APPENDIX K

OEPA STACK TEST REVIEW SUMMARY FORM

APPLICATION NUMBER 08-1448 P002 08570712 96

FACILITY NAME WEIDLE SAND & GRAVEL

SOURCE DESCRIPTION (OR SCC CODE) 120 TPH ASPHALT BATCH PLANT

CONTROL EQUIPMENT FABRIC FILTER BAGHOUSE

DATE(S) OF TEST 5/25/94

FINAL TEST REPORT RECEIVED ON 6/24/94

POLLUTANT(S) TESTED PARTICULATE

TEST METHOD M5

TEST FIRM PES. JWA 8/8/94

EMISSION RATES*:

ACTUAL (~~lb(s)/hr~~) 1.795 ~~3.295~~ $\times 10^{-3}$ gr/dscf ALLOWABLE** 0.04 gr/dscf

OPERATING RATES*:

DURING TEST** 80.03 TPH* MAXIMUM** 84.86 TPH

EMISSION FACTOR***

COMMENTS: RUN #2 only collected 26.062 CU.FT. OF STACK GAS. SUBPART I REQUIRES AT LEAST 31.8 DSCF ∴ RUN #2 HAS BEEN DISCARDED AND THE AVERAGE OF RUNS #1 & #3 ~~ARE~~ IS USED.

I HEREBY VERIFY THAT THE INFORMATION CONTAINED WITHIN THE STACK TEST REPORT HAS BEEN REVIEWED AND IT HAS BEEN DETERMINED THAT THE TEST PROCEDURES, ANALYSES AND CALCULATIONS ARE:

[X] AN ACCEPTABLE DEMONSTRATION OF CONFORMANCE WITH THE APPROVED TESTING METHODOLOGY.

[ ] AN UNACCEPTABLE DEMONSTRATION OF CONFORMANCE WITH THE APPROVED TESTING METHODOLOGY.

7/18/94

DATE OF REVIEW

REVIEWED BY

* BASED ON 3 RUN AVERAGE

** SPECIFY APPLICABLE UNITS

***SPECIFY IN UNITS OF MASS/INPUT

* Tons per hour

==========

PARTICULATE EMISSION TEST DATA

FACILITY :WEIDLE SAND AND GRAVEL
PROCESS/RUN NUMBER :
SOURCE/RUN :1
TEST DATE :5/25/94

****

VOLUME METERED AT STD. CONDITIONS = 33.64693689857778 DSCF

VOLUME WATER COLLECTED AT STP. = 7.695945000000001 SCF
PERCENT MOISTURE BY VOLUME = 18.61492147276928 %

MOLECULAR WEIGHT OF STACK GAS = 27.11512879504984 LB/LB-MOL
PERCENT EXCESS AIR = 630.252100840336 %

AVERAGE STACK GAS VELOCITY = 62.02771822210665 FT/SEC
ABSOLUTE STACK PRESSURE = 29.14911764705882 IN. HG

STACK FLOW RATE AT ACTUAL COND. = 19472.44609423202 ACFM
STACK FLOW RATE AT STD. COND. = 12812.44975622692 DSCFM

STACK EMISSIONS = 1.19000431215159E-003 GR/DSCF
= 1.700516162064622E-007 LB/DSCF

STACK EMISSION RATE = .1307266673166288 LB/HR

ISOKINETIC VARIATION = 104.9730258269964 %

1.2×10^{-3} test

0.131

104.8

****

TIME OF TEST = 60 MIN
VOLUME METERED = 34.15 CU.FT
DRY GAS METER CALB. FACT. = 1.019
TEST BAR. PRESSURE = 29.23 IN HG
AVERAGE DELTA H = 1.29
AVG. METER TEMP. = 75 DEG. F
VOL. H2O (IMPINGERS) = 154.8 ML
WEIGHT GAIN OF SILICA GEL = 8.699999999999999 GM
%CO2 = 3 %
%CO = 0 %
%O2 = 18 %
%N2 = 79 %
STATIC P OF STACK =-1.1 IN. H2O
STACK TEMP. = 176 DEG. F
PITOT COEFFICIENT = .84
AVG. ROOT DELTA P = .9629
STACK DIAMETER = 0 IN.
MASS PARTICULATE = 2.6 MG
NOZZLE DIAMETER = .2 IN
****

==========

PARTICULATE EMISSION TEST DATA

FACILITY :WEIDLE SAND AND GRAVEL
PROCESS/RUN NUMBER :
SOURCE/RUN :2
TEST DATE :5/25/94

DISCARD DUE TO LOW VOLUME PER SUBPART I

31.8

****

VOLUME METERED AT STD. CONDITIONS = 25.61472467207219 DSCF

VOLUME WATER COLLECTED AT STP. = 6.763959000000001 SCF
PERCENT MOISTURE BY VOLUME = 20.89016054051069 %

MOLECULAR WEIGHT OF STACK GAS = 26.8603020194628 LB/LB-MOL
PERCENT EXCESS AIR = 630.252100840336 %

AVERAGE STACK GAS VELOCITY = 49.09403820199745 FT/SEC
ABSOLUTE STACK PRESSURE = 29.76911764705882 IN. HG

STACK FLOW RATE AT ACTUAL COND. = 15412.15830338011 ACFM
STACK FLOW RATE AT STD. COND. = 9911.194285463711 DSCFM

STACK EMISSIONS = 2.525110100852297E-003 GR/DSCF
= 3.608382334117932E-007 LB/DSCF

2.602×10^{-3} TOT

STACK EMISSION RATE = .2145802702180671 LB/HR

0.218

ISOKINETIC VARIATION = 103.3071552685019 %

101.7

****

TIME OF TEST = 60 MIN
VOLUME METERED = 26.062 CU.FT
DRY GAS METER CALB. FACT. = 1.019
TEST BAR. PRESSURE = 29.85 IN HG
AVERAGE DELTA H = .723
AVG. METER TEMP. = 86.90000000000001 DEG. F
VOL. H2O (IMPINGERS) = 138.8 ML
WEIGHT GAIN OF SILICA GEL = 4.9 GM
%CO2 = 3 %
%CO = 0 %
%O2 = 18 %
%N2 = 79 %
STATIC P OF STACK =-1.1 IN. H2O
STACK TEMP. = 186 DEG. F
PITOT COEFFICIENT = .84
AVG. ROOT DELTA P = .7606000000000001
STACK DIAMETER = 0 IN.
MASS PARTICULATE = 4.2 MG
NOZZLE DIAMETER = .2 IN

****

PARTICULATE EMISSION TEST DATA

FACILITY :WEIDLE SAND AND GRAVEL
PROCESS/RUN NUMBER :
SOURCE/RUN :3
TEST DATE :5/25/94

****

VOLUME METERED AT STD. CONDITIONS	= 38.58327040207596 DSCF
VOLUME WATER COLLECTED AT STP.	= 8.147817 SCF
PERCENT MOISTURE BY VOLUME	= 17.4355390660951 %
MOLECULAR WEIGHT OF STACK GAS	= 27.31327119334447 LB/LB-MOL
PERCENT EXCESS AIR	= 312.4999999999999 %
AVERAGE STACK GAS VELOCITY	= 48.96233482696189 FT/SEC
ABSOLUTE STACK PRESSURE	= 28.73911764705882 IN. HG
STACK FLOW RATE AT ACTUAL COND.	= 15370.81248340935 ACFM
STACK FLOW RATE AT STD. COND.	= 10138.22481316844 DSCFM
STACK EMISSIONS	= 2.354906648740468E-003 GR/DSCF
	= 3.36516160105013E-007 LB/DSCF
STACK EMISSION RATE	= .2047005890645285 LB/HR
ISOKINETIC VARIATION	= 101.3743505549967 %

****

TIME OF TEST	= 60 MIN
VOLUME METERED	= 40.678 CU.FT
DRY GAS METER CALB. FACT.	= 1.019
TEST BAR. PRESSURE	= 28.82 IN HG
AVERAGE DELTA H	= 1.73
AVG. METER TEMP.	= 88.58 DEG. F
VOL. H2O (IMPINGERS)	= 165.3 ML
WEIGHT GAIN OF SILICA GEL	= 7.8 GM
%CO2	= 4 %
%CO	= 0 %
%O2	= 16 %
%N2	= 80 %
STATIC P OF STACK	=-1.1 IN. H2O
STACK TEMP.	= 174.6 DEG. F
PITOT COEFFICIENT	= .84
AVG. ROOT DELTA P	= .7583
STACK DIAMETER	= 0 IN.
MASS PARTICULATE	= 5.9 MG
NOZZLE DIAMETER	= .245 IN

****

Support ct - @ least 60min @ 31.8 dscfm

PARTICULATE EMISSION TEST REVIEW SHEET

1. Facility Name: _____
2. Run Number: _____
3. Test Date: _____
4. Time of Test: _____ (min)
5. Volume Metered: 34.15 [illegible] [illegible] (ft³)
6. Dry Gas Meter Calb. Factor: _____
7. Test Barometric Pressure: 29.23 [illegible] (in. Hg)
8. Avg. Delta H: 1.21 , 1.23 , 1.73 (in. H2O)
9. Avg. Meter Temp: 75 86.? [illegible] (Deg. F)
10. Volume H2O (Impingers): 54.? [illegible] 165.3 (ML)
11. Weight Gain of Silica Gel: 2.2 4.9 2.? (GM)
12. % CO2: [illegible]
13. % CO: [illegible]
14. % O2: [illegible]
15. % N2: [illegible]
16. Static Pressure of Stack: -1.1 (in. H2O)
17. Stack Temp: [illegible] 174.[illegible] (Deg. F)
18. Pitot Coefficient: 0.84
19. Avg. Root Delta P: 0.7629, [illegible], 0.7585
20. Stack Diameter: 24.5 × [illegible] (in.)
21. Mass Particulate: 2.6, 4.2, 5.9 (mg)
22. Nozzle Diameter: [illegible], [illegible], .245 (in.)

Coal Data

1. % Hydrogen: _____
2. % Carbon: _____
3. % Sulfur: _____
4. % Nitrogen: _____
5. % Oxygen: _____
6. F Factor: _____
7. Gross Calorific Value: _____

[illegible] [illegible] [illegible]

CONTACT REPORT

FACILITY: Weidle Sand and Gravel, Inc.

CONTACT: Ron Weidle

RAPCA REP.: Cathy O'Neill

DATE: May 25, 1994

RE: Source P002 Stack Test

On Sept. 16, 1993 a stack test was conducted at Weidle Sand and Gravel Inc.on an asphalt batch plant (OEPA source no. P903). The test incorporated (3) one hour runs. Jon Hilty was on site observing the stack test crew's implementation of USEPA approved testing procedures. Meanwhile, I observed the asphalt operating parameters in the control room and took visible emission readings (VE's) during each run.

Run # 1	Started at	9:30	and ended at	10:45	
Time	9:30	10:01	10:40		
Rate (Tons/hr.)	80/85	80/85	84/85		
Photohelic	4.5	4.5	6		
Total tons made		44		84 + 15 in hot storage bins	

Run # 2	Started at	11:50	and ended at	1:00	
Time	11:50	12:18	12:58	1:02	
Rate (Tons/hr.)	80/85	80/85	80/85		
Photohelic	6	6	6		
Total tons made	14	52		98	

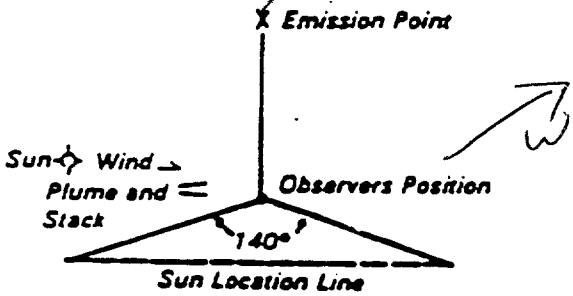
Run # 3	Started at	2:00	and ended at	3:10	
Time	2:00	2:25	3:05		
Rate (Tons/hr.)	80	80	84		
Photohelic	4.5	4.5	6		
Total tons made		42	84	84 +10/15 in hot storage bins	

The new filters made a great improvement on the operations. But they were getting clogged up. The plant operator physically shook the filters out during the shut-down break between runs.

Visible Emission Observation Form Run # 3

SOURCE NAME	Wiedle
ADDRESS	
CITY	Germantown
STATE	Oh
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Hot Mix Asphalt Plant
OPERATING MODE	On
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	ON
DESCRIBE EMISSION POINT START	Square Metal Stack
DESCRIBE EMISSION POINT STOP	✓
HEIGHT ABOVE GROUND LEVEL START	≥ 30'
HEIGHT ABOVE GROUND LEVEL STOP	✓
HEIGHT RELATIVE TO OBSERVER START	≥ 30'
HEIGHT RELATIVE TO OBSERVER STOP	✓
DISTANCE FROM OBSERVER START	≥ 100'
DISTANCE FROM OBSERVER STOP	✓
DIRECTION FROM OBSERVER START	NNW
DIRECTION FROM OBSERVER STOP	✓
DESCRIBE EMISSIONS START	Heat like waves
DESCRIBE EMISSIONS STOP	✓
EMISSION COLOR START	Clear
EMISSION COLOR STOP	✓
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	15 stack width from top of stack
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	✓
DESCRIBE BACKGROUND START	HMA Plant + clouds
DESCRIBE BACKGROUND STOP	✓
BACKGROUND COLOR START	Beige/wt
BACKGROUND COLOR STOP	✓
SKY CONDITIONS START	Overcast
SKY CONDITIONS STOP	Scattered clouds
WIND SPEED START	≥ 0-5 mph
WIND SPEED STOP	✓
WIND DIRECTION START	~~25~~ [illegible]
WIND DIRECTION STOP	SSW Same
AMBIENT TEMP START	≥ 70°F
AMBIENT TEMP STOP	✓
WET BULB TEMP.	
RH, percent	

Source Layout Sketch Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
5/25/94	2:04	

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	Ø	Ø	Ø	Ø	31				
2	Ø	Ø	Ø	Ø	32				
3	Ø	Ø	Ø	Ø	33				
4	Ø	Ø	Ø	Ø	34				
5	Ø	Ø	Ø	Ø	35				
6	Ø	Ø	Ø	Ø	36				
7	Ø	Ø	Ø	Ø	37				
8	Ø	Ø	Ø	Ø	38				
9	Ø	Ø	Ø	Ø	39				
10	Ø	Ø	Ø	Ø	40				
11	Ø	Ø	Ø	Ø	41				
12	Ø	Ø	Ø	Ø	42				
13	Ø	Ø	Ø	Ø	43				
14	Ø	Ø	Ø	Ø	44				
15	Ø	Ø	Ø	Ø	45				
16	Ø	Ø	Ø	Ø	46				
17	Ø	Ø	Ø	Ø	47				
18	Ø	Ø	Ø	Ø	48				
19					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)	Cathy O'Neil
OBSERVER'S SIGNATURE	Cathy O'Neil — DATE 5-25-94
ORGANIZATION	RAPCA
CERTIFIED BY	ETA — DATE 3-2-94
VERIFIED BY	DATE

COMMENTS: No Storm Plume or fugitives

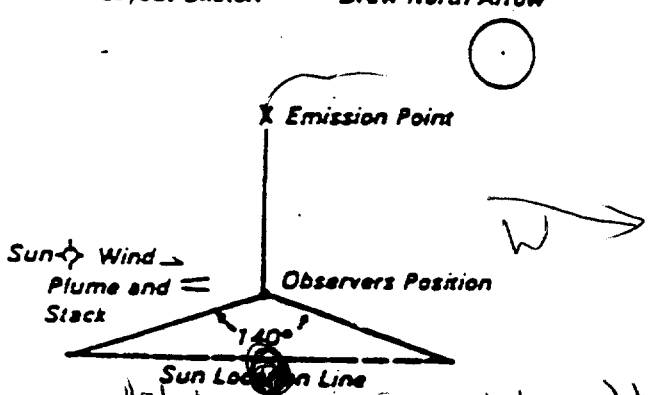
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE

Visible Emission Observation Form — Run 2

SOURCE NAME: Wedle	OBSERVATION DATE: 5/25/94	START TIME: 11:57 AM — STOP TIME: 12:15 PM
ADDRESS:		
CITY: Germantown / STATE: Oh / ZIP:		
PHONE: / SOURCE ID NUMBER:		
PROCESS EQUIPMENT: Hot-mix Asphalt Plant / OPERATING MODE: ON		
CONTROL EQUIPMENT: Bag house / OPERATING MODE: ON		
DESCRIBE EMISSION POINT — START: Square metal stack w/ Curved out top / STOP: ✓		
HEIGHT ABOVE GROUND LEVEL — START: ≈30' / STOP: ✓	HEIGHT RELATIVE TO OBSERVER — START: ≈30' / STOP: ✓	
DISTANCE FROM OBSERVER — START: ≈100' / STOP: ✓	DIRECTION FROM OBSERVER — START: NW / STOP: ✓	
DESCRIBE EMISSIONS — START: heat like waves / STOP: ✓		
EMISSION COLOR — START: Clear / STOP: ✓	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☐ End	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED — START: 1 stack width from top of stack / STOP: end of steam plume ✓		
DESCRIBE BACKGROUND — START: Sky / HMA Plant / STOP: ✓		
BACKGROUND COLOR — START: ~~Blue~~ Blue / STOP: ✓	SKY CONDITIONS — START: Cloudy / STOP: ✓	
WIND SPEED — START: ≈3-5 mph / STOP: ✓	WIND DIRECTION — START: / STOP: ✓	
AMBIENT TEMP. — START: ≈70°F / STOP: ✓	WET BULL TEMP.	RH, percent

MIN	SEC 0	SEC 15	SEC 30	SEC 45	MIN	SEC 0	SEC 15	SEC 30	SEC 45
1	0	0	0	0	31				
2	0	0	0	0	32	start of steam plume			
3	0	0	0	5	33	reading at end of steam plume			
4	5	0	0	0	34				
5	5	0	0	0	35				
6	5	5	0	0	36				
7	0	0	0	0	37	End of Steam Plume			
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45	Steam starts again			
16	0	0	0	0	46	Dust seen			
17	5	5	0	0	47	Coming out of			
18	0	0	0	0	48	back of kiln			
19	Steam ended				49	≈30%			
20					50	Info at 12:15:30			
21					51	Same time as Steam			
22					52	Plume Ended			
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Source Layout Sketch — Draw North Arrow



AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS — MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT): Cathy O'Neill	
OBSERVER'S SIGNATURE: Cathy O'Neill	DATE: 5/25/94
ORGANIZATION: KAPCA	
CERTIFIED BY: ETA	DATE: 3/2/94
VERIFIED BY:	DATE:

which type of rock (more moisture...) + Depending on the baghouse cleaning cycle,

COMMENTS: The stack emissions had periods of steam in the exhaust

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE — DATE

Visible Emission Observation Form

SOURCE NAME: Wiedle

ADDRESS:

CITY: Germantown | STATE: Oh | ZIP:

PHONE: | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Hot Mix Asphalt Plant | OPERATING MODE: ON

CONTROL EQUIPMENT: Baghouse | OPERATING MODE: ON

DESCRIBE EMISSION POINT
START: Square Metal Stack w/ curved outlet ✓ STOP:

HEIGHT ABOVE GROUND LEVEL
START: ~30' ✓ STOP:

HEIGHT RELATIVE TO OBSERVER
START: ~30' ✓ STOP:

DISTANCE FROM OBSERVER
START: ~100' ✓ STOP:

DIRECTION FROM OBSERVER
START: NW ✓ STOP:

DESCRIBE EMISSIONS
START: "looping Plume ✓ STOP:

EMISSION COLOR
START: Wt ✓ STOP:

PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☑

WATER DROPLETS PRESENT: NO ☐ YES ☐

IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: End of Stack ✓ STOP:

DESCRIBE BACKGROUND
START: Clouds, Sky ✓ STOP:

BACKGROUND COLOR
START: Wt ✓ STOP:

SKY CONDITIONS
START: Cloudy ✓ STOP:

WIND SPEED
START: ~3-5 mph ✓ STOP:

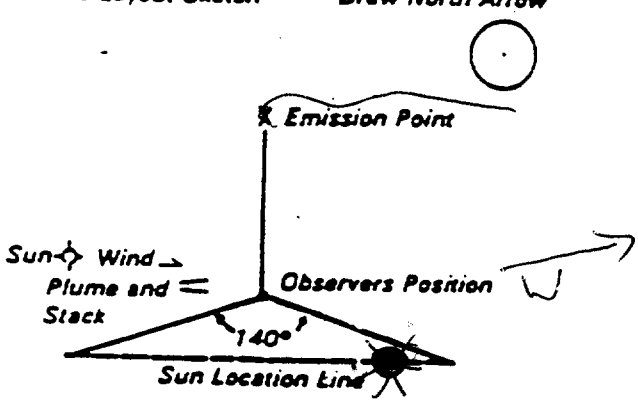
WIND DIRECTION
START: STOP: ✓

AMBIENT TEMP.
START: ~60° ✓ STOP:

WET BULB TEMP.:

RH.percent:

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE				START TIME				STOP TIME			
5/25/94				9:42							
MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	5	0	0	5	33				
4	0	0	5	10	34				
5	0	5	0	15	35				
6	5	10	5	0	36				
7	0	5	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	15	25	46				
17	0	5	10	10	47				
18	15	15	10	10	48				
19	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): Cathy O'Neill

OBSERVER'S SIGNATURE: Cathy O'Neill DATE: 5/25/94

ORGANIZATION: RAPCA

CERTIFIED BY: ETA DATE: 3/2/94

VERIFIED BY: DATE:

COMMENTS:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE:

TITLE: DATE:

CONTACT REPORT

FACILITY: Weidle Sand and Gravel, Inc.

CONTACT: Ron Weidle

RAPCA REP.: Cathy O'Neill

DATE: May 25, 1994

RE: Source P002 Stack Test

On Sept. 16, 1993 a stack test was conducted at Weidle Sand and Gravel Inc.on an asphalt batch plant (OEPA source no. P903). The test incorporated (3) one hour runs. Jon Hilty was on site observing the stack test crew's implementation of USEPA approved testing procedures. Meanwhile, I observed the asphalt operating parameters in the control room and took visible emission readings (VE's) during each run.

Run # 1	Started at 9:30	and ended at 10:45		
Time	9:30	10:01	10:40	
Rate (Tons/hr.)	80/85	80/85	84/85	
Photohelic	4.5	4.5	6	
Total tons made		44		84 + 15 in hot storage bins

Run # 2	Started at 11:50	and ended at 1:00		
Time	11:50	12:18	12:58	1:02
Rate (Tons/hr.)	80/85	80/85	80/85	
Photohelic	6	6	6	
Total tons made	14	52	98	

Run # 3	Started at 2:00	and ended at 3:10		
Time	2:00	2:25	3:05	
Rate (Tons/hr.)	80	80	84	
Photohelic	4.5	4.5	6	
Total tons made		42	84	84 +10/15 in hot storage bins

The new filters made a great improvement on the operations. But they were getting clogged up. The plant operator physically shook the filters out during the shut-down break between runs.

PARTICULATE COMPLIANCE EVALUATION
BATCH ASPHALT PLANT
WEIDLE SAND AND GRAVEL, INC.
GERMANTOWN, OHIO

Prepared for

Weidle Sand and Gravel, Inc.
Routes 4 & 123
Germantown, Ohio 45327

June, 1994
4794-001\REPORT

Submitted by

Pacific Environmental Services, Inc.
4700 Duke Drive, Suite 150
Mason, Ohio 45040
(513) 398-2556
Fax: (513) 398-3342

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LIST OF FIGURES

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SECTION 1

INTRODUCTION

Pacific Environmental Services, Inc. (PES) was retained by Weidle Sand and Gravel, Inc. (Weidle) to conduct a particulate compliance evaluation of their asphalt batch plant. The testing was conducted on May 25, 1994.

PES utilized EPA Reference Methods 1-5 to measure flue gas velocity, flow rate, temperature, composition (O_2 and CO_2) and particulate (filterable and condensible) concentrations and mass emission rates. A total of three 60-minute sample runs were conducted.

The process was correlated with PES test times by Weidle personnel. Mr. Robert Henry directed process operations. Testing and process operations were observed by Mr. Jon Hilty of the Regional Air Pollution Control Agency (RAPCA). Mr. Andrew Weisman and Mr. Peter Hilty conducted the test program for PES.

SECTION 2

SUMMARY OF TEST RESULTS

Particulate sampling was conducted on May 25, 1994. A total of three sampling runs were conducted. Table 2.1 details the stack gas conditions measured at the baghouse. Stack gas velocity averaged 53.68 feet per second (fps) at 179°F. Stack gas volumetric flow rates averaged 16,851 actual cubic feet per minute (acfm) or 10,929 dry standard cubic feet per minute (dscfm). Moisture content averaged 19.3%. Composition of the stack gas (dry molecular weight) averaged 3.3% carbon dioxide (CO_2) and 17.3% oxygen (O_2).

Table 2.2 details the filterable and condensible particulate matter concentrations and mass emission rates. Filterable particulate concentrations averaged 2.07×10^{-3} grains per dry standard cubic foot (gr/dscf) or 2.95×10^{-7} pounds per dry standard cubic feet (lb/dscf). Mass emission rates averaged 0.185 pounds per hour (lb/hr) or 2.3×10^{-3} pounds per ton (lb/ton) of asphalt produced. Process feed rates were supplied by plant personnel. Condensible particulate concentrations averaged 1.14×10^{-4} gr/dscf or 1.45×10^{-7} lb/dscf, for a corresponding mass emission rate of 0.093 lb/hr.

TABLE 2.1

SUMMARY OF STACK GAS CONDITIONS
WEIDLE SAND AND GRAVEL

MAY 25, 1994

Run No.	Time	Stack Gas Velocity, fps[a]	Volumetric Flow Rate		Stack Temp., °F	Moisture, %	Composition	
			acfm[b]	dscfm[c]			CO_2,%	O_2,%
BO-1	0930-1040	62.04	19,474	12,806	176	18.7	3.0	18.0
BO-2	1145-1300	50.01	15,697	9,862	186	21.5	3.0	18.0
BO-3	1400-1515	49.00	15,381	10,119	175	17.6	4.0	16.0
Average		53.68	16,851	10,929	179	19.3	3.3	17.3

[a]Feet per second
[b]Actual cubic feet per minute
[c]Dry standard cubic feet per minute

TABLE 2.2

SUMMARY OF PARTICULATE MATTER EMISSIONS

WEIDLE SAND AND GRAVEL

MAY 25, 1994

Run No.	Filterable Particulate Matter				Condensible Particulate Matter		
	Concentration		Mass Emission Rate		Concentration		Mass Emission Rate
	gr/dscf[a]	lb/dscf[b]	lb/hr[c]	lb/ton[d]	gr/dscf[a]	lb/dscf[b]	lb/hr[c]
BO-1	1.20×10^{-3}	1.71×10^{-7}	0.131	1.5×10^{-3}	8.74×10^{-4}	1.25×10^{-7}	0.096
BO-2	2.62×10^{-3}	3.75×10^{-7}	0.218	2.6×10^{-3}	1.73×10^{-3}	1.96×10^{-7}	0.114
BO-3	2.39×10^{-3}	3.41×10^{-7}	0.207	2.8×10^{-3}	8.09×10^{-4}	1.16×10^{-7}	0.070
Average	2.07×10^{-3}	2.95×10^{-7}	0.185	2.3×10^{-3}	1.14×10^{-4}	1.45×10^{-7}	0.093

[a]Grains per dry standard cubic foot.
[b]Pound per dry standard cubic foot.
[c]Pound per hour.
[d]Pound per ton.

SECTION 3

SAMPLING LOCATION AND TEST METHODS

Sampling was conducted at the outlet duct of the air pollution control system (baghouse and filter). Figure 3.1 shows the outlet sample locations and traverse points. The outlet ports are located 5.94 diameters downstream and 1.21 duct diameters upstream from the nearest flow disturbances. Twenty four sampling points, (four ports--6 points per port) were used to traverse the cross-sectional area of the 24.5" X 30.75" rectangular duct, with an equivalent diameter 27.27".

STACK GAS VOLUMETRIC FLOW RATE

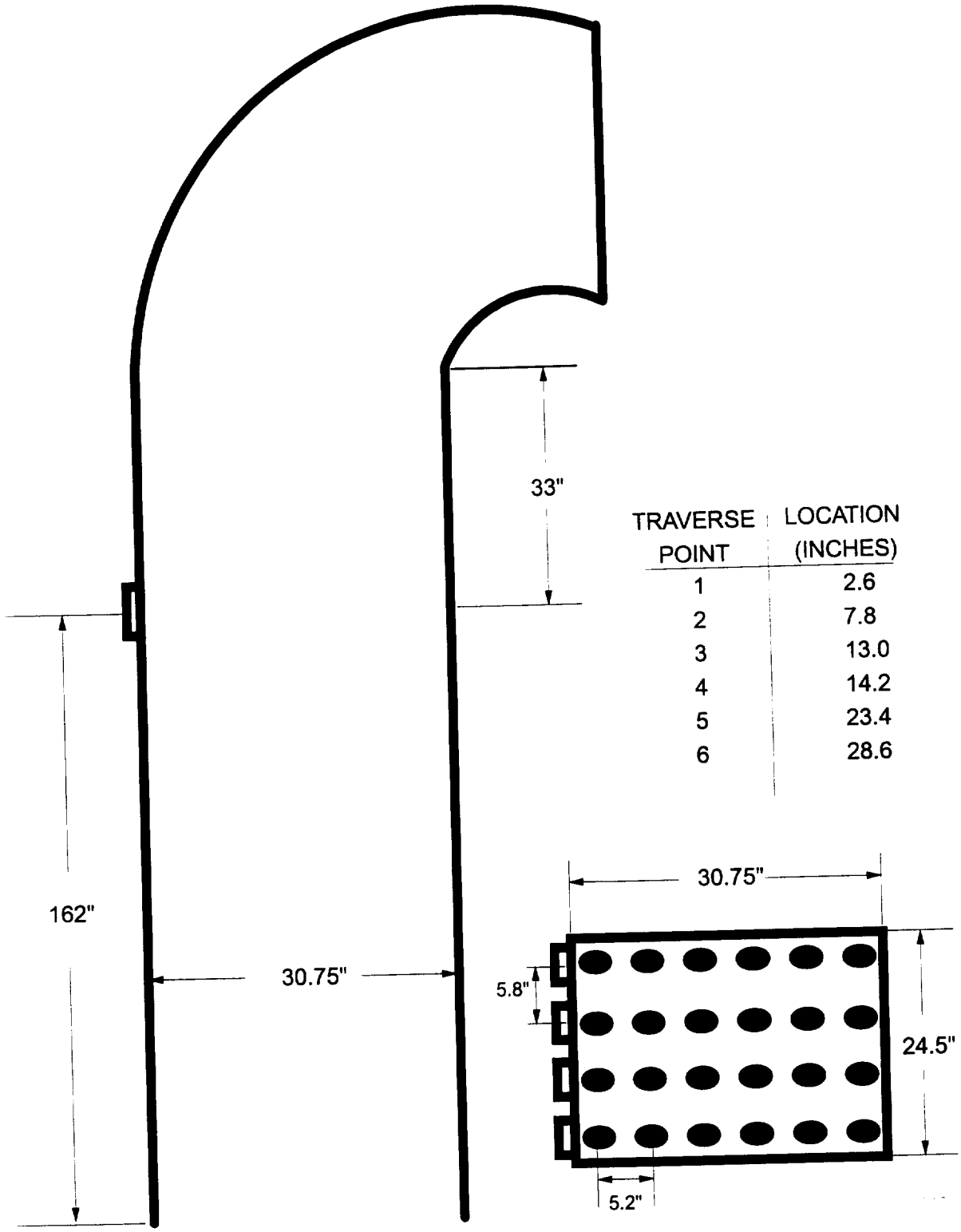
EPA Method 1, "Determination of Stack Gas Velocity and Volumetric Flow Rate," was used to determine volumetric flow rate. A Type "S" pitot tube having an assigned coefficient of 0.84 and an inclined manometer were used to measure velocity pressure. A calibrated Type "K" thermocouple attached directly to the pitot tube was used to measure stack gas temperature. The average stack gas velocity was calculated from the average velocity pressure, average stack gas temperature, stack gas molecular weight, and absolute static pressure. The volumetric flow rate is the product of velocity and the stack cross-sectional area.

EMISSION RATE CORRECTION FACTOR, DRY MOLECULAR WEIGHT, AND EXCESS AIR

EPA Method 3, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight," was used to determine emission rate correction factors, dry molecular weight, and excess air. Integrated gas samples were collected in Tedlar bags by traversing the stack cross-sectional area simultaneously with each particulate test run. The samples were then analyzed using an Orsat analyzer.

STACK GAS MOISTURE CONTENT

EPA Method 4, "Determination of Moisture Content in Stack Gases," was used to determine stack gas moisture content. These samples was conducted simultaneously with each particulate measurement run. The initial and final contents of all impingers were determined gravimetrically.



TRAVERSE POINT	LOCATION (INCHES)
1	2.6
2	7.8
3	13.0
4	14.2
5	23.4
6	28.6

FIGURE 3.1 BAGHOUSE OUTLET SAMPLING LOCATION

FILTERABLE AND CONDENSIBLE PARTICULATE MATTER

EPA Method 5, "Determination of Particulate Emissions from Stationary Sources," was used to determine filterable and condensible particulate matter. The sample train consisted of a heated glass-lined probe, heated glass fiber filter, and a series of impingers followed by a vacuum pump, dry gas meter, and calibrated orifice. The filter temperature was maintained at 248 ± 25°F. Thermocouples were used to monitor temperatures of the stack gas, sample probe, filter, and impinger exit gas. Figure 3.2 is a diagram of the sampling train.

SECTION 4

PROCESS DESCRIPTION

Weidle operates an asphalt batch plant at the intersection of routes 4 and 123 in Germantown, Ohio. This batch plant typically operates from May through October supplying asphalt for road and parking lot construction. The plant operated at an average production rate of 80 tons per hour during testing.

Particulate emissions generated from the gravel dryer and asphalt production are routed from the dryer to a pulse-air baghouse and an auxiliary filter before being exhausted to the atmosphere via the 24.5 X 30.75 inch outlet stack.

SECTION 5

QUALITY ASSURANCE AND QUALITY CONTROL

The field sampling quality assurance for this project included the use of: calibrated source sampling equipment; reference test methods; and traceability protocols, for the recording and calculation of data. The analytical quality assurance included: use of validated analytical procedures; calibration of analytical instruments; and analysis of control samples and blanks. The calibration and quality control procedures used for this test program are described in the following subsections.

CALIBRATIONS PROCEDURES AND FREQUENCY

All manual stack gas sampling equipment was calibrated before the test program in accordance with the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III*, EPA-600/4-72-027B. Summarized in Table 5.1 are the stack gas sampling equipment calibrations which were performed in preparation for this project. The meter boxes were calibrated after the test.

Listed in Table 5.2 are the additional calibration checks which were performed on the sampling equipment on-site, just prior to the testing, to ensure that equipment was not damaged during transport.

TABLE 5.1

FIELD EQUIPMENT CALIBRATION SUMMARY*

Equipment	Calibrated against	Allowable error
Method 5 meter box	Reference test meter	Y ±0.02 Y ▲H @ ±0.15 post-test Y ±0.05 Y
Orsat	Certified cylinder gas	±0.5%
Pitot tube	Geometric specifications	See EPA Method 2
Thermocouple	ASTM-3F thermometer	±1.5%
Impinger (or condenser thermometer)	ASTM-3F	±2°F
Dry gas thermometer	ASTM-3F	±5°F
Probe nozzles	Caliper	±0.004 in.
Barometer	NBS traceable barometer	±0.1 in.Hg

*As recommended in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary Source-Specific Methods*. EPA-600/4-77-027b, August 1977.

TABLE 5.2

FIELD CHECKS OF SAMPLING EQUIPMENT

Equipment	Checked against	Allowable difference
Pitot tube	Inspection	No visible damage
Thermocouples	ASTM 2F or 3F	±1.5%
Probe nozzles	Caliper	±0.004 in.

APPENDIX A

EXAMPLE/COMPUTER CALCULATIONS

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

EXAMPLE CALCULATION

CLIENT/PROJECT NUMBER:
SAMPLE LOCATION:
DATE/TIME:
RUN #:

1.METER CORRECTIONS:

Vmc = Vm-(Lp-La)*Time = Vm-(Lp-0.02)*Time =	34.150
Vm(std) = 17.647*Vmc*Y*(Pbar+/\H/13.6)/Tm(°R) =	33.473

2.MOISTURE FRACTION:

Vw(scf) = Vwc * 0.04707 =	7.70
Bws = Vw(std)/(Vw(std)+Vm(std))*100 =	0.187
%H2O = Bws * 100 =	18.69

3.MOLECULAR WEIGHT:

Md = 0.44*(%CO2)+0.32*(%O2)+0.28(%N2+%CO) =	29.20
Ms = Md*(1-Bws)+(18.0*Bws) =	27.11

Vs = 85.49*Cp*Avg(/\P^0.5)*[Ts(R)/(Ps"Hg*Ms)]^0.5 =	62.04
Qa = Vs*60*As(ft_n) =	19474.1
Qstd = Qa*17.647*(1-%H2O)*Ps/Ts(R) =	12806.2

5.ISOKINETIC:

%I = 0.0945*Ts(R)*Vm(std)/[Ps*Vs*An*Time*(1-Bws)] =	104.53

6.CONCENTRATION(Cs):

Cs(gr/dscf) = 0.0154*Wt(mg)/Vm(std) =	1.20E-03
Cs(lb/dscf) = 1.429E-04*Cs(gr/dscf) =	1.71E-07

7.EMISSION RATE(Er):

Er(lb/hr) = Cs(lb/dscf)*Qstd*60 =	0.13

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/0941
RUN #:	BO-1

STATIC PRESSURE("H2O):	-1.10	"HG	29.15
BAROMETRIC("HG):	29.23		
SAMPLE TIME(min):	60.00	Vm(corr)	34.150
ACTUAL METER VOLUME:	34.150	DSCF	33.473
SQ. ROOT P:	0.963		
AVG ORIFICE H:	1.29		
AVG STACK TEMP °F:	176.0	°R	636.0
AVG METER TEMP °F:	78.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.200	An(ft^2)	2.18E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):	0.000		
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	18.00	DRY MOLE	29.20
% CO2 :	3.00	T MOLE WT	27.11
VOL CONDENSATE(ml):	163.50	% H20	18.69
FILTER GAIN(mg):	0.10		
RINSE GAIN(mg):	2.50	NET WT(mg)	2.60

********** **CALCULATED RESULTS** **********

GAS VELOCITY (Vs):	**62.04**	**FT/SEC**
STACK GAS FLOW (Qs):	**19474.1**	**ACFM**
:	**12806.2**	**DSCFM**
STACK GAS TEMP :	**176**	**Deg F**
MOISTURE (%H2O):	**18.69**	**%**
ISOKINETIC :	**104.53**	**%**
CONCENTRATION (Cs):	**1.20E-03**	**Gr/DSCF**
:	**1.71E-07**	**lb/DSCF**
EMISSION RATE (Er):	**0.131**	**lb/hr**

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/1150
RUN #:	BO-2

STATIC PRESSURE("H2O):	-1.10	"HG	28.77
BAROMETRIC("HG):	28.85		
SAMPLE TIME(min):	60.00	Vm(corr)	26.062
ACTUAL METER VOLUME:	26.062	DSCF	24.673
SQ. ROOT P:	0.761		
AVG ORIFICE H:	0.72		
AVG STACK TEMP °F:	186.0	°R	646.0
AVG METER TEMP °F:	89.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.200	An(ft^2)	2.18E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):	0.000		
CIRC STACK?-1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	18.00	DRY MOLE	29.20
% CO2 :	3.00	T MOLE WT	26.79
VOL CONDENSATE(ml):	143.70	% H20	21.52
FILTER GAIN(mg):	0.20		
RINSE GAIN(mg):	4.00	NET WT(mg)	4.20

**********	**CALCULATED RESULTS**	**********
GAS VELOCITY (Vs):	**50.01**	**FT/SEC**
STACK GAS FLOW (Qs):	**15697.1**	**ACFM**
:	**9682.0**	**DSCFM**
STACK GAS TEMP :	**186**	**Deg F**
MOISTURE (%H2O):	**21.52**	**%**
ISOKINETIC :	**101.91**	**%**
CONCENTRATION (Cs):	**2.62E-03**	**Gr/DSCF**
:	**3.75E-07**	**lb/DSCF**
EMISSION RATE (Er):	**0.218**	**lb/hr**

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/1404
RUN #:	BO-3

ATIC PRESSURE("H2O):	-1.10	"HG	28.74
BAROMETRIC("HG):	28.82		
SAMPLE TIME(min):	60.00	Vm(corr)	40.678
TUAL METER VOLUME:	40.678	DSCF	38.083
SQ. ROOT P:	0.758		
AVG ORIFICE H:	1.73		
AVG STACK TEMP °F:	175.0	°R	635.0
AVG METER TEMP °F:	96.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.245	An(ft^2)	3.27E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):			
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	16.00	DRY MOLE	29.28
% CO2 :	4.00	T MOLE WT	27.29
VOL CONDENSATE(ml):	173.10	% H20	17.62
FILTER GAIN(mg):	0.40		
RINSE GAIN(mg):	5.50	NET WT(mg)	5.90

**********	**CALCULATED RESULTS**	**********
GAS VELOCITY (Vs):	**49.00**	**FT/SEC**
STACK GAS FLOW (Qs):	**15380.5**	**ACFM**
:	**10119.1**	**DSCFM**
STACK GAS TEMP :	**175**	**Deg F**
MOISTURE (%H2O):	**17.62**	**%**
ISOKINETIC :	**100.30**	**%**
CONCENTRATION (Cs):	**2.39E-03**	**Gr/DSCF**
:	**3.41E-07**	**lb/DSCF**
EMISSION RATE (Er):	**0.207**	**lb/hr**

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/0941
RUN #:	BO-1 condensibles

STATIC PRESSURE("H2O):	-1.10	"HG	29.15
BAROMETRIC("HG):	29.23		
SAMPLE TIME(min):	60.00	Vm(corr)	34.150
ACTUAL METER VOLUME:	34.150	DSCF	33.473
SQ. ROOT P:	0.963		
AVG ORIFICE H:	1.29		
AVG STACK TEMP °F:	176.0	°R	636.0
AVG METER TEMP °F:	78.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.200	An(ft^2)	2.18E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):	0.000		
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	18.00	DRY MOLE	29.20
% CO2 :	3.00	T MOLE WT	27.11
VOL CONDENSATE(ml):	163.50	% H20	18.69
FILTER GAIN(mg):	0.00		
RINSE GAIN(mg):	1.90	NET WT(mg)	1.90

**********	**CALCULATED RESULTS**	**********
GAS VELOCITY (Vs):	**62.04**	**FT/SEC**
STACK GAS FLOW (Qs):	**19474.1**	**ACFM**
:	**12806.2**	**DSCFM**
STACK GAS TEMP :	**176**	**Deg F**
MOISTURE (%H2O):	**18.69**	**%**
ISOKINETIC :	**104.53**	**%**
CONCENTRATION (Cs):	**8.74E-04**	**Gr/DSCF**
:	**1.25E-07**	**lb/DSCF**
EMISSION RATE (Er):	**0.096**	**lb/hr**

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/1150
RUN #:	BO-2 condensibles

STATIC PRESSURE("H2O):	-1.10	"HG	28.77
BAROMETRIC("HG):	28.85		
SAMPLE TIME(min):	60.00	Vm(corr)	26.062
ACTUAL METER VOLUME:	26.062	DSCF	24.673
SQ. ROOT P:	0.761		
AVG ORIFICE H:	0.72		
AVG STACK TEMP °F:	186.0	°R	646.0
AVG METER TEMP °F:	89.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.200	An(ft^2)	2.18E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):	0.000		
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	18.00	DRY MOLE	29.20
% CO2 :	3.00	T MOLE WT	26.79
VOL CONDENSATE(ml):	143.70	% H20	21.52
FILTER GAIN(mg):	0.00		
RINSE GAIN(mg):	2.20	NET WT(mg)	2.20

**********	**CALCULATED RESULTS**	**********
GAS VELOCITY (Vs):	**50.01**	**FT/SEC**
STACK GAS FLOW (Qs):	**15697.1**	**ACFM**
:	**9682.0**	**DSCFM**
STACK GAS TEMP :	**186**	**Deg F**
MOISTURE (%H2O):	**21.52**	**%**
ISOKINETIC :	**101.91**	**%**
CONCENTRATION (Cs):	**1.37E-03**	**Gr/DSCF**
:	**1.96E-07**	**lb/DSCF**
EMISSION RATE (Er):	**0.114**	**lb/hr**

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Weidle Sand & Gravel
SAMPLE LOCATION:	Baghouse Outlet
DATE/TIME:	25May94/1404
RUN #:	BO-3 condensibles

STATIC PRESSURE("H2O):	-1.10	"HG	28.74
BAROMETRIC("HG):	28.82		
SAMPLE TIME(min):	60.00	Vm(corr)	40.678
ACTUAL METER VOLUME:	40.678	DSCF	38.083
SQ. ROOT P:	0.758		
AVG ORIFICE H:	1.73		
AVG STACK TEMP °F:	175.0	°R	635.0
AVG METER TEMP °F:	96.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.245	An(ft^2)	3.27E-04
METER GAMMA:	1.019		
LEAK RATE(IF < 0.02):			
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	5.23
DIA OR DIM (inches):	753.38		
% O2 :	16.00	DRY MOLE	29.28
% CO2 :	4.00	T MOLE WT	27.29
VOL CONDENSATE(ml):	173.10	% H20	17.62
FILTER GAIN(mg):	0.00		
RINSE GAIN(mg):	2.00	NET WT(mg)	2.00

**********	**CALCULATED RESULTS**	**********
GAS VELOCITY (Vs):	**49.00**	
STACK GAS FLOW (Qs):	**15380.5**	
:	**10119.1**	
STACK GAS TEMP :	**175**	
MOISTURE (%H2O):	**17.62**	
ISOKINETIC :	**100.30**	
CONCENTRATION (Cs):	**8.09E-04**	
:	**1.16E-07**	
EMISSION RATE (Er):	**0.070**	

COMMENTS:

27.27

TRAVERSE POINT LOCATION FOR RECTANGULAR DUCTS

Plant: Weddle Sand & Gravel

Date: 23 MAY 94

Sampling Location: Baghouse Outlet

Duct Width, inches: 24.5

Inside of Far Wall to Outside of Nipple: 35"

Inside of Near Wall to Outside of Nipple (Nipple Length): 4.25"

Duct Length, inches: ~~[illegible]~~ 30.75

Equivalent Diameter = 2 x L x W / (L + W) = 27.27

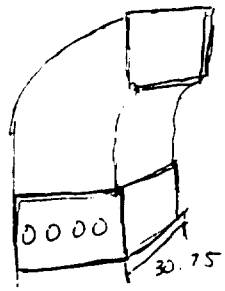
Distance Downstream from Flow Disturbance (Distance B):

16.2 inches / Equivalent Diameter = 5.94 dd

Distance Upstream from Flow Disturbance (Distance A):

~~[illegible]~~ 33 inches / Equivalent Diameter = 1.21 dd

Calculated By: _____



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	.083	30.75	2.55	4.25	6.8
2	.250		7.69		11.94
3	.417		12.82		17.07
4	.583		17.93		22.18
5	.750		23.06		27.3
6	.917		28.20		32.45

If No Ports, Calculate Distances From Stack Walls For Port Locations

Number of Ports	Fraction of Width	Width (inches)	Port Location Product of Col. 2 & 3* (To Nearest 1/8")

* All points or ports should be an equal distance from each other (D) and 1/2 of that distance from the stack walls (D/2), where D = Width / # of points or ports

D_N .197
C_p ~~2.48~~ 1.42

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Weddle Sand & Gravel — Date: ~~23~~ ~~24~~ 25 MAY 94
Sampling Location: _____ — Clock Time: _____
Run #: prelim — Operators: A W / PH
Barometric Pressure, in. Hg: 29.23 — Static Pressure, in. H_2O: -1.1
Moisture, %: 11.2 — Molecular wt., Dry: _____ — Pitot Tube, Cp: 0.84
Stack Dimension, in. Diameter or Side 1: 30.75 — Side 2: 24.5
Wet Bulb, °F: _____ — Dry Bulb, °F: _____

Traverse Point Number	Velocity Head in. H_2O	Stack Temp. °F
A 1	1.9	73
2	2.0	74
3	1.8	74
4	1.2	74
5	.68	74
6	.26	74
B 1	3.0	73
2	3.0	74
3	2.5	74
4	1.8	74
5	.78	74
6	.31	74
C 1	3.0	73
2	3.1	73
3	2.3	73
4	1.5	74
5	.76	73
6	.36	74
D 1	2.5	73
2	2.8	73
3	1.8	73
4	1.1	73
5	.56	73
6	.22	73
	$\overline{\sqrt{\Delta P}}$ = 1.26	$\overline{T_s}$ =

$\overline{\Delta p}$ 1.64 74

T_s 246

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

$Md = (0.44 \times 2.95) + (0.32 \times 16.9) + (0.28 \times \quad)$

$Md = 29.15$

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

$Ms = (29.15) \times (1 - \frac{11.2}{100}) + 18 (\frac{11.2}{100})$

$Ms = 27.90$

$\overline{Ts} = \frac{246}{74}\ ^\circ F = \frac{706}{534}\ ^\circ R\ (^\circ F + 460)$

$Ps = Pb + \frac{S.P.}{13.6} = (29.23) + \frac{-1.1}{13.6}$

$Ps = 29.15$ in. Hg

$\overline{\sqrt{\Delta P}} = 1.26$

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

$Vs = 85.49 \times (.84) \times (1.26) \times \sqrt{\frac{534}{(29.15 \times 27.90)}}$

$Vs = 73.32$ ft/s

$As = 5.23$ ft^2

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

$Qs = 73.32 \times 5.23 \times 60$

$Qs = 23,007.8$ acfm

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

$Qs_{std} = 23,007.8 \times 17.647 \times \frac{29.15}{534} \times (1 - \frac{11.2}{100})$

$Qs_{std} = 21,720.5$ dscfm

FIELD DATA SHEET

Kd = 1.421

Plant: Weddle Sand & Gravel | Sample Type: M5 | Operator: H. Hill | Nozzle ID: .200 | Thermocouple #: S-68

Sampling Location: Baghouse Outlet | Pbar: 29.23 | Ps: -1.1 | Assumed Bws: 11% | Filter #: 3c0099

Run Number: B0-1 | Date: 25 MAY94 | CO2: 3 | O2: 18 | Meter Box #: 15 | Y: 1.019 | ΔH@: 1.801

Pretest Leak Rate: .004 cfm @ 15 in. Hg. | Probe Length/Type: 5' glass | Pitot #: S-69 | Post-Test Leak Rate: .001 cfm @ 5 in. Hg.

Pretest Leak Check: Pitot: ___ Orsat: ___ | Stack Diameter: 30.75 x 24.5 As: ___ | Post-Test Leak Check: Pitot: ___ Orsat: ___

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in H2O	Orifice Pressure Differential (ΔH) in H2O		Stack Temp. (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet (Tm in °F)	Outlet (Tm out °F)	
A 1	0	0941	538.446	0.13	0.156	0.16	165	256	253	65	70	69	0
2	2.5		539.036	0.26	0.312	0.31	167	254	252	63	71	69	2
3	5		539.781	0.70	0.836	0.84	176	252	252	59	71	69	2
4	7.5		540.961	1.0	1.20	1.2	171	254	252	55	72	70	2
5	10		542.421	2.0	2.38	2.4	174	256	252	53	73	70	3.5
6	12.5		544.433	2.1	2.52	2.5	171	252	253	54	76	71	4
B 1	15		546.519	0.18	0.22	0.22	160	258	253	58	77	71	0
2	17.5		547.218	0.41	0.495	0.5	168	253	253	58	77	72	2
3	20		548.221	0.88	1.06	1.1	171	256	253	58	78	73	2
4	22.5		549.691	1.5	1.79	1.8	177	253	253	58	80	73	3
5	25		551.311	2.1	2.51	2.5	180	255	253	59	82	74	4
6	27.5		553.591	2.2	2.62	2.6	182	255	254	60	84	74	4
C 1	30		555.566	0.21	0.257	0.26	163	255	255	60	80	75	0
2	32.5		556.403	0.51	0.609	0.61	181	256	252	53	82	76	2
3	35		557.341	1.0	1.19	1.2	183	253	252	57	83	77	2
4	37.5		558.803	1.6	1.91	1.9	184	252	251	57	85	77	3
5	40		560.601	2.2	2.64	2.6	183	254	255	54	87	78	3.5
6	42.5		563.961	2.1	2.52	2.5	183	257	255	55	88	78	4
D 1	45		564.924	0.11	0.14	0.14	170	256	256	60	87	79	0
2	47.5		565.471	0.33	0.394	0.4	183	255	257	57	86	79	2
3	50		566.428	0.58	0.696	0.7	185	252	252	63	87	80	2
4	52.5		567.688	0.95	1.14	1.1	187	255	254	63	91	83	2
5	55		568.948	1.4	1.69	1.7	183	260	255	60	89	81	3
6	57.5		570.731	1.4	1.70	1.7	179	253	253	61	91	82	3
	60/END		572.596	—	—	—	—	—	—	—	—	—	—

ΔVm= 34.150 | $\overline{\sqrt{\Delta p}}$= 0.9629 | $\overline{\Delta H}$= 1.29 | $\overline{Ts}$= 176 | $\overline{Tm}$= 78

SAMPLE RECOVERY DATA

Plant: WIEOLK Run No.: 30-1

Date: 25MAY94 Sample Box No.: N-7 Job No.: 4794001

Sample Location: Baghouse Outlet

Sample Type: M-5 Filter No.: 300099

Sample Recovery Person: M.TH

Comments:

FRONT HALF

Acetone Container No.: Liquid Level Marked: Sealed:

Filter Container No.: Sealed:

Description of Filter:

Samples Stored and Locked:

BACK HALF/MOISTURE

Container No.:

Liquid Level Marked: Sealed:

IMP. NO.	CONTENTS	INITIAL VOL (ml)	WEIGHT (grams)		
			INITIAL	FINAL	NET
1	H_2O	100	585.9	719.1	133.2
2	H_2O	100	568.6	588.2	19.6
3	—		468.0	470.0	2.0
4	S/G		692.1	700.8	8.7
5					
6					
TOTAL					163.5

Description of Impinger Catch: clear H_2O

FIELD DATA SHEET

Kd = 1.24

Plant: Weddle Sand & Gravel
Sampling Location: Baghouse Outlet
Run Number: B0-2 Date: 25MAY94
Pretest Leak Rate: .004 cfm @ 15 in. Hg.
Pretest Leak Check: Pitot: ✓ Orsat: ✓

Sample Type: MS Operator: Hilly
Pbar: 28.85 Ps: -1.1
CO2: 3 O2: 18
Probe Length/Type: 5'/glass Pitot #: S-611
Stack Diameter: 30.75 x 24.5 As:

Nozzle ID: 0.200 Thermocouple #: S 66
Assumed Bws: 18% Filter #: 300098
Meter Box #: 15 Y: 1.019 ΔH@: 1.801
Post-Test Leak Rate: 0.001 cfm @ 4 in. Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in H2O	Orifice Pressure Differential (ΔH) in H2O		Stack Temp. (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet (Tm in °F)	Outlet (Tm out °F)	
A 1	0	1150	572.689	0.11	0.12	0.12	156	256	263	65	83	83	0
2	2.5		573.189	0.23	0.245	0.25	173	257	257	56	84	83	2
3	5		573.917	0.58	0.614	0.61	177	257	253	60	85	83	2
4	7.5		575.031	0.95	1.01	1.0	176	258	252	55	85	84	2
5	10		576.481	1.50	1.6 ~~1.50~~	1.6	172	253	252	51	87	84	2.5
6	12.5		578.151	1.3	1.38	1.4	180	254	253	50	89	84	2.5
B 1	15		579.718	0.12	0.13	0.13	169	253	255	54	89	85	2
2	17.5		580.274	0.28	0.297	0.3	178	256	252	54	89	85	2
3	20		581.028	0.58	0.616	0.62	178	253	253	55	89	85	2
4	22.5		582.144	0.98	1.03	1.0	189	255	253	57	90	86	2
5	25		583.554	1.3	1.35	1.4	197	256	252	54	91	86	2.5
6	27.5		585.188	1.4	1.45	1.5	200	260	254	53	93	86	2.5
C 1	30		586.817	0.08	0.086	0.09	170	259	253	58	92	81	0
2	32.5		587.298	0.24	0.253	0.25	187	258	253	60	92	88	2
3	35		588.013	0.47	0.493	0.49	190	259	253	60	92	88	2
4	37.5		588.927	0.82	0.857	0.86	194	254	251	60	94	88	2
5	40		590.186	1.5	1.58	1.6	189	257	253	59	94	89	2.5
6	42.5		591.928	1.4	1.48	1.5	187	257	253	56	96	89	2.5
D 1	45		593.583	0.06	0.06	0.06	188	256	252	60	97	90	0
2	47.5		593.981	0.13	0.14	0.14	193	256	255	63	95	90	2
3	50		594.549	0.25	0.259	0.26	199	254	253	62	95	91	2
4	52.5		595.271	0.49	0.509	0.51	200	260	255	61	95	91	2
5	55		596.338	0.75	0.774	0.77	205	255	254	61	96	91	2
6	57.5		597.437	0.90	0.921	0.9	211	259	253	60	97	91	2
	60/END		598.751	—	—	—	—	—	—	—	—	—	—

ΔVm= 26.062 $\sqrt{\Delta p}$= 0.7606 ΔH= 0.723 Ts= 186 Tm= 89

B-6

SAMPLE RECOVERY DATA

Plant: WIEDLE Run No.: B0-2

Date: 25MAY94 Sample Box No.: N-S Job No.: 4794.001

Sample Location: Baghouse outlet

Sample Type: M-5 Filter No.: 300098

Sample Recovery Person: WEISMAN

Comments:

FRONT HALF

Acetone Container No.: Liquid Level Marked: Sealed:

Filter Container No.: Sealed:

Description of Filter:

Samples Stored and Locked:

BACK HALF/MOISTURE

Container No.:

Liquid Level Marked: Sealed:

IMP. NO.	CONTENTS	INITIAL VOL (ml)	WEIGHT (grams)		
			INITIAL	FINAL	NET
1	H_2O	100	564.1	A.W. ~~136~~ 691.0	126.9
2	H_2O	100	607.1	618.6	11.5
3	—	—	452.0	452.4	0.4
4	S/G		631.2	636.1	4.9
5					
6					
TOTAL					143.7

Description of Impinger Catch:

FIELD DATA SHEET

$\sqrt{\Delta}$ = 2.98

Plant: Weddle Sand & Gravel | Sample Type: M5 | Operator: Hilly | Nozzle ID: 0.245 | Thermocouple #: S-6A

Sampling Location: Baghouse Outlet | Pbar: 28.82 | Ps: ~1.1 | Assumed Bws: 18% | Filter #: 300097

Run Number: B0-3 | Date: 25MAY94 | CO2: 4 | O2: 16 | Meter Box #: 15 | Y: 1.019 | ΔH@: 1.801

Pretest Leak Rate: _____ cfm @ ___ in. Hg. | Probe Length/Type: 5' Glass | Pitot #: S-6A | Post-Test Leak Rate: 0.001 cfm @ 6 in. Hg.

Pretest Leak Check: Pitot: ____ Orsat: _____ | Stack Diameter: 30.75 x 24.5 | As: _____ | Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time (min)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft³	Velocity Head (Δp) in H2O	Orifice Pressure Differential (ΔH) in H2O		Stack Temp. (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet (Tm in °F)	Outlet (Tm out °F)	
A1	0	1404	599.410	0.09	0.245	0.25	142	258	256	60	90	89	2
2	2.5		600.176	0.17	0.452	0.45	156	252	254	59	90	89	2
3	5		601.177	0.34	0.856	0.86	190	253	251	60	90	89	2
4	7.5		602.431	0.64	1.61	1.6	191	256	252	56	91	89	2.5
5	10		604.108	1.1	2.78	2.8	189	257	254	55	91	89	4
6	12.5		606.471	1.1	2.80	2.8	186	258	252	54	95	89	4
B1	15		608.718	0.09	0.235	0.24	168	255	256	60	95	90	2
2	17.5		609.453	0.22	0.568	0.57	177	259	253	57	95	90	2
3	20		610.531	0.45	1.16	1.2	181	253	252	54	95	90	2
4	22.5		612.028	0.78	2.01	2.0	182	254	252	55	97	91	3
5	25		614.062	1.3	3.35	3.4	182	252	254	59	99	92	5
6	27.5		616.438	1.4	3.62	3.6	182	251	253	60	101	92	5
C1	30		619.028	0.15	0.40	0.4	161	256	255	61	98	92	2
2	32.5		620.996	0.27	0.708	0.71	172	253	252	54	100	93	2
3	35		621.120	0.60	1.58	1.6	173	253	252	59	100	94	3
4	37.5		622.861	0.94	2.47	2.5	174	252	252	55	102	94	4
5	40		624.948	1.2	3.15	3.2	175	252	253	55	104	94	5
6	42.5		627.408	1.1	2.88	2.9	177	253	255	55	106	95	5
D1	45		629.768	0.09	0.241	0.24	164	257	255	60	104	96	2
2	47.5		630.531	0.24	0.63	0.63	171	254	252	60	102	96	2
3	50		631.578	0.44.56	1.47	1.5	174	252	254	61	103	96	3
4	52.5		633.338	0.86	2.27	2.3	174	260	252	57	104	97	4
5	55		635.292	1.1	2.90	2.9	174	252	253	56	106	97	4
6	57.5		637.652	1.1	2.89	2.9	177	255	253	57	107	97	4
	60/EM		640.088	—	—	—	—	—	—	—	—	—	—

ΔVm= 40.678 | $\overline{\sqrt{\Delta p}}$= 0.7583 | $\overline{\Delta H}$= 1.73 | $\overline{Ts}$= 175 | $\overline{Tm}$= 96

SAMPLE RECOVERY DATA

Plant: WIDOWS Run No.: 30-3

Date: 25 MAY 94 Sample Box No.: IN-1 Job No.: 4794.001

Sample Location: Baghouse Outlet

Sample Type: MS Filter No.: 300097

Sample Recovery Person: WEISMAN

Comments: _____

FRONT HALF

Acetone Container No.: _____ Liquid Level Marked: _____ Sealed: _____

Filter Container No.: _____ Sealed: _____

Description of Filter: _____

Samples Stored and Locked: _____

BACK HALF/MOISTURE

Container No.: _____

Liquid Level Marked: _____ Sealed: _____

IMP. NO.	CONTENTS	INITIAL VOL (ml)	WEIGHT (grams)		
			INITIAL	FINAL	NET
1	H2O	100	570.1	714.5	144.4
2	H2O	100	581.8	601.3	19.5
3	—		482.9	484.3	1.4
4	S/G		683.5	691.3	7.8
5					
6					
TOTAL					173.1

Description of Impinger Catch: _____

ISOKINETIC CALCULATION

SITE Weidle Sand & Gravel TEST NO. BD-1, 2, 3

		RUN 1	RUN 2	RUN 3
1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a). $V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right] =$	V_m, ft^3	34.150	26.062	40.678
	Y	1.019	1.019	1.019
	P_{bar}, in.Hg	29.23	28.85	28.82
	$\overline{\Delta H}$, $in.H_2O$	1.29	0.723	1.73
	$\overline{T_m}$, °R	538.	549	556
	$V_{m_{std}}$, dscf	33.48	24.638	38.09 ~~77.1~~
2. Volume of water vapor at standard conditions, ft^3. $V_{w_{std}} = 0.04707 V_{lc} =$	V_{lc}, g	163.5	143.7	173.1
	$V_{w_{std}}$, ft^3	7.69	6.76	8.15
3. Moisture content in stack gas. $B_{ws} = \frac{V_{w_{std}}}{(V_{m_{std}} + V_{w_{std}})} =$	B_{ws}	0.188	0.215	0.167
	$1-B_{ws}$	0.812	0.785	0.833
4. Dry molecular weight of stack gas, lb/lb-mole. $M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO) =$	% CO_2	3.0	3	4
	% O_2	18.0	18	16
	% N_2 + % CO	79.0	79	80
	M_d, lb/lb-mole	29.20	29.2	29.28
5. Molecular weight of stack gas. $M_s = M_d\ (1-B_{ws}) + 18\ B_{ws} =$	M_s, lb/lb-mole	27.18	26.79	27.01
6. Stack velocity at stack conditions, fps. $V_s = 85.49\ Cp\ (avg.\sqrt{\Delta P}) \sqrt{\frac{T_s}{P_s M_s}} =$	P_{static}, $in.H_2O$	-1.1	-1.1	-1.1
	P_s, in.Hg	29.15	28.77	28.74
	$\overline{T_s}$, °R	636.	646	635
	$\overline{\sqrt{\Delta P}}$	0.9629	0.7606	0.7583
NOTE: $P_s = P_{bar} + \left(\frac{B_{g\,rank}}{13.6}\right)$	Cp	0.84	0.84	0.84
	V_s, fps	61.95	50.00	49.25
7. Isokinetic variation $\%\ I = \frac{V_{m_{std}} \times T_s \times 17.32}{V_s \times D_n^2 \times \theta \times P_s \times (1-B_{ws})}$	Dn, in.	~~0.000~~ 0.2	0.2	0.245
	θ, min.	60.	60	60
	% I	104.8	101.7	98.7

PROJECT ANALYTICAL SHEET

SITE: Waddle Sand & Gravel RUN NO.: Bo-2

FILTER NO.: 300299 I.D. NO.: 94-312

FINAL MASS: TARE MASS: 341.8

	DATE/TIME	NAME	MASS
#1	31-Jan-94 1027	Hilty	341.8
#2	6/7/94 1513	DJM	341.9
#3			
#4			

AVG. MASS: 341.9

NET GAIN: 0.1

F/H BEAKER NO.: 235 I.D. NO.: 94-313

FINAL MASS: TARE MASS: 111,542.1

	DATE/TIME	NAME	MASS
#1	31-Jan-94 1028	Hilty	111,~~542.8~~ 542.1 PM
#2	6/7/94 1523	DJM	111,544.6
#3	6/8/94 0853	DJM	111,544.6
#4			

AVG. MASS: 111,544.6

NET GAIN: 2.5

B/H BEAKER NO.: 239 I.D. NO.: 94-314

FINAL MASS: TARE MASS: 110,383.2

	DATE/TIME	NAME	MASS
#1	6/7/94 1523	DJM	110,384.9
#2	6/8/94 0854	DJM	110,385.3
#3			
#4			

AVG. MASS: 110,385.1

NET GAIN: 1.9

PROJECT ANALYTICAL SHEET

SITE: Middle Sand & Gravel RUN NO.: Bo-2

FILTER NO.: 300098 I.D. NO.: 94-315

FINAL MASS: TARE MASS: 336.85

	DATE/TIME	NAME	MASS
#1	3Jun94 / ~~1040~~ 1048	Hilty	337.1
#2	6/7/94 1515	DJM	337.0
#3			
#4			

AVG. MASS: 337.1

NET GAIN: 0.2

F/H BEAKER NO.: 241 I.D. NO.: 94-316

FINAL MASS: TARE MASS: 109,148.1

	DATE/TIME	NAME	MASS
#1	3Jun94 / 1042	Hilty	109,150.8
#2	6/7/94 1521	DJM	109,151.9
#3	6/8/94 0855	DJM	109,152.3
#4			

AVG. MASS: 109,152.1

NET GAIN: 4.0

B/H BEAKER NO.: 243 I.D. NO.: 94-317

FINAL MASS: TARE MASS: 109,754.65 ~~109,745.65~~ DJM

	DATE/TIME	NAME	MASS
#1	6/7/94 1520	DJM	109,757.0
#2	6/8/94 0856	DJM	109,756.7
#3			
#4			

AVG. MASS: 109,756.9

NET GAIN: 2.2

PROJECT ANALYTICAL SHEET

SITE: Waddle Sand & Gravel RUN NO.: BO-3

FILTER

FILTER NO.: 300097 I.D. NO.: 94-318

FINAL MASS: TARE MASS: ~~114.50~~ 339.5

DATE/TIME	NAME	MASS
#1 3Jun94 / 1046	M.Ilty	339.9
#2 6/7/94 1517	DJM	339.8
#3		
#4		

AVG. MASS: 339.9

NET GAIN: 0.4

F/H BEAKER

F/H BEAKER NO.: 240 I.D. NO.: 94-319

FINAL MASS: TARE MASS: 114,509.95

DATE/TIME	NAME	MASS
#1 3Jun94 / 1044	M.Ilty	114,514.0
#2 6/7/94 1518	DJM	114,515.4
#3 6/8/94 0859	DJM	114,515.5
#4		

AVG. MASS: 114,515.5

NET GAIN: 5.5

B/H BEAKER

B/H BEAKER NO.: 248 I.D. NO.: 94-320

FINAL MASS: TARE MASS: 106,714.7

DATE/TIME	NAME	MASS
#1 6/7/94 1519	DJM	106,716.8
#2 6/8/94 0858	DJM	106,716.9
#3		
#4		

AVG. MASS: 106,716.7

NET GAIN: 2.0

PRODUCTION CALCULATIONS

RUN 1

Total Production during test - 99 tons
Time to conduct test - 1 hour, 10 minutes

$$\frac{99\,tons}{1.166\,hours} = 84.86\ tons/hour$$

Emission rate = 0.131 lb/hr

$$\frac{0.131\,lb/hr}{84.86\,ton/hr} = 0.0015\ lb/ton$$

RUN 2

Total Production during test - 104 tons
Time to conduct test - 1 hour, 15 minutes

$$\frac{104\,tons}{1.25\,hours} = 83.20\ tons/hour$$

Emission rate = 0.218 lb/hr

$$\frac{0.218\,lb/hr}{83.20\,ton/hr} = 0.0026\ lb/ton$$

RUN 3

Total Production during test - 94 tons
Time to conduct test - 1 hour, 15 minutes

$$\frac{94\,tons}{1.25\,hours} = 75.20\ tons/hour$$

Emission rate = 0.207 lb/hr

$$\frac{0.207\,lb/hr}{75.20\,ton/hr} = 0.0028\ lb/ton$$

ASPHALT SALES SHEET

first Run

CUSTOMER NAME Weidle Sand & Gravel # _____

DATE 5/25/94 JOB # Pos JOB NAME Stack test

TRUCK #	MATERIAL	TONS
Start time - 9:30		
# 2	#04	14
# 1	"	14
# 2	"	14
# 1	"	14
# 2	"	14
# 1	"	14
(Material in Hot Bins)		15
Stop time - 10:40		99

TOTAL TON: 99

PRICE PER TON: _____

ASPHALT SALES SHEET

Second Run
2 of 3

CUSTOMER NAME Waidle Sand & Gravel # _____

DATE 5/25/90 JOB # Pes JOB NAME stock test

TRUCK #	MATERIAL	TONS
Start Time 11:45		
# 2	404	14
# 1	"	"
# 95	"	"
# 2	"	"
# 1	"	"
# 95	"	"
	(Hot Bins)	20
Stop time 1:00		104

TOTAL TON: 104

PRICE PER TON: _____

last Run

ASPHALT SALES SHEET

3 of 3

CUSTOMER NAME Weidle Sand & Gravel # _____

DATE 5/25/94 JOB # 165 JOB NAME Stock test

TRUCK #	MATERIAL	TONS
start time 2:00		
# 2	404	14
# 95	"	"
# 1	"	"
# 2	"	"
# 95	"	"
# 2	"	"
Stop time 3:15	(Hot Bins)	10
		94

TOTAL TON: 94

PRICE PER TON: _____

POSTTEST DRY GAS METER CALIBRATION

MB #:	15	BAROMETRIC PRESS.	29.91 (in. hg.)
DATE:	5-26-94	PERFORMED BY:	G GAY
PLANT:	WIEDEL	PRETEST Y :	1.020
		PRETEST ▲H@:	1.801

	RUN 1	RUN 2	RUN 3
VACUUM ("Hg)	6.00	6.00	6.00
▲H ("H2O)	1.10	1.10	1.10
INITIAL RTM	229.342	235.236	241.113
FINAL RTM	235.236	241.113	246.989
INITIAL DGM	687.310	693.149	699.070
FINAL DGM	693.149	699.070	704.809
TEMP. RTM (F)	76.0	77.0	78.0
TEMP. DGM (F)	84.0	85.0	87.0
TEST TIME (MIN.)	10.0	10.0	10.0
NET VOLUME RTM	5.894	5.877	5.876
NET VOLUME DGM	5.839	5.921	5.739
Y	1.022	1.005	1.038
▲H@	1.772	1.786	1.787

PRIOR Y = 1.020
RECHECK Y = 1.022
% DIFFERENCE = 0.168

AVERAGE ▲H@ = 1.782

$Y = (Vw \times Pb \times (Td + 460)) / (Vd\ (Pb + (dHd / 13.6)) \times (Tw + 460)$

$\blacktriangle H@ = 0.0317 \times \blacktriangle H / (Pb\ (Td + 460)) \times ((Tw + 460) \times time) / Vw)^2$

PITOT TUBE CALIBRATION DATA SHEET

Calibrated By: PAUL SIEGEL

Date: 7-8-94

Pitot I.D. No.: S-164

Effective Length: 64" - 5-4"

Pitot Tube Assembly Level? Yes ✓ No _____

Pitot Tube Openings Damaged? Yes (explain below) _____ No ✓

α_1 = 2 ° (<10°) α_2 = 0 ° (<10°)

β_1 = 1 ° (<5°) β_2 = 1 ° (<5°)

γ = 0 ° θ = 0 ° A = 1.128 °

$z = A \sin\gamma$ = 0 cm (in.) 0.32 cm (<1/8 in.)

$w = A \sin\theta$ = 0 cm (in.) 0.08 cm (<1/32 in.)

P_A = 0.563 cm (in.)

P_B = 0.565 cm (in.)

D_t = 0.375 cm (in.)

Comments: _____

Calibration Required? Yes _____ No ✓

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 1/6/94 Thermocouple number S-6e

Ambient temperature 75 °F Barometric pressure 29.05 in Hg

Calibrator Rings Reference: mercury-in-glass ✓

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Temperature difference,[c] %
1	Ambient	75	74	.19
2	Cold H_2O	38	39	.20
3	Hot H_2O	206	210	.60
4	Hot Oil	418	419	.11

[a]Every 30°C (50° for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right]$ 100≤1.5%.