

United States
Environmental Protection
Agency

Office Of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-454/R-00-021a
April, 2000

Air



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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

EPA Contract No. 68D70069
Work Assignment No. 2-09

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September 1999
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TABLE OF CONTENTS

VOLUME I	<u>Page</u>
1.0 INTRODUCTION	1-1
2.0 SUMMARY OF RESULTS	2-1
2.1 OXYGEN AND CARBON DIOXIDE MEASUREMENTS	2-1
2.2 PCDDs/PCDFs MEASUREMENTS	2-1
2.2.1 Baghouse Inlet - Asphalt Production with RAP	2-4
2.2.2 Baghouse Outlet- Asphalt Production with RAP	2-8
2.2.3 Baghouse Outlet - Asphalt Production without RAP	2-8
2.3 PARTICULATE MATTER AND METALS MEASUREMENTS	2-13
2.3.1 Baghouse Inlet - Asphalt Production with RAP	2-13
2.3.2 Baghouse Outlet- Asphalt Production with RAP	2-20
2.3.3 Baghouse Outlet - Asphalt Production without RAP	2-20
2.4 DETERMINATION OF VISIBLE EMISSIONS	2-29
3.0 PROCESS DESCRIPTION	3-1
4.0 SAMPLING LOCATIONS	4-1
4.1 BAGHOUSE INLET SAMPLING LOCATION	4-1
4.2 BAGHOUSE OUTLET SAMPLING LOCATION	4-1
5.0 SAMPLING AND ANALYSIS PROCEDURES	5-1
5.1 LOCATION OF MEASUREMENT SITES AND SAMPLE/VELOCITY TRAVERSE POINTS	5-1
5.2 DETERMINATION OF STACK GAS VOLUMETRIC FLOW RATE	5-1
5.3 DETERMINATION OF DRY MOLECULAR WEIGHT AND EMISSION CORRECTION FACTORS	5-1
5.4 DETERMINATION OF STACK GAS MOISTURE CONTENT	5-2
5.5 DETERMINATION OF POLYCHLORINATED DIBENZO-P-DIOXINS AND POLYCHLORINATED DIBENZOFURANS	5-2
5.6 DETERMINATION OF PARTICULATE MATTER AND METALS	5-4
5.7 DETERMINATION OF PLUME OPACITY	5-5

TABLE OF CONTENTS (Concluded)

VOLUME I		<u>Page</u>
6.0	QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES AND RESULTS.	6-1
6.1	CALIBRATION OF APPARATUS	6-1
6.1.1	Barometers	6-1
6.1.2	Temperature Sensors	6-1
6.1.3	Pitot Tubes	6-1
6.1.4	Differential Pressure Gauges	6-3
6.1.5	Dry Gas Meter and Orifice	6-3
6.2	ON-SITE MEASUREMENTS	6-3
6.2.1	Measurement Sites	6-3
6.2.2	Velocity Measurements	6-5
6.2.3	Flue Gas Sampling	6-5
6.2.4	Moisture	6-5
6.2.5	Method 23/Method 29	6-6
6.3	ANALYSES	6-8
APPENDIX A	PROCESS DATA	
APPENDIX B	RAW FIELD DATA	
	Appendix B.1 Raw Field Data Baghouse Inlet	
	Appendix B.2 Raw Field Data Baghouse Outlet	
VOLUME II		
APPENDIX C	ANALYTICAL DATA	
	Appendix C.1 Analytical Data Method 5 Particulate Matter	
	Appendix C.2 Analytical Data Method 23 PCDDs/PCDFs	
	Appendix C.3 Analytical Data Method 29 Multiple Metals	
APPENDIX D	COMPUTER SUMMARIES	
	Appendix D.1 Computer Summaries Baghouse Inlet Method 23 & 29	
	Appendix D.2 Computer Summaries Baghouse Outlet Method 9, 23 & 29	
APPENDIX E	QA/QC DATA AND CERTIFICATIONS	
APPENDIX F	FIELD TESTING PARTICIPANTS	

LIST OF TABLES

VOLUME I	<u>Page</u>
TABLE 2.1	EMISSIONS SAMPLING TEST LOG ASPHALT PLANT "A" - CLAYTON, NC 2-2
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 2-5
TABLE 2.3	PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC 2-6
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 2-7
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 2-9
TABLE 2.6	PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC 2-10

LIST OF TABLES (Continued)

VOLUME I	<u>Page</u>
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	2-11
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	2-12
TABLE 2.9 PCDDs/PCDFs CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITHOUT RAP ASPHALT PLANT "A" - CLAYTON, NC	2-14
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	2-15
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	2-16
TABLE 2.12 PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC	2-17

LIST OF TABLES (Continued)

VOLUME I	<u>Page</u>
TABLE 2.13 METALS CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE INLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC	2-18
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	2-21
TABLE 2.15 PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC	2-22
TABLE 2.16 METALS CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITH RAP ASPHALT PLANT "A" - CLAYTON, NC	2-23
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	2-25
TABLE 2.18 PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER - BAGHOUSE OUTLET ASPHALT PRODUCTION WITHOUT RAP ASPHALT PLANT "A" - CLAYTON, NC	2-26
TABLE 2.19 METALS CONCENTRATIONS AND EMISSION RATES ROTARY DRUM DRYER-BAGHOUSE OUTLET ASPHALT PRODUCTIONWITHOUT RAP ASPHALT PLANT "A" - CLAYTON, NC	2-27

LIST OF TABLES (Continued)

VOLUME I	<u>Page</u>
TABLE 3.1 PLANT OPERATING CONDITIONS ASPHALT PLANT "A" - CLAYTON, NC	3-3
TABLE 3.2 ASPHALT MIX SPECIFICATIONS ASPHALT PLANT "A" - CLAYTON, NC	3-5
TABLE 3.3 FUEL SPECIFICATIONS ASPHALT PLANT "A" - CLAYTON, NC	3-5
TABLE 3.4 SPECIFICS OF PLANT OPERATION ASPHALT PLANT "A" - CLAYTON, NC	3-6
TABLE 5.1 SAMPLING LOCATIONS, TEST PARAMETERS, AND TEST METHODS SUMMARY ASPHALT PLANT "A"-CLAYTON, NC	5-2
TABLE 6.1 SUMMARY OF TEMPERATURE SENSOR CALIBRATION DATA ASPHALT PLANT "A" - CLAYTON, NC	6-2
TABLE 6.2 SUMMARY OF PITOT TUBE DIMENSIONAL DATA ASPHALT PLANT "A" - CLAYTON, NC	6-4
TABLE 6.3 SUMMARY OF DRY GAS METER AND ORIFICE CALIBRATION DATA ASPHALT PLANT "A" - CLAYTON, NC	6-5
TABLE 6.4 SUMMARY OF METHOD 23/ METHOD 29 FIELD SAMPLING QA/QC DATA ASPHALT PLANT "A" - CLAYTON, NC	6-7
TABLE 6.5 SUMMARY OF METHOD 23 STANDARDS RECOVERY EFFICIENCIES ASPHALT PLANT "A" - CLAYTON, NC	6-9
TABLE 6.6 SUMMARY OF METHOD 29 ANALYSIS QC DATA LAB CONTROL SPIKES ASPHALT PLANT "A" - CLAYTON, NC	6-10

LIST OF TABLES (Concluded)

VOLUME I	<u>Page</u>
TABLE 6.7	SUMMARY OF METHOD 29 ANALYSIS QC DATA POST DIGESTION MATRIX SPIKES RUN NO. S-M29-0-1 ASPHALT PLANT "A" - CLAYTON, NC 6-11
TABLE 6.8	METHOD 29 DUPLICATE ANALYSIS QC DATA RUN NO. S-M29-0-2 ASPHALT PLANT "A" - CLAYTON, NC 6-12
TABLE 6.9	METHOD 29 SERIAL DILUTION ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC 6-13
TABLE 6.10	METHOD 29 METHOD BLANK ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC 6-14
TABLE 6.11	METHOD 29 FIELD AND REAGENT BLANK ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC 6-15
TABLE 6.12	METHOD 29 MERCURY SPIKE ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC 6-16
TABLE 6.13	METHOD 29 MERCURY BLANK ANALYSIS QC DATA ASPHALT PLANT "A" - CLAYTON, NC 6-18

LIST OF FIGURES

VOLUME I	<u>Page</u>
Figure 1.1 Key Personnel and Responsibility for Testing - Asphalt Plant “A”, Clayton, NC	1-3
Figure 1.2 Sampling Locations - Asphalt Plant “A”, Clayton, NC.	1-4
Figure 4.1 Baghouse Inlet Sampling Location - Asphalt Plant “A”, Clayton, NC ..	4-3
Figure 4.2 Baghouse Inlet Point Locations - Asphalt Plant “A”, Clayton, NC	4-4
Figure 4.3 Baghouse Outlet Sampling Location - Asphalt Plant “A”, Clayton, NC	4-5
Figure 4.4 Baghouse Outlet Point Locations - Asphalt Plant “A”, Clayton, NC	4-6
Figure 5.1 Method 23 Sample Train Schematic - Asphalt Plant “A” Clayton, NC	5-3
Figure 5.2 Method 29 Sample Train Schematic - Asphalt Plant “A”, Clayton, NC	5-6
Figure 5.3 Method 29 Sample Recovery Scheme (Sample Fractions 1-4) Asphalt Plant “A”, Clayton, NC	5-7
Figure 5-4 Method 29 Sample Recovery Scheme (Sample Fraction 5) Asphalt Plant “A”, Clayton, NC	5-8

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.

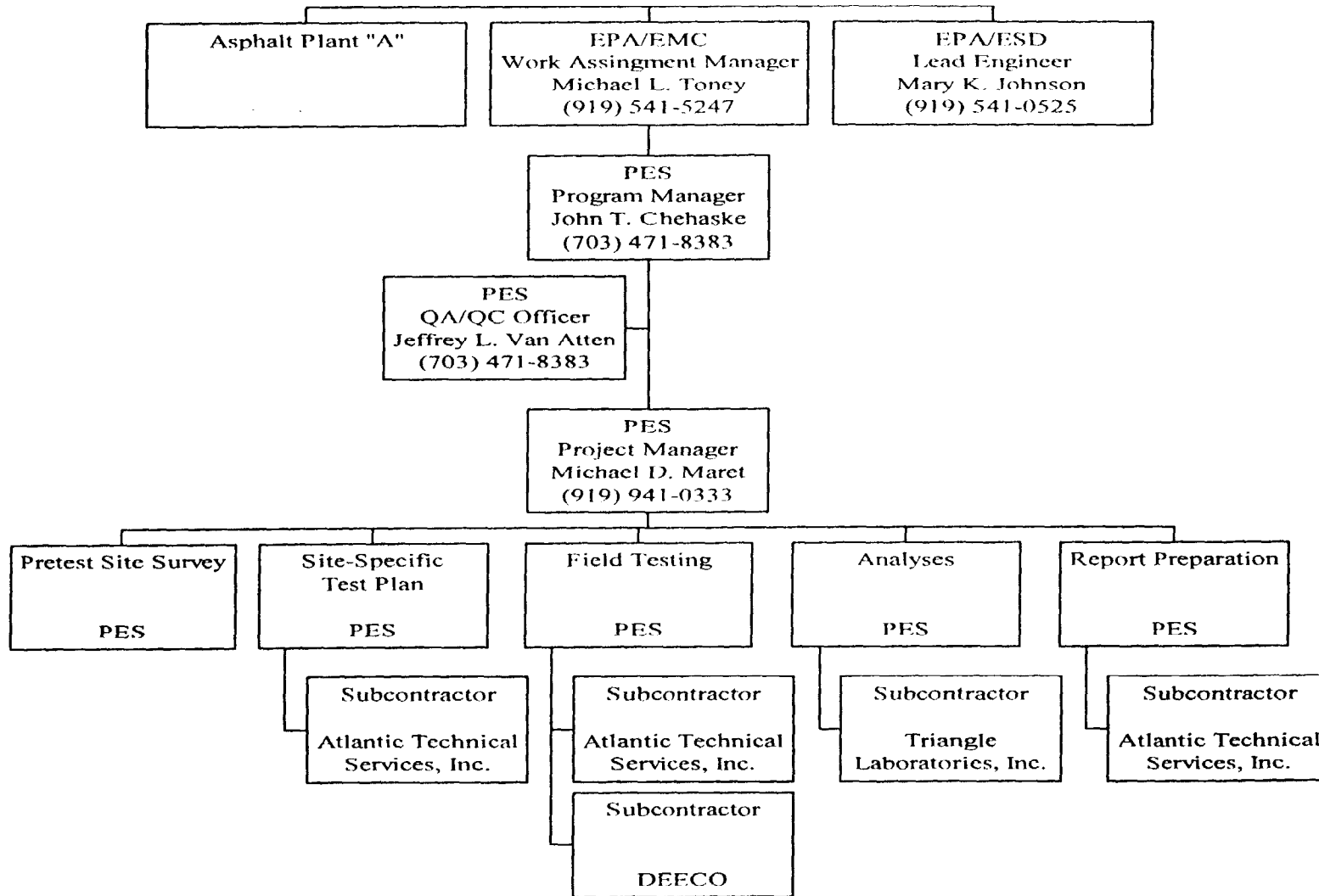


Figure 1.1 Key Personnel and Responsibility for Testing - Asphalt Plant "A", Clayton, NC

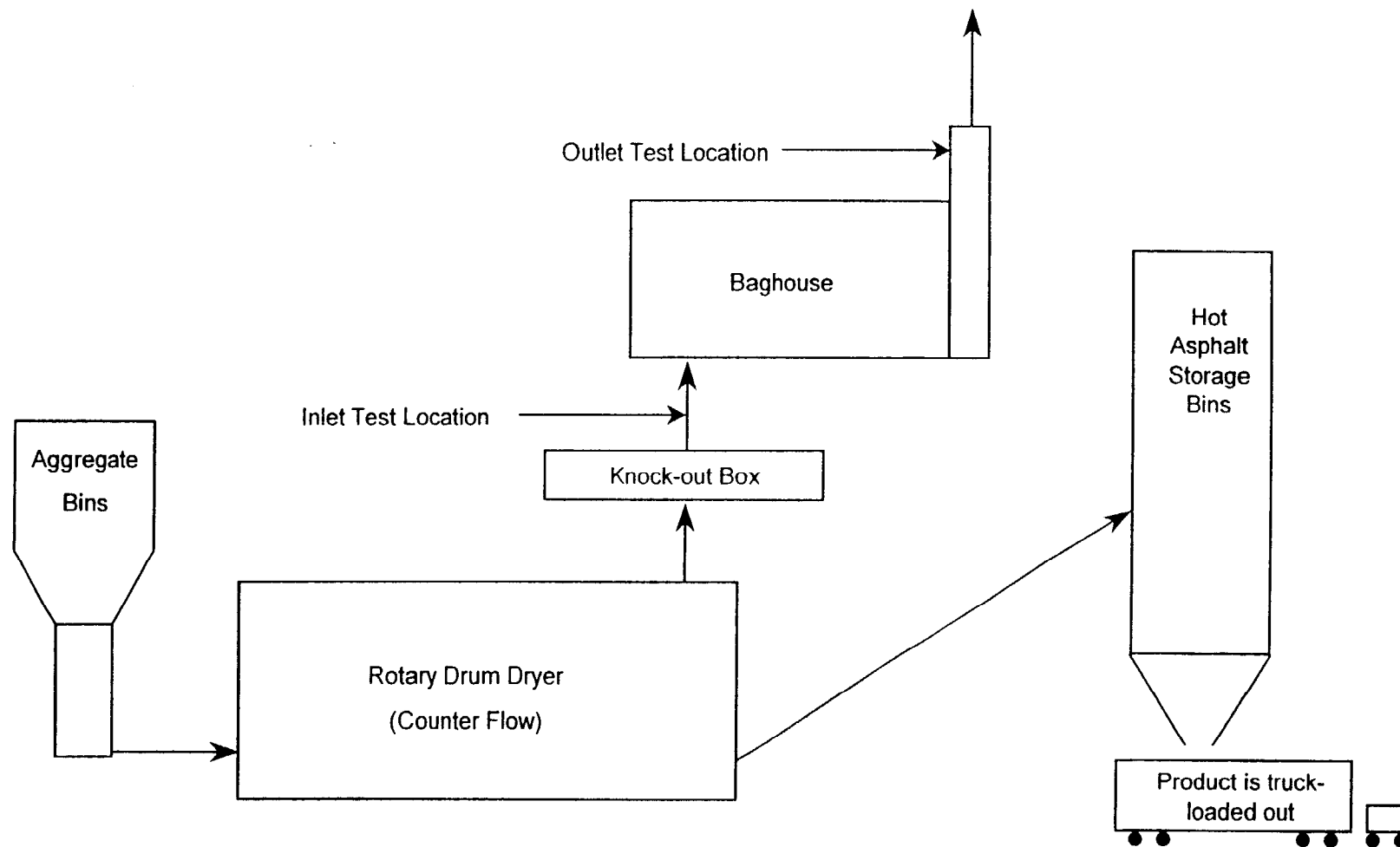


Figure 1.2 Sampling Locations - Asphalt Plant "A", Clayton, NC

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 (O₂) and carbon dioxide (CO₂) concentrations for the purpose of calculating stack gas molecular weight. The O₂ and CO₂ concentrations presented for the first sampling run are the average of the O₂ and CO₂ 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 % O₂, and 3) concentrations adjusted to 7 % O₂ and 2378 tetrachlorinated 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 to 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 Cl³⁵ isotopes and the number of Cl³⁷ isotopes attached to the PCDDs/PCDFs congeners should agree with the Cl³⁵/Cl³⁷ 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 CO₂, 13.1% by volume O₂, 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 O₂ 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% O₂ and the concentration of total PCDFs was 5.23 ng/dscm corrected to 7% O₂, therefore the total PCDDs/PCDFs concentration was 274 ng/dscm, corrected to 7% O₂. The total PCDDs concentration was 0.398 ng/dscm corrected to 7% O₂ and 2378-TCDD equivalents, and the total concentration of PCDFs was 0.143 ng/dscm corrected to 7% O₂ 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
<u>Dioxins</u>		
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
<u>Furans</u>		
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
<u>Dioxins</u>			
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}
<u>Furans</u>			
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.

O₂ 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 % CO₂ by volume, 13.1 % O₂ 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% O₂. 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% O₂, the (3-run) average adjusted concentration of total PCDFs was 0.142 ng/dscm @ 7% O₂, and the (3-run) average adjusted concentration of total PCDDs/PCDFs was 0.369 ng/dscm @ 7% O₂. Also presented in Table 2.7 are the PCDDs and PCDFs concentrations at 7 % O₂, 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% O₂.

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 % CO₂, 10.8 % O₂, 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
<u>Dioxins</u>								
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
<u>Furans</u>								
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
<u>Dioxins</u>									
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}
<u>Furans</u>									
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% O₂. The measured stack gas O₂ 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 % O₂, and 0.0792 ng/dscm @ 7 %O₂ for PCDFs. The adjusted concentration of total PCDDs/PCDFs was 0.152 ng/dscm @ 7 % O₂. 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% CO₂, 13.1% O₂, 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% O₂. 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
<u>Dioxins</u>		
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}
<u>Furans</u>		
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
<u>Dioxins</u>			
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}
<u>Furans</u>			
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 O₂.

^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 O₂.

^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)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr^c	ND
Arsenic (As)	
$\mu\text{g/dscm}^a$	51.2
$\mu\text{g/dscm @ 7\% O}_2^b$	91.2
g/hr^c	1.16
Barium (Ba)	
$\mu\text{g/dscm}^a$	2,063
$\mu\text{g/dscm @ 7\% O}_2^b$	3,677
g/hr^c	46.8
Beryllium (Be)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr^c	ND
Cadmium (Cd)	
$\mu\text{g/dscm}^a$	22.5
$\mu\text{g/dscm @ 7\% O}_2^b$	40.1
g/hr^c	0.511
Chromium (Cr)	
$\mu\text{g/dscm}^a$	91.7
$\mu\text{g/dscm @ 7\% O}_2^b$	163
g/hr^c	2.08
Cobalt (Co)	
$\mu\text{g/dscm}^a$	89.2
$\mu\text{g/dscm @ 7\% O}_2^b$	159
g/hr^c	2.02
Copper (Cu)	
$\mu\text{g/dscm}^a$	417
$\mu\text{g/dscm @ 7\% O}_2^b$	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% O₂.

^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% O₂.

^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% CO₂, 13.1% O₂, 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% O₂. 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 % CO₂, 10.8 % O₂, 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% O₂. 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 than 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 O₂.

^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 O₂.

^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)				
$\mu\text{g/dscm}^a$	0.0640	0.00532	0.00	0.0231
$\mu\text{g/dscm @ 7\% O}_2^b$	0.114	0.00947	0.00	0.0412
g/hr^c	0.00244	0.000237	0.00	0.000893
Arsenic (As)				
$\mu\text{g/dscm}^a$	0.608	0.133	0.188	0.310
$\mu\text{g/dscm @ 7\% O}_2^b$	1.08	0.238	0.334	0.552
g/hr^c	0.0232	0.00594	0.00712	0.0121
Barium (Ba)				
$\mu\text{g/dscm}^a$	49.9	8.37	4.39	20.9
$\mu\text{g/dscm @ 7\% O}_2^b$	89.0	14.9	7.82	37.2
g/hr^c	1.91	0.373	0.166	0.815
Beryllium (Be)				
$\mu\text{g/dscm}^a$	ND	ND	ND	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND	ND	ND	ND
g/hr^c	ND	ND	ND	ND
Cadmium (Cd)				
$\mu\text{g/dscm}^a$	0.199	0.395	0.440	0.345
$\mu\text{g/dscm @ 7\% O}_2^b$	0.355	0.704	0.784	0.614
g/hr^c	0.00759	0.0176	0.0166	0.0139
Chromium (Cr)				
$\mu\text{g/dscm}^a$	1.47	0.161	0.125	0.584
$\mu\text{g/dscm @ 7\% O}_2^b$	2.61	0.287	0.222	1.04
g/hr^c	0.0560	0.00719	0.00472	0.0226
Cobalt (Co)				
$\mu\text{g/dscm}^a$	0.416	ND	ND	0.139
$\mu\text{g/dscm @ 7\% O}_2^b$	0.741	ND	ND	0.247
g/hr^c	0.0159	ND	ND	0.00529
Copper (Cu)				
$\mu\text{g/dscm}^a$	4.05	0.77	1.68	2.16
$\mu\text{g/dscm @ 7\% O}_2^b$	7.21	1.37	2.99	3.86
g/hr^c	0.155	0.0342	0.0635	0.0841
Lead (Pb)				
$\mu\text{g/dscm}^a$	6.07	1.41	26.6	11.4
$\mu\text{g/dscm @ 7\% O}_2^b$	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% O₂.

^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% O₂.

^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 O₂.

^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 O₂.

^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)	
$\mu\text{g/dscm}^a$	0.00
$\mu\text{g/dscm @ 7\% O}_2^b$	0.00
g/hr ^c	0.00
Arsenic (As)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr ^c	ND
Barium (Ba)	
$\mu\text{g/dscm}^a$	2.06
$\mu\text{g/dscm @ 7\% O}_2^b$	2.84
g/hr ^c	0.0849
Beryllium (Be)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr ^c	ND
Cadmium (Cd)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr ^c	ND
Chromium (Cr)	
$\mu\text{g/dscm}^a$	0.00881
$\mu\text{g/dscm @ 7\% O}_2^b$	0.0121
g/hr ^c	0.000363
Cobalt (Co)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr ^c	ND
Copper (Cu)	
$\mu\text{g/dscm}^a$	0.277
$\mu\text{g/dscm @ 7\% O}_2^b$	0.381
g/hr ^c	0.0114
Lead (Pb)	
$\mu\text{g/dscm}^a$	0.371
$\mu\text{g/dscm @ 7\% O}_2^b$	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% O₂.

^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)	
$\mu\text{g/dscm}^a$	14.8
$\mu\text{g/dscm @ 7\% O}_2^b$	20.4
g/hr^c	0.611
Mercury (Hg)	
$\mu\text{g/dscm}^a$	0.438
$\mu\text{g/dscm @ 7\% O}_2^b$	0.603
g/hr^c	0.0181
Nickel (Ni)	
$\mu\text{g/dscm}^a$	0.0778
$\mu\text{g/dscm @ 7\% O}_2^b$	0.107
g/hr^c	0.00320
Phosphorus (P)	
$\mu\text{g/dscm}^a$	15.2
$\mu\text{g/dscm @ 7\% O}_2^b$	20.9
g/hr^c	0.624
Silver (Ag)	
$\mu\text{g/dscm}^a$	0.00
$\mu\text{g/dscm @ 7\% O}_2^b$	0.00
g/hr^c	0.00
Selenium (Se)	
$\mu\text{g/dscm}^a$	0.00
$\mu\text{g/dscm @ 7\% O}_2^b$	0.00
g/hr^c	0.00
Thallium (Tl)	
$\mu\text{g/dscm}^a$	ND
$\mu\text{g/dscm @ 7\% O}_2^b$	ND
g/hr^c	ND
Zinc (Zn)	
$\mu\text{g/dscm}^a$	4.80
$\mu\text{g/dscm @ 7\% O}_2^b$	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% O₂.

^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)*	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 Range Total Produced, tons	171 146-254 735	276 223-302 1,187	240 152-254 840	185 150-204 778
Mix Temperature, °F Average ^b Range	305 295-315	312 303-346	310 299-322	308 271-351
Raw Material (Virgin Aggregate) Use Rate, tph Average ^b Range Total Used, tons	145 126-213 622	236 191-255 1,013	205 138-215 718	176 142-194 740
RAP Use rate, tph Average ^b Range Total Used, tons	18 13-27 76	28 21-32 119	24 17-27 85	none
Asphalt Cement Use rate, tph Average ^b Range Total Used, tons	8.7 7.5-12.6 37	14.0 11.4-15.5 60	12.3 7.8-13.0 43	9.2 7.8-10.6 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 150°F lead 28 mg/kg sulfur 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.

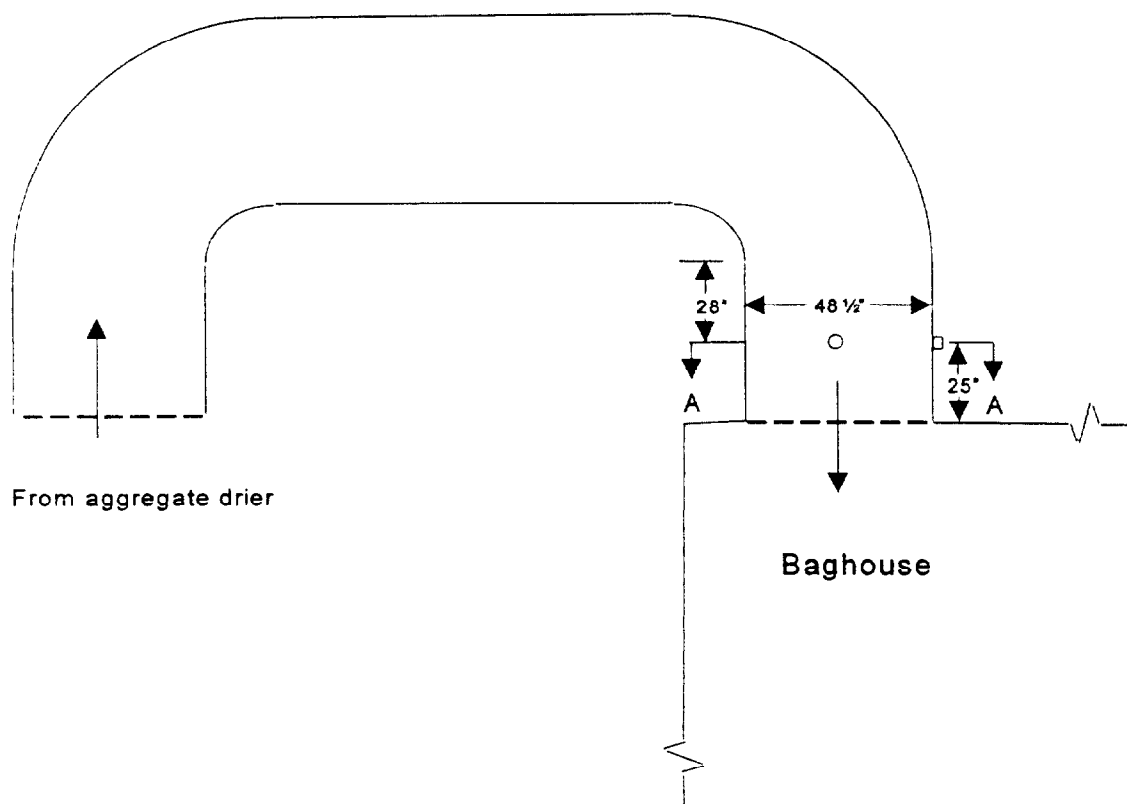
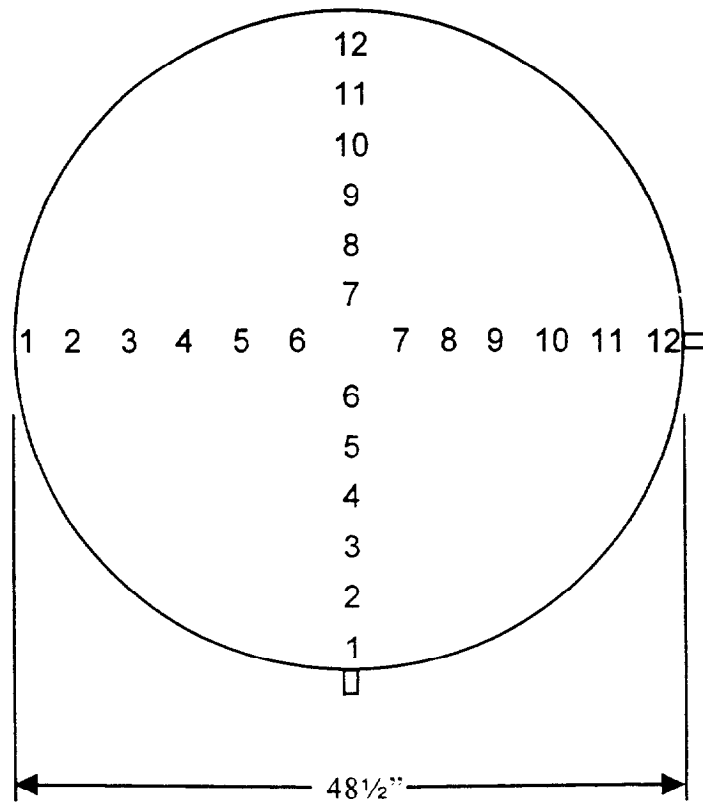


Figure 4.1 Baghouse Inlet Sampling Location - Asphalt Plant "A", Clayton, NC



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

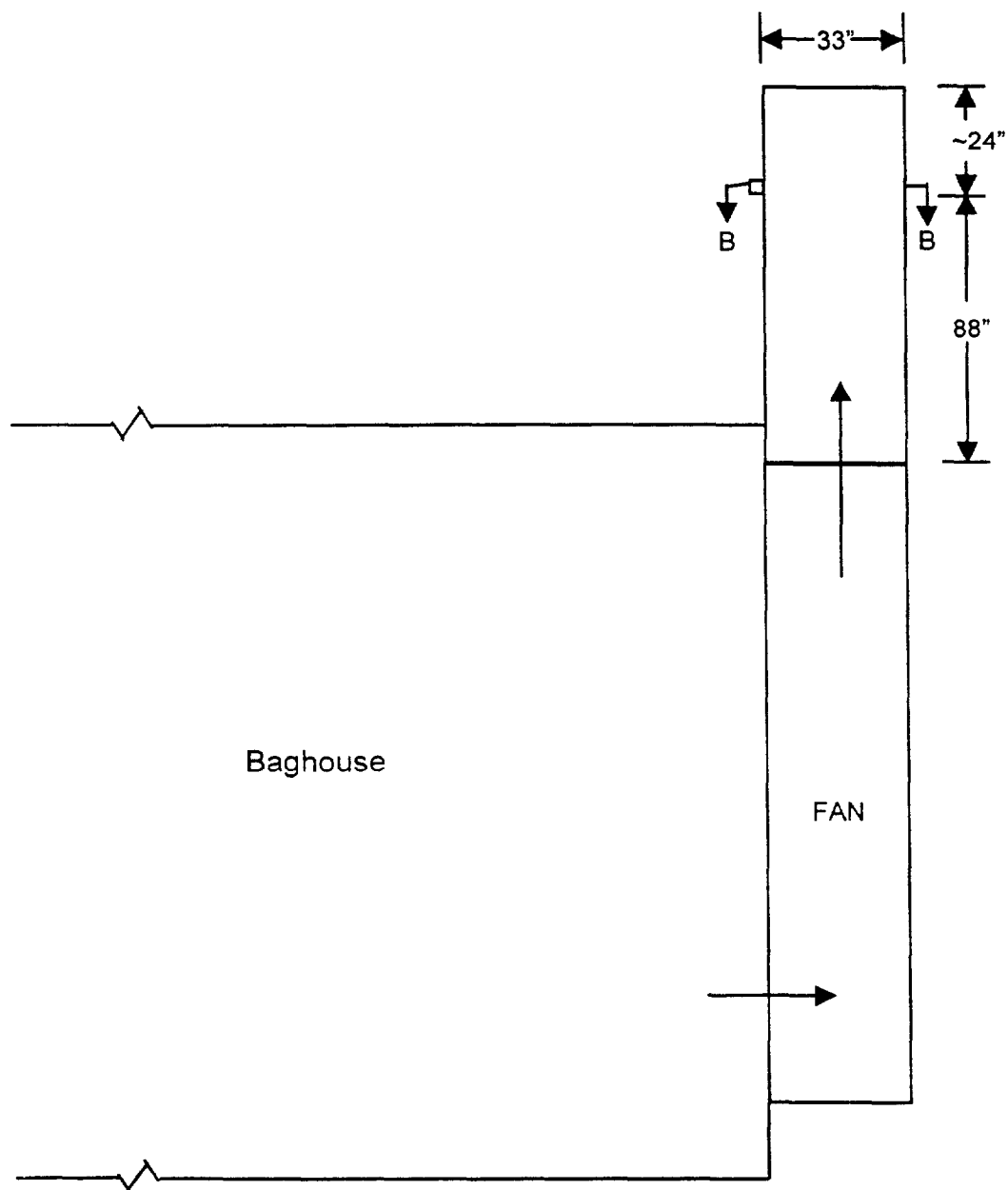
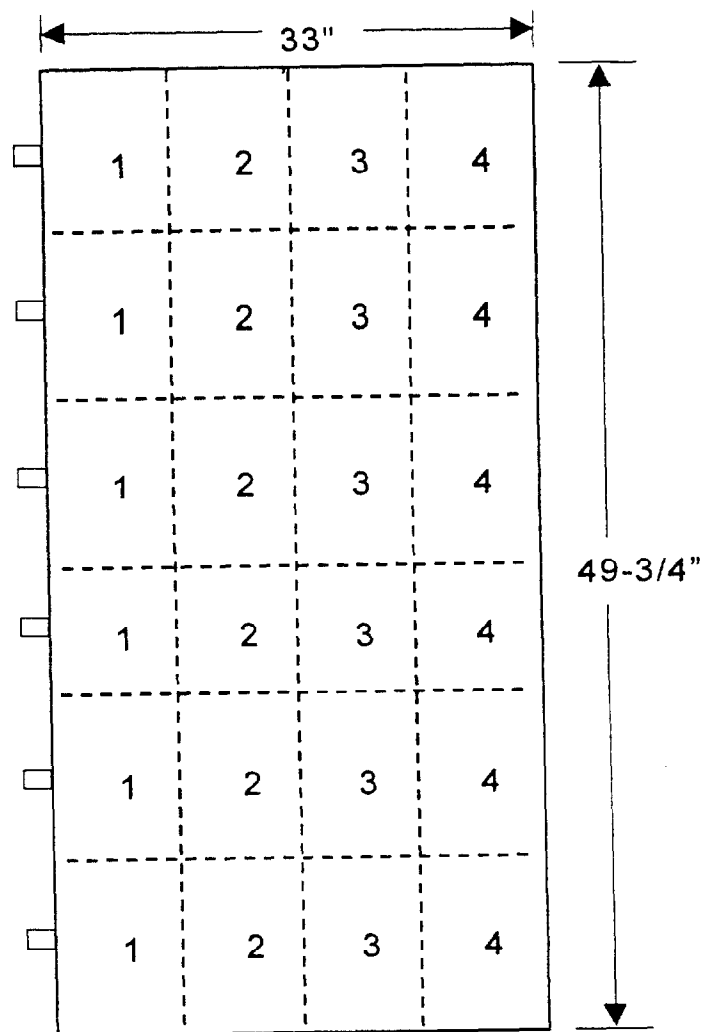


Figure 4.3 Baghouse Outlet Sampling Location - Asphalt Plant "A", Clayton, NC



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 CO₂ and O₂ 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 CO₂ and O₂. 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
<u>Baghouse Inlet</u>	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
<u>Baghouse Outlet</u>	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

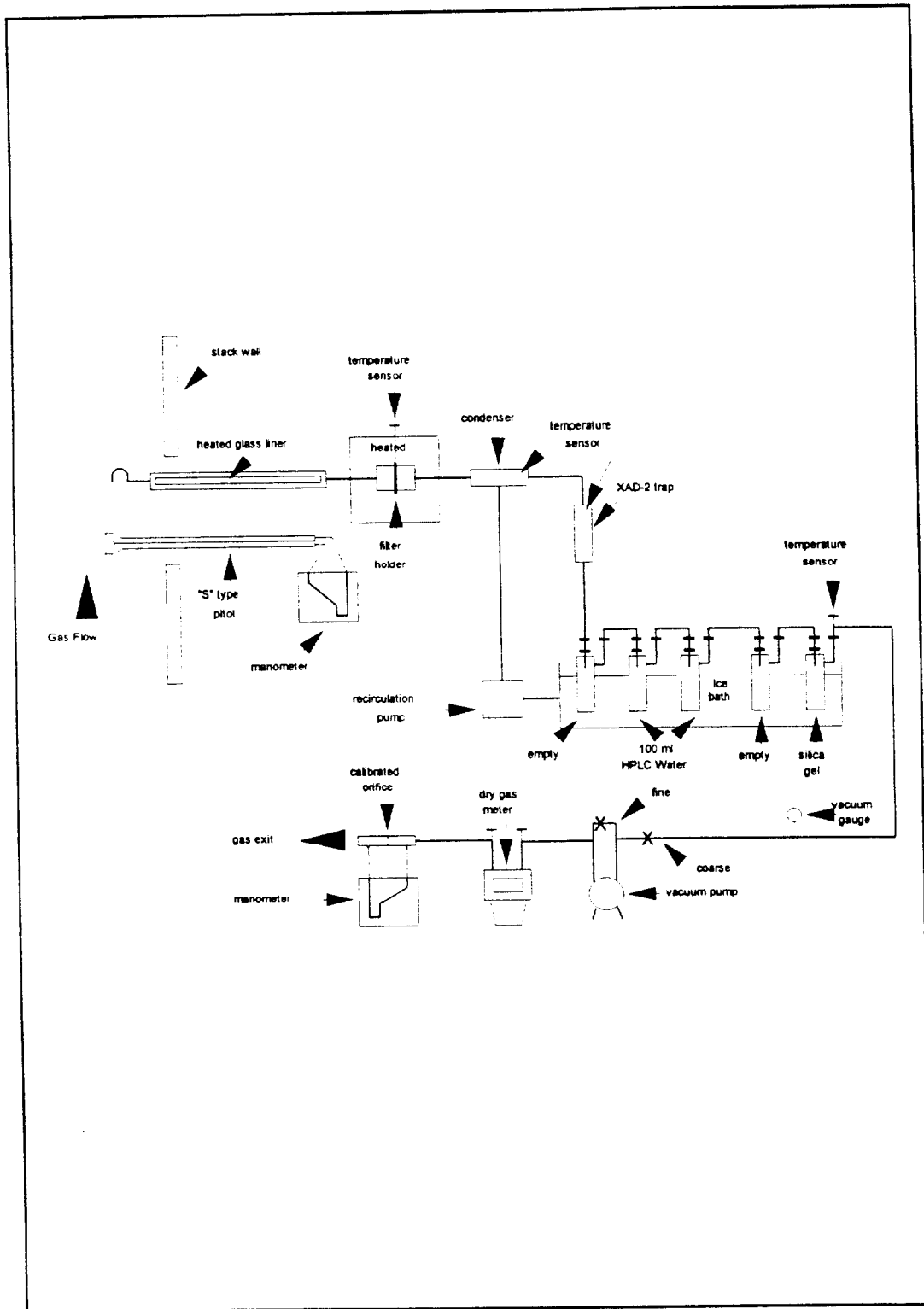


Figure 5.1 Method 23 Sample Train Schematic - Asphalt Plant "A", Clayton NC

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 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).

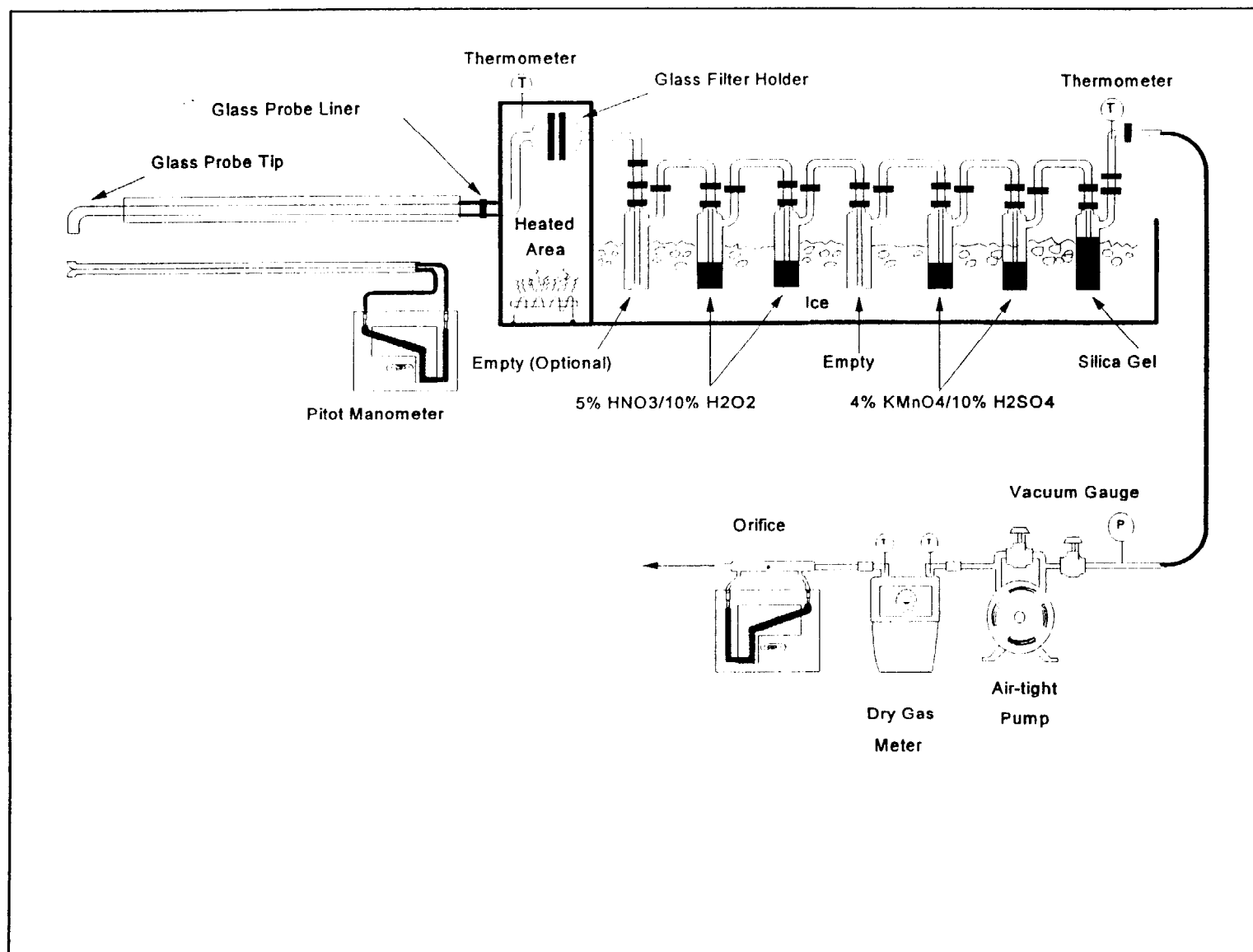


Figure 5.2 Method 29 Sample Train Schematic - Asphalt Plant "A", Clayton NC

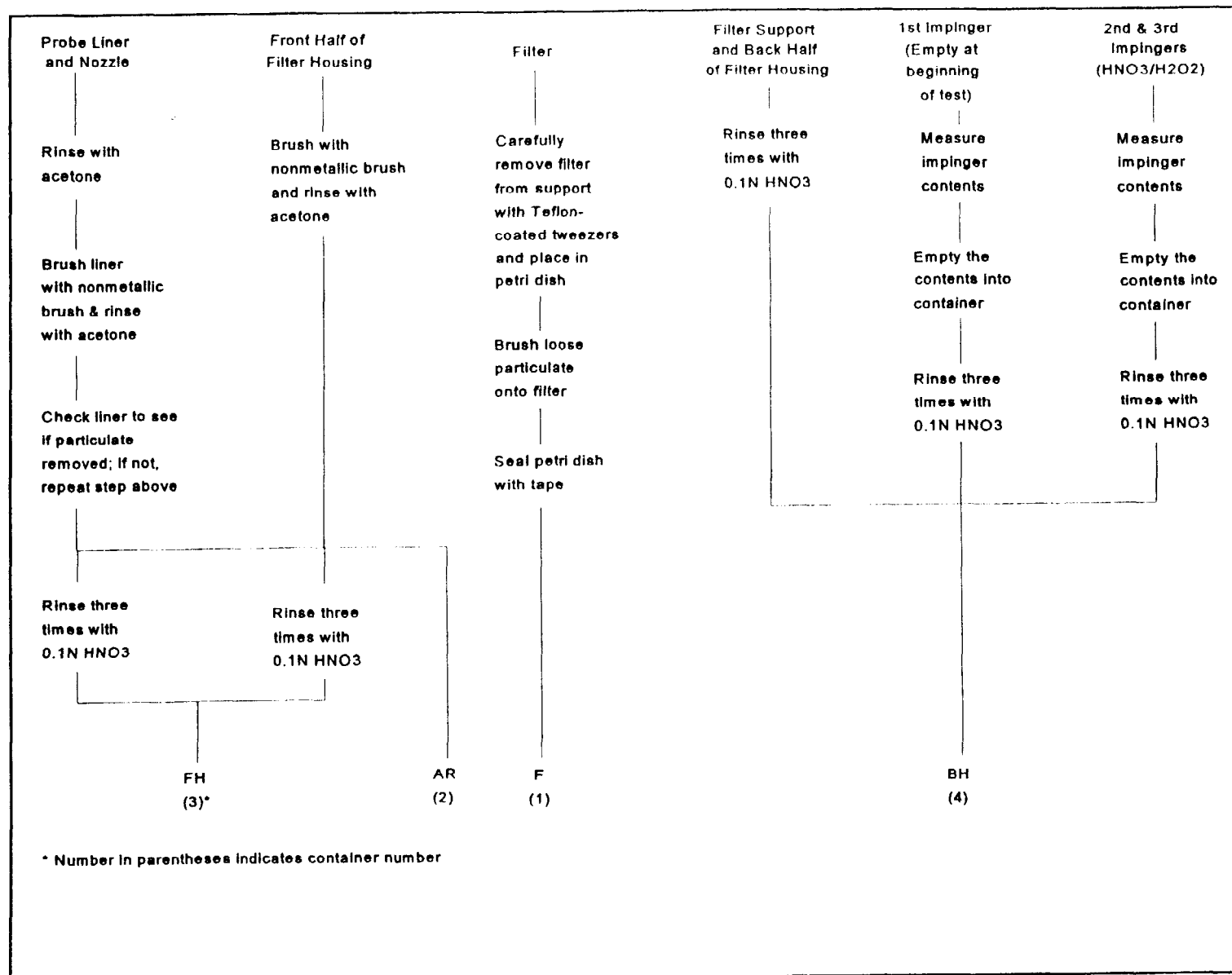
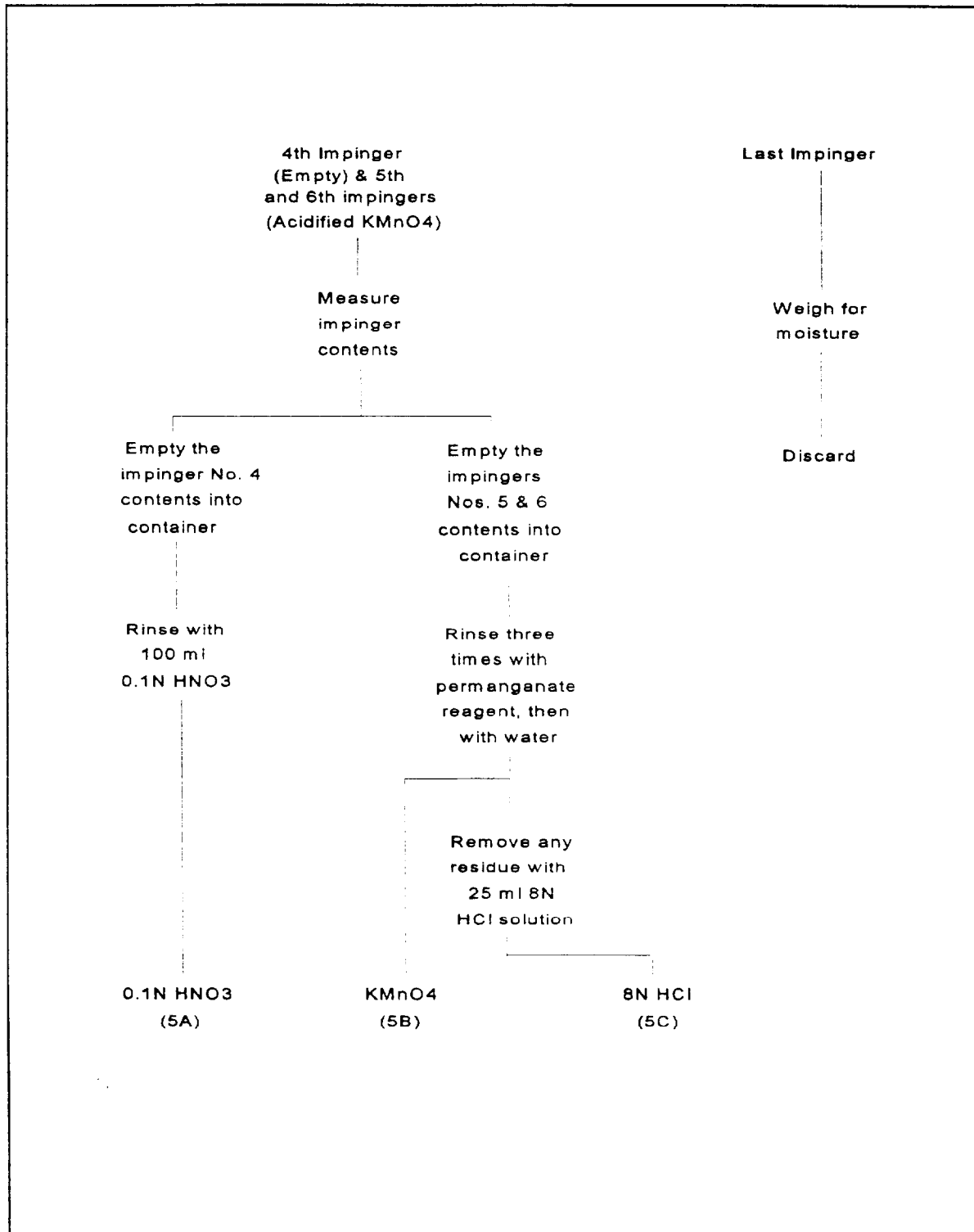


Figure 5.3 Method 29 Sample Recovery Scheme (Sample Fractions 1-4)
Asphalt Plant "A", Clayton NC



**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	< ±1.5
		562	561	0.17	< ±1.5
		628	629	0.16	< ±1.5
5B	Stack Gas	496	499	0.60	< ±1.5
		553	559	1.0	< ±1.5
		596	596	0	< ±1.5
RT3	Stack Gas	501	501	0	< ±1.5
		532	532	0	< ±1.5
		670	672	0.30	< ±1.5
RT20	Stack Gas	492	493	0.20	< ±1.5
		534	532	0.37	< ±1.5
		672	671	0.15	< ±1.5
RT11	Impinger Exit	496	495	0.20	< ±1.5
		532	534	0.37	< ±1.5
		670	670	0	< ±1.5
SH4	Impinger Exit	497	496	0.20	< ±1.5
		532	535	0.56	< ±1.5
		670	669	0.15	< ±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 (ΔH_o), cannot differ from the average by more than 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 than 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	$-10^\circ \leq \alpha_1 \leq 10^\circ$	2.5	2	2
α_2	$-10^\circ \leq \alpha_1 \leq 10^\circ$	-2.5	-1	1
β_1	$-5^\circ \leq \alpha_1 \leq 5^\circ$	1	2	0
β_2	$-5^\circ \leq \alpha_1 \leq 5^\circ$	-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	$0.1875" \leq D_t \leq 0.375"$	0.370	0.383	0.375
$A/2D_t$	$1.05 D_t \leq P \leq 1.50 D_t$	$0.389 \leq 0.55 \leq 0.555$	$0.402 \leq 0.5 \leq 0.575$	$0.394 \leq 0.503 \leq 0.563$
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 (ΔH_o)		
	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 than 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 $\pm 20\%$.

Table 6.9 presents the results of the serial dilution analyses. Serial dilution analyses are not considered valid when the analyte concentration is less than 10 times RDL for ICP analyses, and 5 times RDL for GFAA analyses. The quality control relative percent deviation (RPD) for serial dilutions is $\pm 10\%$. 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 ($\mu\text{g/L}$), which is slightly greater than the RDL of 2 $\mu\text{g/L}$ 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 $\pm 20\%$. 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									
<u>Internal Standards</u>									
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%
<u>Surrogate Standards</u>									
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%
<u>Alternate Standards</u>									
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									
<u>Internal Standards</u>									
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-O-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 ($\mu\text{g/L}$)	Recovered Amount ($\mu\text{g/L}$)	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 $\mu\text{g/L}$	Recovered Amount $\mu\text{g/L}$
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

Date Collected: 7/25/97

Project:

Time Collected:

Project Name:

Date Received: 8/7/97

Sampler:

Time Received: 9:00

State Certification: 387

Sample Type: Oil

Analyte	Result	Units	Report Limit	Qsn 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	2.0	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										
Chlorine in Oil	464.	mg/kg	10.0	10.0	1	8/12/97	15:50	K. Witte	937C	2668
Asn	0.57	%		0.01	1	8/9/97	14:17	A. Hardison	D402	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. Baur	ASTM D908	8920

ND = Not detected at the report limit.

Flash point: Agitability reported to the nearest 10 deg F.

Report Approved By:

Report Date: 8/14/97

Theodore J. Duello, Ph.D., Q.A. Officer
Michael M. 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
941-293-7884

PRODUCT INFORMATION

Trade Name: AD-here LOF 65-00

Chemical Family: Amines

Composition: Modified Fatty Amidoamine

HMS 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: DG 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	1.008	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: Bayhouse Inlet Clock Time: 13:00
 Run #: PRELIMINARY Operators: AB/AD
 Barometric Pressure, in. Hg: 29.90 Static Pressure, in. H₂O: -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 ₂ O	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
		$\overline{\Delta P} = 0.512$	$\overline{T_s} = 194.3$

1 = 7.2°

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

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

$$M_d =$$

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

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

$$M_s =$$

$$T_s = \quad ^\circ F = \quad ^\circ R (^\circ F + 460)$$

$$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$$

$$P_s = \quad \text{in. Hg}$$

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

$$V_s = 85.49 \times C_p \times \sqrt{\overline{\Delta P}} \times \sqrt{\frac{T_s (^\circ R)}{P_s \times M_s}}$$

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

$$V_s = \quad \text{ft/s}$$

$$A_s = \quad \text{ft}^2$$

$$Q_s = V_s \times A_s \times 60 \text{ s/m}$$

$$Q_s = \quad \times \quad \times 60$$

$$Q_s = \quad \text{acfm}$$

$$Q_{s, \text{std}} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{\%H_2O}{100})$$

$$Q_{s, \text{std}} = \quad \times 17.647 \times \quad \times (1 - \frac{\quad}{100})$$

$$Q_{s, \text{std}} = \quad \text{dscfm}$$

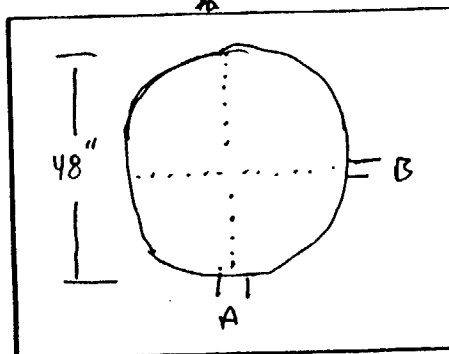


PACIFIC ENVIRONMENTAL SERVICES, INC.

Plant ASPHALT PLANT "A"
 Date 8-19-97
 Sampling Location Inlet to bag house
 Sample Type Dioxin & Furans
 Run Number S-23-T-1
 Operator ADD
 Barometric Pressure (B) 29.90
 Static Pressure (S) -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

Ave 15 170
 11 $\sqrt{DP}$.512

FIELD DATA



Schematic of
Traverse Point Layout

CO ₁			
O ₂			
CO			
N ₂			

Condensers	
V ₁ : Silica gel	
Total H ₂ O	

Probe Length and Type 6' Glass
 Pitot Tube I.D. No. Deeco 5C
 Nozzle I.D. .312
 Assumed Moisture, % 25
 Meter Box Number M5-4
 Meter Δ H @ 1.818
 Meter Gamma 1.021
 Reference p .512
 Post Test Leak Rate = 0.003 cfm @ 20" in. Hg
 Post Test Pitot Leak Check _____
 Post Test Orsat Leak Check _____

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vol) ft ³	Velocity Head (ft) in. H ₂ O	Orifice Pres. Differential (dH) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum in. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
A1	0	17:05	696.812									
		19:15	696.812	0.33	1.73	1.8	231	231 / 253	67	89	84	5
		1	699.12	0.25	1.34	1.3	232	235 / 251	63	95	84	7
2	10	19:25	701.93	0.42	2.20	2.3	229	237 / 252	59	99	86	22
3	20	19:38	704.831	0.42	2.26	2.3	226	235 / 235	68	90	91	18
4	20	1										
5	40	1										
6	50	1										
7	60	1										
8	70	1										
9	80	1										
10	90	1										
11	100	1										
12	110	1										

ter
 ossed →

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

S-23-I-1

Plant: ASPHALT PLANT "A"						Run No.: # PBR 1	
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: —	

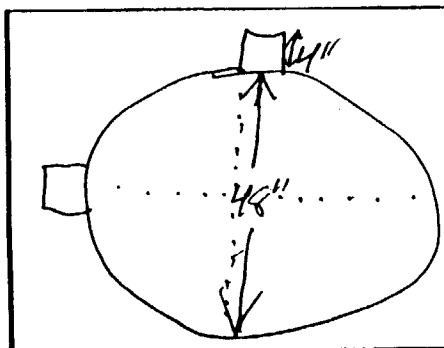
294.1
COND. 292.6



PACIFIC ENVIRONMENTAL SERVICES, INC.

Plant ASPHALT PLANT "A"
 Date 8-19-97
 Sampling Location Inlet to Baghouse
 Sample Type PM - Metals
 Run Number 599-I-1
 Operator ATB
 Barometric Pressure (P_b) 29.90
 Static Pressure (P_s) -2.5
 Filter Number(s) MC7-001 (1MM)
 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 1 of 1

FIELD DATA



Schematic of Traverse Point Layout

Temp. Sensor ID No.

CO ₁			
O ₂			
CO			
N ₂			

Condensers	
V ₁ : Silica gel	
Total H ₂ O	

Probe Length and Type 6' Glass
 Pitot Tube I.D. No. 58
 Nozzle I.D. 3/16" ATB .311
 Assumed Moisture, % 25%
 Meter Box Number M5 #9
 Meter Δ H @ 1.776
 Meter Gamma 1.016
 Reference ρ .572
 Post Test Leak Rate = .007 cfm @ 10" in. Hg
 Post Test Pitot Leak Check ✓
 Post Test Orsat Leak Check ✓

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vol) ft ³	Velocity Head (ft) in. H ₂ O	Orifice Pres. Differential (ΔH) in. H ₂ O		Stack Temp. °F (T ₁)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum in. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
12	0	1:50	105.740									
12	01	9:16	105.740	.23	1.20	1.20	230	233/260	51	91	88	2
11	05	1	108.10	.22	1.09	1.10	233	235/265	50	93	88	5
11	10	9:30	111.20	.25	1.24	1.20	228	234/260	49	96	89	23
10	15	10:05	113.35	.18	0.90	0.90	227	232/257	50	97	95	6
10	20	10:10	116.52									
9	25	1										
9	30	1										
8	35	1										
8	40	1										
8	45	1										
7	50	1										
6	55	1										
6	60	1										
5	65	1										
5	70	1										
4	75	1										
4	80	1										
3	85	1										
3	90	1										
2	95	1										
2	100	1										
1	105	1										
1	110	1										

Port 3
Filter Change

MULT

DO
NOT
COPY
↓

SAMPLE 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	—	—		
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	KMNO ₄ /H ₂ O 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 ₂ O ₂	100	704.7	723.1	18.4
3	5% HNO ₃ / 10% H ₂ O ₂	100	730.3	734.9	4.6
4	Empty	—	636.2	636.7	0.5
5	KMNO ₄ / H ₂ SO ₄	100	681.0	681.5	0.5
6	KMNO ₄ / H ₂ SO 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

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	

SECRET

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	19.2	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	

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		OBSERVATION DATE		START TIME		STOP TIME	
Baghouse Outlet		8-19-97		9:18		11:06	
ADDRESS		SEC	0	15	30	45	SEC
ASPHALT PLANT "A"		MIN	0	15	30	45	MIN
1010 Rd (Cleveland Rd)		1	5	0	5	0	31
CITY	STATE NC	2	0	0	0	5	32
PHONE	SOURCE ID NUMBER	3	0	0	5	5	33
PROCESS EQUIPMENT		4	0	0	0	5	34
aggregate dryer		5	5	0	5	0	35
CONTROL EQUIPMENT		6	0	0	5	0	36
baghouse		7	0	5	0	5	37
OPERATING MODE		8	5	10	0	5	38
normal		9	0	15	0	5	39
DESCRIBE EMISSION POINT		10	5	5	5	0	40
START rectangular STOP same		11	0	0	5	0	41
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	12	0	0	0	0	42
START 29 ft STOP same	START 0 STOP same	13	5	0	0	5	43
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER	14	0	0	0	5	44
START 450 ft STOP same	START WEST STOP same	15	5	5	0	0	45
DESCRIBE EMISSIONS		16	0	0	5	0	46
START condensation cone STOP small amount of condensation		17	0	0	0	5	47
EMISSION COLOR	PLUME TYPE	18	0	5	0	0	48
START pale STOP white	CONTINUOUS ☒	19	0	0	0	0	49
WATER DROPLETS PRESENT	FUGITIVE ☐	20	0	0	5	0	50
NO ☐ YES ☒	INTERMITTENT ☐	21	5	0	0	5	51
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	IF WATER DROPLET PLUME	22	10	5	0	0	52
START 1 dia above exit STOP same	ATTACHED ☐	23	0	0	5	0	53
DESCRIBE BACKGROUND		24	0	0	0	0	54
START trees STOP same		25	0	0	0	0	55
BACKGROUND COLOR	SKY CONDITIONS	26	5	0	0	0	56
START green STOP	START scattered STOP same	27	1	5	0	0	57
WIND SPEED	WIND DIRECTION	28	1	0	0	0	58
START 2-4 mph STOP	START NW STOP same	29	0	5	5	0	59
AMBIENT TEMP.	WET BULB TEMP.	30	0	0	0	5	60
START 77 STOP 86	67	AVERAGE OPACITY FOR HIGHEST PERIOD		3.54%		NUMBER OF READINGS ABOVE 5 % WERE 3	
	59	RANGE OF OPACITY READINGS		MINIMUM 0		MAXIMUM 15	
Source Layout Sketch		Observer's Name (Print)		David Goshaw		Observer's Signature	
		Observer's Signature		DATE 8-19-97		Organization	
Draw North Arrow Silos Emission Point - Stack Observers Position - on large aggregate pile Sun Location Line 140° RT 42° Plume and Stack Wind Sun J-40		Organization		DECO Inc		Certified By	
Comments		Certified By		ETA		Date	
1 - indicates fugitive emission obstruction		Verified By				Date	
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SIGNATURE		Date					
TITLE		Date					

- 1 min break

*

VISIBLE EMISSIONS RECORD

RUN NO. 18

SOURCE NAME <u>Baghouse Exit</u>		OBSERVATION DATE <u>8-19-97</u>		START TIME <u>11:07</u>		STOP TIME <u>12:07</u>	
ADDRESS <u>Asphalt Plant "A"</u>		SEC MIN		SEC MIN			
<u>1010 Rd (Cleveland Rd)</u>		0 15 30 45		0 15 30 45			
CITY	STATE <u>NC</u>	ZIP					
PHONE	SOURCE ID NUMBER						
PROCESS EQUIPMENT <u>aggregate dryer</u>		OPERATING MODE					
CONTROL EQUIPMENT <u>baghouse</u>		OPERATING MODE <u>normal</u>					
DESCRIBE EMISSION POINT <u>rectangular stack</u>		START <u>yellow</u> STOP <u>same</u>					
HEIGHT ABOVE GROUND LEVEL <u>29 ft</u> STOP <u>same</u>		HEIGHT RELATIVE TO OBSERVER <u>0</u> STOP <u>same</u>					
DISTANCE FROM OBSERVER <u>450 ft</u> STOP <u>same</u>		DIRECTION FROM OBSERVER <u>WEST</u> STOP <u>same</u>					
DESCRIBE EMISSIONS <u>con'g condensing</u>		START <u>same</u> STOP <u>same</u>					
EMISSION COLOR <u>grey</u>		PLUME TYPE: CONTINUOUS ☒					
START <u>pink</u> STOP <u>same</u>		FUGITIVE ☐ INTERMITTENT ☐					
WATER DROPLETS PRESENT: NO ☐ YES ☒		IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☒					
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED <u>23 ft above exit</u>		START <u>same</u> STOP <u>same</u>					
DESCRIBE BACKGROUND <u>trees</u>		STOP <u>same</u>					
BACKGROUND COLOR <u>green</u>		STOP <u>same</u>					
SKY CONDITIONS <u>scattered</u>		STOP <u>same</u>					
WIND SPEED <u>2</u> STOP <u>same</u>		WIND DIRECTION <u>NW</u> STOP <u>same</u>					
AMBIENT TEMP. <u>86</u> STOP <u>88</u>		WET BULB TEMP. <u>68</u>		RH, percent <u>38</u>			
Source Layout Sketch		Draw North Arrow					
7-40 Sun & Wind → Plume and Stack 140° Sun Location Line		Rt 42 →					
AVERAGE OPACITY FOR HIGHEST PERIOD <u>1.67%</u>		NUMBER OF READINGS ABOVE 5% WERE <u>1</u>					
RANGE OF OPACITY READINGS MINIMUM <u>0</u> MAXIMUM <u>10</u>							
OBSERVER'S NAME (PRINT) <u>David Goshaw</u>							
OBSERVER'S SIGNATURE <u>[Signature]</u>		DATE <u>8-19-97</u>					
ORGANIZATION <u>DEECO Inc</u>							
CERTIFIED BY <u>ETA</u>		DATE <u>3/97</u>					
VERIFIED BY		DATE					
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE							
TITLE		DATE					
COMMENTS <u>fugitive obstruction</u>							
<u>omission</u>							

VISIBLE EMISSIONS RECORD

RUN NO. 16

SOURCE NAME <u>Baghouse Exit</u>			OBSERVATION DATE <u>8-19-97</u>				START TIME # <u>13:04</u>				STOP TIME <u>14:04</u>			
ADDRESS <u>Asphalt Plant "A"</u>			SEC MIN 0 15 30 45				SEC MIN 0 15 30 45							
<u>1010 Rd (Cleveland Rd)</u>			1 5 0 0 5				31 5 0 5 5							
CITY	STATE <u>NC</u>	ZIP	2 5 0 5 0				32 10 5 0 0							
PHONE	SOURCE ID NUMBER		3 10 5 0 0				33 / / 0 5							
PROCESS EQUIPMENT <u>aggregate dryer</u>		OPERATING MODE	4 0 0 5 /				34 / 0 0 /							
CONTROL EQUIPMENT <u>BAGHOUSE</u>		OPERATING MODE <u>NORMAL</u>	5 0 5 0 5				35 0 5 5 0							
DESCRIBE EMISSION POINT			6 0 5 0 0				36 10 5 5 5							
START <u>rectangular yellow stack</u> STOP <u>same</u>			7 5 0 0 0				37 5 5 0 5							
HEIGHT ABOVE GROUND LEVEL		HEIGHT RELATIVE TO OBSERVER	8 0 0 5 /				38 0 5 5 0							
START <u>29 ft</u> STOP <u>same</u>		START <u>29 ft</u> STOP <u>same</u>	9 0 0 0 /				39 0 5 0 5							
DISTANCE FROM OBSERVER		DIRECTION FROM OBSERVER	10 / 5 5 0				40 5 / 5 /							
START <u>300 ft</u> STOP <u>same</u>		START <u>NE</u> STOP <u>same</u>	11 / 0 5 0				41 5 0 0 0							
DESCRIBE EMISSIONS			12 5 5 0 5				42 5 10 5 /							
START <u>coning</u> STOP <u>same</u>			13 0 0 0 5				43 / 5 0 5							
EMISSION COLOR		PLUME TYPE: CONTINUOUS ☒	14 / / / 0				44 5 0 5 10							
START <u>grey</u> STOP <u>same</u>		FUGITIVE ☐ INTERMITTENT ☐	15 0 / 5 0				45 5 0 5 0							
WATER DROPLETS PRESENT: NO ☐ YES ☒		IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☒	16 / 5 0 0				46 0 5 0 5							
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED			17 5 0 0 5				47 0 0 5 0							
START <u>3 ft above exit</u> STOP <u>same</u>			18 0 0 5 0				48 0 5 0 5							
DESCRIBE BACKGROUND			19 0 5 5 /				49 0 5 5 5							
START <u>trees</u> STOP <u>same</u>			20 10 5 / /				50 5 5 0 5							
BACKGROUND COLOR		SKY CONDITIONS	21 0 0 5 5				51 5 / 5 5							
START <u>green</u> STOP <u>same</u>		START <u>scattered</u> STOP <u>same</u>	22 0 5 / /				52 0 5 0 5							
WIND SPEED		WIND DIRECTION	23 / 5 5 0				53 5 0 5 0							
START <u>2-3 mph</u> STOP <u>same</u>		START <u>NW</u> STOP <u>same</u>	24 0 5 5 0				54 5 0 / 0							
AMBIENT TEMP.		WET BULB TEMP.	25 0 0 5 5				55 5 0 0 0							
START <u>88</u> STOP <u>89</u>		RH. percent <u>34</u>	26 0 5 5 0				56 0 5 0 5							
Source Layout Sketch			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 <u>3.5%</u>				NUMBER OF READINGS ABOVE 5% WERE <u>7</u>							
RANGE OF OPACITY READINGS				MINIMUM <u>0</u> MAXIMUM <u>10</u>										
OBSERVER'S NAME (PRINT) <u>David Goshaw</u>														
COMMENTS <u>1 - interference from fugitive source</u>			OBSERVER'S SIGNATURE <u>[Signature]</u>				DATE <u>8-19-97</u>							
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS			ORGANIZATION <u>DEECO Inc</u>											
SIGNATURE			CERTIFIED BY <u>ETA</u>				DATE <u>3/97</u>							
TITLE			VERIFIED BY				DATE							

VISIBLE EMISSIONS RECORD

RUN NO. 10

SOURCE NAME <u>Baghouse Exit</u>		OBSERVATION DATE <u>8-19-97</u>		START TIME <u>14:12</u>		STOP TIME <u>15:12</u>	
ADDRESS <u>ASPHALT PLANT "A"</u>		SEC MIN		SEC MIN			
<u>1010 Rd</u> <u>(Cleveland Rd)</u> ^{Corp.}		1 5 5 0 5 31		/ 5 0 5			
CITY	STATE <u>NC</u> ZIP	2 5 0 0 5 32		5 5 5 5			
PHONE	SOURCE ID NUMBER	3 0 5 0 10 33		5 / 0 5			
PROCESS EQUIPMENT <u>aggregate dryer</u>	OPERATING MODE	4 0 5 0 0 34		0 5 5 0			
CONTROL EQUIPMENT <u>Baghouse</u>	OPERATING MODE <u>Normal</u>	5 5 5 0 0 35		/ 5 10 5			
DESCRIBE EMISSION POINT		6 0 0 / 0 36		0 5 5 5			
START <u>rectangular yellow stack</u> STOP <u>same</u>		7 / 0 5 5 37		/ / / /			
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	8 / 5 0 0 38		5 5 5 5			
START <u>29ft</u> STOP <u>same</u>	START <u>29ft</u> STOP <u>same</u>	9 / 5 0 5 39		5 0 5 5			
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER	10 5 0 5 5 40		0 5 0 0			
START <u>300ft</u> STOP <u>same</u>	START <u>NE</u> STOP <u>same</u>	11 0 0 / / 41		0 0 5 5			
DESCRIBE EMISSIONS		12 5 5 0 5 42		0 0 0 5			
START <u>coning</u> STOP <u>same</u>		13 5 5 5 5 43		5 0 0 0			
EMISSION COLOR	PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐	14 / / / 5 44		0 5 5 5			
START <u>grey</u> STOP <u>same</u>		15 5 5 0 / 45		5 5 5 5			
WATER DROPLETS PRESENT: NO ☐ YES ☒	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☒	16 5 0 5 0 46		0 5 0 5			
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED		17 / 5 5 0 47		0 5 5 0			
START <u>3ft above exit</u> STOP <u>same</u>		18 5 0 5 / 48		5 5 0 5			
DESCRIBE BACKGROUND		19 / / 5 5 49		5 5 5 5			
BACKGROUND COLOR	SKY CONDITIONS	20 10 0 5 0 50		5 5 5 5			
START <u>green</u> STOP <u>same</u>	START <u>scattered</u> STOP <u>same</u>	21 / 5 5 5 51		10 10 10 10			
WIND SPEED	WIND DIRECTION	22 5 5 5 5 52		5 / / /			
START <u>2-3 mph</u> STOP <u>same</u>	START <u>NW</u> STOP <u>same</u>	23 5 5 / 5 53		5 5 5 10			
AMBIENT TEMP. <u>88</u>	WET BULB TEMP. <u>68</u> RH. percent <u>34</u>	24 5 5 / / 54		5 10 10 5			
START <u>88</u> STOP <u>88</u>		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			
Source Layout Sketch		AVERAGE OPACITY FOR <u>6.46%</u> HIGHEST PERIOD		NUMBER OF READINGS ABOVE <u>5</u> % WERE <u>11</u>			
Draw North Arrow <u>I-40</u>		RANGE OF OPACITY READINGS		MINIMUM <u>0</u> MAXIMUM <u>10</u>			
		OBSERVER'S NAME (PRINT) <u>David Goshaw</u>		OBSERVER'S SIGNATURE <u>[Signature]</u> DATE <u>8-19-97</u>			
COMMENTS <u>negative interference</u>		ORGANIZATION <u>DEECO Inc</u>		CERTIFIED BY <u>ETA</u> DATE <u>3/97</u>			
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Visible Emission Observation Form

2A

SOURCE NAME			OBSERVATION DATE				START TIME				STOP TIME			
Baghouse Exit			8-20-97				8:24				9:24			
ADDRESS			SEC	0	15	30	45	SEC	0	15	30	45		
ASPHALT PLANT "A"			MIN					MIN						
1010 Rd (Cleveland Rd)			1	0	0	0	0	31	—	5	0	0		
CITY	STATE	ZIP	2	0	0	0	5	32	—	0	—	0		
PHONE	SOURCE ID NUMBER		3	0	0	5	0	33	0	0	5	0		
PROCESS EQUIPMENT		OPERATING MODE	4	0	0	0	0	34	0	0	5	0		
aggregate dryer			5	5	5	0	0	35	5	0	0	0		
CONTROL EQUIPMENT		OPERATING MODE	6	0	0	0	0	36	0	0	0	5		
baghouse		normal	7	0	0	0	0	37	0	0	5	0		
DESCRIBE EMISSION POINT			8	0	0	0	0	38	5	—	0	5		
START yellow rectangular STOP same			9	0	0	0	0	39	0	—	—	0		
HEIGHT ABOVE GROUND LEVEL		HEIGHT RELATIVE TO OBSERVER	10	5	0	0	0	40	0	0	0	0		
START 29 ft STOP same		START 3 ft STOP same	11	0	5	0	0	41	0	5	5	0		
DISTANCE FROM OBSERVER		DIRECTION FROM OBSERVER	12	0	0	0	0	42	0	0	0	0		
START 475 ft STOP same		START NW STOP same	13	0	0	5	0	43	0	0	0	0		
DESCRIBE EMISSIONS			14	5	0	—	0	44	0	0	0	5		
START coming/condensing STOP same			15	—	0	0	0	45	0	0	5	5		
EMISSION COLOR		PLUME TYPE: CONTINUOUS ☒	16	0	0	0	0	46	10	0	0	0		
START light gray STOP same		FUGITIVE ☒ INTERMITTENT ☒	17	0	0	5	0	47	0	5	0	0		
WATER DROPLETS PRESENT: NO ☐ YES ☒		IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☒	18	0	0	0	0	48	0	—	—	0		
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED			19	0	0	0	0	49	—	—	0	0		
START 3 ft above exit STOP same			20	0	0	0	0	50	0	0	0	0		
DESCRIBE BACKGROUND			21	0	0	0	5	51	5	0	0	0		
BACKGROUND COLOR		SKY CONDITIONS	22	0	0	0	0	52	0	0	—	0		
START green STOP same		START broken STOP overcast	23	5	0	0	0	53	0	0	0	0		
WIND SPEED		WIND DIRECTION	24	0	0	0	0	54	—	—	0	0		
START 0-1 mph STOP 2-5 mph		START North STOP N	25	0	0	0	5	55	0	0	0	0		
AMBIENT TEMP		WET BULB TEMP.	26	0	0	0	0	56	5	0	—	0		
START 74 STOP 79		66	27	0	0	5	0	57	0	0	0	5		
		RH. percent	28	0	0	0	0	58	0	0	5	0		
		65	29	—	—	0	—	59	0	0	5	0		
↑ plant entrance Source Layout Sketch Draw North Arrow Emission Point Observers Position - on recycled asphalt hill Sun Location Line 140 ft Sun - Wind - Plume and Stack			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										
COMMENTS														
small intermittent opacity "puffs" every few minutes for ~1 second														
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TITLE														
DATE														

Visible Emission Observation Form

28

SOURCE NAME Baghouse Exit				OBSERVATION DATE 8-20-97				START TIME 9:30				STOP TIME 10:30					
ADDRESS ASPHALT PLANT "A"				SEC MIN 0 15 30 45				SEC MIN 0 15 30 45									
1010 Rd (Cleveland Rd)				1 0 0 0 0				31 - 0 0 10									
CITY		STATE NC		ZIP		2 0 0 5 0		32 0 5 0 0									
PHONE		SOURCE ID NUMBER		3 0 0 0 0		33 0 0 0 0											
PROCESS EQUIPMENT aggregate dryer		OPERATING MODE		4 0 0 0 0		34 0 0 5 0											
CONTROL EQUIPMENT baghouse		OPERATING MODE normal		5 0 5 0 10		35 0 0 0 0											
DESCRIBE EMISSION POINT				6 0 0 0 5				36 0 0 10 -									
START yellow rectangular stack STOP same				7 0 0 0 0				37 0 5 0 0									
HEIGHT ABOVE GROUND LEVEL		HEIGHT RELATIVE TO OBSERVER		8 0 0 0 0				38 15 0 0 0									
START 29ft STOP same		START 3ft STOP same		9 0 0 0 0				39 0 0 0 0									
DISTANCE FROM OBSERVER		DIRECTION FROM OBSERVER		10 5 0 0 0				40 0 0 0 0									
START 475ft STOP same		START NW STOP same		11 0 - - -				41 0 0 0 0									
DESCRIBE EMISSIONS				12 - 0 0 0				42 0 0 0 0									
START coning STOP same				13 0 0 0 0				43 0 10 0 0									
EMISSION COLOR		PLUME TYPE: CONTINUOUS ☒		14 0 0 0 0				44 0 10 - 0									
START light gray STOP		FUGITIVE ☐ INTERMITTENT ☒		15 - 0 5 0				45 5 10 0 5									
WATER DROPLETS PRESENT: NO ☐ YES ☒		IF WATER DROPLET PLUME ATTACHED ☐ DETACHED ☒		16 0 0 0 0				46 0 0 0 0									
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED				17 5 - 0 0				47 10 0 0 5									
START 2-3ft above exit STOP same				18 0 0 0 0				48 0 0 0 0									
DESCRIBE BACKGROUND				19 0 5 0 0				49 0 - 5 10									
START trees STOP same				20 0 0 0 0				50 0 10 0 5									
BACKGROUND COLOR		SKY CONDITIONS		21 0 10 0 -				51 0 5 0 0									
START green STOP same		START overcast STOP same		22 0 0 0 0				52 0 0 5 0									
WIND SPEED		WIND DIRECTION		23 0 0 0 0				53 0 0 0 5									
START 1-5 mph STOP same		START North STOP same		24 0 0 0 5				54 5 0 0 0									
AMBIENT TEMP		WET BULB TEMP.		RH, percent		25 - 0 0 0				55 0 0 0 0							
START 79 STOP 83		69		60		26 0 0 0 0				56 0 0 0 5							
plant entrance Source Layout Sketch Draw North Arrow Silos Emission Point Sun Wind → Plume and Stack Observers Position 140° Sun Location Line I-40				27 0 0 0 0				57 0 0 10 0									
				28 0 0 0 0				58 15 0 0 0									
				29 0 0 0 0				59 5 - 5 0									
				30 0 0 0 5				60 0 10 0 0									
				AVERAGE OPACITY FOR HIGHEST PERIOD 2-7%				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													
				I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE				CERTIFIED BY ETA				DATE 3-97					
TITLE		DATE		VERIFIED BY				DATE									

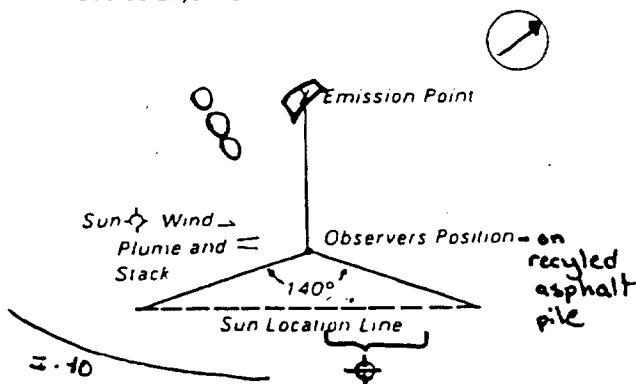
NOTE: intermittent opacity "puffs" for ~1/second

Visible Emission Observation Form

2c

SOURCE NAME			OBSERVATION DATE				START TIME		STOP TIME			
Baghouse Exit			8-20-97				10:35		11:35			
ADDRESS			SEC	0	15	30	45	SEC	0	15	30	45
Asphalt Plant "A"			MIN					MIN				
1010 Rd, (Cleveland Corp. Rd)			1	0	5	—	0	31	15	0	0	0
CITY	STATE	ZIP	2	—	0	0	10	32	0	10	0	20
PHONE	SOURCE ID NUMBER		3	0	—	—	—	33	0	—	0	0
PROCESS EQUIPMENT		OPERATING MODE	4	—	0	0	15	34	0	10	0	5
aggregate dryer			5	0	0	5	0	35	0	5	0	0
CONTROL EQUIPMENT		OPERATING MODE	6	0	—	0	0	36	0	—	0	0
baghouse		normal	7	0	0	0	15	37	0	0	0	—
DESCRIBE EMISSION POINT			8	0	—	0	—	38	0	0	0	0
START rectangular yellow STOP same			9	0	0	0	0	39	10	0	0	0
HEIGHT ABOVE GROUND LEVEL			10	0	0	15	0	40	0	0	5	0
START 29ft STOP same			11	0	5	0	0	41	0	0	10	0
HEIGHT RELATIVE TO OBSERVER			12	—	0	0	0	42	0	0	0	0
START 3ft STOP same			13	0	0	0	0	43	—	0	5	0
DISTANCE FROM OBSERVER			14	0	0	5	0	44	0	0	15	0
START 475ft STOP same			15	—	0	0	0	45	—	—	0	0
DIRECTION FROM OBSERVER			16	0	0	5	0	46	0	0	—	—
START NW STOP same			17	0	0	0	0	47	0	0	—	0
DESCRIBE EMISSIONS			18	0	0	—	0	48	0	0	10	0
START coning STOP same			19	—	0	5	0	49	0	0	0	0
EMISSION COLOR			20	10	0	0	0	50	0	0	0	5
START light grey STOP same			21	0	0	0	10	51	5	10	5	0
PLUME TYPE: CONTINUOUS ☒			22	0	—	—	0	52	0	0	0	0
FUGITIVE ☐ INTERMITTENT ☒			23	0	0	0	0	53	0	0	0	—
WATER DROPLETS PRESENT: NO ☒ YES ☐			24	0	0	5	0	54	0	0	0	—
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐			25	—	0	0	0	55	0	0	—	0
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED			26	0	0	—	5	56	0	0	0	—
START 4ft above exit STOP same			27	0	0	0	0	57	0	15	0	0
DESCRIBE BACKGROUND			28	5	0	0	10	58	0	0	0	—
START trees STOP same			29	0	0	10	0	59	0	0	—	0
BACKGROUND COLOR			30	0	10	0	0	60	0	10	0	0
START green STOP same			AVERAGE OPACITY FOR HIGHEST PERIOD 3.75%			NUMBER OF READINGS ABOVE % WERE						
SKY CONDITIONS			RANGE OF OPACITY READINGS			MINIMUM			MAXIMUM			
START overcast STOP same			MINIMUM			0			MAXIMUM 20			
WIND SPEED			OBSERVER'S NAME (PRINT)			David Goshaw						
START 2-6 mph STOP same			OBSERVER'S SIGNATURE			DATE			8-20-97			
WIND DIRECTION			ORGANIZATION			DEECO Inc						
START North STOP same			CERTIFIED BY			ETA			DATE 3-97			
AMBIENT TEMP			VERIFIED BY						DATE			
START 83 STOP same			TITLE			DATE						
WET BULB TEMP.												
RH. percent												
70												
52												

↑ plant entrance
Source Layout Sketch Draw North Arrow



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

OBSERVER'S SIGNATURE
DATE 8-20-97
ORGANIZATION DEECO Inc
CERTIFIED BY ETA
DATE 3-97
VERIFIED BY
DATE

Visible Emission Observation Form

20

SOURCE NAME <u>Baghouse Exit</u>			OBSERVATION DATE <u>8-20-97</u>				START TIME <u>11:40</u>				STOP TIME <u>12:40</u>			
ADDRESS <u>ASPHALT PLANT "A"</u>			SEC MIN				SEC MIN				SEC MIN			
<u>1010 Rd (Cleveland Rd)</u>			0	15	30	45	0	15	30	45	0	15	30	45
CITY	STATE <u>NC</u>	ZIP	1	0	0	0	31	0	0	0	0	0	0	0
PHONE	SOURCE ID NUMBER		2	0	0	0	32	0	0	0	0	0	0	0
PROCESS EQUIPMENT <u>aggregate dryer</u>		OPERATING MODE	3	0	0	0	33	0	0	0	0	0	0	0
CONTROL EQUIPMENT <u>baghouse</u>		OPERATING MODE <u>Normal</u>	4	0	0	0	34	0	0	0	0	0	0	0
DESCRIBE EMISSION POINT START <u>yellow rectangular stack</u> STOP <u>same</u>			5	0	0	0	35	0	0	0	0	0	0	0
HEIGHT ABOVE GROUND LEVEL START <u>29 ft</u> STOP <u>same</u>		HEIGHT RELATIVE TO OBSERVER START <u>- 3 ft</u> STOP <u>same</u>	6	10	0	0	36	0	0	0	0	0	0	0
DISTANCE FROM OBSERVER START <u>475 ft</u> STOP <u>same</u>		DIRECTION FROM OBSERVER START <u>NW</u> STOP <u>same</u>	7	5	0	0	37	0	0	0	0	0	0	0
DESCRIBE EMISSIONS START <u>coning</u> STOP <u>same</u>			8	0	0	0	38	0	0	0	0	0	0	0
EMISSION COLOR START <u>light grey</u> STOP		PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☒	9	0	0	10	39	15	0	15	0	0	0	0
WATER DROPLETS PRESENT: NO ☒ YES ☐		IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	10	0	0	0	40	0	0	0	0	0	0	0
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START <u>4 ft above exit</u> STOP <u>same</u>			11	0	0	0	41	0	0	0	0	0	0	0
DESCRIBE BACKGROUND START <u>trees</u> STOP <u>same</u>			12	0	0	0	42	5	0	0	0	0	0	0
BACKGROUND COLOR START <u>green</u> STOP <u>same</u>		SKY CONDITIONS START <u>overcast</u> STOP <u>broken</u>	13	0	0	0	43	0	0	0	0	0	0	0
WIND SPEED START <u>5-10 mph</u> STOP <u>5-10 mph</u>		WIND DIRECTION START <u>NW</u> STOP <u>NW</u>	14	5	0	0	44	0	0	0	0	0	0	10
AMBIENT TEMP START <u>83</u> STOP <u>84</u>		WET BULB TEMP. <u>71</u> RH. percent <u>55</u>	15	0	15	10	45	10	0	0	0	0	0	0
Source Layout Sketch Draw North Arrow			16	0	0	0	46	0	0	0	0	0	0	0
↑ plant entrance X Emission Point → Sun → Wind Plume and Stack Observers Position on road Sun Location Time 140°			17	0	0	0	47	5	0	0	0	0	0	0
COMMENTS <u>intermittent opacity cycles of 4 sec for ~ 1 second</u>			18	0	10	0	48	0	0	0	0	0	0	0
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE			19	0	0	0	49	0	0	0	0	0	0	0
TITLE			20	0	0	0	50	0	0	0	0	0	0	0
DATE			21	0	0	0	51	0	0	0	0	0	0	0
			22	0	0	0	52	0	0	0	0	0	0	0
			23	0	0	0	53	0	0	0	0	0	0	0
			24	0	10	10	54	5	0	10	0	0	0	0
			25	0	0	0	55	0	0	0	0	0	0	0
			26	0	0	0	56	0	0	0	0	0	0	0
			27	0	5	0	57	0	0	0	0	0	0	0
			28	0	0	0	58	0	0	0	0	0	0	0
			29	0	0	0	59	0	0	0	0	0	0	0
			30	0	15	0	60	0	0	0	0	0	0	0
			AVERAGE OPACITY FOR HIGHEST PERIOD <u>2.92%</u>				NUMBER OF READINGS ABOVE % WERE							
			RANGE OF OPACITY READINGS MINIMUM <u>0</u> MAXIMUM <u>15</u>											
			OBSERVER'S NAME (PRINT) <u>David Goshaw</u>											
			OBSERVER'S SIGNATURE <u>[Signature]</u> DATE <u>8-20-97</u>											
			ORGANIZATION <u>DEFCO Inc</u>											
			CERTIFIED BY <u>ETA</u> DATE <u>3-16-97</u>											
			VERIFIED BY				DATE							

Visible Emission Observation Form

3A

SOURCE NAME <u>Baghouse Exit</u>		OBSERVATION DATE <u>8-20-97</u>		START TIME <u>14:05</u>		STOP TIME <u>15:05</u>	
ADDRESS <u>Asphalt Plant "A"</u>		SEC MIN		0	15	30	45
CITY <u>1010 Rd (Cleveland Rd)</u>		STATE <u>NC</u>		ZIP			
PHONE		SOURCE ID NUMBER					
PROCESS EQUIPMENT <u>aggregate dryer</u>		OPERATING MODE					
CONTROL EQUIPMENT <u>baghouse</u>		OPERATING MODE <u>Normal</u>					
DESCRIBE EMISSION POINT START <u>rectangular yellow stack</u> STOP <u>same</u>		1		0	0	0	0
HEIGHT ABOVE GROUND LEVEL START <u>29ft</u> STOP <u>same</u>		2		0	0	0	0
DISTANCE FROM OBSERVER START <u>300ft</u> STOP <u>same</u>		3		0	0	0	0
DESCRIBE EMISSIONS START <u>coming</u> STOP <u>same</u>		4		5	0	0	0
EMISSION COLOR START <u>light grey</u> STOP		5		0	0	0	0
WATER DROPLETS PRESENT: NO ☒ YES ☐		6		0	5	0	0
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START <u>3ft above exit</u> STOP <u>same</u>		7		0	0	0	0
DESCRIBE BACKGROUND START <u>trees</u> STOP <u>same</u>		8		0	0	5	0
BACKGROUND COLOR START <u>green</u> STOP <u>same</u>		9		0	0	5	0
WIND SPEED START <u>2-7 mph</u> STOP		10		0	5	0	0
WIND DIRECTION START <u>NW</u> STOP <u>same</u>		11		0	10	0	0
AMBIENT TEMP START <u>93</u> STOP <u>93</u>		12		0	0	0	10
WET BULB TEMP. <u>74</u>		13		0	0	0	0
RH. percent <u>42</u>		14		0	0	15	0
SOURCE LAYOUT SKETCH		15		0	0	0	10
Draw North Arrow <u>I-40</u>		16		0	0	0	0
RT <u>42</u>		17		0	0	0	0
Emission Point		18		0	0	0	0
silos		19		0	0	0	0
Sun → Wind →		20		5	0	0	0
Plume and Stack		21		0	0	0	0
Observers Position		22		0	0	5	0
140°		23		0	0	0	0
Sun Location Line		24		0	0	0	0
↓ plant entrance		25		0	0	0	0
		26		0	0	0	0
		27		0	0	5	0
		28		0	0	0	0
		29		0	10	0	0
		30		0	0	0	0
		31		0	0	0	0
		32		0	0	0	0
		33		0	0	0	0
		34		0	5	0	0
		35		10	0	0	0
		36		0	0	0	0
		37		0	0	0	0
		38		15	0	10	0
		39		0	0	0	0
		40		0	0	0	0
		41		0	0	0	0
		42		0	0	0	0
		43		0	0	5	0
		44		0	0	10	0
		45		0	5	0	0
		46		0	0	0	0
		47		0	0	0	0
		48		0	0	0	0
		49		5	0	0	0
		50		0	0	0	0
		51		0	0	0	0
		52		0	0	0	0
		53		0	0	0	0
		54		0	5	0	5
		55		0	0	10	0
		56		0	0	0	0
		57		0	0	0	0
		58		5	0	0	0
		59		0	0	0	0
		60		0	5	0	0
AVERAGE OPACITY FOR HIGHEST PERIOD <u>2.29%</u>		NUMBER OF READINGS ABOVE 5% WERE <u>12</u>					
RANGE OF OPACITY READINGS MINIMUM <u>0</u> MAXIMUM <u>15</u>							
OBSERVER'S NAME (PRINT) <u>David Goshaw</u>							
OBSERVER'S SIGNATURE <u>[Signature]</u>		DATE <u>8-20-97</u>					
ORGANIZATION <u>DEECO Inc</u>							
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TITLE		DATE		VERIFIED BY		DATE	

Visible Emission Observation Form

38

SOURCE NAME				OBSERVATION DATE				START TIME				STOP TIME			
BAGHOUSE EXIT				8-20-97				15:10				16:10			
ADDRESS				SEC	0	15	30	45	SEC	0	15	30	45		
ASPHALT PLANT "A"				MIN					MIN						
1010 Rd (Cleveland Rd)				1	0	5	0	0	31	0	0	0	0		
CITY		STATE		ZIP		2	10	-	0	5	32	0	0		
PHONE		SOURCE ID NUMBER		3	0	0	0	10	33	0	-	0	0		
PROCESS EQUIPMENT		OPERATING MODE		4	0	0	0	-	34	-	0	5	0		
aggregate dryer				5	0	0	5	0	35	0	0	5	0		
CONTROL EQUIPMENT		OPERATING MODE		6	0	0	0	0	36	-	5	5	0		
big house		normal		7	0	0	-	0	37	0	0	0	0		
DESCRIBE EMISSION POINT				8	0	5	0	-	38	0	0	0	0		
START yellow rectangular stack STOP same				9	0	0	0	-	39	0	0	0	0		
HEIGHT ABOVE GROUND LEVEL		HEIGHT RELATIVE TO OBSERVER		10	-	0	0	0	40	5	0	0	0		
START 29 ft STOP same		START 29 ft STOP same		11	0	0	10	0	41	0	0	0	0		
DISTANCE FROM OBSERVER		DIRECTION FROM OBSERVER		12	5	0	0	0	42	0	0	0	10		
START 300 ft STOP same		START NE STOP same		13	-	-	-	5	43	0	0	0	0		
DESCRIBE EMISSIONS				14	0	0	0	-	44	-	-	-	-		
START coming STOP same				15	5	0	0	-	45	-	-	0	0		
EMISSION COLOR		PLUME TYPE: CONTINUOUS ☐		16	0	0	0	0	46	0	0	0	5		
START grey STOP same		FUGITIVE ☐ INTERMITTENT ☒		17	0	0	0	0	47	0	0	-	0		
WATER DROPLETS PRESENT:		IF WATER DROPLET PLUME:		18	5	-	-	0	48	-	-	0	10		
NO ☒ YES ☐		ATTACHED ☐ DETACHED ☐		19	0	-	15	0	49	0	0	0	0		
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED				20	0	0	0	0	50	0	10	0	0		
START 3 ft above exit STOP same				21	0	0	0	0	51	0	-	0	0		
DESCRIBE BACKGROUND				22	5	10	0	0	52	0	0	0	0		
START trees STOP same				23	0	0	0	0	53	0	0	0	0		
BACKGROUND COLOR		SKY CONDITIONS		24	0	0	0	0	54	5	0	0	-		
START green STOP same		START overcast STOP same		25	0	0	0	0	55	-	0	0	5		
WIND SPEED		WIND DIRECTION		26	0	10	-	-	56	-	0	0	0		
START 2-8 mph STOP 3 mph		START NNE STOP same		27	-	-	-	-	57	0	0	0	0		
AMBIENT TEMP		WET BULB TEMP.		28	0	5	0	0	58	5	0	0	0		
START 73 STOP 84		74		29	0	0	0	-	59	0	10	0	0		
		RH. percent		30	0	-	0	0	60	0	0	-	5		
		42													
Source Layout Sketch				I-40											
Draw North Arrow															
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											
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS				CERTIFIED BY											
SIGNATURE				ETA											
DATE				3/97											
TITLE				VERIFIED BY											
DATE				DATE											

Visible Emission Observation Form

3c

SOURCE NAME				OBSERVATION DATE				START TIME				STOP TIME			
ADDRESS				SEC				MIN				SEC			
MIN				0				15				30			
45				MIN				0				15			
30				45				MIN				0			
Barhouse Exit				8-20-97				16:15				17:20			
ASPHALT PLANT "A"				1010 Rd (Cleveland Rd)				1				0 0 0 0			
CITY				STATE NC				2				0 0 0 0			
PHONE				SOURCE ID NUMBER				3				0 5 0 0			
PROCESS EQUIPMENT				OPERATING MODE				4				0 0 0 0			
aggregate dryer				baghouse				5				0 0 0 0			
CONTROL EQUIPMENT				OPERATING MODE				6				0 0 0 0			
baghouse				norm				7				0 0 0 0			
DESCRIBE EMISSION POINT				8				5 0 0 0				38 0 0 0			
START yellow rectangular gbk STOP same				9				0 0 0 0				39 10 0 0			
HEIGHT ABOVE GROUND LEVEL				HEIGHT RELATIVE TO OBSERVER				10				0 0 0 0			
START 29 ft STOP same				START 29 ft STOP same				11				0 0 0 0			
DISTANCE FROM OBSERVER				DIRECTION FROM OBSERVER				12				5 0 0 0			
START 300 ft STOP same				START NE STOP same				13				0 0 0 0			
DESCRIBE EMISSIONS				14				0 0 0 0				43 0 0 0			
START coning STOP same				15				0 0 0 0				44 0 0 0			
EMISSION COLOR				PLUME TYPE: CONTINUOUS ☒				16				0 0 0 0			
START light grey STOP				FUGITIVE ☐ INTERMITTENT ☒				17				0 0 0 0			
WATER DROPLETS PRESENT: NO ☒ YES ☐				IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐				18				0 0 0 0			
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED				19				0 0 0 0				48 5 0 0			
START 3.5 ft above exit STOP same				20				0 0 0 0				49 0 0 0			
DESCRIBE BACKGROUND				21				0 0 0 0				50 0 0 0			
START trees STOP same				22				0 0 0 0				51 0 0 5			
BACKGROUND COLOR				SKY CONDITIONS				23				0 0 0 0			
START green STOP same				START broken STOP same				24				0 0 0 0			
WIND SPEED				WIND DIRECTION				25				0 5 5 0			
START 3-5 mph STOP 1-3 mph				START E STOP same				26				0 0 0 0			
AMBIENT TEMP				WET BULB TEMP				27				0 0 0 0			
START 91 STOP 84				73				28				0 0 0 0			
				RH, percent				29				0 0 0 0			
				42				30				0 0 0 0			
Source Layout Sketch				Draw North Arrow				31				0 0 0 0			
Emission Point				7				32				0 0 0 0			
Sun Wind →				petroleum tanks				33				0 0 0 0			
Plume and Stack				140°				34				0 0 0 0			
Sun location Line				plant entrance				35				0 0 0 0			
AVERAGE OPACITY FOR HIGHEST PERIOD				1.46%				36				0 0 0 0			
NUMBER OF READINGS ABOVE 5 % WERE				6				37				0 0 0 0			
RANGE OF OPACITY READINGS				MINIMUM 0				38				0 0 0 0			
MAXIMUM 10				OBSERVER'S NAME (PRINT)				39				0 0 0 0			
David Goshaw				OBSERVER'S SIGNATURE				40				0 0 0 0			
DATE 8-20-97				ORGANIZATION				41				0 0 0 0			
DEECO Inc				CERTIFIED BY				42				0 0 0 0			
ETA				DATE				43				0 0 0 0			
3/97				VERIFIED BY				44				0 0 0 0			
DATE				DATE				45				0 0 0 0			

Visible Emission Observation Form

30

SOURCE NAME Baghouse Exit		OBSERVATION DATE 8-20-97		START TIME 17:22		STOP TIME 17:42					
ADDRESS ASPHALT PLANT "A"		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
1010 Rd Cleveland Rd		1	0	0	0	0	31				
CITY	STATE NC	2	0	-	5	0	32				
PHONE	SOURCE ID NUMBER	3	0	0	0	0	33				
PROCESS EQUIPMENT aggregate dryer	OPERATING MODE	4	0	0	0	0	34				
CONTROL EQUIPMENT baghouse	OPERATING MODE normal	5	0	0	0	0	35				
DESCRIBE EMISSION POINT START yellow rectangular stack STOP same		6	0	0	0	5	36				
HEIGHT ABOVE GROUND LEVEL START 29 ft STOP same	HEIGHT RELATIVE TO OBSERVER START 29 ft STOP same	7	0	0	0	0	37				
DISTANCE FROM OBSERVER START 300 ft STOP same	DIRECTION FROM OBSERVER START NE STOP same	8	0	0	0	0	38				
DESCRIBE EMISSIONS START coming STOP same		9	0	0	0	0	39				
EMISSION COLOR START grey STOP	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☒	10	0	5	0	0	40				
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	11	0	0	0	0	41				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START 3-5 ft above exit STOP same		12	0	0	0	0	42				
DESCRIBE BACKGROUND START trees STOP same		13	0	0	0	0	43				
BACKGROUND COLOR START green STOP same	SKY CONDITIONS START overcast STOP same	14	5	0	0	0	44				
WIND SPEED START 1-3 mph STOP 5-12 mph	WIND DIRECTION START East STOP swirling	15	0	0	0	0	45				
AMBIENT TEMP START 84 STOP 84	WET BULB TEMP. 71	16	0	0	0	0	46				
RH. percent 52		17	0	0	0	-	47				
Source Layout Sketch Draw North Arrow		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		DECO Inc									
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TITLE		VERIFIED BY DATE									

thundercast skies created
reduction in light.

4A

[illegible]

Visible Emission Observation Form

48

SOURCE NAME Baghouse Exit				OBSERVATION DATE 8-21-97				START TIME 8:48				STOP TIME 9:48			
ADDRESS ASPHALT PLANT "A"				SEC MIN				SEC MIN				SEC MIN			
1010 Rd (Cleveland Rd)				0 15 30 45				0 15 30 45				0 15 30 45			
CITY		STATE NC		ZIP		1 0 15 30 45		2 0 15 30 45		3 0 15 30 45		4 0 15 30 45			
PHONE		SOURCE ID NUMBER		3 0 15 30 45		4 0 15 30 45		5 0 15 30 45		6 0 15 30 45		7 0 15 30 45			
PROCESS EQUIPMENT aggregate dryer				OPERATING MODE				5 0 15 30 45		6 0 15 30 45		7 0 15 30 45			
CONTROL EQUIPMENT baghouse				OPERATING MODE				6 0 15 30 45		7 0 15 30 45		8 0 15 30 45			
DESCRIBE EMISSION POINT START yellow rectangular stack STOP same				8 0 15 30 45		9 0 15 30 45		10 0 15 30 45		11 0 15 30 45		12 0 15 30 45			
HEIGHT ABOVE GROUND LEVEL START 29 ft STOP same		HEIGHT RELATIVE TO OBSERVER START -3 ft STOP same		9 0 15 30 45		10 0 15 30 45		11 0 15 30 45		12 0 15 30 45		13 0 15 30 45			
DISTANCE FROM OBSERVER START 475 ft STOP same		DIRECTION FROM OBSERVER START NW STOP same		10 0 15 30 45		11 0 15 30 45		12 0 15 30 45		13 0 15 30 45		14 0 15 30 45			
DESCRIBE EMISSIONS START coning STOP same				11 0 15 30 45		12 0 15 30 45		13 0 15 30 45		14 0 15 30 45		15 0 15 30 45			
EMISSION COLOR START grey STOP same		PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐		12 0 15 30 45		13 0 15 30 45		14 0 15 30 45		15 0 15 30 45		16 0 15 30 45			
WATER DROPLETS PRESENT: NO ☒ YES ☐		IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐		13 0 15 30 45		14 0 15 30 45		15 0 15 30 45		16 0 15 30 45		17 0 15 30 45			
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START 2-5 ft above exit STOP same				14 0 15 30 45		15 0 15 30 45		16 0 15 30 45		17 0 15 30 45		18 0 15 30 45			
DESCRIBE BACKGROUND START trees/blue sky STOP same				15 0 15 30 45		16 0 15 30 45		17 0 15 30 45		18 0 15 30 45		19 0 15 30 45			
BACKGROUND COLOR START green/blue STOP same		SKY CONDITIONS START clear STOP same		16 0 15 30 45		17 0 15 30 45		18 0 15 30 45		19 0 15 30 45		20 0 15 30 45			
WIND SPEED START 0-2 mph STOP 0-3 mph		WIND DIRECTION START East STOP South		17 0 15 30 45		18 0 15 30 45		19 0 15 30 45		20 0 15 30 45		21 0 15 30 45			
AMBIENT TEMP START 75 STOP 78		WET BULB TEMP. 66		18 0 15 30 45		19 0 15 30 45		20 0 15 30 45		21 0 15 30 45		22 0 15 30 45			
		RH. percent 62		19 0 15 30 45		20 0 15 30 45		21 0 15 30 45		22 0 15 30 45		23 0 15 30 45			
Source Layout Sketch Draw North Arrow plant entrance Emission Point Observers Position - on recycled asphalt "hill" Sun - Wind - Plume and Stack 140° Sun Location Line				23 0 15 30 45		24 0 15 30 45		25 0 15 30 45		26 0 15 30 45		27 0 15 30 45			
				24 0 15 30 45		25 0 15 30 45		26 0 15 30 45		27 0 15 30 45		28 0 15 30 45		29 0 15 30 45	
				25 0 15 30 45		26 0 15 30 45		27 0 15 30 45		28 0 15 30 45		29 0 15 30 45		30 0 15 30 45	
				26 0 15 30 45		27 0 15 30 45		28 0 15 30 45		29 0 15 30 45		30 0 15 30 45			
				27 0 15 30 45		28 0 15 30 45		29 0 15 30 45		30 0 15 30 45					
				28 0 15 30 45		29 0 15 30 45		30 0 15 30 45							
				29 0 15 30 45		30 0 15 30 45									
				30 0 15 30 45											
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				DATE 8-21-97											
ORGANIZATION DEECO Inc															
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TITLE				DATE				VERIFIED BY				DATE			

Visible Emission Observation Form

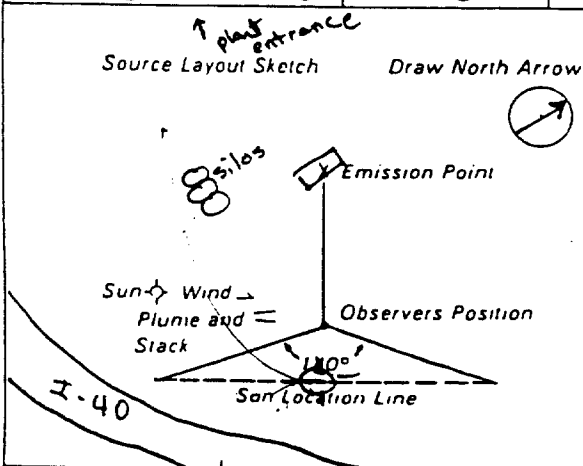
4c

SOURCE NAME		OBSERVATION DATE		START TIME		STOP TIME	
Baghouse Exit		8-21-97		9:53		10:53	
ADDRESS		SEC		SEC		SEC	
ASPHALT PLANT "A"		MIN		MIN		MIN	
1010 Rd (Cleveland Rd)		0		0		0	
CITY	STATE	15		15		15	
	NC	30		30		30	
PHONE	SOURCE ID NUMBER	45		45		45	
PROCESS EQUIPMENT		5		5		5	
aggregate dryer		35		35		35	
CONTROL EQUIPMENT		6		6		6	
bag house		36		36		36	
DESCRIBE EMISSION POINT		7		7		7	
START yellow rectangle stack STOP SAME		37		37		37	
HEIGHT ABOVE GROUND LEVEL		8		8		8	
START 29 ft STOP same		38		38		38	
HEIGHT RELATIVE TO OBSERVER		9		9		9	
START 3 ft STOP same		39		39		39	
DISTANCE FROM OBSERVER		10		10		10	
START 475 ft STOP same		40		40		40	
DIRECTION FROM OBSERVER		11		11		11	
START NW STOP same		41		41		41	
DESCRIBE EMISSIONS		12		12		12	
START coming STOP same		42		42		42	
EMISSION COLOR		13		13		13	
START grey STOP same		43		43		43	
PLUME TYPE: CONTINUOUS ☒		14		14		14	
FUGITIVE ☐ INTERMITTENT ☐		44		44		44	
WATER DROPLETS PRESENT:		15		15		15	
NO ☒ YES ☐		45		45		45	
IF WATER DROPLET PLUME:		16		16		16	
ATTACHED ☐ DETACHED ☐		46		46		46	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED		17		17		17	
START 2.5 ft above exit STOP SAME		47		47		47	
DESCRIBE BACKGROUND		18		18		18	
START blue/sky STOP SAME		48		48		48	
BACKGROUND COLOR		19		19		19	
START grey STOP SAME		49		49		49	
SKY CONDITIONS		20		20		20	
START clear STOP SAME		50		50		50	
WIND SPEED		21		21		21	
START 1-3 mph STOP same		51		51		51	
WIND DIRECTION		22		22		22	
START South STOP South		52		52		52	
AMBIENT TEMP.		23		23		23	
START 78 STOP 82		53		53		53	
WET BULB TEMP.		24		24		24	
67		54		54		54	
RH. percent		25		25		25	
56		55		55		55	
Source Layout Sketch		26		26		26	
Draw North Arrow		27		27		27	
		28		28		28	
Silos Emission Point Observers Position - on recycled asphalt pile Sun Location Line 140° Sun - Wind - Plume and Stack I-40		29		29		29	
		30		30		30	
		56		56		56	
		57		57		57	
		58		58		58	
		59		59		59	
		60		60		60	
		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	
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DATE							

Visible Emission Observation Form

40

SOURCE NAME Baghouse Exit		OBSERVATION DATE 8-21-97		START TIME 10:58		STOP TIME 11:58	
ADDRESS Asphalt Plant "A"		SEC MIN		0	15	30	45
1010 Rd (Cleveland Rd)		SEC MIN		0	15	30	45
CITY	STATE NC	ZIP		1	0	0	0
PHONE	SOURCE ID NUMBER		2	0	0	0	0
PROCESS EQUIPMENT aggregate dryer	OPERATING MODE		3	0	0	0	0
CONTROL EQUIPMENT baghouse	OPERATING MODE		4	0	0	5	0
DESCRIBE EMISSION POINT START yellow rectangular stack STOP SAME		5		0	0	0	0
HEIGHT ABOVE GROUND LEVEL START 29 ft STOP SAME		6		0	0	0	0
HEIGHT RELATIVE TO OBSERVER START 3 ft STOP SAME		7		0	0	0	0
DISTANCE FROM OBSERVER START 475 ft STOP SAME		8		0	0	0	0
DIRECTION FROM OBSERVER START NW STOP SAME		9		0	0	0	0
DESCRIBE EMISSIONS START coning STOP SAME		10		0	0	0	0
EMISSION COLOR START grey STOP SAME		11		0	0	0	0
PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐		12		0	0	0	0
WATER DROPLETS PRESENT: NO ☒ YES ☐		13		0	0	0	0
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐		14		0	0	0	0
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START 2-5 ft above exit STOP SAME		15		0	0	0	0
DESCRIBE BACKGROUND START trees/sky STOP SAME		16		0	0	0	0
BACKGROUND COLOR START grey/blue STOP SAME		17		0	0	0	0
SKY CONDITIONS START clear STOP SAME		18		0	0	0	0
WIND SPEED START 2-4 mph STOP SAME		19		0	0	0	0
WIND DIRECTION START South STOP SAME		20		0	0	0	0
AMBIENT TEMP. START 82 STOP 85		21		0	0	0	0
WET BULB TEMP. 68		22		0	0	0	0
RH, percent 48		23		0	0	0	0
24		24		0	0	0	0
25		25		0	0	0	0
26		26		0	0	0	0
27		27		0	0	0	0
28		28		0	0	0	0
29		29		0	0	0	0
30		30		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 <i>David Goshaw</i>		DATE 8-21-97					
ORGANIZATION DEECO Inc							
CERTIFIED BY ETA		DATE 9/97					
VERIFIED BY		DATE					
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TITLE		DATE					





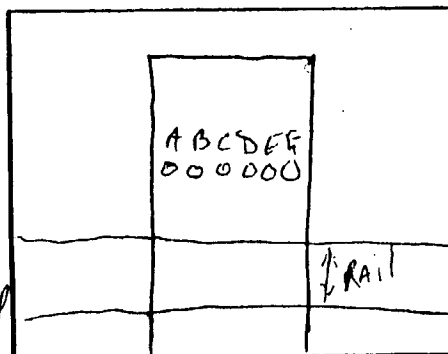
PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

CO ₂			
O ₂			
CO			
N ₂			

Condensers	
V ₁ : Silica gel	
Total H ₂ O	

Plant ASPHALT PLANT "A"
Date 8-19-97
Sampling Location stack
Sample Type M-23
Run Number 1 3123-0-1
Operator DMC
Barometric Pressure (B) 29.9
Static Pressure (B) -0.22
Filter Number(s) Outlet #1 untared
Pretest Leak Rate = 0.004 cfm @ 17 in. Hg
Pretest Pilot Leak Check ✓
Pretest Orsat Leak Check ✓
Read and Record all Data Every 5 Minutes
Page 1 of 1



Schematic of
Traverse Point Layout

Probe Length and Type 4' glass
Pilot Tube I.D. No.
Nozzle I.D. 0.240
Assumed Moisture, %
Meter Box Number MB11
Meter Δ H₂O 1.95
Meter Gamma 0.987
Reference p N/A
Post Test Leak Rate = 0.002 cfm @ 5 in. Hg
Post Test Pilot Leak Check ✓
Post Test Orsat Leak Check ✓

Traverse Point Number	Sampling Time (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vol) ft ³	Velocity (ft/sec) (ft/min)	Orifice Pres. Differential (All) in. H ₂ O		Stack Temp. °F (T ₁)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum in. Hg	
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F		
A 1	0/0	10915	281.500										
	5	10920	288.09	3.5	7.0	7.0	208	248/259	59	88	88	10	65
	10	10925	294.27	2.8	5.6	5.6	209	230/259	54	92	89	10	63
	15	10930	299.70	2.1	4.2	4.2	209	230/258	59	97	91	8	62
	20	11010	305.08	2.2	4.4	4.4	208	240/259	65	97	95	8	63
3	25	11104	308.40	0.72	1.44	1.44	207	243/258	65	100	100	3	65
	30	11109	311.66	0.65	1.30	1.30	206	245/259	64	101	101	3	64
	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	64
	40/0	11122	321.95	1.7	3.8	3.80	206	242/257	64	107	104	7	66
B 1	10	11123	327.09	1.4	3.8	3.8	201	248/256	67	112	105	7	58
	15	11132	331.54	1.3	2.6	2.6	193	238/255	64	116	107	5	61
	20	11137	335.59	1.3	2.6	2.6	191	238/256	65	118	108	5	63
	25	11142	338.60	0.57	1.14	1.14	191	242/257	65	118	110	3	63
	30	11147	341.17	0.42	0.84	0.84	192	238/257	68	119	111	3	64
4	35	11152	343.95	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
	5	11211	350.55	1.1	2.20	2.20	175	249/255	65	117	115	4	65
	10	11216	354.65	1.2	2.40	2.40	173	242/256	66	120	115	4	65
	15	11221	357.52	0.45	0.90	0.90	172	243/255	65	122	116	3	66
2	20	11226	360.28	0.45	0.90	0.90	169	246/254	66	121	116	3	65
	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
	1												

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

Plant Name: ASPHALT PLANT "A"Test Date: 8-19-97Run Number: 0-1 S-M23-a-1Operator: (VMS)

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V) ft ³	Velocity Head (P _v) in. H ₂ O	Orifice Pres. Differential (ΔP) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg	VAD
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F		
C -4	35	1 1241	365.21	0.09	0.18	0.18	170	249 / 255	65	121	118	2	65
	40/0	1 1246/046	366.500	0.09	0.18	0.18	169	250 / 255	65	121	118	2	65
D 1	5	1 1258	—	1.00	2.00	2.00	169	246 / 256	66	121	118	5	65
	10	1 1302	374.323	1.060	2.00	2.00	163	247 / 254	66	121	118	5	65
2	15	1 1308	377.110	1.20	.4	.4	167	243 / 255	66	121	118	5	65
	20	1 1313	379.118	.2	.4	.4	169	242 / 254	66	122	119	5	65
3	25	1 1318	390.324	10.50	.1	.1	169	243 / 252	66	123	119	5	66
	30	1 1323	381.427	.05	.1	.1	171	240 / 253	66	121	119	5	67
4	35	1 1328	382.720	.08	.16	.16	172	242 / 252	67	121	117	2	67
	40/0	1 1333	384.072	.108	.16	.16	174	245 / 252	67	121	119	2	67
E 1	5	1 1340	387.512	.08	.16	.16	181	242 / 252	67	122	119	3	67
	10	1 1345	390.199	.08	.1	.1	169	245 / 251	65	122	119	3	66
2	15	1 1350	392.395	.08	.1	.1	180	247 / 253	66	122	119	3	66
	20	1 1355	393.972	.08	.16	.16	180	247 / 253	66	122	119	3	66
3	25	1 1400	395.301	.15	.3	.3	182	245 / 252	68	123	119	2	67
	30	1 1405	396.992	.15	.3	.3	182	242 / 252	64	123	119	2	68
4	35	1 1410	398.420	.10	.2	.2	182	247 / 255	67	122	119	2	67
	40/0	1 1415/015	400.190	.15	.3	.3	182	244 / 252	68	120	119	2	67
F 1	5	1 1421	402.589	.35	.7	.7	198	242 / 253	68	120	119	2	67
	10	1 1426	405.092	.35	.7	.7	198	243 / 255	68	122	120	2	68
2	15	1 1431	407.082	.21	.42	.42	187	244 / 256	68	122	120	2	68
	20	1 1436	409.030	.21	.42	.42	187	245 / 253	68	122	120	2	68
3	25	1 1441	411.112	.41	.82	.82	187	242 / 257	64	121	120	3	68
	30	1 1446	414.514	.41	.82	.82	197	242 / 253	68	121	120	3	68

Plant Name: WQ ASPHALT PLANT "A"
Run Number: 0-1 S-MZ3-0-1

Test Date: 8-19-97
Operator: GA

[illegible]

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

SR3-0-1

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): 0-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)
Final wt.	533.1	1029.0	696.5
Initial wt.	491.6	506.0	680.5
Net wt.	41.5	573.0	0.1
			0.2
			3.9
			32.9
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:		

264.1
COND. 263.4



CO ₂				
O ₂				
CO				
N ₂				

Condensers _____
 V₁: Silica gel _____
 Total H₂O _____

Plant ASPHALT PLANT "A"
 Date 8-20-97
 Sampling Location Baghouse stack outlet
 Sample Type M-23
 Run Number ~~M-23-0~~ S-M23-0-2
 Operator JM Donald / G. G. G.
 Barometric Pressure (P_B) 29.90
 Static Pressure (P_S) - .25
 Filter Number(s) _____
 Pretest Leak Rate = 0.003 cfm @ 18 in. Hg
 Pretest Pilot Leak Check ✓
 Pretest Orsat Leak Check ✓
 Read and Record all Data Every 5 Minutes

Probe Length and Type 4' 1/4 SS
Pitot Tube I.D. No. _____
Nozzle I.D. ~~0.197~~ 0.251 (2nd)
Assumed Moisture, % 17
Meter Box Number MB 11
Meter Δ H @ 1.95
Meter Gamma 0.987
Reference p N/A
Post Test Leak Rate = 1.002 cfm @ 10 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check C

Schematic of Traverse Point Layout

Temp. Sensor ID No.

[illegible]

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Plant Name: ASPHALT PLANT "A"

Test Date: 8-20-97

Run Number: ~~M23-2~~ S-M23-O-2

Operator: Imcd / Gmg

[illegible]

Plant Name: ASPHALT PLANT "A"Test Date: 8-20-97Run Number: M23-2 S-M23-0-2Operator: (M2)

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V) ft ³	Velocity Head (P _v) in. H ₂ O	Orifice Pres. Differential (ΔP) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
B1	160/01	1114	545.082					1				
B1	5	1119	531.623	2.8	8.4	8.4	233	251 / 263	65	109	103	10
2	10	1124	557.420	2.8	8.4	8.4	234	252 / 264	66	111	105	10
2	15	1129	563.523	1.5	4.5	4.5	239	255 / 260	66	110	104	10
3	20	1134	569.001	1.5	4.5	4.5	236	260 / 261	66	109	103	10
3	25	1139	574.220	1.1	3.3	3.3	237	254 / 262	65	111	104	10
4	30	1144	579.910	1.1	3.3	3.3	237	254 / 262	65	110	104	10
4	35	1149	583.710	1.65	1.9	1.9	237	255 / 260	66	110	105	10
	200/01	1154	587.701	1.65	1.9	1.9	239	257 / 262	66	111	106	6
	1			LEAK CK	005 @	13.41		14650 FIRST imp.				
	1			LEAK CK	007 @	14.11		1				
	200/01	1200	587.834	1.98	2.7	2.9	240	267 / 262	66	107	104	7
2	5	1206	592.571	1.89	2.6	2.6	237	260 / 254	66	111	109	7
	10	1210	596.942	1.70	2.1	2.1	238	260 / 257	67	112	108	7
2	15	1215	601.220	1.70	2.1	2.1	237	252 / 259	65	112	105	7
	20	1220	605.438	1.80	1.8	1.8	239	255 / 260	65	113	105	7
3	25	1225	609.342	1.55	1.6	1.6	237	250 / 261	65	113	105	5
	30	1230	613.110	1.51	1.5	1.5	234	247 / 260	65	113	106	5
4	35	1235	616.710	1.51	1.5	1.5	232	244 / 258	65	112	106	5
	240/01	1240	620.327					1				
	1							1				
	1			1.109		3.35	236.4	1		110.8	105.1	
	1							1				
	1							1				

900.006 0.931 7.715 777.7

105 98.9

Sol % T = 103.4

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

S-m23-0-2

Plant: ASPHALT PLANT "A"		Run No.: # 2	
Sample Date: 8/20/97		Filter No.(s):	
Sample Location: OUTLET		Job No.:	
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)
Final wt.	484.9	SEE BELOW	907.3
Initial wt.	453.3	488.6	691.6
Net wt.	31.6	938.2	215.7
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 2
711.4
513.8
197.6

H2O
740.6

FIELD DATA SHEET

Plant: ASPHALT PLANT "A"
 Sampling Location: BAG House 02761
 Run Number: 0-3 Date: 8-20-97
 Pretest Leak Rate: 0.03 cfm @ 15 in. Hg.
 Pretest Leak Check: Pitot: ✓ Orsat: ✓

Sample Type: m 26 Operator: GC44
 Pbar: 29.8 Ps: -0.25
 CO2: O2:
 Probe Length/Type: 5' GLASS Pitot #:
 Stack Diameter: As:

Nozzle ID: 251 Thermocouple #:
 Assumed Bws: 12 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 (V _m) ft ³	Velocity Head (Δp) in H ₂ O	Orifice Pressure Differential (ΔH) in H ₂ O		Stack Temp. (T _s)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet (T _m in °F)	Outlet (T _m out °F)	
	0	1405	620.573										
A1	5	1416	626.819	3.1	9.3	9.3	209	248	260	69	104	103	10
	10	1415	633.480	3.1	9.3	9.3	247	261	260	69	105	104	10
2	15	1420	639.992	2.1	6.3	6.3	208	249	261	69	108	104	10
	20	1425	646.627	2.1	6.3	6.3	216	247	253	69	110	106	10
3	25	1430	651.752	1.94	2.8	2.8	205	241	255	69	112	106	10
	30	1435	656.672	1.94	2.8	2.8	203	243	255	69	114	107	10
4	35	1440	660.342	1.40	1.2	1.2	204	249	255	69	115	108	9.0
	40	1445	663.889	1.40	1.2	1.2	203	251	256	69	113	107	11
B1	45	1447:15	670.019	2.1	6.3	6.3	208	255	257	69	114	108	11
	50	1451	676.720	2.1	6.3	6.3	209	252	257	69	114	108	11
2	55	1502	682.999	1.4	4.2	4.2	209	247	255	68	115	108	10
	60	1507	688.210	1.4	4.2	4.2	206	250	252	68	115	108	10
3	65	1512	692.199	1.75	2.3	2.3	207	247	251	68	116	108	5
	70	1517	697.538	1.75	2.3	2.3	208	249	252	68	117	108	5
4	75	1522	701.502	1.61	1.8	1.8	207	246	250	68	114	108	5
	80	1527	705.317	1.61	1.8	1.8	208	247	253	68	115	108	5
C1	85	1529	710.501	1.1	3.3	3.3	211	246	258	68	110	108	6
	90	1534	715.520	1.1	3.3	3.3	210	256	249	69	117	108	6
2	95	1539	719.410	1.56	1.6	1.6	209	244	250	68	112	107	5
	100	1544	723.192	1.56	1.6	1.6	210	251	251	68	110	106	5
3	105	1549	726.187	1.32	1.6	1.6	213	255	259	68	111	109	3
	110	1554	729.058	1.32	1.6	1.6	215	252	249	68	110	106	3
4	115	1559	732.311	1.46	1.3	1.3	214	249	250	68	111	106	3
	120	1604	735.550	1.46	1.3	1.3	216	250	255	68	112	107	3

ΔV_m= $\sqrt{\Delta p}$ = ΔH= T_s= T_m=

Plant Name: ASPHALT PLANT "A"Test Date: 8-20-97Run Number: ~~0-2~~ S-M23-0-3Operator: G. Gay

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V) ft ³	Velocity Head (P _v) in. H ₂ O	Orifice Pres. Differential (ΔH) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg	
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F		
D 1	125	1613	730.430	.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	1622	745.872	.22	.66	.66	213	252 / 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	244 / 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	758.642	.52	1.5	1.5	211	253 / 252	68	110	107	2	68
	160	1648	761.711	.52	1.5	1.5	214	252 / 255	69	111	108	2	68
E 1	165	1655	764.512	.30	.90	.90	211	251 / 253	68	111	108	2	62
	170	1660	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	1710	772.299	.23	.69	.69	205	252 / 250	68	112	109	2	62
3	185	1715	774.999	.25	1.0	1.0	197	258 / 256	68	112	109	2	61
	190	1720	777.982	.35	1.0	1.0	193	252 / 256	67	110	108	2	61
4	195	1725	780.262	.20	.60	.60	183	250 / 253	67	109	105	2	61
* F	200	1730	782.690	.20	.60	.60	179	251 / 255	67	108	107	2	61
	205							250 / 240	67	110	108	2	61
	210												
2	215												
	220												
3	225												
	230												
4	235												

CH 1st Imp. (unch. 0.009 @ 7" / y)

METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

S-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.	766.2	422.6	694.4	687.5	612.0	889.4	g
Net wt.	35.9	723.3	105.4	(2.1)	7.9	43.0	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:	

COND 2

514.4

METHOD 5 TESTING FIELD DATA SHEET

PAGE 1 of 3

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	REN NUMBER
ASPHALT PLANT "A"	8-21-97	BK House OUTLET	m 263	5-M23-0-4

OPERATOR	AMBIENT PRESS (in. Hg)	STATIC PRESS (in. Hg)	AMBIENT TEMP (deg. F)	FILTER NUMBER	STACK ID (in.)	PLOT CH	PROBE LENGTH AND LINE TYPE	NOZZLE NUMBER	DIAMETER
GGAY	29.7	-1.25	72			184	3' Gurs	1251	.251

SEUMED MISTURE (%)	DOM BOX NO	DOM ID	DOM CAL FACTOR (%)	STACK THERM NO.	STACK PLOT NO.	ORGAN NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	CO MONITOR %	CO2 CONTENT %	REMARKS
17%	MO 11	1.950	.987				✓				3.4

1002

TRAV POINT NO	ELAPSED TEST TIME (MIN)	CLOCK TIME (24HR)	DOM HEADLINE VOLUME (in)	PUMP VERIFIED HEAD (in. Hg)	UNION GAGE (in. Hg)	STACK TEMP (deg. F)	PROBE TEMP (deg. F)	PITCH OVER TEMP (deg. F)	OIL GEL MPTCH. TEMP (deg. F)	DOM INLET TEMP (deg. F)	SAMPLE TANK VAS (in. Hg)
1	0	741	782.720	3.1	8.9	182	256	255	64	72.77	10
	5	746	789.24	3.1	8.5	184	254	256	64	85.79	10
	10	751	795.330	2.5	7.2	183	255	257	65	86.79	10
2	15	756	801.992	2.2	6.4	182	256	259	64	91.88	10
	20	801	809.245	1.1	3.2	182	257	258	64	93.85	6
3	25	806	813.2	1.1	3.2	184	257	256	64	95.85	6
	30	811	816.04	1.48	1.5	181	258	251	64	98.87	3
4	35	816	821.542	1.46	1.3	181	253	255	65	101.90	3
	40	821	824.755	-	-	-	255	251	65	101.90	3
1	45	827	831.272	2.5	7.4	181	260	255	62	103.92	11
	50	828	837.61-	2.5	7.4	182	255	265	62	104.42	11
2	55	833	843.510	1.6	4.4	176	254	255	62	105.92	9
	60	838	849.62	1.6	4.8	174	254	255	62	107.90	9

63
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TOTAL TIME	DOM VOLUME	AVE. SUMP HEAD	AVE. UNION HEAD	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. 25		0-4			
TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24 hr)	GAS METER HEADING Vol (lit)	VELOCITY HEAD (in. H ₂ O)	H. ORIFICE (in. H ₂ O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SIL GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX. TEMP (°F)	SAMPLE TRAIN ACU (in. Hg)	
3	65	843	853.678	.66	1.9	176	252	255	63	109.98		9	63
	70	844	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 * 2.9
1	85	905	869.999	1.5	3.8	183	252	253	62	112.101		7	64
	90	910	875.232	1.5	3.8	179	253	254	65	113.103		7	64
2	95	915	879.22	.78	2.0	177	247	251	65	115.106		4	64
	100	920	893.20	.78	2.0	174	250	251	65	115.104		4	65
3	105	925	885.352	.20	.5	176	254	253	64	116.110		2	65
	110	930	887.448	.20	.5	176	253	255	63	115.111		2	65
4	115	935	890.442	.42	1.1	179	250	284	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	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	.18	.4	177	255	255	64	119.112		2	64
4	155	1018	913.831	.11	1.29	177	256	254	64	113.110		2	64
	160	1023	915.460	.11	1.29	176	252	252	63	111.109		2	64
TOTAL TIME			DGM VOLUME	AVG. SCHED. P	AVG. H	AVG. STACK T	AVG DGM T						

Sheet Checked By: _____

Date: _____

METHOD 5 TESTING FIELD DATA SHEET

PAGE 3 of 3

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-22-97	BAG HOUSE OUTLET 0-4	n-23	045-MR3-0-4

[illegible]

1001 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	949.2	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
 112.3

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

CO ₂			
O ₂			
CO			
N ₂			

Condensers _____
 V₁: Silica gel _____
 Total H₂O _____

Plant ASTPLANT PLANT "A"
Date 8-19-97
Sampling Location STACK
Sample Type M23
Run Number F10
Operator MM
Barometric Pressure (B) 29.14
Static Pressure (S) NA
Filter Number(s) _____
Pretest Leak Rate = .010 cfm @ 9 in. Hg
Pretest Pilot Leak Check NA
Pretest Orsat Leak Check NA
Read and Record all Data Every NA Minutes
Page 1 of 1

Field
Blank.

Probe Length and Type 4' Glass
Pitot Tube I.D. No. NA
Nozzle I.D. 0.60
Assumed Moisture, % NO
Meter Box Number M010
Meter Δ H (ft) 1.74
Meter Gamma 0.65
Reference Δ p _____
Post Test Leak Rate = 0.10 cfm @ 9 in. Hg
Post Test Pitot Leak Check _____
Post Test Orsat Leak Check _____

Schematic of Traverse Point Layout

Temp. Sensor ID No.

[illegible]

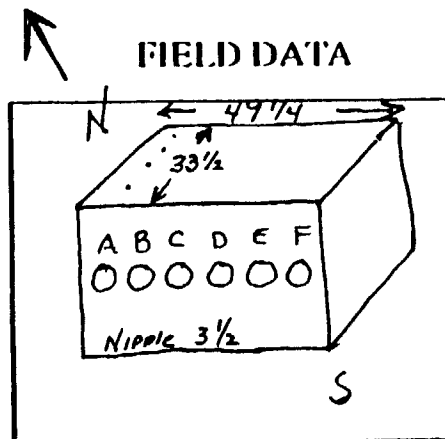
METHOD 23 CDD/CDF SAMPLE RECOVERY DATA

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.

Plant ASPHALT PLANT "A"
 Date 8-19-95
 Sampling Location STACK
 Sample Type M-29
 Run Number 01
 Operator MAD
 Barometric Pressure (B) 29.9
 Static Pressure (S) -.25
 Filter Number(s) _____
 Pretest Leak Rate = 0.06 cfm @ 15 in. Hg
 Pretest Pitot Leak Check LEAK CHECK GOOD
 Pretest Orsat Leak Check _____
 Read and Record all Data Every 5 Minutes
 Page 1 of 2



Schematic of
Traverse Point Layout
Temp. Sensor ID No.

CO ₂			
O ₂			
CO			
N ₂			

Condensers	
V ₁ : Silica gel	
Total H ₂ O	

Probe Length and Type 4' Glass
 Pitot Tube I.D. No. _____
 Nozzle I.D. Borescope .251
 Assumed Moisture, % 25
 Meter Box Number M310
 Meter Δ H₂O 1.74
 Meter Gamma .965
 Referenced p _____
 Post Test Leak Rate = 0.04 cfm @ 7 in. Hg
 Post Test Pitot Leak Check ✓
 Post Test Orsat Leak Check ✓

Traverse Point Number	Sampling Time (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vol) ft ³	Velocity (ft/min) ft ³	Orifice Pres. Differential (in. H ₂ O)		Stack Temp. °F (T _s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum in. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
	0	1 0915	76.4									
1	5	1 0920	82.44	2.14	NA	4.4	209	225 / 240	45	92	89	3
	10	1 0925	88.1	1.3		4.1	208	235 / 235	44	92	89	3
2	15	1 0930	92.97	.90		2.8	210	235 / 236	46	97	91	3
	20	1 0935	97.27	.91		2.2	210	242 / 232	46	99	91	2
3	25	1 1104	100.42	.40		1.19	212	233 / 234	62	103	103	2
	30	1 1109	103.51	.45		1.12	212	234 / 235	60	104	103	2
4	35	1 1114	106.97	.54		1.3	213	232 / 250	58	107	104	2
	40	1 1119	110.44	.65		1.6	216	236 / 253	52	110	109	2
1	45	1 1124	116.07	1.6		3.9	204	244 / 254	57	110	106	2
	50	1 1132	121.74	1.6		3.9	205	243 / 251	56	113	106	3
2	55	1 1137	126.3	1.3		3.2	187	244 / 255	57	104	107	3
	60	1 1142	128.8	.3		.74	188	241 / 254	57	104	102	2
3	65	1 1147	130.95	.2		.49	189	240 / 256	58	103	102	2
	70	1 1152	133.15	.22		.54	191	241 / 252	59	104	104	2
4	75	1 1157	136.15	.39		.97	191	246 / 254	60	102	100	3
	80	1 1202	138.70	.35		.87	192	245 / 256	60	102	101	3
E 1	85	1 1207	141.5	.5		.75	172	246 / 254	61	100	98	2
2	90	1 1216	144.38	.34		.85	173	241 / 259	61	103	100	2
	95	1 1221	146.75	.1		.25	170	246 / 259	57	105	103	2
	100	1 1226	148.13	.14		.35	171	246 / 257	56	106	103	1
3	105	1 1231	149.57	.15		.37	167	246 / 259	57	103	102	1
	110	1 1236	152.14	.2		.5	168	247 / 261	60	103	102	1
4	115	1 1241	154.3	.18		.45	162	244 / 260	60	100	97	1

* STOP @ 0930 1012 1105 1059
 * STOP @ 1012 1105 1059

Plant Name: ASPHALT PLANT "A"Test Date: 8-19-97Run Number: 01Operator: MAAD

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V _g) ft ³	Velocity Head (P _v) in. H ₂ O	Orifice Pres. Differential (ΔH) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
E 4	120	1 1246	156.085	.12	1.0	.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	64	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	175.04	.42		1.05	167	247 / 241	64	105	103	2
	160	1 1328	178.27	.45		1.12	167	248 / 244	64	107	104	2
A 1	165	1 1330/1336	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	.21		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	1.2		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	240.82	.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	1 1454	246.974	.49		1.22	166	248 / 246	65	108	106	3

Leak at .004 @ 7th ✓

MULTI-METALS SAMPLE RECOVERY DATA

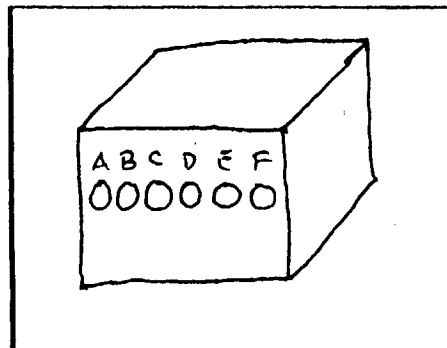
Plant: ASPHALT PLANT "A"		Run No.: S29-0-1			
Date: 8-19-97	Sample Box No.: —	Job No.: S413.003			
Sample Location: Outlet					
Sample Type: Particulate / Metals					
Sample Recovery Person: Troy Abernathy / Barry Rayfield					
Container	Description	Volume, ml	Sealed/Level Marked		
Front Half					
1	Filter No.(s) M97-003	—	—		
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	KMNO ₄ /H ₂ O 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	537.1 537.1
2	5% HNO ₃ / 16% H ₂ O ₂	100	697.4	802.6	105.2
3	5% HNO ₃ / 16% H ₂ O ₂	100	732.1	752.7	20.6
4	Empty	—	524.1	528.2	4.1
5	KMNO ₄ / H ₂ SO ₄	100	684.3	685.3	1.0
6	KMNO ₄ / H ₂ SO ₄	100	708.7	709.2	0.5
7	Silica Gel	200	874.9	897.4	22.5
Total					685.6 691.0
Comments:					



PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant ASPHALT PLANT "A"
 Date 8-20-97
 Sampling Location STACK
 Sample Type M29
 Run Number 02
 Operator MAD
 Barometric Pressure (B) 29.8
 Static Pressure (P) -.25
 Filter Number(s) _____
 Pretest Leak Rate = .006 cfm @ 15 in. Hg
 Pretest Pitot Leak Check OK Good
 Pretest Orsat Leak Check _____
 Read and Record all Data Every 5 Minutes
 Page 1 of 2



(C) ₁			
(O) ₂			
(CO)			
N ₂			

Condensers	_____
V ₁ : Silica gel	_____
Total H ₂ O	_____

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 p .636
 Post Test Leak Rate = .009 cfm @ 11 in. Hg
 Post Test Pitot Leak Check OK Good
 Post Test Orsat Leak Check _____

Schematic of Traverse Point Layout

Page 2 of 2

		Temp. Sensor ID No.										
Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (W) ft ³	Velocity Head (4 ft) in. H ₂ O	Orifice Pres. Differential (ΔH) in. H ₂ O		Stack Temp. °F (T _s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum in. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
	0	10822	49.199									
A 1	5	10827	67.9	3.2	NA	8.8	190	238 / 247	42	80	78	4
	10	10832	66.95	3.3		9.1	190	237 / 246	43	81	78	4
2	15	10837	73.15	2.4		6.6	194	240 / 247	48	86	79	4
	20	10842	80.2	2.3		6.3	193	241 / 248	48	87	79	4
3	25	10847	84.88	1.0		2.7	199	241 / 248	49	90	81	2
	30	10852	89.72	.96		2.6	198	244 / 248	51	92	83	2
4	35	10857	93.25	.4		1.15	191	242 / 248	54	93	84	2
	40	10902	96.791	.35		1.01	189	242 / 249	55	94	86	2
B 1	45	10907/0909	104.15	2.3		6.37	200	244 / 244	57	93	87	3
	50	10914	111.46	2.3		6.37	200	246 / 244	52	93	87	3
2	55	10919	118.78	2.0		5.49	210	247 / 241	57	93	87	3
	60	10924	125.3	1.5		4.11	210	247 / 240	53	92	87	3
3	65	10929	130.83	1.2		3.14	215	246 / 242	53	95	90	3
	70	10934	136.1	1.2		3.14	214	246 / 243	53	101	93	3
4	75	10939	140.41	.75		1.96	213	245 / 244	52	102	94	3
	80	10944	144.631	.77		2.0	214	246 / 243	51	102	94	3
C 1	85	10949/0951	149.55	1.0		2.61	213	244 / 246	51	100	94	3
	90	10956	157.48	1.1		2.8	211	241 / 246	51	100	95	3
2	95	11001	157.47	.35		.91	219	243 / 244	51	101	95	3
	100	11006	160.47	.37		.96	227	244 / 246	51	101	96	3
3	105	11011	164.85	.74		1.93	229	244 / 246	52	100	96	3
	110	11016	169.34	.74		2.06	231	239 / 245	51	103	97	3
4	115	11021	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: 8-20-97Run Number: 02Operator: MAD

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V _g) ft ³	Velocity (Lead & P ₁) in. H ₂ O	Orifice Pres. Differential (ΔP) in. H ₂ O		Stack Temp. °F (T _s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
D 1	125	1031/1036	182.47	1.0	NA	2.6	233	241 / 246	58	98	98	3
	130	1 1041	187.41	1.1		2.8	233	241 / 246	59	100	99	3
2	135	1 1046	191.4	.55		1.4	235	243 / 244	55	105	99	3
	140	1 1051	194.76	.55		1.4	235	241 / 244	56	105	99	3
3	145	1 1056	198.18	.53		1.38	236	242 / 246	57	102	97	3
	150	1 1101	201.55	.47		1.23	238	241 / 246	56	101	93	3
4	155	1 1106	205.6	.69		1.8	236	240 / 246	57	100	97	3
	160	1 1111	209.657	.7		1.8	233	239 / 245	57	100	96	3
E 1	165	11114/1119	214.45	1.0		2.6	232	240 / 246	56	99	96	3
	170	1 1124	219.39	1.1		2.6	232	240 / 246	55	100	96	3
2	175	1 1129	223.26	.55		1.4	237	241 / 247	57	101	97	3
	180	1 1134	226.67	.55		1.4	236	242 / 247	58	103	98	3
3	185	1 1139	229.96	.42		1.1	236	241 / 246	59	102	98	3
	190	1 1144	232.96	.38		1.0	236	241 / 246	60	102	97	3
4	195	1 1149	235.9	.24		.89	236	241 / 246	60	100	96	3
	200	1 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
	210	1 1210	245.16	.34		.89	236	243 / 246	60	98	97	3
2	215	1 1215	248.03	.32		.84	236	244 / 246	60	99	97	2
	220	1 1220	250.87	.34		.89	236	244 / 246	59	101	98	2
3	225	1 1225	254.64	.66		1.74	236	242 / 247	58	103	98	2
	230	1 1230	258.66	.69		1.82	235	241 / 248	58	103	99	2
4	235	1 1235	262.4	.66		1.74	232	242 /	60	103	99	2
	240	1 1240	266.098	.65		1.71	233	243 /	61	105	99	2

216.899 0.887

2.574 222

1.82

%I = 108.4

98.205 93.2

535.7

MULTI-METALS SAMPLE RECOVERY DATA

Plant: <u>ASPHALT PLANT "A"</u>		Run No.: <u>S29-0-2</u>			
Date: <u>8-20-97</u>	Sample Box No.: <u>—</u>	Job No.: <u>S413.003</u>			
Sample Location: <u>Outlet</u>					
Sample Type: <u>Particulate / Metals</u>					
Sample Recovery Person: <u>Troy Abernathy / Barry Rayfield</u>					
Container	Description	Volume, ml	Sealed/Level Marked		
Front Half					
1	Filter No.(s) <u>m97-002</u>	—	—		
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	KMNO ₄ /H ₂ O Rinse - Impingers 5 & 6	—	—		
5C	HCl Rinse - Impingers 5 & 6	—	—		
Moisture Data					
Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	<u>Empty</u>	—	723.6	1408.5	684.9
2	<u>HNO₃ / H₂O₂</u>	100	698.4	874.6	176.2
3	<u>HNO₃ / H₂O₂</u>	100	732.0	808.1	76.1
4	<u>Empty</u>	—	525.5	533.7	8.2
5	<u>KMNO₄ / H₂SO₄</u>	100	686.4	7 690.8	4.4
6	<u>KMNO₄ / H₂SO₄</u>	100	709.1	711.7	2.6
7	<u>Silica Gel</u>	200	838.7	879.4	40.7
Total					993.1 ✓
Comments:					

46. 79.

FIELD DATA SHEET

Plant: ASPHALT PLANT "A"
 Sampling Location: STACK
 Run Number: 03 Date: 8-20-97
 Pretest Leak Rate: 0.11 cfm @ 11 in. Hg.
 Pretest Leak Check: Pitot: ck Orsat:

Sample Type: M29 Operator: MAO
 Pbar: 29.8 Ps: - .25
 CO2: O2:
 Probe Length/Type: 4' GLASS Pitot #:
 Stack Diameter: 33' 1/2 x 4 As:

Nozzle ID: 253 Thermocouple #:
 Assumed Bws: 18 Filter #:
 Meter Box #: M010 Y: 905 ΔH@: 1.74
 Post-Test Leak Rate: 005 cfm @ 9 in. Hg.
 Post-Test Leak Check: Pitot: Orsat:

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vn) 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	1		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	127.925	.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	57	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

ΔVm= $\sqrt{\Delta p}$ = ΔH= Ts= Tm=

Plant Name: ASPHALT PLANT "A"Test Date: 8-20-97Run Number: 03Operator: Hand

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V) ft ³	Velocity Head (P _v) in. H ₂ O	Orifice Pres. Differential (ΔI) in. H ₂ O		Stack Temp. °F (T)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum In. Hg
					Desired	Actual				Inlet (T _{in}) °F	Outlet (T _{out}) °F	
A 1	125	11643/1618	167.69	3.2	NA	8.4	212	246 / 248	58	106	102	5
	130	1 1623	176.16	3.2		8.4	212	247 / 248	58	106	102	5
2	135	1 1628	181.08	3.0		2.64	211	247 / 249	59	111	101	3
	140	1 1633	186.07	1.1		2.9	210	246 / 250	60	108	103	3
3	145	1 1638	189.17	3.2		1.03	212	245 / 251	61	108	102	3
	150	1 1643	192.28	3.8		1.0	212	245 / 251	61	108	102	3
4	155	1 1648	196.9	2.9		.76	211	243 / 250	62	107	101	3
	160	1 1653	197.627	2.9		.76	208	244 / 249	61	105	101	3
B 1	165	1655/1700	204.39	2.0		5.2	209	246 / 247	63	101	99	3
	170	1 1705	211.17	2.1		5.5	211	245 / 248	64	101	98	3
2	175	1 1710	215.67	7.8		2.06	211	246 / 249	65	106	99	3
	180	1 1715	220.11	.77		2.03	211	242 / 252	62	107	99	3
3	185	1 1720	223.42	.56		1.47	240	249 / 251	60	109	101	3
	190	1 1725	227.08	.58		1.53	199	243 / 252	58	109	101	3
4	195	1 1730	230.4	.4		1.65	182	246 / 251	54	109	102	3
	200	1 1735	233.615	.4		1.05	182	245 / 252	54	109	102	3
C 1	205	1						1				
	210	1						1				
2	215	1						1				
	220	1						1				
3	225	1						1				
	230	1	154.831	0.823		2.054	207.15	1		105.78	101.78	
4	235	1						1				
	240	1						1		503.7		

% H₂O
24.6

% J = 106.5

MULTI-METALS SAMPLE RECOVERY DATA

Plant: <u>ASPHALT PLANT "A"</u>		Run No.: <u>S29-0-3</u>			
Date: <u>8-20-97</u>	Sample Box No.: <u>—</u>	Job No.: <u>S413.003</u>			
Sample Location: <u>Outlet</u>					
Sample Type: <u>Particulate / Metals</u>					
Sample Recovery Person: <u>Troy Abernathy / Barry Rayfield</u>					
Container	Description	Volume, ml	Sealed/Level Marked		
Front Half					
1	Filter No.(s) <u>m97-004</u>	—	—		
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	KMNO ₄ /H ₂ O Rinse - Impingers 5 & 6	—	—		
5C	HCl Rinse - Impingers 5 & 6	—	—		
Moisture Data					
Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	<u>Empty</u>	<u>700.7</u>	<u>724.7</u>	<u>1492.2</u>	<u>757.5</u>
2	<u>HNO₃ / H₂O₂</u>	<u>100</u>	<u>724.9</u>	<u>876.5</u>	<u>151.6</u>
3	<u>HNO₃ / H₂O₂</u>	<u>100</u>	<u>680.3</u>	<u>710.2</u>	<u>29.9</u>
4	<u>Empty</u>	<u>—</u>	<u>603.7</u>	<u>607.3</u>	<u>3.6</u>
5	<u>KMNO₄ / H₂SO₄</u>	<u>100</u>	<u>749.2</u>	<u>750.1</u>	<u>0.9</u>
6	<u>KMNO₄ / H₂SO₄</u>	<u>100</u>	<u>641.3</u>	<u>642.2</u>	<u>0.9</u>
7	<u>Silica Gel</u>	<u>200</u>	<u>790.7</u>	<u>825.1</u>	<u>34.4</u>
Total					<u>978.8</u> ✓
Comments:					

METHOD 5 TESTING FIELD DATA SHEET

PAGE 1 of 3

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

PERMATOR	AMBIENT PRESS (in. Hg)	STATIC PRESS (in. Hg)	AMBIENT TEMP (deg. F)	FILTER NUMBER	STACK ID (in.)	PISTON	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	DIAMETER
MAD	29.7	-.25	72°		33.5 X 49.75	.84	4' Glass		.253

BUMED DISTANCE (%)	DCM BOX NO	DCM HD	DCM CAL FACTOR (%)	STACK THERM NO	STACK PISTON NO	ORSA NO	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	REACTOR
17	MB 10	1.74	.965				0100117	0.0080			

RAV POINT NO	ELAPSED TEST TIME (MIN)	CLOCK TIME (24HR)	DCM HEADLINE Vm (GL/H)	DAIRY VELOCITY HEAD (in. H2O)	DAIRY ORIFICE (in. H2O)	STACK TEMP (deg. F)	PROBE TEMP (deg. F)	PITOT TEMP (deg. F)	STATIC TEMP (deg. F)	DCM INLET TEMP (deg. F)	SAMPLE HEAD 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	53.00	.29	.76	180	249	251	53	93/82	2
	30	0811	56.53	.25	.66	180	248	252	53	94/84	2
4	35	0816	58.82	.44	1.16	186	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	97/96	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		DCM VOLUME	AVE. SGT. DELAP	AVE. DELAP	AVE. TEMP				AVE. TEMP	

METHOD 5 TESTING FIELD DATA SHEET

PAGE 2 of 3

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

[illegible]

K=2.4

METHOD 5 TESTING FIELD DATA SHEET

PAGE 3 of 3

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

TRAY POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24 HR)	DGM READING Vm (GL/H)	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 OF IMPLCMT TEMP (deg. F)	DGM IN OVEN 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	189.15	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	2.14	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	0.24	0.62	187	243	251	55	105/103	1
		240	1153	220.541	0.26	0.62	187	242	252	56	105/103	1

MULTI-METALS SAMPLE RECOVERY DATA

Plant: ASPHALT PLANT "A"		Run No.: 529-0-4			
Date:	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) M97-005	—	—		
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% HNO3 / H2O2	100	697.0	790.6	93.6
3	HNO3 / H2O2	100	730.8	745.8	15.0
4	Empty	—	523.0	524.7	1.7
5	KMNO4 / H2SO4	100	683.6	685.1	1.5
6	KMNO4 / H2SO4	100	707.8	710.3	2.5
7	Silica Gel	200	897.4	927.5	30.1
Total					
Comments:					

TOTAL = 821.4 ✓

METHOD 5 TESTING FIELD DATA SHEET

PAGE 1 of 1

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
ASPHALT PLANT "A"	8-21-97	STACH	M-29	Field blank

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

ASSUMED MOISTURE (%)	DGM BOX No.	DGM HQ	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	CHSNT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
NA	M810	1.74	.965	NA	NA	NA	.0090	10" Hg			

TRAV POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24HR)	DGM HEADLINE Vm (GL/G)	WIND VELOCITY HEAD (in. H2O)	WIND DIRECTION (in. H2O)	STACK TEMP (deg. F)	PROBE TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	SILICEL MEINER TEMP (deg. F)	DGM IN/OUT TEMP (deg. F)	SAMPLE TRAIN VAO (in. Hg)
			33.944								
			34.141	.009	8" Hg						
			34.221	.012	10" Hg						
	TOTAL TIME		DGM VOLUME	AVE SGT DELAP	AVE INLET DELAP	AVE TEMP				AVE TEMP	

MULTI-METALS SAMPLE RECOVERY DATA

Plant: <u>ASPHALT PLANT "A"</u>		Run No.: <u>Field Blank</u>			
Date: <u>8-21-97</u>	Sample Box No.: <u> </u>	Job No.: <u>5413.003</u>			
Sample Location: <u> </u>					
Sample Type: <u>Particulate / Metals</u>					
Sample Recovery Person: <u>Troy Abarnathy / Barry Rayfield</u>					
Container	Description	Volume, ml	Sealed/Level Marked		
Front Half					
1	Filter No.(s) <u>M97-006</u>	<u> </u>	<u> </u>		
2	Acetone Rinse	<u> </u>	<u> </u>		
3	Nitric Rinse	<u> </u>	<u> </u>		
Back Half					
4	Nitric Rinse - Imp. 1,2,3, + Back 1/2 Filter	<u> </u>	<u> </u>		
5A	Nitric Rinse - Impinger No. 4	<u> </u>	<u> </u>		
5B	KMNO4/H2O Rinse - Impingers 5 & 6	<u> </u>	<u> </u>		
5C	HCl Rinse - Impingers 5 & 6	<u> </u>	<u> </u>		
Moisture Data					
Impinger No.	Contents	Initial Volume, ml	Weight, grams		
			Initial	Final	Net
1	<u>Empty</u>	<u> </u>	<u>720.5</u>	<u>720.5</u>	
2	<u>HNO3 / H2O2</u>	<u>100</u>	<u>704.3</u>	<u>704.3</u>	
3	<u>HNO3 / H2O2</u>	<u>100</u>	<u>728.9</u>	<u>728.8</u>	
4	<u>Empty</u>	<u> </u>	<u>635.5</u>	<u>635.6</u>	
5	<u>KMnO4 / H2SO4</u>	<u>100</u>	<u>735.4</u>	<u>735.4</u>	
6	<u>KMnO4 / H2SO4</u>	<u>100</u>	<u>652.1</u>	<u>652.1</u>	
7	<u>Silica Gel</u>	<u>200</u>	<u>790.4</u>	<u>790.6</u>	
Total					
Comments: <u> </u>					

TECHNICAL REPORT DATA Please read instructions on the reverse before completing		
1. REPORT NO. EPA-454/T-00-001A	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 April 2000	6. PERFORMING ORGANIZATION CODE
	8. PERFORMING ORGANIZATION REPORT NO.	
7. AUTHOR(S) Michael D. Maret Franklin Meadows	10. PROGRAM ELEMENT NO.	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Pacific Environmental Services, Inc. Post Office Box 12077 Research Triangle Park, North Carolina 27709-2077	11. CONTRACT/GRANT NO. 68-D-70069	
	13. TYPE OF REPORT AND PERIOD COVERED Final	
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	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 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-<i>p</i>-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 from 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		
18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 870
	20. SECURITY CLASS (This page) Unclassified	22. PRICE

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