	none
1130		HDS	205	175	1.9	4	1208	none
1145		HDS	210	180	2.0	5	1285	none
1153		Binder/ HDS	210	180	1.9	4	1323	none
Total**							1,177	
Mean			201	175	1.9	4.2		
St. Dev			6	5	0.1	0.6		
Min			190	168	1.8	3.0		
Max			210	180	2.0	5.0		

* See Table 4 for a description of these events.

** Because running total data were not available, the run totals were calculated from the average of the TPH data multiplied by the total run time.

SPECIALIZED ASSAYS ENVIRONMENTAL
2960 Foster Creighton Drive
Nashville, Tennessee 37204

ANALYTICAL REPORT

** Original report and a copy of the chain of custody will follow by mail.

NOBLE OIL, CO. 7680
ATTN: LARRY PRICE
5617 CLYDE RHYNE DRIVE
SANFORD, NC 27330

Lab Number: 97-A065425

Sample ID: 861-625 OIL

Project:

Project Name:

Sampler:

State Certification: 387

Date Collected: 7/25/97

Time Collected:

Date Received: 8/ 7/97

Time Received: 9:00

Sample Type: Oil

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
METALS										
Arsenic	ND	mg/kg	1.0	1.0	1	8/11/97	14:29	R.Street	6010A	2146
Cadmium	ND	mg/kg	1.0	1.0	1	8/11/97	14:29	R.Street	6010A	2146
Chromium	ND	mg/kg	1.0	1.0	1	8/11/97	14:29	R.Street	6010A	2146
Lead	28.0	mg/kg	1.0	1.0	1	8/11/97	14:29	R.Street	6010A	2146
Nickel	ND	mg/kg	1.0	1.0	1	8/11/97	14:29	R.Street	6010A	2146
GENERAL CHEMISTRY PARAMETERS										
Chloride in Oil	464.	mg/kg	10.0	10.0	1	8/12/97	15:50	K.Witte	9076	2668
Ash	0.57	%		0.01	1	8/ 9/97	14:17	A.Hardison	D482	2433
Flash Point, Closed Cup	FLASHED AT 150F					8/14/97	9:22	D. Hoover	1010	3465
Sulfur	3590	mg/kg	100.	5.00	20	8/14/97	12:37	G. Baun	ASTMD808	8920

ND = Not detected at the report limit.

Flash point/Ignitability reported to the nearest 10 deg F.

Report Approved By: _____ Report Date: 8/14/97

Theodore J. Duello, Ph.D., Q.A. Officer
Michael H. Dunn, M.S., Technical Director
Danny B. Hale, M.S., Laboratory Director

MATERIAL SAFETY DATA SHEET

Manufacturer
ARR-MAZ PRODUCTS, L.P.
621 Snively Avenue
Winter Haven, Fl 33880
Emergency Phone Number
941-293-7824

PRODUCT INFORMATION

Trade Name:	AD-here LOF 65-00
Chemical Family:	Amines
Composition:	Modified Fatty Amidoamine
HMIS RATING:	Health Hazard 2 Moderate Flammability Hazard 1 Slight Reactivity Hazard 0 Minimal
D.O.T. Shipping Classification:	Not regulated

PHYSICAL DATA

Boiling Point (°F):	> 500°F
Solubility in Water:	Slight
Vapor Pressure (mmHg at 25°C):	< 1
Vapor Density (Air = 1):	> 1
Appearance:	Dark brown liquid
Odor:	Mild
Specific Gravity (at 77°F):	0.96 - 0.98

FIRE EXPLOSION

Flash Point PM Closed Cup °F:	>300 °F
Extinguishing Media:	CO2, foam, or dry chemical
Special Fire Fighting Procedures:	Wear NIOSH/MSHA approved self-contained breathing equipment and protective clothing.

APPENDIX B

RAW FIELD DATA

Appendix B.1

Raw Field Data

Baghouse Inlet

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS *

Plant: ASPHALT PLANT "A"

Date: 8/18/97

Sampling Location: Baghouse Inlet

Inside of Far Wall to Outside of Nipple: 52

Inside of Near Wall to Outside of Nipple (Nipple Length): 4

Stack I.D.: 48"

Distance Downstream from Flow Disturbance (Distance B):

22 inches / Stack I.D. = 0.458 dd *

Distance Upstream from Flow Disturbance (Distance A):

33 1/2 inches / Stack I.D. = 0.698 dd

Calculated By: DSG AB

Schematic of Sampling Location

Traverse Point Number	Fraction of Length	Length (inches)	Product of Columns 2 & 3 (To nearest 1/8")	Nipple Length (inches)	Traverse Point Location (Sum of Col. 4 & 5)
1	0.021	48	1.	4	5
2	0.067		3 1/4		7 1/4
3	0.118		5 5/8		9 5/8
4	0.177		8 1/2		12 1/2
5	0.250		12		16
6	0.356		17 1/8		21 1/8
7	0.644		30 3/8		34 7/8
8	0.750		36		40
9	0.823		39 1/2		43 1/2
10	0.882		42 3/8		46 3/8
11	0.933		44 3/4		48 3/4
12	0.979		47		51

* DOES NOT MEET METHOD 1

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: PES/EPA Asphalt Plant # "A" Date: 8/18/97

Sampling Location: Baghouse Inlet Clock Time: 13:00

Run #: PRELIMINARY Operators: AB/AD

Barometric Pressure, in. Hg: 29.90 Static Pressure, in. H_2O: -2.5

Moisture, %: 25 Molecular wt., Dry: _____ Pitot Tube, Cp: 0.84

Stack Dimension, in. Diameter or Side 1: 48 Side 2: 48

Wet Bulb, °F: _____ Dry Bulb, °F: _____

Cyclonic	Traverse Point Number		Velocity Head in. H_2O	Stack Temp. °F
0	A	1	0.36	194
1		2	0.25	195
0		3	0.26	193
4		4	0.23	195
0		5	0.26	194
0		6	0.34	193
11		7	0.50	194
0		8	0.39	196
12		9	0.36	194
4		10	0.34	195
10		11	0.22	193
10		12	0.25	195
15	B	1	0.26	194
0		2	0.12	193
12		3	0.10	194
10		4	0.30	196
-8		5	0.24	194
12		6	0.30	195
10		7	0.38	193
5		8	0.33	195
8		9	0.30	194
9		10	0.23	193
18		11	0.12	194
13		12	0.09	196
			$\overline{\sqrt{\Delta P}}$ = 0.512	$\overline{Ts}$ = 194.3

1 = 7.2°

$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times \%N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

$Md =$

$Ms = Md \times (1 - \frac{\% H_2O}{100}) + 18 (\frac{\% H_2O}{100})$

$Ms = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

$Ms =$

$\overline{Ts} = \quad °F = \quad °R \ (°F + 460)$

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

$Ps = \quad$ in. Hg

$\overline{\sqrt{\Delta P}} =$

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts\ (°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

$Vs = \quad$ ft/s

$As = \quad ft^2$

$Qs = Vs \times As \times 60$ s/m

$Qs = \quad \times \quad \times 60$

$Qs = \quad$ acfm

$Qs_{std} = Qs \times 17.647 \times \frac{Ps}{Ts} \times (1 - \frac{\% H_2O}{100})$

$Qs_{std} = \quad \times 17.647 \times \frac{\quad}{\quad} \times (1 - \frac{\quad}{100})$

$Qs_{std} = \quad$ dscfm

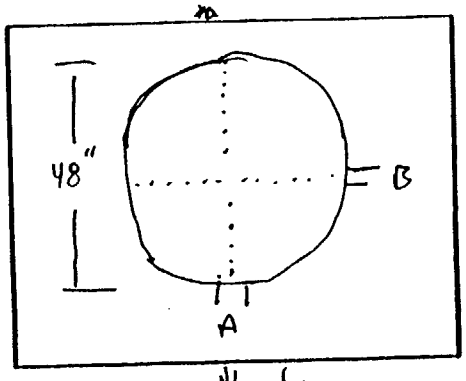
Ave Is 170
11 √ΔP .512

K = 0.975

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant ASPHALT PLANT "A"
Date 8-19-97
Sampling Location Inlet to bag house
Sample Type Dioxin & Furans
Run Number S-23-I-1
Operator ADD
Barometric Pressure (Pb) 29.90
Static Pressure (Pg) -2.5
Filter Number(s)
Pretest Leak Rate = 0.003 cfm @ 10" in. Hg
Pretest Pitot Leak Check 0.001
Pretest Orsat Leak Check
Read and Record all Data Every 5 Minutes
Page 1 of 2



Schematic of Traverse Point Layout

CO_2
O_2
CO
N_2

Condensers
V_l: Silica gel
Total H_2O

Probe Length and Type 6' Glass
Pitot Tube I.D. No. Dreco 5C
Nozzle I.D. .312
Assumed Moisture, % 25
Meter Box Number MS-4
Meter Δ H@ 1.818
Meter Gamma 1.021
Reference Δ p .512
Post Test Leak Rate = 0.003 cfm @ 20" in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (Δ P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg
		1 ~~7:05~~	696.812									5
A 1	0	1 4:15	696.812	0.33	~~1.27~~	1.8	231	231 / 253	67	89	84	7
		1	699.12	0.25	1.34	1.3	232	235 / 251	63	95	84	7
2	10	1 9:25	701.93	0.42	2.20	2.3	229	237 / 252	59	99	86	22
		1 4:32 ~~10:10~~	~~704.831~~	0.42	2.26	2.3	226	233 / 235	68	90	91	18
3	20	1 10:10	707.928									
		1										
4	30	1										
		1										
5	40	1										
		1										
6	50	1										
		1										
7	60	1										
		1										
8	70	1										
		1										
9	80	1										
		1										
10	90	1										
		1										
11	100	1										
		1										
12	110	1										

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

S-23-I-1

Plant: ASPHALT PLANT "A"		Run No.: #1 PBR
Sample Date: 8/19/97	Filter No.(s): —	Job No.: 5413,003
Sample Location: INLET		
Recovery Date: 8/19/97	XAD-2 Trap No.(s): S-23-I-1	
Sample Recovery Person:		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	433.5	474.1	699.8	703.9	594.4	888.7	g
Initial wt.	408.7	422.3	699.2	703.6	593.3	883.3	g
Net wt.	24.8	51.8	0.6	0.3	1.1	5.4	g

Description Total = ~~78.0~~ 84.0

Train System: —			
Probe: —			
Filter: Color - —	Loading - —		
Impinger Contents: —			
Silica Gel: @Grams Used - —	Color - —	% Spent - —	
Condensate Observed In Front Half: —			

Recovered Sample Fractions

Filter Container No. —	marked/sealed: —
XAD Module Container No.: —	marked/sealed: —
Probe (FH) & Back Half Rinse (Acetone) Container No.: —	Liquid level marked/sealed: —
Probe (FH) & Back Half Rinse (Toluene) Container No.: —	Liquid level marked/sealed: —
Impinger Contents Container No.: —	Liquid level marked/sealed: —
Impinger Rinse (Acetone/MeCl2) Container No.: —	Liquid level marked/sealed: —

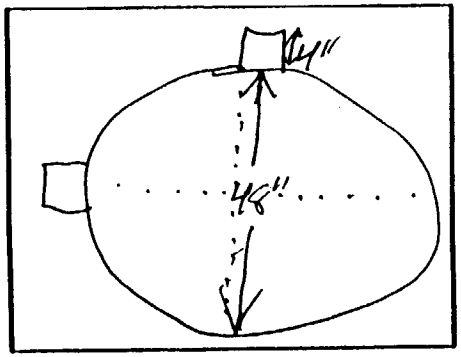
294.1
COND. 292.6

K Factor - 5.679 ATB

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: Asphalt Plant "A"
Date: 8-19-97
Sampling Location: Inlet to Baghouse
Sample Type: PM - Metals
Run Number: S29-I-1
Operator: ATB
Barometric Pressure (Pb): 29.90
Static Pressure (Ps): -2.5
Filter Number(s): M97-001 - (MAM)
Pretest Leak Rate = .005 cfm @ 10" in. Hg
Pretest Pitot Leak Check: ✓
Pretest Orsat Leak Check: ✓
Read and Record all Data Every 10 Minutes
Page ____ of ____



Schematic of Traverse Point Layout

CO_2				
O_2				
CO				
N_2				

Condensers
V_{lc}: Silica gel
Total H_2O

Probe Length and Type: 6' Glass
Pitot Tube I.D. No.: 52
Nozzle I.D.: ATB .311
Assumed Moisture, %: 26%
Meter Box Number: M5 #9
Meter Δ H@: 1.776
Meter Gamma: 1.016
Reference Δ p: .572
Post Test Leak Rate = .007 cfm @ 10" in. Hg
Post Test Pitot Leak Check: ✓
Post Test Orsat Leak Check:

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (Δ Ps) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m,in}$) °F	Dry Gas Meter Temp. Outlet ($T_{m,out}$) °F	Pump Vacuum in. Hg
	0 1 Start	105.740									
12	5 01 9:16	105.740	.23	1.20	1.20	230	233 / 260	51	91	88	2
	10 5 1	108.10	.22	1.09	1.10	233	235 / 255	50	93	88	5
11	15 101 9:30	111.20	.25	1.24	1.20	228	234 / 260	49	96	89	23
	20 151 10:05	113.35	.18	0.90	0.90	227	232 / 257	50	97	95	6
10	25 201 10:10	116.52	.				/				
	30 251						/				
9	35 301						/				
	40 351						/				
8	45 401						/				
	50 451						/				
7	55 501						/				
	60 551						/				
6	65 601						/				
	70 651						/				
5	75 701						/				
	80 751						/				
4	85 801						/				
	90 851						/				
3	95 901						/				
	100 951						/				
2	105 1001						/				
	110 1						/				
1							/				

Pb + 3

filter change

DO NOT COPY

MULT[illegible]MPLE RECOVERY DATA

Plant: Asphalt Plant "A"		Run No.: S29-I-1
Date: 8-19-97	Sample Box No.: —	Job No.: S413-003
Sample Location: Inlet		
Sample Type: Particulate / Metals		
Sample Recovery Person: Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-001 [redacted]	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	~~100~~	723.1	773.1	50.0
2	5% HNO_3 / 10% H_2O_2	100	704.7	723.1	18.4
3	5% HNO_3 / 10% H_2O_2	100	730.3	734.9	4.6
4	Empty	—	636.2	636.7	0.5
5	$KMnO_4$ / H_2SO_4	100	681.0	681.5	0.5
6	$KMnO_4$ / H_2SO_4	100	741.1	741.7	0.6
7	Silica Gel	200	786.8	791.0	4.2
Total					78.8 ✓

Comments:

Appendix B.2

Raw Field Data

Baghouse Outlet

GAS ANALYSIS DATA FORM

PLANT Asphalt Plant "A"

DATE 8/20/97 TEST NO 523/524-0-2

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Baghouse Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD CBAT

AMBIENT TEMPERATURE 85

OPERATOR TA

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.4	5.4	5.5	5.5			5.45	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.4	13.0	18.7	13.2			13.10	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS ANALYSIS DATA FORM

PLANT Asphalt Plant "A"

DATE 8-20-97 TEST NO M29-O-3

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD ORSAT®

AMBIENT TEMPERATURE 68°F

OPERATOR TA

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.0	5.0	5.2	5.2			5.1	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.2	13.2	18.2	13.0			13.1	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS ANALYSIS DATA FORM

PLANT Asphalt Plant "A"
DATE 8/21/97 TEST NO #4
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION OUTLET
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	3.2	3.2						44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	14.0 TOTAL 10.8	10.8 ✓						32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

VISIBLE EMISSIONS RECORD

RUN NO. 1A

SOURCE NAME: Baghouse Outlet

ADDRESS: Asphalt Plant "A"

1010 Rd (Cleveland Rd)

CITY | STATE: NC | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE:

CONTROL EQUIPMENT: baghouse | OPERATING MODE: normal

DESCRIBE EMISSION POINT
START: rectangular yellow stack STOP: same

HEIGHT ABOVE GROUND LEVEL
START: 29 ft STOP: same

HEIGHT RELATIVE TO OBSERVER
START: 0 STOP: same

DISTANCE FROM OBSERVER
START: ~450 ft STOP: same

DIRECTION FROM OBSERVER
START: WEST STOP: same

DESCRIBE EMISSIONS
START: condensation forming 5 ft after exit STOP: small amount of condensation

EMISSION COLOR
START: pale, yellow/white STOP:

PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES ☑

IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: 1 dia above exit (3ft) STOP: same

DESCRIBE BACKGROUND
START: trees STOP: same

BACKGROUND COLOR
START: green STOP:

SKY CONDITIONS
START: scattered STOP: same

WIND SPEED
START: 2-4 mph STOP:

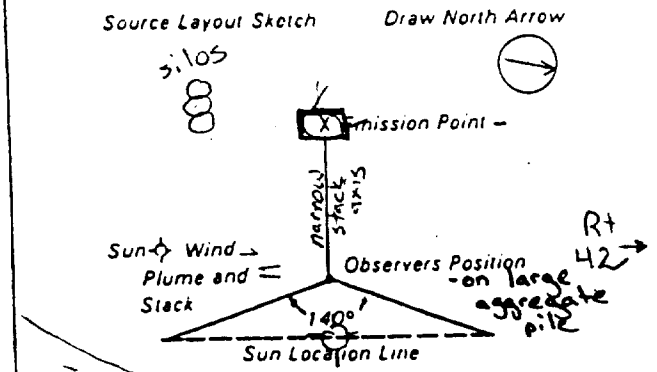
WIND DIRECTION
START: NW STOP: same

AMBIENT TEMP.
START: 77 STOP: 86

WET BULB TEMP.: 67

RH, percent: 59

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE: 8-19-97 | START TIME: 9:18 | STOP TIME: 11:06

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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2	0	0	0	5	32	0	0	0	0
3	0	0	5	5	33	5	0	0	5
4	0	0	0	5	34	0	5	0	0
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6	0	0	5	0	36	0	0	0	0
7	0	5	0	5	37	0	5	0	0
8	5	10	0	5	38	0	0	0	0
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10	5	5	5	0	40	0	0	0	0
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12	0	0	0	0	42	0	/	0	0
13	5	0	0	5	43	0	0	0	0
14	0	0	0	5	44	5	0	0	0
15	5	5	0	0	45	0	0	0	0
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18	0	5	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	5	0	50	0	0	0	0
21	5	0	0	5	51	0	0	0	0
22	10	5	0	0	52	0	5	0	0
23	0	0	5	0	53	5	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	5	0	0	0	56	5	0	0	5
27	/	5	0	0	57	5	0	0	0
28	/	0	0	0	58	0	0	0	0
29	0	5	5	0	59	5	0	0	0
30	0	0	0	5	60	0	0	0	0

- 1 min break

AVERAGE OPACITY FOR HIGHEST PERIOD: 3.54%

NUMBER OF READINGS ABOVE 5 % WERE: 3

RANGE OF OPACITY READINGS — MINIMUM: 0 MAXIMUM: 15

OBSERVER'S NAME (PRINT): David Goshaw

OBSERVER'S SIGNATURE: [signature] DATE: 8-19-97

ORGANIZATION: DEECO Inc

CERTIFIED BY: ETA DATE: 3/97

VERIFIED BY: DATE:

COMMENTS: / - indicates fugitive emissions

obstruction

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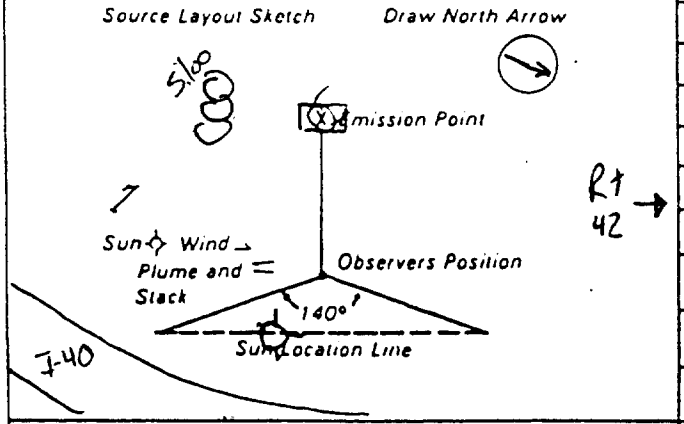
TITLE DATE

VISIBLE EMISSIONS RECORD

RUN NO. 1B

SOURCE NAME	Baghouse Exit
ADDRESS	Asphalt Plant "A"
	1010 Rd (Cleveland Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	baghouse
OPERATING MODE	normal
DESCRIBE EMISSION POINT START	yellow rectangular stack
DESCRIBE EMISSION POINT STOP	same
HEIGHT ABOVE GROUND LEVEL START	29 ft
HEIGHT ABOVE GROUND LEVEL STOP	same
HEIGHT RELATIVE TO OBSERVER START	0
HEIGHT RELATIVE TO OBSERVER STOP	same
DISTANCE FROM OBSERVER START	450 ft
DISTANCE FROM OBSERVER STOP	same
DIRECTION FROM OBSERVER START	WEST
DIRECTION FROM OBSERVER STOP	same
DESCRIBE EMISSIONS START	con'ng, condensating
DESCRIBE EMISSIONS STOP	same
EMISSION COLOR START	pale, yellow grey
EMISSION COLOR STOP	same
PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☑	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	~~23~~ 3 ft above exit
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	same
DESCRIBE BACKGROUND START	trees
DESCRIBE BACKGROUND STOP	same
BACKGROUND COLOR START	trees green
BACKGROUND COLOR STOP	same
SKY CONDITIONS START	scattered
SKY CONDITIONS STOP	same
WIND SPEED START	2
WIND SPEED STOP	same
WIND DIRECTION START	NW
WIND DIRECTION STOP	same
AMBIENT TEMP START	86
AMBIENT TEMP STOP	88
WET BULB TEMP.	68
RH, percent	38

Source Layout Sketch



OBSERVATION DATE	START TIME	STOP TIME
8-19-97	11:07	12:07

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	5	0	0	/	31	0	0	0	/
2	/	/	0	0	32	0	0	5	0
3	0	0	0	0	33	0	0	0	/
4	0	5	0	0	34	5	0	0	0
5	5	5	5	0	35	0	0	0	0
6	0	0	0	/	36	0	0	0	0
7	5	0	0	0	37	0	5	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	/	0	5	0	41	10	0	5	0
12	0	0	5	5	42	5	0	/	/
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14	0	0	5	0	44	0	0	0	0
15	0	/	0	0	45	5	5	0	0
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17	0	0	5	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	5	0	0	/	49	0	5	0	0
20	0	0	0	/	50	0	0	0	5
21	0	0	0	5	51	0	5	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	5	0	0	0
24	5	0	0	0	54	0	5	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	5	56	0	5	0	0
27	0	0	/	/	57	0	0	0	0
28	0	0	0	0	58	0	5	0	5
29	0	5	0	0	59	0	0	0	5
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	1.67%
NUMBER OF READINGS ABOVE 5 % WERE	1
RANGE OF OPACITY READINGS MINIMUM	0
RANGE OF OPACITY READINGS MAXIMUM	10
OBSERVER'S NAME (PRINT)	David Goshaw
OBSERVER'S SIGNATURE	
DATE	8-19-97
ORGANIZATION	DEECO Inc
CERTIFIED BY	ETA
DATE	3/97
VERIFIED BY	
DATE	

COMMENTS / - fugitive obstruction omission

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TITLE

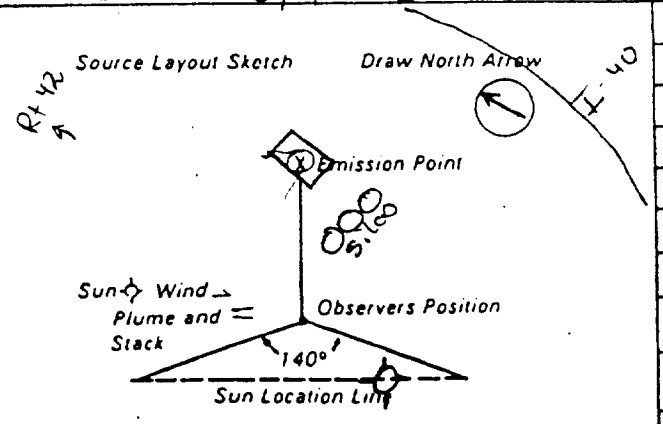
DATE

VISIBLE EMISSIONS RECORD

RUN NO. 1c

SOURCE NAME	Baghouse Exit
ADDRESS	Asphalt Plant "A"
	1010 Rd (Cleveland Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	BAGHOUSE
OPERATING MODE	NORMAL
DESCRIBE EMISSION POINT	START rectangular yellow stack STOP same
HEIGHT ABOVE GROUND LEVEL	START 29 ft STOP same
HEIGHT RELATIVE TO OBSERVER	START 29 ft STOP same
DISTANCE FROM OBSERVER	START 300 ft STOP same
DIRECTION FROM OBSERVER	START NE STOP same
DESCRIBE EMISSIONS	START coning STOP same
EMISSION COLOR	START light grey STOP same
PLUME TYPE: CONTINUOUS ☑	FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT:	NO ☐ YES ☑
IF WATER DROPLET PLUME:	ATTACHED ☐ DETACHED ☑
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 3 ft above exit STOP same
DESCRIBE BACKGROUND	START trees STOP same
BACKGROUND COLOR	START green STOP same
SKY CONDITIONS	START scattered STOP same
WIND SPEED	START 2-3 mph STOP same
WIND DIRECTION	START NW STOP same
AMBIENT TEMP.	START 88 STOP 89
WET BULB TEMP.	68
RH, percent	34

Source Layout Sketch



OBSERVATION DATE	START TIME *	STOP TIME
8-19-97	13:04	14:04

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4	0	0	5	/	34	/	0	0	/
5	0	5	0	5	35	0	5	5	0
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9	0	0	0	/	39	0	5	0	5
10	/	5	5	0	40	5	/	5	/
11	/	0	5	0	41	5	0	0	0
12	5	5	5	0	42	5	10	5	/
13	0	0	0	5	43	/	5	0	5
14	/	/	/	0	44	5	0	5	10
15	0	/	5	0	45	5	0	5	0
16	/	5	0	0	46	0	5	0	5
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18	0	0	5	0	48	0	5	0	5
19	0	5	5	/	49	0	5	5	5
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22	0	5	/	/	52	0	5	0	5
23	/	5	5	0	53	5	0	5	0
24	0	5	5	0	54	5	0	/	0
25	0	0	5	5	55	5	0	0	0
26	0	5	5	0	56	0	5	0	5
27	5	0	0	0	57	5	/	5	/
28	5	5	5	/	58	/	0	0	5
29	0	5	0	0	59	5	5	10	5
30	0	0	5	0	60	0	5	5	5

AVERAGE OPACITY FOR HIGHEST PERIOD 3.5% ~~3.5%~~ — NUMBER OF READINGS ABOVE 5 % WERE 7

RANGE OF OPACITY READINGS — MINIMUM 0 — MAXIMUM 10

OBSERVER'S NAME (PRINT) David Goshaw

OBSERVER'S SIGNATURE — DATE 8-19-97

ORGANIZATION DEECO Inc

CERTIFIED BY ETA — DATE 3/97

VERIFIED BY — DATE

COMMENTS 1 - interference from fugitive source

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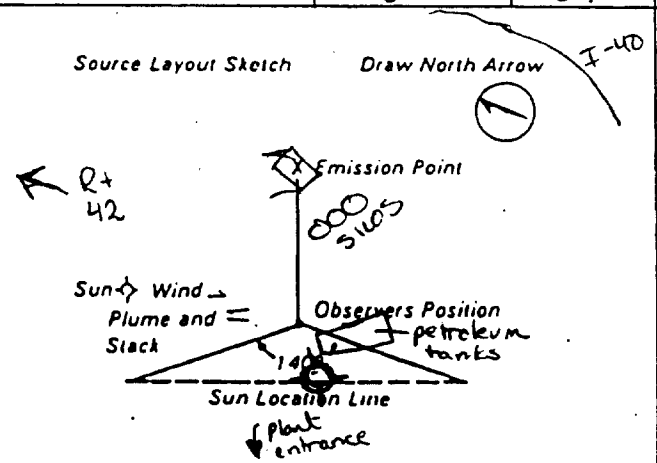
VISIBLE EMISSIONS RECORD

RUN NO. 1D

SOURCE NAME	Baghouse Exit
ADDRESS	ASPHALT PLANT "A"
	1010 Rd (Cleveland Corp. Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT START	rectangular yellow stack STOP same
HEIGHT ABOVE GROUND LEVEL START	29ft STOP same
HEIGHT RELATIVE TO OBSERVER START	29 ft STOP same
DISTANCE FROM OBSERVER START	300ft STOP same
DIRECTION FROM OBSERVER START	NE STOP same
DESCRIBE EMISSIONS START	coning STOP same
EMISSION COLOR START	light grey STOP same
PLUME TYPE: CONTINUOUS ☑	FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ☐ YES ☑	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	3 ft above exit STOP same
DESCRIBE BACKGROUND START	Trees STOP same
BACKGROUND COLOR START	green STOP same
SKY CONDITIONS START	scattered STOP same
WIND SPEED START	1-2 mph STOP same
WIND DIRECTION START	NW STOP same
AMBIENT TEMP. START	88 STOP 88
WET BULB TEMP.	68
RH.percent	34

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE: 8-19-97 | START TIME: 14:12 | STOP TIME: 15:12

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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3	0	5	0	10	33	5	/	0	5
4	0	5	0	0	34	0	5	5	0
5	5	5	0	0	35	/	5	10	5
6	0	0	/	0	36	0	5	5	5
7	/	0	5	5	37	/	/	/	/
8	/	5	0	0	38	5	5	5	5
9	/	5	0	5	39	5	0	5	5
10	5	0	5	5	40	0	5	0	0
11	0	0	/	/	41	0	0	5	5
12	5	5	0	5	42	0	0	0	5
13	5	5	5	5	43	5	0	0	0
14	/	/	/	5	44	0	5	5	5
15	5	5	0	/	45	5	5	5	5
16	5	0	5	0	46	0	5	0	5
17	/	5	5	0	47	0	5	5	0
18	5	0	5	/	48	5	5	0	5
19	/	/	5	5	49	5	5	5	5
20	10	0	5	0	50	5	5	5	5
21	/	5	5	5	51	10	10	10	10
22	5	5	5	5	52	5	/	/	/
23	5	5	/	5	53	5	5	5	10
24	5	5	/	/	54	5	10	10	5
25	/	/	0	5	55	5	5	5	5
26	0	5	0	5	56	5	0	5	5
27	10	5	0	5	57	5	5	5	5
28	5	0	5	0	58	/	/	5	5
29	5	5	0	0	59	5	5	5	5
30	5	5	0	0	60	0	5	0	5

AVERAGE OPACITY FOR HIGHEST PERIOD 6.46% ~~6.45~~ | NUMBER OF READINGS ABOVE 5 % WERE 11

RANGE OF OPACITY READINGS MINIMUM 0 MAXIMUM 10

OBSERVER'S NAME (PRINT) David Goshaw

OBSERVER'S SIGNATURE [signature] DATE 8-19-97

ORGANIZATION DEECO Inc

CERTIFIED BY ETA DATE 3/97

COMMENTS: / fugitive interference

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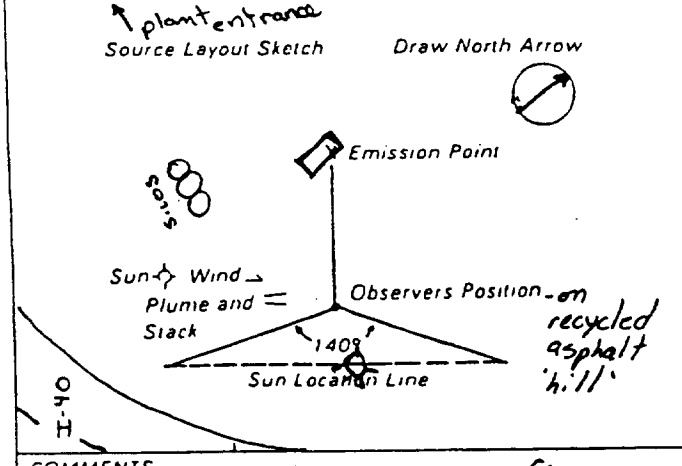
2A

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit
ADDRESS: Asphalt Plant "A"
1010 Rd (Cleveland Rd)
CITY:
STATE: NC
ZIP:
PHONE:
SOURCE ID NUMBER:
PROCESS EQUIPMENT: aggregate dryer
OPERATING MODE:
CONTROL EQUIPMENT: baghouse
OPERATING MODE: normal
DESCRIBE EMISSION POINT: START yellow rectangular stack STOP same
HEIGHT ABOVE GROUND LEVEL: START 29 ft STOP same
HEIGHT RELATIVE TO OBSERVER: START -3 ft STOP same
DISTANCE FROM OBSERVER: START 475 ft STOP same
DIRECTION FROM OBSERVER: START NW STOP same
DESCRIBE EMISSIONS: START coming/condensating STOP same
EMISSION COLOR: START light gray STOP same
PLUME TYPE: CONTINUOUS ■ FUGITIVE ☑ INTERMITTENT ☑
WATER DROPLETS PRESENT: NO ☐ YES ☑
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 3 ft above exit STOP same
DESCRIBE BACKGROUND: START trees STOP same
BACKGROUND COLOR: START green STOP same
SKY CONDITIONS: START broken STOP overcast
WIND SPEED: START 0-1 mph STOP 2-5 mph
WIND DIRECTION: START North STOP N
AMBIENT TEMP: START 74 STOP 79
WET BULB TEMP.: 66
RH, percent: 65



COMMENTS: small intermittent opacity "puffs" every few minutes for ~1 second

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SIGNATURE
TITLE
DATE

OBSERVATION DATE: 8-20-97
START TIME: 8:24
STOP TIME: 9:24

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	—	5	0	0
2	0	0	0	5	32	—	0	—	0
3	0	0	5	0	33	0	0	5	0
4	0	0	0	0	34	0	0	5	0
5	5	5	0	0	35	5	0	0	0
6	0	0	0	0	36	0	0	0	5
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14	5	0	—	0	44	0	0	0	5
15	—	0	0	0	45	0	0	5	5
16	0	0	0	0	46	10	0	0	0
17	0	0	5	0	47	0	5	0	0
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19	0	0	0	0	49	—	—	0	0
20	0	0	0	0	50	0	0	0	0
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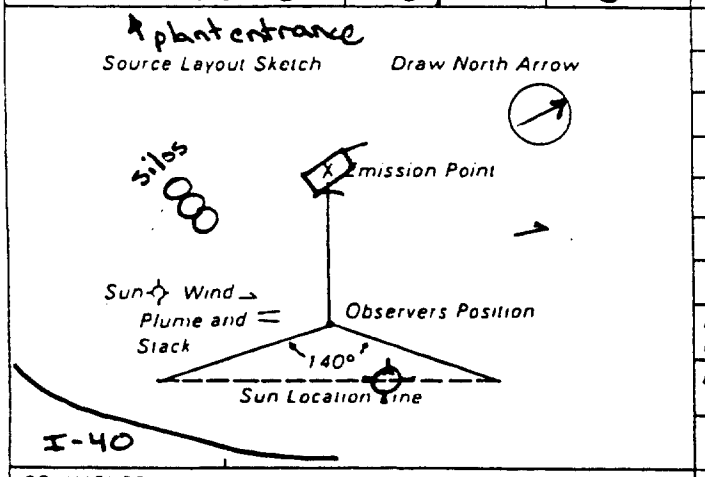
23	5	0	0	0	53	0	0	0	0
24	0	0	0	0	54	—	—	0	0
25	0	0	0	5	55	0	0	0	0
26	0	0	0	0	56	5	0	—	0
27	0	0	5	0	57	0	0	0	5
28	0	0	0	0	58	0	0	5	0
29	—	—	0	—	59	0	0	5	0
30	—	0	0	5	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 1.46%
NUMBER OF READINGS ABOVE 5 % WERE: 1
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 10
OBSERVER'S NAME (PRINT): David Goshaw
OBSERVER'S SIGNATURE:
DATE: 8-20-97
ORGANIZATION: DEECO Inc
CERTIFIED BY: ETA
DATE: 3-97
VERIFIED BY:
DATE:

2B

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit	OBSERVATION DATE: 8-20-97
ADDRESS: Asphalt Plant "A" 1010 Rd (Cleveland Rd)	START TIME: 9:30
CITY:	STATE: NC ZIP:
PHONE:	SOURCE ID NUMBER:
PROCESS EQUIPMENT: aggregate dryer	OPERATING MODE:
CONTROL EQUIPMENT: baghouse	OPERATING MODE: normal
DESCRIBE EMISSION POINT START: Yellow rectangular stack STOP: same	
HEIGHT ABOVE GROUND LEVEL START: 29 ft STOP: same	HEIGHT RELATIVE TO OBSERVER START: -3 ft STOP: same
DISTANCE FROM OBSERVER START: 475 ft STOP: same	DIRECTION FROM OBSERVER START: NW STOP: same
DESCRIBE EMISSIONS START: coning STOP: same	
EMISSION COLOR START: light gray STOP:	PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☑
WATER DROPLETS PRESENT: NO ☐ YES ☑	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START: 2-3 ft above exit STOP: same	
DESCRIBE BACKGROUND START: trees STOP: same	
BACKGROUND COLOR START: green STOP: same	SKY CONDITIONS START: overcast STOP: same
WIND SPEED START: 1-5 mph STOP: same	WIND DIRECTION START: North STOP: same
AMBIENT TEMP START: 79 STOP: 83	WET BULB TEMP.: 69 RH, percent: 60



SEC / MIN	0	15	30	45
1	0	0	0	0
2	0	0	5	0
3	—	0	0	0
4	0	0	0	0
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6	0	0	0	5
7	0	0	0	0
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9	0	0	0	0
10	5	0	0	0
11	0	—	—	—
12	—	0	0	0
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25	—	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	5

SEC / MIN	0	15	30	45
31	—	0	0	10
32	0	5	0	0
33	0	0	0	0
34	0	0	5	0
35	0	0	0	0
36	0	0	10	—
37	0	5	0	0
38	15	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	10	0	0
44	0	10	—	0
45	5	10	0	5
46	0	0	0	0
47	10	0	0	5
48	0	0	0	0
49	0	—	5	10
50	0	10	0	5
51	0	5	0	0
52	0	0	5	0
53	0	0	0	5
54	5	0	0	0
55	0	0	0	0
56	0	0	0	5
57	0	0	10	0
58	15	0	0	0
59	5	—	5	0
60	0	10	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD ~~2.75~~	NUMBER OF READINGS ABOVE 5 % WERE 14
RANGE OF OPACITY READINGS MINIMUM 0	MAXIMUM 15
OBSERVER'S NAME (PRINT): David Goshaw	
OBSERVER'S SIGNATURE:	DATE: 8-20-97
ORGANIZATION: DEECO Inc	
CERTIFIED BY: ETA	DATE: 3-97
VERIFIED BY:	DATE:

COMMENTS: - indicates obstruction of reading opacity (from condensation switching or fugitive)

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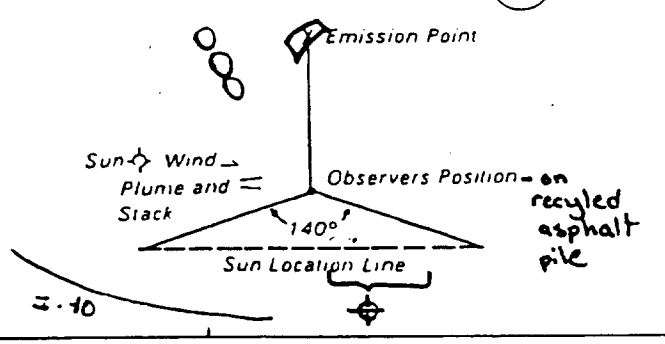
NOTE: intermittent opacity "puffs" for ~1 second

2c

Visible Emission Observation Form

SOURCE NAME	Baghouse Exit
ADDRESS	Asphalt Plant "A"
	1010 Rd, (Cleveland Corp. Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	baghouse
OPERATING MODE	normal
DESCRIBE EMISSION POINT	START rectangular yellow stack STOP same
HEIGHT ABOVE GROUND LEVEL	START 29ft STOP same
HEIGHT RELATIVE TO OBSERVER	START ~3ft STOP same
DISTANCE FROM OBSERVER	START ~475ft STOP same
DIRECTION FROM OBSERVER	START NW STOP same
DESCRIBE EMISSIONS	START coning STOP same
EMISSION COLOR	START light grey STOP same
PLUME TYPE	CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☑
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 4ft above exit STOP same
DESCRIBE BACKGROUND	START trees STOP same
BACKGROUND COLOR	START green STOP same
SKY CONDITIONS	START overcast STOP same
WIND SPEED	START 2-6 mph STOP same
WIND DIRECTION	START North STOP same
AMBIENT TEMP	START 83 STOP same
WET BULB TEMP.	70
RH, percent	52

Source Layout Sketch — plant entrance — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-20-97	10:35	11:35

SEC / MIN	0	15	30	45	MIN	0	15	30	45
1	0	5	—	0	31	15	0	0	0
2	—	0	0	10	32	0	10	0	20
3	0	—	—	—	33	0	—	0	0
4	—	0	0	15	34	0	10	0	5
5	0	0	5	0	35	0	5	0	0
6	0	—	0	0	36	0	—	0	0
7	0	0	0	15	37	0	0	0	—
8	0	—	0	—	38	0	0	0	0
9	0	0	0	0	39	10	0	0	0
10	0	0	15	0	40	0	0	5	0
11	0	5	0	0	41	0	0	10	0
12	—	0	0	0	42	0	0	0	0
13	0	0	0	0	43	—	0	5	0
14	0	0	5	0	44	0	0	15	0
15	—	0	0	0	45	—	—	0	0
16	0	0	5	0	46	0	0	—	—
17	0	0	0	0	47	0	0	—	0
18	0	0	—	0	48	0	0	10	0
19	—	0	5	0	49	0	0	0	0
20	10	0	0	0	50	0	0	0	5
21	0	0	0	10	51	5	10	5	0
22	0	—	—	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	—
24	0	0	5	0	54	0	0	0	—
25	—	0	0	0	55	0	0	—	0
26	0	0	—	5	56	0	0	0	—
27	0	0	0	0	57	0	15	0	0
28	5	0	0	10	58	0	0	0	—
29	0	0	10	0	59	0	0	—	0
30	0	10	0	0	60	0	10	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	3.75%
NUMBER OF READINGS ABOVE % WERE	
RANGE OF OPACITY READINGS MINIMUM	0
MAXIMUM	20
OBSERVER'S NAME (PRINT)	David Goshaw
OBSERVER'S SIGNATURE	
DATE	8-20-97
ORGANIZATION	DEECO Inc
CERTIFIED BY	ETA
DATE	3-97
VERIFIED BY	
DATE	

COMMENTS: intermittent opacity "puffs" for ~1 second account for 5-15% opacity readings

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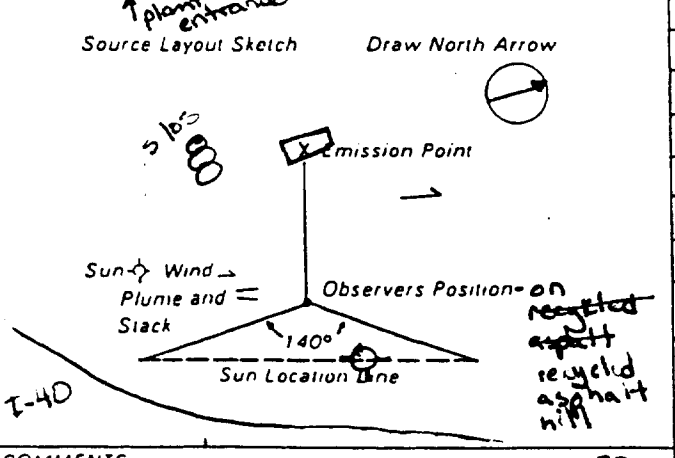
TITLE
DATE

Visible Emission Observation Form

3 20

SOURCE NAME: Baghouse Exit
ADDRESS: Asphalt Plant "A"
1010 Rd (Cleveland Rd)
CITY: | STATE: NC | ZIP:
PHONE: | SOURCE ID NUMBER:
PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE:
CONTROL EQUIPMENT: baghouse | OPERATING MODE: Normal
DESCRIBE EMISSION POINT: START yellow rectangular stack STOP same
HEIGHT ABOVE GROUND LEVEL: START 29 ft STOP same | HEIGHT RELATIVE TO OBSERVER: START - 3 ft STOP same
DISTANCE FROM OBSERVER: START 475 ft STOP same | DIRECTION FROM OBSERVER: START NW STOP same
DESCRIBE EMISSIONS: START coming STOP same
EMISSION COLOR: START light grey STOP | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☑
WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4 ft above exit STOP same
DESCRIBE BACKGROUND: START trees STOP same
BACKGROUND COLOR: START green STOP same | SKY CONDITIONS: START overcast STOP broken
WIND SPEED: START 5-10 mph STOP 5-10 mph | WIND DIRECTION: START NW STOP NW
AMBIENT TEMP: START 83 STOP 84 | WET BULB TEMP: 71 | RH, percent: 55

Source Layout Sketch



SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	—	0	31	0	0	0	0
2	0	—	—	0	32	—	0	15	5
3	0	0	0	—	33	0	0	0	0
4	0	—	0	—	34	0	0	0	0
5	0	0	0	0	35	0	0	5	0
6	10	0	0	0	36	0	—	0	15
7	5	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	10	—	39	15	0	15	—
10	0	—	0	—	40	0	0	0	0
11	0	0	0	—	41	0	0	0	0
12	0	0	0	0	42	5	—	0	0
13	0	0	0	0	43	0	0	5	0
14	5	0	0	0	44	0	0	0	10
15	0	15	10	0	45	10	0	0	0
16	—	0	0	—	46	0	0	0	0
17	—	5	5	0	47	5	—	0	0
18	0	10	0	0	48	—	0	0	0
19	0	0	0	0	49	0	—	0	0
20	0	0	0	0	50	0	0	—	0
21	—	—	5	0	51	0	0	0	0
22	0	0	0	—	52	0	0	0	0
23	0	0	0	15	53	0	0	0	0
24	0	10	10	15	54	5	0	10	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	—	56	0	0	0	0
27	0	5	0	0	57	0	0	0	0
28	0	0	—	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	—	15	0	—	60	0	—	—	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 2.92% | NUMBER OF READINGS ABOVE % WERE:
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 15
OBSERVER'S NAME (PRINT): David Goshaw
OBSERVER'S SIGNATURE: | DATE: 8-20-97
ORGANIZATION: DEFCO Inc
CERTIFIED BY: ETA | DATE: 3-16-97
VERIFIED BY: | DATE:

COMMENTS: intermittent opacity cycles of < 30 sec for ~ 1 second

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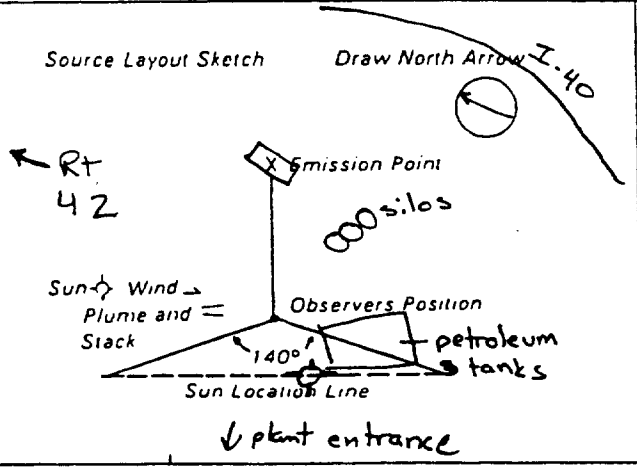
3A

Visible Emission Observation Form

SOURCE NAME	Baghouse Exit
ADDRESS	ASPHALT PLANT "A"
	1010 Rd (Cleveland Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	baghouse
OPERATING MODE	Normal
DESCRIBE EMISSION POINT START	rectangular yellow stack STOP same
HEIGHT ABOVE GROUND LEVEL START	29 ft STOP same
HEIGHT RELATIVE TO OBSERVER START	29 ft STOP same
DISTANCE FROM OBSERVER START	300 ft STOP same
DIRECTION FROM OBSERVER START	NE STOP same
DESCRIBE EMISSIONS START	coming STOP same
EMISSION COLOR START	light gray STOP
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☑	
WATER DROPLETS PRESENT: NO ☑ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	3ft above exit STOP same
DESCRIBE BACKGROUND START	trees STOP same
BACKGROUND COLOR START	green STOP same
SKY CONDITIONS START	overcast STOP same
WIND SPEED START	2-7 mph STOP
WIND DIRECTION START	NW STOP same
AMBIENT TEMP START	93 STOP 93
WET BULB TEMP.	94
RH,percent	42

Source Layout Sketch



OBSERVATION DATE	START TIME	STOP TIME
8-20-97	14:05	15:05

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	—	5	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	5	0	0	0	34	0	5	0	0
5	0	0	0	0	35	10	0	0	0
6	0	5	0	0	36	0	0	0	0
7	—	0	0	0	37	—	0	0	—
8	0	0	5	0	38	15	0	10	0
9	0	0	5	—	39	0	0	0	0
10	0	5	0	0	40	0	0	0	0
11	0	10	—	0	41	0	0	—	0
12	0	0	0	10	42	0	0	0	0
13	0	0	0	0	43	0	0	5	—
14	0	0	15	0	44	0	0	10	0
15	0	0	0	10	45	0	5	0	0
16	0	0	0	—	46	0	0	0	0
17	0	—	0	0	47	0	0	0	0
18	—	10	0	0	48	0	0	0	0
19	0	0	0	0	49	5	0	0	0
20	5	0	0	0	50	—	0	0	0
21	0	—	0	10	51	0	0	0	—
22	0	0	5	0	52	0	0	0	0
23	0	0	0	0	53	5	0	0	0
24	0	0	0	5	54	0	5	0	5
25	0	5	0	0	55	0	0	10	0
26	0	0	0	0	56	—	0	0	0
27	0	0	5	0	57	0	0	0	0
28	0	0	0	0	58	5	0	0	0
29	0	10	0	0	59	0	0	0	0
30	0	0	0	0	60	0	5	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	2.29%
NUMBER OF READINGS ABOVE 5 % WERE	12
RANGE OF OPACITY READINGS MINIMUM	0
MAXIMUM	15
OBSERVER'S NAME (PRINT)	David Goshow
OBSERVER'S SIGNATURE	
DATE	8-20-97
ORGANIZATION	DEECO Inc
CERTIFIED BY	ETA
DATE	3/97
VERIFIED BY	
DATE	
COMMENTS	
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TITLE	
DATE	

3B

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit

ADDRESS: Asphalt Plant "A"

1010 Rd (Cleveland Rd)

CITY: | STATE: NC | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE:

CONTROL EQUIPMENT: baghouse | OPERATING MODE: normal

DESCRIBE EMISSION POINT
START yellow rectangular stack STOP same

HEIGHT ABOVE GROUND LEVEL: START 29 ft STOP same | HEIGHT RELATIVE TO OBSERVER: START 29 ft STOP same

DISTANCE FROM OBSERVER: START 300 ft STOP same | DIRECTION FROM OBSERVER: START NE STOP same

DESCRIBE EMISSIONS
START coming ~~smoke~~ STOP same

EMISSION COLOR: START light grey STOP same | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☒

WATER DROPLETS PRESENT: NO ☒ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START 3 ft above exit STOP same

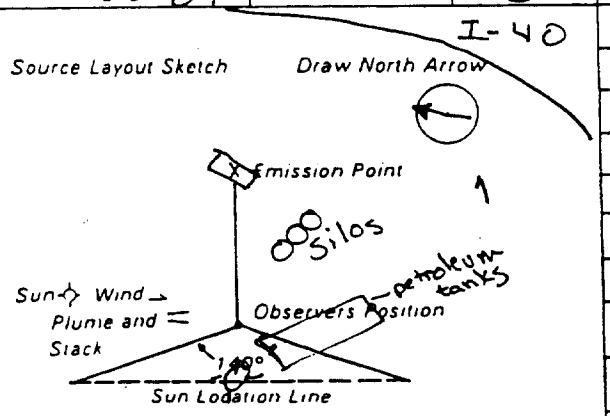
DESCRIBE BACKGROUND
START trees STOP same

BACKGROUND COLOR: START green STOP same | SKY CONDITIONS: START overcast STOP ~~same~~ broken

WIND SPEED: START 2-8 mph STOP ~~same~~ 3 mph | WIND DIRECTION: START NNE STOP same

AMBIENT TEMP: START 73 STOP 84 | WET BULB TEMP.: 74 | RH, percent: 42

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-20-97	15:10	16:10

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	5	0	0	31	0	0	0	0
2	10	—	0	5	32	0	0	0	0
3	0	0	0	10	33	0	—	0	0
4	0	0	0	—	34	—	0	5	0
5	0	0	5	0	35	0	0	5	0
6	0	0	0	0	36	—	5	5	0
7	0	0	—	0	37	0	0	0	0
8	0	5	0	—	38	0	0	0	0
9	0	0	0	→	39	0	0	0	0
10	—	0	0	0	40	5	0	0	0
11	0	0	10	0	41	0	0	0	0
12	5	0	0	0	42	0	0	0	10
13	—	—	—	5	43	0	0	0	0
14	0	0	0	—	44	—	—	—	—
15	5	0	0	—	45	—	—	0	0
16	0	0	0	0	46	0	0	0	5
17	0	0	0	0	47	0	0	—	0
18	5	—	—	0	48	—	—	0	10
19	0	—	15	0	49	0	0	0	0
20	0	0	0	0	50	0	10	0	0
21	0	0	0	0	51	0	—	0	0
22	5	10	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	5	0	0	—
25	0	0	0	0	55	—	0	0	5
26	0	10	—	—	56	—	0	0	0
27	—	—	—	—	57	0	0	0	0
28	0	5	0	0	58	5	0	0	0
29	0	0	0	—	59	0	10	0	0
30	0	—	0	0	60	0	0	—	5

AVERAGE OPACITY FOR HIGHEST PERIOD: 1.46% | NUMBER OF READINGS ABOVE 5 % WERE: 10

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 15

OBSERVER'S NAME (PRINT): David Goshaw

OBSERVER'S SIGNATURE: | DATE: 8-20-97

ORGANIZATION: DEECO Inc

CERTIFIED BY: ETA | DATE: 3/97

VERIFIED BY: | DATE:

COMMENTS

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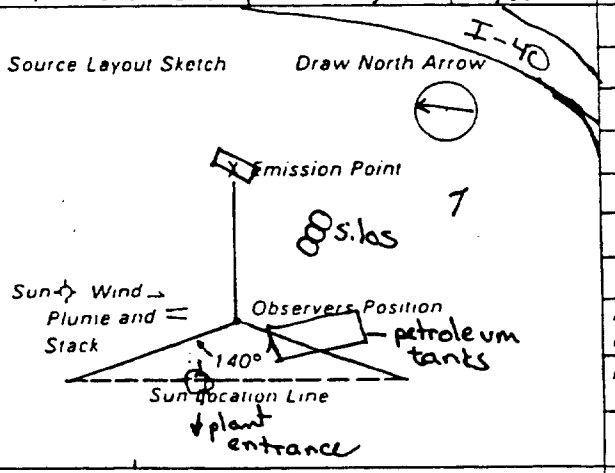
SIGNATURE
TITLE | DATE

3c

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit
ADDRESS: Asphalt Plant "A"
1010 Rd (Cleveland Rd)
CITY: | STATE: NC | ZIP:
PHONE: | SOURCE ID NUMBER:
PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE:
CONTROL EQUIPMENT: baghouse | OPERATING MODE: normal
DESCRIBE EMISSION POINT: START yellow rectangular stack STOP same
HEIGHT ABOVE GROUND LEVEL: START 29 ft STOP same | HEIGHT RELATIVE TO OBSERVER: START 29 ft STOP same
DISTANCE FROM OBSERVER: START 300 ft STOP same | DIRECTION FROM OBSERVER: START NE STOP same
DESCRIBE EMISSIONS: START coning STOP same
EMISSION COLOR: START light grey STOP | PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☑
WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 3-5 ft above exit STOP same
DESCRIBE BACKGROUND: START trees STOP same
BACKGROUND COLOR: START green STOP same | SKY CONDITIONS: START broken STOP same
WIND SPEED: START 3-5 mph STOP 1-3 mph | WIND DIRECTION: START E STOP same
AMBIENT TEMP: START 91 STOP 84 | WET BULB TEMP: 73 | RH, percent: 42

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE: 8-20-97 | START TIME: 16:15 | STOP TIME: 17:20

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	—	31	0	0	0	0
2	0	—	0	0	32	0	0	0	0
3	0	5	0	0	33	0	0	0	0
4	0	0	—	—	34	0	0	0	0
5	0	0	—	0	35	0	0	0	—
6	0	—	5	0	36	5	0	0	0
7	0	0	0	0	37	0	0	—	—
8	5	0	0	—	38	—	0	0	0
9	0	—	0	0	39	10	0	0	10
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	10	—	—	0
12	5	0	0	5	42	—	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	—	—	—	44	0	—	—	0
15	0	0	—	10	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	—	47	0	0	—	10
18	0	0	—	—	48	5	—	0	0
19	—	5	0	0	49	0	0	0	—
20	0	0	0	0	50	0	—	—	0
21	0	0	0	0	51	0	0	5	0
22	0	0	0	10	52	0	0	5	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	5	5	0	55	0	0	0	0
26	0	0	0	0	56	0	5	0	0
27	—	0	5	0	57	0	0	0	0
28	0	0	0	0	58	0	—	0	0
29	0	0	0	5	59	—	0	0	0
30	0	0	0	—	60	0	5	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 1.46% | NUMBER OF READINGS ABOVE 5 % WERE: 6
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 10
OBSERVER'S NAME (PRINT): David Goshaw
OBSERVER'S SIGNATURE: | DATE: 8-20-97
ORGANIZATION: DEECO Inc
CERTIFIED BY: ETA | DATE: 3/97
VERIFIED BY: | DATE:

COMMENTS:

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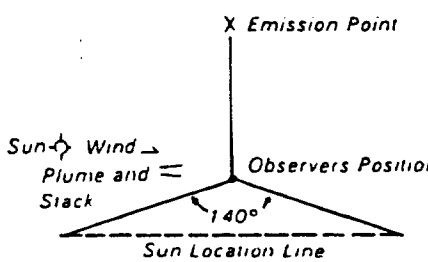
SIGNATURE | TITLE | DATE

3D

Visible Emission Observation Form

SOURCE NAME	Baghouse Exit
ADDRESS	Asphalt Plant "A"
	1010 Rd Cckeveland Rd
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	normal
DESCRIBE EMISSION POINT	START yellow rectangular stack STOP same
HEIGHT ABOVE GROUND LEVEL	START 29 ft STOP same
HEIGHT RELATIVE TO OBSERVER	START 29 ft STOP same
DISTANCE FROM OBSERVER	START 300 ft STOP same
DIRECTION FROM OBSERVER	START NE STOP same
DESCRIBE EMISSIONS	START coming STOP same
EMISSION COLOR	START light grey STOP
PLUME TYPE: CONTINUOUS ☐	FUGITIVE ☐ INTERMITTENT ☑
WATER DROPLETS PRESENT:	NO ☑ YES ☐
IF WATER DROPLET PLUME:	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 3-5 ft above exit STOP same
DESCRIBE BACKGROUND	START trees STOP same
BACKGROUND COLOR	START green STOP same
SKY CONDITIONS	START overcast STOP same
WIND SPEED	START 1-3 mph STOP 5-12 mph
WIND DIRECTION	START East STOP swirling
AMBIENT TEMP	START 84 STOP 84
WET BULB TEMP.	71
RH.percent	52

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-20-97	17:22	17:42

MIN	SEC 0	15	30	45	MIN	SEC 0	15	30	45
1	0	0	0	0	31				
2	0	-	5	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	5	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	5	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	5	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	—	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	—	—	*		50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	David Goshaw
OBSERVER'S SIGNATURE	DATE 8-20-97
ORGANIZATION	DEECO Inc
CERTIFIED BY	ETA — DATE 3/97
VERIFIED BY	DATE

COMMENTS: thundercast skies created reduction in light.

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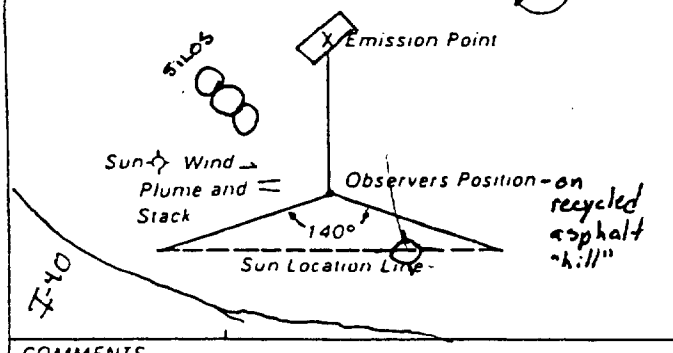
TITLE — DATE

Visible Emission Observation Form

9 4A

SOURCE NAME	Baghouse Exit
ADDRESS	Asphalt Plant "A"
	1010 Rd (Calevend Rd)
CITY	
STATE	NC
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	aggregate dryer
OPERATING MODE	
CONTROL EQUIPMENT	baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT START	yellow rectangular stack STOP same
HEIGHT ABOVE GROUND LEVEL START	29 ft STOP same
HEIGHT RELATIVE TO OBSERVER START	- 3 ft STOP same
DISTANCE FROM OBSERVER START	475 ft STOP same
DIRECTION FROM OBSERVER START	NW STOP same
DESCRIBE EMISSIONS START	coning, condensating STOP ~~same~~ coning
EMISSION COLOR START	light grey STOP same
PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☑	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	2-3 ft above exit STOP 3-5 ft above exit
DESCRIBE BACKGROUND START	trees STOP same
BACKGROUND COLOR START	green STOP same
SKY CONDITIONS START	scattered STOP clear
WIND SPEED START	0-2 mph STOP 0-2 mph
WIND DIRECTION START	NE STOP same
AMBIENT TEMP START	71 STOP 75
WET BULB TEMP.	66
RH, percent	77

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-21-97	7:41	8:41

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	5	0	35	0	0	0	0
6	0	0	0	0	36	0	0	5	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	5
9	0	0	0	0	39	0	0	0	0
10	0	—	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	5	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	5	0	0
19	0	0	0	5	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	5	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	0.42%
NUMBER OF READINGS ABOVE	0 % WERE 5
RANGE OF OPACITY READINGS MINIMUM	0
MAXIMUM	5
OBSERVER'S NAME (PRINT)	David Goshaw
OBSERVER'S SIGNATURE	
DATE	8-21-97
ORGANIZATION	DEECO Inc
CERTIFIED BY	ETA
DATE	8/97
VERIFIED BY	
DATE	
COMMENTS	
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TITLE	
DATE	

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit

ADDRESS: Asphalt Plant "A"

1010 Rd (Cleveland Rd)

CITY | STATE: NC | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE

CONTROL EQUIPMENT: baghouse | OPERATING MODE

DESCRIBE EMISSION POINT
START: yellow rectangular stack STOP: same

HEIGHT ABOVE GROUND LEVEL
START: 29 ft STOP: same

HEIGHT RELATIVE TO OBSERVER
START: - 3 ft STOP: same

DISTANCE FROM OBSERVER
START: 475 ft STOP: same

DIRECTION FROM OBSERVER
START: NW STOP: same

DESCRIBE EMISSIONS
START: conuns STOP: same

EMISSION COLOR
START: grey STOP: same

PLUME TYPE: CONTINUOUS ☑
FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT:
NO ☑ YES ☐

IF WATER DROPLET PLUME:
ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: 2 - 5 ft above exit STOP: same

DESCRIBE BACKGROUND
START: trees/blue sky STOP: same

BACKGROUND COLOR
START: green/blue STOP: same

SKY CONDITIONS
START: clear STOP: same

WIND SPEED
START: 0-2 mph STOP: 0-3 mph

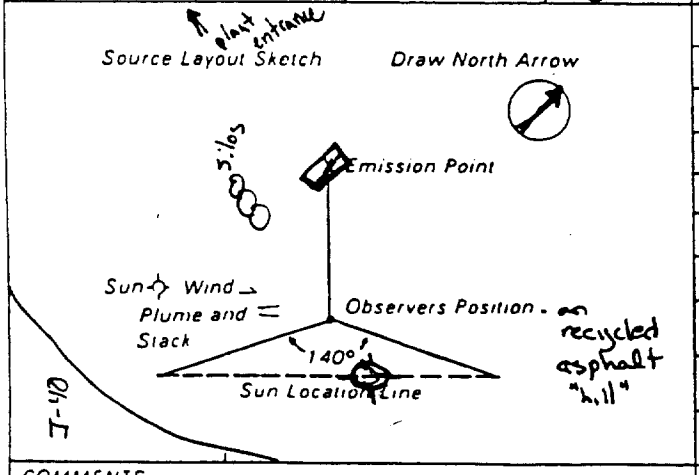
WIND DIRECTION
START: East STOP: South

AMBIENT TEMP
START: 75 STOP: 78

WET BULB TEMP.: 66

RH, percent: 62

Source Layout Sketch



OBSERVATION DATE: 8-21-97

START TIME: 8:48

STOP TIME: 9:48

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	5	0	0	0
2	0	0	5	0	32	5	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	5	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	5
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	5
23	0	5	0	0	53	0	0	0	0
24	0	0	0	5	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 0.42 %

NUMBER OF READINGS ABOVE 0 % WERE: 8

RANGE OF OPACITY READINGS
MINIMUM: 0 MAXIMUM: 5

OBSERVER'S NAME (PRINT): David Goshaw

OBSERVER'S SIGNATURE: [signature] DATE: 8-21-97

ORGANIZATION: DEECO Inc

CERTIFIED BY: ETA DATE: 3/97

VERIFIED BY: DATE:

COMMENTS

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SIGNATURE
TITLE DATE

4c

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit

ADDRESS: Asphalt Plant "A"

1010 Rd (Cleveland Rd)

CITY | STATE: NC | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE

CONTROL EQUIPMENT: baghouse | OPERATING MODE

DESCRIBE EMISSION POINT
START: yellow rectangle stack STOP: SAME

HEIGHT ABOVE GROUND LEVEL
START: 29 ft STOP: same

HEIGHT RELATIVE TO OBSERVER
START: -3 ft STOP: same

DISTANCE FROM OBSERVER
START: 475 ft STOP: same

DIRECTION FROM OBSERVER
START: NW STOP: same

DESCRIBE EMISSIONS
START: coming STOP: same

EMISSION COLOR
START: grey STOP: same

PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐

IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: 2-5 ft above exit STOP: SAME

DESCRIBE BACKGROUND
START: trees/sky STOP: SAME

BACKGROUND COLOR
START: green/blue STOP: SAME

SKY CONDITIONS
START: clear STOP: SAME

WIND SPEED
START: 1-3 mph STOP: same

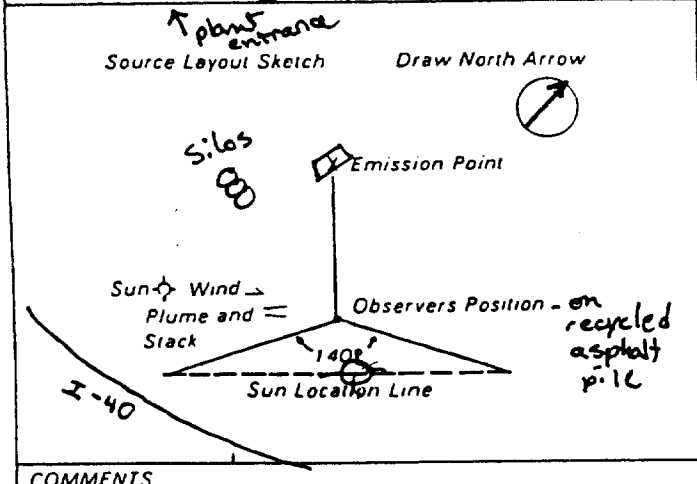
WIND DIRECTION
START: South STOP: South

AMBIENT TEMP.
START: 78 STOP: 82

WET BULB TEMP.: 67

RH, percent: 56

Source Layout Sketch



COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

TITLE | DATE

OBSERVATION DATE: 8-21-97

START TIME: 9:53

STOP TIME: 10:53

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	5	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	5
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	5	0	41	0	0	5	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	5	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	5	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 0.42 %

NUMBER OF READINGS ABOVE 0 % WERE: 6

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 5

OBSERVER'S NAME (PRINT): David Goshaw

OBSERVER'S SIGNATURE | DATE: 8-21-97

ORGANIZATION: DEECO Inc

CERTIFIED BY: ETA | DATE: 3/97

VERIFIED BY | DATE

40

Visible Emission Observation Form

SOURCE NAME: Baghouse Exit

ADDRESS: Asphalt Plant "A"

1010 Rd (Cleveland Rd)

CITY | STATE: NC | ZIP

PHONE | SOURCE ID NUMBER

PROCESS EQUIPMENT: aggregate dryer | OPERATING MODE

CONTROL EQUIPMENT: baghouse | OPERATING MODE

DESCRIBE EMISSION POINT
START: yellow rectangular stack STOP: same

HEIGHT ABOVE GROUND LEVEL
START: 29 ft STOP: same

HEIGHT RELATIVE TO OBSERVER
START: -3 ft STOP: same

DISTANCE FROM OBSERVER
START: ~475 ft STOP: same

DIRECTION FROM OBSERVER
START: NW STOP: same

DESCRIBE EMISSIONS
START: coming STOP: same

EMISSION COLOR
START: grey STOP: same

PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐

IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: 2-5 ft above exit STOP: same

DESCRIBE BACKGROUND
START: trees/sky STOP: same

BACKGROUND COLOR
START: grey/blue STOP: same

SKY CONDITIONS
START: clear STOP: same

WIND SPEED
START: 2-4 mph STOP: same

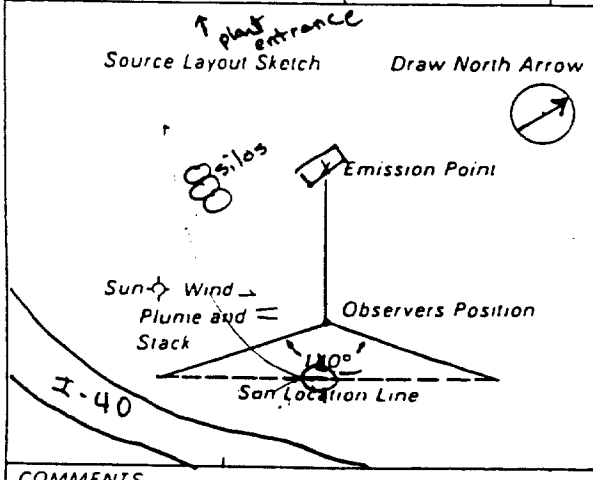
WIND DIRECTION
START: South STOP: same

AMBIENT TEMP
START: 82 STOP: 85

WET BULB TEMP.: 68

RH, percent: 48

Source Layout Sketch — Draw North Arrow



COMMENTS

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SIGNATURE

TITLE | DATE

OBSERVATION DATE: 8-21-97

START TIME: 10:58

STOP TIME: 11:58

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	5	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	5	0	0
13	0	0	0	5	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	—	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	5	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	5	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD: 0.21 %

NUMBER OF READINGS ABOVE 0 % WERE: 5

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 5

OBSERVER'S NAME (PRINT): David Goshaw

OBSERVER'S SIGNATURE | DATE: 8-21-97

ORGANIZATION: DEECO Inc

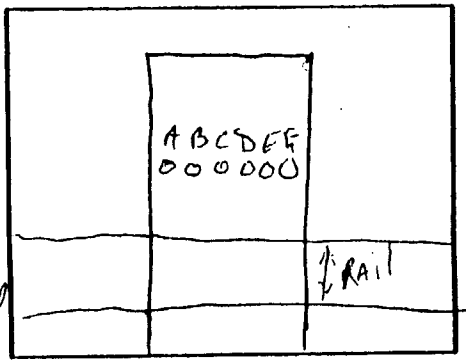
CERTIFIED BY: ETA | DATE: 9/97

VERIFIED BY | DATE

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: ASPHALT PLANT "A"
Date: 8-19-97
Sampling Location: Stack
Sample Type: M-23
Run Number: 1 3 M23-0-1
Operator: DMcD
Barometric Pressure (Pb): 29.9
Static Pressure (Pg): -0.22
Filter Number(s): Outlet #1 ustared
Pretest Leak Rate = 0.004 cfm @ 17 in. Hg
Pretest Pitot Leak Check: ✓
Pretest Orsat Leak Check: ✓
Read and Record all Data Every 5 Minutes
Page 1 of



Schematic of Traverse Point Layout

CO_2
O_2
CO
N_2

Condensers
V_{lc}: Silica gel
Total H_2O

Probe Length and Type: 4' glass
Pitot Tube I.D. No.
Nozzle I.D.: 0.240
Assumed Moisture, %
Meter Box Number: MB11
Meter ΔH@: 1.95
Meter Gamma: 0.987
Reference Δp: N/a
Post Test Leak Rate = .002 cfm @ 5 in. Hg
Post Test Pitot Leak Check: ✓
Post Test Orsat Leak Check

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m\,in}$) °F	Dry Gas Meter Temp. Outlet ($T_{m\,out}$) °F	Pump Vacuum in. Hg	XAD
	0/0	10915	281.500					/					65
A 1	5	10920	288.09	3.5	7.0	7.0	208	248/259	59	88	88	10	63
	10	10925	294.27	2.8	5.6	5.6	209	230/259	54	92	89	10	62
2	15	10930	299.70	2.1	4.2	4.2	209	230/258	55	97	91	8	63
	20	11010/	305.88	2.2	4.4	4.4	208	240/259	65	97	95	8	65
3	25	11104	308.40	0.72	1.44	1.44	207	243/258	65	100	100	3	64
	30	11109	311.66	0.65	1.30	1.30	206	245/259	64	101	101	3	64
4	35	11114	314.36	0.46	0.92	0.92	208	244/256	65	103	101	2	64
	40/0	11119	316.754	0.40	0.80	0.80	210	236/257	66	108	103	2	66
B 1	0/5	11122	321.95	1.7	3.8	3.80	206	242/257	64	107	104	7	58
	10	11127	327.09	1.9	3.8	3.8	201	248/256	67	112	105	7	61
2	15	11132	331.54	1.3	2.6	2.6	193	238/255	64	116	107	5	63
	20	11137	335.59	1.3	2.6	2.6	191	238/256	65	118	108	5	63
3	25	11142	338.60	0.57	1.14	1.14	191	242/257	65	118	110	3	64
	30	11147	341.17	0.42	0.84	0.84	192	238/257	68	119	111	3	65
4	35	11152	342.95	0.45	0.90	0.90	190	242/258	67	119	112	3	65
	40/0	11157/1200	346.468	0.40	0.80	0.80	184	243/256	66	120	114	3	65
C 1	5	11211	350.55	1.01	2.20	2.20	175	249/255	65	117	115	4	65
	10	11216	354.68	1.02	2.40	2.40	173	242/256	66	120	115	4	65
2	15	11221	357.52	0.85	0.90	0.90	172	243/255	65	122	116	3	66
	20	11226	360.28	0.45	0.90	0.90	169	246/254	66	121	116	3	65
3	25	11231	362.05	0.15	0.30	0.30	169	248/256	67	121	117	3	66
	30	11236	363.60	0.12	0.24	0.24	169	245/255	67	121	118	3	65
		/						/					

* stop 0930, change inlet filter, restart (1005), stop @ 1010 change inlet filter Restart (1059)

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-19-97

Run Number: 0-1 S-M23-A-1 **Operator:** (TMS)

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg	YAD
C-4	35	1241	365.21	0.09	0.18	0.18	170	249 / 255	65	121	118	2	65
	40/0	1246/1246	366.500	0.09	0.18	0.18	169	250 / 255	65	121	118	2	65
D 1	5	1258	—	1.00	2.00	2.00	169	246 / 256	66	121	118	5	65
	10	1302	374.323	1.00	2.00	2.00	165	247 / 254	66	121	119	5	65
2	15	1307	377.110	.20	.4	.4	169	243 / 255	66	121	118	5	65
	20	1313	379.148	.2	.4	.4	169	242 / 254	66	122	119	5	65
3	25	1318	380.324	.050	.1	.1	169	243 / 252	66	123	119	5	66
	30	1323	381.42	.05	.1	.1	171	240 / 253	66	121	119	5	67
4	35	1328	382.720	.08	.16	.16	172	241 / 254	67	121	117	2	67
	40/0	1333/1333	384.07x	.08	.16	.16	174	245 / 254	67	121	119	2	67
E 1	5	1340	387.71x	.08	.16	.16	181	242 / 252	67	122	119	3	67
	10	1345	390.999	.05	.1	.1	169	245 / 251	65	122	119	3	66
2	15	1350	392.395	.08	.1	.1	180	247 / 253	66	122	119	3	66
	20	1355	393.97x	.08	.16	.16	180	247 / 253	66	122	119	3	66
3	25	1400	395.301	.15	.3	.3	19x	245 / 252	68	125	119	2	67
	30	1405	396.992	.15	.3	.3	182	244 / 252	64	123	119	2	68
4	35	1410	398.620	.10	.2	.2	187	247 / 255	67	12x	119	2	67
	40/0	1415/1416	400.190	.15	.3	.3	18x	248 / 25x	68	120	119	2	67
F 1	5	1421	402.589	.35	.7	.7	198	242 / 253	68	120	119	2	67
	10	1426	405.09x	.35	.7	.7	198	243 / 255	68	12x	120	2	68
2	15	1431	407.08x	.21	.4x	.4x	187	244 / 256	64	12x	120	2	64
	20	1436	409.030	.21	.4x	.4x	187	245 / 253	68	12x	120	2	64
3	25	1441	411.712	.41	.8x	.8x	187	24x / 257	64	127	120	3	64
	30	1446	413.510	.41	.8x	.8x	197	24x / 253	68	127	120	3	64

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-19-97

Run Number: 0-1 S-M23-0-1 **Operator:** CG

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg	
F 4	35	1451	417.438	.90	.8	.8	187	245 / 253	68	122	120	3	69
	40	1456	420.002	.90	.9	.9	185	245 / 252	68	122	120	3	68
			138.502	0.690		1.289	184			117	113		
											575		
			% H_2O		18.4								
			M_d = 29.6										
			M_s = 27.11										
			V_s =		44.17								
			% I		= 94.2								

69
68

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

SM23-O-1

Plant: ASPHALT PLANT "A"		Run No.: #1
Sample Date: 8/19/97	Filter No.(s): ———	Job No.: 5413-003
Sample Location: OUTLET RVN1		
Recovery Date: 8/19/97	XAD-2 Trap No.(s): O-M23-1-XAD	
Sample Recovery Person: BHR		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	533.1	1029.0	696.5	680.7	615.6	901.8	g
Initial wt.	491.6	506.0	696.4	680.5	611.7	868.9	g
Net wt.	41.5	523.0	0.1	0.2	3.9	32.9	g

Description TOTM = 601.6 ✓

Train System: ———	
Probe: ———	
Filter: Color - ———	Loading - ———
Impinger Contents: ———	
Silica Gel: @Grams Used - ———	Color - ——— % Spent - ———
Condensate Observed In Front Half: ———	

Recovered Sample Fractions

Filter Container No. ———	marked/sealed:
XAD Module Container No.: ———	marked/sealed:
Probe (FH) & Back Half Rinse (Acetone) Container No.: ———	Liquid level marked/sealed:
Probe (FH) & Back Half Rinse (Toluene) Container No.: ———	Liquid level marked/sealed:
Impinger Contents Container No.: ———	Liquid level marked/sealed:
Impinger Rinse (Acetone/MeCl2) Container No.: ———	Liquid level marked/sealed:

264.1
COND. 263.4

A-228 3.0

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: Asphalt Plant "A"
Date: 8-20-97
Sampling Location: Baghouse stack outlet
Sample Type: M-23
Run Number: ~~M23-2~~ S-M23-0-2
Operator: JM Waddell / G Sosa
Barometric Pressure (Pb): 29.90
Static Pressure (Ps): -.25
Filter Number(s):
Pretest Leak Rate = 0.003 cfm @ 15 in. Hg
Pretest Pitot Leak Check: ✓
Pretest Orsat Leak Check: ✓
Read and Record all Data Every 5 Minutes

CO_2 | O_2 | CO | N_2

Condensers
V_{lc}: Silica gel
Total H_2O

Probe Length and Type: 4' g/ss
Pitot Tube I.D. No.
Nozzle I.D.: ~~0.192~~ 0.251 (Dn)
Assumed Moisture, %: 17
Meter Box Number: MB 11
Meter ΔH@: 1.95
Meter Gamma: 0.987
Reference Δp: N/A
Post Test Leak Rate = .002 cfm @ 10 in. Hg
Post Test Pitot Leak Check: ✓
Post Test Orsat Leak Check: ✓

Page 1 of 3

Schematic of Traverse Point Layout

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m,in}$) °F	Dry Gas Meter Temp. Outlet ($T_{m,out}$) °F	Pump Vacuum in. Hg	
	0/0	1872	420.315										
D 1	5	1877	425.094	1.1	3.3	3.3	198	250 / 258	70	81	80	6	57
	10	1882	430.012	1.1	3.3	3.3	193	247 / 255	58	83	81	6	57
2	15	1887	433.164	.50	1.5	1.5	196	250 / 256	59	89	82	4	56
	20	1892	436.572	.50	1.5	1.5	178	252 / 259	59	90	84	4	56
3	25	1897	439.082	.26	.78	.78	201	249 / 262	60	92	85	3	56
	30	1902	441.587	.26	.78	.78	202	250 / 260	61	92	86	3	56
4	35	1907	445.360	.65	1.9	1.9	200	249 / 260	62	94	87	3	57
	40/0	1402/912	449.191	.65	1.9	1.9	202	249 / 262	62	98	87	3	57
E 1	5	1909	452.331	.38	1.1	1.1	201	250 / 262	62	96	89	3	58
	10	1914	455.112	.38	1.1	1.1	202	249 / 261	62	99	92	3	59
2	15	1919	457.520	.22	.66	.66	204	247 / 260	62	101	94	2	59
	20	1924	459.954	.22	.66	.66	205	251 / 261	62	101	94	3	59
3	25	1929	462.350	.25	.75	.75	208	252 / 261	62	102	94	2	58
	30	1934	465.340	.25	.75	.75	210	255 / 259	62	102	94	2	58
4	35	1939	469.921	.56	1.6	1.6	213	249 / 261	62	102	95	3	59
	80	1944	472.591	.56	1.6	1.6	210	250 / 260	63	102	95	3	58
				0.676		1.469	702.1			95.0	88.1		

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-20-97

Run Number: ~~M23-2~~ S-M23-O-2 **Operator:** TMcD / GMG

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp.° F	Impinger Temp. ° F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$)° F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg	
~~P~~	80/0	1946	472.591	~~.40~~	~~1.2~~	~~1.2~~	~~211~~	~~255 / 261~~	63	104	99	2	~~59~~
f 1	5	1957	476.002	.40	1.2	1.2	212	253 / 261	63	104	99	2	57
R	10	1957	479.012	.30	.90	.90	217	256 / 258	62	105	100	2	59
2	15	2002	481.670	.30	.90	.90	220	248 / 260	62	107	101	2	55
	20	2007	484.691	.26	2.2	2.2	229	248 / 261	62	107	101	2	59
3	25	2012	488.697	.26	2.2	2.2	233	248 / 261	62	110	103	5	59
	30	2017	492.987	.28	2.3	2.3	236	247 / 263	62	111	104	6	60
4	35	2022	497.126	.22	2.3	2.3	236	248 / 262	62	113	105	6	60
	~~120~~	2027	501.197	.24	23	23	236	250 / 262	62	114	107	6	60
	120/0	1031	506.387	2.8	8.4	8.4	235	248 / 260	64	111	106	10	60
A 1	5	1042	513.710	2.8	8.4	8.4	236	248 / 262	64	113	107	10	60
	10	1047	520.516	2.5	7.5	7.5	237	249 / 262	64	113	109	10	60
2	15	1054	526.512	2.5	7.5	7.5	238	250 / 263	64	109	107	10	60
	20	1059	532.220	2.0	6.0	6.0	237	248 / 265	62	109	106	10	60
3	25	1104	538.997	2.0	6.0	6.0	231	248 / 267	65	109	106	10	61
	30	1109	542.251	.28	.84	.84	230	250 / 265	65	109	100	5	61
4	35	1114	545.087	.24	.84	.84	229	250 /	65	109	100	5	61
	160												
				1.609		3.507	229.6			109.3	103.6		

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-20-97

Run Number: ~~M23-2~~ S-M23-O-2 **Operator:** TM

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp.° F	Impinger Temp. ° F	Dry Gas Meter Temp. Inlet (T_{in})° F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg	
B	160/0	1114	545.08[illegible]					/					
B1	5	1119	551,623	2.8	8.4	84	233	251 / 263	65	108	103	10	61
1	10	1124	557,420	2.8	8.4	84	234	252 / 254	66	111	105	10	61
2	15	1129	563.523	1.5	4.5	4.5	239	255 / 260	66	110	104	10	61
3	20	1134	569.001	1.5	4.5	4.5	236	260 / 261	66	109	103	10	61
3	25	1139	574.220	1.1	3.3	3.3	237	254 / 262	65	111	104	10	61
4	30	1144	579,910	1.1	3.3	3.3	237	254 / 262	65	110	104	10	61
4	35	1149	583,710	.65	1.9	1.9	237	255 / 260	66	110	105	~~10~~6	61
	200/0	1154	587.701	.65	1.9	1.9	239	257 / 262	66	111	106	6	61
				~~LEAK CK~~	.005 @	13"Hg		/ CHECK FIRST imp.					
				LEAK CK	.007 @	14"Hg		/					
	200/0	1210	587834	.98	2.9	2.9	240	267 / 262	66	107	104	7	61
C1	5	1206	592,571	.89	2.6	2.6	237	260 / 254	66	111	109	7	61
	10	1210	596.942	.70	2.1	2.1	238	260 / 257	67	112	108	7	62
2	15	1215	601,220	.70	2.1	2.1	237	252 / 259	65	112	105	7	61
	20	1220	605.438	.60	1.8	1.8	239	255 / 260	65	113	105	7	61
3	25	1225	609,342	.55	1.6	1.6	237	250 / 261	65	113	105	5	61
	30	1230	613,110	.51	1.5	1.5	234	247 / 260	65	113	106	5	61
4	35	1235	616,710	.51	1.5	1.5	232	249 / 258	65	112	106	5	61
	240/0	1240	620.321					/					
								/					
				1.109		3.35	236.4	/		110.8	105,1		
								/					
								/					

200.006 0.931 7.715 777.7 105 98.9

261 $\bar{T}_s$ = 103.4

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

S-M23-O-2

Plant: ASPHALT PLANT "A"		Run No.: #2
Sample Date: 8/20/97	Filter No.(s):	Job No.:
Sample Location: OUTLET		
Recovery Date:	XAD-2 Trap No.(s):	
Sample Recovery Person:		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	484.9	SEE BELOW	907.3	701.4	609.7	926.2	g
Initial wt.	453.3	~~488.6~~	691.6	703.5	602.8	863.4	g
Net wt.	31.6	938.2	215.7	-2.1	6.9	62.8	g

Description 1253.1 ✓

Train System:	
Probe:	
Filter: Color -	Loading -
Impinger Contents:	
Silica Gel: @Grams Used -	Color - % Spent -
Condensate Observed In Front Half:	

Recovered Sample Fractions

Filter Container No.	marked/sealed:
XAD Module Container No.:	marked/sealed:
Probe (FH) & Back Half Rinse (Acetone) Container No.:	Liquid level marked/sealed:
Probe (FH) & Back Half Rinse (Toluene) Container No.:	Liquid level marked/sealed:
Impinger Contents Container No.:	Liquid level marked/sealed:
Impinger Rinse (Acetone/MeCl2) Container No.:	Liquid level marked/sealed:

COND 1,1.4
513.8
197.6

H2O
740.6

FIELD DATA SHEET

Plant: ASPHALT PLANT "A"
Sampling Location: BAG House 027b1
Run Number: ~~5-M23-0-3~~ 0-3 Date: 8-20-97
Pretest Leak Rate: .003 cfm @ 15 in. Hg.
Pretest Leak Check: Pitot: ✓ Orsat: ✓

Sample Type: M 26 3 Operator: GCAA
Pbar: 29.8 Ps: -0.25
CO2: ____ O2: ____
Probe Length/Type: 3'GLASS Pitot #: ____
Stack Diameter: ____ As: ____

Nozzle ID: .251 Thermocouple #: ____
Assumed Bws: 18 Filter #: ____
Meter Box #: 11 Y: .987 ΔH@: 1.950
Post-Test Leak Rate: ____ cfm @ ____ in. Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in H2O	Orifice Pressure Differential (ΔH) in H2O		Stack Temp. (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)	
					Desired	Actual		Probe	Filter		Inlet (Tm in °F)	Outlet (Tm out °F)		
	0	1405	620.573											
A1	5	1410	626.819	3.1	9.3	9.3	209	248	260	69	104	103	10	61
	10	1415	633.480	3.1	9.3	9.3	247	261	260	69	103	104	10	62
2	15	1420	639.992	2.1	6.3	6.3	208	249	261	69	108	104	10	62
	20	1425	646.627	2.1	6.3	6.3	210	247	253	69	110	106	10	63
3	25	1430	651.752	.94	2.8	2.8	205	241	255	69	112	106	10	63
	30	1435	656.672	.94	2.8	2.8	203	243	255	69	114	107	10	61
4	35	1440	660.342	.40	1.2	1.2	204	249	255	69	114	107	10	63
	40	1445	663.889	.40	1.2	1.2	203	251	256	69	115	108	10	63
B1	45	1450 1452	670.019	2.1	6.3	6.3	208	255	259	69	113	107	11	63
	50	1457	676.720	2.1	6.3	6.3	209	257	257	69	114	108	11	63
2	55	1502	682.999	1.4	4.2	4.2	209	247	255	68	115	109	10	63
	60	1507	688.210	1.4	4.2	4.2	206	250	252	68	115	109	10	63
3	65	1512	693.199	.75	2.3	2.3	207	247	251	68	116	109	5	64
	70	1517	697.538	.75	2.3	2.3	208	249	252	68	117	108	5	64
4	75	1522	701.502	.61	1.8	1.8	207	246	250	68	114	107	5	65
	80	1527	705.317	.61	1.8	1.8	208	247	253	68	115	108	5	67
C1	85	1529	710.501	1.1	3.3	3.3	211	246	258	68	110	108	6	67
	90	1534	715.520	1.1	3.3	3.3	210	256	249	69	117	108	6	67
2	95	1539	719.410	.56	1.6	1.6	209	244	260	68	112	107	5	67
	100	1544	723.197	.56	1.6	1.6	210	251	251	64	110	106	5	67
3	105	1549	726.187	.32	~~.96~~	.96	213	255	259	64	111	109	3	67
	110	1554	729.058	.32	.96	.96	215	252	249	68	110	106	3	67
4	115	1559	732.311	.46	1.3	1.3	212	249	250	68	111	106	3	67
	120	1604	735.550	.46	1.3	1.3	216	250	255	68	112	107	3	67

ΔVm=____ $\sqrt{\Delta p}$=____ ΔH=____ Ts=____ Tm=____

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-20-97

Run Number: ~~0-3~~ S-M23-0-3 **Operator:** G Gay

Traverse Point Number	Sampling Time, (min.) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp.° F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg	
D 1	125 / 1613	739.930	.68	2.0	2.0	215	247 / 252	68	110	104	4	68
	130 / 1618	743.267	.65	1.9	1.9	213	248 / 250	67	111	107	4	66
2	135 / 1623	745.817	.22	.66	.66	213	250 / 251	67	111	106	2	67
	140 / 1628	748.213	.21	.66	.66	213	255 / 252	67	111	109	2	67
3	145 / 1633	751.482	.45	1.3	1.3	216	248 / 253	67	110	108	2	68
	150 / 1638	754.772	.45	1.3	1.3	214	252 / 250	68	111	107	2	68
4	155 / 1643	758642	.52	1.5	1.5	211	253 / 252	68	110	107	2	68
	160 / 1648	761.711	.52	1.5	1.5	214	250 / 255	69	111	107	2	69
E 1	165 / 1655	764.512	.30	.90	.90	211	251 / 253	69	111	108	2	62
	170 / 1700	767.215	.30	.90	.90	212	250 / 251	68	112	109	2	62
2	175 / 1705	769.742	.25	.75	.75	213	251 / 252	69	112	109	2	62
	180 / 1716	772.299	.23	.69	.69	205	252 / 258	68	112	109	2	67
3	185 / 1715	774.999	.25	1.0	1.0	197	258 / 256	68	112	109	2	67
	190 / 1720	777.932	.35	1.0	1.0	193	252 / 256	69	110	108	2	61
4	195 / 1725	780.262	.20	.60	.60	183	250 / 253	67	109	105	2	61
*	200 / 1730	782.696	.20	.60	.60	179	251 / 255	67	108	107	2	61
F 1	205 /						250 / 290	67	110	108	2	61
	210 /						/					
2	215 /						/					
	220 /						/					
3	225 /						/					
	230 /						/					
4	237 /						/					
	/						/					

CHNG) 1st Imp. LEAK @ .009 @ 7"Hg

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

5-M23-0-3

Plant: ASPHALT PLANT "A"		Run No.: #3
Sample Date: 8/20/97	Filter No.(s):	Job No.:
Sample Location: OUTLET		
Recovery Date: 8/20/97	XAD-2 Trap No.(s):	
Sample Recovery Person: BHR		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	502.1	1145.9	799.8	684.4	619.9	932.4	g
Initial wt.	466.2	422.6	694.4	687.5	612.0	889.4	g
Net wt.	35.9	723.3	105.4	(3.1)	7.9	43.0	g

Description TOTAL = 912.4g

Train System:	
Probe:	
Filter: Color -	Loading -
Impinger Contents:	
Silica Gel: @Grams Used -	Color - % Spent -
Condensate Observed In Front Half:	

Recovered Sample Fractions

Filter Container No.	marked/sealed:
XAD Module Container No.:	marked/sealed:
Probe (FH) & Back Half Rinse (Acetone) Container No.:	Liquid level marked/sealed:
Probe (FH) & Back Half Rinse (Toluene) Container No.:	Liquid level marked/sealed:
Impinger Contents Container No.:	Liquid level marked/sealed:
Impinger Rinse (Acetone/MeCl2) Container No.:	Liquid level marked/sealed:

~~COND 2~~

514.4

METHOD 5 TESTING FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21.97	BAG HOUSE OUTLET	M263	S-M23-0-4

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESS (In Hg)	AMBIENT TEMP (deg F)	FILTER NUMBER	STACK ID (in.)	PROBE Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
GGM	29.7	-.25	72			.84	3' GLASS	.251	.251

ASSUMED MOISTURE (%)	DGM BOX No.	DGM Hg@	DGM CAL. FACTOR (Y)	STACK THERM No.	STACK PROT No.	ORSAT No.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
17%	MB 11	1.950	.987				1002				3.4

TRAV. POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24 Hr)	DGM READING Vm (CU. ft)	delta P VELOCITY HEAD (in. H2O)	delta H ORIFICE (in H2O)	STACK TEMP (deg F)	PROBE TEMP (deg F)	FILTER OVEN TEMP (deg F)	SILICA GEL IMPINGER TEMP (deg F)	DGM INLET TEMP (deg F)	SAMPLE TRAIN VAC (in Hg)	
	0	741	782.720	3.1	8.9	182	256	255	61	78 77	10	63
1	5	746	789.24	3.1	8.5	184	254	256	61	85 79	10	64
	10	751	795.330	2.5	7.2	183	255	257	65	86 79	10	64
2	15	756	801.992	2.2	6.4	182	256	259	61	91 84	10	64
	20	801	808.245	1.1	3.2	182	257	258	61	93 85	6	63
3	25	806	813.2	1.1	3.2	184	257	256	64	95 85	6	64
	30	811	818.04	.49	1.5	181	254	251	64	98 87	3	64
4	35	816	821.542	.46	1.3	181	253	255	65	101 90	3	64
	40	821	824.755	—	—	—	255	251	65	101 90	3	66
1	45	827	831.277	2.5	7.4	181	254	255	62	103 92	11	64
	50	832	837.611	2.5	7.4	182	255	255	62	101 92	11	64
2	55	837	843.510	1.6	4.4	176	254	255	62	105 92	9	63
	60	838	849.067	1.6	4.4	174	254	253	62	107 90	9	63
	TOTAL TIME		DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE TEMP				AVE TEMP		

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Asphalt Plant "A"	8-21-9	Bag House outlet 0-4	M-23	0-4

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24 hr)	GAS METER READING Vm (ft³)	ΔP VELOCITY HEAD (in H2O)	ΔH ORIFICE (in H2O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SI GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX TEMP (°F)	SAMPLE TRAIN ACUU (in Hg)	
3	65	845	853.678	.66	1.9	176	252	255	63	109 98		9	63
	70	849	857.580	.66	1.9	175	254	252	63	109 99		4	63
4	75	853	861.110	.56	1.6	176	255	253	64	110 101		3	64 K=2.9
	80	858	864.675	.56	1.6	176	247	254	65	110 102		3	64
1	85	905	869.999	1.5	3.8 4.5	183	252	253	65	112 101		7	64
	90	910	875.232	1.5	3.8	179	253	254	65	113 105		7	64
2	95	915	879.27	.78	2.0	177	247	251	65	115 106		4	64
	100	920	883.20	.78	2.0	174	250	251	65	115 109		4	65
3	105	925	885.352	.20	.5	176	254	253	64	116 110		2	65
	110	930	887.499	.20	.5	176	253	255	63	115 111		2	65
4	115	935	890.642	.42	1.1	179	250	254	63	115 111		2	64
	120	940	893.571	.42	1.1	181	251	255	64	115 112		2	64
1	125	948	897.842	.83	2.1	178	254	256	65	116 112		4	65
	130	953	901.720	.83	2.1	176	252	253	65	116 113		4	65
2	135	958 959	905.078	.50	1.3	174	255	256	65	116 113		3	65
	140	1003	908.101	.50	1.3	173	256	255	64	117 113		3	65
3	145	1008	910.001	.18	.4	172	255	252	64	115 111		2	64
	150	1013	912.010	.19	.4	177	255	255	64	119 112		2	64
4	155	1018	913.831	.11	.29	177	256	254	64	113 110		2	64
	160	1023	915.460	.11	.29	176	252	252	63	111 109		2	64
Page Totals	TOTAL TIME		DGM VOLUME	AVG SQRT ΔP	AVG ΔH	AVG STK °F				AVG DGM °F			

Sheet Checked By: _____ Date _____

METHOD 5 TESTING FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21-97	BAG HOUSE OUTLET 0-4	M-23	~~0-4~~ 5-M23-0-4

TRAV POINT NO	ELAPSED TEST TIME (MIN)	CLOCK TIME (24 HR)	DGM READING Vm (cu ft)	delta P VELOCITY HEAD (in H2O)	delta H ORIFICE (in H2O)	STACK TEMP (deg F)	PROBE TEMP (deg F)	FILTER OVEN TEMP (deg F)	SILICA GEL IMPINGER TEMP (deg F)	DGM INLET TEMP (deg F)	SAMPLE VAC (in Hg)	
E 1	165	1030	920.285	1.1	2.9	174	254	256	67	111 108	5	67
	170	1035	924.990	1.1	2.9	178	252	256	64	113 108	5	66
2	175	1040	929.680	.58	1.5	182	255	257	64	114 108	4	65
	180	1045	931.992	.58	1.3	184	252	255	64	115 109	4	65
3	185	1050	934.084	.18	.46	188	255	253	64	114 109	2	65
	190	1055	935.998	.18	.46	188	253	252	65	113 109	2	65
4	195	1100	938.764	.25	.65	182	254	255	65	111 108	2	65
	200	1105	~~940~~ 940	.25	.65	184	257	254	65	110 107	2	65
F 1	205	1113	944.62	.70	1.8	184	251	254	65	108 108	3	65
	210	1118	9	.70	1.8	182	252	256	65	109 107	3	65
2	215	1123	950.672	.26	.68	182	254	255	64	110 107	2	64
	220	1128	952.999	.26	.68	182	251	253	64	111 107	2	64
3	225	1133	955.210	.20	.52	181	255	257	63	110 106	2	64
	230	1138	957.321	.20	.52	184	249	254	63	109 106	2	64
4	235	1143	960.192	.31	.80	186	250	253	63	110 106	2	64
	240	1148	962.697	.31	.80	185	251	255	64	110 106	2	64

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE TEMP	AVE VAC

.001 10.11

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

O-M23-4

Plant: ASPHALT PLANT "A"		Run No.: #4
Sample Date: 8/20/97	Filter No.(s):	Job No.:
Sample Location: OUTLET		
Recovery Date: 8/21/97	XAD-2 Trap No.(s):	
Sample Recovery Person: BHR		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	496.3	1249.1	697.6	686.1	610.6	944.2	g
Initial wt.	465.0	506.7	700.0	689.5	603.5	900.1	g
Net wt.	31.3	742.4	(2.4)	(3.4)	7.1	44.1	g

Description TOTAL 819.1 ✓

Train System:		
Probe:		
Filter: Color -	Loading -	
Impinger Contents:		
Silica Gel: @Grams Used -	Color -	% Spent -
Condensate Observed In Front Half:		

Recovered Sample Fractions

Filter Container No.	marked/sealed:
XAD Module Container No.:	marked/sealed:
Probe (FH) & Back Half Rinse (Acetone) Container No.:	Liquid level marked/sealed:
Probe (FH) & Back Half Rinse (Toluene) Container No.:	Liquid level marked/sealed:
Impinger Contents Container No.:	Liquid level marked/sealed:
Impinger Rinse (Acetone/MeCl2) Container No.:	Liquid level marked/sealed:

~~COND 2~~

~~513.5~~ 503.9

~~400.6~~

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: ASPHALT PLANT "A"
Date: 8-19-97
Sampling Location: STACK
Sample Type: M23
Run Number: FIB
Operator: (illegible)
Barometric Pressure (Pb): 29.14
Static Pressure (Pg): NA
Filter Number(s):
Pretest Leak Rate = .010 cfm @ 9 in. Hg
Pretest Pitot Leak Check: NA
Pretest Orsat Leak Check: NA
Read and Record all Data Every: NA Minutes
Page 1 of 1

Field Blank.

CO_2			
O_2			
CO			
N_2			

Condensers:
V_{lc}: Silica gel:
Total H_2O:

Probe Length and Type: 4' GLASS
Pitot Tube I.D. No.: NA
Nozzle I.D.: Ø.60
Assumed Moisture, %: NO
Meter Box Number: M#10
Meter ΔH@: 1.714
Meter Gamma: .965
Reference Δp:
Post Test Leak Rate = .010 cfm @ 9 in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:

Schematic of Traverse Point Layout

Temp. Sensor ID No.:

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (Δp) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m,in}$) °F	Dry Gas Meter Temp. Outlet ($T_{m,out}$) °F	Pump Vacuum in. Hg
	NA	1159	47.351									
			47.409	NA								
			47.504	LEAK	ch. .005 @ 7 in Hg							
			47.591	LEAK	ch. .006 @ 8 in Hg							

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

Plant: ASPHALT PLANT "A"		Run No.: FB
Sample Date: 8/20/97	Filter No.(s):	Job No.:
Sample Location: FIELD BLANK		
Recovery Date:	XAD-2 Trap No.(s): O-M23-FB-XAD	
Sample Recovery Person:		

Moisture Data

Impingers	XAD - 2 Trap	1 (knockout)	2 (100 ml H2O) (untipped)	3 (100 ml H2O) (tipped)	4 (knockout) (untipped)	Silica gel (untipped)	
Final wt.	316.8	480.5	698.4	708.1	594.3	868.9	g
Initial wt.	316.5	480.6	696.2	708.1	594.0	868.9	g
Net wt.							g

Description

Train System:
Probe:
Filter: Color - Loading -
Impinger Contents:
Silica Gel: @Grams Used - Color - % Spent -
Condensate Observed In Front Half:

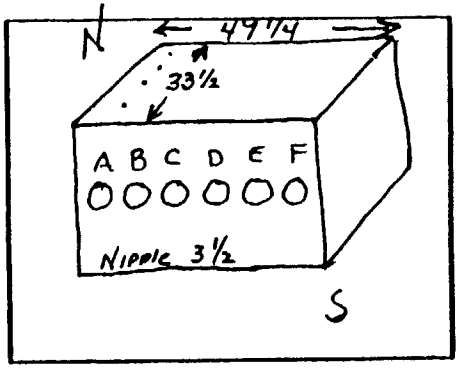
Recovered Sample Fractions

Filter Container No.	marked/sealed:
XAD Module Container No.:	marked/sealed:
Probe (FH) & Back Half Rinse (Acetone) Container No.:	Liquid level marked/sealed:
Probe (FH) & Back Half Rinse (Toluene) Container No.:	Liquid level marked/sealed:
Impinger Contents Container No.:	Liquid level marked/sealed:
Impinger Rinse (Acetone/MeCl2) Container No.:	Liquid level marked/sealed:

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: ASPHALT PLANT "A"
Date: 8-19-95
Sampling Location: STACK
Sample Type: M-29
Run Number: 01
Operator: MAD
Barometric Pressure (Pb): 29.9
Static Pressure (Pg): -.25
Filter Number(s):
Pretest Leak Rate = .006 cfm @ 15 in. Hg
Pretest Pilot Leak Check: LEAK Ck. Good
Pretest Orsat Leak Check:
Read and Record all Data Every 5 Minutes
Page 1 of 2



Schematic of Traverse Point Layout

CO_2 | O_2 | CO | N_2

Condensers
V_{lc}: Silica gel
Total H_2O

Probe Length and Type: 4' Glass
Pilot Tube I.D. No.:
Nozzle I.D. Broke (1st Run) New .251
Assumed Moisture, %: 25
Meter Box Number: MB 10
Meter $\Delta H@$: 1.74
Meter Gamma: .965
Reference Δp:
Post Test Leak Rate = .004 ✓ cfm @ 7 in. Hg
Post Test Pilot Leak Check: ✓
Post Test Orsat Leak Check: ✓

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (Δp) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum in. Hg
	0	0915	76.4									
C 1	5	0920	82.44	1.4	NA	4.4	209	225 / 240	45	92	89	3
	10	0925	88.1	1.3		4.1	208	235 / 235	44	92	89	3
2	15	0930*	92.97	.90		2.8	210	235 / 236	46	97	91	3
12	20	**1007	97.27	.91		2.8	210	242 / 232	46	99	91	2
3	25	1104	100.42	.40		1.19	212	233 / 234	62	103	103	2
	30	1109	103.51	.46		1.12	212	234 / 235	60	104	103	2
4	35	1114	106.97	.54		1.3	213	232 / 250	58	107	104	2
	40	1119	110.442	.65		1.6	216	236 / 253	52	110	109	2
1128 D 1	45	**	116.07	1.6		3.9	204	244 / 254	57	110	106	2
	50	1132	121.74	1.6		3.9	205	245 / 251	56	113	106	3
2	55	1137	126.3	1.3		3.2	187	244 / 255	57	104	102	3
	60	1142	128.8	.3		.74	188	241 / 254	57	104	102	2
3	65	1147	130.95	.2		.49	189	240 / 256	58	103	102	2
	70	1152	133.15	.22		.54	191	241 / 252	59	104	104	2
4	75	1157	136.15	.39		.97	191	246 / 254	60	102	100	3
	80	1202	138.906	.35		.87	192	245 / 256	60	102	101	3
E 1	85	1206/1811	141.5	.3		.75	172	246 / 254	61	100	98	2
2	90	1216	144.38	.34		.85	173	241 / 255	61	103	100	2
2	95	1221	146.95	.1		.25	170	246 / 259	57	105	103	2
	100	1226	148.13	.14		.35	171	246 / 257	56	106	103	1
3	105	1231	149.97	.15		.37	169	244 / 259	59	103	102	1
	110	1236	152.14	.2		.5	168	247 / 260	60	103	102	1
4	115	1241	154.3	.18		.45	162	249 / 260	60	100	99	1

* STOP @ 0930 Inlet clog Restart @ 1007
** STOP @ 1012 " " 1059

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-19-97

Run Number: 01 **Operator:** MAD

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg
E 4	120	1 1246	156.085	.12	ΔD	.3	170	256 / 257	62	102	102	2
F 1	125	1 1248/1253	159.4	.55		1.3	166	254 / 248	64	98	98	2
	130	1 1258	162.92	.53		1.3	167	256 / 246	69	102	101	2
2	135	1 1303	164.97	.19		.47	167	253 / 248	65	104	100	2
	140	1 1308	166.96	.16		.4	166	250 / 249	61	104	101	2
3	145	1 1313	169.35	.25		.62	166	248 / 248	62	103	103	2
	150	1 1318	171.81	.27		.67	167	249 / 249	63	104	103	2
4	155	1 1323	175.06	.42		1.05	167	247 / 241	64	105	103	2
	160	1 1328	178.299	.45		1.12	167	248 / 244	64	107	104	2
A 1	165	1 1331/1336	185.94	.30		7.5	167	247 / 245	58	113	105	4
	170	1 1341	193.22	.24		6.0	168	246 / 247	57	113	107	4
2	175	1 1346	197.55	.85		2.1	167	247 / 249	58	115	106	4
	180	1 1351	201.82	.86		2.2	167	248 / 254	59	116	105	4
3	185	1 1356	204.57	.26		.65	166	249 / 253	58	114	107	3
	190	1 1401	207.07	.23		.57	165	253 / 251	57	112	109	3
4	195	1 1406	209.37	.23		.57	165	254 / 254	58	96	99	3
	200	1 1411	211.697	.23		.57	155	257 / 252	59	99	98	3
B 1	205	1 1414/1419	218.2	2.1		5.2	164	252 / 256	61	107	107	3
	210	1 1424	224.57	1.9		4.7	168	254 / 258	63	110	108	3
2	215	1 1429	229.56	1.8		3.0	167	255 / 256	62	115	109	3
	220	1 1434	234.22	1.0		2.5	166	254 / 258	62	114	109	3
3	225	1 1439	237.27	.42		1.05	167	248 / 259	64	115	110	3
	230	1 1444	240.52	.46		1.15	168	247 / 259	65	113	110	3
4	235	1 1449	243.63	.49	✓	1.22	166	249 / 254	65	110	109	3
	240	1454	246.974	.49		1.22	166	248	246	65	108	106	3

Leak ck .004 @ 7in ✓

MULTI-METALS SAMPLE RECOVERY DATA

Plant: Asphalt Plant "A"		Run No.: S29-O-1
Date: 8-19-97	Sample Box No.: —	Job No.: 5413.003
Sample Location: Outlet		
Sample Type: Particulate / Metals		
Sample Recovery Person: Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-003	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	—	722.6	1259.7	~~531.7~~ 537.1
2	5% HNO_3 / 10% H_2O_2	100	697.4	802.6	105.2
3	5% HNO_3 / 10% H_2O_2	100	732.1	752.7	20.6
4	Empty	—	524.1	528.2	4.1
5	$KMnO_4$ / H_2SO_4	100	684.3	685.3	1.0
6	$KMnO_4$ / H_2SO_4	100	709.7	709.2	6.5
7	Silica Gel	200	874.9	897.4	22.5
Total					~~685.6~~ 691.0

Comments:

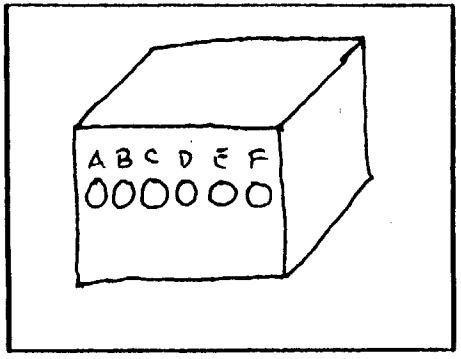
PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

CO_2				
O_2				
CO				
N_2				

Condensers
V_{lc}: Silica gel
Total H_2O

Plant: Asphalt Plant "A"
Date: 8-20-97
Sampling Location: Stack
Sample Type: M29
Run Number: 02
Operator: MAD
Barometric Pressure (P_b): 29.8
Static Pressure (P_g): -.25
Filter Number(s):
Pretest Leak Rate = .006 cfm @ 15 in. Hg
Pretest Pilot Leak Check: Ck Good
Pretest Orsat Leak Check:
Read and Record all Data Every 5 Minutes
Page 1 of 2



Schematic of Traverse Point Layout

Probe Length and Type: 4' Glass
Pitot Tube I.D. No.:
Nozzle I.D.: .253
Assumed Moisture, %: 17
Meter Box Number: MB 10
Meter Δ H@: 1.74
Meter Gamma: .965
Reference Δ p: .636
Post Test Leak Rate = .009 cfm @ 11 in. Hg
Post Test Pilot Leak Check: Ck Good
Post Test Orsat Leak Check:

Temp. Sensor ID No.

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (Δ P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg
	0	1022	49.199									
A 1	5	1027	67.9	3.2	NA	8.8	190	238 / 247	42	80	78	4
	10	1032	66.95	3.3		9.1	190	237 / 246	43	81	78	4
2	15	1037	73.15	2.4		6.6	194	240 / 247	48	86	79	4
	20	1042	80.2	2.3		6.3	193	241 / 248	48	87	79	4
3	25	1047	84.88	1.0		2.7	199	241 / 248	49	90	81	2
	30	1052	89.72	.96		2.6	198	244 / 248	51	92	83	2
4	35	1057	93.25	.4		1.15	191	243 / 248	54	93	84	2
	40	1102	96.791	.35		1.01	189	242 / 249	55	94	86	2
B 1	45	1104/0909	104.15	2.3		6.37	200	244 / 244	51	93	87	3
	50	0914	111.46	2.3		6.37	200	246 / 244	52	93	87	3
2	55	0919	118.78	2.0		5.49	210	247 / 241	53	93	87	3
	60	0924	125.3	1.5		4.11	210	247 / 240	53	92	87	3
3	65	0929	130.83	1.2		3.14	215	246 / 242	53	95	90	3
	70	0934	136.1	1.2		3.14	214	246 / 243	53	101	93	3
4	75	0939	140.41	75		1.96	213	245 / 244	52	102	94	3
	80	0944	144.631	.77		2.0	214	246 / 243	51	102	94	3
C 1	85	1046/0951	149.55	1.0		2.61	213	244 / 246	51	100	94	3
	90	0956	154.48	1.1		3.8	211	241 / 246	51	100	95	3
2	95	1001	157.47	.35		.91	219	243 / 244	51	101	95	3
	100	1006	160.47	.37		.96	227	244 / 246	51	101	96	3
3	105	1011	164.85	.74		1.93	229	244 / 246	52	100	96	3
	110	1016	169.34	.79		2.06	231	239 / 245	51	103	97	3
4	115	1021	173.58	.69		1.8	235	244 / 247	51	103	97	3
	120	1026	177.701	.79		2.06	235	241 / 246	52	105	97	3

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-20-97

Run Number: 02 **Operator:** MTD

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg
D 1	125	1031/1036	182.47	1.0	HA	2.6	233	241 / 246	58	98	98	3
	130	1041	187.41	1.1		2.8	233	241 / 246	59	100	99	3
2	135	1046	191.4	.55		1.4	235	243 / 244	55	105	99	3
	140	1051	194.76	.55		1.4	235	241 / 244	56	105	99	3
3	145	1056	198.18	.53		1.38	236	242 / 246	57	102	97	3
	150	1101	201.55	.47		1.23	238	241 / 246	56	101	93	3
4	155	1106	205.6	.69		1.8	236	240 / 246	57	100	97	3
	160	1111	209.657	.7		1.8	233	239 / 245	57	100	96	3
E 1	165	1114/1119	214.45	1.0		2.6	232	240 / 246	56	99	96	3
	170	1124	219.39	1.1		2.6	232	240 / 246	55	100	96	3
2	175	1129	223.26	.55		1.4	237	241 / 247	57	101	97	3
	180	1134	226.67	.55		1.4	236	242 / 247	58	103	98	3
3	185	1139	229.96	.42		1.1	236	241 / 246	59	102	98	3
	190	1144	232.96	.38		1.0	236	241 / 246	60	102	97	3
4	195	1149	235.9	.34		.89	236	241 / 246	60	100	96	3
	200	1154	239.289	.59		1.54	236	239 / 247	58	99	96	3
P 1	205	1200/1205	242.46	.38		1.0	236	242 / 247	60	97	97	3
1	210	1210	245.16	.34		.89	236	243 / 246	60	98	97	3
2	215	1215	248.03	.32		.84	236	244 / 246	60	99	97	2
	220	1220	250.87	.34		.89	236	244 / 246	59	101	98	2
3	225	1225	254.64	.66		1.74	236	242 / 247	58	103	98	2
	230	1230	258.66	.69		1.82	235	241 / 248	58	104	99	2
4	235	1235	262.4	.66		1.74	232	242 /	60	103	99	0
	240	1240	266.098	.65		1.71	233	243 /	61	105	99	2
			216.899	0.887		2.574	722			98.265	93.2	
						682	4/I: 108.4			555.7		

MULTI-METALS SAMPLE RECOVERY DATA

Plant: Asphalt Plant "A"		Run No.: S29-O-2
Date: 8-20-97	Sample Box No.: —	Job No.: S413.003
Sample Location: Outlet		
Sample Type: Particulate / Metals		
Sample Recovery Person: Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-002	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	—	723.6	1408.5	684.9
2	HNO_3 / H_2O_2	100	698.4	874.6	176.2
3	HNO_3 / H_2O_2	100	732.0	808.1	76.1
4	Empty	—	525.5	533.7	8.2
5	KMNO4 / H_2SO_4	100	686.4	690.8	4.4
6	KMNO4 / H_2SO_4	100	709.1	711.7	2.6
7	Silica Gel	200	838.7	879.4	40.7
Total					993.1 ✓ 46.7

Comments:

FIELD DATA SHEET

Plant: ASPHALT PLANT "A" Sample Type: M29 Operator: MAD Nozzle ID: .253 Thermocouple #: ____

Sampling Location STACK Pbar: 29.8 Ps: -.25 Assumed Bws: .18 Filter #: ____

Run Number: 03 Date: 8-20-97 CO2: ____ O2: ____ Meter Box #: MB10 Y: .965 ΔH@: 1.74

Pretest Leak Rate: .011 cfm @ 11 in. Hg. Probe Length/Type: 4' GLASS Pitot #: ____ Post-Test Leak Rate: .005 cfm @ 9 in. Hg.

Pretest Leak Check: Pitot: OK Orsat: ____ Stack Diameter: 33"ℎ x 8 As: ____ Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in H2O	Orifice Pressure Differential (ΔH) in H2O		Stack Temp. (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet (Tm in °F)	Outlet (Tm out °F)	
	0	1405	73.784										
D 1	5	1410	78.54	1.0	NA	2.6	210	235	245	64	102	101	2
	10	1415	83.61	1.1		2.9	209	237	246	63	103	102	2
2	15	1420	86.97	4		1.0	208	256	246	45	106	102	2
	20	1425	89.95	.37		.97	212	250	244	47	106	103	2
3	25	1430	92.75	.29		.76	208	252	240	47	106	103	2
	30	1435	95.43	.3		.79	209	253	242	48	106	103	2
4	35	1440	98.97	.5		1.32	208	254	241	49	105	102	2
	40	1445	102.185	.47		1.24	207	255	240	52	104	102	2
E 1	45	1447/1452	106.97	1.1		2.9	207	254	251	54	104	103	2
	50	1457	112.14	1.1		2.9	207	253	250	55	104	103	2
2	55	1502	114.55	.2		.52	208	254	251	56	106	103	2
	60	1507	116.71	.19		.5	208	253	252	56	108	103	2
3	65	1512	119.05	.22		.58	206	253	250	58	105	103	2
	70	1517	121.37	.22		.58	205	253	249	58	104	102	2
4	75	1522	124.65	.45		1.18	205	254	247	59	104	102	2
	80	1527	127.923	.49		1.29	206	253	247	59	104	102	2
F 1	85	1529/1534	132.61	1.0		2.6	207	252	249	57	103	102	2
	90	1539	137.65	1.1		2.9	209	251	249	56	103	101	2
2	95	1544	141.31	.52		1.37	208	250	249	57	105	101	2
	100	1549	144.61	.5		1.32	206	250	249	57	107	101	2
3	105	1554	147.75	.45		1.18	208	250	248	56	106	101	2
	110	1559	151.08	.46		1.21	210	250	248	56	106	101	2
4	115	1604	155.15	.71		1.87	211	250	248	57	106	101	2
	120	1609	159.188	.74		1.9	212	248	247	58	106	101	2

101

2

ΔVm= ____ $\overline{\sqrt{\Delta p}}$= ____ $\overline{\Delta H}$= ____ $\overline{Ts}$= ____ $\overline{Tm}$= ____

Plant Name: ASPHALT PLANT "A" **Test Date:** 8-20-97

Run Number: 03 **Operator:** [illegible]

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet (T_{in}) °F	Dry Gas Meter Temp. Outlet (T_{out}) °F	Pump Vacuum In. Hg
A 1	125	1613/1618	167.69	3.7	NO	8.4	212	246 / 248	58	100	102	5
	130	1623	176.16	3.2		8.4	212	247 / 248	58	106	102	5
2	135	1628	181.08	1.0		2.64	211	247 / 249	59	111	10[illegible]	3
	140	1633	186.07	1.1		2.9	210	24[illegible] / 250	60	108	103	3
3	145	1638	189.17	.39		1.03	[illegible]12	245 / 251	61	108	107	3
	150	1643	192.28	.38		1.0	[illegible]	245 / 251	6[illegible]	10[illegible]	[illegible]	3
4	155	1648	19[illegible].9	.29		.76	211	243 / 250	62	107	101	3
	160	1653	197.627	.29		.76	208	244 / 249	61	105	101	3
B 1	165	1655/1700	204.39	2.0		5.2	209	246 / 247	63	10[illegible]	99	3
	170	1705	211.17	2.1		5.5	21[illegible]	245 / [illegible]48	64	101	98	[illegible]
2	175	1710	215.67	.78		2.06	[illegible]11	24[illegible] / 249	65	106	99	3
	180	1715	220.11	.77		2.03	211	242 / 252	62	107	99	3
[illegible]	185	1720	223.42	.56		1.47	240	249 / 251	[illegible]0	109	101	3
	1[illegible]	1725	227.08	.58		1.53	199	247 / 252	[illegible]58	109	[illegible]01	3
4	1[illegible]5	1730	230.4	.4		1.06	182	246 / 251	54	109	102	3
	2[illegible]0	1[illegible]35	233.615	.4		1.05	182	245 / 252	54	109	102	3
C 1	205	/						/				
	210	/				Leak ck .005 @ 19" Hg						
2	215	/						/				
	220	/						/				
3	[illegible]25	/						/				
	230	/	159.831	0.823		2.064	207.15	/		105.78	101.78	
4	235	/						/				
	240	/						/			583.7	

% H_2O 34.6

% I = 106.5

MULTI-METALS SAMPLE RECOVERY DATA

Plant: ASPHALT PLANT "A"		Run No.: S29-0-3
Date: 8-20-97	Sample Box No.: —	Job No.: S413.003
Sample Location: Outlet		
Sample Type: Particulate / metals		
Sample Recovery Person: Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-004	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	~~100~~ TA	724.7	1482.2	757.5
2	HNO_3 / H_2O_2	100	724.9	876.5	151.6
3	HNO_3 / H_2O_2	100	680.3	710.2	29.9
4	Empty	—	603.7	607.3	3.6
5	$KMnO_4$ / H_2SO_4	100	749.2	750.1	0.9
6	$KMnO_4$ / H_2SO_4	100	641.3	642.2	0.9
7	Silica Gel	200	790.7	825.1	34.4
Total					978.8

Comments:

METHOD 5 TESTING FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21-97	STACK	M-29	04

OPERATOR	AMBIENT PRESS (in Hg)	STATIC PRESS (in Hg)	AMBIENT TEMP (deg F)	FILTER NUMBERS	STACK ID (in)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
MAD	29.7	-.25	72°		33.5 x 49.25	.84	4' Glass		.253

ASSUMED MOISTURE (%)	DGM BOX No	DGM Y@	DGM CAL FACTOR (Y)	STACK THERM NO	STACK PITOT NO	ORSAT NO	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
17	MB 10	1.74	.965				@10" 1.14	0.0080 @ 10"			

TRAV. POINT NO	ELAPSED TEST TIME (MIN)	CLOCK TIME (24 Hr)	DGM READING Vm (CU ft)	delta P VELOCITY HEAD (in H2O)	delta H ORIFICE (in H2O)	STACK TEMP (deg F)	PROBE TEMP (deg F)	FILTER OVEN TEMP (deg F)	SILICA GEL IMPINGER TEMP (deg F)	DGM IN/OUT TEMP (deg F)	SAMPLE TRAIN VAC (in Hg)
	0	0741	34.320								
1	5	0746	38.94	1.0	2.5	185	247	249	65	79/77	1.5
	10	0751	43.52	.96	2.4	186	250	248	65	82/79	2
2	15	0756	47.16	.44	1.16	183	252	249	55	91/80	2
	20	0801	50.38	.39	1.02	183	251	250	53	93/80	2
3	25	0806	53.08	.29	.76	180	249	251	53	93/82	2
	30	0811	55.53	.25	.66	180	248	252	53	94/84	2
4	35	0816	58.82	.44	1.16	181	249	250	54	94/86	2
	40	0821	62.12	.44	1.16	186	248	250	57	95/87	2
1	45	0823/0828	67.3	1.2	3.16	180	249	251	59	97/90	2
	50	0833	72.85	1.3	3.4	180	247	252	61	98/91	2
2	55	0838	75.98	.44	1.16	176	249	253	61	99/92	2
	60	0843	79.17	.39	1.02	175	251	252	58	102/93	2
	TOTAL TIME		DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE TEMP				AVE TEMP	

METHOD 5 TESTING FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21-97	STACK	M29	04

TRAY POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK-TIME (24-HR)	DGM READING Vm (cu ft)	delta P VELOCITY HEAD (in H2O)	delta H ORIFICE (in H2O)	STACK TEMP (deg F)	PROBE TEMP (deg F)	FILTER OVEN TEMP (deg F)	SILICA MIRROR TEMP (deg F)	CYCLONE AND PROBE TEMP (deg F)	SAMPLE GAS VAC (in Hg)
E 3	65	0848	81.48	.21	.55	174	251	247	58	100/94	2
	70	0853	83.71	.19	.50	175	250	246	55	101/94	2
4	75	0858	86.12	.24	.63	175	250	247	56	100/95	2
	80	0903	88.428	.21	.55	175	250	248	56	99/95	2
F 1	85	0905/0910	93.81	1.4	3.4	182	251	247	54	104/96	2
	90	0915	99.22	1.4	3.4	181	252	248	52	104/97	2
2	95	0920	102.27	.41	.97	176	251	249	53	106/98	2
	100	0925	105.02	.36	.85	177	252	248	54	108/99	2
3	105	0930	107.15	.18	.42	175	253	248	54	108/102	2
	110	0935	109.28	.18	.42	174	254	248	55	108/104	2
4	115	0940	112.76	.55	1.3	176	256	249	54	108/104	2
	120	0945	116.056	.57	1.2	178	254	251	55	108/104	2
A 1	125	0948/0953	123.7	3.1	7.3	176	253	250	56	109/105	2
	130	0958	131.88	3.1	7.3	176	254	250	58	110/106	2
2	135	1003	137.3	1.4	3.3	175	253	251	58	113/107	4
	140	1008	142.44	1.3	3.0	172	253	252	59	114/108	4
3	145	1013	145.9	.56	1.3	172	243	252	49	113/108	2
	150	1018	149.43	.59	1.4	172	247	251	47	112/108	2
4	155	1023	151.66	.2	.47	173	246	253	50	112/108	2
	160	1028	153.922	.2	.47	174	245	253	52	112/108	2

TOTAL TIME	DGM VOLUME	AVG SQRT delta P	AVG delta H	AVG TEMP	AVG TEMP

K-2.4

METHOD 5 TESTING FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21-97	STACK	M-29	04

TRAV. POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (in. H2O)	delta H ORIFICE (in. H2O)	STACK TEMP (deg. F)	PROBE TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	SI. GEL IMPINGER TEMP (deg. F)	DGM IN/OUT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B 1	165	1030/1035	161.54	3.1	7.3	176	249	248	46	111/106	3
	170	1040	168.97	2.8	6.6	176	250	247	46	111/106	3
2	175	1045	175.5	2.0	4.7	182	251	248	58	114/106	2
	180	1050	181.9	2.0	4.7	180	253	247	51	116/107	2
3	185	1055	186.7	0.71	1.7	188	235	252	56	117/108	2
	190	1100	190.15	0.59	1.4	188	234	251	56	114/108	2
4	195	1105	193.11	0.40	0.96	182	234	253	56	112/107	1
	200	1110	196.33	0.50	1.2	187	236	252	55	110/107	1
C 1	205	1113/1118	200.88	1.00	2.4	185	236	251	60	106/104	2
	210	1123	205.91	1.20	2.9	183	238	251	52	109/105	2
2	215	1128	208.80	0.35	0.84	184	240	252	52	112/105	1
	220	1133	211.65	0.40	0.96	183	238	252	54	110/105	1
3	225	1138	213.78	0.17	0.41	183	237	250	53	108/104	1
	230	1143	215.78	0.17	0.41	186	241	252	55	106/103	1
4	235	1148	218.22	0.26	0.62	187	243	251	55	105/103	1
	240	1153	220.541	0.26	0.62	187	247	252	56	105/103	1

TOTAL TIME	DGM VOLUME	AVG SQRT delta P	AVG delta H	AVG TEMP	AVG VAC

MULTI-METALS SAMPLE RECOVERY DATA

Plant:	ASPHALT PLANT "A"		Run No.: S29-04
Date:		Sample Box No.: —	Job No.: S413.003
Sample Location:	Outlet		
Sample Type:	Particulate / Metals		
Sample Recovery Person:	Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-005	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	—	722.5	1399.5	677.0
2	5% HNO_3 / H_2O_2	100	697.0	790.6	93.6
3	HNO_3 / H_2O_2	100	730.8	745.8	15.0
4	Empty	—	523.0	524.7	1.7
5	$KMnO_4$ / H_2SO_4	100	683.6	685.1	1.5
6	$KMnO_4$ / H_2SO_4	100	707.8	710.3	2.5
7	Silica Gel	200	897.4	927.5	30.1
				TOTAL =	821.4 ✓
Total					

Comments:

METHOD 5 TESTING FIELD DATA SHEET

PAGE 1 of 1

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	6-21-97	STACK	M-29	Field Blank

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESS (In. Hg)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
MAT	NA	NA	NA	NA	NA	NA	4' Glass	NA	.253

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
NA	MB10	1.74	.965	NA	NA	NA	.0090	10" Hg			

TRAV. POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24 HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	STACK TEMP (deg. F)	PROBE TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	SILICA GEL IMPINGER TEMP (deg. F)	DGM IN/OUT TEMP (deg. F)	SAMPLE TRAIN VAC (In. Hg)
			33.944								
			34.141	.009	@ 8" Hg						
			34.221	.012	@ 10" Hg						
	TOTAL TIME		DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE TEMP				AVE TEMP	

MULTI-METALS SAMPLE RECOVERY DATA

Plant: Asphalt Plant "A"		Run No.: Field Blank
Date: 8-21-97	Sample Box No.: —	Job No.: 5413.003
Sample Location: —		
Sample Type: Particulate / Metals		
Sample Recovery Person: Troy Abernathy / Barry Rayfield		

Container	Description	Volume, ml	Sealed/Level Marked
Front Half			
1	Filter No.(s) M97-0006	—	—
2	Acetone Rinse	—	—
3	Nitric Rinse	—	—
Back Half			
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	—	—
5A	Nitric Rinse - Impinger No. 4	—	—
5B	KMNO4/H2O Rinse - Impingers 5 & 6	—	—
5C	HCl Rinse - Impingers 5 & 6	—	—

Moisture Data

Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	Empty	—	720.5	720.5	
2	HNO_3 / H_2O_2	100	704.3	704.3	
3	HNO_3 / H_2O_2	100	728.9	728.8	
4	Empty	—	635.5	635.6	
5	$KMnO_4$ / H_2SO_4	100	735.4	735.4	
6	$KMnO_4$ / H_2SO_4	100	652.1	652.1	
7	Silica Gel	200	790.4	790.6	
Total					

Comments:

TECHNICAL REPORT DATA

Please read instructions on the reverse before completing

1. REPORT NO. EPA-454/R-00-007A	2.
3. RECIPIENT'S ACCESSION NO.	
4. TITLE AND SUBTITLE Final Report - Volume I of II, Emissions Test at an Asphalt Concrete Production Plant Asphalt Plant "A" - Clayton, North Carolina	5. REPORT DATE [redacted] April 2000
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Michael D. Maret Franklin Meadows	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Pacific Environmental Services, Inc. Post Office Box 12077 Research Triangle Park, North Carolina 27709-2077	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO. 68-D-70069
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emissions, Monitoring and Analysis Division Research Triangle Park, North Carolina 27711	13. TYPE OF REPORT AND PERIOD COVERED Final
	14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT

The United States Environmental Protection Agency (EPA) is investigating the asphalt concrete production source category to identify and quantify emissions of hazardous air pollutants (HAPs) from rotary aggregate dryers. There are two types of rotary drum dryers in use at asphalt concrete production plants: parallel flow, wherein the direction of travel of the drying aggregate is in the same direction of travel of the the burner exhaust gases, and counter flow, wherein the aggregate and exhaust gas flows are opposite to each other. Plant "A", Clayton, North Carolina was identified and selected by EPA as the host facility at which to obtain data on air emissions from a counter flow continuous drum mix process that utilized a baghouse for control of air emissions.

The primary objective of the testing program was to obtain data on controlled and uncontrolled emissions of polychlorinated dibenzo-*p*-dioxins (PCDDs or "dioxins") and polychlorinated dibenzofurans (PCDFs or "furans"), particulate matter (PM), and metallic HAP and non-HAP compounds. Testing of uncontrolled emissions was deleted from the scope of work because the high particulate grain loading at the inlet to the baghouse exceeded the sampling capacity of the Method 23 and Method 29 sampling trains. A secondary objective was to observe and record plume opacity form the baghouse. The data will be used by the EPA's Emission Standards Division to determine whether HAPs are emitted at levels that would justify regulation under the Maximum Achievable Control Technology (MACT) program.

During the testing program another EPA contractor monitored and recorded process and emission control system operating parameters, and prepared Section 3.0, Process Description, of this report.

This volume (Volume I) is comprised of 166 pages and consists of the report text, and Appendices: A (Process Data) and B (Raw Field Data).

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTIONS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COASTI Field/Group
Baghouse Dioxins/Furans Emission Measurements Hazardous Air Pollutants Metals Particulate Matter Volatile Organic Hazardous Air Pollutants		

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