Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP42 Section:	11.3
Reference:	8
Title:	Emission Testing At A Structural Brick Manufacturing Plant--Final Emission Test Report For Testing At Belden Brick Company, Plant 6, Sugarcreek, OH, U. S. Environmental Protection Agency, Research Triangle Park, NC, February 1995.

CSA COMPANY

(Custom Stack Analysis)

ENGINEERING REPORT

Revised

SOURCE EMISSION TESTS
AT
BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
NOVEMBER 17, 1994

TECHNICAL SERVICES FOR POLLUTION CONTROL

SOURCE TESTING - LAB SERVICE - BOILER CONSULTING

CSA CO.

CARBON MONOXIDE DATA SHEET-CFR METHOD 10

PLANT Belden Brick DATE 11/17/94 BY [illegible]

LOCATION Plant 6 #23 Kiln Drier BAG _____ STACK _____

NDIR UNIT T.E MOD.48 RECORDER ✓ RANGE 0-500 FLOW 1.1 lpm

SPAN GAS VALUES, CO IN N_2 1) 99.6 2) 150.0 3) 316 4) _____

	ZERO	SPAN 1	SPAN 2	SPAN 3
INITIAL CALIBRATION	0	99.3	149.7	316
FINAL CALIBRATION				

	TRIAL 1	TRIAL 2	TRIAL 3
TEST 1	[redacted]	Gas Burner On	
TEST 2	[redacted]	Gas Burner Off	
TEST 3			

CO_7 (CO CORRECTED TO 7% O_2) = CO (ACTUAL) X (20.9 - 7)/(20.9 - O_2)

TEST 1, _____ X 13.9 /20.9 - _____ = _____ PPM @ 7% O_2

TEST 2, _____ X 13.9 /20.9 - _____ = _____

TEST 3, _____ X 13.9 /20.9 - _____ = _____

TEST 4, _____ X 13.6 /20.9 - _____ = _____

CARBON MONOXIDE MASS CONCENTRATION CALCULATION

CO_L = Qs X %V X D_{CO}

CO_L = POUNDS PER HOUR CARBON MONOXIDE

Qs = GAS FLOW, F^3/HR (FROM M-5 TEST)

%V = DECIMAL PERCENTAGE OF CO (V/V)

D_{CO} = DENSITY OF CO, LB/F^3 = 0.0724

TEST 1 2225078 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 2 2040602 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 3 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 4 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

METHOD 25A CALCULATIONS FOR THC AS CARBON

FOR Belden Brick BY [illegible] DATE 11/17/94

C_C = ORGANIC CONCENTRATION AS CARBON, PPMV

C_{meas} = ORGANIC CONCENTRATION AS MEASURED, PPMV

K = CARBON EQUIVALENT CORRECTION FACTOR

K = 2 FOR ETHANE, K = 3 FOR PROPANE, K = 4 FOR BUTANE

$M_C = C_C \, Q_S \, D_C \, 10^{-6}$

M_C = MASS FLOW RATE AS CARBON, LB/HR

Q_S = GAS FLOW, DRY STD FT^3/HR FROM GAS FLOW MEASUREMENT

D_C = 0.0312 LB/FT^3 AT 68 °F

10^{-6} = DECIMAL PERCENT VOLUME CONVERSION FROM PPMV

FUEL GAS 40% N_2 / 60% He

CAL GAS 981 PPMV PROPANE / N_2

RANGE 0-500

AUTOMATIC CAL TIME 60 MINUTES (T.E.I. MODEL 51)

HEATED SAMPLE LINE TEMP 350 °F

TEST	TIME	C_{meas}	C_C	M_C
1	10:50/11:50	[redacted]	[redacted]	[redacted]
2	13:13/14:13	[redacted]	[redacted]	[redacted]

TEST	1	2
DATE	11/17/94	11/17/94
TIME	10:50/11:50	13:13/14:13
EMISSIONS		
CO - PPMV MEASURED	[redacted]	[redacted]
CO - POUNDS/HOUR	[redacted]	[redacted]
VOC - PPMV(MEASURED PROPANE)	[redacted]	[redacted]
VOC - PPMV AS CARBON	[redacted]	[redacted]
VOC - POUNDS/HOUR AS CARBON	[redacted]	[redacted]
STACK GAS CONDITIONS		
TEMPERATURE - ^{o}F	103	164
STATIC PESSURE - IN.H_2O	-.5	-.5
CO_2 - %	2.1	1.8
O_2 - %	18.1	18.3
H_2O - %	2.40	2.55
VELOCITY - FPS	39.07	39.73
STACK AREA - F^2	17.7	17.7
GAS FLOW - ACFM	41494	42191
GAS FLOW - (DSTP) CFH	2225078	2040602
SAMPLE TRAIN CONDITIONS		
PITOT Δ P - IN. H_2O	.440	.411
ORIFICE Δ P - IN. H_2O	2.0	2.0
AVG. METER TEMP - ^{o}F	85	90
METER GAS VOLUME - DSCF	44.09	43.28
BAROMETER - IN. Hg	29.14	29.14

NOTE: TEST 1, DRIER GAS BURNER TURNED ON.
TEST 2, DRIER GAS BURNER TURNED OFF.

BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
COMPILED DATA

TABLE 1

AIR QUALITY SERVICES, INC.

4527 Clairton Boulevard
Pittsburgh, PA 15236
(412) 881-5630

TABLE I
RESULTS OF THE ANALYSIS OF TEDLAR AIR BAGS
FOR HYDROGEN AND CARBON MONOXIDE CONTENT
CSA COMPANY
POST OFFICE BOX 3750
ALLIANCE, OHIO 44601
SAMPLES COLLECTED BY CSA COMPANY
SAMPLES RECEIVED: NOVEMBER 18, 1994 9:50 AM

PARAMETER	TEDLAR BAG #206 KILN OUT	TEDLAR BAG #207 TEST 2	TEDLAR BAG #213 TEST 1
LABORATORY #	68022	68023	68024
CARBON MONOXIDE (PPM)	[redacted]	[redacted]	[redacted]
METHANE (PPM)	[redacted]	[redacted]	[redacted]
BENZENE (PPM)	<0.1	<0.1	<0.1
TOLUENE (PPM)	<0.2	<0.2	<0.2
XYLENE (PPM)	<0.3	<0.3	<0.3
ETHYL BENZENE (PPM)	<0.1	<0.1	<0.1
TOTAL HYDROCARBON EXPRESSED AS METHANE (PPM)	[redacted]	[redacted]	[redacted]

THE SAMPLES WERE ANALYZED BY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR.

BELDEN BRICK

John O. Frohliger

AIR QUALITY SERVICES, INC.

JOB 4557
REPORTED: NOVEMBER 21, 1994

TABLE 2

SOURCE EMISSION TEST
AT
BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
NOVEMBER 17, 1994

Brief of Tests

Tests were performed to determine the carbon monoxide (CO) and total volatile organic (VOC) emissions from the plant 6, kiln 3 drier stack to verify previous data obtained by others. The testing developed into an impromtu mini test program to find the cause of the emissions that were present.

The drier is used to evaporate the moisture from the brick before charging it into the kiln. It is heated by removing the hot air from the cooling section of the kiln and transporting it via. fan and duct to the product discharge end of the drier. Additional heat is added with a natural gas burner located on top of the drier at the product discharge end. The hot air and flue gas pass over the product and discharges through a vane/axial fan to the stack at the product charging end of the kiln. The samples were extracted from the stack below the roof line and the gas flow was measured from sample ports above the roof line.

Results

See table 1 and 2.

Discussion

The testing was originally intended to verify data obtained by others that showed the emissions from this drier to be much higher than those at other sites. Since the data verified these findings showing [redacted] ppmv of CO and [redacted] ppmv VOC as carbon, the drier gas burner was turned off to see if it was the cause. The results showed [redacted] ppmv of CO and [redacted] ppmv of VOC as carbon. This was a decrease of [redacted] percent CO and [redacted] percent VOC.

A fifteen minute integrated sample was taken in the duct from the kiln cooling section to the drier to determine if this was the cause of the remaining emissions. It showed [redacted] PPMV of CO.

Since a very small quantity of fuel oil (diesel fuel) is used as a mold release in forming the clay, the Tedlar bags from the

BELDEN BRICK, SUGARCREEK, PLANT 6, KILN 3 DRIER, NOVEMBER 17,1994

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RESULTS	1
DISCUSSION	1
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TEST APPARATUS AND PROCEDURES, METHOD 25	4
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CSA CO., PO BOX 3750, ALLIANCE, OH 44601 PH (216)525-5119

FAX (216)525-7908

SOURCE EMISSION TEST
AT
BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
NOVEMBER 17, 1994

Brief of Tests

Tests were performed to determine the carbon monoxide (CO) and total volatile organic (VOC) emissions from the plant 6, kiln 3 drier stack to verify previous data obtained by others. The testing developed into an impromtu mini test program to find the cause of the emissions that were present.

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A fifteen minute integrated sample was taken in the duct from the kiln cooling section to the drier to determine if this was the cause of the remaining emissions. It showed [redacted] PPMV of CO.

Since a very small quantity of fuel oil (diesel fuel) is used as a mold release in forming the clay, the Tedlar bags from the

Method 3 test were tested for benzine, ethylbenzene, toluene and xylene. These are the standard tests performed for fuel oil contaminations. The results were below the detection limits of the chromatograph.

The Tedlar bags were also tested for methane to check for unburned natual gas. The results showed the highest concentration with the drier burner in operation. There were smaller quantities in the kiln cooling section air/gas to the drier.

The pitot traverse at the sample ports located above the roofline are the same sample ports used in prior tests. The velocity profile showed a tangential component of 6-10 degrees at the outer perimeter of the stack with the flow dropping off sharply (within 10 inches from the stack wall) to no flow with a negative flow near the center. A judgement call was made in selecting the pitot traverse points that may not reflect an accurate gas velocity and flow that in turn would cause erroneous mass emission rates. There are no other ports higher up the stack. It may be difficult to obtain a good velocity profile at any location in the stack since the gas is moved by a vane/axial (propeller) type fan with an evase' and control damper located directly below the roof line. Also, the velocity profile will change with movement of the butterfly control damper. A location of two diameters down from the top of the stack would be the most ideal place for the sample ports but this would be difficult and costly to accomplish.

Test Apparatus and Procedures.

(A) Methods 1-4

During each of the two tests, a pitot traverse (Method 1 and 2) was performed simultaneously with CO and VOC tests. The sampling port locations are shown in figure 1A. The traverse point locations are shown in figure 1B.

An integrated sample was withdrawn as per Method 3 to determine the carbon dioxide and oxygen concentrations required for the gas density. The flue gas was sampled from a single point through a stainless steel probe connected to a condenser by neoprene hose as shown in figure 2. The condenser was connected to the sampling module with a teflon hose. The module is designed with a three way valve

to purge the system prior to injecting it into a tedlar bag. This was done at the inlet and stack during each of the VOC tests collecting about two cubic feet of flue gas in each bag. The orsat analysis were performed with the gas contained in the bag shortly after the test was completed.

The Method 4 test was started at the same time as the CO and VOC sample and ran for one hour. The sample train is shown in figure 3. The first and second impinger contained 100 ml of distilled water and the third one was used as a dry trap. They were packed in ice to condense the water vapor from the flue gas with any remaining vapor collected in a Drierite column . The impingers and the Drierite column were weighed prior to and after the test with the weight difference showing the amount of condensate collected. This data along with the flue gas temperature, flue gas composition and meter temperature, pressure and volume were used to calculate the percent moisture by volume.

The flue gas temperature was measured with a type K thermocouple connected to a digital temperature indicator.

Data from the above Methods 1-4 were used to calculate the flue gas volumes at the inlet and stack of the incinerator. The raw data and calculations are shown in Appendix I.

(B) Carbon Monoxide Test Methods

EPA Method 10 was used to measure the CO emission using a Thermal Environmental Instruments Model 48 nondispersive infared analyzer (NDIR). The NDIR was opperated as per manufactures operating instructions.

It was set up to show instantaneous readings recorded on a strip chart recorder and from a one hour integrated sample collected in the Tedlar bag used in Method 3 test. The results obtained from the Tedlar bag were used to report data. The readings of the recorder were used to observe changes during the test.

The instantaneous sample was obtained by withdrawing a sample via stainless steel probe through Teflon tubing using a vacuum/pressure pump discharging to a stainless steel dump tube as shown in figure 4. The flow to the dump tube was held at a higher rate than the internal pump of the analyzer to maintain atmospheric

pressure required to operate the instrument.

All calibrating gases were EPA Protocol.

The Tedlar sample bags were taken to an outside laboratory for analysis of methane, benzine, etylbenzene, toluene and xylene.

(C) VOC Test Methods

EPA Method 25A was used to determine the total volatile organic compounds using a Thermal Environmental Instruments model 51H high temperature flame ionization analyzer (FIA). The FIA was operated as per manufacturers operating instructons.

The sample was withdrawn through a stainlesss steel probe and heated sample line directly to the analyzer as shown in figure 5.

The analyzer output was connected to a serial dot matrix printer. It was programed to print the VOC concentratin high, low and average every five minutes. The five minute averages were used to obtain an average for the one hour run. The analyzer automaticaly calibrated after each run. The results are shown in appendix I.

EPA Protocol gases were used for operating the flame detector and calibrations. A mixture of fourty percent hydrogen and sixty percent helium along with air was used for the fuel and propane in nitrogen was used for the calibration gases.

Submitted by

Ernest L.Kolm

TEST	1	2
DATE	11/17/94	11/17/94
TIME	10:50/11:50	13:13/14:13
EMISSIONS		
CO - PPMV MEASURED	[redacted]	[redacted]
CO - POUNDS/HOUR	[redacted]	[redacted]
VOC - PPMV(MEASURED PROPANE)	[redacted]	[redacted]
VOC - PPMV AS CARBON	[redacted]	[redacted]
VOC - POUNDS/HOUR AS CARBON	[redacted]	[redacted]
STACK GAS CONDITIONS		
TEMPERATURE - ^{o}F	103	164
STATIC PESSURE - IN.H_2O	-.5	-.5
CO_2 - %	2.1	1.8
O_2 - %	18.1	18.3
H_2O - %	2.40	2.55
VELOCITY - FPS	39.07	39.73
STACK AREA - F^2	17.7	17.7
GAS FLOW - ACFM	41494	42191
GAS FLOW - (DSTP) CFH	2225078	2040602
SAMPLE TRAIN CONDITIONS		
PITOT Δ P - IN. H_2O	.440	.411
ORIFICE Δ P - IN. H_2O	2.0	2.0
AVG. METER TEMP - ^{o}F	85	90
METER GAS VOLUME - DSCF	44.09	43.28
BAROMETER - IN. Hg	29.14	29.14

NOTE: TEST 1, DRIER GAS BURNER TURNED ON.
TEST 2, DRIER GAS BURNER TURNED OFF.

BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
COMPILED DATA

TABLE 1

AIR QUALITY SERVICES, INC.

4527 Clairton Boulevard
Pittsburgh, PA 15236
(412) 881-5630

TABLE I
RESULTS OF THE ANALYSIS OF TEDLAR AIR BAGS
FOR HYDROGEN AND CARBON MONOXIDE CONTENT
CSA COMPANY
POST OFFICE BOX 3750
ALLIANCE, OHIO 44601
SAMPLES COLLECTED BY CSA COMPANY
SAMPLES RECEIVED: NOVEMBER 18, 1994 9:50 AM

PARAMETER	TEDLAR BAG #206 KILN OUT	TEDLAR BAG #207 TEST 2	TEDLAR BAG #213 TEST 1
LABORATORY #	68022	68023	68024
CARBON MONOXIDE (PPM)	[redacted]	[redacted]	[redacted]
METHANE (PPM)	[redacted]	[redacted]	[redacted]
BENZENE (PPM)	<0.1	<0.1	<0.1
TOLUENE (PPM)	<0.2	<0.2	<0.2
XYLENE (PPM)	<0.3	<0.3	<0.3
ETHYL BENZENE (PPM)	<0.1	<0.1	<0.1
TOTAL HYDROCARBON EXPRESSED AS METHANE (PPM)	[redacted]	[redacted]	[redacted]

THE SAMPLES WERE ANALYZED BY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR.

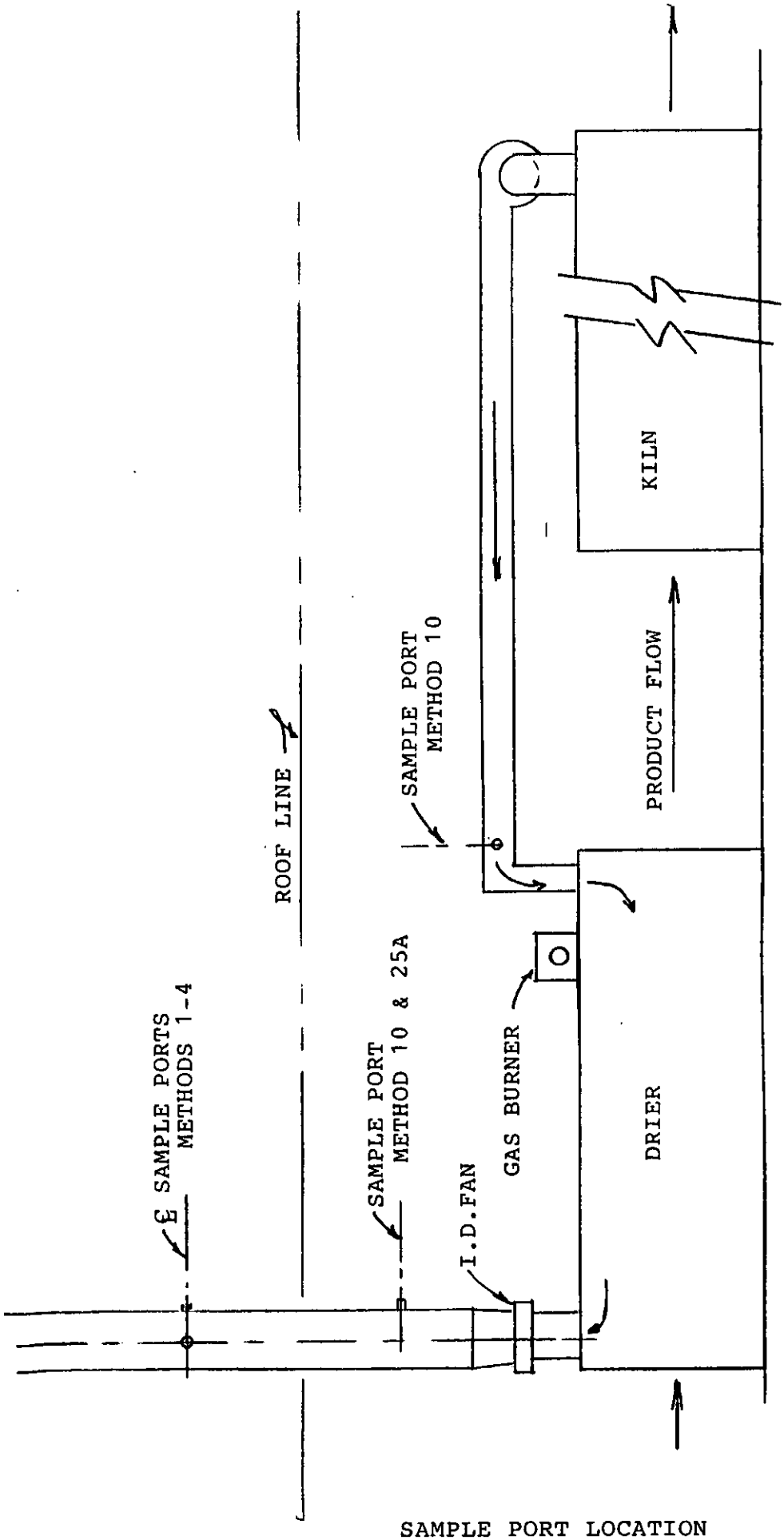
BELDEN BRICK

John O. Frohliger

AIR QUALITY SERVICES, INC.

JOB 4557
REPORTED: NOVEMBER 21, 1994

TABLE 2



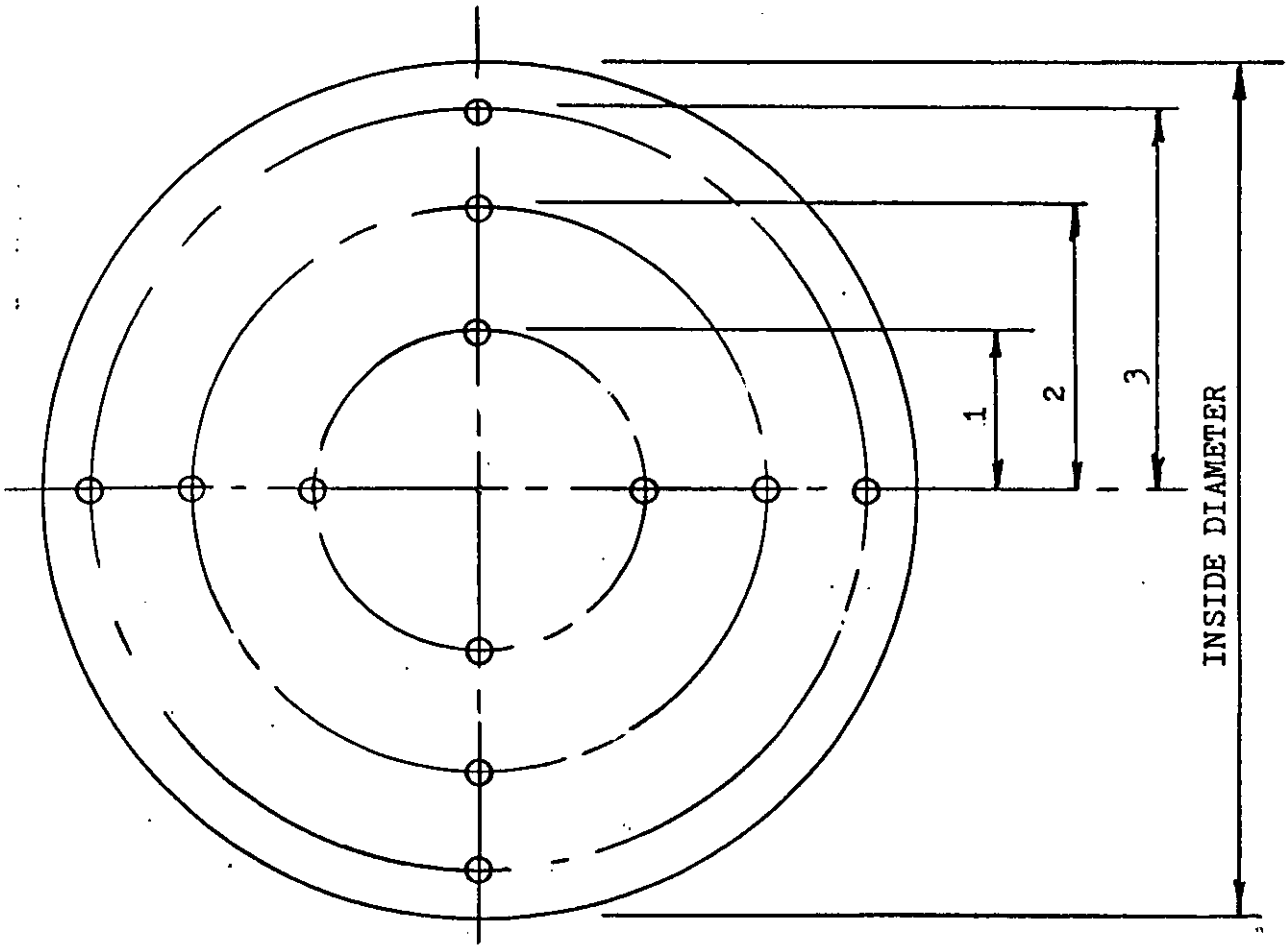
SAMPLE PORT LOCATION

FIGURE 1A

Sample Points For Round Ducts

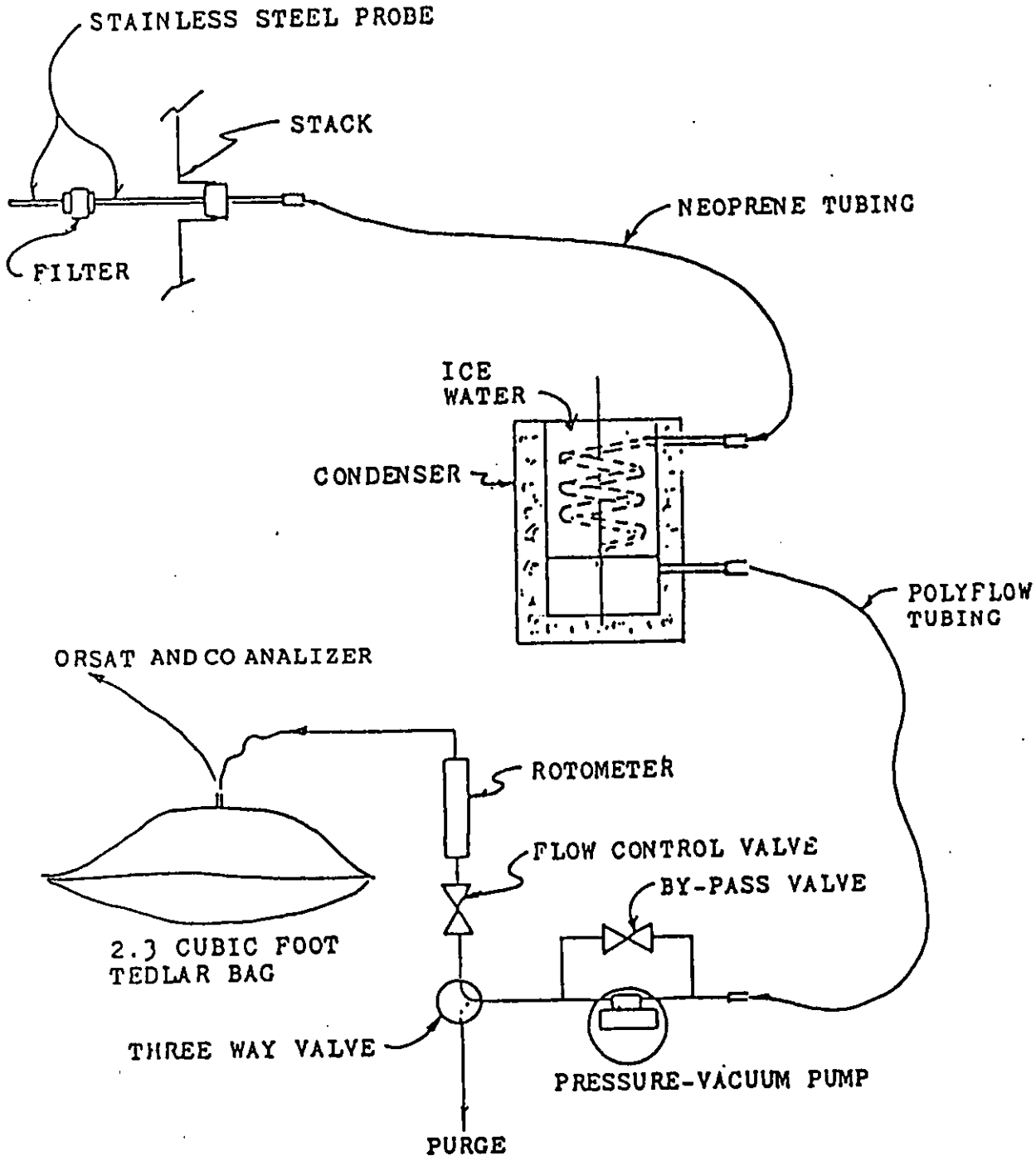
Diameter of duct in inches = 57
Area = 17.72055
Radius = 28.5
Total No. Of Points = 15

(1)- 10.40673
(2)- 18.02498
(3)- 23.27015



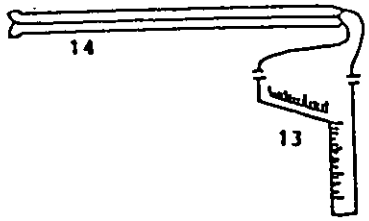
SAMPLE POINT LOCATION

FIGURE 1B

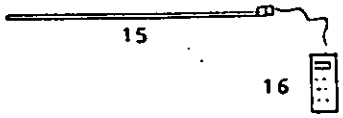


INTEGRATED SAMPLER

FIGURE 2

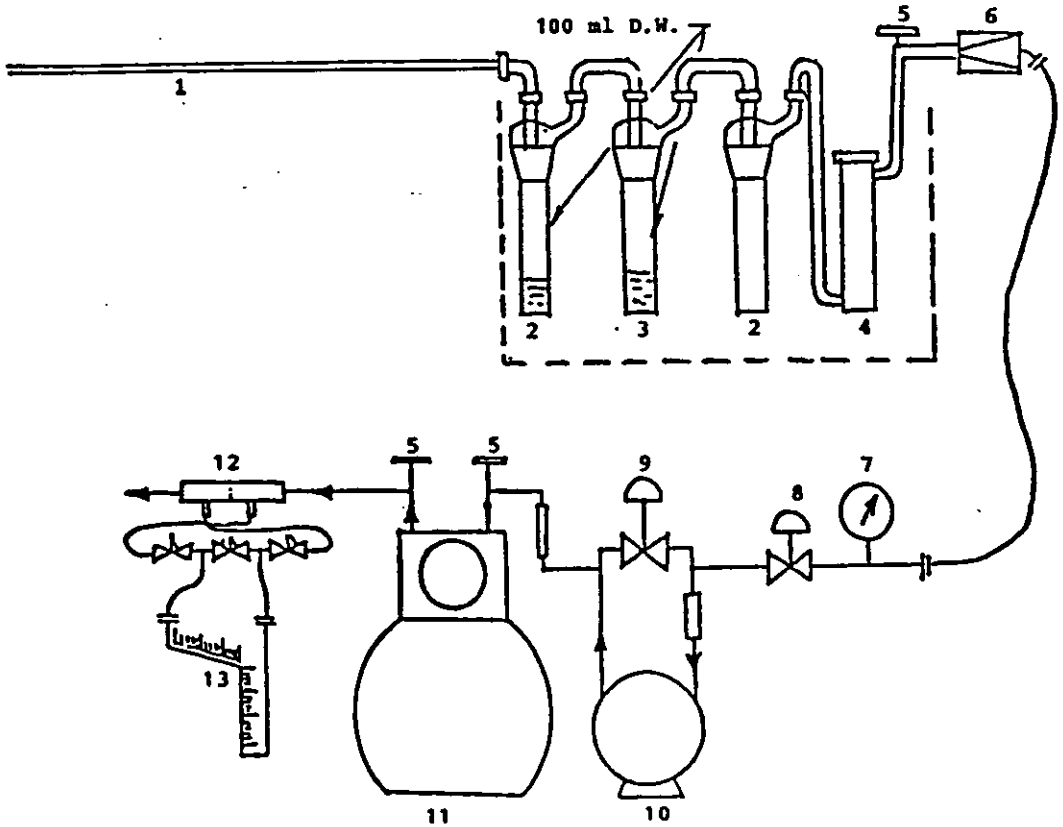


EPA METHOD 2



STACK TEMPERATURE

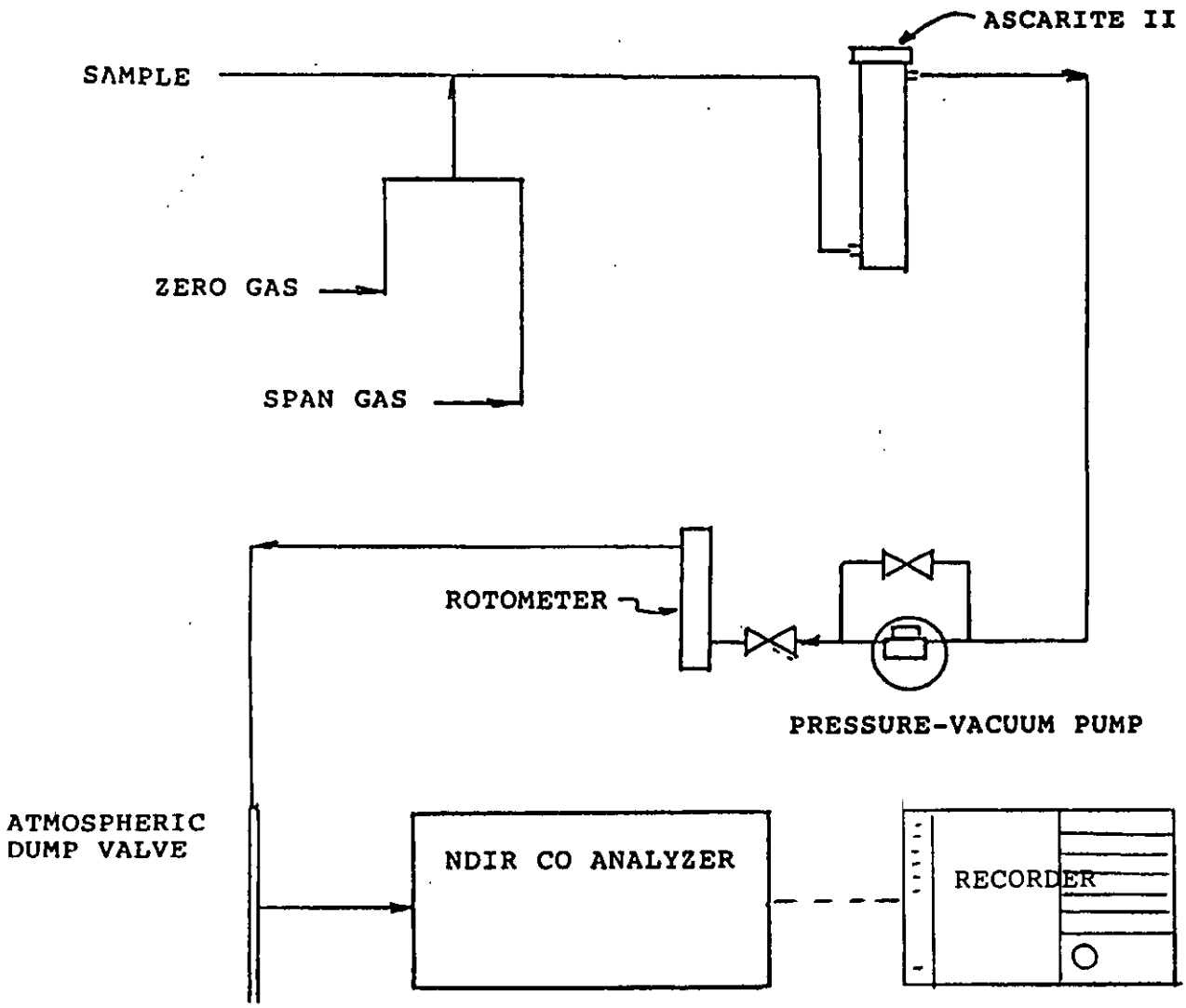
1) PROBE
2) IMPINGER (MODIFIED G-S)
3) IMPINGER (STD. G-S)
4) DESICANT COLUMN
5) THERMOMETER
6) CHECK VALVE
7) VACUMM GAGE
8) COARSE CONTROL VALVE
9) FINE CONTROL VALVE
10) VACUMM PUMP
11) DRY GAS METER
12) ORICICE TUBE
13) MANOMETER
14) PITOT TUBE
15) THERMOCOUPLE
16) DIGITAL TEMPERATURE INDICATOR



EPA METHOD 4 SAMPLE TRAIN

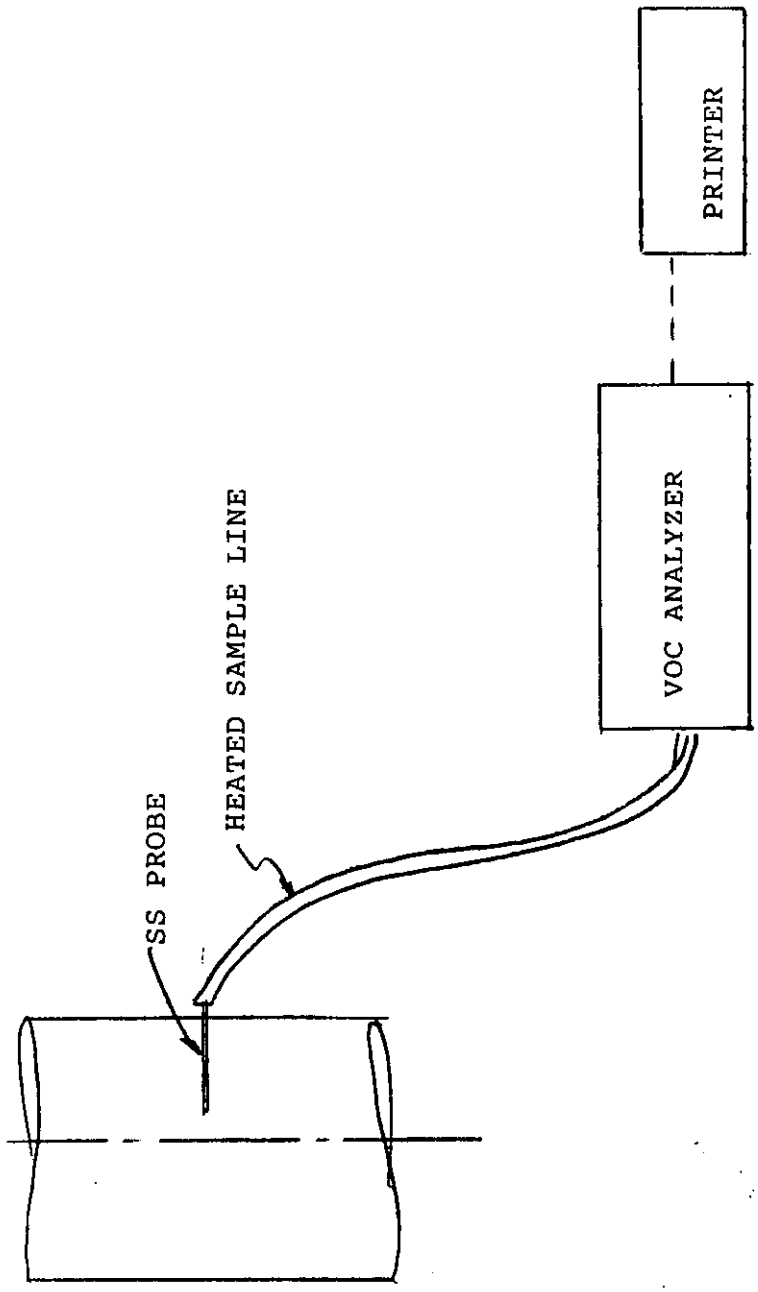
SAMPLING APPARATUS FOR GAS FLOW MEASUREMENT

FIGURE 3



METHOD 10 - CARBON MONOXIDE ANALYSIS

FIGURE 4



METHOD 25A VOC ANALYZER

FIGURE 5

APPENDIX I

METHOD 2, 3 and 4
COMPUTER NOMENCLATURE

SYMBOL	DESCRIPTION	UNITS
VM, FT_3	METER VOLUME	CUBIC FEET
Pb, IN Hg	BAROMETRIC PRESSURE	INCHES MERCURY
ΔH, IN H_2O	ORIFICE DIFFERENTIAL	INCHES WATER
PMA, IN Hg	ABSOLUTE METER PRESSURE	INCHES MERCURY
TM, ^oF	METER TEMPERATURE	DEGREES FARENHEIT
TS, ^oF	STACK TEMPERATURE	DEGREES FARENHEIT
PG, IN H2O	STACK STATIC PRESSURE	INCHES WATER
PSA, IN H2O	STACK ABSOLUTE PRESSURE	INCHES MERCURY
CP,	PITOT COEFFICIENT	DIMENSIONLESS
ΔP, IN H2O	AVERAGE SQUARE ROOT OF ΔP	INCHES WATER
%CO2	CARBON DIOXIDE	PERCENT
%O2	OXYGEN	PERCENT
%CO	CARBON MONOXIDE	PERCENT
%N2	NITROGEN	PERCENT
MD	MOLECULAR WEIGHT DRY	DIMENTIONLESS
VCL, ML	VOLUME OF CONDENSATE	MILLILITERS
AS, FT^2	STACK AREA	SQUARE FEET
Θ, MIN	TEST TIME	MINUTES
VMSTP,FT^3	METER VOLUME @ STANDARD TEMP. & PRESS.(DRY)	CUBIC FEET
VWSTP,FT^3	METER VOLUME @ STANDARD TEMP. & PRESS.(WET)	CUBIC FEET
BW%	MOISTURE	PERCENT
MS	MOLECULAR WEIGHT @ STACK CONDITIONS	DIMENSIONLESS
VS, FT/SEC	STACK GAS VELOCITY	FEET/SECOND
QA, FT^3/SEC	STACK GAS VOLUME ACTUAL	ACFM
QS, FT^3/HR	STACK GAS VOLUME @ STD. TEMP. & PRESS.(DRY)	CUBICFEET/HOUR

METHOD 2, 3 & 4 CACULATIONS

DRY MOLECULAR WEIGHT lb/lb mol
$Md = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%O_2)$.

DRY GAS VOLUME (Standard conditions) F^3
VMSTP = (17.71 ^oR/in.Hg)(VM)((Pb + (PM/13.6))/(TM +460)

VOLUME OF WATER VAPOR (Standard conditions) FT^3
VWSTP = (0.0474 FT^3/ML)(VLC)

MOISTURE CONTENT (Proportion by volume) %
BW% = VMSTP/(VMSTP + VWSTP)

MOLECULAR WEIGHT @ STACK CONDITIONS (Wet basis) lb/lb mol
MS = MD (1-BW) + 18(BW)

GAS VELOCITY ft/sec
VS = (85.48)(CP)(ΔP) ((TSA/(PSA)(MS))

GAS FLOW (Actual cubic feet /minute) ACFM
QA = (AS)(VS)

GAS FLOW (Dry standard cubic feet/hour)
QS = 3600 (1 - BW)(VS)(AS)((530/(TSA))((PSA)/(29.92))

Y = METER CALIBRATION FACTOR (Dimensionless)

Pb=29.14

1-4

CSA CO. DATA SHEET (METHOD 29)

TEST NO. 1 PLANT BELDEN BRICK DATE 11/17/94

LOCATION PLANT 6 KILN DRIER BY BK GT

BAROMETER(P_B) 29.14 AMBIENT TEMP ASSUMED MOISTURE "Y" .99X

MOUDULE NO. 2031 PROBE NO. — FILTER NO. — HEATER NO. — NOZZLE DIA. —

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	METER TEMP (Tm) OUT	COND TEMP °F	FILTER HEATER TEMP°F	STACK TEMP °F(Ts)	STACK PRESS. (Ps)	VACUUM "Hg	ORIFICE "H_2O (ΔH)(Pm)	VEL HEAD (ΔP)	TIME
1	48.0	68	68	48	10,250	102	-.5	4	2.0	.55	10150
		83	70	48	11.3	102	-.5	4	2.0	.50	55
		86	74	48	11.2	102	-.5	4	2.0	.45	11:00
		88	76	48	12.0	102	-.5	4	2.0	.40	05
		91	77	45	19.6	102	-.5	4	2.0	.44	10
		93	77	46	10.9	103	-.5	4	2.0	.43	15
		95	79	48	21.9	103	-.5	4	2.0	.44	20
		96	80	48	12.8	103	-.5	4	2.0	.43	25
		98	82	50	13.6	103	-.5	4	2.0	.43	30
		99	83	50	19.3	103	-.5	4	2.0	.42	35
		99	84	50	14.0	104	-.5	4	2.0	.42	40
		99	84	50	14.0	104	-.5	4	2.0	.41	45
	94.9	99	85	50	17.2	104	-.5	4	2.0	.47	50
(Vm)	46.9	91.8	78.4								
AVERAGE		85		****	******	103	-.5	MAX 4	2.0	.44	60 MINUTES

INTEGRATED GAS SAMPLE 213 AVG N_2=79.8

				AVG
CO_2				2.1
O_2				18.1
CO				

CONDENSATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE	952.9	944.5	8.4
IMPINGER	214.6	200	14.6
GRAND TOTAL			23.0

FILTER WT	PROBE WASH WT	HEAVY METALS WT-mg	
GROSS		As	Hg
TARE		Be	Ni
NET		Cd	
		Cr	
		Pb	

LEAK RATE @ 6 "Hg= <.02

STACK AREA (As) 17.7 ft²

AVG SQ RT ΔP .6638

BAG 205 17 min

57" DIA

AVG VOC 316 ppm

CSA CO. DATA SHEET (METHOD 29)

TEST NO. 2 PLANT BELDEN BRICK DATE 11/17/94

LOCATION PLANT 6 KILN 3 DRIER BY ACK OT

BAROMETER(P_B) 29.14 AMBIENT TEMP ASSUMED MOISTURE "Y" .998

MOUDULE NO. 2031 PROBE NO. — FILTER NO. — HEATER NO. — NOZZLE DIA. —

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	OUT	COND TEMP °F	FILTER HEATER TEMP°F	STACK TEMP °F(Ts)	STACK PRESS. (Ps)	VACUUM "Hg	ORIFICE "H_2O (ΔH)(Pm)	VEL HEAD (ΔP)	TIME	
1	94.9	85	85	50	4.4 CO	106	-.5	4	2.0	.41	13:13	
		89	82	50	4.2	106		4	2.0	.41	:18	
		93	82	51	5.0	106		4	2.0	.41	23	
		95	83	52	6.0	106		4	2.0	.40	28	
		96	84	52	3.9	106		4	2.0	.43	33	
		99	84	52	13.7	106		4	2.0	.40	38	
		92	84	54	5.3	102	-.5	4	2.0	.42	43	lost power
		95	84	54	23.0	102		4	2.0	.41	48	
		97	85	54	6	102		4	2.0	.41	53	
		99	86	56	5.8	102		4	2.0	.41	58	
		99	86	56	7.9	102		4	2.0	.41	03	
		100	87	58	4.5	103		4	2.0	.40	08	
	141.3	100	88	60	4.9	103	-.5	4	2.0	.42	14:13	
		GAS OFF										
		KILN EXHAUST BAG 206										
		14:40 to 14:55										
(Vm)	46.4	95.3	84.6									
AVERAGE		90		****	******	164	-.5	MAX 4	2.0	.411	60 MINUTES	

INTEGRATED GAS SAMPLE 207				AVG	N_2= 79.9
CO_2				1.8	
O_2				18.3	
CO					

CONDENSATE COLLECTED	FINAL	INITIAL	TOTAL
DRIERITE	981.9	974.4	7.5
IMPINGER	216.6	200	16.6
GRAND TOTAL			24.1

FILTER WT	PROBE WASH WT	HEAVY METALS WT-mg	
GROSS		As	Hg
TARE N/A		Be	Ni
NET		Cd	
		Cr	
		Pb	

LEAK RATE @ 6"Hg= <.02

STACK AREA (As) 17.7 ft²

AVG SQ RT ΔP .6409

Gas Conditions From Methods 1, 2, 3 & 4

DATA INPUT

Pb,In Hg	Barometer	29.14
VM,ft3	Meter Volume	46.9
ΔH,In H2O	Orifice Differential	2
PG,In H20	Stack Static Pressure	-.5
Tm,F	Meter Temperture	85
Ts,F	Stack Temperture	103
CP	Pitot Coefficient	.84
√ΔP,In H20	Average Square Root Of Delta P	.6638
% CO2	Carbon Dioxide	2.1
% O2	Oxygen	18.1
% N	Nitrogen	79.8
VCL,Ml	Volume Of Condensate	23
AS,ft2	Stack Area	17.7

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.29
PSA,In Hg	Absolute Stack Pressure	29.10
MD	Molecular Weight Dry Gas	29.06
MS	Molecular Weight @ Stack Conditions	28.79
VMSTP,ft3	VM Standard Temp.& Press. Dry	44.09
VWSTP,ft3	VM Standard Temp.& Press. Wet	1.08
BWO,%	Moisture	2.40
VS,ft/Sec	Stack Velocity	39.07
QA,ASCFM	Stack Gas Flow (Actual)	41494
QS,ft3/HR	Stack Gas Flow (Dry STP)	2225078

BELDEN BRICK
SUGARCREEK PLANT 6
KILN 3 DRIER STACK
11/17/94
TEST 1

Gas Conditions From Methods 1, 2, 3 & 4

DATA INPUT

Pb,In Hg	Barometer	29.14
VM,ft3	Meter Volume	46.4
ΔH,In H2O	Orifice Differential	2
PG,In H20	Stack Static Pressure	0
Tm,F	Meter Temperture	90
Ts,F	Stack Temperture	164
CP	Pitot Coefficient	.84
√ΔP,In H20	Average Square Root Of Delta P	.6409
% CO2	Carbon Dioxide	1.8
% O2	Oxygen	18.3
% N	Nitrogen	79.9
VCL,Ml	Volume Of Condensate	24.1
AS,ft2	Stack Area	17.7

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.29
PSA,In Hg	Absolute Stack Pressure	29.14
MD	Molecular Weight Dry Gas	29.02
MS	Molecular Weight @ Stack Conditions	28.74
VMSTP,ft3	VM Standard Temp.& Press. Dry	43.28
VWSTP,ft3	VM Standard Temp.& Press. Wet	1.13
BWO,%	Moisture	2.55
VS,ft/Sec	Stack Velocity	39.73
QA,ASCFM	Stack Gas Flow (Actual)	42191
QS,ft3/HR	Stack Gas Flow (Dry STP)	2040602

BELDEN BRICK
SUGARCREEK PLANT 6
KILN 3 DRIER STACK
11/17/94
TEST 2

CSA CO.
CARBON MONOXIDE DATA SHEET-CFR METHOD 10

PLANT Belden Brick DATE 11/17/94 BY ELK GT

LOCATION Plant 6 No 3 Kiln Drier BAG _____ STACK _____

NDIR UNIT T.E MOD.48 RECORDER ✓ RANGE 0-500 FLOW 1.1 lpm

SPAN GAS VALUES, CO IN N_2 1) 99.6 2) 150.0 3) 316 4) _____

	ZERO	SPAN 1	SPAN 2	SPAN 3
INITIAL CALIBRATION	0	99.3	149.7	316
FINAL CALIBRATION				

	TRIAL 1	TRIAL 2	TRIAL 3
TEST 1	[redacted]	GAS BURNER ON	
TEST 2	[redacted]	GAS BURNER OFF	
TEST 3			

CO_7 (CO CORRECTED TO 7% O_2) = CO (ACTUAL) X (20.9 - 7)/(20.9 - O_2)

TEST 1, _____ X 13.9 /20.9 - _____ = _____ PPM @ 7% O_2

TEST 2, _____ X 13.9 /20.9 - _____ = _____

TEST 3, _____ X 13.9 /20.9 - _____ = _____

TEST 4, _____ X 13.6 /20.9 - _____ = _____

CARBON MONOXIDE MASS CONCENTRATION CALCULATION
CO_L = Qs X %V X D_{CO}
CO_L = POUNDS PER HOUR CARBON MONOXIDE
Qs = GAS FLOW, F^3/HR (FROM M-5 TEST)
%V = DECIMAL PERCENTAGE OF CO (V/V)
D_{CO} = DENSITY OF CO, LB/F^3 = 0.0724

TEST 1 2225078 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 2 2040602 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 3 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 4 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

METHOD 25A CALCULATIONS FOR THC AS CARBON

FOR Belden Brick BY [illegible] DATE 11/17/94

C_C = ORGANIC CONCENTRATION AS CARBON, PPMV

C_{meas} = ORGANIC CONCENTRATION AS MEASURED, PPMV

K = CARBON EQUIVALENT CORRECTION FACTOR

K = 2 FOR ETHANE, K = 3 FOR PROPANE, K = 4 FOR BUTANE

$M_C = C_C\ Q_S\ D_C\ 10^{-6}$

M_C = MASS FLOW RATE AS CARBON, LB/HR

Q_S = GAS FLOW, DRY STD FT^3/HR FROM GAS FLOW MEASUREMENT

D_C = 0.0312 LB/FT^3 AT 68 °F

10^{-6} = DECIMAL PERCENT VOLUME CONVERSION FROM PPMV

FUEL GAS 40% N_2 / 60% He

CAL GAS 981 PPMV PROPANE / N_2

RANGE 0-500

AUTOMATIC CAL TIME 60 MINUTES (T.E.I. MODEL 51)

HEATED SAMPLE LINE TEMP 350 °F

TEST	TIME	C_{meas}	C_C	M_C
1	10:50/11:50	[redacted]	[redacted]	[redacted]
2	13:13/14:13	[redacted]	[redacted]	[redacted]

MIDWEST RESEARCH INSTITUTE

Project/Acct. No. 4602-01 Date/Time 4/21/95

Project Title BRICK MANUFACTURING AP-42
BELDEN BRICK -- BRICK DRYER EMISSION FACTORS

Signature [signature] Verified by _____ (signature/date)

Phone Contact ☐
Meeting Notes ☐
Work Sheet ☒

Page ___ of ___

TOC as carbon

ppmv = 7.59

lb/hr = 7.59 x 2,000,000 x 0.0312 x 10^{-6} = 0.474 lb/hr as carbon
(ppmv) x (dscfh) x lb/ft^3

TOC as methane

0.474 lb/hr as carbon x $\frac{16}{12}$ = 0.631 lb/hr as methane

Process rate

Reported feed rate to dryer = ~~4.84~~ TPH

Ratio of production to feed (from MRI test report -- Belden) = $\frac{3.7}{4.33}$ = ~~0.8545~~

Tons of brick dried per hour = ~~4.84 x 0.8545~~ = ~~4.14~~ 3.43 TPH *

Emission factor, TOC as methane

0.631 $\frac{lb}{hr}$ ÷ ~~4.14~~ 3.43 $\frac{tons}{hr}$ = ~~0.152~~ 0.18 $\frac{lb}{ton}$ or 0.092 Kg/Mg

Emission factor, CO

1.52 $\frac{lb}{hr}$ ÷ ~~4.14~~ 3.43 $\frac{tons}{hr}$ = ~~0.367~~ 0.44 $\frac{lb}{ton}$ or 0.22 Kg/Mg

FACTORS BASED ON SINGLE 1-HOUR CONTINUOUS RUN AND FLOW RATES FROM A PREVIOUS TEST.
DATA RATED B.

* PROCESS RATE CORRECTED 4/24/95 PER FAX FROM BELDEN BRICK

MRI

Air Pollution Source Testing

Phone - 216 - 525-5119

CSA COMPANY

Custom Stack Analysis

24385 Center Road
P.O. Box 3750
Alliance, Ohio 44601

March 7, 1995

Mr. John Jensen

Belden Brick, inc.
Sugarcreek, Oh

Dear John,

This is a follow-up of the tests performed on November 11, 1994 for VOC and CO testing of your Plant 6, No. 3 drier stack. In November the VOC and CO emissions were high. It was found to be a problem with the auxillary burner. The burner was repaired and the tests were performed again on March 7, 1995. The emissions now show 0.474 pounds per hour of VOC as Carbon and 1.52 pounds per hour of CO.

The raw data and calculations are enclosed.

Sicerely,

Ernest L. Kolm

METHOD 25A CALCULATIONS FOR THC AS CARBON

FOR BELDEN BRICK BY dek GT DATE 3/7/95

C_C = ORGANIC CONCENTRATION AS CARBON, PPMV

C_{meas} = ORGANIC CONCENTRATION AS MEASURED, PPMV

K = CARBON EQUIVALENT CORRECTION FACTOR

K = 2 FOR ETHANE, K = 3 FOR PROPANE, K = 4 FOR BUTANE

$M_C = C_C\ Q_S\ D_C\ 10^{-6}$

M_C = MASS FLOW RATE AS CARBON, LB/HR

Q_S = GAS FLOW, DRY STD FT^3/HR FROM GAS FLOW MEASUREMENT

D_C = 0.0312 LB/FT^3 AT 68 °F

10^{-6} = DECIMAL PERCENT VOLUME CONVERSION FROM PPMV

FUEL GAS 40% H_2 /60% He

CAL GAS 101.00 PPM ∞ PROPANE

RANGE 0-500

AUTOMATIC CAL TIME 60 MINUTES (T.E.I. MODEL 51)

HEATED SAMPLE LINE TEMP 350 °F

ASSUMED 2,000,000 DSCFH AS Q_S

TEST	TIME	C_{meas}	C_C	M_C
1	10:10/11:11	2.53	7.59	0.474

CSA CO.
CARBON MONOXIDE DATA SHEET-CFR METHOD 10

PLANT BELDEN BRICK DATE 3/7/95 BY SGK GT

LOCATION PLANT 6, NO 3 DRIER BAG — STACK ✓

NDIR UNIT T.E MOD.48 RECORDER — RANGE - FLOW 1.1 LPM

SPAN GAS VALUES, CO IN N_2 1) 0 2) 99.6 3) 150 4) 316

	ZERO	SPAN 1	SPAN 2	SPAN 3
INITIAL CALIBRATION	0	316		
FINAL CALIBRATION	0	315		

	TRIAL 1	TRIAL 2	TRIAL 3
TEST 1	10.95		
TEST 2			
TEST 3			

CO_7 (CO CORRECTED TO 7% O_2) = CO (ACTUAL) X (20.9 - 7)/(20.9 - O_2)

TEST 1, _____ X 13.9 /20.9 - _____ = _____ PPM @ 7% O_2

TEST 2, _____ X 13.9 /20.9 - _____ = _____

TEST 3, _____ X 13.9 /20.9 - _____ = _____

TEST 4, _____ X 13.6 /20.9 - _____ = _____

CARBON MONOXIDE MASS CONCENTRATION CALCULATION
CO_L = Qs X %V X D_{CO}
CO_L = POUNDS PER HOUR CARBON MONOXIDE
Qs = GAS FLOW, F^3/HR (FROM M-5 TEST)
%V = DECIMAL PERCENTAGE OF CO (V/V)
D_{CO} = DENSITY OF CO, LB/F^3 = 0.0724

TEST 1 2,000,000* x 10.95 x 10^{-6} x 0.0724 = 1.52 LB/HR

TEST 2 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 3 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 4 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

* ASSUMED BASED ON PRIOR DATA

BELDEN BRICK
PLANT 6, NO 3 DRIER
EK GT

OFFSET
"0" = 2.8 PPM

START ONE HOUR RUN

CO READING

T = 120°F KILN TEMP

AVG. = .4

** SAMPLE REPORT **
03/07/95 10:06
HIGH = .8 10:04
LOW = .2 10:06
AVG. = .5

** SAMPLE REPORT **
03/07/95 10:08
HIGH = .9 10:06
LOW = .2 10:06
AVG. = .6

** SAMPLE REPORT **
03/07/95 10:10
HIGH = .7 10:08
LOW = .2 10:10
AVG. = .5 3.3

** SAMPLE REPORT **
03/07/95 10:12
HIGH = .4 10:10
LOW =- .6 10:11
AVG. =- .1 2.9

3.6

** SAMPLE REPORT **
03/07/95 10:14
HIGH = .1 10:13
LOW =- .7 10:14
AVG. =- .3 2.5

2.8

DRIER DOOR OPEN

** SAMPLE REPORT **
03/07/95 10:16
HIGH =- .1 10:16
LOW =- 1.2 10:15 2.1
AVG. =- .7

6.5

** SAMPLE REPORT **
03/07/95 10:18
HIGH = 1.0 10:17
LOW = .0 10:16 3.5
AVG. = .7

10.4

** SAMPLE REPORT **
03/07/95 10:20
HIGH = .6 10:18
LOW = .1 10:19 3.0
AVG. = .2

11.2

** SAMPLE REPORT **
03/07/95 10:23
HIGH = .4 10:21
LOW =- 1.5 10:23 2.2
AVG. =- .6

11.2

** SAMPLE REPORT **
03/07/95 10:25
HIGH =- .6 10:25
LOW =- 1.4 10:23
AVG. =- 1.0 1.8

11.5

** SAMPLE REPORT **
03/07/95 10:27
HIGH =- .7 10:25
LOW =- 1.9 10:25
AVG. =- 1.4 1.4

11.1

** SAMPLE REPORT **
03/07/95 10:29
HIGH =- 1.4 10:28
LOW =- 2.1 10:29
AVG. =- 1.7 1.1

10.8

** SAMPLE REPORT **
03/07/95 10:31
HIGH =- 1.1 10:31
LOW =- 2.3 10:29
AVG. =- 1.7 1.1

10.6

** SAMPLE REPORT **
03/07/95 10:33
HIGH =- .7 10:32
LOW =- 1.1 10:31
AVG. =- .9 1.9

11.0

** SAMPLE REPORT **
03/07/95 10:35
HIGH =- .6 10:35
LOW =- 1.1 10:34
AVG. =- .8 2.0

10.9

** SAMPLE REPORT **
03/07/95 10:37
HIGH =- .6 10:35
LOW =- 1.2 10:37
AVG. =- 1.0 1.8

11.8

** SAMPLE REPORT **
03/07/95 10:39
HIGH =- .5 10:39
LOW =- .9 10:37

12.5

03/07/95 10:42
HIGH =- .4 10:41
LOW =- .9 10:40
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:44 12.7
HIGH =- .4 10:42
LOW =- 1.0 10:44
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:46 12.0
HIGH =- .8 10:44
LOW =- 1.6 10:46
AVG. =- 1.2 1.6

** SAMPLE REPORT **
03/07/95 10:48 12.2
HIGH =- .6 10:48
LOW =- 1.7 10:46
AVG. =- 1.1 1.7

** SAMPLE REPORT **
03/07/95 10:50 13.0
HIGH =- .5 10:48
LOW =- .8 10:49
AVG. =- .6 2.2

** SAMPLE REPORT **
03/07/95 10:52 12.6
HIGH =- .1 10:51
LOW =- .7 10:52
AVG. =- .4 2.4

** SAMPLE REPORT **
03/07/95 10:54 12.2
HIGH =- .3 10:53
LOW =- .9 10:52
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:56 12.2
HIGH =- .6 10:56
LOW =- 1.0 10:54
AVG. =- .8 2.0

** SAMPLE REPORT **
03/07/95 10:58 11.9
HIGH =- .4 10:57
LOW =- 1.2 10:58
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 11:01 12.2
HIGH =- .7 11:00
LOW =- 1.1 10:59
AVG. =- .9 1.9

** SAMPLE REPORT **
03/07/95 11:03 12.9
HIGH =- .6 11:01
LOW =- 1.2 11:02
AVG. =- .9 1.9

** SAMPLE REPORT **
03/07/95 11:05 12.0
HIGH =- 1.2 11:03
LOW =- 1.6 11:03
AVG. =- 1.4 1.4

** SAMPLE REPORT **
03/07/95 11:07
HIGH =- 1.2 11:06
LOW =- 1.9 11:07
AVG. =- 1.5 1.3

** SAMPLE REPORT **
03/07/95 11:09
HIGH =- 1.3 11:09
LOW =- 1.7 11:07
AVG. =- 1.5 1.3

** SAMPLE REPORT **
03/07/95 11:11
HIGH =- 1.5 11:09
LOW =- 2.0 11:10
AVG. =- 1.8 1.0

END ONE HR RUN

*** ZERO CHECK ***
03/07/95 11:12 — 2.8 PPM OFFSET
03/07/95 11:12

** ZERO ADJUST **
03/07/95 11:14
*** MANUAL ***
Z.MV =-16.0
ZERO =- 1.8
AUTO = 8.6

"0" CAL CO 0-0 SPAN 316 - 315 Gas Rdg

T = 121°F KILN TEMP

AVG VDC = 2.53 PPM

AVG CO = 10.95 PPM

SHEET 2 of 2

Filename:
P6RETEST.DRY

THE BELDEN BRICK COMPANY
SUGARCREEK, OHIO
PLANT 6 DRYER RETEST

3/31/95

PROCESS WEIGHT:

NUM BRICK PER CAR	LBS PER WET BRICK	KILN SCHED CAR/DAY	PROCESS WEIGHT (LBS/HR)	PROCESS WEIGHT (TON/HR)
3472	5.5726	~~12~~ 10	9674	4.84

per phone conversation w/ John Jensen 4/24/95

EMISSIONS FROM RETESTS:

POLUTANT	LBS PER HOUR	
VOC.....	0.474	as carbon
CO.....	1.52	

EMISSION FACTOR:

POLUTANT	LBS PER TON
VOC.....	0.31

THE BELDEN BRICK COMPANY
PLANT 6 - KILN 3 - DRYER
PROCESS WEIGHT DURING RETEST
C.S.A. RETEST DATED 3/7/95

BRICK PER CAR	X	LBS PER BRK	X	CARS PER DAY	÷	24 HR PER DAY	=	PROCESS WEIGHT	(LBS/HR)
3472	X	4.7462	X	10	÷	24	=	6866	

Report prepared for:

TO: BRIAN SCHRAGER
MRI

Sent By FAX:
919-677-0065

Report prepared by:

John C. Jensen
Environmental Engineer
THE BELDEN BRICK COMPANY

4/21/95

PROCESS WEIGHT:

NUM BRICK PER CAR	LBS PER WET BRICK	KILN SCHED CAR/DAY	PROCESS WEIGHT (LBS/HR)	PROCESS WEIGHT (TON/HR)
3472	5.5726	~~12~~ 10	~~9674~~	~~4.84~~

EMISSIONS FROM RETESTS:

POLUTANT	LBS PER HOUR	
VOC.....	0.474	as carbon
CO.....	1.52	

EMISSION FACTOR:

POLUTANT	LBS PER TON
VOC.....	0.~~31~~

AP-42 Section 11.3
Reference 8
Report Sect. 4
Reference 1

Emission Testing at a Structural Brick Manufacturing Plant

Final Emission Test Report
For Testing at Belden Brick Company Plant 6

Sugarcreek, Ohio
November 8 to 12, 1993

Prepared for
Emission Factor and Inventory Group, MD-14
U. S. Environmental Protection Agency

EPA Contract No. 68-D2-0159
MRI Project No. 4602-01

April 24, 1995

Emission Testing at a Structural Brick Manufacturing Plant

Final Emission Test Report
For Testing at Belden Brick Company Plant 6
Sugarcreek, Ohio
November 8 to 12, 1993

Prepared for
Emission Factor and Inventory Group, MD-14
Emissions, Monitoring, and Analysis Division
Office of Air Quality Planning and Standards
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

Attn: Ronald E. Myers

EPA Contract No. 68-D2-0159
MRI Project No. 4602-01

April 24, 1995

This document is printed on recycled paper.

PREFACE

This report of emission testing at a structural brick manufacturing plant was prepared under Contract No. 68-D2-0159, Work Assignments I-01 and II-01. The report, which describes testing that was performed at Plant 6 of the Belden Brick Company in Sugarcreek, Ohio, on November 8 to 12, 1993, was prepared by Ms. April Carender, Mr. Slawomir Szydlo, and Mr. Richard Marinshaw of Midwest Research Institute (MRI). Mr. Marinshaw is the Work Assignment Leader for this project; the EPA Work Assignment Manager is Mr. Ronald Myers of the Emission Factor and Inventory Group (EFIG).

Approved:

MIDWEST RESEARCH INSTITUTE

Roy Neulicht
Program Manager

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SECTION 1

INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

The U. S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS), Emission Factor and Inventory Group (EFIG) is responsible for preparing and periodically updating the document entitled *Compilation of Air Pollutant Emission Factors* (AP-42). During the past 3 years, EFIG has been working with the Brick Institute of America (BIA) and the Brick Association of North Carolina (BANC) to develop improved emission factors for AP-42 Section 11.3, Bricks and Related Clay Products. In addition to collecting readily available test reports for emission tests conducted at brick manufacturing plants, EFIG sponsored emission tests at three structural brick manufacturing facilities. This test program was also developed as a result of an evaluation performed by the Air Quality Strategies and Standards Division that indicated that brick manufacturing facilities were responsible for a significant quantity of particulate matter (PM) emissions in areas of nonattainment of PM less than 10 micrometers in aerodynamic diameter (PM-10). However, that study was based upon the existing AP-42 emission factors, which were suspected of greatly overestimating emissions from brick manufacturing.

In September 1992, an emission test was conducted at a brick manufacturing facility that uses sawdust-fired kilns, and in August 1993, EFIG sponsored an emission test at a brick facility that uses coal-fired kilns. This test report presents the results of the emission test conducted at the third structural brick manufacturing plant, Belden Brick Company (Belden), Plant No. 6, which uses gas-fired kilns.

Belden's Plant No. 6 is located in Sugarcreek, Ohio. The plant was selected for testing because it was identified by BIA as being representative of gas-fired structural brick manufacturing plants. In addition, emissions from the grinding/screening operation at Belden can be readily tested because the emissions are ducted to an air pollution control device. A further reason for selecting Belden is that the raw materials used to manufacture bricks at the facility is different in terms of texture, moisture, and chemical composition from the material used by the two brick facilities tested previously.

During the period November 8 through 12, 1993, a series of emission tests were conducted by Midwest Research Institute (MRI) at Belden's Plant No. 6. The grinding/screening operation was sampled for emissions of PM-10 simultaneously with background ambient air sampling for PM-10; the unfired brick drying operation was sampled

for emissions of methane/ethane and total organic compounds (TOC); and the brick firing (kiln) operation was sampled for emissions of filterable PM, filterable PM-10, condensible PM, volatile organic compounds (VOC), semivolatile organic compounds, hydrogen fluoride (HF), hydrogen chloride (HCl), multiple metals, TOC, nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and carbon dioxide (CO_2). In addition, process samples of the fine material exiting the grinding/screening operation were collected for moisture and sieve analysis.

1.2 KEY PERSONNEL

The key personnel who coordinated the test program and their telephone numbers are as follows:

- EFIG Work Assignment Manager, Ron Myers (919) 541-5407
- MRI Program Manager for EFIG, Roy Neulicht (919) 677-0249
- MRI Work Assignment Leader, Rick Marinshaw (919) 677-0249
- MRI Field Sampling Task Leader, Slawomir Szydlo (816) 753-7600
- Belden Brick Company Contact, John Jensen (216) 852-2424
- Brick Institute of America, Nelson Cooney (703) 620-0010

SECTION 2

PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION AND OPERATION

Plant No. 6 consists of a central crushing, grinding, and screening operation, a central brick-forming operation, eight brick dryers, and three kilns. Plant No. 6 produces 36 to 40 million bricks per year. The grinding/screening building operates 8 hours per day, 5 days per week, and the kilns operate continuously. Figure 2-1 shows the layout of Plant No. 6 and identifies the general sampling locations; Figure 2-2 presents a process flow diagram for the plant.

2.1.1 Raw Material Processing

Production begins at the grinding/screening operation, which is contained in a large metal building that includes separate fire clay and shale processing lines. Each identical line consists of a hopper, double-roll primary crusher, crushed material storage bins, a grinder, and three screens. The raw material is transported from the mine by truck in loads of approximately 23 megagrams (Mg) (25 tons). The trucks dump the material into the fire clay or shale hoppers, from which the material is transported by drag chains to double-roll primary crushers. From each crusher, the material is conveyed to storage bins, then to the grinder and screens. All material is ground prior to screening. The facility uses single-deck mechanically-vibrated screens with a mesh size of 14 (1.4 millimeters [mm]). Oversize material from the screens is conveyed back to the grinder for further size reduction. Undersized material from the screens is conveyed to the fine clay/shale storage bins located in an adjacent building. Emissions from each line (crusher, grinder, screens, and conveyer transfer points) are ducted to separate fabric filtration systems that are located just outside the grinding/screening room.

The grinding/screening operation tests were conducted on the clay processing line fabric filter. This fabric filter is a DCE, Incorporated, Model DLM 3/7/15 pulse jet filter. The fabric filter has an air to cloth ratio of 7.4 to 1, a total filter area of 314 square meters (m^2) (3,381 square feet [ft^2]), and is designed for a flow rate of 708 cubic meters per minute (m^3/min) (25,000 cubic feet per minute [ft^3/min]). Figure 2-3 shows a vibrating screen with the hood and ductwork that leads to the fabric filter. Two smaller ducts from the processing line tie into the main exhaust duct downstream of the testing location. However, these two smaller ducts exhaust conveyor pickup points, which do not contribute significantly to overall emissions from the operation.

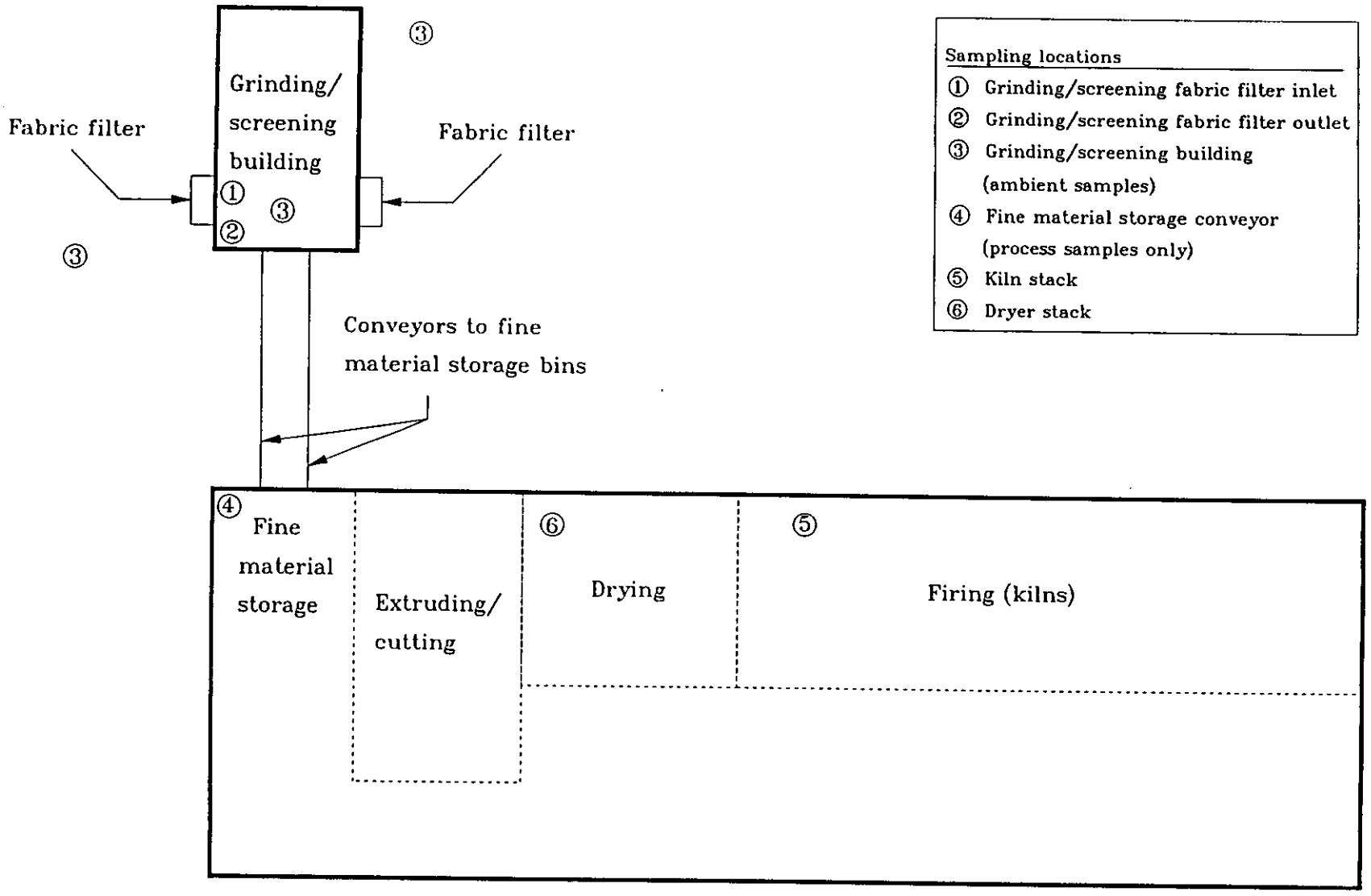


Figure 2-1. Layout of Belden Brick Plant No. 6.

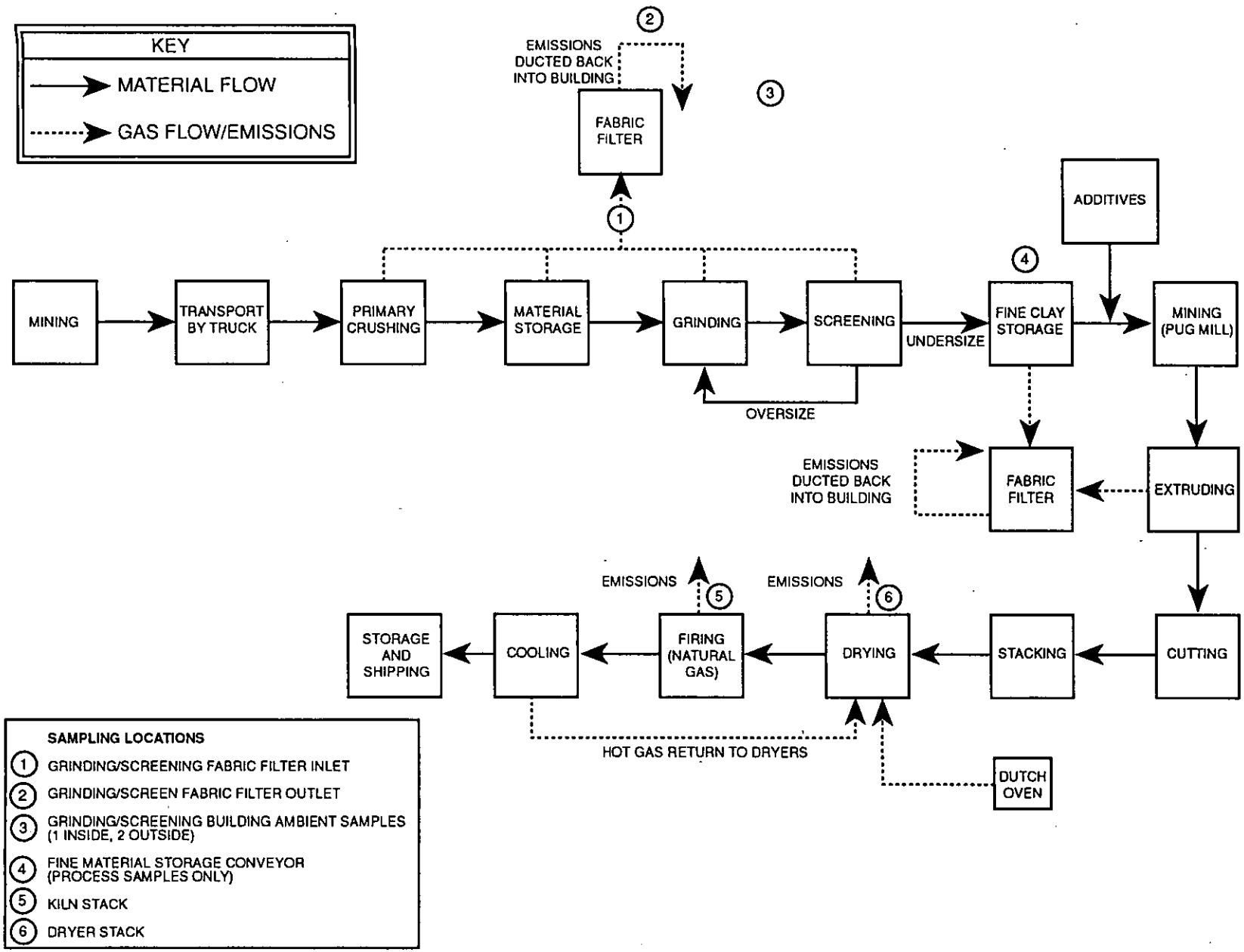


Figure 2-2. Fire clay process flow diagram for Belden Brick, Plant No. 6, Sugar Creek, Ohio.

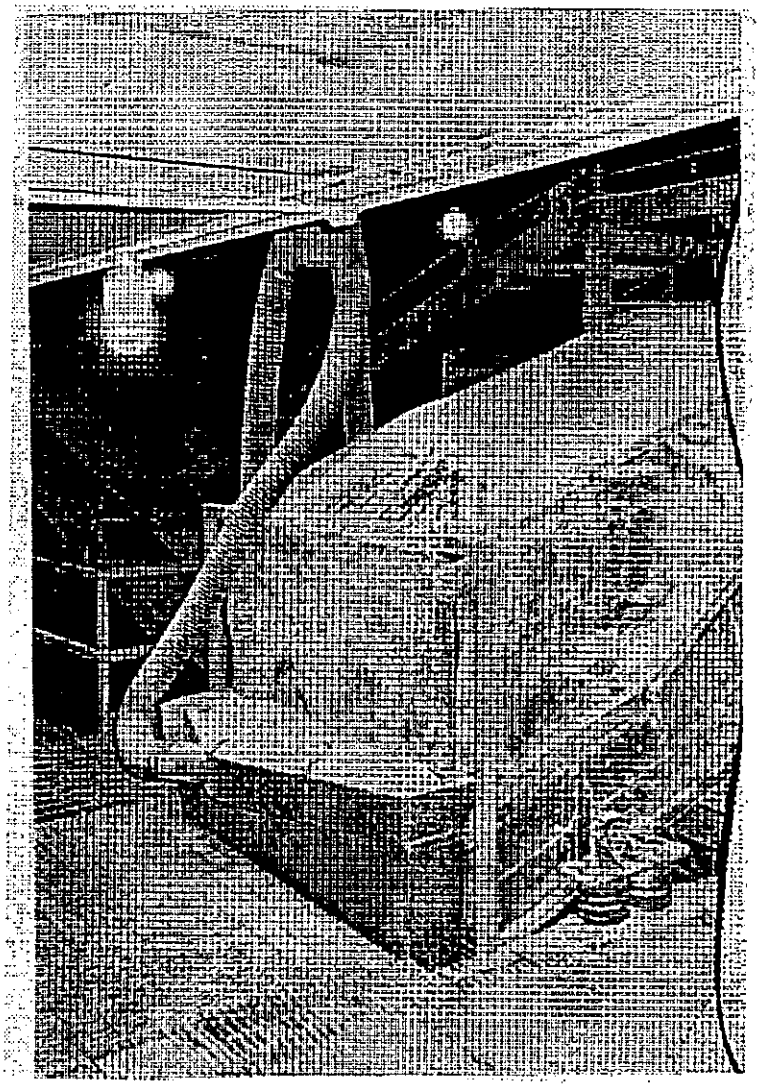


Figure 2-3. Vibrating screen with hood and ductwork.

The fire clay line outlet duct is 0.84 m (33 in.) in diameter and is 3.8 m (12.3 ft) in length. The airflow rate for the screen hood is about 68 m^3/min (2,400 ft^3/min), and the airflow rate through the crusher and grinder pickup point and conveyor transfer point hood is 17.0 m^3/min (600 ft^3/min). The system carrying velocity is 1,370 m/min (4,500 ft/min). Because nearly all of the emission points in the grinding room are hooded, fugitive particulate matter (PM) emissions are negligible.

The grinding/screening operation products (fine clay and fine shale) are conveyed to the fine clay/shale storage bins located in a building adjacent to the grinding/screening building. Material from the fine clay/shale storage bins is conveyed to the mill room.

2.1.2 Extruding and Cutting

In the mill room, the material is conveyed to one of four extrusion lines. Lines 1 and 4 process shale, and lines 2 and 3 process fire clay. However, clay and shale can be mixed on any of the four lines. Approximately one-third of the bricks produced in Plant 6 are made from a blend of shales, one-third are made from fire clay blends, and the remaining third are made from a mixture of fire clays and shales. The bricks fired during the emission test were made from a blend of two shale materials.

Each extrusion line includes a pug mill, vacuum chamber, and die. The pug mills mix the material with water to raise the material moisture content and discharge the material directly into the vacuum chambers. The vacuum chambers remove the air and compact the material. Next, the material is continuously augered through the dies. This is referred to as the "stiff extrusion process." The material is extruded in four continuous columns, the outsides of which are lubricated with No. 2 oil, which facilitates cutting. The columns then pass through rotating wire cutters and are cut into the desired brick dimensions.

Several additives are mixed as needed with the raw material before extrusion. Iron chromite and manganese dioxide are used for coloring purposes, and barium carbonate is added to keep sulfates from rising to the surface of the brick. Additive feed is controlled by computer.

2.1.3 Unfired Brick Drying

After cutting, the bricks are stacked by hand onto the kiln cars. On average, each car carries 3,472 bricks, and during the test all kiln cars were loaded with exactly 3,472 bricks. From the stacking area, the bricks are transported to eight dryers, which are heated by waste heat from the cooling section of the kilns and by Dutch Oven type heaters, which are additional gas-fired burners located on the top of the dryers. These dryers maintain temperatures ranging from 49°C (120°F) at the entrances to 177°C (350°F) at the exits. Three stacks vent emissions from the eight dryers to the atmosphere. Dryers 1, 2, and 3 share a stack, dryers 4 and 5 share a stack, and dryers 6, 7, and 8 share a stack. The dryer

stacks are circular in cross section and are made of steel. Testing was conducted on the stack to dryers 6, 7, and 8.

During the week of the test, Belden produced both standard size cored bricks and solid bricks. The kiln cars each were loaded with the same quantities of cored and solid bricks, and the rate of kiln car movement through the dryers was constant throughout the test week. Therefore, the brick drying rate was constant during the test.

2.1.4 Brick Firing

Plant 6 has three natural gas-fired tunnel kilns that are used to fire the bricks. Kilns 1 and 2 are 104 m (340 ft) long, and kiln 3 is 119 m (390 ft) long. Each kiln consists of six sections, including the offtake, oxidation, preheat, firing, rapid cool, and cooling sections. Kilns firing fire clay products maintain temperatures ranging from 204°C (400°F) at the offtake section to about 1149°C (2100°F) at the hottest point of the firing section. Between the firing and rapid cool sections is the zero point of each kiln. The zero point is the theoretical point beyond which combustion gases do not pass. Beyond the zero point, only the waste heat (no combustion gases) from the fired bricks in the cooling section is emitted and ducted to the brick dryers.

Emissions from the kilns are ducted to two stacks, one serving kilns 1 and 2, and one serving kiln 3. There are no emission control devices on either of the two stacks. Testing was conducted on the stack for kiln 3.

During the week of the test, Belden processed both standard size cored bricks and solid bricks in kiln 3. The kiln cars each were loaded with the same quantities of cored and solid bricks, and the rate of kiln car movement through the kilns was constant throughout the test week. Therefore, the brick production rate was constant during the test.

2.2 FLUE GAS, AMBIENT, AND PROCESS MATERIAL SAMPLING LOCATIONS

Emission sampling was conducted at the following locations: (1) the inlet to the grinding/screening room fabric filter, (2) the outlet to the grinding/screening room fabric filter, (3) the kiln stack, and (4) the dryer stack. Background ambient sampling was conducted both inside and outside the grinding/screening building. In addition, process samples were collected at the dropoff point of the conveyor that transports fine material from the grinding/screening operation to the fine material storage bins. The following paragraphs describe these sampling locations in detail.

2.2.1 Grinding/Screening Building Fabric Filter Inlet and Outlet

Emissions from the crusher, grinder, screen set, and conveyor transfer points are ducted to a fabric filter located just outside of the grinding/screening building. Two smaller ducts from the processing line tie into the main inlet duct to the fabric filter downstream of the sampling location. However, these two smaller ducts exhaust conveyor transfer points

are not believed to contribute significantly to overall emissions from the grinding/screening operations.

The location of sampling ports for the inlet and outlet is schematically depicted in Figure 2-4. The outlet duct is 0.84 m (33 in.) in diameter and approximately 3.7 m (12 ft) in length. The inlet duct is 0.89 (35 in.) in diameter and approximately 3.7 m (12 ft) in length.

2.2.2 Ambient Samples

Ambient PM-10 samples were collected both inside and outside the grinding/screening building in order to determine background levels for the tests conducted on the grinding/screening fabric filter (i.e., the background concentration of ambient air drawn into the building). Two Hi-Vol samplers were set up outside the building: (one to the east of the building and one to the west of the building), and one sampler was set up inside the building. Figure 2-1 shows the relative locations of these samplers.

2.2.3 Kiln Stack

The square kiln exhaust stack tested during this program has inside dimensions of 1.7 m by 1.7 m (67 in. by 67 in.). There are no emission control devices associated with this emission stream.

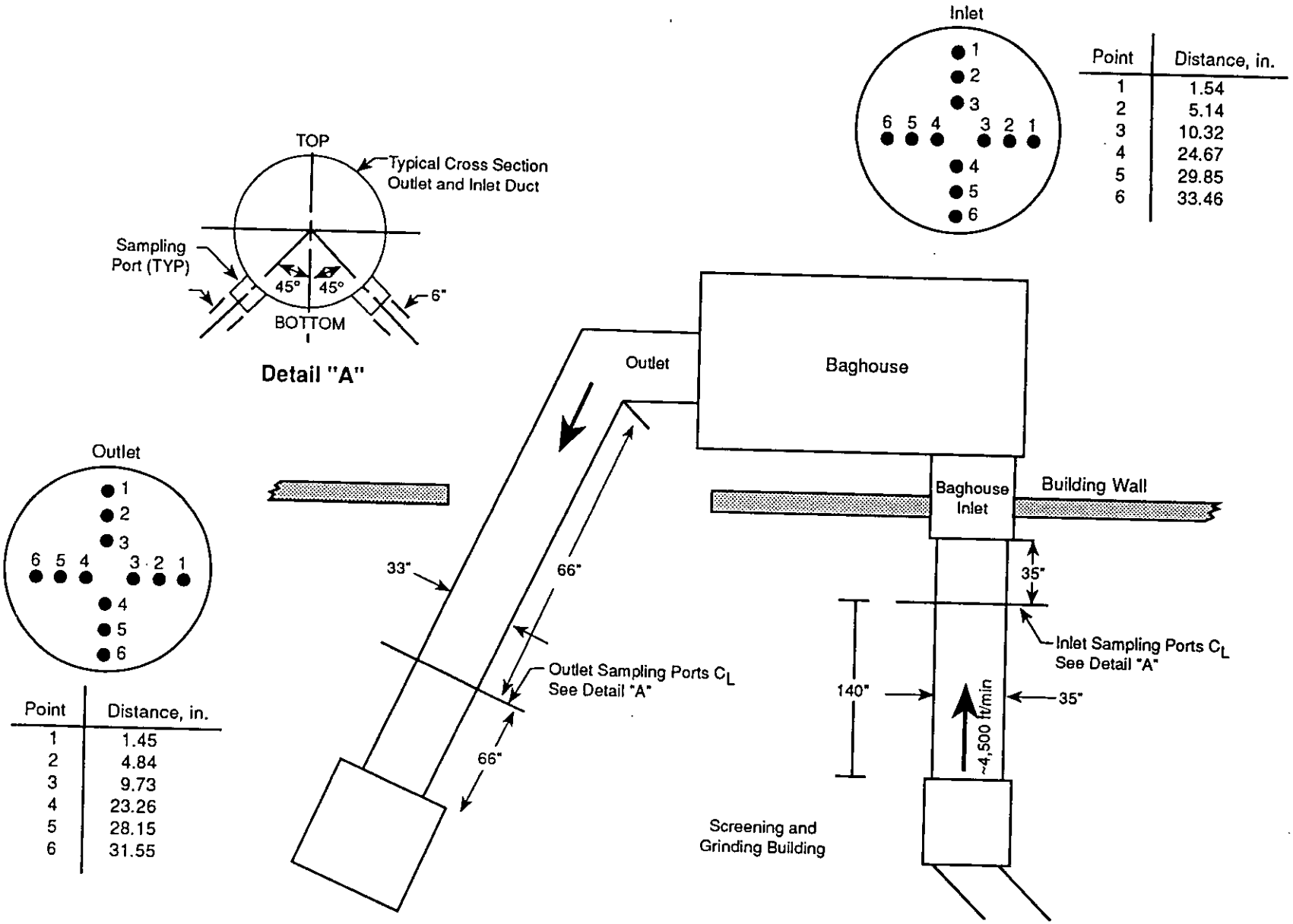
In order to obtain a representative sample of the flue gas, a set of five sampling ports were installed on the kiln stack. The location of sampling ports and traverse points is shown in Figure 2-5.

2.2.4 Dryer Stack

The stack venting emissions from dryers 6, 7, and 8 was sampled during the test. The dryer stack is 1.45 m (57 in.) in diameter. Figure 2-6 shows the location of sampling ports and traverse points for the dryer stack.

2.2.5 Process Samples

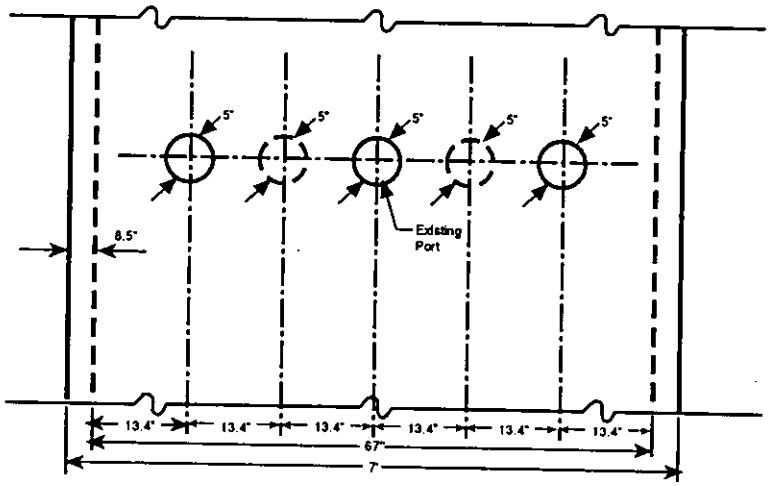
Samples of the fine material produced in the grinding/screening operation were collected from the conveyor that transports the material from the grinding/screening building to the fine material storage bins. For the purposes of measuring process rates for the grinding/screening operation, Belden prepared a diversion chute to direct the material from the conveyor dropoff point to a separate container. Samples of the processed material were collected from the container for subsequent analysis.



Point	Distance, in.
1	1.54
2	5.14
3	10.32
4	24.67
5	29.85
6	33.46

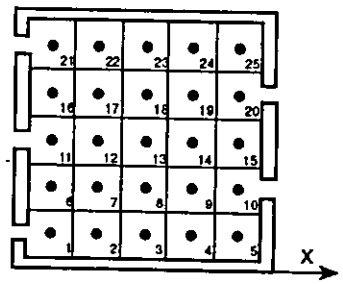
Point	Distance, in.
1	1.45
2	4.84
3	9.73
4	23.26
5	28.15
6	31.55

Figure 2-4. Fabric filter inlet and outlet sampling locations.



SIDE VIEW OF KILN STACK SHOWING PORT HOLE LOCATIONS

#	x
1	15.2
2	21.5
3	28.6
4	35.3
5	42.0



PLAN VIEW OF KILN STACK SHOWING TRAVERSE POINT LOCATIONS

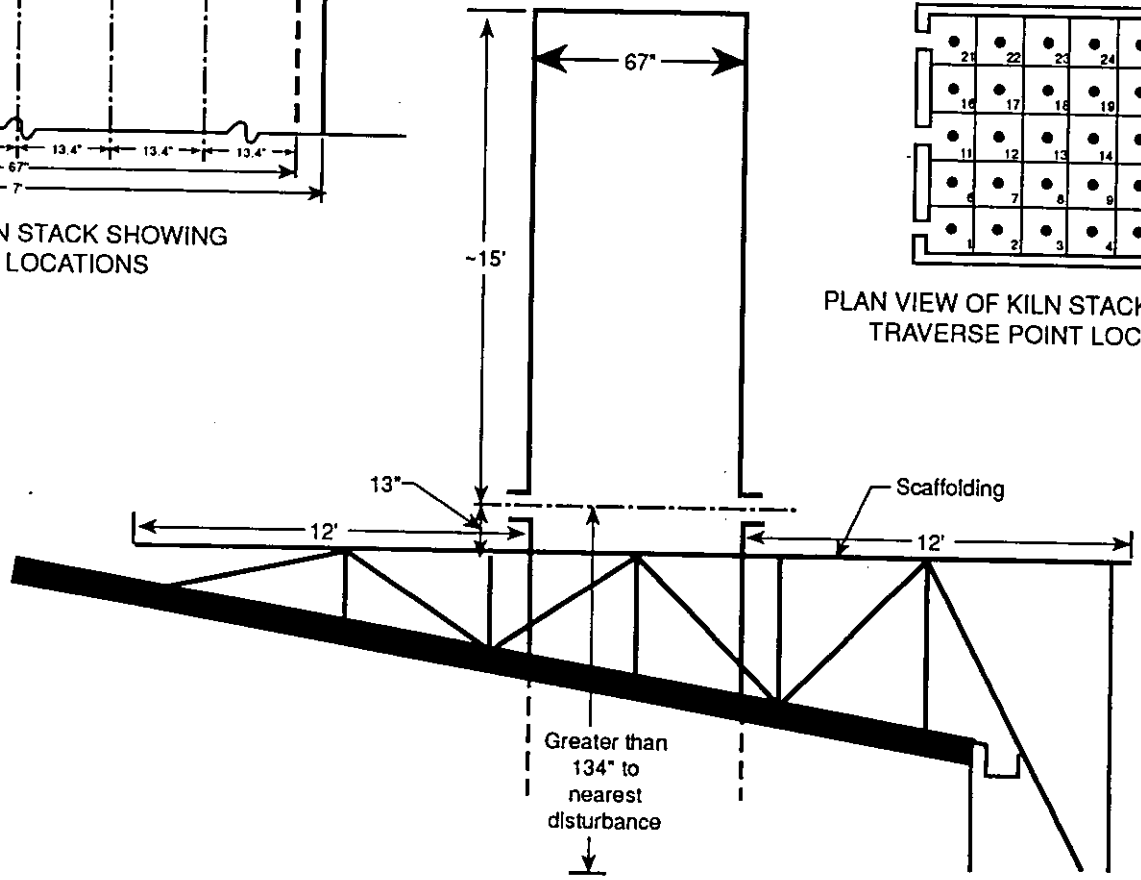
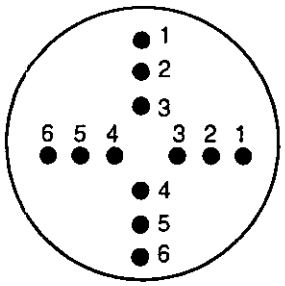


Figure 2-5. Kiln stack sampling location.



Point	Distance, in.
1	2.51
2	8.38
3	16.87
4	40.13
5	48.68
6	54.49

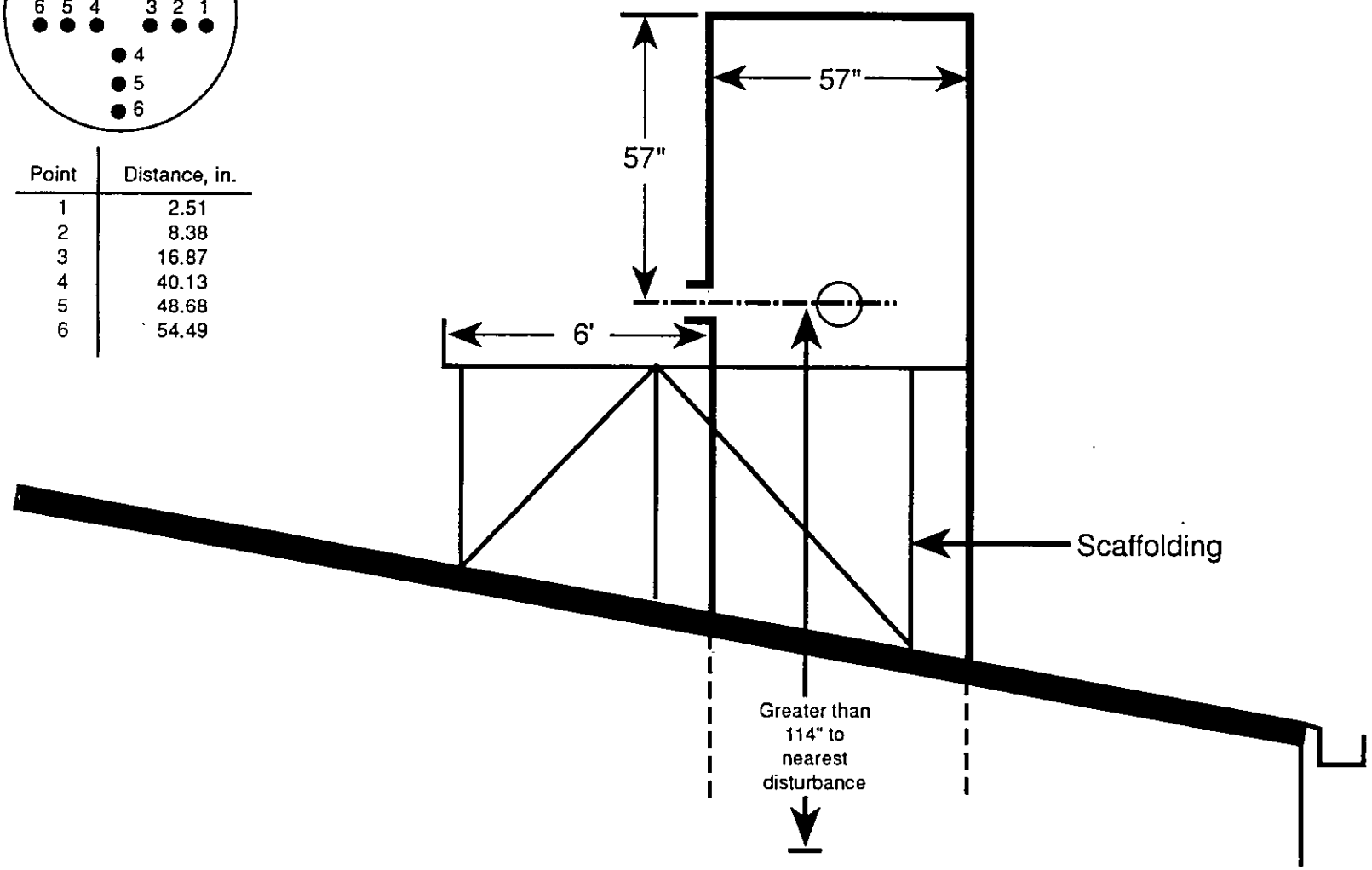


Figure 2-6. Dryer stack sampling location.

SECTION 3

SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES AND TEST MATRIX

The primary objective of the test conducted at Belden's Plant No. 6 was to obtain emission and process data to develop emission factors for structural brick raw material grinding/screening operations and gas-fired brick kilns. The emission factors will be used to update and revise the emission factors in Section 11.3, Bricks and Related Clay Products, of AP-42. Specifically, the purpose of the emission test was to determine the following:

- The concentrations and emission rates of speciated VOC in kiln stack gas.
- The concentrations and emission rates of semivolatile organic compounds in kiln stack gas.
- The concentrations and emission rates of metals (arsenic, beryllium, cadmium, chromium, cobalt, mercury, manganese, nickel, lead, antimony, and selenium) in kiln stack gas.
- The concentration and emission rates of filterable PM-10 in the kiln stack, inlet and outlet of the grinding/screening operation baghouse, and screening/grinding room air.
- The concentrations and emission rates of condensible PM, hydrochloric acid (HCl), hydrogen fluoride (HF), chlorine (Cl_2), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon dioxide (CO_2), and carbon monoxide (CO) in the kiln stack gas.
- The concentrations and emission rates of TOC, methane, and ethane in the kiln stack and dryer exhaust gas.

The test matrix is presented in Table 3-1, and the test schedule, including the date, start time, and finish time of each test run is presented in Table 3-2.

TABLE 3-1. SAMPLING MATRIX FOR BELDEN BRICK PLANT 6[a]

	Grinding screening fabric filter inlet	Grinding screening fabric filter outlet	Ambient samples	Process samples	Kiln stack	Dryer stack
Filterable PM	201A[b]	201A[b]			201A[b]	
Filterable PM-10	201A[b]	201A[b]	Hi-Vol		201A[b]	
Condensible PM					202[b]	
Metals/PM					29	
Speciated VOC					0030[c]	
Semivolatiles					0010[c]	
$HF/HCl/Cl_2$/ Filterable PM					26A	
SO_2					6C	
NO_x					7E	
CO					10	
CO_2					3A	
TOC					25A	25A
Methane/ethane					18	18
Sieve size				screening		
Moisture				gravimetric		

[a]Test method for each pollutant indicated; method number refers to EPA Reference Method 40 CFR 60, unless otherwise noted.
[b]40 CFR 51, App. M.
[c]Test Methods for evaluating solid waste; physical/chemical methods; U. S. EPA Office of Solid Waste, SW-846, November 1986.

TABLE 3-2. BELDEN BRICK-TEST SCHEDULE

Location	Analyte	Run	Date	Start	Finish	Comments
Grinding/screening: fabric filter inlet	Filterable PM-10	1	11/09/93	930	1121	
		2	11/09/93	1340	1440	
		3	11/11/93	755	855	
Grinding/screening: fabric filter outlet		1	11/09/93	835	1446	
		2	11/11/93	727	1427	
Grinding/screening: ambient--east		1	11/09/93	1200	1400	
		2	11/11/93	800	1000	
		3	11/11/93	1045	1245	
Grinding/screening: ambient--west		1	11/11/93	945	1145	
		2	11/11/93	1230	1430	
Grinding/screening: fabric filter hopper	Total PM	1	11/09/93	700	1515	
		2	11/11/93	700	1510	
Grinding/screening: finished material conveyor	Process samples	1	11/09/93	929	929	
		2	11/09/93	1059	1059	
		3	11/09/93	1214	1214	
		4	11/11/93	845	845	
		5	11/11/93	1015	1015	
		6	11/11/93	1130	1130	
Kiln stack	Metals/filterable PM	1	11/09/93	1430	1915	
		2	11/10/93	942	1357	
		3	11/10/93	1553	1947	Shutdown between 1609 and 1613
Kiln stack	VOC	1	11/11/93	1520	1540	Sample No. 1067/1068
		1	11/11/93	1550	1610	Sample No. 1069/1070
		1	11/11/93	1620	1640	Sample No. 1071/1072
		1	11/11/93	1650	1710	Sample No. 1073/1074
		2	11/11/93	1715	1735	Sample No. 2067/2068
		2	11/11/93	1745	1805	Sample No. 2069/2070
		2	11/11/93	1815	1835	Sample No. 2071/2072
Kiln stack	Semivolatile organics	1	11/09/93	1430	1915	
		2	11/10/93	942	1357	
		3	11/10/93	1553	1947	Shutdown between 1609 and 1613
Kiln stack	TOC/NOx/CO/SO2/ methane/ethane	1	11/11/93	1035	1236	
		2	11/11/93	1311	1511	
		3	11/11/93	1527	1727	
Kiln stack	PM/HCl/Cl2/HF	1	11/09/93	1407	1917	Shutdown between 1410 and 1431
		2	11/10/93	942	1357	
		3	11/10/93	1553	1947	Shutdown between 1609 and 1613
Kiln stack	filterable PM-10/ condensible PM	1	11/11/93	1055	1227	
		2	11/11/93	1459	1642	
		3	11/11/93	1707	1839	
Dryer stack	TOC/methane/ ethane	1	11/11/93	1035	1236	
		2	11/11/93	1311	1511	
		3	11/11/93	1527	1727	

3.2 FIELD TEST CHANGES AND PROBLEMS

During implementation of the field test, some modifications to the test protocol established in the site-specific test plan were warranted. The major changes are briefly discussed in the following paragraphs.

The test plan indicated 24 points on two traverses would be used for the testing at the grinding/screening baghouse inlet and outlet locations. However, Method 201A (PM-10 at constant sampling rate) stipulates that no more than 12 sampling points be used. For this reason, sampling was conducted using 12 points on a single traverse. In addition, because of the low loadings at the baghouse outlet, the sampling time was extended for the second test run. The sampling time was 6 hours for Run 1 and 7 hours for Run 2.

At the kiln outlet location the full 5 x 5 25-point sample point matrix was used for the metals/particulate, semivolatile, and HCl/HF/particulate test runs. However, as noted above, Method 201A stipulates that no more than 12 traverse points be used; therefore, for Method 201A, 2 traverses of 6 points each were used for a total of 12 sample points. Also, at the kiln outlet location, different filter temperatures were maintained in the metals/particulate and HCl/HF/particulate sample trains. The metals/particulate train maintained a filter temperature of 250°F; this is the standard filter temperature for Reference Method 5 for measuring filterable PM. As such, the metals/particulate train results represent standard PM measurement methods/results. Due to some concern about the possibility of sulfuric acid mist condensation on the filter, the HCl/HF/particulate sampling train used an elevated filter temperature; the filter temperature was maintained at 350°F.

Three 2-hour runs were conducted for TOC, ethane, and methane using instrumental analyzers at the dryer outlet location as stipulated in the test plan. However, no stack gas volumetric flow measurements were taken during the first test run. This does not have any impact on the measured concentrations; these data are needed to calculate emission rates (lb/hr) and emission factors (lb/ton of brick produced). Since all three runs were conducted on the same day, a flow rate for Run 1 can be estimated from the average of flow rates of Runs 2 and 3; the measured flows for Runs 2 and 3 agreed closely.

During recovery of the semivolatile sampling trains, a black viscous material was noted in and around the filter holders and glassware between the filter and resin trap; discoloration of the filter frit also occurred. This situation had never been encountered before and as a precaution the sample recovery washes from the filter frits were recovered separately; the washes were dark in color. Some matrix effects were noted during analysis of these washes (i.e., the analytical sensitivity was somewhat reduced). Nonetheless, no significant concentration of the target compounds were found in these washes; the concentrations were below detection limits and consequently have no impact on the reported results.

3.3 PRESENTATION OF RESULTS

Tables 3-3 to 3-11 summarize the emission rates and emission factors determined from the emission sampling and analysis. The following sections present the process data and the results of the testing on the grinding/screening operation emissions, kiln emissions, and dryer emissions, ambient samples, and process samples.

3.3.1 Process Operating Rates

This section summarizes the results of the measurements of process rates for the raw material grinding/screening operation and the brick drying/firing operation during the emission test. Appendix B presents the process data for the actual measurements made during the emission test.

3.3.1.1 Grinding/screening operation. For the grinding/screening operation, the rate of fine material production was measured by Belden personnel on November 9 and 11. Table 3-12 summarizes these process rate measurements.

3.3.1.2 Unfired brick drying. Table 3-13 summarizes the process data for the unfired brick dryer during the test period. The average feed rate for unfired bricks to the dryer was determined to be 3.93 Mg/hr (4.33 ton/hr); the average production rate of unfired bricks from the dryer was determined to be 3.36 Mg/hr (3.70 ton/hr).

3.3.1.3 Brick firing. Table 3-14 summarizes the process data for the kiln during the emission test. The average feed rate for unfired bricks to the kiln was determined to be 3.36 Mg/hr (3.70 ton/hr); the average production rate of fired bricks from the kiln was determined to be 3.16 Mg/hr (3.48 ton/hr).

3.3.2 Grinding/Screening Operation Emission Results

Emissions of filterable PM and PM-10 were sampled from the inlet and outlet of the fabric filter that serves the clay processing line in the grinding/screening building. Ambient PM-10 samples also were taken inside and to the east and west of the grinding/screening building. In addition, the weight of material caught in the fabric filter was measured to coincide with the fabric filter sampling. Table 3-3 summarizes the uncontrolled and controlled emission rates and emission factors developed for this source, and Tables 3-15 to 3-17 summarize the emission data and results for the tests. The following paragraphs describe the results of the sampling of these sources.

TABLE 3-3. SUMMARY OF GRINDING/SCREENING EMISSION RATES AND EMISSION FACTORS--FILTERABLE PM AND PM-10 (METRIC UNITS)

Source/analyte	Mass emission rate, kg/hr				Emission factor, kg/Mg material processed (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
FABRIC FILTER INLET								
Filterable PM-10	11	11	10	10	0.27	0.27	0.26	0.27
Filterable PM	107	186	206	166	2.7	4.7	5.3	4.2
FABRIC FILTER OUTLET								
Filterable PM-10	0.024	0.020	(b)	0.022	0.00062	0.00053	(b)	0.00057
Filterable PM	0.12	0.082	(b)	0.10	0.0030	0.0021	(b)	0.0026
FABRIC FILTER HOPPER CATCH								
Total PM	305	343	(b)	324	7.8	8.9	(b)	8.3

(a) Emission factors based on average process rates of 39.2 Mg/hr (11/9/93) and 38.5 Mg/hr (11/11/92).
(b) Only two runs conducted.

TABLE 3-3. SUMMARY OF GRINDING/SCREENING EMISSION RATES AND EMISSION FACTORS--FILTERABLE PM AND PM-10 (ENGLISH UNITS)

Source/analyte	Mass emission rate, lb/hr				Emission factor, lb/ton material processed (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
FABRIC FILTER INLET								
Filterable PM-10	24	23	22	23	0.55	0.54	0.51	0.53
Filterable PM	234	409	453	365	5.4	9.5	10.5	8.5
FABRIC FILTER OUTLET								
Filterable PM-10	0.053	0.045	(b)	0.049	0.0012	0.0011	(b)	0.0011
Filterable PM	0.26	0.18	(b)	0.22	0.0061	0.0043	(b)	0.0052
FABRIC FILTER HOPPER CATCH								
Total PM	672	754	(b)	713	16	18	(b)	17

(a) Emission factors based on average process rates of 43.1 ton/hr (11/9/93) and 42.3 ton/hr (11/11/92).
(b) Only two runs conducted.

TABLE 3-4. SUMMARY OF PROCESS SAMPLE MOISTURE AND SIEVE ANALYSIS

Date	11/9/93						11/11/93						Average	
Sample No.	1		2		3		1		2		3			
Moisture, percent	4.44		4.35		4.24		3.59		3.48		3.48		3.93	
Sieve size	Wt., g	%	Wt., g	%	Wt., g	%	Wt., g	%	Wt., g	%	Wt., g	%	Wt., g	%
10 mesh	2.2	0.47	2.2	0.40	1.6	0.39	2.4	0.42	2.1	0.42	1.6	0.36	2.0	0.41
20 mesh	137.3	29.5	189.6	34.2	120.6	29.8	179.8	31.6	184.6	36.9	139.7	31.0	158.6	32.2
40 mesh	108.8	23.4	128.4	23.2	93.3	23.0	120.5	21.2	108.7	21.7	97.0	21.6	109.5	22.4
100 mesh	105.6	22.7	110.8	20.0	89.9	22.2	109.6	19.3	88.9	17.8	87.1	19.4	98.7	20.2
140 mesh	21.8	4.69	25.7	4.64	17.1	4.22	28.4	5.00	17.0	3.40	21.7	4.82	22.0	4.5
200 mesh	14.9	3.20	20.0	3.61	13.7	3.38	22.9	4.03	15.3	3.06	17.0	3.78	17.3	3.5
Pan	74.4	16.0	76.9	13.9	68.9	17.0	104.7	18.4	83.9	16.8	85.9	19.1	82.5	16.9
Total	465.0	100	553.6	100	405.1	100	568.3	100	500.5	100	450.0	100	490.4	100

TABLE 3-5. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--METALS (METRIC UNITS)

Analyte (a)	Emission rate, kg/hr				Emission factor, kg/Mg bricks produced (b)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
Cadmium (c)	5.1E-05	9.0E-05	1.6E-05	5.2E-05	1.6E-05	2.8E-05	5.2E-06	1.7E-05
Chromium	0.0055	0.024	0.0063	0.012	0.0017	0.0075	0.0020	0.0038
Cobalt (c)	8.3E-05	0.00031	0.00013	0.00018	2.6E-05	9.8E-05	4.2E-05	5.5E-05
Mercury	0.00027	0.00011	0.00036	0.00024	8.5E-05	3.5E-05	0.00011	7.8E-05
Manganese	0.00067	0.00200	0.00077	0.00115	0.00021	0.00063	0.00024	0.00036
Nickel	0.0027	0.013	0.0043	0.0067	0.00085	0.0041	0.0014	0.0021
Lead (c)	0.00015	0.00010	0.00012	0.00012	4.9E-05	3.2E-05	3.7E-05	3.9E-05
Antimony (c)	4.3E-05	2.2E-05	4.0E-05	3.5E-05	1.4E-05	6.9E-06	1.3E-05	1.1E-05
Selenium (c)	0.00049	0.00043	0.00081	0.00058	0.00016	0.00013	0.00026	0.00018

(a) Arsenic and beryllium not detected.

(b) Emission factors based on process rate of 3.16 Mg of bricks produced per hour.

(c) Background corrections represent a significant portion of total amounts measured.

TABLE 3-5. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--METALS (ENGLISH UNITS)

Analyte (a)	Emission rate, lb/hr				Emission factor, lb/ton bricks produced (b)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
Cadmium (c)	0.00011	0.00020	3.6E-05	0.00012	3.2E-05	5.7E-05	1.0E-05	3.3E-05
Chromium	0.012	0.052	0.014	0.026	0.0035	0.0151	0.0040	0.0075
Cobalt (c)	0.00018	0.00069	0.00029	0.00039	5.2E-05	0.00020	8.4E-05	0.00011
Mercury	0.00059	0.00024	0.00078	0.00054	0.00017	7.0E-05	0.00023	0.00016
Manganese	0.0015	0.0044	0.0017	0.0025	0.00043	0.0013	0.00049	0.00073
Nickel	0.0059	0.029	0.0095	0.015	0.0017	0.0082	0.0027	0.0042
Lead (c)	0.00034	0.00022	0.00026	0.00027	9.8E-05	6.3E-05	7.5E-05	7.9E-05
Antimony (c)	9.5E-05	4.8E-05	8.8E-05	7.7E-05	2.7E-05	1.4E-05	2.5E-05	2.2E-05
Selenium (c)	0.0011	0.00094	0.0018	0.0013	0.00031	0.00027	0.00051	0.00036

(a) Arsenic and beryllium not detected.

(b) Emission factors based on process rate of 3.48 tons of bricks produced per hour.

(c) Background corrections represent a significant portion of total amounts measured.

TABLE 3-6. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SPECIATED VOC (METRIC UNITS)

	Mass emission rate, kg/hr				Emission factor, kg/Mg bricks produced (a)			
	Run				Run			
Analyte	1	2	3	Ave.	1	2	3	Ave.
Chloromethane (b)	0.0027	0.00014	0.00032	0.0011	0.00086	4.5E-05	0.00010	0.00034
Chloroethane	0.0021	3.1E-06 (c)	0.00061	0.00090	0.00066	9.7E-07 (c)	0.00019	0.00028
Iodomethane (b)	0.00029	2.2E-05	0.00012	0.00015	9.3E-05	7.1E-06	3.9E-05	4.6E-05
Acetone	0.0018	0.0020	0.0042	0.0027	0.00058	0.00064	0.0013	0.00085
Carbon disulfide	7.8E-05	8.2E-05	4.2E-05	6.7E-05	2.5E-05	2.6E-05	1.3E-05	2.1E-05
2-Butanone	0.00017	0.00035	0.00054	0.00035	5.3E-05	0.00011	0.00017	0.00011
1,1,1-Trichloroethane	1.3E-05	1.0E-06 (c)	8.1E-06	7.4E-06	4.2E-06	3.3E-07 (c)	2.6E-06	2.3E-06
Benzene (b)	0.0047	0.0070	0.0019	0.0045	0.0015	0.0022	0.00062	0.0014
2-Hexanone	4.8E-06	0.00024	0.00016	0.00013	1.5E-06	7.4E-05	5.1E-05	4.2E-05
Tetrachloroethene	7.4E-07 (c)	5.9E-06	6.5E-06	4.4E-06	2.3E-07 (c)	1.9E-06	2.0E-06	1.4E-06
Toluene	0.00019	0.00026	0.00029	0.00025	6.0E-05	8.1E-05	9.2E-05	7.8E-05
Ethylbenzene	5.6E-05	6.6E-05	8.6E-05	7.0E-05	1.8E-05	2.1E-05	2.7E-05	2.2E-05
Styrene	1.8E-05	7.4E-05	4.1E-06	3.2E-05	5.6E-06	2.4E-05	1.3E-06	1.0E-05
m-/p-Xylene	8.7E-05	0.00010	0.00013	0.00011	2.7E-05	3.3E-05	4.0E-05	3.4E-05
o-Xylene	7.4E-05	9.4E-05	0.00011	9.2E-05	2.3E-05	3.0E-05	3.5E-05	2.9E-05

(a) Based on process rate of 3.16 Mg bricks per hour.

(b) Estimated values, all runs.

(c) Estimated as one-half the detection limit.

TABLE 3-6. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SPECIATED VOC (ENGLISH UNITS)

Analyte	Mass emission rate, lb/hr				Emission factor, lb/ton bricks produced (a)			
	Run				Run			
	1	2	3	Ave.	1	2	3	Ave.
Chloromethane (b)	0.0060	0.00031	0.00070	0.0023	0.0017	9.0E-05	0.00020	0.00067
Chloroethane	0.0046	6.8E-06 (c)	0.0013	0.0020	0.0013	1.9E-06 (c)	0.00038	0.00057
Iodomethane (b)	0.00065	4.9E-05	0.00027	0.00032	0.00019	1.4E-05	7.7E-05	9.3E-05
Acetone	0.0040	0.0045	0.0092	0.0059	0.0012	0.0013	0.0026	0.0017
Carbon disulfide	0.00017	0.00018	9.2E-05	0.00015	4.9E-05	5.2E-05	2.7E-05	4.3E-05
2-Butanone	0.00037	0.00077	0.0012	0.00078	0.00011	0.00022	0.00034	0.00022
1,1,1-Trichloroethane	2.9E-05	2.3E-06 (c)	1.8E-05	1.6E-05	8.3E-06	6.6E-07 (c)	5.1E-06	4.7E-06
Benzene (b)	0.010	0.015	0.0043	0.010	0.0030	0.0044	0.0012	0.0029
2-Hexanone	1.1E-05	0.00052	0.00036	0.00030	3.0E-06	0.00015	0.00010	8.5E-05
Tetrachloroethene	1.6E-06 (c)	1.3E-05	1.4E-05	9.6E-06	4.7E-07 (c)	3.7E-06	4.1E-06	2.8E-06
Toluene	0.00042	0.00057	0.00064	0.00054	0.00012	0.00016	0.00018	0.00016
Ethylbenzene	0.00012	0.00015	0.00019	0.00015	3.6E-05	4.2E-05	5.5E-05	4.4E-05
Styrene	3.9E-05	0.00016	9.0E-06	7.1E-05	1.1E-05	4.7E-05	2.6E-06	2.0E-05
m-/p-Xylene	0.00019	0.00023	0.00028	0.00023	5.5E-05	6.6E-05	8.0E-05	6.7E-05
o-Xylene	0.00016	0.00021	0.00024	0.00020	4.7E-05	5.9E-05	6.9E-05	5.8E-05

(a) Based on process rate of 3.48 ton bricks per hour.

(b) Estimated values, all runs.

(c) Estimated as one-half the detection limit.

TABLE 3-7. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SEMIVOLATILES (METRIC UNITS)

Source/analyte	Mass emission rate, kg/hr				Emission factor, kg/Mg bricks produced (a)			
	Run				Run			
	1	2	3	Ave.	1	2	3	Ave.
Phenol	0.00016	0.00015	0.00010	0.00014	5.0E-05	4.8E-05	3.1E-05	4.3E-05
1,4-Dichlorobenzene	5.8E-05	5.7E-05	0.00011	7.5E-05	1.8E-05	1.8E-05	3.5E-05	2.4E-05
Naphthalene (b)	7.3E-05	0.00014	9.7E-05	0.00010	2.3E-05	4.4E-05	3.1E-05	3.3E-05
2-Methylnaphthalene	5.8E-05	0.00013	8.5E-05	9.0E-05	1.8E-05	4.0E-05	2.7E-05	2.8E-05
Diethyl phthalate	0.00064	0.00027	0.00021	0.00037	0.00020	8.4E-05	6.5E-05	0.00012
Di-n-butyl phthalate	0.00016	0.00016	0.00035	0.00022	5.0E-05	5.1E-05	0.00011	7.1E-05
Butylbenzyl phthalate	2.4E-05	2.5E-05	3.4E-05	2.8E-05	7.7E-06	8.0E-06	1.1E-05	8.9E-06
Bis(2-ethylhexyl) phthalate (c)	0.00093	0.0028	0.0058	0.0032	0.00030	0.00088	0.0018	0.0010

(a) Emission factors based on process rate of 3.16 Mg of bricks produced per hour.
(b) Naphthalene found in method blank at 25 to 50 percent of sample level.
(c) Bis(2-ethylhexyl) phthalate found in method blank at 3 to 22 percent of sample level.

TABLE 3-7. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SEMIVOLATILES (ENGLISH UNITS)

Source/analyte	Mass emission rate, lb/hr				Emission factor, lb/ton bricks produced (a)			
	Run				Run			
	1	2	3	Ave.	1	2	3	Ave.
Phenol	0.00035	0.00033	0.00022	0.00030	0.00010	9.5E-05	6.3E-05	8.6E-05
1,4-Dichlorobenzene	0.00013	0.00012	0.00024	0.00017	3.7E-05	3.6E-05	7.0E-05	4.8E-05
Naphthalene (b)	0.00016	0.00031	0.00021	0.00023	4.6E-05	8.8E-05	6.2E-05	6.5E-05
2-Methylnaphthalene	0.00013	0.00028	0.00019	0.00020	3.7E-05	8.0E-05	5.4E-05	5.7E-05
Diethyl phthalate	0.00142	0.00059	0.00045	0.00082	0.00041	0.00017	0.00013	0.00024
Di-n-butyl phthalate	0.00035	0.00036	0.00078	0.00050	0.00010	0.00010	0.00022	0.00014
Butylbenzyl phthalate	5.3E-05	5.6E-05	7.6E-05	6.2E-05	1.5E-05	1.6E-05	2.2E-05	1.8E-05
Bis(2-ethylhexyl) phthalate (c)	0.0021	0.0061	0.013	0.0070	0.00059	0.0018	0.0037	0.0020

(a) Emission factors based on process rate of 3.48 ton of bricks produced per hour.
(b) Naphthalene found in method blank at 25 to 50 percent of sample level.
(c) Bis(2-ethylhexyl) phthalate found in method blank at 3 to 22 percent of sample level.

TABLE 3-8. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--INORGANIC GASES, TOC, AND METHANE (METRIC UNITS)

	Emission rate, kg/hr				Emission factor, kg/Mg bricks produced (b)			
	Run				Run			
Analyte (a)	1	2	3	Average	1	2	3	Average
SO2	3.9	5.2	5.2	4.8	1.2	1.7	1.7	1.5
NOx	1.1	1.6	1.6	1.4	0.35	0.51	0.50	0.45
CO	1.9	1.9	1.6	1.8	0.61	0.59	0.51	0.57
CO2	1,320	1,200	1,150	1,220	420	380	360	390
TOC, as methane	0.15	0.079	0.16	0.13	0.046	0.025	0.051	0.041
Methane	0.17	0.12	0.11	0.13	0.053	0.037	0.036	0.042

(a) Ethane not detected.

(b) Emission factors based on process rate of 3.16 Mg of bricks produced per hour.

TABLE 3-8. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--INORGANIC GASES, TOC, AND METHANE (ENGLISH UNITS)

	Emission rate, lb/hr				Emission factor, lb/ton bricks produced (b)			
	Run				Run			
Analyte (a)	1	2	3	Average	1	2	3	Average
SO2	8.5	11.5	11.5	10.5	2.4	3.3	3.3	3.0
NOx	2.5	3.5	3.5	3.2	0.71	1.01	1.00	0.91
CO	4.2	4.1	3.6	4.0	1.2	1.2	1.0	1.1
CO2	2,900	2,650	2,520	2,690	830	760	720	770
TOC, as methane	0.32	0.17	0.35	0.28	0.093	0.050	0.10	0.081
Methane	0.37	0.25	0.25	0.29	0.11	0.073	0.072	0.084

(a) Ethane not detected.

(b) Emission factors based on process rate of 3.48 tons of bricks produced per hour.

TABLE 3-9. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--PM, PM-10, (METRIC UNITS)

Analyte	Emission rate, kg/hr				Emission factor, kg/Mg bricks produced (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
Filterable PM (b)	0.73	0.54	0.69	0.66	0.23	0.17	0.22	0.21
Filterable PM (c)	0.67	0.50	1.03	0.74	0.21	0.16	0.33	0.23
Filterable PM (d)	0.56	0.52	0.35	0.48	0.18	0.16	0.11	0.15
Filterable PM-10	0.10	0.40	0.13	0.21	0.033	0.13	0.041	0.067
Cond. inorganic PM	5.2	5.0	4.5	4.9	1.7	1.6	1.4	1.6
Cond. organic PM	1.7	0.42	0.29	0.81	0.54	0.13	0.092	0.26
Total cond. PM	7.0	5.5	4.8	5.7	2.2	1.7	1.5	1.8

(a) Emission factors based on process rate of 3.16 Mg of bricks produced per hour.
(b) Measured simultaneously with Method 26A (HF, HCl) train operated with filter temperature of 177 degrees C.
(c) Measured simultaneously with Method 29 (metals) train operated with a filter temperature of 121 degrees C.
(d) Based on Method 201A train operated with a filter temperature of 121 degrees C.

TABLE 3-9. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--PM, PM-10 (ENGLISH UNITS)

Analyte	Emission rate, lb/hr				Emission factor, lb/ton bricks produced (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
Filterable PM (b)	1.6	1.2	1.5	1.4	0.46	0.35	0.44	0.42
Filterable PM (c)	1.5	1.1	2.3	1.6	0.43	0.32	0.65	0.47
Filterable PM (d)	1.2	1.1	0.8	1.1	0.35	0.33	0.23	0.30
Filterable PM-10	0.23	0.89	0.29	0.47	0.066	0.26	0.083	0.13
Cond. inorganic PM	12	11	10.0	11	3.3	3.2	2.9	3.1
Cond. organic PM	3.8	0.93	0.64	1.8	1.1	0.27	0.18	0.51
Total cond. PM	15	12	11	13	4.4	3.5	3.0	3.6

(a) Emission factors based on process rate of 3.48 ton of bricks produced per hour.
(b) Measured simultaneously with Method 26A (HF, HCl) train operated with a filter temperature of 350 degrees F.
(c) Measured simultaneously with Method 29 (metals) train operated with a filter temperature of 250 degrees F.
(d) Based on Method 201A train operated with a filter temperature of 250 degrees F.

TABLE 3-10. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--HF, HCl, Cl2 (METRIC UNITS)

Analyte	Emission rate, kg/hr				Emission factor, kg/Mg bricks produced (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
HF	0.47	0.50	0.43	0.47	0.15	0.16	0.14	0.15
HCl	0.031	0.028	0.027	0.029	0.010	0.0089	0.0084	0.0091
Cl2	0.0019	0.0025	0.0020	0.0021	0.00060	0.00079	0.00062	0.00067

(a) Emission factors based on process rate of 3.16 Mg of brick produced per hour.

TABLE 3-10. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--HF, HCl, CL2 (ENGLISH UNITS)

Analyte	Emission rate, lb/hr				Emission factor, lb/ton bricks produced (a)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
HF	1.0	1.1	1.0	1.0	0.30	0.32	0.27	0.30
HCl	0.069	0.062	0.059	0.063	0.020	0.018	0.017	0.018
Cl2	0.0042	0.0055	0.0043	0.0047	0.0012	0.0016	0.0012	0.0013

(a) Emission factors based on process rate of 3.48 tons of brick produced per hour.

TABLE 3-11. SUMMARY OF DRYER EMISSION RATES AND EMISSION FACTORS--TOC, METHANE, AND ETHANE (METRIC UNITS(a)

Analyte	Emission rate, kg/hr				Emission factor, kg/Mg (b)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
TOC, as methane	13	13	14	13	4.0	4.1	4.5	4.2
methane	5.4	4.6	5.5	5.1	1.7	1.4	1.7	1.6
ethane	0.91	0.63	0.73	0.76	0.29	0.20	0.23	0.24

(a) Gas burners malfunctioning during emission test; results not representative of properly operating gas-fired dryer.
(b) Emission factors based on process rate of 3.36 Mg of bricks dried per hour.

TABLE 3-11. SUMMARY OF DRYER EMISSION RATES AND EMISSION FACTORS--TOC, METHANE, AND ETHANE (ENGLISH UNITS) (a)

Analyte	Emission rate, lb/hr				Emission factor, lb/ton (b)			
	Run				Run			
	1	2	3	Average	1	2	3	Average
TOC, as methane	28	28	31	29	8.0	8.2	9.0	8.4
methane	12	10	12	11	3.4	2.9	3.5	3.2
ethane	2.0	1.4	1.6	1.7	0.57	0.40	0.46	0.48

(a) Gas burners malfunctioning during emission test; results not representative of properly operating gas-fired dryer.
(b) Emission factors based on process rate of 3.70 tons of bricks dried per hour.

TABLE 3-12. SUMMARY OF PROCESS RATES FOR GRINDING/SCREENING OPERATION

Description		
Date	11/9/93	11/11/93
Start time	7:52	7:30
Finish time	12:14	11:30
No. of measurements	17	17
Minimum process rate, Mg/hr (ton/hr)	37.9 (41.7)	36.0 (39.6)
Maximum process rate, Mg/hr (ton/hr)	41.2 (45.3)	41.1 (45.2)
Average process rate, Mg/hr (ton/hr)	39.2 (43.1)	38.5 (42.3)

TABLE 3-13. SUMMARY OF DRYER PROCESS DATA

Date	Inlet temperature, °C (°F)	Outlet temperature, °C (°F)	Average feed rate, Mg/hr (ton/hr)	Average production rate, Mg/hr (ton/hr)
11/9/93	35 (95)	132 (269)	3.93 (4.33)	3.36 (3.70)
11/10/93	37.7 (100)	129 (265)	3.93 (4.33)	3.36 (3.70)
11/11/93	37.3 (100)	134 (274)	3.93 (4.33)	3.36 (3.70)

TABLE 3-14. SUMMARY OF KILN PROCESS DATA

Date	Inlet temperature, °C (°F)	Peak temperature, °C (°F)	Average feed rate, Mg/hr (ton/hr)	Average production rate, Mg/hr (ton/hr)	Gas consumption rate, m^3/hr (ft^3/hr)
11/9/93	41.1 (106)	1116 (2040)	3.36 (3.70)	3.16 (3.48)	272 (9,607)
11/10/93	51.1 (124)	1116 (2040)	3.36 (3.70)	3.16 (3.48)	269 (9,500)
11/11/93	60.0 (140)	1111 (2031)	3.36 (3.70)	3.16 (3.48)	258 (9,120)

TABLE 3-15. GRINDING/SCREENING AMBIENT PM-10 MEASUREMENTS (METRIC UNITS)

Inside building				
Run No.	1	2		Average
Date	11/09/93	11/09/93		
Start time	10:42	12:50		
Finish time	12:45	14:50		
Sample time, min	120	120		
Flow rate, ACM/min	1.186	1.188		
Flow rate, DSCM/min	1.198	1.196		
Mass collected, mg	321	448		
Concentration, g/DSCM	0.00223	0.00312		0.00268
Outside (East)				
Run No.	1	2	3	
Date	11/09/93	11/11/93	11/11/93	
Start time	12:00	8:00	10:45	
Finish time	14:00	10:00	12:45	
Sample time, min	120	120	120	
Flow rate, ACM/min	1.169	1.186	1.188	
Flow rate, DSCM/min	1.173	1.198	1.196	
Mass collected, mg	8.5	16.2	9.8	
Concentration, g/DSCM	6.04E-05	0.000113	6.83E-05	8.04E-05
Outside (West)				
Run No.	1	2		
Date	11/11/93	11/11/93		
Start time	9:45	12:30		
Finish time	11:45	14:30		
Sample time, min	120	120		
Flow rate, ACM/min	1.186	1.188		
Flow rate, DSCM/min	1.198	1.196		
Mass collected, mg	30.1	26.3		
Concentration, g/DSCM	0.000209	0.000183		0.000196

TABLE 3-15. GRINDING/SCREENING AMBIENT PM-10 MEASUREMENTS (ENGLISH UNITS)

Inside building				
Run No.	1	2		Average
Date	11/09/93	11/09/93		
Start time	10:42	12:50		
Finish time	12:45	14:50		
Sample time, min	120	120		
Flow rate, ACFM	41.87	41.94		
Flow rate, DSCFM	42.32	42.23		
Mass collected, gr	4.9537	6.9135		
Concentration, gr/DSCF	0.000975	0.00136		0.00117
Outside (East)				
Run No.	1	2	3	
Date	11/09/93	11/11/93	11/11/93	
Start time	12:00	8:00	10:45	
Finish time	14:00	10:00	12:45	
Sample time, min	120	120	120	
Flow rate, ACFM	41.30	41.87	41.94	
Flow rate, DSCFM	41.42	42.32	42.23	
Mass collected, gr	0.1312	0.2500	0.1512	
Concentration, gr/DSCF	2.64E-05	4.92E-05	2.98E-05	3.52E-05
Outside (West)				
Run No.	1	2		
Date	11/11/93	11/11/93		
Start time	9:45	12:30		
Finish time	11:45	14:30		
Sample time, min	120	120		
Flow rate, ACFM	41.87	41.94		
Flow rate, DSCFM	42.32	42.23		
Mass collected, gr	0.4645	0.4059		
Concentration, gr/DSCF	9.15E-05	8.01E-05		8.58E-05

TABLE 3-16. GRINDING/SCREENING EMISSION TEST RESULTS--FABRIC FILTER INLET FILTERABLE PM, PM-10 (METRIC UNITS)

Run No.	1	2	3	Average
Date	11/09/93	11/09/93	11/11/93	
Start time	9:30	13:40	7:55	
Finish time	11:21	14:40	8:55	
Sample time, min	111	60	60	
% isokinetic	94.5	97	97.8	
Sample volume, ACM	1.497	0.785	0.774	
Sample volume, DSCM	1.498	0.765	0.778	
GAS PARAMETERS				
Gas temperature, C	15	18	13	
Oxygen, %	21	21	21	
Carbon dioxide, %	0	0	0	
Moisture, %	1.5	1.5	1.5	
Velocity, M/min	905	909	902	
Flowrate, ACM/min	593.9	596.5	591.8	
Flowrate, DSCM/min	578.8	576.3	580.9	
FILTERABLE PM-10				
Mass collected, g	0.4604	0.234	0.2242	
Concentration, g/DSCM	0.307	0.306	0.288	0.300
FILTERABLE PM				
Mass collected, g	4.5862	4.1066	4.5845	
Concentration, g/DSCM	3.061	5.366	5.895	4.77

TABLE 3-16. (ENGLISH UNITS)

Run No.	1	2	3	Average
Date	11/09/93	11/09/93	11/11/93	
Start time	9:30	13:40	7:55	
Finish time	11:21	14:40	8:55	
Sample time, min	111	60	60	
% isokinetic	94.5	97.0	97.8	
Sample volume, ACF	52.878	27.738	27.347	
Sample volume, DSCF	52.915	27.028	27.464	
GAS PARAMETERS				
Gas temperature, F	59	64	55	
Oxygen, %	21	21	21	
Carbon dioxide, %	0	0	0	
Moisture, %	1.5	1.5	1.5	
Velocity, ft/min	2,967	2,980	2,957	
Flowrate, ACFM	20,974	21,065	20,899	
Flowrate, DSCFM	20,439	20,351	20,513	
FILTERABLE PM-10				
Mass collected, gr	7.10	3.61	3.46	
Concentration, gr/DSCF	0.134	0.134	0.126	0.131
FILTERABLE PM				
Mass collected, gr	70.8	63.4	70.7	
Concentration, gr/DSCF	1.34	2.34	2.58	2.09

TABLE 3-17. GRINDING/SCREENING EMISSION TESTS RESULTS--
FABRIC FILTER OUTLET FILTERABLE PM, PM-10, (METRIC UNITS)

Run No.	1	2	Average
Date	11/09/93	11/11/93	
Start time	8:38	7:27	
Finish time	14:46	14:27	
Sample time, min	350	420	
% isokinetic	92.1	91.1	
Sample volume, ACM	5.153	6.057	
Sample volume, DSCM	4.968	5.849	
GAS PARAMETERS			
Gas temperature, C	14	13	
Oxygen, %	21	21	
Carbon dioxide, %	0	0	
Moisture, %	1.5	1.5	
Velocity, m/min	1,455	1,438	
Flowrate, ACM/min	755	746	
Flowrate, DSCM/min	740	734	
FILTERABLE PM-10			
Mass collected, g	0.0027	0.0027	
Concentration, g/DSCM	0.000543	0.000462	0.000503
FILTERABLE PM			
Mass collected, g	0.0133	0.0109	
Concentration, g/DSCM	0.00268	0.00186	0.00227

TABLE 3-17. (ENGLISH UNITS)

Run No.	1	2	Average
Date	11/09/93	11/11/93	
Start time	8:38	7:27	
Finish time	14:46	14:27	
Sample time, min	350	420	
% isokinetic	92.1	91.1	
Sample volume, ACF	181.97	213.913	
Sample volume, DSCF	175.437	206.567	
GAS PARAMETERS			
Gas temperature, F	58	56	
Oxygen, %	21	21	
Carbon dioxide, %	0	0	
Moisture, %	1.5	1.5	
Velocity, ft/min	4,773	4,716	
Flowrate, ACFM	26,656	26,337	
Flowrate, DSCFM	26,140	25,925	
FILTERABLE PM-10			
Mass collected, gr	0.0417	0.0417	
Concentration, gr/DSCF	0.00024	0.00020	0.000220
FILTERABLE PM			
Mass collected, gr	0.2052	0.1682	
Concentration, gr/DSCF	0.00117	0.000814	0.000992

3.3.2.1 Ambient sampling. Ambient Hi-Vol PM-10 samplers were set up in three locations: inside the grinding/screening building, east of the building and west of the building. At the inside and east locations, three runs were conducted, and at the west location two runs were conducted. The data for these runs are summarized in Table 3-15. Ambient PM-10 concentrations averaged 0.0027 g/DSCM (0.0012 gr/DSCF) inside, 0.000080 g/DSCM (0.000035 gr/DSCF) east of the building, and 0.00020 g/DSCM (0.000086 gr/DSCF) west of the building.

3.3.2.2 Fabric filter inlet PM and PM-10. Uncontrolled filterable PM-10 emissions from the grinding/screening operation were measured at the fabric filter inlet using Method 201A. The sampling train cyclone catch was also quantified in order to estimate the filterable PM emissions from the source. Three runs were conducted. The data for these runs are summarized in Table 3-16. Filterable PM-10 concentrations ranged from 0.029 g/DSCM (0.13 gr/DSCF) to 0.031 (0.13 gr/DSCF)and averaged 0.30 g/DSCM (0.13 gr/DSCF). The average emission rate and emission factors for filterable PM-10 emissions from the source were 10 kg/hr (23 lb/hr) and 0.27 kg/Mg (0.53 lb/ton). Filterable PM concentrations ranged from 3.1 g/DSCM (1.3 gr/DSCF) to 5.9 (2.6 gr/DSCF)and averaged 4.8 g/DSCM (2.1 gr/DSCF). The average emission rate and emission factors for filterable PM emissions from the source were estimated to be 170 kg/hr (370 lb/hr) and 4.2 kg/Mg (8.5 lb/ton).

3.3.2.3 Fabric filter outlet PM and PM-10. Controlled filterable PM-10 emissions from the grinding/screening operation were measured at the fabric filter outlet using Method 201A. The sampling train cyclone catch was also quantified in order to estimate the filterable PM emissions from the source. Because of the length of time required to collect an adequate sample for analysis, only two runs were conducted. The data for these runs are summarized in Table 3-17. Filterable PM-10 concentrations were 0.00054 g/DSCM (0.00024 gr/DSCF) and 0.00046 (0.00020 gr/DSCF)and averaged 0.00050 g/DSCM (0.00022 gr/DSCF). The average emission rate and emission factors for filterable PM-10 emissions from the source were 0.022 kg/hr (0.049 lb/hr) and 0.00057 kg/Mg (0.0011 lb/ton). Filterable PM concentrations were 0.0027 g/DSCM (0.0012 gr/DSCF) and 0.0019 g/DSCM (0.00081 gr/DSCF) and averaged 0.0023 g/DSCM (0.00099 gr/DSCF). The average emission rate and emission factors for filterable PM emissions from the source were 0.10 kg/hr (0.22 lb/hr) and 0.0026 kg/Mg (0.0052 lb/ton).

3.3.2.4 Fabric filter inlet mass balance. Prior to the start of testing on the grinding/screening operation, the fabric filter hopper was emptied; during the test the hopper contents were weighed periodically. On the first day of testing (November 9), 2,513 kilograms (kg) (5,540 lb) of material were collected by the fabric filter over a period of 8.25 hours, and on the second day of testing (November 11), 2,794 kg (6,160 lb) of material were collected over 8.17 hours. These data indicate collection rates of 305 kg/hr (672 lb/hr) and 343 kg/hr (754 lb/hr), respectively. As shown in Table 3-3, the emission factor estimated from the fabric filter hopper catch is approximately twice the filterable PM emission factor determined from the Method 201A test results. One possible explanation for this discrepancy could be that the contribution of PM emissions from the two inlet ducts that

were not sampled were significantly higher than expected. A more likely explanation is that sloughing of the fabric filter cake material occurred during the sampling and biased the results of the hopper catch high.

3.3.3 Grinding/Screening Operation Process Sample Analysis

Samples of fine clay material, which is the product of the grinding/screening process, were collected for sieve and moisture analysis during each day of sampling on the grinding/screening operation. The results of these analyses are summarized in Table 3-4. The moisture content of the finished materials averaged 4.34 percent on November 9 and 3.52 on November 11. The overall average moisture content of the material was 3.93 percent. The silt content of the finished material, corresponding to the amount of material that passes a 200 mesh sieve, averaged 15.6 percent on November 9 and 18.1 percent on November 11. The overall average silt content of the material was 16.9 percent. As would be expected the drier material (sampled November 11) has a higher silt content. The detailed results of the analysis of the process samples are provided in Appendix C.

3.3.4 Kiln Emission Results

Emissions from the kiln were sampled for the following pollutants: metals, speciated VOC, speciated semivolatile organic compounds, inorganic gases (SO_2, NO_x, CO, CO_2), TOC, filterable PM and PM-10, condensible PM, HF, HCl, and Cl_2. The following paragraphs summarize the results of the sampling conducted on the kiln.

3.3.4.1 Metals. Emissions from the kiln stack were sampled using Method 29 for 11 metals: arsenic, beryllium, cadmium, chromium, cobalt, mercury, manganese, nickel, lead, antimony, and selenium. Table 3-5 summarizes the emission rates and emission factors for metal emissions from the kiln, and Table 3-18 summarizes the sampling data and concentrations of metals in the exhaust stream. The results are presented in Table 3-18 as the blank corrected sum of the front and back half fractions for each metal. Arsenic and beryllium were not detected; the other metals were found in trace quantities in the samples. Nickel, chromium, and manganese had the highest emission rates among the metals quantified. For five of the metals (cadmium, cobalt, lead, antimony, and selenium), background concentrations represented a significant portion of the total amounts quantified. The detailed results of the sampling and analysis for metals are provided in Appendix C.

3.3.4.2 Speciated VOC. Emissions samples from the kiln stack were analyzed using Method 0030 (VOST) for 47 VOC, of which 19 were detected in at least two of the three test runs. Table 3-6 summarizes the emission rates and emission factors for speciated VOC emissions from the kiln, and Table 3-19 summarizes the sampling data and concentrations of VOC in the exhaust stream. The results are presented in Table 3-19 as the blank-corrected sum of the Tenax and Tenax/charcoal fractions for one pair of sample traps for each compound for each of the three test runs. It should be noted that the data for chloromethane, bromomethane, iodomethane, methylene chloride, and benzene are considered estimates.

TABLE 3-18. KILN EMISSION TESTS RESULTS--METALS (METRIC UNITS)

Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:30	09:42	15:53	
Finish time	19:15	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	92.7	99.3	99.5	
Sample volume, ACM	2.891	3.724	2.990	
Sample volume, DSCM	2.809	3.594	2.867	
GAS PARAMETERS				
Gas temperature, C	221	221	224	
Oxygen, %	17.6	18.4	17.8	
Carbon dioxide, %	2.2	1	1.7	
Moisture, %	4.4	4.3	4.7	
Velocity, m/min	354	422	339	
Flowrate, ACM/min	1,055	1,259	1,012	
Flowrate, DSCM/min	587	701	557	
MASS COLLECTED, ug (BLANK CORRECTED)				
Arsenic	<1.97	<1.96	<1.97	
Beryllium	<0.034	<0.034	<0.034	
Cadmium (a)	4.06	7.87	1.40	
Chromium	436	2084	544	
Cobalt (a)	6.6	27.2	11.33	
Mercury	21.4	9.66	30.5	
Manganese	53.6	175.2	65.8	
Nickel	215	1136	371	
Lead (a)	12.3	8.77	10.1	
Antimony (a)	3.43	1.92	3.42	
Selenium (a)	39.2	37.2	69.6	
CONCENTRATION, ug/DSCM				Average
Arsenic	ND	ND	ND	
Beryllium	ND	ND	ND	
Cadmium (a)	1.45	2.14	0.49	1.36
Chromium	155	567	190	304
Cobalt (a)	2.35	7.39	3.95	4.56
Mercury	7.63	2.63	10.6	6.97
Manganese	19.1	47.6	22.9	29.9
Nickel	76.5	309	129	172
Lead (a)	4.38	2.38	3.52	3.43
Antimony (a)	1.22	0.522	1.19	0.979
Selenium (a)	14.0	10.1	24.3	16.1

ND = not detected.

(a) Background corrections represent a significant portion of total amounts measured.

TABLE 3-18. KILN EMISSION TESTS RESULTS--METALS (ENGLISH UNITS)

Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:30	09:42	15:53	
Finish time	19:15	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	92.7	99.3	99.5	
Sample, volume, ACF	102.1	131.5	105.6	
Sample volume, DSCF	99.2	126.9	101.3	
GAS PARAMETERS				
Gas temperature, F	429	429	435	
Oxygen, %	17.6	18.4	17.8	
Carbon dioxide, %	2.2	1	1.7	
Moisture, %	4.4	4.3	4.7	
Velocity, ft/min	1,160	1,385	1,113	
Flowrate, ACFM	37,260	44,462	35,729	
Flowrate, DSCFM	20,713	24,738	19,683	
MASS COLLECTED, gr (BLANK CORRECTED)				
Arsenic	<7.2E-05	<7.2E-05	<7.2E-05	
Beryllium	<1.4E-06	<1.4E-06	<1.4E-06	
Cadmium (a)	6.27E-05	0.000121	2.15E-05	
Chromium	0.00673	0.03216	0.00840	
Cobalt (a)	0.000102	0.000420	0.000175	
Mercury	0.000331	0.000149	0.000471	
Manganese	0.00082703	0.00270	0.00101	
Nickel	0.00332	0.0175	0.0057	
Lead (a)	0.000190	0.000135	0.000156	
Antimony (a)	5.29E-05	2.96E-05	5.28E-05	
Selenium (a)	0.000605	0.000574	0.001075	
CONCENTRATION, gr/DSCF				Average
Arsenic	ND	ND	ND	
Beryllium	ND	ND	ND	
Cadmium (a)	6.32E-07	9.35E-07	2.13E-07	5.93E-07
Chromium	6.78E-05	0.00025	8.30E-05	0.00013
Cobalt (a)	1.03E-06	3.23E-06	1.73E-06	1.99E-06
Mercury	3.34E-06	1.15E-06	4.65E-06	3.04E-06
Manganese	8.34E-06	2.08E-05	1.00E-05	1.31E-05
Nickel	3.34E-05	0.00013	5.65E-05	7.49E-05
Lead (a)	1.91E-06	1.04E-06	1.54E-06	1.50E-06
Antimony (a)	5.34E-07	2.28E-07	5.21E-07	4.28E-07
Selenium (a)	6.10E-06	4.42E-06	1.06E-05	7.04E-06

ND = not detected.

(a) Background corrections represent a significant portion of total amounts measured.

TABLE 3-19. KILN EMISSION TESTS RESULTS--SPECIATED VOC (METRIC UNITS)

Run No.	1	2	3
Date	11/11/93	11/11/93	11/11/93
Start time	15:50	16:50	17:45
Finish time	16:10	17:10	18:05
Sample time, min	20	20	20
Sample volume, ACM	0.0200	0.0200	0.0200
Sample volume, DSCM	0.01996	0.02012	0.02017
GAS PARAMETERS			
Gas temperature, C	204	207	209
Oxygen, %	17.6	17.6	17.6
Carbon dioxide, %	2.2	2.2	2.2
Moisture, %	5.5	4.9	4.2
Velocity, m/min	351	321	327
Flowrate, ACM/min	1,048	958.1	975.1
Flowrate, DSCM/min	614.8	541.0	552.0
MASS, ng (BLANK CORRECTED)			
Chloromethane (a)	1475.956	88.518	192.644
Dichlorofluoromethane			
Bromomethane (a)			
Acetonitrile			
Acrylonitrile			
Vinyl chloride			
Chloroethane	1132.853	1.9 (b)	368.637
Iodomethane (a)	159.293	13.875	74.476
Trichlorofluoromethane			
Methylene chloride (a)			
Acetone	993.771	1261.417	2543.338
Carbon disulfide	42.116	51.006	25.523
1,1-Dichloroethene			
1,1-Dichloroethane			
1,2-Dichloroethene (total)			
t-1,2-Dichloroethene			
Chloroform			
1,2-Dichloroethane			
2-Butanone	90.74	216.682	330.505
1,1,1-Trichloroethane	7.106	0.650 (b)	4.913
Carbon tetrachloride			
Vinyl acetate			
Bromodichloromethane			
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Trichloroethene			
2-Chloroethyl vinyl ether			

TABLE 3-19 (continued)
(METRIC UNITS)

Dibromochloromethane				
Dibromomethane				
Dibromoethane				
1,1,2-Trichloroethane				
1,4-Dichloro-2-butene				
Benzene (d)	2522.718	4337.655	1184.394	
trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-Pentanone				
2-Hexanone	2.6	145.766	98.485	
Tetrachloroethene	0.40 (b)	3.65	3.944	
1,1,2,2-Tetrachloroethane				
Toluene	103.442	159.558	176.358	
Chlorobenzene				
Ethylbenzene	30.577	41.073	52.656	
Styrene	9.654	46.172	2.492	
m-/p-Xylene	46.992	64.574	77.281	
o-Xylene	39.935	58.095	66.438	
Hexachloroethane				
1,2-Dibromo-3-chloropropane				
CONCENTRATION, ug/DSCM				Average
Chloromethane (a)	73.93	4.40	9.55	29.29
Dichlorofluoromethane				
Bromomethane (a)				
Acetonitrile				
Acrylonitrile				
Vinyl chloride				
Chloroethane	56.74	0.094 (b)	18.28	25.04
Iodomethane (a)	7.98	0.690	3.69	4.12
Trichlorofluoromethane				
Methylene chloride (a)				
Acetone	49.78	62.70	126.10	79.53
Carbon disulfide	2.11	2.54	1.27	1.97
1,1-Dichloroethene				
1,1-Dichloroethane				
1,2-Dichloroethene (total)				
t-1,2-Dichloroethene				
Chloroform				
1,2-Dichloroethane				
2-Butanone	4.55	10.77	16.39	10.57
1,1,1-Trichloroethane	0.356	0.0323 (b)	0.244	0.211
Carbon tetrachloride				
Vinyl acetate				
Bromodichloromethane				

TABLE 3-19 (continued).
(METRIC UNITS)

1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Trichloroethene				
2-Chloroethyl vinyl ether				
Dibromochloromethane				
Dibromomethane				
Dibromoethane				
1,1,2-Trichloroethane				
1,4-Dichloro-2-butene				
Benzene (c)	126.36	215.60	58.72	133.56
trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-Pentanone				
2-Hexanone	0.130	7.25	4.88	4.09
Tetrachloroethene	0.020 (b)	0.181	0.196	0.132
1,1,2,2-Tetrachloroethane				
Toluene	5.18	7.93	8.74	7.29
Chlorobenzene				
Ethylbenzene	1.53	2.04	2.61	2.06
Styrene	0.484	2.29	0.124	0.967
m-/p-Xylene	2.35	3.21	3.83	3.13
o-Xylene	2.00	2.89	3.29	2.73
Hexachloroethane				
1,2-Dbromo-3-chloropropane				

(a) Estimated for all runs.
(b) Based on one-half detection limit.
(c) Minimum concentration; sample concentrations exceeded calibration range of instrument.

TABLE 3-19. KILN EMISSION TESTS RESULTS--SPECIATED VOC (ENGLISH UNITS)

Run No.	1	2	3
Date	11/11/93	11/11/93	11/11/93
Start time	15:50	16:50	17:45
Finish time	16:10	17:10	18:05
Sample time, min	20	20	20
Sample volume, ACF	0.7063	0.7063	0.7063
Sample volume, DSCF	0.7050	0.7105	0.7122
GAS PARAMETERS			
Gas temperature, F	400	405	409
Oxygen, %	17.6	17.6	17.6
Carbon dioxide, %	2.2	2.2	2.2
Moisture, %	5.5	4.9	4.2
Velocity, ft/min	1,152	1,054	1,072
Flowrate, ACFM	37,001	33,836	34,435
Flowrate, DSCFM	21,711	19,104	19,493
MASS, gr (BLANK CORRECTED)			
Chloromethane (a)	2.28E-05	1.37E-06	2.97E-06
Dichlorofluoromethane			
Bromomethane (a)			
Acetonitrile			
Acrylonitrile			
Vinyl chloride			
Chloroethane	1.75E-05	2.93E-08 (b)	5.69E-06
Iodomethane (a)	2.46E-06	2.14E-07	1.15E-06
Trichlorofluoromethane			
Methylene chloride (a)			
Acetone	1.53E-05	1.95E-05	3.92E-05
Carbon disulfide	6.50E-07	7.87E-07	3.94E-07
1,1-Dichloroethene			
1,1-Dichloroethane			
1,2-Dichloroethene (total)			
t-1,2-Dichloroethene			
Chloroform			
1,2-Dichloroethane			
2-Butanone	1.40E-06	3.34E-06	5.10E-06
1,1,1-Trichloroethane	1.10E-07	1.00E-08 (b)	7.58E-08
Carbon tetrachloride			
Vinyl acetate			
Bromodichloromethane			
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Trichloroethene			
2-Chloroethyl vinyl ether			

TABLE 3-19 (continued).
(ENGLISH UNITS)

Dibromochloromethane				
Dibromomethane				
Dibromoethane				
1,1,2-Trichloroethane				
1,4-Dichloro-2-butene				
Benzene (c)	3.89E-05	6.69E-05	1.83E-05	
trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-Pentanone				
2-Hexanone	4.01E-08	2.25E-06	1.52E-06	
Tetrachloroethene	6.17E-09 (b)	5.63E-08	6.09E-08	
1,1,2,2-Tetrachloroethane				
Toluene	1.60E-06	2.46E-06	2.72E-06	
Chlorobenzene				
Ethylbenzene	4.72E-07	6.34E-07	8.13E-07	
Styrene	1.49E-07	7.13E-07	3.85E-08	
m-/p-Xylene	7.25E-07	9.97E-07	1.19E-06	
o-Xylene	6.16E-07	8.97E-07	1.03E-06	
Hexachloroethane				
1,2-Dbromo-3-chloropropane				
CONCENTRATION, gr/DSCF				Average
Chloromethane (a)	3.23E-05	1.92E-06	4.17E-06	1.28E-05
Dichlorofluoromethane				
Bromomethane (a)				
Acetonitrile				
Acrylonitrile				
Vinyl chloride				
Chloroethane	2.48E-05	4.13E-08 (b)	7.99E-06	1.09E-05
Iodomethane (a)	3.49E-06	3.01E-07	1.61E-06	1.80E-06
Trichlorofluoromethane				
Methylene chloride (a)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetone	2.18E-05	2.74E-05	5.51E-05	3.48E-05
Carbon disulfide	9.22E-07	1.11E-06	5.53E-07	8.61E-07
1,1-Dichloroethene				
1,1-Dichloroethane				
1,2-Dichloroethene (total)				
t-1,2-Dichloroethene				
Chloroform				
1,2-Dichloroethane				
2-Butanone	1.99E-06	4.71E-06	7.16E-06	4.62E-06
1,1,1-Trichloroethane	1.56E-07	1.41E-08 (b)	1.06E-07	9.20E-08
Carbon tetrachloride				
Vinyl acetate				
Bromodichloromethane				

TABLE 3-19 (continued).
(ENGLISH UNITS)

1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Trichloroethene				
2-Chloroethyl vinyl ether				
Dibromochloromethane				
Dibromomethane				
Dibromoethane				
1,1,2-Trichloroethane				
1,4-Dichloro-2-butene				
Benzene (c)	5.52E-05	9.42E-05	2.57E-05	5.84E-05
trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-Pentanone				
2-Hexanone	5.69E-08	3.17E-06	2.13E-06	1.79E-06
Tetrachloroethene	8.76E-09 (b)	7.93E-08	8.55E-08	5.78E-08
1,1,2,2-Tetrachloroethane				
Toluene	2.26E-06	3.47E-06	3.82E-06	3.18E-06
Chlorobenzene				
Ethylbenzene	6.69E-07	8.92E-07	1.14E-06	9.01E-07
Styrene	2.11E-07	1.00E-06	5.40E-08	4.23E-07
m-/p-Xylene	1.03E-06	1.40E-06	1.67E-06	1.37E-06
o-Xylene	8.74E-07	1.26E-06	1.44E-06	1.19E-06
Hexachloroethane				
1,2-Dibromo-3-chloropropane				

(a) Estimated for all runs.
(b) Based on one-half detection limit.
(c) Minimum concentration; sample concentrations exceeded calibration range of instrument.

The results of the analysis for these compounds are discussed in Section 5.3 of this report. The detailed results of the sampling and analysis for VOC are provided in Appendix C. The results reported in Tables 3-6 and 3-19 are only for those compounds that were detected on at least two of the three test runs. In such cases, the mass collected was assumed to be one-half the detection limit for those compounds. In addition, a few compounds were detected in the Tenax trap only in one run, for the Tenax/charcoal trap only in another run, and in neither trap in the remaining run. Those compounds also are not reported in Tables 3-6 and 3-19. Appendix C, Section 4.5 includes tables listing the detection limits, and the raw and blank-corrected data for the Tenax and Tenax/charcoal traps for each of the VOST runs.

3.3.4.3 Semivolatile organic compounds. Emissions samples from the kiln stack were analyzed using Method 0010 (semi-VOST) for 72 semivolatile organic compounds, of which 8 were detected in at least two of the three test runs. Table 3-7 summarizes the emission rates and emission factors for speciated semivolatile organic compound emissions from the kiln, and Table 3-20 summarizes the sampling data and concentrations of these compounds in the exhaust stream. The detailed results of the sampling and analysis for semivolatile compounds are provided in Appendix C.

3.3.4.4 Inorganic gases. Kiln emissions were monitored continuously for SO_2, NO_x, CO, and CO_2. Table 3-8 summarizes the emission rates, and emission factors for emissions of these compounds and Table 3-21 summarizes the sampling data and concentrations of these compounds in the exhaust stream. The detailed results of the sampling and analysis are provided in Appendix C.

Emissions of SO_2 were monitored using Method 6C. The concentrations of SO_2 in the kiln exhaust ranged from 39 to 61 ppm and averaged 53 ppm. The average emission rate and emission factors for SO_2 emissions were determined to be 4.8 kg/hr (11 lb/hr) and 1.5 kg/Mg (3.0 lb/ton).

Emissions of NO_x were monitored using Method 7E. The concentrations of NO_x in the kiln exhaust ranged from 16 to 26 ppm and averaged 22 ppm. The average emission rate and emission factors for NO_x emissions were determined to be 1.4 kg/hr (3.2 lb/hr) and 0.45 kg/Mg (0.91 lb/ton).

Emissions of CO were monitored using Method 10. The concentrations of CO in the kiln exhaust ranged from 42 to 49 ppm and averaged 45 ppm. The average emission rate and emission factors for CO emissions were determined to be 1.8 kg/hr (4.0 lb/hr) and 0.57 kg/Mg (1.1 lb/ton).

Emissions of CO_2 were monitored using Method 3A. The concentrations of CO_2 in the kiln exhaust ranged from 1.9 to 2.0 percent and averaged 2.0 percent. The average emission rate and emission factors for CO_2 emissions were determined to be 1,200 kg/hr (2,700 lb/hr) and 390 kg/Mg (770 lb/ton).

TABLE 3-20. KILN EMISSION TEST RESULTS--SEMIVOLATILES (METRIC UNITS)

Run No.	1	2	3
Date	11/09/93	11/10/93	11/10/93
Start time	14:30	09:42	15:53
Finish time	19:15	13:57	19:47
Sample time, min	175	175	175
% isokinetic	94.8	100.5	100.5
Sample volume, ACM	3.004	2.966	3.294
Sample volume, DSCM	2.891	2.844	3.136
GAS PARAMETERS			
Gas temperature, C	223	220	220
Oxygen, %	17.8	18.8	17.8
Carbon dioxide, %	2.2	1.8	2.2
Moisture, %	4.3	4.3	4.8
Velocity, m/min	354	329	366
Flowrate, ACMM	1,055	982.8	1,091
Flowrate, DSCMM	584.3	547.2	598.0
MASS COLLECTED, ug			
Phenol	13	13	8.7
Aniline	<2	<2	<2
Bis(2-chloroethyl)ether	<2	<2	<2
2-Chlorophenol	<2	<2	<2
1,3-Dichlorobenzene	<2	<2	<2
1,4-Dichlorobenzene	4.8	4.9	9.7
Benzyl alcohol	<2	<2	<2
1,2-Dichlorobenzene	<2	<2	<2
2-Methylphenol	2.1	<2	<2
2,2'-oxybis(1-Chloropropane)	<2	<2	<2
4-Methylphenol	<2	<2	<2
N-Nitrosodipropylamine	<2	<2	<2
Hexachloroethane	<2	<2	<2
Nitrobenzene	<2	<2	<2
Isophorone	<2	<2	<2
2-Nitrophenol	<2	<2	<2
2,4-Dimethylphenol	<2	<2	<2
Benzoic acid	<2	<2	623
Bis(2-chloroethoxy)methane	<2	<2	<2
2-Chloroacetophenone	<2	<2	<2
2,4-Dichlorophenol	<2	<2	<2
1,2,4-Trichlorobenzene	<2	<2	<2
Naphthalene (a)	6	12	8.5
4-Chloroaniline	<2	<2	<2
2,6-Dichlorophenol	<2	<2	<2
Hexachlorobutadiene	<2	<2	<2
4-Chloro-3-methylphenol	<2	<2	<2
2-Hydroxyacetophenone	<2	<2	<2

TABLE 3-20. (continued)
(METRIC UNITS)

MASS COLLECTED, ug			
2-Methylnaphthalene	4.8	11	7.4
Hexachlorocyclopentadiene	<2	<2	<2
2,4,6-Trichlorophenol	<2	<2	<2
2,4,5-Trichlorophenol	<2	<2	<2
2-Chloronaphthalene	<2	<2	<2
2-Nitroaniline	<2	<2	<2
Dimethylphthalate	<2	<2	<2
Acenaphthylene	<2	<2	<2
2,6-Dinitrotoluene	<2	<2	<2
2,3,4,6-Tetrachlorophenone	<2	<2	<2
3-Nitroaniline	<2	<2	<2
Acenaphthene	<2	<2	<2
2,4-Dinitrophenol	<2	<2	<2
4-Nitrophenol	<2	<2	<2
Dibenzofuran	<2	<2	<2
2,4-Dinitrotoluene	<2	<2	<2
Diethyl phthalate	53	23	18
4-Chlorophenylphenyl ether	<2	<2	<2
Fluorene	<2	<2	<2
4-Nitroaniline	<2	<2	<2
4,6-Dinitro-2-methylphenol	<2	<2	<2
N-Nitrosodiphenylamine	<2	<2	<2
4-Bromophenyl-phenylether	<2	<2	<2
Hexachlorobenzene	<2	<2	<2
Pentachlorophenol	<2	<2	<2
Phenanthrene	<2	<2	<2
Anthracene	<2	<2	<2
Carbazole	<2	<2	<2
Di-n-butyl phthalate	13	14	31
Fluoranthene	<2	<2	<2
Benzidine	<2	<2	<2
Pyrene	<2	<2	<2
Butylbenzyl phthalate	2	2.2	3
3,3'-Dichlorobenzidine	<2	<2	<2
Benzo(a)anthracene	<2	<2	<2
Chrysene	<2	<2	<2
Bis(2-ethylhexyl) phthalate (b)	77	240	510
Di-n-octyl phthalate	<2	<2	10
Benzo(b)fluoranthene	<2	<2	<2
Benzo(k)fluoroanthene	<2	<2	<2
Benzo(a)pyrene	<2	<2	<2
Indeno(1,2,3-cd)pyrene	<2	<2	<2
Dibenz(a,h)anthracene	<2	<2	<2
Benzo(g,h,i)perylene	<2	<2	<2

TABLE 3-20. (continued)
(METRIC UNITS)

CONCENTRATION, ug/DSCM				Ave.
Phenol	4.50	4.57	2.77	3.95
Aniline				
Bis(2-chloroethyl)ether				
2-Chlorophenol				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene	1.66	1.72	3.09	2.16
Benzyl alcohol				
1,2-Dichlorobenzene				
2-Methylphenol	0.726			
2,2'-oxybis(1-Chloropropane)				
4-Methylphenol				
N-Nitrosodipropylamine				
Hexachloroethane				
Nitrobenzene				
Isophorone				
2-Nitrophenol				
2,4-Dimethylphenol				
Benzoic acid			199	
Bis(2-chloroethoxy)methane				
2-Chloroacetophenone				
2,4-Dichlorophenol				
1,2,4-Trichlorobenzene				
Naphthalene (a)	2.08	4.22	2.71	3.00
4-Chloroaniline				
2,6-Dichlorophenol				
Hexachlorobutadiene				
4-Chloro-3-methylphenol				
2-Hydroxyacetophenone				
2-Methylnaphthalene	1.66	3.87	2.36	2.63
Hexachlorocyclopentadiene				
2,4,6-Trichlorophenol				
2,4,5-Trichlorophenol				
2-Chloronaphthalene				
2-Nitroaniline				
Dimethylphthalate				
Acenaphthylene				
2,6-Dinitrotoluene				
2,3,4,6-Tetrachlorophenone				
3-Nitroaniline				
Acenaphthene				
2,4-Dinitrophenol				
4-Nitrophenol				
Dibenzofuran				

TABLE 3-20. (continued)
(METRIC UNITS)

CONCENTRATION, ug/DSCM				Ave.
2,4-Dinitrotoluene				
Diethyl phthalate	18.3	8.09	5.74	10.7
4-Chlorophenylphenyl ether				
Fluorene				
4-Nitroaniline				
4,6-Dinitro-2-methylphenol				
N-Nitrosodiphenylamine				
4-Bromophenyl-phenylether				
Hexachlorobenzene				
Pentachlorophenol				
Phenanthrene				
Anthracene				
Carbazole				
Di-n-butyl phthalate	4.50	4.92	9.88	6.43
Fluoranthene				
Benzidine				
Pyrene				
Butylbenzyl phthalate	0.692	0.774	0.957	0.807
3,3'-Dichlorobenzidine				
Benzo(a)anthracene				
Chrysene				
Bis(2-ethylhexyl) phthalate (b)	26.6	84.4	162.6	91.2
Di-n-octyl phthalate			3.2	
Benzo(b)fluoranthene				
Benzo(k)fluoroanthene				
Benzo(a)pyrene				
Indeno(1,2,3-cd)pyrene				
Dibenz(a,h)anthracene				
Benzo(g,h,i)perylene				

(a) Naphthalene found in method blank at 25 to 50 percent of sample level.

(b) Bis(2-ethylhexyl) phthalate found in method blank at 3 to 22 percent of sample level.

TABLE 3-20. KILN EMISSION TEST RESULTS--SEMIVOLATILES (ENGLISH UNITS)

Run No.	1	2	3
Date	11/09/93	11/10/93	11/10/93
Start time	14:30	09:42	15:53
Finish time	19:15	13:57	19:47
Sample time, min	175	175	175
% isokinetic	94.8	100.5	100.5
Sample volume, ACF	106.077	104.759	116.333
Sample volume, DSCF	102.084	100.421	110.755
GAS PARAMETERS			
Gas temperature, F	433	428	428
Oxygen, %	17.8	18.8	17.8
Carbon dioxide, %	2.2	1.8	2.2
Moisture, %	4.3	4.3	4.8
Flowrate, ACFM	37,260	34,708	38,537
Flowrate, DSCFM	20,635	19,325	21,118
MASS COLLECTED, gr			
Phenol	2.01E-04	2.01E-04	1.34E-04
Aniline	<3.1E-05	<3.1E-05	<3.1E-05
Bis(2-chloroethyl)ether	<3.1E-05	<3.1E-05	<3.1E-05
2-Chlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
1,3-Dichlorobenzene	<3.1E-05	<3.1E-05	<3.1E-05
1,4-Dichlorobenzene	7.41E-05	7.56E-05	1.50E-04
Benzyl alcohol	<3.1E-05	<3.1E-05	<3.1E-05
1,2-Dichlorobenzene	<3.1E-05	<3.1E-05	<3.1E-05
2-Methylphenol	3.24E-05	<3.1E-05	<3.1E-05
2,2'-oxybis(1-Chloropropane)	<3.1E-05	<3.1E-05	<3.1E-05
4-Methylphenol	<3.1E-05	<3.1E-05	<3.1E-05
N-Nitrosodipropylamine	<3.1E-05	<3.1E-05	<3.1E-05
Hexachloroethane	<3.1E-05	<3.1E-05	<3.1E-05
Nitrobenzene	<3.1E-05	<3.1E-05	<3.1E-05
Isophorone	<3.1E-05	<3.1E-05	<3.1E-05
2-Nitrophenol	<3.1E-05	<3.1E-05	<3.1E-05
2,4-Dimethylphenol	<3.1E-05	<3.1E-05	<3.1E-05
Benzoic acid	<3.1E-05	<3.1E-05	0.00961
Bis(2-chloroethoxy)methane	<3.1E-05	<3.1E-05	<3.1E-05
2-Chloroacetophenone	<3.1E-05	<3.1E-05	<3.1E-05
2,4-Dichlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
1,2,4-Trichlorobenzene	<3.1E-05	<3.1E-05	<3.1E-05
Naphthalene (a)	9.26E-05	0.000185	0.000131
4-Chloroaniline	<3.1E-05	<3.1E-05	<3.1E-05
2,6-Dichlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
Hexachlorobutadiene	<3.1E-05	<3.1E-05	<3.1E-05
4-Chloro-3-methylphenol	<3.1E-05	<3.1E-05	<3.1E-05
2-Hydroxyacetophenone	<3.1E-05	<3.1E-05	<3.1E-05

TABLE 3-20. (continued)
(ENGLISH UNITS)

MASS COLLECTED, gr			
2-Methylnaphthalene	7.41E-05	0.00017	0.00011
Hexachlorocyclopentadiene	<3.1E-05	<3.1E-05	<3.1E-05
2,4,6-Trichlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
2,4,5-Trichlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
2-Chloronaphthalene	<3.1E-05	<3.1E-05	<3.1E-05
2-Nitroaniline	<3.1E-05	<3.1E-05	<3.1E-05
Dimethylphthalate	<3.1E-05	<3.1E-05	<3.1E-05
Acenaphthylene	<3.1E-05	<3.1E-05	<3.1E-05
2,6-Dinitrotoluene	<3.1E-05	<3.1E-05	<3.1E-05
2,3,4,6-Tetrachlorophenone	<3.1E-05	<3.1E-05	<3.1E-05
3-Nitroaniline	<3.1E-05	<3.1E-05	<3.1E-05
Acenaphthene	<3.1E-05	<3.1E-05	<3.1E-05
2,4-Dinitrophenol	<3.1E-05	<3.1E-05	<3.1E-05
4-Nitrophenol	<3.1E-05	<3.1E-05	<3.1E-05
Dibenzofuran	<3.1E-05	<3.1E-05	<3.1E-05
2,4-Dinitrotoluene	<3.1E-05	<3.1E-05	<3.1E-05
Diethyl phthalate	0.000818	0.000355	0.000278
4-Chlorophenylphenyl ether	<3.1E-05	<3.1E-05	<3.1E-05
Fluorene	<3.1E-05	<3.1E-05	<3.1E-05
4-Nitroaniline	<3.1E-05	<3.1E-05	<3.1E-05
4,6-Dinitro-2-methylphenol	<3.1E-05	<3.1E-05	<3.1E-05
N-Nitrosodiphenylamine	<3.1E-05	<3.1E-05	<3.1E-05
4-Bromophenyl-phenylether	<3.1E-05	<3.1E-05	<3.1E-05
Hexachlorobenzene	<3.1E-05	<3.1E-05	<3.1E-05
Pentachlorophenol	<3.1E-05	<3.1E-05	<3.1E-05
Phenanthrene	<3.1E-05	<3.1E-05	<3.1E-05
Anthracene	<3.1E-05	<3.1E-05	<3.1E-05
Carbazole	<3.1E-05	<3.1E-05	<3.1E-05
Di-n-butyl phthalate	0.000201	0.000216	0.000478
Fluoranthene	<3.1E-05	<3.1E-05	<3.1E-05
Benzidine	<3.1E-05	<3.1E-05	<3.1E-05
Pyrene	<3.1E-05	<3.1E-05	<3.1E-05
Butylbenzyl phthalate	3.09E-05	3.40E-05	4.63E-05
3,3'-Dichlorobenzidine	<3.1E-05	<3.1E-05	<3.1E-05
Benzo(a)anthracene	<3.1E-05	<3.1E-05	<3.1E-05
Chrysene	<3.1E-05	<3.1E-05	<3.1E-05
Bis(2-ethylhexyl) phthalate (b)	0.00119	0.00370	0.00787
Di-n-octyl phthalate	<3.1E-05	<3.1E-05	0.00015
Benzo(b)fluoranthene	<3.1E-05	<3.1E-05	<3.1E-05
Benzo(k)fluoroanthene	<3.1E-05	<3.1E-05	<3.1E-05
Benzo(a)pyrene	<3.1E-05	<3.1E-05	<3.1E-05
Indeno(1,2,3-cd)pyrene	<3.1E-05	<3.1E-05	<3.1E-05
Dibenz(a,h)anthracene	<3.1E-05	<3.1E-05	<3.1E-05
Benzo(g,h,i)perylene	<3.1E-05	<3.1E-05	<3.1E-05

TABLE 3-20. (continued)
(ENGLISH UNITS)

CONCENTRATION, gr/DSCF				Ave.
Phenol	1.97E-06	2.00E-06	1.21E-06	1.73E-06
Aniline				
Bis(2-chloroethyl)ether				
2-Chlorophenol				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene	7.26E-07	7.53E-07	1.35E-06	9.43E-07
Benzyl alcohol				
1,2-Dichlorobenzene				
2-Methylphenol	3.17E-07			
2,2'-oxybis(1-Chloropropane)				
4-Methylphenol				
N-Nitrosodipropylamine				
Hexachloroethane				
Nitrobenzene				
Isophorone				
2-Nitrophenol				
2,4-Dimethylphenol				
Benzoic acid			8.68E-05	
Bis(2-chloroethoxy)methane				
2-Chloroacetophenone				
2,4-Dichlorophenol				
1,2,4-Trichlorobenzene				
Naphthalene (a)	9.07E-07	1.84E-06	1.18E-06	1.31E-06
4-Chloroaniline				
2,6-Dichlorophenol				
Hexachlorobutadiene				
4-Chloro-3-methylphenol				
2-Hydroxyacetophenone				
2-Methylnaphthalene	7.26E-07	1.69E-06	1.03E-06	1.15E-06
Hexachlorocyclopentadiene				
2,4,6-Trichlorophenol				
2,4,5-Trichlorophenol				
2-Chloronaphthalene				
2-Nitroaniline				
Dimethylphthalate				
Acenaphthylene				
2,6-Dinitrotoluene				
2,3,4,6-Tetrachlorophenone				
3-Nitroaniline				
Acenaphthene				
2,4-Dinitrophenol				
4-Nitrophenol				
Dibenzofuran				

TABLE 3-20. (continued)
(ENGLISH UNITS)

CONCENTRATION, gr/DSCF				Ave.
2,4-Dinitrotoluene				
Diethyl phthalate	8.01E-06	3.53E-06	2.51E-06	4.68E-06
4-Chlorophenylphenyl ether				
Fluorene				
4-Nitroaniline				
4,6-Dinitro-2-methylphenol				
N-Nitrosodiphenylamine				
4-Bromophenyl-phenylether				
Hexachlorobenzene				
Pentachlorophenol				
Phenanthrene				
Anthracene				
Carbazole				
Di-n-butyl phthalate	1.97E-06	2.15E-06	4.32E-06	2.81E-06
Fluoranthene				
Benzidine				
Pyrene				
Butylbenzyl phthalate	3.02E-07	3.38E-07	4.18E-07	3.53E-07
3,3'-Dichlorobenzidine				
Benzo(a)anthracene				
Chrysene				
Bis(2-ethylhexyl) phthalate (b)	1.16E-05	3.69E-05	7.11E-05	3.99E-05
Di-n-octyl phthalate			1.4E-06	
Benzo(b)fluoranthene				
Benzo(k)fluoroanthene				
Benzo(a)pyrene				
Indeno(1,2,3-cd)pyrene				
Dibenz(a,h)anthracene				
Benzo(g,h,i)perylene				

(a) Naphthalene found in method blank at 25 to 50 percent of sample level.

(b) Bis(2-ethylhexyl) phthalate found in method blank at 3 to 22 percent of sample level.

TABLE 3-21. KILN EMISSION TESTS RESULTS--INORGANIC GASES (METRIC UNITS)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time, min	121	120	120	
GAS PARAMETERS				
Gas temperature, C	193	204	209	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, m/min	351	321	327	
Flowrate, ACMM	1,048	958.1	975.1	
Flowrate, DSCMM	614.8	541.0	552.0	
CONCENTRATION, ppm (a)				Average
SO2	39.1	60.5	59.0	52.9
NOx	15.8	25.7	25.0	22.2
CO	44.5	49.0	41.9	45.1
CO2 (b)	1.9	2.0	1.9	2.0

(a) Based on average of 120 one-minute readings.

(b) Concentration in percent.

TABLE 3-21. KILN EMISSION TESTS RESULTS--INORGANIC GASES (ENGLISH UNITS)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time, min	121	120	120	
GAS PARAMETERS				
Gas temperature, F	380	400	409	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, ft/min	1,152	1,054	1,072	
Flowrate, ACFM	37,001	33,836	34,435	
Flowrate, DSCFM	21,711	19,104	19,493	
CONCENTRATION, ppm (a)				Average
SO2	39.1	60.5	59.0	52.9
NOx	15.8	25.7	25.0	22.2
CO	44.5	49.0	41.9	45.1
CO2 (b)	1.9	2.0	1.9	2.0

(a) Based on average of 120 one-minute readings.

(b) Concentration in percent.

3.3.4.5 TOC, methane, and ethane. Kiln emissions were monitored continuously for TOC emissions and semicontinuously for emissions of methane and ethane. Table 3-8 summarizes the emission rates and emission factors for emissions of these gases from the kiln, and Table 3-22 summarizes the sampling data and concentrations of these gases in the exhaust stream.

Emissions of TOC were monitored using Method 25A. The concentrations of TOC in the kiln exhaust ranged from 1.3 to 2.5 ppm and averaged 2.0 ppm as propane. When converted to a methane basis, the TOC concentrations ranged from 3.8 to 7.5 ppm and averaged 5.9 ppm. The average emission rate and emission factors for TOC emissions were determined to be 0.13 kg/hr (0.28 lb/hr) and 0.041 kg/Mg (0.081 lb/ton) as methane. The as-methane results are reported in Tables 3-8 and 3-22. These data indicate that essentially all TOC emissions measured from the kiln were methane.

Emissions of methane and ethane were measured using Method 18. Ethane was not detected in the exhaust stream; the emission rates and emission factors for methane emissions from the kiln are presented in Table 3-8. Table 3-22 summarizes the sampling data and concentrations of methane in the exhaust stream. Methane averaged 5.8 ppm and the average emission rate and emission factor for methane emissions from the kiln were 0.13 kg/hr (0.29 lb/hr) and 0.042 kg/Mg (0.084 lb/ton), respectively.

3.3.4.6 Filterable PM, filterable PM-10, and condensible PM. Emissions from the kiln were sampled for filterable PM using three sampling trains, filterable PM-10, and condensible PM. Table 3-9 summarizes the emission rates and emission factors for PM emissions from the kiln, and Table 3-23 summarizes the sampling data and concentrations of PM in the exhaust stream. The detailed results of the sampling and analysis for these pollutants are provided in Appendix C.

Emissions of filterable PM were measured in conjunction with the Method 26A sampling train (HF, HCl, and Cl_2). The front half of the Method 29 sampling train (metals) also was analyzed for filterable PM. Methods 26A and 29 were run simultaneously on November 9-10. Finally, filterable PM was measured in conjunction with the Method 201A PM-10 train; Method 201A runs were conducted on November 11. The average emission rates for the three runs of each sampling train were consistent; for the Method 26A train, filterable PM emissions averaged 0.66 kg/hr (1.4 lb/hr); for the Method 29 train, the average filterable PM emission rate was determined to be 0.74 kg/hr (1.6 lb/hr); and for the Method 201A sampling train, the average filterable PM emission rate was 0.48 kg/hr (1.1 lb/hr). The average emission factors for filterable PM emission as measured by the same three sampling trains were 0.21 kg/Mg (0.42 lb/ton), 0.23 kg/Mg (0.47 lb/ton), and 0.15 kg/Mg (0.30 lb/ton), respectively.

Filterable PM-10 and condensible PM emissions were measured using a combination Method 201A/202 sampling train. Table 3-9 summarizes the emission rates and emission factors for these compounds, and Table 3-23 summarizes the sampling data and concentrations of these compounds in the exhaust stream. The average emission rates for

TABLE 3-22. KILN EMISSION TESTS RESULTS--TOC, METHANE/ETHANE (METRIC UNITS)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time, min	121	120	120	
GAS PARAMETERS				
Gas temperature, C	193	204	209	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, m/min	351	321	327	
Flowrate, ACM/min	1,048	958.1	975.1	
Flowrate, DSCM/min	614.8	541.0	552.0	
CONCENTRATION, ppm				Average
TOC, as propane (a)	2.1	1.3	2.5	2.0
TOC, as methane (a)	6.2	3.8	7.5	5.9
Methane (b)	6.8	5.3	5.1	5.8
Ethane	<3	<3	<3	

(a) Based on average of 120 one-minute readings.

(b) Runs 1 and 2 based on average of 2 readings; run 3 based on average of 5 readings; corrected to dry basis.

TABLE 3-22. KILN EMISSION TESTS RESULTS--TOC, METHANE/ETHANE (ENGLISH UNITS)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time, min	121	120	120	
GAS PARAMETERS				
Gas temperature, F	380	400	409	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, ft/min	1,152	1,054	1,072	
Flowrate, ACFM	37,001	33,836	34,435	
Flowrate, DSCFM	21,711	19,104	19,493	
CONCENTRATION, ppm				Average
TOC, as propane (a)	2.1	1.3	2.5	2.0
TOC, as methane (a)	6.2	3.8	7.5	5.9
Methane (b)	6.8	5.3	5.1	5.8
Ethane	<3	<3	<3	

(a) Based on average of 120 one-minute readings.

(b) Runs 1 and 2 based on average of 2 readings; run 3 based on average of 5 readings; corrected to dry basis.

TABLE 3-23. KILN EMISSION TESTS RESULTS--PM, PM-10, CONDENSIBLE PM (METRIC UNITS)

Method 26A train				
Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:07	09:42	15:53	
Finish time	19:17	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	78.3	100.8	100.5	
Sample volume, ACM	2.439	3.092	2.995	
Sample volume, DSCM	2.338	2.955	2.835	
GAS PARAMETERS				
Gas temperature, C	224	222	227	
Oxygen, %	17.8	18.8	18	
Carbon dioxide, %	1.1	1.8	2	
Moisture, %	4.4	4.6	4.7	
Velocity, m/min	349	344	334	
Flowrate, ACM/min	1,042	1,026	998	
Flowrate, DSCM/min	575.0	567.4	545.6	
MASS COLLECTED, g				
Filterable PM	0.0496	0.0473	0.0600	
CONCENTRATION, g/DSCM				Average
Filterable PM	0.0212	0.0160	0.0212	0.0195

Method 29 train				
Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:30	09:42	15:53	
Finish time	19:15	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	92.7	99.3	99.5	
Sample volume, ACM	2.891	3.724	2.990	
Sample volume, DSCM	2.809	3.594	2.867	
GAS PARAMETERS				
Gas temperature, C	221	221	224	
Oxygen, %	17.6	18.4	17.8	
Carbon dioxide, %	2.2	1	1.7	
Moisture, %	4.4	4.3	4.7	
Velocity, m/min	354	422	339	
Flowrate, ACM/min	1,055	1,259	1,012	
Flowrate, DSCM/min	587	701	557	
MASS COLLECTED, g				
Filterable PM	0.0537	0.0430	0.0886	
CONCENTRATION, g/DSCM				Average
Filterable PM	0.0191	0.0120	0.0309	0.0207

TABLE 3-23 (continued)
(METRIC UNITS)

Method 201A/202 train				
Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:55	14:59	17:07	
Finish time	12:27	16:42	18:39	
Sample time, min	90	90	90	
% isokinetic	106.8	99	97.4	
Sample volume, ACM	1.212	1.234	1.247	
Sample volume, DSCM	1.174	1.183	1.187	
GAS PARAMETERS				
Gas temperature, C	193	204	209	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, m/min	351.1	321.3	326.7	
Flowrate, ACM/min	1,048	958.1	975.1	
Flowrate, DSCM/min	614.8	541.0	552.0	
MASS COLLECTED, g				
Filterable PM	0.0177	0.0188	0.0127	
Filterable PM-10	0.0033	0.0147	0.0047	
Cond. inorganic PM	0.167	0.183	0.162	
Cond. organic PM	0.0548	0.0153	0.0104	
Total cond. PM	0.222	0.199	0.172	
CONCENTRATION, g/DSCM				Average
Filterable PM	0.0151	0.0159	0.0107	0.0139
Filterable PM-10	0.00281	0.01243	0.00396	0.00640
Cond. inorganic PM	0.142	0.155	0.136	0.144
Cond. organic PM	0.0467	0.0129	0.0088	0.0228
Total cond. PM	0.189	0.168	0.145	0.167

TABLE 3-23. KILN EMISSION TESTS RESULTS--PM, PM-10, CONDENSIBLE PM (ENGLISH UNITS)

Method 26A train				
Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:07	09:42	15:53	
Finish time	19:17	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	78.3	100.8	100.5	
Sample volume, ACF	86.15	109.20	105.78	
Sample volume, DSCF	82.57	104.34	100.10	
GAS PARAMETERS				
Gas temperature, F	436	431	440	
Oxygen, %	17.8	18.8	18.0	
Carbon dioxide, %	1.1	1.8	2.0	
Moisture, %	4.4	4.6	4.7	
Velocity, ft/min	1,146	1,128	1,097	
Flowrate, ACFM	36,805	36,230	35,241	
Flowrate, DSCFM	20,307	20,036	19,269	
MASS COLLECTED, gr				
Filterable PM	0.765	0.730	0.926	
CONCENTRATION, gr/DSCF				Average
Filterable PM	0.00927	0.00700	0.00925	0.00851

TABLE 3-23. KILN EMISSION TESTS RESULTS--PM, PM-10, CONDENSIBLE PM (ENGLISH UNITS) (continued)

Method 29 train				
Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:30	09:42	15:53	
Finish time	19:15	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	92.7	99.3	99.5	
Sample volume, ACF	102.1	131.5	105.6	
Sample volume, DSCF	99.21	126.9	101.3	
GAS PARAMETERS				
Gas temperature, F	429	429	435	
Oxygen, %	17.6	18.4	17.8	
Carbon dioxide, %	2.2	1	1.7	
Moisture, %	4.4	4.3	4.7	
Velocity, ft/min	1,160	1,385	1,113	
Flowrate, ACFM	37,260	44,462	35,729	
Flowrate, DSCFM	20,713	24,738	19,683	
MASS COLLECTED, gr				
Filterable PM	0.829	0.664	1.367	
CONCENTRATION, gr/DSCF				Average
Filterable PM	0.00835	0.00523	0.0135	0.00903

Method 201A/202 train	Run			
Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:55	14:59	17:07	
Finish time	12:27	16:42	18:39	
Sample time, min	90	90	90	
% isokinetic	106.8	99.0	97.4	
Sample volume, ACF	42.79	43.57	44.04	
Sample volume, DSCF	41.46	41.76	41.93	
GAS PARAMETERS				
Gas temperature, F	380	400	409	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.1	5.5	4.2	
Velocity, ft/min	1,152	1,054	1,072	
Flowrate, ACFM	37,001	33,836	34,435	
Flowrate, DSCFM	21,711	19,104	19,493	
MASS COLLECTED, gr				
Filterable PM	0.273	0.290	0.196	
Filterable PM-10	0.051	0.227	0.073	
Cond. inorganic PM	2.573	2.830	2.497	
Cond. organic PM	0.846	0.236	0.160	
Total cond. PM	3.418	3.066	2.657	
CONCENTRATION, gr/DSCF				Average
Filterable PM	0.00659	0.00695	0.00467	0.00607
Filterable PM-10	0.00123	0.00543	0.00173	0.00280
Cond. inorganic PM	0.0620	0.0678	0.0596	0.0631
Cond. organic PM	0.02040	0.00565	0.00383	0.00996
Total cond. PM	0.0824	0.0734	0.0634	0.0731

filterable PM-10, condensible inorganic PM and condensible organic PM were 0.21 kg/hr (0.47 lb/hr), 4.9 kg/hr (11 lb/hr), and 0.81 kg/hr (1.8 lb/hr), respectively. The average emission factors for filterable PM-10, condensible inorganic PM, and condensible organic PM were 0.067 kg/Mg (0.13 lb/ton), 1.6 kg/Mg (3.1 lb/ton), and 0.26 kg/Mg (0.51 lb/ton), respectively.

3.3.4.7 HF, HCl, Cl_2. Emissions from the kiln were sampled for HF, HCl, and Cl_2 using a Method 26A sampling train. Table 3-10 summarizes the emission rates and emission factors for emissions of these compounds from the kiln, and Table 3-24 summarizes the sampling data and concentrations of these compounds in the exhaust stream. Emissions of HF averaged 0.47 kg/hr (1.0 lb/hr); HCl emissions averaged 0.029 kg/hr (0.063 lb/hr); and Cl_2 emissions averaged 0.0021 kg/hr (0.0047 lb/hr). Calculated average emission factors are 0.15 kg/Mg (0.30 lb/ton) for HF, 0.0091 kg/Mg (0.018 lb/ton) for HCl, and 0.00067 kg/Mg (0.0013 lb/ton) for Cl_2. The detailed results of the sampling and analysis for these pollutants are provided in Appendix C.

3.3.5 Dryer Emission Results

Emissions from the dryer stack were monitored continuously for TOC and semi-continuously for methane/ethane. Total hydrocarbon emissions were measured using Method 25A. Volumetric flowrates were measured only during Runs 2 and 3. Therefore, emission rates for Run 1 were determined using the average of the flowrates for Runs 2 and 3. The concentration of TOC in the dryer stack exhaust averaged 90 ppm as propane (converted to 269 ppm as methane). Emissions of methane/ethane were measured using Method 18. The concentration of methane in the dryer stack exhaust averaged 104 ppm and the concentration of ethane in the exhaust stream averaged 8.2 ppm. Table 3-11 summarizes the emission rates and emission factors for these compounds from the kiln, and Table 3-25 summarizes the sampling data and concentrations of these compounds in the exhaust stream. The detailed results of the sampling and analysis for these pollutants are provided in Appendix C.

Following the emission test, it was determined that the gas burners on the dryer were malfunctioning. Therefore, the results presented in Tables 3-11 and 3-25 are not considered to be representative of emissions from a gas-fired brick dryer. After the defective burners were repaired, emissions from the dryer were retested by another testing firm that was contracted by Belden. The results of that retest are provided in Appendix F.

TABLE 3-24. KILN EMISSION TESTS RESULTS--HF, HCl, Cl2 (METRIC UNITS)

Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:07	09:42	15:53	
Finish time	19:17	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	78.3	100.8	100.5	
Sample volume, ACM	2.439	3.092	2.995	
Sample volume, DSCM	2.338	2.955	2.835	
GAS PARAMETERS				
Gas temperature, C	224	222	227	
Oxygen, %	17.8	18.8	18.0	
Carbon dioxide, %	1.1	1.8	2.0	
Moisture, %	4.4	4.6	4.7	
Velocity M/min	349.4	343.9	334.5	
Flowrate, ACM/min	1,042	1,026	997.9	
Flowrate, DSCM/min	575.0	567.4	545.6	
MASS COLLECTED, ug				
HF	31,969	43,518	37,333	
HCl	2,117	2,449	2,302	
Cl2	128	216	169	
CONCENTRATION, ug/DSCM				Average
HF	13,673	14,729	13,171	13,858
HCl	905	829	812	849
Cl2	54.7	73.1	59.6	62.5

TABLE 3-24. KILN EMISSION TESTS RESULTS--HF, HCl, Cl2 (ENGLISH UNITS)

Run No.	1	2	3	
Date	11/09/93	11/10/93	11/10/93	
Start time	14:07	09:42	15:53	
Finish time	19:17	13:57	19:47	
Sample time, min	175	175	175	
% isokinetic	78.3	100.8	100.5	
Sample volume, ACF	86.148	109.203	105.783	
Sample volume, DSCF	82.567	104.337	100.101	
GAS PARAMETERS				
Gas temperature, F	436	431	440	
Oxygen, %	17.8	18.8	18.0	
Carbon dioxide, %	1.1	1.8	2.0	
Moisture, %	4.4	4.6	4.7	
Velocity, ft/min	1,146	1,128	1,097	
Flowrate, ACFM	36,805	36,230	35,241	
Flowrate, DSCFM	20,307	20,036	19,269	
MASS COLLECTED, gr				
HF	0.493	0.672	0.576	
HCl	0.0327	0.0378	0.0355	
Cl2	0.00198	0.00333	0.00261	
CONCENTRATION, gr/DSCF				Average
HF	0.00598	0.00644	0.00576	0.00606
HCl	0.000396	0.000362	0.000355	0.000371
Cl2	2.39E-05	3.19E-05	2.61E-05	2.73E-05

TABLE 3-25. DRYER EMISSION TESTS RESULTS--TOC, METHANE, AND ETHANE (METRIC UNITS)(a)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time	121	120	120	
GAS PARAMETERS				
Gas temperature, C	38	38	38	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.2	4.2	4.2	
Velocity, m/min	868	831	852	
Flowrate, ACM/min	1,428	1,368	1,402	
Flowrate, DSCM/min	1,256	1,203	1,233	
CONCENTRATION, ppm				Average
TOC, as propane (b)	83.7	89.4	95.9	89.7
TOC, as methane (b)	251	268	288	269
Methane (c)	106	95.0	111	104
Ethane (c)	9.6	7.0	7.9	8.2

(a) Gas burners malfunctioning during emission test; results not representative of properly operating gas-fired dryer.

(b) Based on average of 120 one-minute readings.

(c) Runs 1, 2, and 3 based on 6, 8, and 1 readings, respectively.

TABLE 3-25. (ENGLISH UNITS) (a)

Run No.	1	2	3	
Date	11/11/93	11/11/93	11/11/93	
Start time	10:35	13:11	15:27	
Finish time	12:36	15:11	17:27	
Sample time	121	120	120	
GAS PARAMETERS				
Gas temperature, F	100	100	100	
Oxygen, %	17.6	17.6	17.6	
Carbon dioxide, %	2.2	2.2	2.2	
Moisture, %	4.2	4.2	4.2	
Velocity, ft/min	2,847	2,726	2,794	
Flowrate, ACFM	50,444	48,305	49,502	
Flowrate, DSCFM	44,365	42,487	43,545	
CONCENTRATION, ppm				Average
TOC, as propane (b)	83.7	89.4	95.9	89.7
TOC, as methane (b)	251	268	288	269
Methane (c)	106	95.0	111	104
Ethane (c)	9.6	7.0	7.9	8.2

(a) Gas burners malfunctioning during emission test; results not representative of properly operating gas-fired dryer.

(b) Based on average of 120 one-minute readings.

(c) Runs 1, 2, and 3 based on 6, 8, and 1 readings, respectively.

SECTION 4

SAMPLING AND ANALYTICAL PROCEDURES

This section describes the sampling procedures and analysis procedures used during this test program. Section 4.1 presents the sampling methods used. Section 4.2 presents the procedures for collecting process samples. Section 4.3 presents the analytical procedures.

4.1 EMISSION TEST METHODS

Emission samples were collected using the following seven separate sampling systems:

1. EPA draft Reference Method (RM) 29 for multiple metals;
2. Reference Method 26A for filterable PM, HCl/Cl_2, and HF;
3. Method 0030 (VOST) for speciated VOC;
4. Method 0010 for semivolatile organic compounds;
5. Reference Method 201A/202 for filterable PM-10 and condensible PM;
6. Instrumental analyses for CO_2 (Method 3A), CO (Method 10), SO_2 (Method 6C), TOC (Method 25A), NO_x (Method 7E), and Method 18 for methane/ethane(semicontinuous);
7. High-volume ambient sampling system for ambient PM-10; and
8. Grab sampling of process material from the grinding/screening operation.

An integrated gas bag sample for Orsat analysis (Method 3A) was collected in conjunction with the sampling runs (see Figure 4-1).

4.1.1 Metals

The sampling train and procedure for Method 29 is shown in Figure 4-2. Because of the low PM emissions expected for this test, a cyclone was not used. The samples were

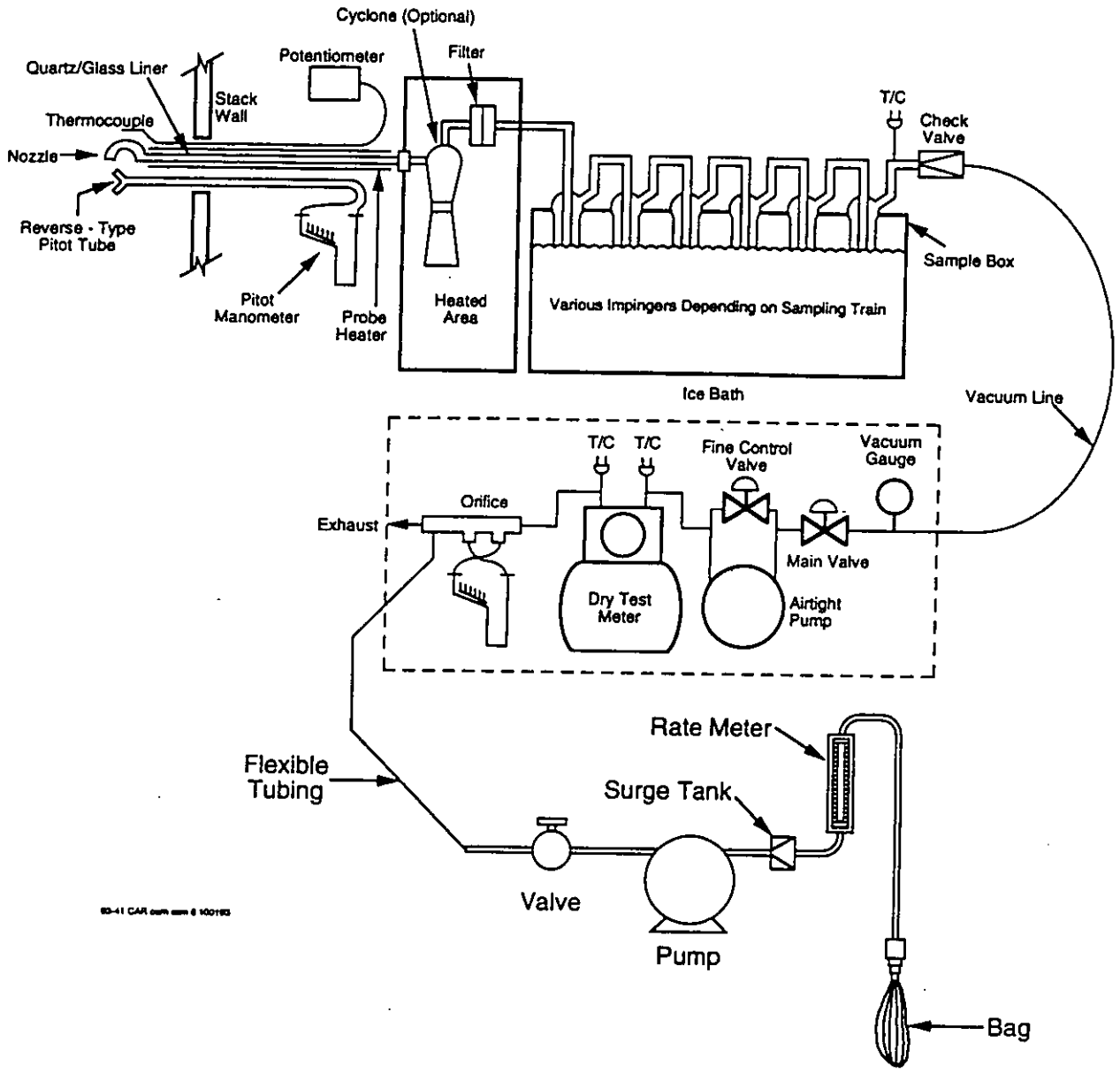
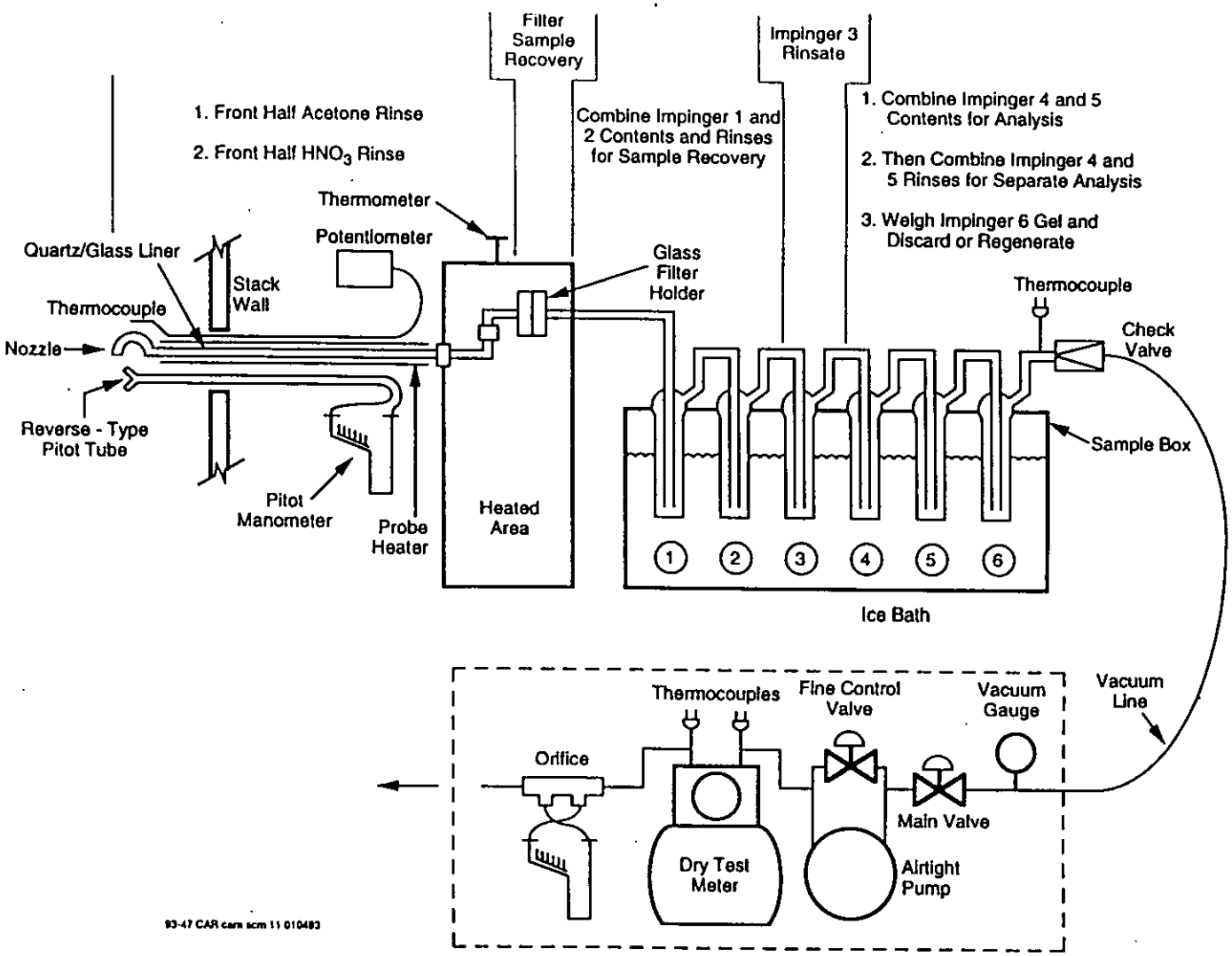


Figure 4-1. Sampling system for oxygen and carbon dioxide.



1. Modified Greenburg-Smith, 100 mL 5% HNO_3/10% H_2O_2
2. Greenburg-Smith, 100 mL 5% HNO_3/10% H_2O_2
3. Modified Greenburg-Smith, Empty
4. Modified Greenburg-Smith, 100 mL 4% $KMnO_4$/10% H_2SO_4
5. Modified Greenburg-Smith, 100 mL 4% $KMnO_4$/10% H_2SO_4
6. Modified Greenburg-Smith, 200 g SiO_2

Figure 4-2. Schematic of the metals sampling train.

collected isokinetically over a complete traverse of the stack as required by *40 CFR 60 Appendix A, Methods 1 through 5.*

4.1.2 Method 26A Sampling Train for Particulate Matter, HCl/Cl_2, and HF

The Method 26A train used for PM, HCl/Cl_2, and HF is a standard EPA Method 5 train except for modifications to the impinger train (Figure 4-3 is a schematic of the sample for train and sample recovery procedures). The first two impingers were used to collect HCl and HF. The third impinger prevents the mixing of acid and base impinger solutions. The fourth and fifth impingers were used to collect Cl_2. The probe/front-half wash and filter fractions from all test runs were analyzed gravimetrically for particulates per EPA Method 5.

Because of the low PM emissions expected for this test, a cyclone was not used. The samples were collected isokinetically over a complete traverse of the stack as required by 40 *CFR* 60, Appendix A, Methods 1 through 5.

4.1.3 VOST for Volatile Organic Compounds

Volatile organic compound emissions were sampled from the exhaust gas stream by the SW-846 Method 0030. (Figure 4-4 presents a schematic of the sampling train). A total of seven trap pairs were collected, each over a 20 min period. However, only three trap pairs were analyzed. Target analytes and analytical procedures are discussed in more detail in Section 4.3.2.

The following are exceptions and/or additions to the procedures to the SW-846 0030 sampling method.

1. The heated probe liner may be constructed of Teflon instead of glass.

2. After collection of the 20-L sample, the two sorbent traps were removed from the train, immediately capped at the ends, and placed into metal transport cans which contained charcoal. The cans were stored and transported in insulated containers packed with ice to maintain the temperature of the traps near 4°C at all times.

3. Field blanks, trip blanks, and other conditioned (cleaned) sorbent traps were also stored and transported as described above for sample traps.

4.1.4 Semivolatile Organic Compounds

Semivolatile organic compound emissions were sampled from the exhaust gas stream by the SW-846 Method 0010. The samples were collected isokinetically over a complete traverse of the stack as required by 40 *CFR* 60, Appendix A, Methods 1 through 5. In this train, semivolatile organic target analytes are collected in a sorbent trap with about 65 g XAD-2 resin. Figure 4-5 is a schematic of the sampling train. Figure 4-6 provides the

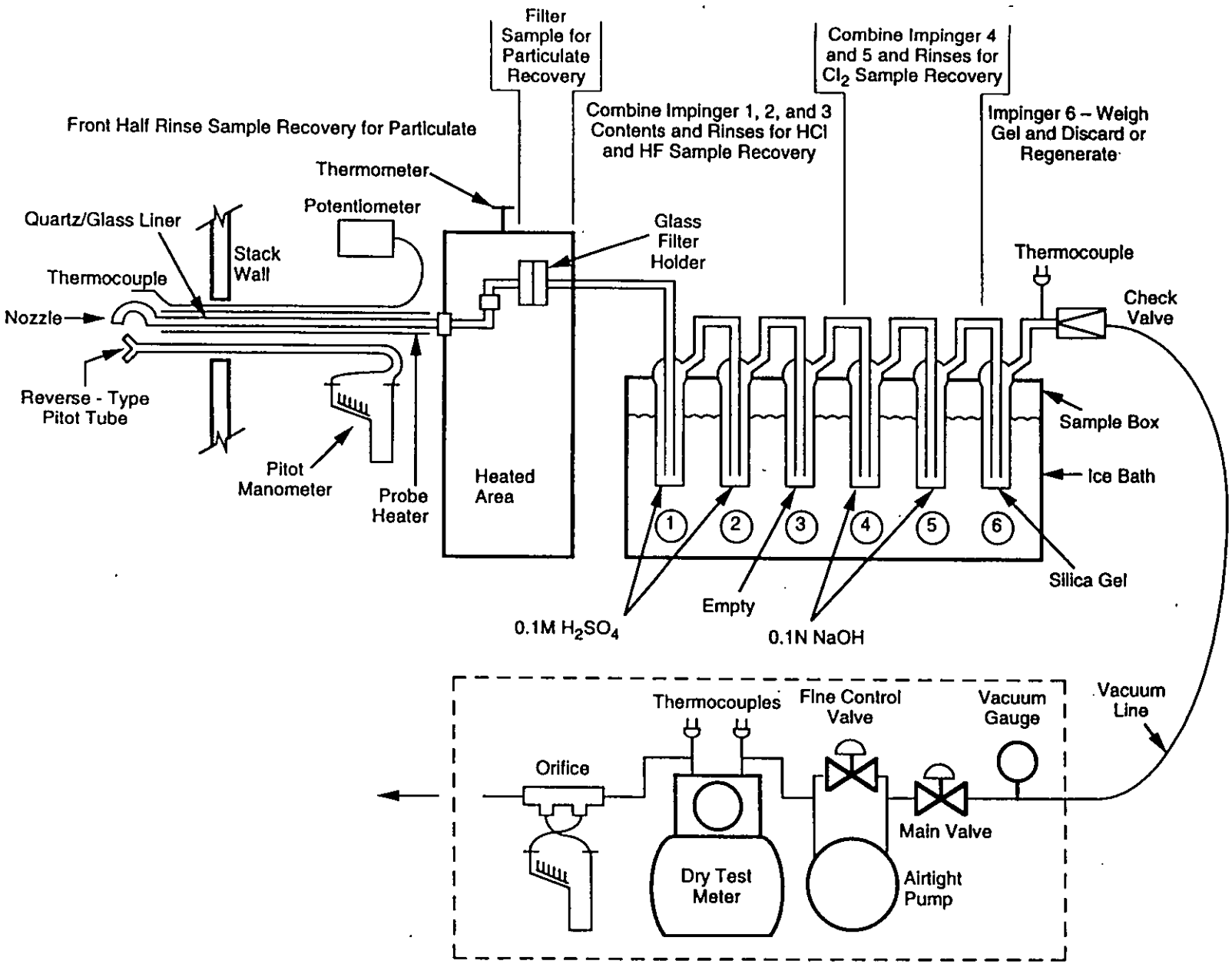


Figure 4-3. Schematic for the Method 26A sample train for particulate matter, HCl, and HF.

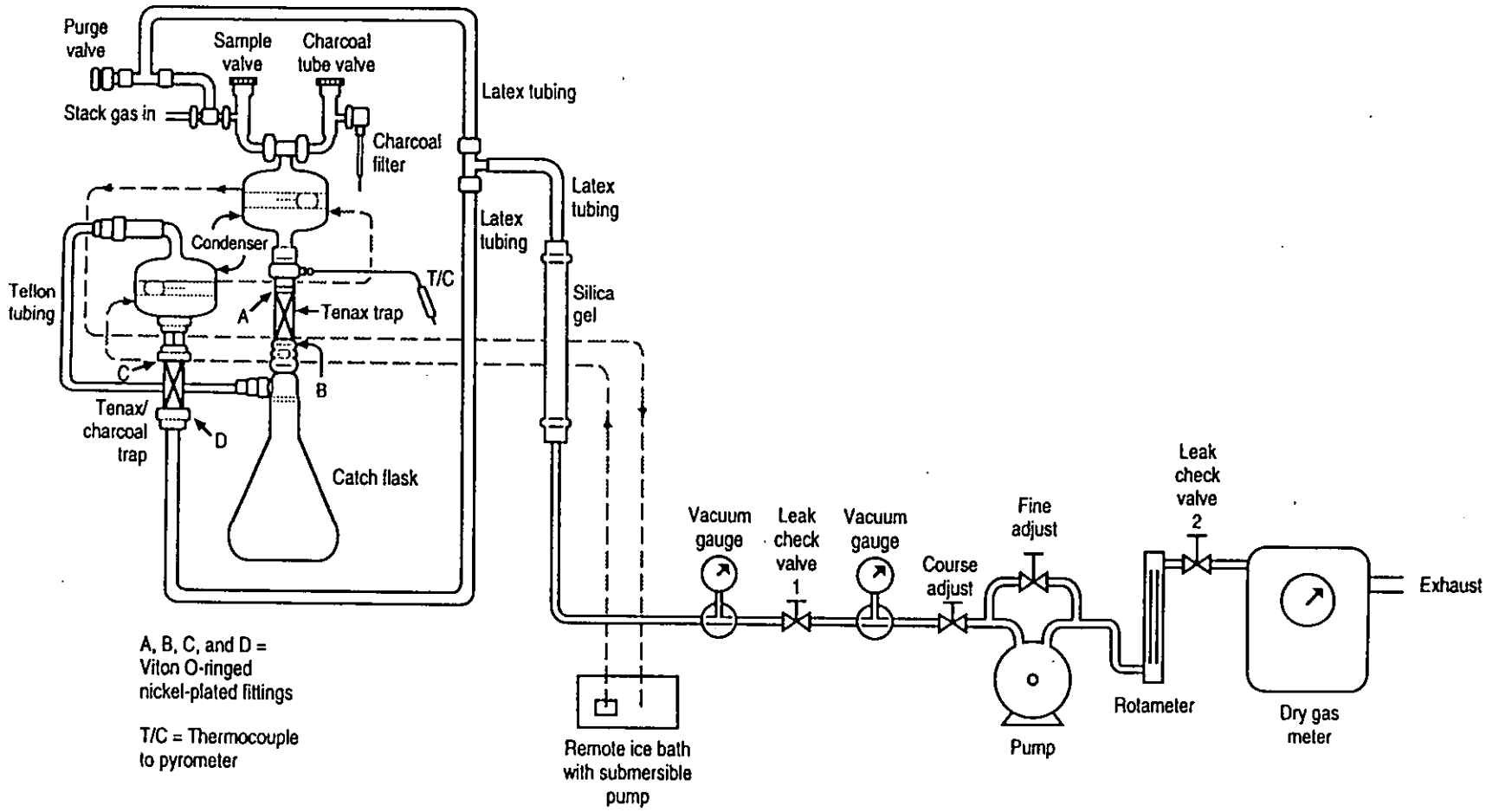


Figure 4-4. Volatile organics sampling train (VOST).

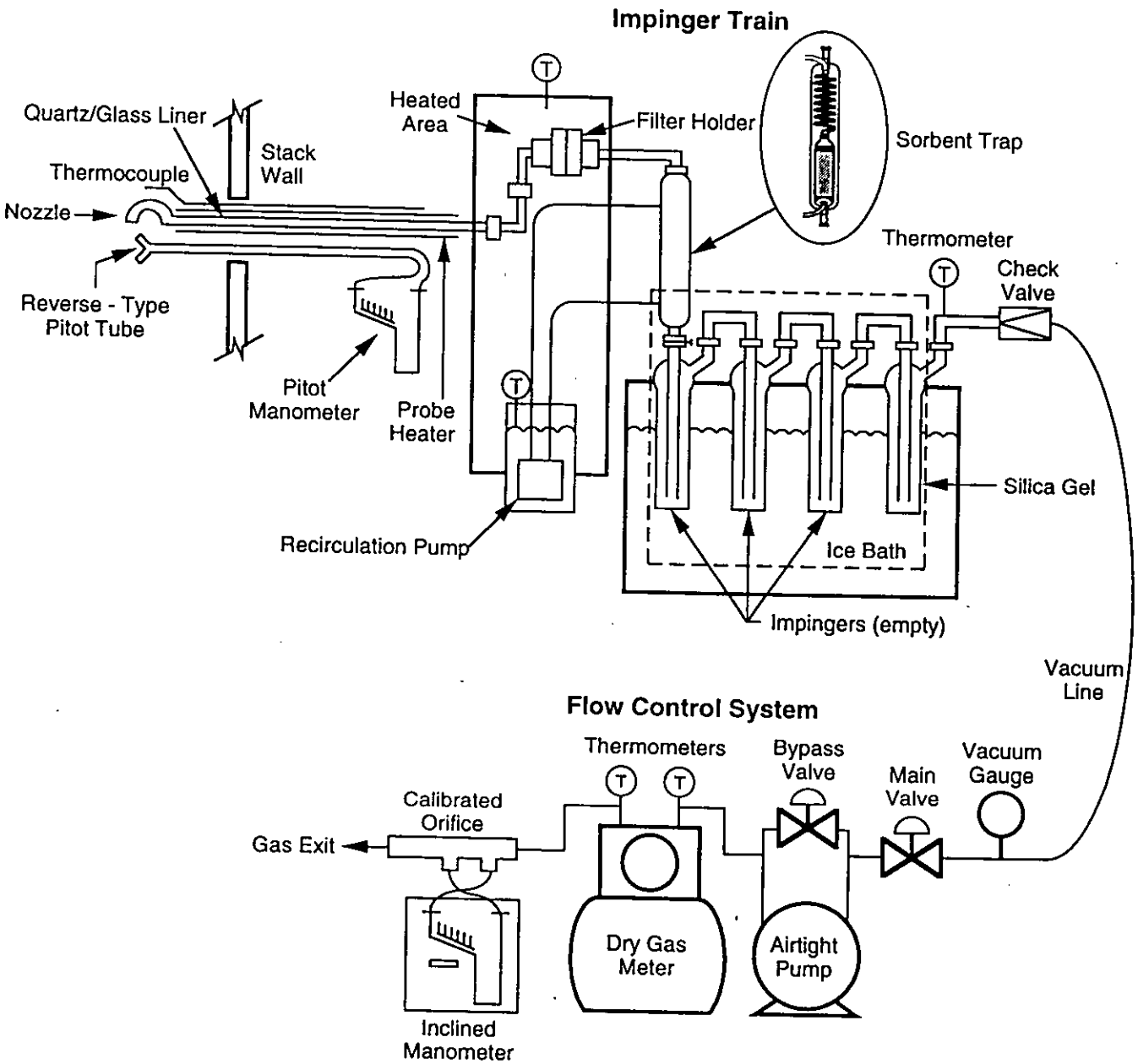


Figure 4-5. Schematic of the semivolatile organic sampling train (SVOST).

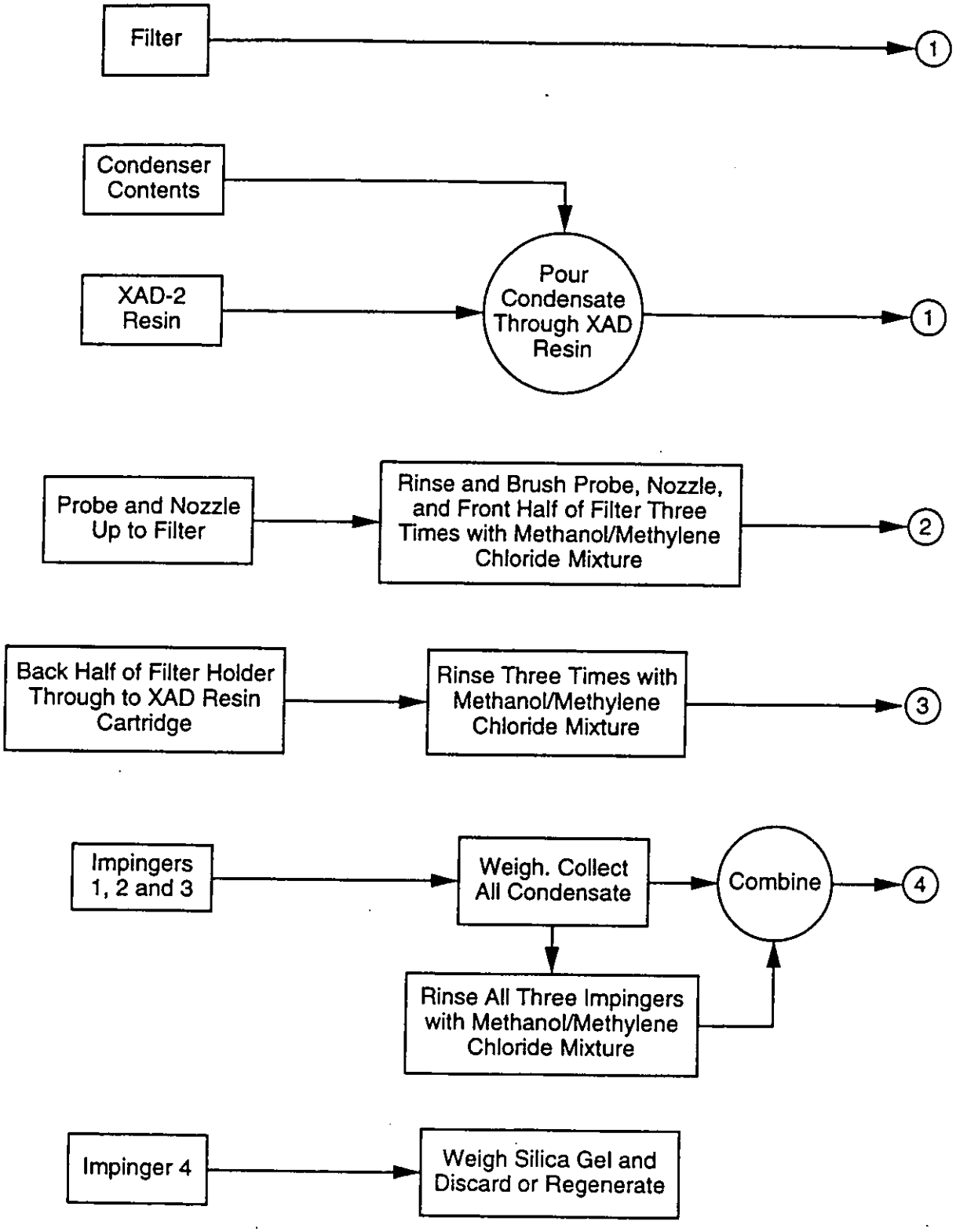


Figure 4-6. SVOST sample recovery.

sample recovery diagram. The end numbers are sample container numbers, which are discussed in Section 4.3.3.

4.1.5 Method 201A Sampling Train for Filterable PM-10

PM-10 sampling was performed using the constant sampling rate procedure given in EPA Method 201A. An Andersen Model 28-9 train equipped with a SoRI Cyclone X in-stack sizing device was used during sampling. A schematic of the Method 201A sampling train and recovery diagram is shown in Figure 4-7.

4.1.6 Method 202 for Condensible PM-10

Condensible PM-10 emissions were measured (kiln only) in conjunction with and using the same sampling train as filterable PM-10. Per Method 202, the third impinger contained 100 ml of distilled water. The impinger train contents were extracted and analyzed according to Method 202.

4.1.7 High-Volume Sampling System for PM-10

Ambient PM-10 sampling was performed inside and outside the screening/grinding building. The air sampling devices used were two standard high-volume air samplers fitted with Sierra Model 230P cyclone preseparators. The cyclone exhibits an effective 50 percent cutoff diameter (D_{50}) of approximately 10 μm in aerodynamic diameter when operated at a flow rate of 20 acfm. The sampler was fitted with an appropriate diameter intake nozzle so that samples were collected under nearly isokinetic conditions. The instrument was placed at two outdoor locations: one to the east and one to the west of the grinding/screening building. Also, sampling was performed at one indoor.

At the end of each run, the exposed media was carefully transferred in the sampling cartridges to protective containers to prevent particulate loss and to avoid handling in the dusty sampling environment. The media then was transferred to the field laboratory where exposed filters were removed from their cartridges, folded, and placed in individual glassine envelopes and then into numbered file folders. Filter conditioning and weighing was performed according to MRI's Standard Operating Procedures.

4.1.8 CO, CO_2, SO_2, NO_x, TOC, and Methane/Ethane

Emissions of TOC, NO_x, SO_2, CO, and CO_2 were measured using instrumental analyzers. The measurements were conducted in accordance with EPA Methods 25A, 7E, 6C, 10, and 3A, respectively. EPA Method 18 was used to measure methane/ethane.

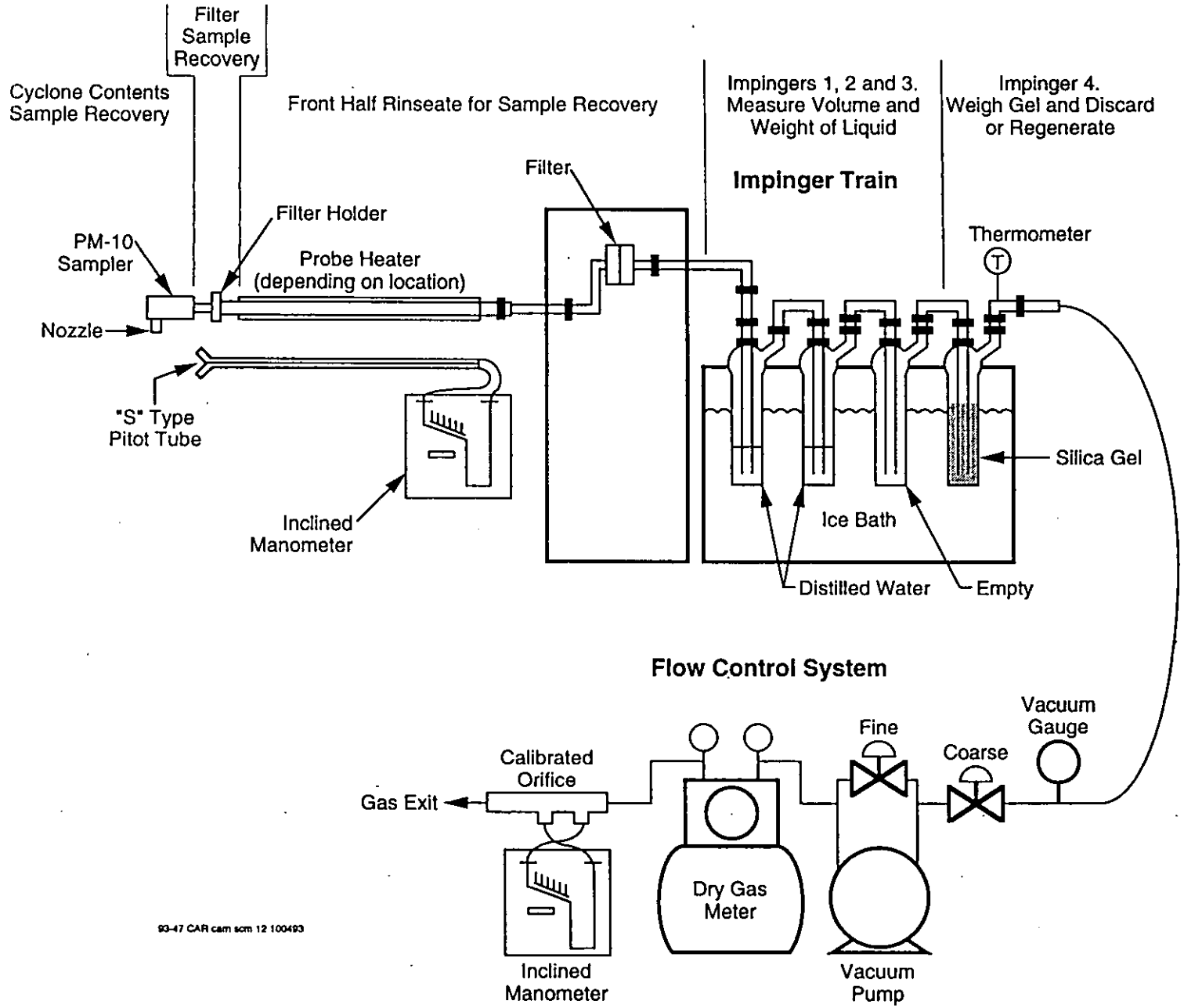


Figure 4-7. Method 201A sampling train.

4.1.8.1 Instrumental measurement system. A simplified schematic of the instrumental analyzer system is shown in Figure 4-8. The sampling system contained the following components:

- A gas distribution manifold
- M&C Model ECF Electro Gas Cooler
- Odessa data logging unit, Model No. SPLC 3260
- Thermal Environmental Model 42 Chemiluminescence NO_x Analyzer
- Horiba Model CMA/CFA Series for CO, CO_2, and NO_2
- Bovar Model 721ATM SO_2 Analyzer
- JUM Model VE-7 TOC Analyzer

The probe was stainless steel tube approximately 0.5 in o.d. of sufficient length to reach the center of the stack. An electrically heated Teflon line from Technical Heaters, Inc., was used to maintain line temperature at 250°F.

Prefiltered air was the TOC zero gas, and prepurified nitrogen was the zero gas for the remaining analyzers. All span gases were EPA Protocol cylinder gases, in date, certified to within 1 percent by Scott Specialty Gases. Analyzers were spanned at the following nominal concentrations:

Analyzer	Span conc.
SO_2	250 ppm SO_2
CO	250 ppm CO
NO_x	200 ppm NO
TOC	100 ppm propane
CO_2	25 percent CO_2

Analyzer linearity checks were conducted at each of the following nominal test gas concentrations using EPA Protocol gases which were introduced to the analyzer manifold.

Analyzer	Linearity conc.	Accuracy limit
SO_2	25 ppm, 100 ppm	2% of span gas
CO	90 ppm, 125 ppm	2% of span gas
NO_x	100 ppm	2% of span gas
TOC	25 ppm, 50 ppm	5% of span gas
CO_2	61%, 12%	

4.1.8.2 Procedure for Method 18. Sampling and analysis was completed using EPA Method 18. A vacuum pump was used to draw samples and standards through a 1/4-in Teflon line from the sampling manifold to charge a 2-mm heated sample loop before introduction onto the analytic column (Supelco SPB-5, 30-m x 530-μm, and 1.5-μm film). Samples were analyzed every 10 min. Two primary standards, each containing methane and ethane at concentrations expected to bracket the concentrations found in the sample stream,

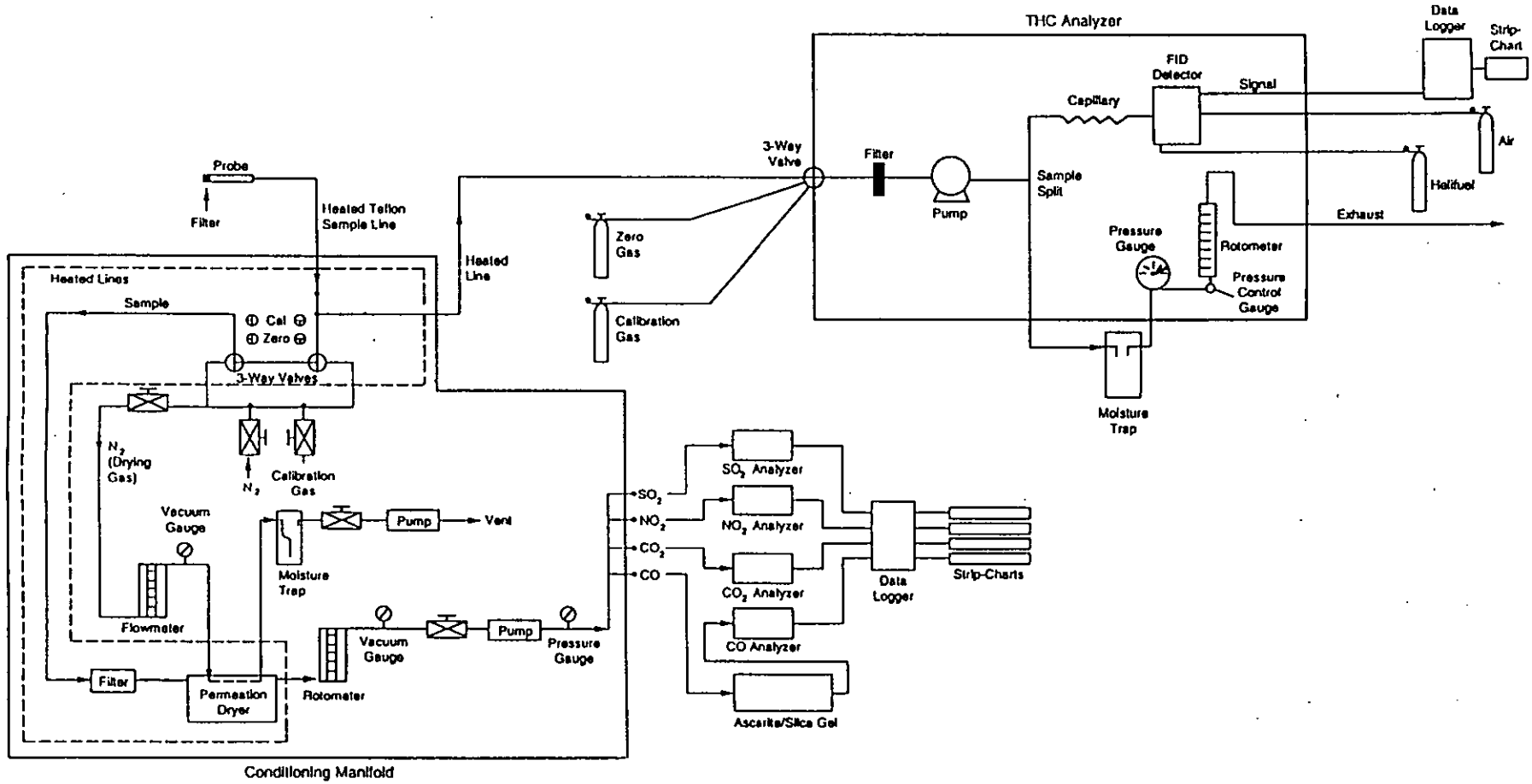


Figure 4-8. Schematic of Instrumental Measurement System.

were used to calibrate the gas chromatograph at the beginning and end of each run. The gas chromatograph was operated isothermally at −20°C.

The sample peaks were quantified by direct comparison with the external standard peak using the equation:

$$\text{Sample conc. } [\text{ppm}_v] = \frac{(\text{Sample peak area})\,(\text{Standard conc. } [\text{ppm}_v])}{\text{Standard peak area}}$$

4.2 PROCESS DATA MEASUREMENT

Process data were collected on the kiln, dryer, and raw material grinding/screening operations for Plant No. 6. These data, which were recorded by Belden, were used to monitor the processes and to develop emission factors for the sources being tested. The procedures used to measure process rates during the emission test are summarized in the following paragraphs.

4.2.1 Grinding/Screening Operation

In addition to the emission measurements on the fabric filter inlet and outlet, three sets of data were collected from the grinding/screening operation: (1) a record of truck loads (clay material only) received at the grinding building; (2) the weight of material collected by the clay line fabric filter; and (3) measurements of the processing rate of finished clay material.

4.2.1.1 Quantity of raw material received. Raw material is transported in 25-ton truckloads from the mines to the grinding/screening building continuously throughout the day. Belden Brick routinely records the time at which each truckload is emptied into the crusher hopper. The daily records of truckloads received for each day of testing at the grinding/screening building are summarized in Appendix E.

4.2.1.2 Fabric filter dust collection. Prior to testing, Belden emptied the two hoppers for the fabric filter that serves the clay processing line in the grinding/screening building. During both days of testing on the grinding/screening operation, Belden emptied the hopper and weighed the dust collected at intervals of 1 to 3 hours.

4.2.1.3 Fine clay production. Finished clay material is conveyed from the grinding/screening building to the fine clay storage bins, which are located in an adjacent building. Prior to testing, Belden installed a diverter chute at the dropoff point for this conveyor. During the testing of the grinding/screening operation, Belden collected the material diverted from the fine clay storage bins in a container. This material was collected for 10 seconds at 15 minute intervals over a 4-hour period and weighed. A total of 17 measurements were made on each day of the test. From these measurements, average

production rates were determined for each of the two days of testing on the grinding/screening operation. The results showed little variation and indicate that the fine clay production rate was consistent during the test; the relative standard deviations of the weight measurements for each day were 3 and 4 percent, respectively.

While measuring the fine material production rate, Belden also collected three samples of the material for subsequent sieve and moisture analysis. The results of all measurements related to the grinding/screening operation are presented in Appendix E.

4.2.2 Kiln and Dryer

Three sets of process data were collected on kiln and dryer operations during the emission test: (1) kiln and dryer temperatures, (2) kiln and dryer throughput, and (3) natural gas consumption rate.

Kiln and dryer temperatures are recorded routinely by Belden. Following the test, Belden provided average dryer inlet and outlet temperatures and average kiln inlet and peak temperatures for each day of testing. Belden does not routinely record gas consumption for the kilns. However, during the week of the test, Belden recorded daily gas consumption for kiln 3 based on the gas usage meter at the kiln. Appendix E includes the data for these measurements as provided by Belden.

Belden routinely maintains separate kiln car records, which include the number of bricks, type of brick, brick weight, and kiln car push times for each kiln car. During the week of the test, each kiln car of bricks dried and fired were identical in terms of the number, size, and type of bricks loaded on each. Using this information, Belden determined the process rate for both feed and production for the dryers and kiln tested. These reduced data are presented in Appendix E.

4.3 ANALYTICAL PROCEDURES

The following section describes the procedures employed during the analysis of samples collected during this project. These procedures cover the analysis of metals, VOC, semivolatiles, PM, $HCl/Cl_2/HF$, sieve sizing, and moisture. Instrumental (TOC, SO_2, NO_x, CO, CO_2) analysis information is incorporated into the sampling procedures.

4.3.1 Metals Analysis by ICAP

Metals were analyzed in the stack emission samples for 11 metals of interest, arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), beryllium (Be), antimony (Sb), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni), and selenium (Se). The metals analysis procedures for the stack emission samples are summarized in Figure 4-9 and were performed in accordance with the detailed procedures developed in the Draft EPA Method 29 ("Determination of Metals Emissions From Stationary Sources"), and SW 846 Methods 6010A (multiple metals) and 7470 (mercury) with some modifications as described below.

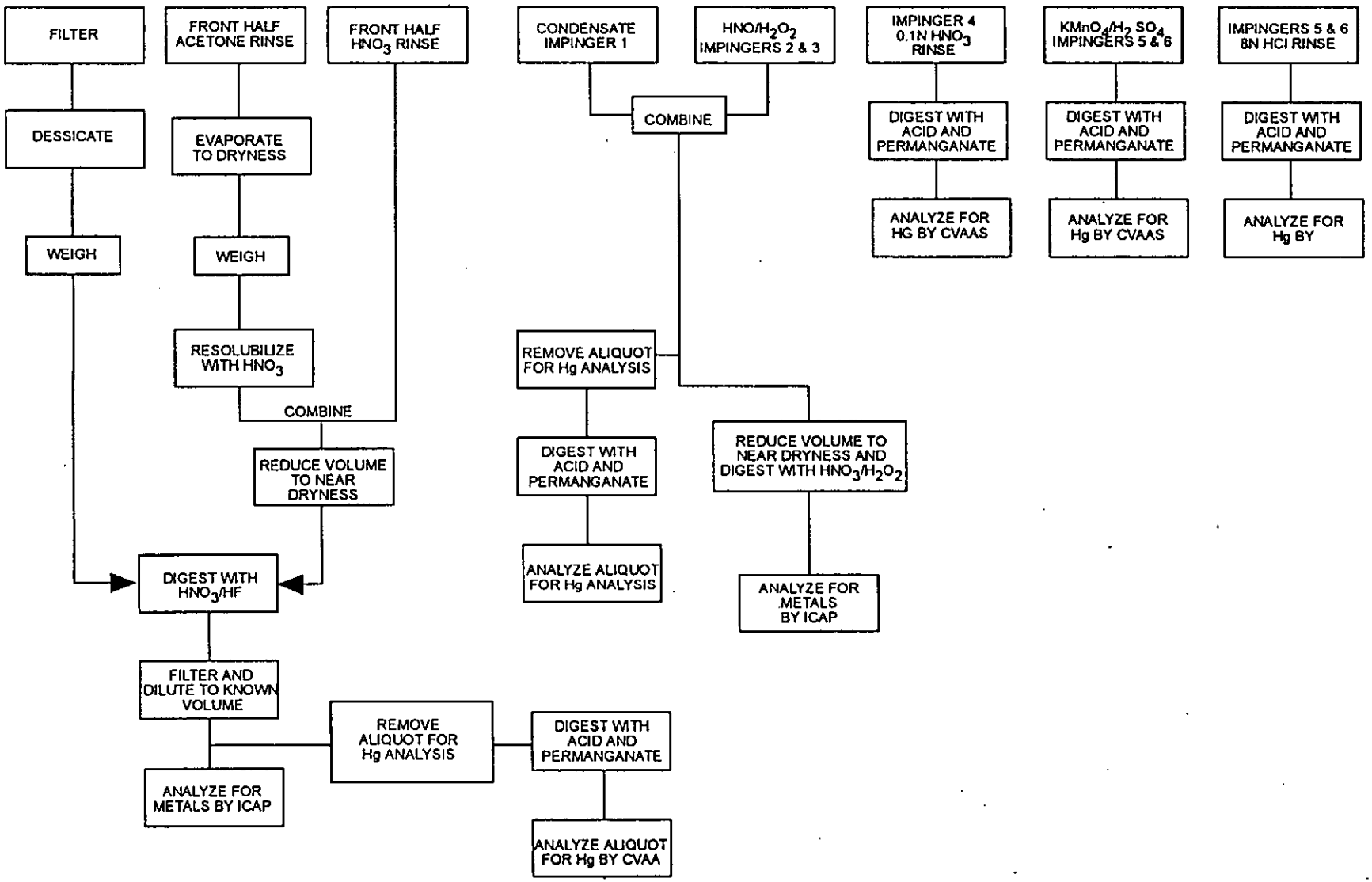


Figure 4-9. Analysis scheme for Method 29 metals train.

The stack gas samples and blank reagents from the emissions test at the Belden brick kiln were digested using Draft Method 29. Boric acid addition was not utilized as specified in the Test Plan, since the ICP was fitted with a hydrofluoric acid-(HF) resistant inlet system prior to analysis. The boric addition was previously used to allow ICP analysis without risk of damaging (HF etching) the torch. In addition, the front-half filter, probe rinse and back-half impinger samples were digested and analyzed separately. The flow chart presented in the test plan (page 5-15) designates that these FH and BH samples are proportionally combined and then analyzed. Further digestion was performed for mercury (Hg) in the stack gas samples using SW-846 Method 7470. This method was slightly modified in order to allow sufficient digest volume for multimetals analysis by ICP.

4.3.1.1 Stack gas analysis. Multiple metals analysis was performed on a Thermo-Jarrell Ash Model 61E ICP-AES and Hg was analyzed using a PSA Merlin Plus Mercury Analyzer. Each instrument was calibrated and verified using a calibration check standard (from an alternate supplier), prior to analysis of stack gas samples. In addition, method continuing calibration standards and blanks were routinely analyzed to verify calibration of the instrument.

An HF-resistant inlet system to the ICP was utilized for the analysis of front-half digests containing HF, in order to prevent damage to the standard inlet system of the ICP. Quarterly instrumental detection limits (IDL's) for each analytical system were utilized during these analyses. The quarterly IDL's are determined from seven analyses of a low standard on 3 nonconsecutive days.

4.3.2 VOST Sample Analysis by GC/MS

VOST samples were analyzed for the Method 8240 target analytes as listed in Table 4-1. Analysis of each pair of traps was by thermal desorption followed by purge and trap GC/MS analysis, specifically as described in SW-846 Method 5041 with minor modifications listed in Table 4-2. A DB-624 megabore (J&W Scientific, Folson, California) column was used for the analysis of VOST samples.

For each run, Tenax and Tenax/charcoal traps were analyzed separately to determine target analyte concentrations. Analyte concentrations on each trap pair were summed and divided by the total volume of gas sampled to determine the average emission concentration (ng/L). Sample analyses were completed on November 23, 1993; all analyses were performed within the 14-day holding time.

4.3.3 Semivolatile Organic Compound Analysis by GC/MS

Samples were received on November 15, 1993, the samples were stored at 4°C prior to extraction. Reagent blanks were received with the MM5 samples. These blanks were archived in the cold room.

TABLE 4-1. TARGET ANALYTES FOR METHOD 8240 (VOST)

Method 8240
Volatiles

Bromochloromethane	1,4-Difluorobenzene	Chlorobenzene-d_5
Acetone	Benzene	Bromofluorobenzene (surr.)
Bromoethane	Bromodichloromethene	Chlorobenzene
Carbon disulfide	Bromoform	Ethylbenzene
Chloroethane	2-Butanone	2-Hexanone
Chloroform	Carbon tetrachloride	4-Methyl-2-pentanone
Chloromethane	Chlorodibromomethane	Styrene
1,1-Dichloroethane	1,2-Dichloropropane	1,1,2,2-Tetrachloroethane
1,2-Dichloroethane	cis-1,3-Dichloropropene	Tetrachloroethene
1,2-Dichloroethane-d_4 (surr.)	trans-1,3-Dichloropropene	Toluene
1,1-Dichloroethene	1,1,1-Trichloroethane	Toluene-d_8 (surr.)
cis-1,2-Dichloroethene	1,1,2-Trichloroethane	o-Xylene
trans-1,2-Dichloroethene	Trichloroethene	m/p-Xylene
Methylene chloride	Vinyl acetate	
Trichlorofluoromethane	Benzene-d_4 (surr.)[1]	Does not include:
Vinyl chloride		2-Chloroethyl vinylether

[1] VOST matrices only.

Internal standards are underlined.

TABLE 4-2. MODIFICATIONS TO THE VOLATILE ORGANIC ANALYSIS METHODS

The following modifications for EPA SW-846 (3rd Ed.) are listed by method number and applicable section.

Section No.	Modification
Method 5041	
4.2.1	The purge vessel was heated to 65°C in order to have an acceptable recovery for water soluble compound, acrylonitrile. See text for explanation.
4.2.2	The analytical trap vary according to analysis needs.
5.4.2	Stock solutions are maintained for 2 months for reactive compounds and gases, 6 months for all others. They are replaced sooner if signs of degradation are evident (per Method 8260).
5.8	The amount of BFB used to demonstrate acceptable MS tuning varies according to the instrument sensitivity requirements for this analysis. In general, however, 100 ng of BFB is used.
5.9	Concentrations of stock, secondary and calibration standards vary according to analysis needs.
5.7	Internal standard and surrogate standard concentrations vary according to analysis needs. Internal standard and surrogate compounds are prepared in a combined solution for VOST and water analyses, and in separate solutions for waste feed analyses.

The MM5 samples were extracted according to EPA SW-846 Method 0010. The extractions were started on November 16, 1993 and GC/MS analysis completed on December 1, 1993. All holding times were met for extraction and analysis.

Figure 4-10 presents a schematic of the analysis procedures. For the MM5 samples, the XAD/filter were combined, fortified with the 8270 Base/Neutral and Acid surrogate spiking mix, and Soxhlet-extracted with methylene chloride (Method 3540). The front half rinse, back half rinse, and condensate were combined in a separatory funnel and extracted with methylene chloride (Method 3510). The two extracts were combined and concentrated using Kuderna-Danish and nitrogen evaporation to a volume of 10 mL. The samples were split, 5 mL for archive and 5 mL were further concentrated to 1 mL.

Three additional samples labeled filter support rinse were collected in the field. These rinses were spiked with the surrogate spiking mixes and concentrated by Kuderna-Danish and nitrogen evaporation to 10 mL. The samples were split, 5 mL for archive and 5 mL were further concentrated to 1 mL.

The samples were analyzed by quadruple gas chromatography/mass spectrometry (GC/MS), on the TRIO-1A using a DB-5 60-m column according to SW-846 Method 8270. Two of the MM5 sample trains were diluted. Run 1 was injected twice for a duplicate injection. Table 4-3 lists the target analytes for the analysis.

During the analysis of the filter support rinses, the internal standard areas decreased by a factor of three. This is attributed to sample matrix effects since the extracts were a black color with visible particles suspended in the solvent. The lower internal standard areas affected the surrogate recoveries and the majority were outside the method objective. These samples could be subject to cleanup (e.g., Florisil or GPC) and reanalyzed to improve surrogate recovery and internal standard response. This additional work is outside the scope of this project.

4.3.4 Particulate Matter Analysis

Total particulate analysis was performed according to the procedures established in EPA Method 5. Analysis for filterable PM-10 was performed according to Method 201A, and analyses for condensible PM-10 was performed according to Method 202. Analysis for high-volume PM-10 samples was performed gravimetrically on filters and cyclone washes according to MRI's Standard Operating Procedures.

4.3.5 HCl/Cl_2 and HF Analysis

Analysis of HCl and HF as chloride and fluoride in impinger aliquots was conducted according to draft EPA Method 26A. The concentration of chloride (mg/L) in the sample solution and the total volume of the solution was reported. Analysis of total chlorine was conducted according to ASTM Method D 808-87 with the resulting sample matrix analyzed by ion chromatography according to ASTM Method D 4327-84.

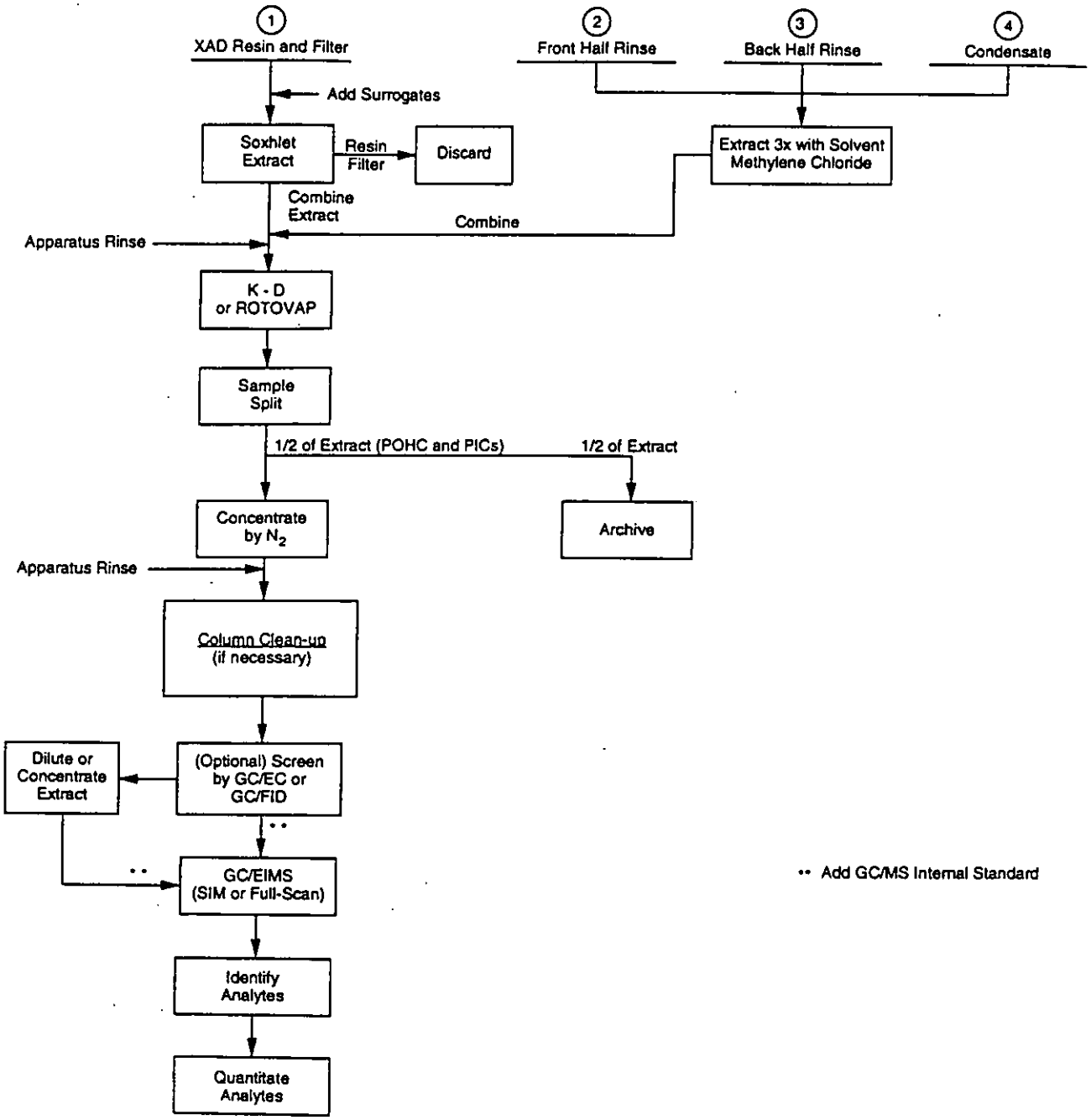


Figure 4-10. Analysis scheme for MM5-SV train components.

TABLE 4-3. TARGET ANALYTES FOR METHOD 8270
(Semivolatile organic compound)

Method 8270
SW-846 Semivolatiles

1,4-Dichlorobenzene-d_4
Benzyl alcohol
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl)ether
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
2-Fluorophenol (surr.)
Hexachloroethane
2-Methylphenol
4-Methylphenol
N-Nitroso-di-n-propylamine
Phenol
Phenol-d_5 (surr.)
1,4-Dibromobenzene-d_4 (surr.)

Phenanthrene-d_{10}
Anthracene
4-Bromophenyl phenyl ether
Di-n-butyl phthalate
4,6-Dinitro-2-methylphenol
Fluoranthene
Hexachlorobenzene
N-Nitrosodiphenylamine
Pentachlorophenol
Phenanthrene
Anthracene-d_{10} (surr.)

Does not include:
1,2-Diphenylhydrazine

Naphthalene-d_8
Benzoic acid
Bis(2-chloroethoxy)methane
4-Chloroaniline
4-Chloro-3-methylphenol
2,4-Dichlorophenol
2,4-Dimethylphenol
Hexachlorobutadiene
isophorone
2-Methylnaphthalene
Naphtalene
Nitrobenzene
Nitrobenzene-d_5 (surr.)
2-Nitrophenol
1,2,4-Trichlorobenzene
1,3,5-Trichlorobenzene-d_3 (surr.)

Chrysene-d_{12}
Benzo(a)anthracene
Bis(2-ethylhexyl)phthalate
Chrysene
3,3'-Dichlorobenzidine
Pyrene
Terphenyl-d_{14} (surr.)
Pyrene-d_{10} (surr.)

Acenaphthene-d_{10}
Acenaphthene
Acenaphthylene
2-Chloronaphthalene
4-Chlorophenyl phenyl ether
Dibenzofuran
Diethyl phthalate
Dimethyl phthalate
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Fluorene
2-Fluorobiphenyl (surr.)
Hexachlorocyclopentadiene
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
4-Nitrophenol
2,4,6-Tribromophenol (surr.)
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol

Perylene-d_{12}
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Dibenzo(a,h)anthracene
Di-n-ocrylphthalate
Indeno(1,2,3-cd)pyrene

Internal standards are underlined.
surr. = surrogate compound

4.3.6 Sieve Sizing and Moisture Analysis

For each run, a composite sample was prepared from the three grab samples and analyzed for sieve size (silt) by screening and percent moisture by gravimetric methods.

SECTION 5

INTERNAL QA/QC ACTIVITIES

5.1 METALS ANALYSIS

5.1.1 Instrumental Quality Control

Instrument calibration was verified using multielement standards obtained from an alternate supplier than those used for calibration. In addition, all correlation coefficient requirements were met per the analytical method. Instrumental drift was monitored throughout each analysis at less than 7 percent for all analytes (method criteria is ± 10 percent from target). All initial calibration verification analyses met SW-846 Methods 6010A and 7470 criteria and were within 5 percent from the target concentration (method criteria is ± 10 percent from target).

In addition, the interference check standard results (ICP only) were within the limits set by Method 6010A (method criteria is ± 20 percent from target). Serial dilution tests were not required per Method 6010A, due to the low levels in the resulting digest by ICP.

5.1.1 Method Quality Control

The method blanks were used for monitoring potential laboratory contribution during processing and analysis. Levels of analytes in the method blank were beneath the detection limit for most analytes. The few analytes detected were close to the detection limit (i.e., less than approximately 2 times the MDL).

Reagent blanks were also analyzed to monitor potential for contribution from reagent supplies and equipment used in sample collection. All back-half and Hg impinger reagents were detected near or less than the instrumental DL. Results for the filter and acetone rinse reagent blanks are reported in Table 5-1 (1056/MMBI R. Blanks). Table 5-2 presents the reagent and method blank values for the mercury analysis.

Method quality control results are reported in Tables 5-3 (for ICP analytes) and 5-4 (for Hg). Accuracy was monitored using spiked laboratory reagents (LCS), recoveries ranged from 93 to 111 percent (criteria is 70 to 130 percent). Further accuracy was monitored using a front-half representative NIST filter containing certified levels of Cd, Mn, and Pb. The resulting front-half recoveries ranged from 70 to 110 percent, with the exception of Pb, which was at a target level below ICP detection capability.

TABLE 5-1. METALS, FILTER, AND ACETONE RINSE REAGENT BLANK RESULTS

Front-half Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se	CVAA Hg
Microwave Method Blank	02881	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	< 1.26	< 8.51	< 2.33	< 3.23	1.18
Microwave Method Blank	02894	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	< 1.26	< 8.51	< 2.33	< 3.23	2.43
1056/MMBI (Filter/Acet. R.Blk)*	02883	ug	< 4.67	< 0.09	5.93*	5.62*	4.40*	2.18*	22.5*	155*	19.6*	12.9*	2.15
1055 (0.1N HNO3 R. Blank)	02895	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	3.51	< 8.51	< 2.33	< 3.23	< 1.00
1029/1030/1065	02884	ug	< 4.67	< 0.09	7.52	6.01	35.8	7.70	32.5	152	21.0	23.4	1.73
2029/2030/2065	02885	ug	< 4.67	< 0.09	7.65	5.56	21.9	5.63	27.2	156	18.6	17.2	1.37
3029/3030/3065	02886	ug	< 4.67	< 0.09	6.36	5.56	22.2	5.48	27.2	157	17.9	18.1	11
Hg Prep Method Blank	02921	ug											2.26

* Results are higher than expected for sample 1056/MMBI (filter and acetone reagent blanks), since levels for these reagent blanks are elevated compared to historical data.

Back-half Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se	CVAA Hg
Method Blk/Cookdown Blk	02888	ug	2.49	< 0.030	0.099	< 0.350	< 0.340	0.047	< 0.520	< 2.88	< 1.46	< 3.03	< 1.00
1057/1055	02890	ug	< 1.89	< 0.033	0.160	< 0.382	0.589	0.228	2.08	< 3.14	< 1.59	< 3.31	0.637
1031	02889	ug	< 1.97	< 0.034	2.63	6.21	405	48.3	207	12.3	2.03	28.7	15.9
2031	02891	ug	< 1.96	0.034	6.31	27.2	2067	172	1133	7.77	1.92	32.9	4.86
3031	02892	ug	< 1.97	< 0.034	0.593	0.430	7.13	5.99	9.11	6.15	2.44	57.1	17.3
3031A	02893	ug	< 2.33	< 0.040	0.533	10.9	520	56.7	359	< 3.870	< 1.962	7.33	0.098

Notes:

"<" indicates a sample result below the method DL.
All analyses reported are from ICP analysis results except for Hg which is taken from CVAA analyis results.
Bold values represent field samples, all others are laboratory generated QC samples.

TABLE 5-2. MERCURY REAGENT AND METHOD BLANK RESULTS

Impingers 4 - 6, Hg Results:

Sample ID	Barcode ID	CVAA Hg	Units
Method Blank	02921	2.26*	ug
1058 Reagent Blank	**02904**	**0.150**	**ug**
1059 Reagent Blank	**02905**	**< 0.20**	**ug**
1060 Reagent Blank	**02906**	**0.294**	**ug**
1032	**02907**	**0.353**	**ug**
2032	**02908**	**0.132**	**ug**
3032	**02909**	**0.394**	**ug**
1033	**02910**	**5.72**	**ug**
2033	**02911**	**5.04**	**ug**
3033	**02912**	**4.28**	**ug**
1034	**02913**	**< 0.22**	**ug**
2034	**02914**	**0.264**	**ug**
3034	**02915**	**0.238**	**ug**

"<" indicates a sample result is below the method DL
Bold values represent field samples, all others are laboratory generated QC samples.

*** The method blank level is near the DL**

TABLE 5-3. QC SUMMARY FOR METALS ICP ANALYSIS

Front-Half QC Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se
LCS	02882	ug	100.090	97.839	108.330	105.460	105.340	106.960	109.580	110.330	106.820	102.250
LCS Spike Level		ug	100	100	100	100	100	100	100	100	100	100
LCS % Recovery:			100.1%	97.8%	108.3%	105.5%	105.3%	107.0%	109.6%	110.3%	106.8%	102.3%
NIST 2676c Ic**	02896	ug	< 4.67	< 0.09	0.672	< 1.17	< 1.23	2.315	< 1.26	< 8.51	< 2.33	< 3.23
NIST 2676c Ic Spike Level		ug	NA	NA	0.954	NA	NA	2.11	NA	7.47	NA	NA
NIST % Recovery:			NA	NA	70.4%	NA	NA	109.7%	NA	0.0%	NA	NA

** The NIST filter digested was low level. The Pb concentration was below the quarterly IDL and therefore shows low recovery.

Back-Half QC Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se
LCS	02897	ug	101.690	96.588	107.730	104.530	103.990	104.340	107.180	107.560	103.640	101.040
LCS Spike Level		ug	100	100	100	100	100	100	100	100	100	100
LCS % Recovery:			101.7%	96.6%	107.7%	104.5%	104.0%	104.3%	107.2%	107.6%	103.6%	101.0%

"<" indicates a sample result below the method DL.

% RPD = | Found 1 - Found 2 | / ((Found 1 + Found 2) / 2) * 100

LCS % Recovery = LCS Found / LCS Spike Level * 100

TABLE 5-4. QC SUMMARY FOR MERCURY CVAA ANALYSIS

Sample ID	Reported Average Conc.	Units	% Recovery	% RPD*	
1055 (digest) MS	49.2	ug	98.3%	----	
7470 LCS	49.3	ug	98.6%	----	**Front-half Results**
FH LCS (digest)	1074	ug	107.4%	----	
3029/3030/3065 (digest)	**11.0**	ug	----	**4.3%**	
BH MB/Ckdn Blk (digest)	< 1.00	ug	----	----	
BH LCS (digest)	985	ug	98.5%	----	
1031	**15.9**	ug	----	**1.5%**	**Back-half Results**
2031	**4.86**	ug	----	**1.3%**	
3031	**17.3**	ug	----	**0.8%**	
1055/1057 BH Blank	**0.637**	ug	----	----	
1055/1057 MS	49.2	ug	94.2%	----	
1033	**5.72**	ug	----	**4.6%**	
2033	**5.04**	ug	----	**1.7%**	
3033	**4.28**	ug	----	**1.9%**	**Impinger 4 - 6 Results**
1058 MS	48.4	ug	93.3%	----	
1059 MS	50.3	ug	98.4%	----	
1060 MS	48.7	ug	94.8%	----	

Bold Sample IDs represent field samples, all others are lab QC samples.
"<" indicates a sample result below the method DL.
"digest" means that the Hg aliquot is taken from a previously digested sample.
*RPD Relative Percent Difference. This is calculated only if the instrument response is greater than 10 times the IDL.

Precision, based on duplicate samples, were not a requirement for this work based on QA/QC objectives in the Draft test plan. However, precision was monitored for Hg analysis; results for duplicate analysis were less than 5 percent relative percent difference.

5.2 SEMIVOLATILE ANALYSIS

5.2.1 Calibration

For the initial calibration curve analyzed on October 25, 1993, all calibration check compounds (CCC's) and system performance check compounds (SPCC's) passed Method criteria. Two analytes were greater than 30 percent REF (Benzidine at 42 percent and 3,3'-dichlorobenzidine at 30.1 percent).

All CCC's and SPCC's for the CCAL (continuing calibration check) analyzed on November 30, 1993, passed Method criteria. Four analytes were greater than 30 percent difference from the initial calibration curve (benzoic acid at 47 percent, 2,4-dinitrophenol at 30.3 percent, 3,'dichlorobenzidine at 30.1 percent, and benzidine at 86 percent).

All CCC's and SPCC's for the CCAL (continuing calibration check) analyzed on December 1, 1993, passed Method criteria. One analyte was greater than 30 percent difference from the initial calibration curve benzidine at 62 percent).

5.2.2 Sample Surrogate Recoveries

Surrogate recoveries for the samples are reported in Table 5-5. With the exception of the additional filter support rinse samples (Samples 1038A, 2038A, and 3038A), all sample surrogate recoveries were within the objective of 50 to 150 percent.

5.2.3 Quality Control Sample Analyses

During the extraction of the XAD/filter samples, a XAD method blank, 28425, and one XAD QA spike, 00482, were also extracted. A water QA spike, 00483, was extracted with the condensate samples. The results and surrogate recoveries of the blank and QA samples are presented in Tables 5-6 and 5-7.

The method blank contained four compounds, three of which were also found in the samples. The amounts in the blank are lower than the samples. The compounds and amounts in the blank are: benzoic acid 64 μg, naphthalene 3.1 μg, 2-hydroxyace-tophenone 3.2 μg, and bis(2-ethyl hexyl)phthalate 17 μg. Benzoic acid is found Run in 3 at 623 μg, naphthalene in Runs 1 through 3 at 6 to 12 μg, and bis(2-ethyl hexyl)phthalate in Runs 1 through 3 at 77 to 510 μg. Benzoic acid and bis(2-ethyl hexyl)phthalate were found in the XAD spike sample 00482.

TABLE 5-5. SURROGATE RECOVERY, %

Analyte	Sample ID						
	Run 1	Run 1 RI	Run 2	Run 3	1038A	2038A	3038A
D4-1,2-Dichlorobenzene	57	57	72	67	31[a]	29[a]	32[a]
D5-Nitrobenzene	63	61	73	67	64	49[a]	56
2-Fluorobiphenyl	76	76	83	82	128	340[a]	495[a]
D1 4-4-Terphenyl	94	91	91	102	280[a]	423[a]	485[a]
2-Fluorophenol	62	62	75	68	39[a]	42[a]	42[a]
D6-Phenol	60	61	75	68	13[a]	13[a]	10[a]
D4-2-Chlorophenol	60	61	71	67	6.4[a]	47[a]	48[a]
2,4,6-Tribromophenol	106	115	111	118	220[a]	528[a]	650[a]

[a]Do not meet method objective of 50 to 150 percent. Samples extracts were dark in color and internal standard response was less than required. These difficulties are due to the sample matrix.

TABLE 5-6. SEMIVOLATILE ORGANIC COMPOUND QA RESULTS

Analyte	Method blank mass, ug	00481 Mass, ug	Percent recovery	00482 Mass, ug	Percent recovery	00483 Mass, ug	Percent recovery
Phenol	<2	308	92	39	58	10	30
Aniline	<2	<2		<2		<2	
Bis(2-chloroethyl)ether	<2	<2		<2		<2	
2-Chlorophenol	<2	316	95	39	58	22	67
1,3-Dichlorobenzene	<2	597	90	76	57	34	50
1,4-Dichlorobenzene	<2	615	92	79	59	36	55
Benzyl alcohol	<2	597	90	77	57	29	45
1,2-Dichlorobenzene	<2	589	88	74	55	35	54
2-Methylphenol	<2	<2		<2		<2	
2,2'-oxybis(1-Chloropropane)	<2	<2		<2		<2	
4-Methylphenol	<2	5.3		<2		<2	
N-Nitrosodipropylamine	<2	<2		<2		<2	
Hexachloroethane	<2	592	89	71	53	30	45
Nitrobenzene	<2	584	88	80	60	46	70
Isophorone	<2	584	88	86	64	50	76
2-Nitrophenol	<2	320	96	43	64	23	71
2,4-Dimethylphenol	<2	337	101	15	22	17	52
Benzoic acid	64	<2		85		<2	
Bis(2-chloroethoxy)methane	<2	<2		<2		<2	
2-Chloroacetophenone	<2	<2		<2		<2	
2,4-Dichlorophenol	<2	331	99	<2	65	24	74
1,2,4-Trichlorobenzene	<2	606	91	82	61	41	62
Naphthalene	3.1	326	98	46	69	24	71
4-Chloroaniline	<2	<2		<2		<2	
2,6-Dichlorophenol	<2	<2		<2		<2	
Hexachlorobutadiene	<2	617	93	82	61	37	56
4-Chloro-3-methylphenol	<2	323	97	49	73	25	77
2-Hydroxyacetophenone	3.2	<2		<2		<2	
2-Methylnaphthalene	<2	554	83	81	60	45	68
Hexachlorocyclopentadiene	<2	607	91	42	3	18	27
2,4,6-Trichlorophenol	<2	350	105	54	81	27	83
2,4,5-Trichlorophenol	<2	<2		<2		<2	
2-Chloronaphthalene	<2	604	91	93	70	51	76
2-Nitroaniline	<2	<2		<2		<2	
Dimethylphthalate	<2	<2		<2		<2	
Acenaphthylene	<2	360	108	59	88	31	94
2,6-Dinitrotoluene	<2	662	99	128	96	58	88
2,3,4,6-Tetrachlorophenone	<2	<2		<2		<2	
3-Nitroaniline	<2	<2		<2		<2	
Acenaphthene	<2	337	101	57	85	29	88
2,4-Dinitrophenol	<2	200	60	<2	0	167	5
4-Nitrophenol	<2	289	87	57	85	9	27
Dibenzofuran	<2	574	86	104	78	56	85
2,4-Dinitrotoluene	<2	632	95	128	96	58	88
Diethyl phthalate	<2	<2		<2		<2	
4-Chlorophenylphenyl ether	<2	<2		<2		<2	
Fluorene	<2	354	106	67	100	33	100
4-Nitroaniline	<2	<2		<2		<2	
4,6-Dinitro-2-methylphenol	<2	280	84	19	29	21	65
N-Nitrosodiphenylamine	<2	<2		<2		<2	

TABLE 5-6. (continued)

Analyte	Method blank mass, ug	00481 Mass, ug	Percent recovery	00482 Mass, ug	Percent recovery	00483 Mass, ug	Percent recovery
4-Bromophenyl-phenylether	<2	<2		<2		<2	
Hexachlorobenzene	<2	620	93	119	89	63	95
Pentachlorophenol	<2	365	110	38	57	29	88
Phenanthrene	<2	345	104	66	99	32	97
Anthracene	<2	339	102	63	94	31	92
Carbazole	<2	<2		<2		<2	
Di-n-butyl phthalate	<2	<2		<2		<2	
Fluoranthene	<2	358	108	71	106	35	106
Benzidine	<2	<2		<2		<2	
Pyrene	<2	342	103	69	103	35	105
Butylbenzyl phthalate	<2	<2		<2		<2	
3,3'-Dichlorobenzidine	<2	<2		<2		<2	
Benzo(a)anthracene	<2	314	94	62	93	30	90
Chrysene	<2	292	88	58	87	28	86
Bis(2-ethylhexyl) phthalate	17	<2		14		<2	
Di-n-octyl phthalate	<2	<2		<2		<2	
Benzo(b)fluoranthene	<2	352	106	73	109	31	92
Benzo(k)fluoroanthene	<2	318	95	63	94	29	89
Benzo(a)pyrene	<2	336	101	59	88	27	82
Indeno(1,2,3-cd)pyrene	<2	332	100	62	93	28	85
Dibenz(a,h)anthracene	<2	352	106	65	97	29	88
Benzo(g,h,i)perylene	<2	265	80	49	73	22	70

TABLE 5-7. QA SURROGATE RECOVERY, %

Analyte	Sample ID		
	Method blank	00482	00483
D4-1,2-Dichlorobenzene	51	56	45[a]
D5-Nitrobenzene	55	62	67
2-Fluorobiphenyl	60	73	66
D14-4-Terphenyl	100	93	87
2-Fluorophenol	49[a]	49[a]	41[a]
D6-Phenol	51	54	27[a]
D4-2-Chlorophenol	50	52	60
2,4,6-Tribromophenol	87	98	92

[a]Do not meet method objective of 50 to 150%.

5.2.4 Performance Audit Analyses

A Performance Audit Sample (PAS) 00481, provided by MRI's QA unit was analyzed by GC/MS. The PAS met the percent recovery objective of 50 to 150 percent (see Table 5-6).

5.3 VOST ANALYSIS

5.3.1 GC/MS Calibration

MRI used historical data from March 1993 for Initial Precision Recovery; these data are presented in Appendix C. For each matrix, four replicate samples were analyzed at the mid-level standard of 100 ng on-column.

Samples were received on November 15, 1993, in good condition. Eleven trap pairs were received, including two field blank pairs, two trip blank pairs, and seven sample pairs. The Tenax calibration curve was extended with two standards on November 18, 1993, and two more standards on November 19, 1993. The purpose was to bracket the high levels of benzene in the samples. The addition of calibration points to the curve for high level samples is allowed by Method 5041. Sample 1073 contained very high levels of benzene, and the instrument detector was saturated. The benzene result should be considered a minimum value. Since the Tenax samples contained high levels of analytes, several system blanks were required to ensure that the analytical system was free of sample contamination.

5.3.2 Assessment of Data Quality

The method was followed, and the objectives were met except for the following:

1. Chloromethane, bromomethane, and iodomethane were observed in the system blank samples. The source of the contamination was identified as the methanol which was used to prepare the internal standard solution and the internal standard/surrogate solution. Chloromethane was observed in the field sample at 10 times the amount found in the system blanks. Bromomethane was observed in the samples at the same level or below that found in the system blank. Iodomethane was not a target compound. These three compounds have been blank corrected and should be considered as "estimated" values only.

2. The calibration curve ranged from 20 to 3,000 ng for the Tenax trap analysis, with an extension for benzene up to 15,000 ng. Four compounds (chloromethane, bromomethane, 1,1,2-trichlorotrifluoethane, and methylene chloride) did not meet the calibration curve objective of 30 percent RSD.

3. The calibration curve ranged from 30 to 1,000 ng for the Tenax/charcoal trap curve. Eight compounds (chloromethane, bromomethane, dichlorodifluoromethane, methylene

chloride, carbon disulfide, benzene, 1,1,2-trichloroethane, and chloroethane) did not meet the 30 percent RSD objective. All values below 20 ng are considered estimates.

4. Two additional standards with benzene and internal standards were analyzed in order to quantitate the high level of benzene in one sample. Since the benzene peak was saturated in these two standards, the average response factor was not calculated for these two points. The calibration standards were used to estimate the level of benzene found in the sample using a single point calibration.

5. A high bias was observed in the performance audit samples (PAS) for a few analytes, but all results were between 103 and 151 percent accuracy.

For the Tenax trap analysis, three compounds (carbon tetrachloride, *cis*-1,3-dichloropropene, and *trans*-1,3-dichloropropene) were higher than the 70 to 130 percent objective listed in the project plan. These three analytes were not observed in the samples.

5.3.3 Performance Audit Samples

For the Tenax/charcoal trap analysis, five compounds in one PAS and eight compounds in a second PAS did not meet the 70 to 130 percent objective listed in the project plan. The results for the two PAS's were consistent with each other. The affected compounds were 1,1-dichloroethane, 1,2-dichloroethane, *trans*-1,2-dichloroethane, carbon tetrachloride, 1,2-dicholoropropane, *cis*-1,3-dichloropropene, dibromochloromethane, and *trans*-1,3-dichloropropene. These compounds were not observed in the samples; therefore, there is minimal impact to the data quality. Results of the blind audit sample No. C-139-03 is presented in Table 5-8.

5.3.4 Surrogate Recoveries

Surrogate recoveries were 79 $\pm$ 6 percent RSD for toluene-d_8, 88 $\pm$ 6 percent RSD for benzene-d_6, and 103 $\pm$ 16 percent for 1,2-dichloroethane-d_4. The spiked surrogate 4-bromofluorobenzene averaged 145 $\pm$ 7 percent RSD which was slightly above the 130 percent objective. Surrogate recoveries are presented in Table 5-9.

TABLE 5-8. VOST AUDIT SAMPLE RESULTS
Sample: VOC Mix C-139-03

Analysis Date: 11/23/93

Compound	Accuracy (%)[a]
Methylene chloride	118
1,1-Dichloroethane	149
1,2-Dichloroethane (total	131
t-1,2-Dichloroethene	142
Chloroform	123
1,2-Dichloroethane	119
1,1,1-Trichlooethane	117
Carbon Tetrachloride	135
Bromodichloromethane	116
1,2-Dichloropropane	132
cis-1,3-Dichloropropene	136
Dibromochloromethane	131
1,1,2-Trichloroethane	127
trans-1,3-Dichloropropene	151
Bromoform	126
1,1,2,2-Tetrachloroethane	103

[a]Based on theoretical concentration of 400 ng per trap.

TABLE 5-9. VOST SURROGATE RECOVERIES

	VOST surrogate recoveries (%)[a]			
Sample	1,2-Dichloroethane-d_4	Benzene-d_6	4-Bromofluorobenzene	Toluene-d_8
TR BL TNX 1077	115	92	130	76
TR BL T/C 1078	94	84	155	76
FD BL TNX 1075	113	90	139	76
FD BL T/C 1076	109	88	127	78
Pair 2 TNX 1069	106	95	140	77
Pair 2 T/C 1070	88	84	149	85
Pair 4 TNX 1073	140	80	155	77
Pair 4 T/C 1074	84	94	151	89
Pair 2 TNX 2069	93	91	156	76
Pair 2 T/C 2070	92	86	152	78
Average:	103% R	88% R	145% R[b]	79% R
Precision (RSD):	± 16% RSD	± 6% RSD	± 7% RSD	± 6% RSD

[a]Based on spiked concentration of 250 ng per trap.
[b]Value is above the 70 to 130 percent recovery objective of the QA Plan.

APPENDIX A.

FIELD DATA FORMS

A.1 GRINDING/SCREENING OPERATION FIELD DATA FORMS
- A.1.1 Grinding/Screening Baghouse Inlet PM/PM-10
- A.1.2 Grinding/Screening Baghouse Outlet PM/PM-10
- A.1.3 Grinding/Screening Ambient PM-10

A.2 KILN FIELD DATA FORMS
- A.2.1 Kiln PM/PM-10/Condensible PM
- A.2.2 Kiln Multiple Metals/PM
- A.2.3 Kiln Semivolatile Organic Compounds
- A.2.4 Kiln Volatile Organic Compounds
- A.2.5 Kiln Inorganic/Organic Gases
- A.2.6 Kiln HCl/HF/PM

A.3 DRYER FIELD DATA FORMS
- A.3.1 Dryer Organic Gases

A 2

A.1 GRINDING/SCREENING OPERATION FIELD DATA FORMS

A.1.1 Grinding/Screening Baghouse Inlet PM/PM-10

RUN NO. INLET #1
DATE 11-09-93

SAMPLING LOCATION BAGHOUSE INLET
PROJECT NO. 6601-01-05-01

p. 1 of 1
OPERATOR NEAL

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min	GAS METER READING (V_m), ft³ INITIAL 847.042 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1	11:21/111		896.530	0.24	0.67	0.67	59	57	53	2.0	53					
2	11:16/106		896.195	0.54	0.67	0.67	59	57	54	2.0	53					
3	11:08/98		892.255	0.54	0.67	0.67	59	57	54	2.0	54					
4	11:00/90		888.325	0.75	0.67	0.67	59	57	54	2.0	53					
5	10:51/81		884.135	1.10	0.67	0.67	59°	57	54	2.0	53					
6	10:40/70		877.005	1.10	0.67	0.67	59°	57	54	2.0	53					
7	10:29/59		873.978	0.60	0.67	0.67	59°	56	53	2.8	52					
8	10:21/51		870.255	1.20	0.67	0.67	59°	57	53	2.0	52					
9	10:09/39		864.825	0.96	0.67	0.67	59°	57	54	2.0	52					
10	9:59/29		860.185	0.70	0.67	0.67	59°	57	54	2.0	54					
11	9:50/20		856.044	0.83	0.67	0.67	59°	52	48	2.0	55					
12	9:40/10		852.452	0.92	0.67	0.67	59°	51	46	2.0	55					
	9:30/0		~~852.452~~													

Final Leak Check = 0.005 at 2.8 psi

COMMENTS

INITIAL LEAK CHECK 0.001

A 7

METHOD 201A/202

FIELD LABORATORY SETUP DATA Inlet

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: ~~Kiln Stack No. 3~~ Baghouse Inlet 1 HE.

Run No. 1 Sampling Train No. P10-2 Sample Box No. _____

Set up person(s): JM C Date 11-8-93

Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By Dan Neal Received By J.M.C Date/Time 11-9-93 1230

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
PM-10 Preseparator	*	+ In Stack Filter		
~~Probe~~ (Liner-Glass)	•			
~~Female Probe~~ Blank-off				
~~90° Bypass~~	•	Filter Type:		
~~Filter Holder Front~~		Whatman QM-A		
Filter Holder Back		Filter I.D.No.:		
~~Short 90° Connector~~		SF2		
1st Impinger				
(Short-stem Mod-GBS)		~~50~~ 100 mLs	469.9	571.4
U-Connector (A)		H_2O		
2nd Impinger (GBS)		100 mLs	472.5	575.9
U-Connector (B)		H_2O		
3rd Impinger Mod. (GBS)	Nonsaturated	Empty	—	461.1
U-Connector (C)				
4th Impinger (Mod-GBS)		~200 g indicating		675.7
Impinger Outlet Connector	UH-2	silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Inlet

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Baghouse Inlet

Run No. 1 Sampling Train No. P10-2 Sample Box No. _____ _____
Transfer for Recovery:

Relinquished By M. Sabolo Received By J. McC Date/Time 11-9-93 1150
Sample box recovery person(s): J. McC Date: 11-9-93
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt.(g)	572.1	576.8	462.2	684.9					
Initial Wt.(g)	571.4	575.9	461.1	675.7					
Net Wt.(g)	.7	.9	1.1	9.2					

[Total Condensate Collected (g): 11.9]

Description and color: _____ _____ _____ _____ _____ _____ _____ _____ _____
Impingers: >>>>>>>>>>>>> 1-3 <<<
Sample Number: _____ _____ _____ >>>> _____
Sample Bottle Tare Wt.(g) _____ _____ _____ _____
Sample Bottle Gross Wt.(g) _____ _____ _____ <----------Before Rinses
Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C
Sample Bottle Final Wt.(g) _____ _____ _____ _____ After Rinses
Net Sample Wt.(g) _____ _____ _____ _____

FRONT HALF RECOVERY

Sample Number:	1001	1002	1003
Sample Bottle Tare Wt.(g)	98.5	99.3	IN-STK FILTER _____
Sample Bottle Gross Wt.(g)	228.9	130.5	
Rinse Solution	Acetone	Acetone	

Sample Number: _____ _____ _____
Sample Bottle Tare Wt.(g) _____ _____ Filter Description and Color:
Rinse Solution: Acetone _____
Components Rinsed****: probe liner, filter holder front w/Acetone
Sample Bottle Gross Wt.(g) _____
Net Acetone Sample Wt.(g) _____
Sample Bottle Final Wt.(g) _____
Net Sample Wt.(g) _____

COMMENTS:

FILE NAME - bagin1
RUN # - bagin1
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:56:03

Initial Meter Volume (Cubic Feet)=	847.042
Final Meter Volume (Cubic Feet)=	898.530
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	52.878
Gas Volume (Dry Standard Cubic Feet)=	52.915
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	54
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.790
Average Stack Temperature (F)=	59
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	0.8733
% Isokinetic=	94.5
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	120.0
Nozzle Diameter (Inches)=	0.172
Stack Axis #1 (Inches)=	36.0
Stack Axis #2 (Inches)=	36.0
Circular Stack	
Stack Area (Square Feet)=	7.07
Stack Velocity (Actual, Feet/min)=	2,967
Flow Rate (Actual, Cubic ft/min)=	20,974
Flow rate (Standard, Wet, Cubic ft/min)=	20,753
Flow Rate (Standard, Dry, Cubic ft/min)=	20,439

Particulate Loading - Front Half

Particulate Weight (g)=	0.4604	Corr. to 7% O2 & 12% C
Particulate Loading, Dry Std. (gr/scf)=	0.1340	% 2.279735E+37
		13.3991
Particulate Loading, Actual (gr/cu ft)=	0.1305	
Emission Rate (lb/hr)=	23.47	

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - bagin1
RUN # - bagin1
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:56:04

Initial Meter Volume (Cubic Meters)=	23.985
Final Meter Volume (Cubic Meters)=	25.443
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.497
Gas Volume (Dry Standard Cubic Meters)=	1.498
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-9
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (C)=	12
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	20.1
Average Stack Temperature (C)=	15
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (mm H20)=	4.4014
% Isokinetic=	94.5
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	120.0
Nozzle Diameter (mm)=	4.37
Stack Axis #1 (Meters)=	0.914
Stack Axis #2 (Meters)=	0.914
Circular Stack	
Stack Area (Square Meters)=	0.657
Stack Velocity (Actual, m/min)=	904
Flow rate (Actual, Cubic m/min)=	594
Flow rate (Standard, Wet, Cubic m/min)=	588
Flow rate (Standard, Dry, Cubic m/min)=	579

Particulate Loading - Front Half

Particulate Weight (g)=	0.4604	Corr. to 7% O2 & 12% CO
Particulate Loading, Dry Std. (mg/cu m)=	307.3	% 1.701412E+38
		30727.2
Particulate Loading, Actual (mg/cu m)=	299.3	
Emission Rate (kg/hr)=	10.66	

No Back Half Analysis

PM-10

FILE NAME - bagin1
RUN # - bagin1
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01_05.01

PROG.=VER 06/09/89
05-04-1994 12:56:05

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.240	0.67	59	57	53
2	0.540	0.67	59	57	54
3	0.540	0.67	59	57	54
4	0.750	0.67	59	57	54
5	1.100	0.67	59	57	54
6	1.100	0.67	59	57	54
7	0.600	0.67	59	56	53
8	1.200	0.67	59	57	53
9	0.960	0.67	59	57	54
10	0.700	0.67	59	57	54
11	0.830	0.67	59	52	48
12	0.920	0.67	59	51	46

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.3705	0.2889	0.0000	0.0816

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	109.2394	108.8606	120.0	0.3788
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

Pm-10

FILE NAME - bagin1t
RUN # - bagin1t
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-05-1994 11:15:56

Initial Meter Volume (Cubic Feet)=	847.042
Final Meter Volume (Cubic Feet)=	898.530
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	52.878
Gas Volume (Dry Standard Cubic Feet)=	52.915
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	54
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.790
Average Stack Temperature (F)=	59
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	0.8733
% Isokinetic=	94.5
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	120.0
Nozzle Diameter (Inches)=	0.172
Stack Axis #1 (Inches)=	36.0
Stack Axis #2 (Inches)=	36.0
Circular Stack	
Stack Area (Square Feet)=	7.07
Stack Velocity (Actual, Feet/min)=	2,967
Flow Rate (Actual, Cubic ft/min)=	20,974
Flow rate (Standard, Wet, Cubic ft/min)=	20,753
Flow Rate (Standard, Dry, Cubic ft/min)=	20,439

Particulate Loading - Front Half

Particulate Weight (g)=	4.5862	Corr. to 7% O2 & 12% C
Particulate Loading, Dry Std. (gr/scf)=	1.3347	% 1.701412E+38
		133.4729
Particulate Loading, Actual (gr/cu ft)=	1.3001	
Emission Rate (lb/hr)=	233.80	

No Back Half Analysis

Filterable PM

RUN NO. ~~Outlet~~ INLET #2
DATE 11-09-93

SAMPLING LOCATION Baghouse Inlet
PROJECT NO. 4601-01-05-01

p. 1 of 1
OPERATOR NEal

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min	GAS METER READING (V_m), ft³ INITIAL 899.746 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1	14:40/60		926.755	0.24	0.67	0.67	64	71	69	3.0	71					
2	14:35/55		924.445	0.54	0.67	0.67	64	71	68	3.0	75					
3	14:30/50		922.145	0.54	0.67	0.67	63	71	68	3.0	79					
4	14:25/45		919.865	0.75	0.67	0.67	64	71	68	3.0	85					
5	14:20/40		917.580	1.10	0.67	0.67	64	71	68	3.0	86					
6	14:15/35		915.385	1.10	0.67	0.67	63	71	67	3.0	84					
7	14:10/30		913.010	0.60	0.67	0.67	64	70	67	3.0	82					
8	14:05/25		911.230	1.20	0.67	0.67	64	70	67	3.0	82					
9	14:00/20		908.950	0.96	0.67	0.67	63	69	66	3.0	79					
10	13:55/15		906.540	0.70	0.67	0.67	63	68	65	3.0	77					
11	13:50/10		904.360	0.83	0.67	0.67	63	66	65	3.0	76					
12	13:45/5		902.087	0.92	0.67	0.67	63	65	64	3.0	73					
	13:40/0															

FINAL LEAK CHECK 0.005 AT 3 PSI

COMMENTS

INITIAL LEAK CHECK = 0.001

METHOD 201A/202

FIELD LABORATORY SETUP DATA Inlet

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: ~~Kiln Stack No. 3~~ Baghouse Inlet # 2

Run No. 2 Sampling Train No. P10-2 Sample Box No. _____
Set up person(s): Jy M C Date 11-9-93
Transfer to Sampler: Sample Box Leak Check: _____cfm @ _____in.Hg vacuum

Relinquished By Jy M C Received By Dan Neal Date/Time 11-9-93 1330

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
PM-10 Preseparator	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
90° Bypass	*	Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back		Filter I.D.No.:		
Short 90° Connector		5F8		
1st Impinger (Short-stem Mod-GBS)		~~50~~ 100 mLs	469.9	572.1
U-Connector (A)		H_2O		
2nd Impinger (GBS)		100 mLs	472.5	576.8
U-Connector (B)		H_2O		
3rd Impinger (GBS)		Empty	—	461.1
U-Connector (C)				
4th Impinger (Mod-GBS)		~200 g indicating		697.9
Impinger Outlet Connector	VH-2	silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Inlet

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Baghouse Inlet

Baghouse Inlet #2

Run No. 2 Sampling Train No. P10-2 Sample Box No. _____
Transfer for Recovery:

Relinquished By Dan Nard Received By Jay M. C. Date/Time 11-9-93 1700
Sample box recovery person(s): Jay M. C. Date: 11-9-93
Probe recovery person(s): Jay M. C. Date: 11-9-93

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt. (g)	568.1	575.6	461.9	706.9					
Initial Wt. (g)	572.1	576.8	461.1	697.9					
Net Wt. (g)	(4.0)	(1.2)	.8	9.0					

[Total Condensate Collected (g): 4.6]

Description and color: _____
Impingers: >>>>>>>>>>>>> 1-3 <<<
Sample Number: _____ _____ _____ >>>> _____
Sample Bottle Tare Wt. (g) _____ _____ _____ _____
Sample Bottle Gross Wt. (g) _____ _____ _____ <----------Before Rinses
Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C
Sample Bottle Final Wt. (g) _____ _____ _____ _____ After Rinses
Net Sample Wt. (g) _____ _____ _____ _____

FRONT HALF RECOVERY

Sample Number:	2 001	2 002	003
Sample Bottle Tare Wt. (g)		44	IN-STK FILTER _____
Sample Bottle Gross Wt. (g)	231.0	120.6	
Rinse Solution	Acetone	Acetone	

Sample Number: _____ _____ _____
Sample Bottle Tare Wt. (g) _____ _____ Filter
Rinse Solution: Acetone Description and Color:
Components Rinsed****: probe liner, filter holder front w/Acetone _____
Sample Bottle Gross Wt. (g) _____
Net Acetone Sample Wt. (g) _____
Sample Bottle Final Wt. (g) _____
Net Sample Wt. (g) _____

COMMENTS:

FILE NAME - bagin2
RUN # - bagin2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:59:35

Initial Meter Volume (Cubic Feet)=	899.746
Final Meter Volume (Cubic Feet)=	926.755
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	27.738
Gas Volume (Dry Standard Cubic Feet)=	27.028
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	68
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.790
Average Stack Temperature (F)=	64
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	0.8733
% Isokinetic=	97.0
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	60.0
Nozzle Diameter (Inches)=	0.172
Stack Axis #1 (Inches)=	36.0
Stack Axis #2 (Inches)=	36.0
Circular Stack	
Stack Area (Square Feet)=	7.07
Stack Velocity (Actual, Feet/min)=	2,980
Flow Rate (Actual, Cubic ft/min)=	21,065
Flow rate (Standard, Wet, Cubic ft/min)=	20,663
Flow Rate (Standard, Dry, Cubic ft/min)=	20,351

Particulate Loading - Front Half

Particulate Weight (g)=	0.2340	Corr. to 7% 02 & 12% C
Particulate Loading, Dry Std. (gr/scf)=	0.1333	% 2.268297E+37
		13.3319
Particulate Loading, Actual (gr/cu ft)=	0.1287	
Emission Rate (lb/hr)=	23.25	

No Back Half Analysis

PM-10

* * METRIC UNITS * *

FILE NAME - bagin2
RUN # - bagin2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:59:37

Initial Meter Volume (Cubic Meters)=	25.477
Final Meter Volume (Cubic Meters)=	26.242
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	0.785
Gas Volume (Dry Standard Cubic Meters)=	0.765
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-9
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (C)=	20
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	20.1
Average Stack Temperature (C)=	18
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (mm H20)=	4.4014
% Isokinetic=	97.0
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	60.0
Nozzle Diameter (mm)=	4.37
Stack Axis #1 (Meters)=	0.914
Stack Axis #2 (Meters)=	0.914
Circular Stack	
Stack Area (Square Meters)=	0.657
Stack Velocity (Actual, m/min)=	908
Flow rate (Actual, Cubic m/min)=	596
Flow rate (Standard, Wet, Cubic m/min)=	585
Flow rate (Standard, Dry, Cubic m/min)=	576

Particulate Loading - Front Half

Particulate Weight (g)=	0.2340	Corr. to 7% 02 & 12% C
Particulate Loading, Dry Std. (mg/cu m)=	305.7	% 1.701412E+38
		30573.0
Particulate Loading, Actual (mg/cu m)=	295.2	
Emission Rate (kg/hr)=	10.56	

No Back Half Analysis

PM-10

FILE NAME - bagin2
RUN # - bagin2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:59:38

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.240	0.67	64	71	69
2	0.540	0.67	64	71	68
3	0.540	0.67	63	71	68
4	0.750	0.67	64	71	68
5	1.100	0.67	64	71	68
6	1.100	0.67	63	71	67
7	0.600	0.67	64	70	67
8	1.200	0.67	64	70	67
9	0.960	0.67	63	69	66
10	0.700	0.67	63	68	65
11	0.830	0.67	63	66	65
12	0.920	0.67	63	65	64

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.3323	0.2874	0.0000	0.0449

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	86.4034	86.2143	97.0	0.1891
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

FILE NAME - bagin2t
RUN # - bagin2t
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01_05.01

PROG.=VER 06/09/89
05-05-1994 11:17:40

Initial Meter Volume (Cubic Feet)=	899.746
Final Meter Volume (Cubic Feet)=	926.755
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	27.738
Gas Volume (Dry Standard Cubic Feet)=	27.028
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	68
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.790
Average Stack Temperature (F)=	64
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	0.8733
% Isokinetic=	97.0
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	60.0
Nozzle Diameter (Inches)=	0.172
Stack Axis #1 (Inches)=	36.0
Stack Axis #2 (Inches)=	36.0
Circular Stack	
Stack Area (Square Feet)=	7.07
Stack Velocity (Actual, Feet/min)=	2,980
Flow Rate (Actual, Cubic ft/min)=	21,065
Flow rate (Standard, Wet, Cubic ft/min)=	20,663
Flow Rate (Standard, Dry, Cubic ft/min)=	20,351

Particulate Loading - Front Half

Particulate Weight (g)=	4.1066	Corr. to 7% 02 & 12% CC
Particulate Loading, Dry Std. (gr/scf)=	2.3398	% 1.701412E+38
		233.9809
Particulate Loading, Actual (gr/cu ft)=	2.2596	
Emission Rate (lb/hr)=	408.08	

No Back Half Analysis

Filterable PM

METHOD 501A / PM-10 TRAIN

RUN NO. INLET #3
DATE 9-11-93

SAMPLING LOCATION BAGHOUSE INLET
PROJECT NO. 4601-01-05-01

P. 1 of 1
OPERATOR NEAL

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min		GAS METER READING (V_m), ft³ INITIAL 926.807 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1	8:55	60		953.435	0.24	0.67	0.67	56	57	54	4	52					
2	8:50	55		951.200	0.54	0.67	0.67	56	57	54	4	51					
3	8:45	50		948.945	0.54	0.67	0.67	56	57	53	4	50					
4	8:40	45		946.683	0.75	0.67	0.67	56	56	53	4	50					
5	8:35	40		944.395	1.10	0.67	0.67	56	55	52	4	49					
6	8:30	35		942.175	1.10	0.67	0.67	56	54	51	4	48					
7	8:25	30		940.035	0.60	0.67	0.67	55	54	51	4	47					
8	8:20	25		937.885	1.20	0.67	0.67	55	53	51	4	46					
9	8:15	20		935.723	0.96	0.67	0.67	55	52	50	4	46					
10	8:10	15		933.538	0.70	0.67	0.67	54	51	49	4	44					
11	8:05	10		931.330	0.83	0.67	0.67	54	50	48	4	44					
12	8:00	5		929.058	0.52	0.67	0.67	54	49	48	4	46					
	7:55	0							~~50~~	~~47~~							

COMMENTS

INITIAL LEAK CHECK = 0.001
FINAL LEAK CHECK = 0.005

A 21

METHOD 201A/202

FIELD LABORATORY SETUP DATA Inlet

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: ~~Kiln Stack~~ Baghouse No. 3

Run No. 3 Sampling Train No. P10-2 Sample Box No. _____ _____
Set up person(s): J. M. C. Date 11-9-93
Transfer to Sampler: Sample Box Leak Check: _____cfm @ _____in.Hg vacuum

Relinquished By _____ Received By _____ Date/Time _____ _____

TRAIN COMPONENT	COMPONENT NO.		LOADING DATA	
			Initial Weights (grams)**	
			Empty	Loaded
PM-10 Preseparator	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
90° Bypass	*	Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back		Filter I.D.No.:		
Short 90° Connector		SF6		
1st Impinger				
(Short-stem Mod-GBS)		50 mLs	469.9	568.1
U-Connector (A)		H_2O		
2nd Impinger (GBS)		100 mLs	472.5	575.6
U-Connector (B)		H_2O		
3rd Impinger (GBS)		Empty	—	461.9
U-Connector (C)				
4th Impinger (Mod-GBS)		~200 g indicating		706.9
Impinger Outlet Connector		silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Inlet

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Baghouse Inlet

Run No. 3 Sampling Train No. P10-2 Sample Box No. _____ _____
Transfer for Recovery:

Relinquished By _____ Received By J M. Cu Date/Time 11-11-93 10 cw
Sample box recovery person(s): J. M. Cu Date: _____
Probe recovery person(s): [signature] Date: 11-11-93

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt. (g)	569.3	578.5	462.1	717.6					
Initial Wt. (g)	568.1	575.6	461.9	706.9					
Net Wt. (g)	1.2	2.9	.2	10.7					

[Total Condensate Collected (g): 15.0]

Description and color: clear clear clear 25%
Impingers: >>>>>>>>>>>>> 1-3 <<<
Sample Number: _____ _____ _____ >>>> _____
Sample Bottle Tare Wt. (g) _____ _____ _____ _____
Sample Bottle Gross Wt. (g) _____ _____ _____ <----------Before Rinses
Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C
Sample Bottle Final Wt. (g) _____ _____ _____ _____ After Rinses
Net Sample Wt. (g) _____ _____ _____ _____

FRONT HALF RECOVERY

Sample Number:	3001	3002	3003
Sample Bottle Tare Wt. (g)	92.7	98.6	IN-STK FILTER 5F6
Sample Bottle Gross Wt. (g)	149.7	130.6	
Rinse Solution	Acetone	Acetone	

Sample Number: _____ _____ _____
Sample Bottle Tare Wt. (g) _____ _____ Filter Description and Color:
Rinse Solution: Acetone
Components Rinsed****: probe liner, filter holder front w/Acetone — Gray
Sample Bottle Gross Wt. (g) _____
Net Acetone Sample Wt. (g) _____
Sample Bottle Final Wt. (g) _____
Net Sample Wt. (g) _____

COMMENTS: CAE 2CC14
Filter 5F6

FILE NAME - bagin3
RUN # - bagin3
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 13:01:02

Initial Meter Volume (Cubic Feet)=	926.807	
Final Meter Volume (Cubic Feet)=	953.435	
Meter Factor=	1.027	
Final Leak Rate (cu ft/min)=	0.001	
Net Meter Volume (Cubic Feet)=	27.347	
Gas Volume (Dry Standard Cubic Feet)=	27.464	
Barometric Pressure (in Hg)=	29.13	
Static Pressure (Inches H20)=	-0.37	
Percent Oxygen=	21.0	
Percent Carbon Dioxide=	0.0	
Percent Water=	1.5	**Saturated Stack**
Average Meter Temperature (F)=	52	
Average Delta H (in H20)=	0.67	
Average Delta P (in H20)=	0.790	
Average Stack Temperature (F)=	55	
Dry Molecular Weight=	28.84	
Wet Molecular Weight=	28.68	
Average Square Root of Delta P (in H20)=	0.8733	
% Isokinetic=	97.8	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	60.0	
Nozzle Diameter (Inches)=	0.172	
Stack Axis #1 (Inches)=	36.0	
Stack Axis #2 (Inches)=	36.0	
Circular Stack		
Stack Area (Square Feet)=	7.07	
Stack Velocity (Actual, Feet/min)=	2,957	
Flow Rate (Actual, Cubic ft/min)=	20,899	
Flow rate (Standard, Wet, Cubic ft/min)=	20,828	
Flow Rate (Standard, Dry, Cubic ft/min)=	20,513	

Particulate Loading - Front Half

Particulate Weight (g)=	0.2242	Corr. to 7% O2 & 12% CO
Particulate Loading, Dry Std. (gr/scf)=	0.1257	% 2.138926E+37
		12.5715
Particulate Loading, Actual (gr/cu ft)=	0.1233	
Emission Rate (lb/hr)=	22.10	

No Back Half Analysis

PM-10

* * METRIC UNITS * *

FILE NAME - bagin3
RUN # - bagin3
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 13:01:03

Initial Meter Volume (Cubic Meters)=	26.243	
Final Meter Volume (Cubic Meters)=	26.997	
Meter Factor=	1.027	
Final Leak Rate (cu m/min)=	0.0000	
Net Meter Volume (Cubic Meters)=	0.774	
Gas Volume (Dry Standard Cubic Meters)=	0.778	
Barometric Pressure (mm Hg)=	740	
Static Pressure (mm H20)=	-9	
Percent Oxygen=	21.0	
Percent Carbon Dioxide=	0.0	
Percent Water=	1.5	**Saturated Stack**
Average Meter Temperature (C)=	11	
Average Delta H (mm H20)=	17.0	
Average Delta P (mm H20)=	20.1	
Average Stack Temperature (C)=	13	
Dry Molecular Weight=	28.84	
Wet Molecular Weight=	28.68	
Average Square Root of Delta P (mm H20)=	4.4014	
% Isokinetic=	97.8	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	60.0	
Nozzle Diameter (mm)=	4.37	
Stack Axis #1 (Meters)=	0.914	
Stack Axis #2 (Meters)=	0.914	
Circular Stack		
Stack Area (Square Meters)=	0.657	
Stack Velocity (Actual, m/min)=	901	
Flow rate (Actual, Cubic m/min)=	592	
Flow rate (Standard, Wet, Cubic m/min)=	590	
Flow rate (Standard, Dry, Cubic m/min)=	581	

Particulate Loading - Front Half

Particulate Weight (g)=	0.2242	Corr. to 7% O2 & 12% CO
Particulate Loading, Dry Std. (mg/cu m)=	288.3	% 1.701412E+38
		28829.3
Particulate Loading, Actual (mg/cu m)=	282.9	
Emission Rate (kg/hr)=	10.03	

No Back Half Analysis

PM-10

FILE NAME - bagin3
RUN # - bagin3
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 13:01:04

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.240	0.67	56	57	54
2	0.540	0.67	56	57	54
3	0.540	0.67	56	57	53
4	0.750	0.67	56	56	53
5	1.100	0.67	56	55	52
6	1.100	0.67	56	54	51
7	0.600	0.67	55	54	51
8	1.200	0.67	55	53	51
9	0.960	0.67	55	52	50
10	0.700	0.67	54	51	49
11	0.830	0.67	54	50	48
12	0.920	0.67	54	49	48

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.3241	0.2794	0.0000	0.0447

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	115.8773	115.6978	68.0	0.1795
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

PM-10

FILE NAME - bagin3t
RUN # - bagin3t
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01_05.01

PROG.=VER 06/09/89
05-05-1994 11:20:19

Initial Meter Volume (Cubic Feet)=	926.807	
Final Meter Volume (Cubic Feet)=	953.435	
Meter Factor=	1.027	
Final Leak Rate (cu ft/min)=	0.001	
Net Meter Volume (Cubic Feet)=	27.347	
Gas Volume (Dry Standard Cubic Feet)=	27.464	
Barometric Pressure (in Hg)=	29.13	
Static Pressure (Inches H20)=	-0.37	
Percent Oxygen=	21.0	
Percent Carbon Dioxide=	0.0	
Percent Water=	1.5	**Saturated Stack**
Average Meter Temperature (F)=	52	
Average Delta H (in H20)=	0.67	
Average Delta P (in H20)=	0.790	
Average Stack Temperature (F)=	55	
Dry Molecular Weight=	28.84	
Wet Molecular Weight=	28.68	
Average Square Root of Delta P (in H20)=	0.8733	
% Isokinetic=	97.8	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	60.0	
Nozzle Diameter (Inches)=	0.172	
Stack Axis #1 (Inches)=	36.0	
Stack Axis #2 (Inches)=	36.0	
Circular Stack		
Stack Area (Square Feet)=	7.07	
Stack Velocity (Actual, Feet/min)=	2,957	
Flow Rate (Actual, Cubic ft/min)=	20,899	
Flow rate (Standard, Wet, Cubic ft/min)=	20,828	
Flow Rate (Standard, Dry, Cubic ft/min)=	20,513	

Particulate Loading - Front Half

Particulate Weight (g)=	4.5845	Corr. to 7% 02 & 12% CO2
Particulate Loading, Dry Std. (gr/scf)=	2.5707	% 1.701412E+38
		257.0683
Particulate Loading, Actual (gr/cu ft)=	2.5223	
Emission Rate (lb/hr)=	451.93	

No Back Half Analysis

Filterable PM

A.1.2 Grinding/Screening Baghouse Outlet PM/PM-10

RUN NO. Outlet # 1
DATE 11-09-93

SAMPLING LOCATION [illegible] Outlet
PROJECT NO. [illegible]

p. 1 of 1
OPERATOR [illegible]

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min	GAS METER READING (V_m), ft³ INITIAL 709.505 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1																
2																
3																
4	14:46/368		868.673	1.9	0.67	0.67	60°	85	79	5.0	64					
5	14:06/328		877.765	2.1	0.67	0.67	60°	84	77	5.0	64°					
6	13:26/288		857.105	1.9	0.67	0.67	59°	83	76	5.0	63°					
7	12:45/247		834.75	1.8	0.67	0.67	59°	82	75	5.0	60°					
8	12:04/206		813.025	1.8	0.67	0.67	57°	~~6281~~	~~6274~~	5.0	54°					
9	11:21/163		791.175	1.8	0.67	0.67	57°	~~6281~~	~~6273~~	5.0	53°					
10	10:40/122		769.525	2.3	0.67	0.67	57°	~~6279~~	~~6270~~	5.0	54°					
11	9:58\80		748.110	2.3	0.67	0.67	57°	~~6276~~	~~6265~~	5.0	54°					
12	9:17\39	~~728.455~~	728.455	1.9	0.67	0.67	57°	63	62	5.0	54°					
	9:35\0															

FINAL LEAK CHECK 0.004 @ 5 PSI

COMMENTS

Initial leak check [illegible]

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METHOD 201A/202
FIELD LABORATORY SETUP DATA

Out ~~Inlet~~

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 1 Sampling Train No. PM-1 Sample Box No. _____
Set up person(s): Jay M. G Date 11-8-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By Don Nard Received By J. M. G Date/Time 11-9-93 1400

TRAIN COMPONENT	COMPONENT NO.		LOADING DATA	
			Initial Weights (grams)**	
			Empty	Loaded
PM-10 Preseparator	•			
~~Probe (Liner-Glass)~~	•			
~~Female Probe Blank-off~~				
~~90° Bypass~~	•	Filter Type:		
~~Filter Holder Front~~		Whatman QM-A		
~~Filter Holder Back~~		Filter I.D.No.:		
~~Short 90° Connector~~				
1st Impinger				
(Short-stem Mod-GBS)		~~50~~ 100 mLs	469.9	579.9*
U-Connector (A)		H_2O		
2nd Impinger (GBS)	I-120	100 mLs	474.1	574.7
U-Connector (B)		H_2O		
3rd Impinger Mod (GBS)		Empty	—	463.1
U-Connector (C)				
4th Impinger (Mod-GBS)	I-302	~200 g indicating		654.1
Impinger Outlet Connector	UH-32	silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

* calculated

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Outlet

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Baghouse Inlet

Run No. 1 Sampling Train No. P10-1 Sample Box No. _____
Transfer for Recovery:

Relinquished By Don Neal Received By J. McC Date/Time 11-9-93 1700
Sample box recovery person(s): J. McC Date: _____
Probe recovery person(s): J. McC Date: 11-9-93

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt. (g)	565.2	572.3	464.6	682.4*					
Initial Wt. (g)	579.9	574.7	463.1	654.1					
Net Wt. (g)	(14.9)	(2.4)	1.5	28.3					

[Total Condensate Collected (g): 12.5]

Description and color: _____
Impingers: >>>>>>>>>>>>> 1-3 <<<
Sample Number: _____ _____ _____>>>>_____
Sample Bottle Tare Wt. (g) _____ _____ _____ _____
Sample Bottle Gross Wt. (g) _____ _____ _____ <----------Before Rinses
Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C
Sample Bottle Final Wt. (g) _____ _____ _____ _____ After Rinses
Net Sample Wt. (g) _____ _____ _____ _____

FRONT HALF RECOVERY

Sample Number:	1006	1007	1008
Sample Bottle Tare Wt. (g)	173.4	98.1	IN-STK FILTER _____
Sample Bottle Gross Wt. (g)	231.9	121.7	
Rinse Solution	Acetone	Acetone	

Sample Number: _____ _____ gray
Sample Bottle Tare Wt. (g) _____ _____ Filter
Rinse Solution: Acetone Description and Color: _____
Components Rinsed****: probe liner, filter holder front w/Acetone
Sample Bottle Gross Wt. (g) _____
Net Acetone Sample Wt. (g) _____
Sample Bottle Final Wt. (g) _____
Net Sample Wt. (g) _____

COMMENTS:

Saturated

FILE NAME - bagout1
RUN # - bagout1
LOCATION - baghouse
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:46:17

Initial Meter Volume (Cubic Feet)=	708.505
Final Meter Volume (Cubic Feet)=	888.673
Meter Factor=	1.010
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	181.970
Gas Volume (Dry Standard Cubic Feet)=	175.437
Barometric Pressure (in Hg)=	29.27
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	76
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	1.990
Average Stack Temperature (F)=	58
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	1.4092
% Isokinetic=	92.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	350.0
Nozzle Diameter (Inches)=	0.146
Stack Axis #1 (Inches)=	32.0
Stack Axis #2 (Inches)=	32.0
Circular Stack	
Stack Area (Square Feet)=	5.59
Stack Velocity (Actual, Feet/min)=	4,773
Flow Rate (Actual, Cubic ft/min)=	26,656
Flow rate (Standard, Wet, Cubic ft/min)=	26,541
Flow Rate (Standard, Dry, Cubic ft/min)=	26,140

Particulate Loading - Front Half

Particulate Weight (g)=	0.0027	Corr. to 7% O2 & 12%
Particulate Loading, Dry Std. (gr/scf)=	0.0002	% 4.042677E+34
		0.0238
Particulate Loading, Actual (gr/cu ft)=	0.0002	
Emission Rate (lb/hr)=	0.05	

No Back Half Analysis

PM-10

* * METRIC UNITS * *

FILE NAME - bagout1
RUN # - bagout1
LOCATION - baghouse
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/8
05-04-1994 12:46

Initial Meter Volume (Cubic Meters)=	20.062
Final Meter Volume (Cubic Meters)=	25.164
Meter Factor=	1.010
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	5.153
Gas Volume (Dry Standard Cubic Meters)=	4.968
Barometric Pressure (mm Hg)=	743
Static Pressure (mm H20)=	-9
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (C)=	25
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	50.5
Average Stack Temperature (C)=	15
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (mm H20)=	7.1019
% Isokinetic=	92.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	350.0
Nozzle Diameter (mm)=	3.71
Stack Axis #1 (Meters)=	0.813
Stack Axis #2 (Meters)=	0.813
Circular Stack	
Stack Area (Square Meters)=	0.519
Stack Velocity (Actual, m/min)=	1,455
Flow rate (Actual, Cubic m/min)=	755
Flow rate (Standard, Wet, Cubic m/min)=	752
Flow rate (Standard, Dry, Cubic m/min)=	740

Particulate Loading - Front Half

Particulate Weight (g)=	0.0027	Corr. to 7% 02 & 1
Particulate Loading, Dry Std. (mg/cu m)=	0.5	% 9.270783E+37
		5
Particulate Loading, Actual (mg/cu m)=	0.5	
Emission Rate (kg/hr)=	0.02	

No Back Half Analysis

PM-10

FILE NAME - bagout1
RUN # - bagout1
LOCATION - baghouse
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:46:19

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	1.900	0.67	57	63	62
2	2.300	0.67	57	76	65
3	2.300	0.67	57	79	70
4	1.800	0.67	57	81	73
5	1.800	0.67	57	81	74
6	1.800	0.67	59	82	75
7	1.900	0.67	59	83	76
8	2.100	0.67	60	84	77
9	1.900	0.67	60	85	79
10	2.100	0.67	60	85	79

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.2894	0.2868	0.0000	0.0026

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	101.3541	101.3540	56.0	0.0001
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

PM-10

FILE NAME - bagout1t
RUN # - bagout1t
LOCATION - baghouse
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-05-1994 11:23:08

Initial Meter Volume (Cubic Feet)=	708.505
Final Meter Volume (Cubic Feet)=	888.673
Meter Factor=	1.010
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	181.970
Gas Volume (Dry Standard Cubic Feet)=	175.437
Barometric Pressure (in Hg)=	29.27
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	76
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	1.990
Average Stack Temperature (F)=	58
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	1.4092
% Isokinetic=	92.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	350.0
Nozzle Diameter (Inches)=	0.146
Stack Axis #1 (Inches)=	32.0
Stack Axis #2 (Inches)=	32.0
Circular Stack	
Stack Area (Square Feet)=	5.59
Stack Velocity (Actual, Feet/min)=	4,773
Flow Rate (Actual, Cubic ft/min)=	26,656
Flow rate (Standard, Wet, Cubic ft/min)=	26,541
Flow Rate (Standard, Dry, Cubic ft/min)=	26,140

Particulate Loading - Front Half

Particulate Weight (g)=	0.0133	Corr. to 7% O2 & 12%
Particulate Loading, Dry Std. (gr/scf)=	0.0012	% 1.986977E+35
		0.116
Particulate Loading, Actual (gr/cu ft)=	0.0011	
Emission Rate (lb/hr)=	0.26	

No Back Half Analysis

F Hardable PM

METHOD 201A / PM-10 TRAIN

RUN NO. OUTLET #2
DATE 9-11-93

SAMPLING LOCATION BAGHOUSE OUTLET
PROJECT NO. 4601-01-05-01

p. 1 of 1
OPERATOR NEAL

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min	GAS METER READING (V_m), ft³ INITIAL 878.745 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1	14:27		1110.540	1.9	0.67	0.67	58	85	80	3	52					
2	~~14:30~~		~~1110.540~~	2.3	0.67	0.67	58	85	80	3	52					
3	14.15		~~1110.540~~	2.3	0.67	0.67	58	85	80	3	52					
4	13:30			1.8	0.67	0.67	58	84	79	3	52					
5	12:50			1.8	0.67	0.67	58	82	75	3	52					
6	12:10			1.8	0.67	0.67	58	82	74	3	51					
7	11:31			1.9	0.67	0.67	58	81	72	3	49					
8	10:53			2.1	0.67	0.67	58	80	70	3	50					
9	10:10 163			1.9	0.67	0.67	56	79	71	3	54					
10	9:29 122			2.0	0.67	0.67	55	76	68	3	54					
11	8:47 80		939.005	1.9	0.67	0.67	53	70	61	3	54					
12	8:08 39		918.250	1.7	0.67	0.67	50	62	54	3	56					
	7:27 0															

COMMENTS

INITIAL LEAK CHECK = 0.001
Final Leak Check = 0.001

A 37

METHOD 201A/202

FIELD LABORATORY SETUP DATA ~~Inlet~~ Outlet

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 2 Sampling Train No. P10-3 Sample Box No. _____ _____
Set up person(s): Jy McC Date 11-8-93
Transfer to Sampler: ✓ Sample Box Leak Check: _____cfm @ _____in.Hg vacuum

Relinquished By _____ Received By _____ Date/Time _____ _____

TRAIN COMPONENT	COMPONENT NO.		LOADING DATA		
			Initial Weights (grams)**		
				Empty	Loaded
PM-10 Preseparator	*				
~~Probe (Liner-Glass)~~	*				
~~Female Probe Blank-off~~					
~~90° Bypass~~	*	Filter Type:			
~~Filter Holder Front~~		Whatman QM-A			
~~Filter~~ Holder Back		Filter I.D.No.:			
~~Short 90° Connector~~		5F4			
1st Impinger					
(Short-stem Mod-GBS)		150 mLs		470.7	570.4
U-Connector (A)		H_2O			
2nd Impinger (GBS)	I-112	100 mLs		474.8	574.8
U-Connector (B)		H_2O			
3rd Impinger Mod-(GBS)	B-143	Empty		—	462.6
U-Connector (C)					
4th Impinger (Mod-GBS)	~~B-7x3~~	~200 g indicating			721.1
Impinger Outlet Connector	UH-2	silica gel			

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Outlet

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Baghouse Inlet

Run No. 2 Sampling Train No. P10-3 Sample Box No. _____ _____
Transfer for Recovery:

Relinquished By _____ Received By _____ Date/Time _____ _____
Sample box recovery person(s): _____ Date: _____
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt. (g)	560.8	571.5	465.7	759.5					
Initial Wt. (g)	570.7	574.8	462.6	721.1					
Net Wt. (g)	(9.6)	(3.3)	3.1	38.4					

[Total Condensate Collected (g): 28.6]

Description and color: _____ _____ _____ 17. _____ _____ _____ _____ _____
Impingers: >>>>>>>>>>>>> 1-3 <<<
Sample Number: _____ _____ _____>>>>_____
Sample Bottle Tare Wt. (g) _____ _____ _____ _____
Sample Bottle Gross Wt. (g) _____ _____ _____ <----------Before Rinses
Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C
Sample Bottle Final Wt. (g) _____ _____ _____ _____ After Rinses
Net Sample Wt. (g) _____ _____ _____ _____

FRONT HALF RECOVERY

Sample Number:	2006	2007	008
Sample Bottle Tare Wt. (g)	165.7	97.9	IN-STK FILTER _____
Sample Bottle Gross Wt. (g)	267.3	142.6	
Rinse Solution	Acetone	Acetone	

Sample Number: _____ _____ _____
Sample Bottle Tare Wt. (g) _____ _____ Filter Description and Color:
Rinse Solution: Acetone _____
Components Rinsed****: probe liner, filter holder front w/Acetone
Sample Bottle Gross Wt. (g) _____
Net Acetone Sample Wt. (g) _____
Sample Bottle Final Wt. (g) _____
Net Sample Wt. (g) _____

COMMENTS:

FILE NAME - bagout2
RUN # - bagout2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:51:08

Initial Meter Volume (Cubic Feet)=	898.745
Final Meter Volume (Cubic Feet)=	1110.540
Meter Factor=	1.010
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	213.913
Gas Volume (Dry Standard Cubic Feet)=	206.567
Barometric Pressure (in Hg)=	29.27
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	76
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	1.950
Average Stack Temperature (F)=	56
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	1.3949
% Isokinetic=	91.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	420.0
Nozzle Diameter (Inches)=	0.146
Stack Axis #1 (Inches)=	32.0
Stack Axis #2 (Inches)=	32.0
Circular Stack	
Stack Area (Square Feet)=	5.59
Stack Velocity (Actual, Feet/min)=	4,716
Flow Rate (Actual, Cubic ft/min)=	26,337
Flow rate (Standard, Wet, Cubic ft/min)=	26,322
Flow Rate (Standard, Dry, Cubic ft/min)=	25,925

Particulate Loading - Front Half

Particulate Weight (g)=	0.0027	Corr. to 7% O2 & 12%
Particulate Loading, Dry Std. (gr/scf)=	0.0002	% 3.428217E+34
		0.0201
Particulate Loading, Actual (gr/cu ft)=	0.0002	
Emission Rate (lb/hr)=	0.04	

No Back Half Analysis

PM-10

* * METRIC UNITS * *

FILE NAME - bagout2
RUN # - bagout2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
05-04-1994 12:51:10

Initial Meter Volume (Cubic Meters)=	25.449
Final Meter Volume (Cubic Meters)=	31.446
Meter Factor=	1.010
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	6.057
Gas Volume (Dry Standard Cubic Meters)=	5.849
Barometric Pressure (mm Hg)=	743
Static Pressure (mm H20)=	-9
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (C)=	24
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	49.5
Average Stack Temperature (C)=	14
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (mm H20)=	7.0301
% Isokinetic=	91.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	420.0
Nozzle Diameter (mm)=	3.71
Stack Axis #1 (Meters)=	0.813
Stack Axis #2 (Meters)=	0.813
Circular Stack	
Stack Area (Square Meters)=	0.519
Stack Velocity (Actual, m/min)=	1,437
Flow rate (Actual, Cubic m/min)=	746
Flow rate (Standard, Wet, Cubic m/min)=	745
Flow rate (Standard, Dry, Cubic m/min)=	734

Particulate Loading - Front Half

Particulate Weight (g)=	0.0027	Corr. to 7% O2 & 12% CO
Particulate Loading, Dry Std. (mg/cu m)=	0.5	% 7.861686E+37
		46.2
Particulate Loading, Actual (mg/cu m)=	0.5	
Emission Rate (kg/hr)=	0.02	

No Back Half Analysis

PM-10

FILE NAME - bagout2
RUN # - bagout2
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01_.05.01

PROG.=VER 06/09/89
05-04-1994 12:51:11

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	1.700	0.67	50	62	54
2	1.900	0.67	53	70	61
3	2.000	0.67	53	76	68
4	1.900	0.67	56	78	71
5	2.100	0.67	58	80	70
6	1.900	0.67	58	81	72
7	1.800	0.67	58	82	74
8	1.800	0.67	58	82	75
9	1.800	0.67	58	84	79
10	2.300	0.67	58	85	80
11	2.300	0.67	58	85	80
12	1.900	0.67	58	85	80

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.2882	0.2861	0.0000	0.0021

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	85.1247	85.1241	98.0	0.0006
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

PM-10

FILE NAME - bagout2t
RUN # - bagout2t
LOCATION - baghouse
DATE - 11-09-93
PROJECT # - 4601.01_05.01

PROG.=VER 06/09/89
05-05-1994 11:25:34

Initial Meter Volume (Cubic Feet)=	898.745
Final Meter Volume (Cubic Feet)=	1110.540
Meter Factor=	1.010
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	213.913
Gas Volume (Dry Standard Cubic Feet)=	206.567
Barometric Pressure (in Hg)=	29.27
Static Pressure (Inches H20)=	-0.37
Percent Oxygen=	21.0
Percent Carbon Dioxide=	0.0
Percent Water=	1.5
Average Meter Temperature (F)=	76
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	1.950
Average Stack Temperature (F)=	56
Dry Molecular Weight=	28.84
Wet Molecular Weight=	28.68
Average Square Root of Delta P (in H20)=	1.3949
% Isokinetic=	91.1
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	420.0
Nozzle Diameter (Inches)=	0.146
Stack Axis #1 (Inches)=	32.0
Stack Axis #2 (Inches)=	32.0
Circular Stack	
Stack Area (Square Feet)=	5.59
Stack Velocity (Actual, Feet/min)=	4,716
Flow Rate (Actual, Cubic ft/min)=	26,337
Flow rate (Standard, Wet, Cubic ft/min)=	26,322
Flow Rate (Standard, Dry, Cubic ft/min)=	25,925

Particulate Loading - Front Half

Particulate Weight (g)=	0.0109	Corr. to 7% 02 & 12% CC
Particulate Loading, Dry Std. (gr/scf)=	0.0008	% 1.383142E+35
		0.0813
Particulate Loading, Actual (gr/cu ft)=	0.0008	
Emission Rate (lb/hr)=	0.18	

No Back Half Analysis

Filterable PM

A.1.3 Grinding/Screening Ambient PM-10

Temperature (T_a) 62 °F

Barometric Pressure (P_a) 29.4 in Hg

MIDWEST RESEARCH INSTITUTE

WEST Run #1

PM_{10} Sampler Flow Determination

Project No.: 4601.01.05.01

Date: 11-11-93

By: Szydlo

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
1598	0.945		1.2	0.95918	41.98	42.43
"	0.950		1.3	0.95578	41.87	42.32
"	1015		1.3	0.95578	41.87	42.32
"	1030		1.3	0.95578	41.87	42.32
"	1045		1.3	0.95578	41.87	42.32
"	1100		1.3	0.95578	41.87	42.32
"	1110		1.3	0.95578	41.87	42.32
"	1120		1.3	0.95578	41.87	42.32
"	1130		1.3	0.95578	41.87	42.32
"	1145		1.3	0.95578	41.87	42.32
			1.3	0.95578	41.87	42.32

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_f + .14)/13.61$

[c] $P_o/P_a = 1 - P_f/P_a$. P_f and P_a must have consistent units.

[d] From Look-Up Table.

[e] $Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460° + T_a}$

Temperature (T_a) 64 °F

Barometric Pressure (P_a) 29.4 in Hg

MIDWEST RESEARCH INSTITUTE

WEST Run # 2

PM_{10} Sampler Flow Determination

Project No.: 4601.01.05.01

Date: 11-11-93

By: Szydlo

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
1598	1230		1.4	0.952	41.66	41.95
"	1240		1.3	0.956	41.94	42.23
"	1250		1.4	0.952	41.66	41.95
"	1300		1.3	0.956	41.94	42.23
"	1320		1.3	0.956	41.94	42.23
"	1335		1.3	0.956	41.94	42.23
"	1345		1.3	0.956	41.94	42.23
"	1355		1.3	0.956	41.94	42.23
"	1415		1.3	0.956	41.94	42.23
"	1430		1.3	0.956	41.94	42.23

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_f + .14)/13.61$

[c] $P_o/P_a = 1 - P_f/P_a$. P_f and P_a must have consistent units.

[d] From Look-Up Table.

[e] $Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460° + T_a}$

Temperature (T_a) 65.9 °F

Barometric Pressure (P_a) 29.0 in Hg

MIDWEST RESEARCH INSTITUTE

EAST Run # 1

Project No.: 4601.01.05.01

Date: 11-09-94

By: Szydlo

PM_{10} Sampler Flow Determination

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
1600	1200		1.3	0.955	41.30	41.42
"	1210		1.3	0.955	41.30	41.42
"	1220		1.3	0.955	41.30	41.42
"	1230		1.3	0.955	41.30	41.42
"	1240		1.3	0.955	41.30	41.42
"	1250		1.3	0.955	41.30	41.42
"	1300		1.3	0.955	41.30	41.42
"	1320		1.3	0.955	41.30	41.42
"	1340		1.3	0.955	41.30	41.42
"	1400		1.3	0.955	41.30	41.42

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_t + .14)/13.61$

[c] $P_o/P_a = 1 - P_f/P_a$. P_f and P_a must have consistent units.

[d] From Look-Up Table.

[e] $$Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460° + T_a}$$

Temperature (T_a) 62 °F

Barometric Pressure (P_a) 29.4 in Hg

MIDWEST RESEARCH INSTITUTE

EAST Run #2

PM_{10} Sampler Flow Determination

Project No.: 4601.01.05.01

Date: 11-11-93

By: Szydlo

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
1600	0800		1.3	0.95578	41.87	42.32
"	0815		1.2	0.95918	42.06	42.52
"	0825		1.3	0.95578	41.87	42.32
"	0840		1.3	0.95578	41.87	42.32
"	0900		1.3	0.95578	41.87	42.32
"	0910		1.3	0.95578	41.87	42.32
"	0920		1.3	0.95578	41.87	42.32
"	0940		1.3	0.95578	41.87	42.32
"	1000		1.3	0.95578	41.87	42.32

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_f + .14)/13.61$

[c] $P_o/P_a = 1 - P_f/P_a$. P_f and P_a must have consistent units.

[d] From Look-Up Table.

[e] $Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460° + T_a}$

Temperature (T_a) 64 °F

Barometric Pressure (P_a) 29.4 in Hg

MIDWEST RESEARCH INSTITUTE

EAST # 3

PM_{10} Sampler Flow Determination

Project No.: 4601.01.05.01

Date: 11-11-93

By: Szydlo

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
1600	1045		1.3	0.95518	41.94	42.23
"	1055		1.4	0.9520	41.66	41.95
"	1110		1.3	0.95518	41.94	42.23
"	1120		1.3	0.95518	41.94	42.23
"	1130		1.3	0.95518	41.94	42.23
"	1140		1.3	0.95518	41.94	42.23
"	1150		1.3	0.95518	41.94	42.23
"	1160		1.3	0.95518	41.94	42.23
"	~~1200~~ 1200		1.3	0.95518	41.94	42.23
"	1220		1.3	0.95518	41.94	42.23
"	1245		1.3	0.95518	41.94	42.23

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_f + .14)/13.61$

[c] $P_o/P_a = 1 - P_f/P_a$. P_f and P_a must have consistent units.

[d] From Look-Up Table.

[e] $$Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460° + T_a}$$

Screening & Grinding
Inside 1241

Temperature (T_a) 70 °F

MIDWEST RESEARCH INSTITUTE

Barometric Pressure (P_a) 29.39 in Hg

Project No.: 4601.01.05.01
Date: 11-09-93
By: [illegible]

PM_{10} Sampler Flow Determination

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_f (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
10.42		1.2				
10.45		1.3				
11.00		1.3				
11.30		1.3				
12.00		1.3				
12.45		1.3				

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_f = (.979\ P_t + .14)/13.61$

[c] $P_o/P_a = 1 - P_t/P_a$. P_t and P_a must have consistent units.

[d] From Look-Up Table.

[e] $$Q_{std} = Q_a \cdot \frac{P_a}{29.92\ inHg} \cdot \frac{537°\ R}{460°\ +\ T_a}$$

Temperature (T_a) 70 °F

Barometric Pressure (P_a) 29.4 in Hg

MIDWEST RESEARCH INSTITUTE

Project No.: 4601.01.05.01

Date: 11-05-93

By: Szydlo

PM_{10} Sampler Flow Determination

Sampler No.	Flow Controller Serial No.	Throat pressure[a] P_t (in H_2O)	Filter pressure[b] P_1 (in Hg)	Pressure ratio[c] P_o/P_a	Flow rate[d] Q_a (acfm)	Std. flow rate[e] Q_{std} (scfm)
12.50		1.3				
13.15		1.3				
14.00		1.3				
14.50		1.3				

[a] Does not apply to Wedding and Associates PM_{10} sampler.

[b] $P_1 = (.979\ P_t + .14)/13.61$

[c] $P_o/P_a = 1 - P_1/P_a$. P_1 and P_a must have consistent units.

[d] From Look-Up Table.

[e] $$Q_{std} = Q_a \cdot \frac{P_a}{29.92\ in\text{-}Hg} \cdot \frac{537°\ R}{460° + T_a}$$

A.2 KILN FIELD DATA FORMS

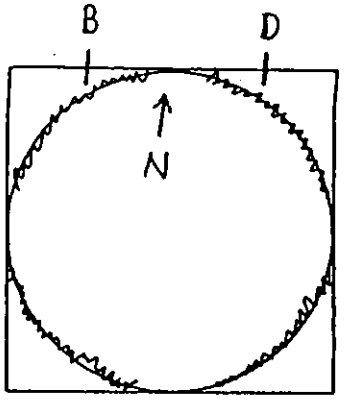
A.2.1 Kiln PM/PM-10/Condensible PM

FIELD DATA

RUN NO. KILN STACK #1
PROJECT NO. 4601-01-05-01
PLANT BELDEN BRICK
DATE 11-11-93
SAMPLING LOCATION KILN STACK
SAMPLE TYPE METHOD 201A/PM-10
OPERATOR NEAL
FILTER NO. LF 8
RECORD DATA EVERY VAR. MIN.
UMBILICAL/SAMPLER HOOKUP ~~[illegible]~~

PROBE NO. VL-7
PROBE LENGTH AND TYPE STANDARD 8'
SAMPLE BOX NO. 011995
METER BOX NO. N12
TEMP. CONTROLLER NO. N12
TEMP. METER NO. N12
THERMOCOUPLE I.D. NO. 96-4
UMBILICAL CORD I.D. NO. N-125-5
UMBILICAL CORD I.D. NO. N-125-5
NOZZLE NO. N/A

NOZZLE DIA. ~~N/A~~ .342
ASSUMED MOISTURE % —
METER ΔH@ 1.715
METER CORRECTION 1.027
PITOT NO. P-15
PITOT COEFFICIENT 0.8339
BAROMETRIC PRESSURE 29.126
SITE TO BARO. ELEVATION (ft.) —
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1045	12:30				
PASS/FAIL		Pass.				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1045	12:29			
VACUUM, In. Hg	≥15"	≥3	≥15"		≥15"
CFM	0.001	0.001			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME
FINAL VOLUME
LEAK CHECK VOLUME
ADJUSTED FINAL VOLUME

A 57

RUN NO. KILN STACK #1
DATE 9-11-93

SAMPLING LOCATION KILN STACK
PROJECT NO. 1601-01-05-01

p. 1 of 1
OPERATOR NEAL

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.) 0.00 10:55	GAS METER READING (V_m), ft³ INITIAL 327.801 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
1-D	13 11:08		333.775	.010	0.67	0.67	107	65	63	3	52	248	252	257		
2-D	25 11:20		339.295	.140	0.67	0.67	439	71	65	3	55	239	255	256		
3-D	33 11:28		343.038	.130	0.67	0.67	375	73	67	3	55	243	253	258		
4-D	38 11:33		345.365	.065	0.67	0.67	417	74	67	3	55	244	251	259		
5-D	41 11:36		346.760	.030	0.67	0.67	432	74	68	3	55	237	252	254		
6-B	13 11:51		352.765	.010	0.67	0.67	246	74	69	3	54	236	252	254		
7-B	26 12:04		358.765	.135	0.67	0.67	444	76	70	3	54	234	252	253		
8-B	40 12:18		363.450	.125	0.67	0.67	447	78	71	3	54	236	252	254		
9-B	43 12:21		365.32	.080	0.67	0.67	447	77	71	3	55	236	252	254		
10-B	49 12:27		369.465	.060	0.67	0.67	445	77	72	3	55	234	251	252		

PORT CHG. 11:38

COMMENTS
PROBE # VL-7
PROBE T.C. 96-4
PITOT # P-15

A 58

METHOD 201A/202

FIELD LABORATORY SETUP DATA Stack

Kiln Stack - P14101

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 1 Sampling Train No. SV-1 Sample Box No. 011995
Set up person(s): J. M. C. Date 11-12-93
Transfer to Sampler: Sample Box Leak Check: ____ cfm @ ____ in.Hg vacuum

Relinquished By ____ Received By ____ Date/Time ____

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
PM-10 Preseparator	•			
Probe (Liner-Glass)	•			
Female Probe Blank-off				
90° Bypass	*	Filter Type:		
Filter Holder Front	—	Whatman QM-A		
Filter Holder Back	—	Filter I.D.No.:		
Short 90° Connector		LF8		
1st Impinger				
(Short-stem Mod-GBS)		~~100~~ 100 mLs	468.0	568.7
U-Connector (A)		H_2O		
2nd Impinger (GBS)		100 mLs	475.8	576.5
U-Connector (B)		H_2O		
3rd Impinger (Mod-GBS)		Empty	—	470.8
U-Connector (C)				
4th Impinger (Mod-GBS)		~200 g indicating		703.9
Impinger Outlet Connector		silica gel		

• Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Stack

Kiln Stack - PM101

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3 - PM101

Run No. 1 Sampling Train No. SV-1 Sample Box No. 011995
Transfer for Recovery:

Relinquished By _____ Received By J M-C Date/Time 11-11-93 1300
Sample box recovery person(s): _____ Date: _____
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt.(g)	585.4	585.0	471.7	715.3					
Initial Wt.(g)	568.7	576.5	470.8	703.9					
Net Wt.(g)	16.7	8.5	.9	11.4					

[Total Condensate Collected (g): 37.5]

Description and color:	clear	clear	clear	yo					

Impingers: >>>>>>>>>>>>> 1-3 <<<

Sample Number:	1019 *		1020 Basks-Half Rinses *		
Sample Bottle Tare Wt.(g)	~~176.7~~ 262.4		176.7		
Sample Bottle Gross Wt.(g)	~~489.2~~ 470.4			<----------Before Rinses	

Rinse Solution: MethChlrd
Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C

Sample Bottle Final Wt.(g)			345.0		After Rinses
Net Sample Wt.(g)	226.8		168.3		

FRONT HALF RECOVERY

Sample Number:	1014	1015	1016
Sample Bottle Tare Wt.(g)	170.9	174.8	IN-STK FILTER 5F7
Sample Bottle Gross Wt.(g)	183.2	281.3	
Rinse Solution	Acetone	Acetone	

Sample Number:	1017	1019	1018 / #
Sample Bottle Tare Wt.(g)	172.3	262.4	Filter
Rinse Solution:	Acetone		Description and Color:
Components Rinsed****:	probe liner, filter holder front w/Acetone		gry
Sample Bottle Gross Wt.(g)	~~180.5~~		
Net Acetone Sample Wt.(g)	304.8		
Sample Bottle Final Wt.(g)			
Net Sample Wt.(g)			

COMMENTS:

* Included rinse of filter support

FILE NAME - kilnp1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:35:30

Initial Meter Volume (Cubic Feet)=	327.801
Final Meter Volume (Cubic Feet)=	369.465
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	42.789
Gas Volume (Dry Standard Cubic Feet)=	41.464
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	37.5
Percent Water=	4.1
Average Meter Temperature (F)=	71
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.082
Average Stack Temperature (F)=	380
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.60
Average Square Root of Delta P (in H20)=	0.2663
% Isokinetic=	106.8
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.342
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,152
Flow Rate (Actual, Cubic ft/min)=	37,001
Flow rate (Standard, Wet, Cubic ft/min)=	22,636
Flow Rate (Standard, Dry, Cubic ft/min)=	21,711

Particulate Loading - Front Half

Particulate Weight (g)=	0.0033	Corr. to 7% O2 & 12% C	
Particulate Loading, Dry Std. (gr/scf)=	0.0012	0.0050	0.0067
Particulate Loading, Actual (gr/cu ft)=	0.0007		
Emission Rate (lb/hr)=	0.23		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - kilnp1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:35:31

Initial Meter Volume (Cubic Meters)=	9.282
Final Meter Volume (Cubic Meters)=	10.462
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.212
Gas Volume (Dry Standard Cubic Meters)=	1.174
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	37.5
Percent Water=	4.1
Average Meter Temperature (C)=	22
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	2.1
Average Stack Temperature (C)=	193
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.60
Average Square Root of Delta P (mm H20)=	1.3423
% Isokinetic=	106.8
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	8.69
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	351
Flow rate (Actual, Cubic m/min)=	1,048
Flow rate (Standard, Wet, Cubic m/min)=	641
Flow rate (Standard, Dry, Cubic m/min)=	615

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO
Particulate Weight (g)=	0.0033		
Particulate Loading, Dry Std. (mg/cu m)=	2.8	11.5	15.3
Particulate Loading, Actual (mg/cu m)=	1.6		
Emission Rate (kg/hr)=	0.10		

No Back Half Analysis

FILE NAME - kilnp1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:35:32

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.010	0.67	107	65	63
2	0.140	0.67	439	71	65
3	0.170	0.67	375	73	67
4	0.065	0.67	417	74	67
5	0.030	0.67	432	74	68
6	0.010	0.67	246	74	69
7	0.135	0.67	444	76	70
8	0.125	0.67	447	78	71
9	0.080	0.67	447	77	71
10	0.060	0.67	445	77	72

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	117.3744	117.3722	167.0000	0.0000
FILTER	1.1037	1.1022	0.0000	0.0015

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	92.9948	92.9930	160.0	0.0018
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

FILE NAME - kilnpt1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:30:33

Initial Meter Volume (Cubic Feet)=	327.801
Final Meter Volume (Cubic Feet)=	369.465
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	42.789
Gas Volume (Dry Standard Cubic Feet)=	41.464
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	37.5
Percent Water=	4.1
Average Meter Temperature (F)=	71
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.082
Average Stack Temperature (F)=	380
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.60
Average Square Root of Delta P (in H20)=	0.2663
% Isokinetic=	106.8
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.342
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,152
Flow Rate (Actual, Cubic ft/min)=	37,001
Flow rate (Standard, Wet, Cubic ft/min)=	22,636
Flow Rate (Standard, Dry, Cubic ft/min)=	21,711

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% C
Particulate Weight (g)=	0.0055		
Particulate Loading, Dry Std. (gr/scf)=	0.0020	0.0084	0.0111
Particulate Loading, Actual (gr/cu ft)=	0.0012		
Emission Rate (lb/hr)=	0.38		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0177		
Particulate Loading, Dry Std. (gr/scf)=	0.0066	0.0270	0.0358
Particulate Loading, Actual (gr/cu ft)=	0.0039		
Emission Rate (lb/hr)=	1.22		
Percent Impinger Catch=	69.0		

* * METRIC UNITS * *

FILE NAME - kilnpt1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:30:34

Initial Meter Volume (Cubic Meters)=	9.282
Final Meter Volume (Cubic Meters)=	10.462
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.212
Gas Volume (Dry Standard Cubic Meters)=	1.174
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	37.5
Percent Water=	4.1
Average Meter Temperature (C)=	22
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	2.1
Average Stack Temperature (C)=	193
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.60
Average Square Root of Delta P (mm H20)=	1.3423
% Isokinetic=	106.8
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	8.69
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	351
Flow rate (Actual, Cubic m/min)=	1,048
Flow rate (Standard, Wet, Cubic m/min)=	641
Flow rate (Standard, Dry, Cubic m/min)=	615

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO
Particulate Weight (g)=	0.0055		
Particulate Loading, Dry Std. (mg/cu m)=	4.7	19.2	25.5
Particulate Loading, Actual (mg/cu m)=	2.7		
Emission Rate (kg/hr)=	0.17		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0		
Particulate Loading, Dry Std. (mg/cu m)=	15.1	62.0	82.1
Particulate Loading, Actual (mg/cu m)=	8.8		
Emission Rate (kg/hr)=	0.55		
Percent Impinger Catch=	69.0		

FILE NAME - kilnpt1
RUN # - kilnp1
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:30:35

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.010	0.67	107	65	63
2	0.140	0.67	439	71	65
3	0.170	0.67	375	73	67
4	0.065	0.67	417	74	67
5	0.030	0.67	432	74	68
6	0.010	0.67	246	74	69
7	0.135	0.67	444	76	70
8	0.125	0.67	447	78	71
9	0.080	0.67	447	77	71
10	0.060	0.67	445	77	72

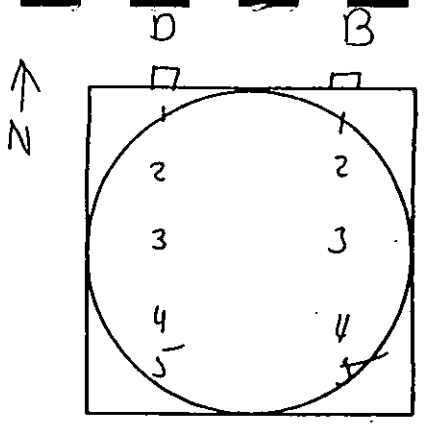
Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	117.3744	117.3722	0.0000	0.0022
FILTER	1.1037	1.1022	0.0000	0.0015

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	92.9948	92.9930	160.0	0.0018
IMPINGERS	98.9282	98.9160	90.0	0.0122

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

FIELD DATA

RUN NO.	PM #2	PROBE NO.	VL-5	NOZZLE DIA.	.380
PROJECT NO.	4601	PROBE LENGTH AND TYPE	8ft Quartz	ASSUMED MOISTURE %	4
PLANT	Belden Brick	SAMPLE BOX NO.	012002	METER ΔH@	1.715
DATE	11/11/93	METER BOX NO.	N-12	METER CORRECTION	1.027
SAMPLING LOCATION	Kiln Stack	TEMP. CONTROLLER NO.	N12	PITOT NO.	S-8
SAMPLE TYPE	PM10	TEMP. METER NO.	N12	PITOT COEFFICIENT	.8162
OPERATOR	Edwards	THERMOCOUPLE I.D. NO.	96-7	BAROMETRIC PRESSURE	29.126
FILTER NO.	LF14	UMBILICAL CORD I.D. NO.	N-125-5	SITE TO BARO. ELEVATION (ft.)	—
RECORD DATA EVERY	Var MIN.	UMBILICAL CORD I.D. NO.		CORRECTED B.P. (0.1 in./100 ft.)	—
UMBILICAL/SAMPLER HOOKUP	UH-30	NOZZLE NO.	PM-10	STATIC PRESSURE	-.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1456	1641			
VACUUM, in. Hg	≥15"	≥4"	≥15"		≥15"
CFM	.003	.001			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, in. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME _____

FINAL VOLUME _____

LEAK CHECK VOLUME _____

ADJUSTED FINAL VOLUME _____

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RUN NO. 2, Pm 10
DATE 11/4/93

SAMPLING LOCATION Kiln Stack
PROJECT NO. 4601

p. 1 of 1
OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft³ INITIAL 373.900 DESIRED	GAS METER READING (V_m), ft³ ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
	0	1456															
D1	13	1512		380.00	0.010	0.67		168	70	69	2.0	54					
2	25	1524		385.68	0.120	0.67		446	75	70	2.0	56					
3	33	1532		389.40	0.130	0.67		450	78	72	2.0	61					
4	38	1537		391.28	0.090	0.67		445	80	73	2.0	54					
5	41	1540		393.23	0.020	0.67		442	81	74	2.0	53					
		~~1543~~															
~~B1~~	0	1543		393.23		~~0.67~~											
ZB1	13	1556		399.48	0.015	0.67		280	79	74	2.0	53					
~~1~~ 2	26	1609		405.52	0.155	0.67		445	83	76	2.0	53					
~~2~~ 3	40	1623		411.23	0.130	0.67		442	83	77	2.0	54					
~~3~~ 4	43	1636		413.80	0.060	0.67		442	84	77	2.0	54					
~~4~~ 5	49	1642		416.323	0.040	0.67		443	85	78	2.0	52					

COMMENTS

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METHOD 201A/202

FIELD LABORATORY SETUP DATA Stack

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Kiln Stack - PM102

Run No. 2 Sampling Train No. PH-3 Sample Box No. 012002
Set up person(s): J. M. C. Date 11-11-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By J. M. C. Received By _____ Date/Time 11-11-93 12:00

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
PM-10 Preseparator	•			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
90° Bypass	•	Filter Type:		
Filter Holder Front	F-115	Whatman QM-A		
Filter Holder Back		Filter I.D.No.:		
Short 90° Connector		~~MLF13~~ LF14		
1st Impinger (Short-stem Mod-GBS)		~~100~~ 50 mLs H_2O	461.8	562.9
U-Connector (A)				
2nd Impinger (GBS)		100 mLs H_2O	493.2	593.3
U-Connector (B)				
3rd Impinger Mod (GBS)		Empty		468.3
U-Connector (C)				725.0
4th Impinger (Mod-GBS)		~200 g indicating silica gel		~~742.5~~
Impinger Outlet Connector				

• Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Stack

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3

Kiln Stack - PM102

Run No. 2 Sampling Train No. PH-3 Sample Box No. _____
Transfer for Recovery:

Relinquished By _____ Received By _____ Date/Time _____
Sample box recovery person(s): _____ Date: _____
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt.(g)	580.1	609.1	474.0	737.6					
Initial Wt.(g)	562.9	593.3	468.3	725.0					
Net Wt.(g)	17.2	15.8	5.7	12.6					

[Total Condensate Collected (g): 51.3]

Description and color: clear clear clear 50°

Impingers: >>>>>>>>>>>>> 1-3 <<<

Sample Number:	2019*		2020 Back Half Rinses >>>>	
Sample Bottle Tare Wt.(g)	258.9		262.8	
Sample Bottle Gross Wt.(g)	490.3			<----------Before Rinses
Rinse Solution:	MethChlrd			

Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C

Sample Bottle Final Wt.(g)			416.8	After Rinses
Net Sample Wt.(g)	231.4		~~158~~ 154.0	

FRONT HALF RECOVERY

Sample Number:	2014	2015	016
Sample Bottle Tare Wt.(g)	171.5	171.2	IN-STK FILTER
Sample Bottle Gross Wt.(g)	241.7	212.7	
Rinse Solution	Acetone	Acetone	

Sample Number:	2017	019	018 / #
Sample Bottle Tare Wt.(g)	262.4		Filter Description and Color:
Rinse Solution:	Acetone		

Components Rinsed****: probe liner, filter holder front w/Acetone

Sample Bottle Gross Wt.(g)	~~319.9~~
Net Acetone Sample Wt.(g)	322.5
Sample Bottle Final Wt.(g)	
Net Sample Wt.(g)	~~57.0~~ 60.4

COMMENTS:

FILE NAME - kilnp2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG. [illegible]
11-30-1994 10:36:48

Initial Meter Volume (Cubic Feet)=	373.900
Final Meter Volume (Cubic Feet)=	416.323
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	43.568
Gas Volume (Dry Standard Cubic Feet)=	41.763
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	51.3
Percent Water=	5.5
Average Meter Temperature (F)=	77
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.072
Average Stack Temperature (F)=	400
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.45
Average Square Root of Delta P (in H20)=	0.2470
% Isokinetic=	99.0
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.380
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,054
Flow Rate (Actual, Cubic ft/min)=	33,836
Flow rate (Standard, Wet, Cubic ft/min)=	20,209
Flow Rate (Standard, Dry, Cubic ft/min)=	19,104

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0147		
Particulate Loading, Dry Std. (gr/scf)=	0.0054	0.0223	0.0296
Particulate Loading, Actual (gr/cu ft)=	0.0031		
Emission Rate (lb/hr)=	0.89		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0148		
Particulate Loading, Dry Std. (gr/scf)=	0.0055	0.0224	0.0297
Particulate Loading, Actual (gr/cu ft)=	0.0031		
Emission Rate (lb/hr)=	0.89		
Percent Impinger Catch=	0.6		

* * [illegible]

FILE NAME - kilnp2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG:=VER 06/27/89
11-30-1994 10:36:49

Initial Meter Volume (Cubic Meters)=	10.587
Final Meter Volume (Cubic Meters)=	11.789
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.234
Gas Volume (Dry Standard Cubic Meters)=	1.183
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	51.3
Percent Water=	5.5
Average Meter Temperature (C)=	25
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	1.8
Average Stack Temperature (C)=	205
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.45
Average Square Root of Delta P (mm H20)=	1.2449
% Isokinetic=	99.0
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	9.65
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	321
Flow rate (Actual, Cubic m/min)=	958
Flow rate (Standard, Wet, Cubic m/min)=	572
Flow rate (Standard, Dry, Cubic m/min)=	541

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO
Particulate Weight (g)=	0.0147		
Particulate Loading, Dry Std. (mg/cu m)=	12.4	51.2	67.8
Particulate Loading, Actual (mg/cu m)=	7.0		
Emission Rate (kg/hr)=	0.40		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0		
Particulate Loading, Dry Std. (mg/cu m)=	12.5	51.5	68.2
Particulate Loading, Actual (mg/cu m)=	7.1		
Emission Rate (kg/hr)=	0.41		
Percent Impinger Catch=	0.6		

FILE NAME - kilnp2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:36:50

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.010	0.67	168	70	69
2	0.120	0.67	446	75	70
3	0.130	0.67	450	78	72
4	0.040	0.67	445	80	73
5	0.020	0.67	442	81	74
6	0.015	0.67	280	79	74
7	0.155	0.67	445	83	76
8	0.130	0.67	442	83	77
9	0.060	0.67	442	84	77
10	0.040	0.67	443	85	78

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.1060	1.1059	0.0000	0.0001

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	102.6027	102.5881	85.4	0.0146
IMPINGERS	83.9241	83.9240	198.0	0.0001

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

FILE NAME - kilnpt2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:32:36

Initial Meter Volume (Cubic Feet)=	373.900
Final Meter Volume (Cubic Feet)=	416.323
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	43.568
Gas Volume (Dry Standard Cubic Feet)=	41.763
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	51.3
Percent Water=	5.5
Average Meter Temperature (F)=	77
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.072
Average Stack Temperature (F)=	400
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.45
Average Square Root of Delta P (in H20)=	0.2470
% Isokinetic=	99.0
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.380
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,054
Flow Rate (Actual, Cubic ft/min)=	33,836
Flow rate (Standard, Wet, Cubic ft/min)=	20,209
Flow Rate (Standard, Dry, Cubic ft/min)=	19,104

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% C
Particulate Weight (g)=	0.0187		
Particulate Loading, Dry Std. (gr/scf)=	0.0069	0.0284	0.0376
Particulate Loading, Actual (gr/cu ft)=	0.0039		
Emission Rate (lb/hr)=	1.13		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0188		
Particulate Loading, Dry Std. (gr/scf)=	0.0069	0.0285	0.0378
Particulate Loading, Actual (gr/cu ft)=	0.0039		
Emission Rate (lb/hr)=	1.13		
Percent Impinger Catch=	0.5		

* * METRIC UNITS * *

FILE NAME - kilnpt2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:33:21

Initial Meter Volume (Cubic Meters)=	10.587
Final Meter Volume (Cubic Meters)=	11.789
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.234
Gas Volume (Dry Standard Cubic Meters)=	1.183
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	51.3
Percent Water=	5.5
Average Meter Temperature (C)=	25
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	1.8
Average Stack Temperature (C)=	205
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.45
Average Square Root of Delta P (mm H20)=	1.2449
% Isokinetic=	99.0
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	9.65
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	321
Flow rate (Actual, Cubic m/min)=	958
Flow rate (Standard, Wet, Cubic m/min)=	572
Flow rate (Standard, Dry, Cubic m/min)=	541

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0187		
Particulate Loading, Dry Std. (mg/cu m)=	15.8	65.1	86.2
Particulate Loading, Actual (mg/cu m)=	8.9		
Emission Rate (kg/hr)=	0.51		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0		
Particulate Loading, Dry Std. (mg/cu m)=	15.9	65.4	86.6
Particulate Loading, Actual (mg/cu m)=	9.0		
Emission Rate (kg/hr)=	0.51		
Percent Impinger Catch=	0.5		

FILE NAME - kilnpt2
RUN # - kiln2
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:34:19

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.010	0.67	168	70	69
2	0.120	0.67	446	75	70
3	0.130	0.67	450	78	72
4	0.040	0.67	445	80	73
5	0.020	0.67	442	81	74
6	0.015	0.67	280	79	74
7	0.155	0.67	445	83	76
8	0.130	0.67	442	83	77
9	0.060	0.67	442	84	77
10	0.040	0.67	443	85	78

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	102.5226	102.5186	0.0000	0.0040
FILTER	1.1060	1.1059	0.0000	0.0001

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	102.6027	102.5881	85.4	0.0146
IMPINGERS	83.9241	83.9240	198.0	0.0001

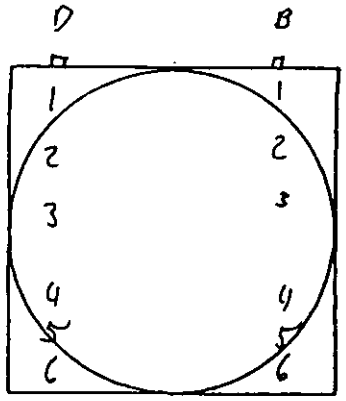
Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

FIELD DATA

RUN NO. PM #3
PROJECT NO. 4601
PLANT Belden Brick
DATE 11/11/93
SAMPLING LOCATION Kiln Stack
SAMPLE TYPE PM-10
OPERATOR Edwards
FILTER NO. 1
RECORD DATA EVERY VAC MIN.
UMBILICAL/SAMPLER HOOKUP UH-12

PROBE NO. UL-7
PROBE LENGTH AND TYPE 8ft Quartz
SAMPLE BOX NO. 011995
METER BOX NO. N 12
TEMP. CONTROLLER NO. N 12
TEMP. METER NO. N 12
THERMOCOUPLE I.D. NO. 96-4
UMBILICAL CORD I.D. NO. N-125-5
UMBILICAL CORD I.D. NO. —
NOZZLE NO. PM 10

NOZZLE DIA. 0.380
ASSUMED MOISTURE % —
METER ΔH@ 1.715
METER CORRECTION 1.027
PITOT NO. P-15
PITOT COEFFICIENT .8339
BAROMETRIC PRESSURE 29.126
SITE TO BARO. ELEVATION (ft.) —
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -0.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1700	1850				
PASS/FAIL		Pass.				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1706	1846			
VACUUM, In. Hg	≥15"	≥5"	≥15"		≥15"
CFM	.013	.010			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME
FINAL VOLUME
LEAK CHECK VOLUME
ADJUSTED FINAL VOLUME

A 77

RUN NO. PM #3
DATE 11/11/93

SAMPLING LOCATION Kiln Stack
PROJECT NO. 4601

p. 1 of
OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft³ INITIAL 417.076 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
		1707															
B 1	13	1720		423.20	0.020	0.67		231	76	75	2.5	44					
2	25	1732		429.04	0.155	0.67		448	78	75	2.5	46					
3	33	1740		432.86	0.100	0.67		449	82	76	2.5	48					
4	38	1745		435.14	0.060	0.67		446	84	78	2.5	49					
5	41	1748		436.5	0.030	0.67		446	85	79	2.5	49					
		1750															
D 1	13	1803		442.73	0.010	0.67		315	83	78	2.5	49					
D2	26	1816		448.91	0.100	0.67		440	85	79	2.5	50					
D3	40	1830		455.66	0.140	0.67		442	86	80	2.5	50					
D4	43	1833		457.11	0.055	0.67		438	86	80	2.5	50					
D5	49	1839		459.958	0.020	0.67		437	86	81	2.5	49					

COMMENTS

A 78

METHOD 201A/202

FIELD LABORATORY SETUP DATA Stack

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Kiln Stack - P14103

Run No. 3 Sampling Train No. SV-1 Sample Box No. _____ _____
Set up person(s): J. McCa Date 11-11-93
Transfer to Sampler: Sample Box Leak Check: _____cfm @ _____in.Hg vacuum

Relinquished By _____ Received By _____ Date/Time _____ _____

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
PM-10 Preseparator	*			
Probe (Liner-Glass)	•			
Female Probe Blank-off				
90° Bypass	•	Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back		Filter I.D.No.:		
Short 90° Connector		~~LF14~~ LF15		
1st Impinger (Short-stem Mod-GBS)		50 mLs	469.9	569.3
U-Connector (A)		H_2O		
2nd Impinger (GBS)		100 mLs	472.5	578.5
U-Connector (B)		H_2O		
3rd Impinger (GBS)		Empty		462.1
U-Connector (C)				
4th Impinger (Mod-GBS)		~200 g indicating		679.1
Impinger Outlet Connector		silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

METHOD 201A/202
FIELD LABORATORY SAMPLE RECOVERY DATA Stack

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3

Kiln Stack - PM103

Run No. 3 Sampling Train No. SV-1 Sample Box No. _____
Transfer for Recovery:

Relinquished By _____ Received By _____ Date/Time _____
Sample box recovery person(s): _____ Date: _____
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	8th-2
Final Wt.(g)	583.9	590.0	465.4	689.1					
Initial Wt.(g)	569.3	578.5	462.1	679.1					
Net Wt.(g)	14.6	11.5	3.3	10.0					

[Total Condensate Collected (g): 39.4]

Description and color: 152
Impingers: >>>>>>>>>>>>> 1-3 <<<

Sample Number:	3019 •		3020 *>>>> Back Half Rinses	
Sample Bottle Tare Wt.(g)	262.5		262.8	
Sample Bottle Gross Wt.(g)	490.7			<----------Before Rinses
Rinse Solution:	MethChlrd			

Components Rinsed: ** filter support, *** 1th-3th impingers, filter holder back, 45/90° connector U-connectors A-C

Sample Bottle Final Wt.(g)			511.4	After Rinses
Net Sample Wt.(g)	228.2		248.6	

FRONT HALF RECOVERY

Sample Number:	3014	3015	016
Sample Bottle Tare Wt.(g)	175.3	171.5	IN-STK FILTER
Sample Bottle Gross Wt.(g)	235.6	~~212.7~~ 216.2	
Rinse Solution	Acetone	Acetone	

Sample Number:	3017	019	018 / #
Sample Bottle Tare Wt.(g)	263.1		Filter Description and Color:
Rinse Solution:	Acetone		

Components Rinsed****: probe liner, filter holder front w/Acetone

Sample Bottle Gross Wt.(g)	366.9
Net Acetone Sample Wt.(g)	
Sample Bottle Final Wt.(g)	
Net Sample Wt.(g)	103.8

COMMENTS:

FILE NAME - kilnp3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:37:20

Initial Meter Volume (Cubic Feet)=	417.076
Final Meter Volume (Cubic Feet)=	459.958
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	44.040
Gas Volume (Dry Standard Cubic Feet)=	41.926
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	39.4
Percent Water=	4.2
Average Meter Temperature (F)=	81
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.069
Average Stack Temperature (F)=	409
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (in H20)=	0.2436
% Isokinetic=	97.4
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.380
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,072
Flow Rate (Actual, Cubic ft/min)=	34,435
Flow rate (Standard, Wet, Cubic ft/min)=	20,356
Flow Rate (Standard, Dry, Cubic ft/min)=	19,493

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO
Particulate Weight (g)=	0.0047		
Particulate Loading, Dry Std. (gr/scf)=	0.0017	0.0071	0.0094
Particulate Loading, Actual (gr/cu ft)=	0.0010		
Emission Rate (lb/hr)=	0.29		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - kilnp3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:37:21

Initial Meter Volume (Cubic Meters)=	11.810
Final Meter Volume (Cubic Meters)=	13.024
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.247
Gas Volume (Dry Standard Cubic Meters)=	1.187
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	39.4
Percent Water=	4.2
Average Meter Temperature (C)=	27
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	1.8
Average Stack Temperature (C)=	210
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (mm H20)=	1.2276
% Isokinetic=	97.4
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	9.65
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	327
Flow rate (Actual, Cubic m/min)=	975
Flow rate (Standard, Wet, Cubic m/min)=	576
Flow rate (Standard, Dry, Cubic m/min)=	552

Particulate Loading - Front Half

		Corr. to 7% O2 & 12% CC	
Particulate Weight (g)=	0.0047		
Particulate Loading, Dry Std. (mg/cu m)=	4.0	16.3	21.6
Particulate Loading, Actual (mg/cu m)=	2.2		
Emission Rate (kg/hr)=	0.13		

No Back Half Analysis

FILE NAME - kilnp3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
11-30-1994 10:37:22

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.020	0.67	231	76	75
2	0.155	0.67	448	78	75
3	0.100	0.67	449	82	76
4	0.060	0.67	446	84	78
5	0.030	0.67	446	85	79
6	0.010	0.67	315	83	78
7	0.100	0.67	440	85	79
8	0.140	0.67	442	86	80
9	0.055	0.67	438	86	80
10	0.020	0.67	437	86	81

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	106.6634	106.6631	0.0000	0.0003
FILTER	1.0952	1.0937	0.0000	0.0015

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	112.9901	112.9872	0.0	0.0029
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

FILE NAME - kilnpt3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:39:33

Initial Meter Volume (Cubic Feet)=	417.076
Final Meter Volume (Cubic Feet)=	459.958
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.001
Net Meter Volume (Cubic Feet)=	44.040
Gas Volume (Dry Standard Cubic Feet)=	41.926
Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	39.4
Percent Water=	4.2
Average Meter Temperature (F)=	81
Average Delta H (in H20)=	0.67
Average Delta P (in H20)=	0.069
Average Stack Temperature (F)=	409
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (in H20)=	0.2436
% Isokinetic=	97.4
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (Inches)=	0.380
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,072
Flow Rate (Actual, Cubic ft/min)=	34,435
Flow rate (Standard, Wet, Cubic ft/min)=	20,356
Flow Rate (Standard, Dry, Cubic ft/min)=	19,493

Particulate Loading - Front Half

		Corr. to 7% 02	& 12% C
Particulate Weight (g)=	0.0047		
Particulate Loading, Dry Std. (gr/scf)=	0.0017	0.0071	0.0094
Particulate Loading, Actual (gr/cu ft)=	0.0010		
Emission Rate (lb/hr)=	0.29		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0127		
Particulate Loading, Dry Std. (gr/scf)=	0.0047	0.0192	0.0254
Particulate Loading, Actual (gr/cu ft)=	0.0026		
Emission Rate (lb/hr)=	0.78		
Percent Impinger Catch=	63.0		

* * METRIC UNITS * *

FILE NAME - kilnpt3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:39:34

Initial Meter Volume (Cubic Meters)=	11.810
Final Meter Volume (Cubic Meters)=	13.024
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0000
Net Meter Volume (Cubic Meters)=	1.247
Gas Volume (Dry Standard Cubic Meters)=	1.187
Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	39.4
Percent Water=	4.2
Average Meter Temperature (C)=	27
Average Delta H (mm H20)=	17.0
Average Delta P (mm H20)=	1.8
Average Stack Temperature (C)=	210
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (mm H20)=	1.2276
% Isokinetic=	97.4
Pitot Coefficient=	0.84
Sampling Time (Minutes)=	90.0
Nozzle Diameter (mm)=	9.65
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	327
Flow rate (Actual, Cubic m/min)=	975
Flow rate (Standard, Wet, Cubic m/min)=	576
Flow rate (Standard, Dry, Cubic m/min)=	552

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO
Particulate Weight (g)=	0.0047		
Particulate Loading, Dry Std. (mg/cu m)=	4.0	16.3	21.6
Particulate Loading, Actual (mg/cu m)=	2.2		
Emission Rate (kg/hr)=	0.13		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.0		
Particulate Loading, Dry Std. (mg/cu m)=	10.7	44.0	58.4
Particulate Loading, Actual (mg/cu m)=	6.1		
Emission Rate (kg/hr)=	0.35		
Percent Impinger Catch=	63.0		

FILE NAME - kilnpt3
RUN # - kilnp3
LOCATION - kiln
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
12-06-1994 11:39:35

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.020	0.67	231	76	75
2	0.155	0.67	448	78	75
3	0.100	0.67	449	82	76
4	0.060	0.67	446	84	78
5	0.030	0.67	446	85	79
6	0.010	0.67	315	83	78
7	0.100	0.67	440	85	79
8	0.140	0.67	442	86	80
9	0.055	0.67	438	86	80
10	0.020	0.67	437	86	81

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	106.6634	106.6631	0.0000	0.0003
FILTER	1.0952	1.0937	0.0000	0.0015

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	112.9901	112.9872	0.0	0.0029
IMPINGERS	84.1220	84.1140	105.0	0.0080

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

A.2.2 Kiln Multiple.Metals/PM

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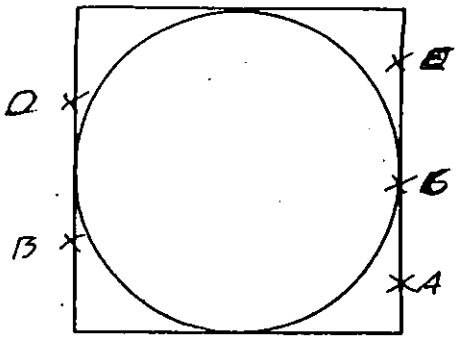
FIELD DATA

RUN NO.	MM-1	PROBE NO.	BL-5	NOZZLE DIA.	0.417
PROJECT NO.	4601	PROBE LENGTH AND TYPE	Quartz-8'	ASSUMED MOISTURE %	10%
PLANT	Belden	SAMPLE BOX NO.	011996	METER ΔH@	1.715
DATE	11-09-93	METER BOX NO.	N-12	METER CORRECTION	1.027
SAMPLING LOCATION	Kiln	TEMP. CONTROLLER NO.	N-12	PITOT NO.	S-8
SAMPLE TYPE	Metals	TEMP. METER NO.	N-12	PITOT COEFFICIENT	.84
OPERATOR	Szydlo	THERMOCOUPLE I.D. NO.	96-7	BAROMETRIC PRESSURE	29.3
FILTER NO.	5	UMBILICAL CORD I.D. NO.	N-125-2	SITE TO BARO. ELEVATION (ft.)	29.27
RECORD DATA EVERY	7 MIN.	UMBILICAL CORD I.D. NO.	—	CORRECTED B.P. (0.1 in./100 ft.)	—
UMBILICAL/SAMPLER HOOKUP	VH-35	NOZZLE NO.	MM-1	STATIC PRESSURE	-.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1307	1920				
PASS/FAIL		Pass				

PITOT LEAK CHECK ≥3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1309	1615	1640	1923	
VACUUM, in. Hg	≥15"	≥5"	≥15"	≥6"	≥15"
CFM	.009	0.005	0.005	0.001	
VOLUMES					
FINAL			486.568		1044.423
INITIAL			486.359		1044.399
DIFFERENCE			.209		.024

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, in. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 944.772

FINAL VOLUME 1044.399

LEAK CHECK VOLUME .209

ADJUSTED FINAL VOLUME [redacted]

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RUN NO. MM-1
DATE 11-09-93

SAMPLING LOCATION Kiln
PROJECT NO. 4601.01.05.01

p. 1 of 1
OPERATOR SZYDLO

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.) 0 / 1430	GAS METER READING (V_m), ft³ INITIAL 944.772 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F
B 1	7 \ 1437	949.601	950.126	0.16	2.42	2.40	433	71	70	5	41	223	250	258
B 2	14 \ 1444	955.689	956.119	0.13	1.46	1.46	432	70	70	5	41	223	250	255
B 3	21 \ 1451	960.600	959.992	0.10	1.52	1.52	431	77	71	5	45	206	224	252
B 4	28 \ 1458	964.574	964.421	0.065	0.99	1.00	429	78	71	5	46	211	252	248
B 5	35 \ 1505	967.499	967.370	0.035	0.53	0.53	427	75	72	5	47	211	253	255
D 6	42 \ 1524	973.103	973.024	0.13	1.98	1.98	431	74	73	5	41	217	250	254
D 7	49 \ 1531	978.488	978.523	0.12	1.82	1.82	434	76	73	5	41	208	252	255
D 8	56 \ 1538	983.673	983.621	0.11	1.68	1.70	434	81	74	5	41	212	248	245
D 9	63 \ 1545	985.894	985.825	0.02	0.30	0.30	431	83	75	1	41	215	242	242
D 10	70 \ 1552	986.389	986.359	0.001	0.01	0.01	429	79	75	0	43	213	253	253
C 11	77 \ 1650	988.768	988.562	0.02	0.30	0.30	422	72	71	1	41	213	253	253
C 12	84 \ 1657	990.974	991.214	0.02	0.30	0.30	422	73	72	1	40	243	255	263
C 13	91 \ 1704	993.659	993.725	0.03	0.45	0.45	432	73	72	1	41	240	252	255
C 14	98 \ 1711	997.909	997.825	0.075	1.13	1.13	437	75	74	1	42	242	250	257
C 15	105 \ 1718	1003.717	1003.737	0.14	2.12	2.10	438	77	72	6	42	225	253	250
A 16	112 \ 1800	1006.433	1006.297	0.03	0.46	0.46	406	72	71	1	41	229	250	252
A 17	119 \ 1807	1008.632	1008.456	0.02	0.3	0.30	422	72	70	1	42	232	248	250
A 18	126 \ 1814	1014.099	1014.125	0.12	1.89	1.80	437	72	70	5	41	252	250	252
A 19	133 \ 1821	1020.468	1020.826	.17	2.56	2.60	442	76	72	6	41	250	254	254
A 20	140 \ 1828	1027.743	1026.527	.22	3.32	3.30	442	80	72	6	42	247	252	252
E 21	147 \ 1847	1029.313	1028.524	.01	0.15	0.15	412	74	72	1	39	229	249	253
E 22	154 \ 1854	1031.535	1030.025	.02	0.31	0.30	408	74	71	1	40	232	245	250
E 23	161 \ 1901	1035.169	1034.925	.055	0.83	0.80	433	74	71	2	38	226	251	252
E 24	168 \ 1908	1040.413	1040.425	.115	1.74	1.70	437	75	70	4	37	219	252	251
E 25	175 \ 1915	1044.934	1044.349	.085	1.29	1.30	436	77	70	4	37	220	254	250

COMMENTS

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MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kin Stack No. 3

Run No. 1 Sampling Train No. MM-1 Sample Box No. 010996
Set up person(s): Jg M-Cann Date 11-8-93
Transfer to Sampler: J Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By Jg M. C Received By J. Sum Date/Time 11-4-93 7:30

TRAIN COMPONENT	COMPONENT NO.		LOADING DATA: Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)		*		
Probe (Liner-Glass)		*		
Female Probe Blank-off				
~~Cyclone~~*		*		
~~Flask~~				
90° Bypass		* Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back	F-210	Filter I.D.No.: 5		
~~45/90° Connector~~				
Short 90° Connector				
1st Impinger (2 Short-stem Mod-GBS)		Empty	466.8	
U-Connector (A)				
2nd Impinger (Mod-GBS)		100 mLs ± 2 mLs	472.7	573.1
U-Connector (B)		5% HNO_3/10% H_2O_2		
3rd Impinger (GBS)		100 mLs ± 2 mLs	476.4	577.0
U-Connector (C)		5% HNO_3/10% H_2O_2		
4th Impinger (Mod-GBS)		Empty	467.3	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	458.7	569.5
U-Connector (E)		4% $KMnO_4$/10% H_2SO_4		
6th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	497.8	608.5
U-Connector (F)		4% $KMnO_4$/10% H_2SO_4		
7th Impinger (Mod-GBS)		100 mLs*****	660.4	
U-Connector (G)		1.0 N NaOH		
8th Impinger (Mod-GBS)		~200 g indicating	738.0	
Impinger Outlet Connector		silica gel		
~~Replacement 8th Impinger~~ *		<--Exchange when necessary		

Note: Components in italics used only when mercury is a target metal.

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil after sampling.
~~Optional for low/high particulate/moisture gas streams as applicable~~

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm or Teflon tape.

**** Use 200 mLs ± 2 mLs and document below if reagent is exhausted before the end of a previous run. Prepare additional reagent blanks accordingly.

***** Used for acid trap and is not recovered as a sample. Replace with acidic $KMnO_4$ if the acidic $KMnO_4$ in the previous impinger is exhausted before the end of a previous run, and prepare additional reagent blanks accordingly.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack, No. 3

Run No. 1 Sampling Train No. MM-1 Sample Box No. 010996
Transfer for Recovery:

Relinquished By: _____ Received By J McC Date/Time 11-9-93 2000
Sample box recovery person(s): J McC J. Sur Date: 11-10-93
Probe recovery person(s): M. Whitmire Date: 11-9-93

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	~~8th-2~~
Final Wt.(g)	498.3	612.0	586.1	468.1	570.9	608.5	660.2	752.5	
Initial Wt.(g)	466.8	573.1	577.0	467.3	569.5	608.5	660.4	738.0	
Net Wt.(g)	31.5	38.9	9.1	.8	1.4	.0	(.2)	14.5	

[Total Condensate Collected (g): 96.0]

Description and color:	clear	clear	clear	clear	purple	purple	clear	20	
Impingers:	>>>>>> 1-3 <<<<<			4	>>>> 5-6 <<<<			~~5-8~~	~~% Blue~~
Sample Number:	1031 *		1032		1033 *>>>>		1034		
Sample Bottle Tare Wt.(g)	498.4		172.8		262.7		172.8		
Sample Bottle Gross Wt.(g	769.6		173.5		478.5 <----------Before Rinses				
Rinse Solution:	0.1N HNO_3		0.1N HNO_3		acidic $KMnO_4$		8 N HCl		
Components Rinsed:	** filter support, filter holder back, 45/90° connector or short 90° connector, 1st-3rd impingers, U-connectors A-C		** 4th impinger		*** 5th-6th impingers, U-connectors D-F				
Sample Bottle Final Wt.(g)	872.0		277.2		684.3		396.4 After Rinses		
Net Sample Wt.(g)	373.6		104.4		421.6		223.6		

907.6 rerinsed (soaked) filter support to remove condensed residue

FRONT HALF RECOVERY

Sample Number:	1065	1029	1030
Sample Bottle Tare Wt.(g)	175.6	171.1	Filter
Rinse Solution:	Acetone	0.1 N HNO_3	Description and Color:

Components Rinsed****: nozzle, probe liner, cyclone and flask or bypass, filter holder front _____

Sample Bottle Gross Wt.(g)	_____	w/Acetone	
Net Acetone Sample Wt.(g)			
Sample Bottle Final Wt.(g)	293.6	~~w/added Water~~	263.4
Net Sample Wt.(g)	118.0		92.3

* Do not fill bottle; vent pressure after recovery (before and after shipment). Keep samples iced to minimize pressure buildup.

** Using 100 mLs 0.1 N HNO_3, rinse components (2X).

*** Check pH with a glass rod and pH indicator strips; adjust with conc. HNO_3.

**** Using a total of 150 mLs (250 mLs if cyclone and flask are used) acetone, rinse components (3X or more with brushing) until clean. If some residue cannot be removed, rinse components again with a total of 100 mLs (200 mLs if cyclone and flask are used) ASTM Type I water (3X or more with brushing). Combine water and acetone rinses. Then, using a total of 100 mLs (200 mLs if cyclone and flask are used) 0.1 N HNO_3, rinse components (3X or more with brushing); combine these rinses and keep separate. Follow with water, then acetone rinses and discard those rinses.

COMMENTS:

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601 RUN NO. Metals 1
SAMPLE NO. _____ DATE 11/9/93
PLANT SAMPLING LOCATION Kiln Stack
ANALYSIS TIME (24hr-CLOCK) 2105
SAMPLE TYPE (BAG, GRAB) Bag
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 2.2 2 2.2 3 2.2	2.2	1 2.2 2 2.2 3 2.4	2.3	1 2.2 2 2.2 3 2.2	2.2	2.2
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 19.8 2 19.8 3 19.8	~~18.6~~ 17.6	1 19.8 2 19.8 3 19.8	17.5	1 19.8 2 20.0 3 20.0	~~19.9~~ 17.7	17.6

91-18 SEV SURMAN wkshtc 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

FILE NAME - metals1
RUN # - MM5KILN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 15:05:13

Initial Meter Volume (Cubic Feet)=	944.772		
Final Meter Volume (Cubic Feet)=	1044.190		
Meter Factor=	1.027		
Multiple leak checks, see end of printout		Leak Correction=	0.0000
Net Meter Volume (Cubic Feet)=	102.102		
Gas Volume (Dry Standard Cubic Feet)=	99.211		
Barometric Pressure (in Hg)=	29.30		
Static Pressure (Inches H20)=	-0.12		
Percent Oxygen=	17.6		
Percent Carbon Dioxide=	2.2		
Moisture Collected (ml)=	96.0		
Percent Water=	4.4		
Average Meter Temperature (F)=	74		
Average Delta H (in H20)=	1.22		
Average Delta P (in H20)=	0.081		
Average Stack Temperature (F)=	429		
Dry Molecular Weight=	29.06		
Wet Molecular Weight=	28.57		
Average Square Root of Delta P (in H20)=	0.2613		
% Isokinetic=	92.7		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	175.0		
Nozzle Diameter (Inches)=	0.417		
Stack Axis #1 (Inches)=	68.0		
Stack Axis #2 (Inches)=	68.0		
Rectangular Stack			
Stack Area (Square Feet)=	32.11		
Stack Velocity (Actual, Feet/min)=	1,160		
Flow Rate (Actual, Cubic ft/min)=	37,260		
Flow rate (Standard, Wet, Cubic ft/min)=	21,657		
Flow Rate (Standard, Dry, Cubic ft/min)=	20,713		

Particulate Loading - Front Half

Particulate Weight (g)=	0.0537	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0083	0.0343	0.0455
Particulate Loading, Actual (gr/cu ft)=	0.0046		
Emission Rate (lb/hr)=	1.48		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - metals1
RUN # - MM5KILN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 15:05:15

Initial Meter Volume (Cubic Meters)=	26.752	
Final Meter Volume (Cubic Meters)=	29.567	
Meter Factor=	1.027	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	2.891	
Gas Volume (Dry Standard Cubic Meters)=	2.809	
Barometric Pressure (mm Hg)=	744	
Static Pressure (mm H20)=	-3	
Percent Oxygen=	17.6	
Percent Carbon Dioxide=	2.2	
Moisture Collected (ml)=	96.0	
Percent Water=	4.4	
Average Meter Temperature (C)=	23	
Average Delta H (mm H20)=	30.9	
Average Delta P (mm H20)=	2.0	
Average Stack Temperature (C)=	221	
Dry Molecular Weight=	29.06	
Wet Molecular Weight=	28.57	
Average Square Root of Delta P (mm H20)=	1.3168	
% Isokinetic=	92.7	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (mm)=	10.59	
Stack Axis #1 (Meters)=	1.727	
Stack Axis #2 (Meters)=	1.727	
Rectangular Stack		
Stack Area (Square Meters)=	2.983	
Stack Velocity (Actual, m/min)=	354	
Flow rate (Actual, Cubic m/min)=	1,055	
Flow rate (Standard, Wet, Cubic m/min)=	613	
Flow rate (Standard, Dry, Cubic m/min)=	587	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0537	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (mg/cu m)=	19.1	78.7 104.3
Particulate Loading, Actual (mg/cu m)=	10.6	
Emission Rate (kg/hr)=	0.67	

No Back Half Analysis

FILE NAME - metals1
RUN # - MM5KILN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 15:05:15

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.160	2.40	433	71	70
2	0.130	1.96	432	70	70
3	0.100	1.52	431	77	71
4	0.065	1.00	429	78	71
5	0.035	0.53	427	79	72
6	0.130	1.98	431	74	73
7	0.120	1.82	434	76	73
8	0.110	1.70	434	81	74
9	0.020	0.30	431	83	75
10	0.001	0.01	429	79	75
11	0.020	0.30	422	72	71
12	0.020	0.30	422	73	72
13	0.030	0.45	432	73	72
14	0.075	1.13	437	75	74
15	0.140	2.10	438	77	72
16	0.030	0.46	406	72	71
17	0.020	0.30	422	72	70
18	0.125	1.90	437	72	70
19	0.170	2.60	442	76	72
20	0.220	3.30	442	80	72
21	0.020	0.30	408	74	71
22	0.020	0.30	408	74	71
23	0.055	0.80	433	74	71
24	0.115	1.70	437	75	70
25	0.085	1.30	436	77	70

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.0939	1.0830	0.0000	0.0109

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	92.5844	92.5408	214.5	0.0428
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0037
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

Lk Rate (cfm)	Time (min)
0.0010	70.0000
0.0050	105.0000

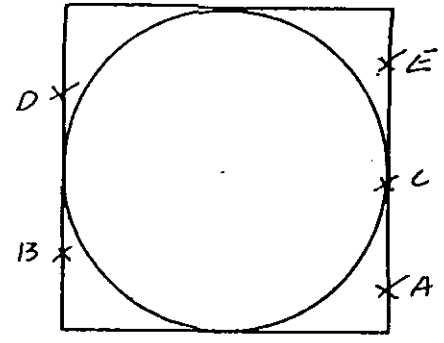
FIELD DATA

BL-5

RUN NO. MM-2
PROJECT NO. 4601.01.05.01
PLANT Belden Brick
DATE 11-10-93
SAMPLING LOCATION Kiln
SAMPLE TYPE Integrated MM5
OPERATOR Szydlo
FILTER NO. 4
RECORD DATA EVERY 7 MIN.
UMBILICAL/SAMPLER HOOKUP VH-11

PROBE NO. ~~8' quartz~~
PROBE LENGTH AND TYPE 8' quartz
SAMPLE BOX NO. ~~512~~
METER BOX NO. N-12
TEMP. CONTROLLER NO. N-12
TEMP. METER NO. N-12 ~~96-7~~
THERMOCOUPLE I.D. NO. ~~N-12-2~~
UMBILICAL CORD I.D. NO. N-12-2
UMBILICAL CORD I.D. NO. —
NOZZLE NO. MM5 #1/MM5 #2

NOZZLE DIA. .417
ASSUMED MOISTURE % 5%
METER ΔH@ 1.715
METER CORRECTION 1.027
PITOT NO. 5-8
PITOT COEFFICIENT .8162
BAROMETRIC PRESSURE 29.3
SITE TO BARO. ELEVATION (ft.) ~~29~~
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	0910	1407				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	0908	1107	1122	1405	
VACUUM, In. Hg	≥15"	≥5"	≥~~15"~~ 19"	26	≥15"
CFM	.010	0.001	0.01	.001	
VOLUMES					
FINAL			94.495	94.789	
INITIAL			94.240	94.495	
DIFFERENCE			.255	.294	

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 49.800
FINAL VOLUME 178.093
LEAK CHECK VOLUME ~~.544~~ .255
ADJUSTED FINAL VOLUME [redacted] 177.838

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RUN NO. MM5 / Run #2 / Kiln
DATE 11-10-93

SAMPLING LOCATION Kiln
PROJECT NO. 4601.01.05.01

p. 1 of 1
OPERATOR Szydlo

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr.) / SAMPLING TIME, min	GAS METER READING (V_m), ft³ INITIAL 49.800 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
	0 / 0942															
B-1	7 / 0949	55.132	55.235	0.115	1.80	1.80	433	68	67	4	44	240	251	257		
B-2	14 / 0956	60.941	60.792	.135	2.13	2.10	430	71	68	5	44	240	250	255		
B-3	21 / 1003	65.970	65.895	.100	1.59	1.60	428	76	69	5	43	242	250	250		
B-4	28 / 1010	69.879	69.915	.06	0.95	0.95	430	78	71	2	43	240	250	250		
B-5	35 / 1017	73.072	72.974	.04	0.63	0.63	431	79	71	1	46	220	254	255		
D-1	42 / 1033	78.702	78.425	.125	1.98	2.00	432	75	73	4	50	246	252	253		
D-2	49 / 1040	84.359	83.998	.125	1.99	2.00	432	79	74	4	51	220	254	250		
D-3	56 / 1047	89.281	88.932	.100	1.54	1.50	436	75	51	4	50	205	255	255		
D-4	63 / 1054	92.501	92.237	.04	0.64	0.64	431	84	75	1	52	220	255	255		
D-5	70 / 1101	94.473	94.240	.015	0.24	0.24	431	83	76	1	51	225	250	250		
1	77 / 1138	~~94.784~~ 99.947	100.927	.150	2.44	2.50	409	75	74	5	48	252	253	262		
2	84 / 1192	107.279	107.217	.150	2.42	2.50	421	75	74	6	48	250	252	258		
3	91 / 1140	113.509	113.521	.150	2.40	2.50	431	85	75	6	48	252	256	252		
4	98 / 1156	119.549	119.256	.140	2.25	2.30	431	86	76	5	48	256	259	260		
5	105 / 1203	125.489	125.475	.135	2.17	2.20	432	87	77	5	48	252	255	255		
C 1	112 / 1243	130.980	131.127	.115	1.87	2.00	414	78	77	5	55	238	249	253		
C 2	119 / 1250	136.445	136.412	.115	1.85	1.80	423	79	76	4	54	224	252	253		
C 3	126 / 1257	141.904	142.024	.115	1.84	1.80	431	82	77	4	57	247	255	251		
C 4	133 / 1304	147.358	147.325	.115	1.84	1.80	436	84	77	4	58	247	256	258		
C 5	140 / 1311	152.819	152.525	.115	1.84	1.80	439	86	78	4	55	259	252	255		
1	147 / 1329	157.769	157.892	.105	1.70	1.70	425	81	80	4	55	242	250	256		
2	154 / 1336	162.915	162.815	.100	1.63	1.60	420	84	80	4	52	236	253	255		
3	161 / 1343	168.031	168.002	.100	1.61	1.60	434	86	80	4	51	235	253	253		
4	168 / 1350	173.144	173.025	.100	1.60	1.60	438	88	80	4	51	232	252	254		
5	175 / 1357	178.258	178.093	.100	1.60	1.60	438	88	80	4	51	234	250	252		

COMMENTS

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MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kin Stack No. 3

Run No. 2 Sampling Train No. MM-2 Sample Box No. 012001
Set up person(s): Jg M. Cu Date 11-8-93
Transfer to Sampler:) Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By _____ Received By Jg M. Cu Date/Time 11-10-93 715

TRAIN COMPONENT	COMPONENT NO.		LOADING DATA: Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)		*		
Probe (Liner-Glass)		*		
Female Probe Blank-off				
Cyclone**		*		
Flask**				
90° Bypass**		* Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back		Filter I.D.No.: 4		
45/90° Connector**		4		
Short 90° Connector**				
1st Impinger (2-L** Short-stem Mod-GBS)		Empty	466.3	
U-Connector (A)				
2nd Impinger (Mod-GBS)		100 mLs ± 2 mLs	459.3	559.7
U-Connector (B)		5% HNO_3/10% H_2O_2		
3rd Impinger (GBS)		100 mLs ± 2 mLs	475.2	575.0
U-Connector (C)		5% HNO_3/10% H_2O_2		
4th Impinger (Mod-GBS)		Empty	471.8	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	457.3	567.8
U-Connector (E)		4% $KMnO_4$/10% H_2SO_4		
6th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	468.5	579.2
U-Connector (F)		4% $KMnO_4$/10% H_2SO_4		
7th Impinger (Mod-GBS)		100 mLs*****	755.4	
U-Connector (G)		1.0 N NaOH		
8th Impinger (Mod-GBS)	B-142	~200 g indicating	743.6	
Impinger Outlet Connector		silica gel		
Replacement 8th Impinger**	UH-11	<--Exchange when necessary		

Note: Components in italics used only when mercury is a target metal.

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil after sampling.

** Optional for low/high particulate/moisture gas streams as applicable.

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm or Teflon tape.

**** Use 200 mLs ± 2 mLs and document below if reagent is exhausted before the end of a previous run. Prepare additional reagent blanks accordingly.

***** Used for acid trap and is not recovered as a sample. Replace with acidic $KMnO_4$ if the acidic $KMnO_4$ in the previous impinger is exhausted before the end of a previous run, and prepare additional reagent blanks accordingly.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack, No. 3

Run No. 2 Sampling Train No. MM-2 Sample Box No. 012001
Transfer for Recovery:

Relinquished By: _____ Received By Jg M. C. Date/Time 11-10-93 1430
Sample box recovery person(s): Jg M. C. Date: 11-10-93
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	~~8th-2~~
Final Wt.(g)	482.5	614.3	592.4	475.9	573.7	581.9	750.7	771.4	
Initial Wt.(g)	466.3	559.7	575.0	471.8	567.8	579.2	755.4	743.6	
Net Wt.(g)	16.2	54.6	17.4	4.1	1.9	2.7	(4.7)	27.8	

[Total Condensate Collected (g): 120.0]

Description and color:	clear	clear	clear	clear	purple	purple	clear	15
Impingers:	>>>>>> 1-3	<<<<<	4	>>>>	5/6	<<<<	5-6	% Blue

Sample Number:	2031 *	2032	2033 *>>>>	2034
Sample Bottle Tare Wt.(g)	498.4	175.8	261.5	172.3
Sample Bottle Gross Wt.(g	778.6	178.2	483.0 <----------Before Rinses	
Rinse Solution:	0.1N HNO_3	0.1N HNO_3	acidic $KMnO_4$	8 N HCl
Components Rinsed:	** filter support, filter holder back, 45/90° connector or short 90° connector, 1st-3rd impingers, U-connectors A-C	** 4th impinger	*** 5th-6th impingers, U-connectors D-F	
Sample Bottle Final Wt.(g)	923.8	277.2	688.9	399.3 After Rinses
Net Sample Wt.(g)	425.4	101.4	427.4	654.4

FRONT HALF RECOVERY

Sample Number:	2065	2029	2030
Sample Bottle Tare Wt.(g)	175.1	~~172.~~ 171.8	Filter
Rinse Solution:	Acetone	0.1 N HNO_3	Description and Color:
Components Rinsed****: nozzle, probe liner, cyclone and flask or bypass, filter holder front			dirty white
Sample Bottle Gross Wt.(g)	285.5* w/Acetone		
Net Acetone Sample Wt.(g)			
Sample Bottle Final Wt.(g)	~~w/added Water~~		259.4 *
Net Sample Wt.(g)	110.4		86.6

* Do not fill bottle; vent pressure after recovery (before and after shipment). Keep samples iced to minimize pressure buildup.

** Using 100 mLs 0.1 N HNO_3, rinse components (2X).

*** Check pH with a glass rod and pH indicator strips; adjust with conc. HNO_3.

**** Using a total of 150 mLs (250 mLs if cyclone and flask are used) acetone, rinse components (3X or more with brushing) until clean. If some residue cannot be removed, rinse components again with a total of 100 mLs (200 mLs if cyclone and flask are used) ASTM Type I water (3X or more with brushing). Combine water and acetone rinses. Then, using a total of 100 mLs (200 mLs if cyclone and flask are used) 0.1 N HNO_3, rinse components (3X or more with brushing); combine these rinses and keep separate. Follow with water, then acetone rinses and discard those rinses.

COMMENTS:

* Not sure amount of rinses acetone ~ 175 ml HNO_3 ~ 100 ml

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601 RUN NO. mm-2
SAMPLE NO. _____ DATE 11/10/93
PLANT SAMPLING LOCATION Brick Kiln Stack
ANALYSIS TIME (24hr-CLOCK) 2018
SAMPLE TYPE (BAG, GRAB) BAG
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -00- CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 1.0 2 1.0 3 1.0	1.0	1 1.0 2 1.0 3 1.0	1.0	1 1.0 2 1.0 3 1.0	1.0	1.0
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 19.2 2 19.4 3 19.4	18.3	1 19.4 2 19.4 3 19.4	18.4	1 19.4 2 19.4 3 19.4	18.4	18.4

91-18 SEV SURMAN wkshit 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

A 101

FILE NAME - metals2
RUN # - mm5k12
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 16:00:03

Initial Meter Volume (Cubic Feet)=	49.800	
Final Meter Volume (Cubic Feet)=	177.838	
Meter Factor=	1.027	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Feet)=	131.495	
Gas Volume (Dry Standard Cubic Feet)=	126.906	
Barometric Pressure (in Hg)=	29.30	
Static Pressure (Inches H20)=	-0.12	
Percent Oxygen=	18.4	
Percent Carbon Dioxide=	1.0	
Moisture Collected (ml)=	120.0	
Percent Water=	4.3	
Average Meter Temperature (F)=	78	
Average Delta H (in H20)=	1.71	
Average Delta P (in H20)=	0.106	
Average Stack Temperature (F)=	429	
Dry Molecular Weight=	28.90	
Wet Molecular Weight=	28.43	
Average Square Root of Delta P (in H20)=	0.3201	
% Isokinetic=	99.3	
Pitot Coefficient=	0.82	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (Inches)=	0.417	
Stack Axis #1 (Inches)=	68.0	
Stack Axis #2 (Inches)=	68.0	
Rectangular Stack		
Stack Area (Square Feet)=	32.11	
Stack Velocity (Actual, Feet/min)=	1,385	
Flow Rate (Actual, Cubic ft/min)=	44,462	
Flow rate (Standard, Wet, Cubic ft/min)=	25,840	
Flow Rate (Standard, Dry, Cubic ft/min)=	24,738	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0430	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0052	0.0281	0.0627
Particulate Loading, Actual (gr/cu ft)=	0.0029		
Emission Rate (lb/hr)=	1.11		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - metals2
RUN # - mm5kl2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 16:00:04

Initial Meter Volume (Cubic Meters)=	1.410
Final Meter Volume (Cubic Meters)=	5.036
Meter Factor=	1.027
Multiple leak checks, see end of printout	Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	3.723
Gas Volume (Dry Standard Cubic Meters)=	3.593
Barometric Pressure (mm Hg)=	744
Static Pressure (mm H20)=	-3
Percent Oxygen=	18.4
Percent Carbon Dioxide=	1.0
Moisture Collected (ml)=	120.0
Percent Water=	4.3
Average Meter Temperature (C)=	25
Average Delta H (mm H20)=	43.4
Average Delta P (mm H20)=	2.7
Average Stack Temperature (C)=	221
Dry Molecular Weight=	28.90
Wet Molecular Weight=	28.43
Average Square Root of Delta P (mm H20)=	1.6131
% Isokinetic=	99.3
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	175.0
Nozzle Diameter (mm)=	10.59
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	422
Flow rate (Actual, Cubic m/min)=	1,259
Flow rate (Standard, Wet, Cubic m/min)=	732
Flow rate (Standard, Dry, Cubic m/min)=	700

Particulate Loading - Front Half

Particulate Weight (g)=	0.0430	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (mg/cu m)=	12.0	64.5 143.7
Particulate Loading, Actual (mg/cu m)=	6.7	
Emission Rate (kg/hr)=	0.50	

No Back Half Analysis

FILE NAME - metals2
RUN # - mm5kl2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-04-1994 16:00:05

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.115	1.80	433	68	67
2	0.135	2.10	430	71	68
3	0.100	1.60	428	76	71
4	0.060	0.95	430	78	71
5	0.040	0.63	431	79	71
6	0.125	2.00	432	75	73
7	0.125	2.00	432	79	74
8	0.100	1.50	436	75	71
9	0.040	0.64	431	84	75
10	0.015	0.24	431	83	76
11	0.150	2.50	409	75	74
12	0.150	2.50	421	79	74
13	0.150	2.50	431	83	75
14	0.140	2.30	431	86	76
15	0.135	2.20	432	87	77
16	0.115	2.00	414	78	77
17	0.115	1.80	423	79	76
18	0.115	1.80	431	82	77
19	0.115	1.80	436	84	77
20	0.115	1.80	439	86	78
21	0.105	1.70	425	81	80
22	0.100	1.60	420	84	80
23	0.100	1.60	434	86	80
24	0.100	1.60	438	88	80
25	0.100	1.60	438	88	80

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.1205	1.1103	0.0000	0.0102

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	103.7065	103.6735	244.0	0.0328
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0007
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

Lk Rate (cfm)	Time (min)
0.0010	70.0000
0.0010	105.0000

FIELD DATA

RUN NO. MM5 #3
PROJECT NO. 4601.01.05.01
PLANT Belden Brick
DATE 11-10-93
SAMPLING LOCATION Kiln
SAMPLE TYPE MM5 - Integrated
OPERATOR Szydlo
FILTER NO. 6
RECORD DATA EVERY 7 MIN.
UMBILICAL/SAMPLER HOOKUP UH-35

PROBE NO. BL-5
PROBE LENGTH AND TYPE 8' quartz
SAMPLE BOX NO.
METER BOX NO. N-12
TEMP. CONTROLLER NO. N-12
TEMP. METER NO. N-12
THERMOCOUPLE I.D. NO. 96-7
UMBILICAL CORD I.D. NO. N-12-2
UMBILICAL CORD I.D. NO. —
NOZZLE NO. MM5#1/MM5#2

NOZZLE DIA. .417
ASSUMED MOISTURE % 5%
METER ΔH@ 1.715
METER CORRECTION 1.027
PITOT NO. S-8
PITOT COEFFICIENT .8162
BAROMETRIC PRESSURE 29.3
SITE TO BARO. ELEVATION (ft.) —
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -.12

SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1501	0804				
PASS/FAIL		Pass				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1520	1955			
VACUUM, In. Hg	≥15"	≥7"	≥15"		≥15"
CFM	.009	0.008			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 179.500
FINAL VOLUME 282.335
LEAK CHECK VOLUME 0.008
ADJUSTED FINAL VOLUME [illegible]

A 105

RUN NO. MMS # 3 SAMPLING LOCATION Kiln p. 1 of 1

DATE 11-10-93 PROJECT NO. 4601.01.05.01 OPERATOR Szydlo

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.) 0	1559	GAS METER READING (V_m), ft³ INITIAL 179.500 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
E 1	7	1600	181.122	181.105	0.01	.16	.16	403	75	75	1	49	222	251	253		
E 2	14	1607	184.123	184.102	0.035	.56	.60	421	75	74	1	49	224	250	254		
4 min stop → E 3	21	1618	187.310	187.105	0.040	.63	.60	434	76	74	1	49	222	253	254		
E 4	28	1625	193.487	191.487	.15	2.37	2.40	438	78	75	7	49	225	254	252		
E 5	35	1632	199.159	198.582	.125	1.99	2.00	437	83	76	5	49	225	254	252		
C 1	42	1646	200.772	200.524	.010	.16	.16	425	80	77	1	51	222	234	254		
C 2	49	1653	202.750	202.639	.015	.24	.24	427	82	78	1	50	224	232	250		
C 3	56	1700	206.000	205.998	.040	.65	.65	416	82	78	1	50	225	238	260		
C 4	63	1707	210.556	210.426	0.08	1.28	1.28	435	84	78	4	45	217	252	254		
C 5	70	1714	216.364	215.865	0.13	2.07	2.10	440	84	81	5	45	222	254	255		
A 1	77	1721	218.919	218.625	.025	0.40	0.40	426	80	80	1	42	229	235	242		
A 2	84	1728	223.156	222.945	.070	1.10	1.10	442	81	79	4	42	218	253	253		
A 3	91	1758	228.229	227.952	.100	1.58	1.60	444	84	79	5	40	219	251	250		
A 4	98	1805	234.249	234.301	.140	2.23	2.20	444	86	80	5	40	224	242	245		
A 5	105	1812	238.512	238.123	.070	1.11	1.10	444	88	80	6	41	225	230	250		
B -1	112	1836	244.109	244.029	.14	2.21	2.20	444	80	80	5	40	217	251	254		
B -2	119	1843	249.905	249.252	.13	2.07	2.10	443	84	80	5	40	225	250	252		
B 3	126	1850	255.126	255.025	.105	1.67	1.70	441	86	80	5	40	232	245	250		
B 4	133	1857	259.400	259.872	.07	1.12	1.12	438	87	80	5	40	234	240	245		
B 5	140	1904	262.198	262.760	.03	.48	.48	438	87	80	1	42	240	252	250		
D-1	147	1918	268.526	262.916	.155	2.47	2.50	434	82	80	6	41	248	255	257		
D-2	154	1926	274.131	274.326	.120	1.93	1.90	432	85	80	5	41	224	252	254		
D-3	161	1933	278.393	278.723	.070	1.11	1.10	443	87	80	5	41	230	250	252		
D-4	168	1940	281.191	281.297	.030	.48	.48	438	87	80	1	41	232	253	257		
D-5	175	1947	282.335	282.335	.005	.08	.08	432	85	80	1	41	234	257	255		

COMMENTS 0755: ~~The data did not passed the final leak check.~~
~~The leak rate was 0.09 cf/min.~~
~~The leak occured because of loose nozzle.~~

A 106

MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kin Stack No. 3

Run No. 3 Sampling Train No. MM-1 Sample Box No. 011996
Set up person(s): J. Surman Date 11-10-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By _____ Received By _____ Date/Time _____

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
~~Cyclone~~*	*			
~~Flask~~				
90° Bypass	*	Filter Type:		
Filter Holder Front		Whatman QM-A		
Filter Holder Back	211	Filter I.D.No.:		
~~45/90° Connector~~		LF-6		
Short 90° Connector				
1st Impinger				
(~~2-L~~ Short-stem Mod-GBS)		Empty	474.2	
U-Connector (A)				
2nd Impinger (Mod-GBS)		100 mLs ± 2 mLs	472.7	581.4
U-Connector (B)		5% HNO_3/10% H_2O_2		
3rd Impinger (GBS)		100 mLs ± 2 mLs	476.4	578.5
U-Connector (C)		5% HNO_3/10% H_2O_2		
4th Impinger (Mod-GBS)		Empty	468.9	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	458.7	571.3
U-Connector (E)		4% $KMnO_4$/10% H_2SO_4		
6th Impinger (Mod-GBS)		100 mLs ± 2 mLs****	497.8	611.0
U-Connector (F)		4% $KMnO_4$/10% H_2SO_4		
7th Impinger (Mod-GBS)		100 mLs*****	660.2	
U-Connector (G)		1.0 N NaOH		
8th Impinger (Mod-GBS)		~200 g indicating	747.9	
Impinger Outlet Connector	UH-35	silica gel		
~~Replacement 8th Impinger~~		<--Exchange when necessary		

Note: Components in italics used only when mercury is a target metal.

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil after sampling.

~~Optional for low/high particulate/moisture gas streams as applicable~~

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm or Teflon tape.

**** Use 200 mLs ± 2 mLs and document below if reagent is exhausted before the end of a previous run. Prepare additional reagent blanks accordingly.

***** Used for acid trap and is not recovered as a sample. Replace with acidic $KMnO_4$ if the acidic $KMnO_4$ in the previous impinger is exhausted before the end of a previous run, and prepare additional reagent blanks accordingly.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/29 - PARTICULATES AND MULTIPLE METALS TRAIN (MM5PM)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack, No. 3

Run No. 3 Sampling Train No. MM-1 Sample Box No. 011996
Transfer for Recovery:

Relinquished By: _____ Received By J McC Date/Time 11-10-93 2030
Sample box recovery person(s): J. McC Date: 11-11-93
Probe recovery person(s): _____ Date: _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th	8th-1	~~8th-2~~
Final Wt.(g)	498.5	626.7	590.3	470.8	575.5	611.2	660.1	765.5	
Initial Wt.(g)	474.2	581.4	578.5	468.9	571.3	611.0	660.2	747.9	
Net Wt.(g)	24.3	45.3	11.8	1.9	4.2	.2	(0.1)	17.6	

[Total Condensate Collected (g): 105.1]

Description and color:	clear	clear	clear	clear	purple	purple	clear	40	
Impingers:	>>>>>> 1-3	<<<<<		4	>>>> 5-6	<<<<		5-6	% Blue

Sample Number:	3031 *	3032	3033 *>>>>	3034	3031A
Sample Bottle Tare Wt.(g)	497.1	172.4	260.8	172.3	
Sample Bottle Gross Wt.(g	786.6	174.0	483.9 <----------Before Rinses		174.7
Rinse Solution:	0.1N HNO_3	0.1N HNO_3	acidic $KMnO_4$	8 N HCl	
Components Rinsed:	** filter support, filter holder back, 45/90° connector or short 90° connector, 1st-3rd impingers, U-connectors A-C	** 4th impinger	*** 5th-6th impingers, U-connectors D-F		
Sample Bottle Final Wt.(g)	~~882.4~~ 905.8	270.7	683.5	396.6 After Rinses	214.5
Net Sample Wt.(g)	408.7	98.3	422.7	224.3	39.8

FRONT HALF RECOVERY

Sample Number:	3065	3029	3030
Sample Bottle Tare Wt.(g)	172.3	175.7	Filter
Rinse Solution:	Acetone	0.1 N HNO_3	Description and Color:
Components Rinsed****: nozzle, probe liner, cyclone and flask or bypass, filter holder front			gray
Sample Bottle Gross Wt.(g)	274.2 w/Acetone		
Net Acetone Sample Wt.(g)			
Sample Bottle Final Wt.(g)	w/added Water		275.4 ~~230.4~~
Net Sample Wt.(g)	101.9		99.7

* Do not fill bottle; vent pressure after recovery (before and after shipment). Keep samples iced to minimize pressure buildup.

** Using 100 mLs 0.1 N HNO_3, rinse components (2X).

*** Check pH with a glass rod and pH indicator strips; adjust with conc. HNO_3.

**** Using a total of 150 mLs (250 mLs if cyclone and flask are used) acetone, rinse components (3X or more with brushing) until clean. If some residue cannot be removed, rinse components again with a total of 100 mLs (200 mLs if cyclone and flask are used) ASTM Type I water (3X or more with brushing). Combine water and acetone rinses. Then, using a total of 100 mLs (200 mLs if cyclone and flask are used) 0.1 N HNO_3, rinse components (3X or more with brushing); combine these rinses and keep separate. Follow with water, then acetone rinses and discard those rinses.

COMMENTS:

4 ml HNO_3 used

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601 RUN NO. MM5-3
SAMPLE NO. _____ DATE 11/10/93
PLANT SAMPLING LOCATION Kiln
ANALYSIS TIME (24hr-CLOCK) 2112
SAMPLE TYPE (BAG, GRAB) BAG
OPERATOR Szydlo

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE 0 CHANGE IN 4 MIN.
PIPETTES 0 CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE 0 CHANGE IN 4 MIN.
PIPETTES 0 CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 1.7 2 1.7 3 1.8	1.7	1 1.8 2 1.7 3 1.8	1.8	1 1.5 2 1.7 3 1.8	1.7	1.73
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 19.6 2 19.7 3 19.7	17.9	1 19.5 2 19.8 3 19.6	17.8	1 18.9 2 19.5 3 19.6	17.6	17.8

91-18 SEV SURMAN white 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

FILE NAME - metals3
RUN #" - mm5kl3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:33:21

Initial Meter Volume (Cubic Feet)=	179.500
Final Meter Volume (Cubic Feet)=	282.327
Meter Factor=	1.027
Final Leak Rate (cu ft/min)=	0.008
Net Meter Volume (Cubic Feet)=	105.603
Gas Volume (Dry Standard Cubic Feet)=	101.263
Barometric Pressure (in Hg)=	29.30
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.8
Percent Carbon Dioxide=	1.7
Moisture Collected (ml)=	105.1
Percent Water=	4.7
Average Meter Temperature (F)=	81
Average Delta H (in H20)=	1.21
Average Delta P (in H20)=	0.076
Average Stack Temperature (F)=	435
Dry Molecular Weight=	28.99
Wet Molecular Weight=	28.48
Average Square Root of Delta P (in H20)=	0.2567
% Isokinetic=	99.5
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	175.0
Nozzle Diameter (Inches)=	0.417
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,113
Flow Rate (Actual, Cubic ft/min)=	35,729
Flow rate (Standard, Wet, Cubic ft/min)=	20,645
Flow Rate (Standard, Dry, Cubic ft/min)=	19,683

Particulate Loading - Front Half

Particulate Weight (g)=	0.0886	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0135	0.0590	0.0935
Particulate Loading, Actual (gr/cu ft)=	0.0074		
Emission Rate (lb/hr)=	2.27		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - metals3
RUN # - mm5k13
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:33:22

Initial Meter Volume (Cubic Meters)=	5.083
Final Meter Volume (Cubic Meters)=	7.994
Meter Factor=	1.027
Final Leak Rate (cu m/min)=	0.0002
Net Meter Volume (Cubic Meters)=	2.990
Gas Volume (Dry Standard Cubic Meters)=	2.867
Barometric Pressure (mm Hg)=	744
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.8
Percent Carbon Dioxide=	1.7
Moisture Collected (ml)=	105.1
Percent Water=	4.7
Average Meter Temperature (C)=	27
Average Delta H (mm H20)=	30.7
Average Delta P (mm H20)=	1.9
Average Stack Temperature (C)=	224
Dry Molecular Weight=	28.99
Wet Molecular Weight=	28.48
Average Square Root of Delta P (mm H20)=	1.2935
% Isokinetic=	99.5
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	175.0
Nozzle Diameter (mm)=	10.59
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	339
Flow rate (Actual, Cubic m/min)=	1,012
Flow rate (Standard, Wet, Cubic m/min)=	585
Flow rate (Standard, Dry, Cubic m/min)=	557

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0886		
Particulate Loading, Dry Std. (mg/cu m)=	30.9	135.2	214.3
Particulate Loading, Actual (mg/cu m)=	17.0		
Emission Rate (kg/hr)=	1.03		

No Back Half Analysis

FILE NAME - metals3
RUN # - mm5kl3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:33:23

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.010	0.16	403	75	75
2	0.035	0.60	421	75	74
3	0.040	0.60	434	76	74
4	0.150	2.40	438	78	75
5	0.125	2.00	437	83	76
6	0.010	0.16	425	80	77
7	0.015	0.24	427	82	78
8	0.040	0.65	416	82	78
9	0.080	1.28	435	84	78
10	0.130	2.10	440	84	81
11	0.025	0.40	426	80	80
12	0.070	1.10	442	81	79
13	0.100	1.60	444	84	79
14	0.140	2.20	444	86	80
15	0.070	1.10	444	88	80
16	0.140	2.20	444	80	80
17	0.130	2.10	443	84	80
18	0.105	1.70	441	86	80
19	0.070	1.12	438	87	80
20	0.030	0.48	438	87	80
21	0.155	2.50	439	82	80
22	0.120	1.90	432	85	80
23	0.070	1.10	443	87	80
24	0.030	0.48	438	87	80
25	0.005	0.08	432	85	80

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.1285	1.1002	0.0000	0.0283

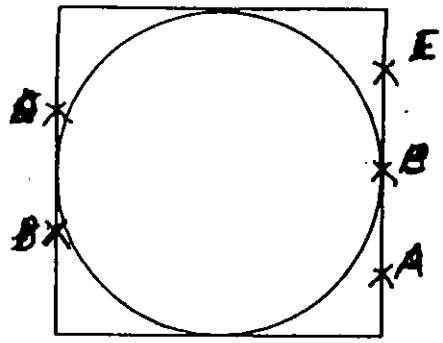
Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	99.3346	99.2743	0.0	0.0603
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0007
Impinger Blank (mg/ml)= 0.0000

A.2.3 Kiln Semivolatile Organic Compounds

FIELD DATA

RUN NO.	SV-~~2~~ H 1	PROBE NO.	UL-1	NOZZLE DIA.	0.419
PROJECT NO.	4601	PROBE LENGTH AND TYPE		ASSUMED MOISTURE %	10%
PLANT	BELDEN BRICK NO6	SAMPLE BOX NO.	011995	METER ΔH@	1.853
DATE	11/9/93	METER BOX NO.	N-~~8~~ 7	METER CORRECTION	1.021
SAMPLING LOCATION		TEMP. CONTROLLER NO.	N-~~8~~ 7	PITOT NO.	M-1
SAMPLE TYPE	SEMNOLATILE	TEMP. METER NO.	N-~~8~~ 7	PITOT COEFFICIENT	.8400
OPERATOR	WHITMIRE	THERMOCOUPLE I.D. NO.	96-6A	BAROMETRIC PRESSURE	29.3
FILTER NO.		UMBILICAL CORD I.D. NO.	N-125.5	SITE TO BARO. ELEVATION (ft.)	
RECORD DATA EVERY	7 MIN.	UMBILICAL CORD I.D. NO.	—	CORRECTED B.P. (0.1 in./100 ft.)	
UMBILICAL/SAMPLER HOOKUP	U/H-8	NOZZLE NO.	SV-3	STATIC PRESSURE	-0.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1305	1927				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1325	1600	1640	1730	1740
VACUUM, In. Hg	≥15"	≥12	≥15"	12	≥15"
CFM	.001	0.01	0.01	0.006	0.005
VOLUMES					
FINAL		497.052		570.075	
INITIAL		496.700		519.709	
DIFFERENCE		0.352		0.366	

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg	≥13"	≥15"		≥15"	
CFM	0.003				
VOLUMES					
FINAL		564.68			
INITIAL					
DIFFERENCE					

INITIAL VOLUME 960.067 564.68

FINAL VOLUME ~~0.718~~ ~~539.01~~

LEAK CHECK VOLUME 0.718

ADJUSTED FINAL VOLUME ~~539.0~~

A 115

SEMIVOLATILES

RUN NO. SV-1
DATE 11/9/93

SAMPLING LOCATION KILN STACK
PROJECT NO. 4601

p. 1 of 2
OPERATOR WHITMIRE

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.)		GAS METER READING (V_m), ft³ INITIAL 460.067 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F	XAD	
	0.00	1430															
C1				460.067	0.005	0.08	0.08	425	72	71	2	49	238	257	257		
1	7	1437	461.182	461.400	0.015	0.25	0.21	422	74	73	3	55	240	257	253	52	
2	14	1444	463.125	463.250	0.025	0.42	0.40	426	73	73	5	50	240	254	248		
3	21	1451	465.626	465.770	0.085	1.44	1.40	428	75	74	8	47	242	259	255	52	
4	28	1458	470.244	470.210	0.165	2.80	2.80	430	78	75	12	46	243	254	248		
5	35	1505	476.695	476.70													
		1517															
E 1		1517		476.70	0.005	0.08	0.08	425	78	77	3	59	244	256	252		
E1	7	1524	477.823	477.835	0.025	0.43	0.41	422	79	78	6	53	242	255	255	50	
2	14	1581	480.355	480.320	0.07	1.19	1.20	429	80	79	8	48	246	259	254		
3	21	1538	484.58	484.31	0.16	2.73	2.73	432	82	79	10	46	242	261	256	52	
4	28	1545	490.976	490.48	0.145	2.47	2.50	437	85	80	12	44	239	261	253		
5	35	1552	497.067	496.700													
A		1643		497.052	0.02	0.34	0.34	424	78	77	5	49	245	257	252		
A1	7	1650	499.309	499.430	0.07	1.19	1.20	429	77	77	8	45	244	255	257	52	
2	14	1657	503.638	503.260	0.115	1.95	2.00	436	79	78	10	42	243	254	254		
3	21	1704	509.02	508.62	0.175	2.97	3.00	438	82	78	12	42	244	252	253	51	
4	28	1711	515.683	515.01	0.07	1.19	1.20	439	85	82	7	43	242	257	253		
5	35	1718	519.918	519.709													
D 1		1753		520.075	0.145	2.46	2.5	437	79	79	12	42	260	256	264	40	
2	7	1800	526.127	526.230	0.12	2.03	2.0	439	81	79	10	40	257	259	264		
3	14	1807	531.636	531.640	0.055	0.93	.85	441	82	79	7	41	242	257	257	41	
4	21	1814	535.366	535.430	0.025	0.42	0.42	441	82	80	5	41	240	258	256	41	
5	28	1821	537.883	537.88	0.005	0.08	0.08	438	82	80		41	239	258	254		
	35	1828	539.01														

1600 Leak check = 0.01

COMMENTS

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RUN NO. 1
DATE 11/9/93

SAMPLING LOCATION KILN STACK
PROJECT NO. 4601

p. 2 of 2
OPERATOR WHITMIRE

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.)		GAS METER READING (V_m), ft³ INITIAL 539.23 DESIRED	GAS METER READING (V_m), ft³ INITIAL 539.23 ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F	XAD	
	0.00	1840															
8 1	7	1847	545.075	545.41	0.145	2.46	2.50	438	81	80	12	40	237	253	252	40	
2	14	1854	551.247	551.560	0.15	2.54	2.40	439	82	80	12	39	235	258	252	41	
3	21	1901	557.718	557.93	0.165	2.80	2.70	441	83	80	6	41	234	256	251	43	
4	28	1908	561.630	562.28	0.06	1.02	1.0	440	85	80	6	42	233	256	252	45	
6	35	1915	564.155	564.68	0.025	0.42	0.40	438	84	80	5	42	237	260	252	45	

COMMENTS

A 117

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3

Run No. 1 Sampling Train No. SV-1 Sample Box No. 011995
Set up person(s): Jy McC Date 11-8-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By Jy McC Received By J. Sum Date/Time 11-9-93 730

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
~~Cyclone~~	*			
~~Flask~~				
90° Bypass	*			
Filter Holder Front	—	Filter Type: #2		
Filter Holder Back	—	Whatman QM-A		
~~Short 90° Connector~~ STL				
Condenser		Thermocouple No.:		
Thermowell ~~*U-Connector*~~				
XAD-2 Resin Cartridge		~65 grams XAD-2 Resin		484.1 ****
U-Connector (A)				
1st Impinger (condensate trap) (~~2nd~~ Short-stem Mod-GBS)		Empty	466.7	
U-Connector (B)				
2nd Impinger (Mod-GBS)		100 mLs ASTM Type II Water	469.2	567.5
U-Connector (C)				
3rd Impinger (GBS)		100 mLs ASTM Type II Water	472.9	573.4
U-Connector (D)				
4th Impinger (Mod-GBS)		Empty	468.9	
U-Connector (E)				
5th ~~Impinger (Mod-GBS)~~		~200 g indicating silica gel		741.8
~~U-Connector (F)~~	—	~~200 g indicating silica~~ gel		—
~~6th~~ Impinger (Mod-GBS)	—			
Impinger Outlet Connector				

Note: Components in italics used only with MRI-style organic module. Do not use for PAHs.

* Nozzle openings covered with hexane-rinsed aluminum foil, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with hexane-rinsed aluminum foil before and after sampling.

~~Optional for low/high particulate/moisture gas streams as applicable~~.

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with hexane-rinsed aluminum foil.

**** Cartridge weighed with blank-offs in place; then, covered with aluminum foil to seal out light during storage and sampling.

Component Changes After Setup And Before Recovery And Other Comments:
STL is glass sample transfer line from filter holder outlet to condenser inlet. Entire length is heated.

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 1 Sampling Train No. SV-1 Sample Box No. 011995
Transfer for Recovery:

Relinquished By _____ Received By J. M. C. Date/Time 11-9-93 2000
Sample box recovery person(s): J. M. C., J. S. Date 11-9-93
Probe recovery person(s): Mark Whitman Date 11-9-93

RESIN CARTRIDGE AND IMPINGERS RECOVERY

Impinger:	XAD Cartridge	1st	2nd	3rd	4th	5th	~~6th~~
Final Wt.(g)	486.1	540.2	568.4	574.0	470.0	759.7	
Initial Wt.(g)	484.1	466.7	567.5	573.4	468.9	741.8	
Net Wt.(g)	2.0	73.5	.9	.6	2.1	17.9	
Description and color:	white	clear	clear	clear	clear	20	
		>>>>>>				% Blue	

[Total Condensate Collected (g): 97.0]

Impingers: XAD Cartridge >>>>>>>>> 1-4 <<<<<<<<<<<

Sample Number: 1039 1040 <--Recovery of 2nd-4th Impingers and
Sample Bottle Tare Wt.(g) 498.4 U-connectors C-E Optional
Sample Bottle Gross Wt.(g) 762.0 Before Rinses
Components Rinsed**: 1st-4th impingers, U-connectors A-E

Sample Bottle Final Wt.(g) 869.7 After Rinses
Net Sample Wt.(g) 371.3

FILTER RECOVERY AND TRAIN RINSES

FILTER
Sample Number: 1037 Description and Color: dirty white

TRAIN RINSES Sample Number: 1036/038A 1038
Sample Bottle Tare Wt.(g) 171.3 174.6 175.0
Components Rinsed***: nozzle, probe liner, cyclone/flask or bypass, filter holder, short 90° connector, condenser, thermowell U-connector

Sample Bottle Final Wt.(g) 250.8 254.7 225.4
Net Sample Wt.(g) 79.5 80.1 50.4

* Pour any residual condensate from condenser into cartridge inlet, replace blank-offs and remove aluminum foil, then weigh; replace aluminum foil to cover entire cartridge.
** Methanol/methylene chloride (1:1 v/v) rinses (3X).
*** Methanol/methylene chloride (1:1 v/v) rinses with brushing (with 5 minute soaks of underlined components) 3X or more until clean.

COMMENTS: Greenish brown tacky material condensed on Teflon filter support on filter side. Some of this residue is on back side of filter. The rinse sample includes back half filter holder & support rinses (sample 1038A) sample 1038 includes other component rinses

FILE NAME - semv1
RUN # - M5SVKL1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:12:38

Initial Meter Volume (Cubic Feet)=	460.067		
Final Meter Volume (Cubic Feet)=	563.962		
Meter Factor=	1.021		
Multiple leak checks, see end of printout		Leak Correction=	0.0000
Net Meter Volume (Cubic Feet)=	106.077		
Gas Volume (Dry Standard Cubic Feet)=	102.084		
Barometric Pressure (in Hg)=	29.30		
Static Pressure (Inches H20)=	-0.12		
Percent Oxygen=	17.8		
Percent Carbon Dioxide=	2.2		
Moisture Collected (ml)=	97.0		
Percent Water=	4.3		
Average Meter Temperature (F)=	79		
Average Delta H (in H20)=	1.38		
Average Delta P (in H20)=	0.082		
Average Stack Temperature (F)=	433		
Dry Molecular Weight=	29.06		
Wet Molecular Weight=	28.59		
Average Square Root of Delta P (in H20)=	0.2608		
% Isokinetic=	94.8		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	175.0		
Nozzle Diameter (Inches)=	0.419		
Stack Axis #1 (Inches)=	68.0		
Stack Axis #2 (Inches)=	68.0		
Rectangular Stack			
Stack Area (Square Feet)=	32.11		
Stack Velocity (Actual, Feet/min)=	1,160		
Flow Rate (Actual, Cubic ft/min)=	37,260		
Flow rate (Standard, Wet, Cubic ft/min)=	21,559		
Flow Rate (Standard, Dry, Cubic ft/min)=	20,635		

Particulate Loading - Front Half

Particulate Weight (g)=	0.0000	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0000	0.0000	0.0000
Particulate Loading, Actual (gr/cu ft)=	0.0000		
Emission Rate (lb/hr)=	0.00		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - semv1
RUN # - M5SVKL1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:12:39

Initial Meter Volume (Cubic Meters)=	13.027	
Final Meter Volume (Cubic Meters)=	15.969	
Meter Factor=	1.021	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	3.004	
Gas Volume (Dry Standard Cubic Meters)=	2.891	
Barometric Pressure (mm Hg)=	744	
Static Pressure (mm H20)=	-3	
Percent Oxygen=	17.8	
Percent Carbon Dioxide=	2.2	
Moisture Collected (ml)=	97.0	
Percent Water=	4.3	
Average Meter Temperature (C)=	26	
Average Delta H (mm H20)=	35.0	
Average Delta P (mm H20)=	2.1	
Average Stack Temperature (C)=	223	
Dry Molecular Weight=	29.06	
Wet Molecular Weight=	28.59	
Average Square Root of Delta P (mm H20)=	1.3142	
% Isokinetic=	94.8	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (mm)=	10.64	
Stack Axis #1 (Meters)=	1.727	
Stack Axis #2 (Meters)=	1.727	
Rectangular Stack		
Stack Area (Square Meters)=	2.983	
Stack Velocity (Actual, m/min)=	354	
Flow rate (Actual, Cubic m/min)=	1,055	
Flow rate (Standard, Wet, Cubic m/min)=	610	
Flow rate (Standard, Dry, Cubic m/min)=	584	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0000	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (mg/cu m)=	0.0	0.0 0.0
Particulate Loading, Actual (mg/cu m)=	0.0	
Emission Rate (kg/hr)=	0.00	

No Back Half Analysis

FILE NAME - semv1
RUN # - M5SVKL1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:12:40

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.005	0.08	425	72	71
2	0.015	0.21	422	74	73
3	0.025	0.40	426	73	73
4	0.085	1.40	428	75	74
5	0.165	2.80	430	78	75
6	0.005	0.08	425	78	77
7	0.025	0.41	422	79	78
8	0.070	1.20	429	80	79
9	0.160	2.73	432	82	79
10	0.145	2.50	437	85	80
11	0.020	0.34	424	78	77
12	0.070	1.20	429	77	77
13	0.115	2.00	436	79	78
14	0.175	3.00	438	82	78
15	0.070	1.20	439	85	82
16	0.145	2.50	437	79	79
17	0.120	2.00	439	81	79
18	0.055	0.85	441	82	79
19	0.025	0.42	441	82	80
20	0.005	0.08	438	82	80
21	0.145	2.50	438	81	80
22	0.150	2.40	439	82	80
23	0.165	2.70	441	83	80
24	0.060	1.00	440	85	80
25	0.025	0.40	438	84	80

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.0000	0.0000	0.0000	0.0000

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	0.0000	0.0000	0.0	0.0000
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

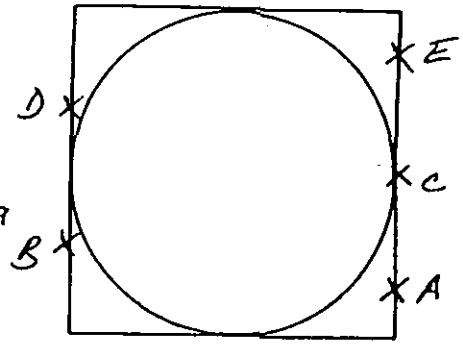
Lk Rate (cfm)	Time (min)
0.0100	35.0000
0.0060	35.0000
0.0050	105.0000

FIELD DATA

RUN NO. SV-2
PROJECT NO. 4601
PLANT BELDEN BRICK 6
DATE 11/10/93
SAMPLING LOCATION KILN STACK
SAMPLE TYPE SEMIVOLATILES
OPERATOR WHITMIRE
FILTER NO.
RECORD DATA EVERY 7 MIN.
UMBILICAL/SAMPLER HOOKUP U/H-Ø31

PROBE NO. VL-1
PROBE LENGTH AND TYPE 8 ft GLASS
SAMPLE BOX NO. ~~011555~~ 011512
METER BOX NO. N-7
TEMP. CONTROLLER NO. N-7
TEMP. METER NO. N-7
THERMOCOUPLE I.D. NO. 96-6A
UMBILICAL CORD I.D. NO. N-125-5
UMBILICAL CORD I.D. NO.
NOZZLE NO. SV-1

NOZZLE DIA. 0.417
ASSUMED MOISTURE % 10%
METER ΔH@ 1.853
METER CORRECTION 1.021
PITOT NO. M-1
PITOT COEFFICIENT ~~0.8400~~ 0.8339
BAROMETRIC PRESSURE ~~29.3~~ 29.26
SITE TO BARO. ELEVATION (ft.)
CORRECTED B.P. (0.1 in./100 ft.)
STATIC PRESSURE -0.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	0930	1408				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	~~0825~~		0931	1215	1230
VACUUM, In. Hg	≥ 15"		≥ 15"	12	≥ 15"
CFM	~~.006~~		.007	0.008	0.006
VOLUMES					
FINAL			625.077		
INITIAL			624.065		
DIFFERENCE			1.012		

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1410				
VACUUM, In. Hg	> 13	≥ 15"		≥ 15"	
CFM	.005				
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 565.23
FINAL VOLUME 668.846
LEAK CHECK VOLUME 1.012
ADJUSTED FINAL VOLUME 667.834

A 123

RUN NO. 2 SAMPLING LOCATION KILN STACK p. 1 of 1

DATE 11/10/93 PROJECT NO. 4661 OPERATOR WILLIAMS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr.)		GAS METER READING (V_m), ft³ INITIAL 565.23 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F	XAD	
	0.00	0942															
1A	7.00	0949	566.394	566.270	0.005	0.09	0.09	417	73	72	3	50	237	254	250	48	
2	14	0956	570.943	570.23	0.085	1.39	1.45	463	74	72	7	49	242	255	252	47	
3	21	1003	576.696	~~583.116~~	0.15	2.2	2.6	407	75	73	10	46	248	256	257	47	
4	28	1010	583.116	582.110	0.16	1.99	2.2	435	81	74	11	50	243	257	244	46	
5	35	1017	588.572	588.037	0.10	1.92	2.0	434	83	77	11	50	246	253	256	46	
1C	7	1033	590.242	590.04	0.01	0.18	0.18	472	79	78	5	57	244	255	254	49	
	14	1040	591.911	592.08	0.01	0.18	0.22	414	80	78	5	55	246	258	255	49	
	21	1047	594.780	595.03	0.03	0.54	0.54	431	81	79	7	54	241	259	253	50	
	28	1054	598.484	598.48	0.05	0.91	0.91	431	81	79	7	53	247	257	255	50	
	35	1101	604.565	604.463	0.135	2.45	2.45	439	84	80	11	50	249	257	255	49	
1E	7	1135	605.654	605.70	0.005	0.09	0.09	400	80	78	4	62	246	255	251	55	
	14	1142	608.048	608.17	0.02	0.38	0.40	391	80	79	8	53	250	257	256	54	
	21	1149	612.272	612.10	0.065	0.18	1.10	431	81	79	11	54	245	258	247	52	
	28	1156	618.141	618.09	0.125	2.28	2.40	432	83	80	12	51	260	256	254	50	
	35	1203	624.025	624.065	0.125	2.28	2.40	434	86	81	12	53	245	256	255	50	
B	7	1243	630.942	630.82	0.125	2.28	2.30	433	82	82	12	50	252	257	256	49	
	14	1250	636.930	637.05	0.13	2.37	2.40	436	84	82	13	49	255	257	257	50	
	21	1257	641.619	641.810	0.08	1.45	1.45	441	85	82	12	51	235	262	253	49	
	28	1304	645.857	645.82	0.06	1.18	1.10	446	86	83	12	50	243	260	257	48	
	35	1311	648.737	648.805	0.03	0.54	0.54	439	86	83	12	50	246	259	257	48	
D	7	1329	654.660	654.70	0.125	2.27	2.30	442	84	84	12	48	238	255	252	48	
	14	1336	660.425	660.830	0.12	2.18	2.18	440	86	83	12	48	234	258	252	48	
	21	1343	664.505	664.93	0.06	1.09	0.97	441	88	84	7	50	235	259	254	48	
	28	1350	667.353	667.69	0.03	0.54	0.50	440	88	84	3	51	236	257	253	49	
	35	1357	668.574	668.846	0.005	0.09		436	87	85	5	51	241	262	253	50	

COMMENTS

A 124

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3

Run No. 2 Sampling Train No. SV-2 Sample Box No. 011512
Set up person(s): Jy M C Date 11-9-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By _____ Received By _____ Date/Time _____

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
Cyclone**	*			
Flask**				
90° Bypass**	*			
Filter Holder Front	F-115	Filter Type:		
Filter Holder Back		Whatman QM-A #3		
Short 90° Connector				
Condenser		Thermocouple No.:		
Thermowell U-Connector				
XAD-2 Resin Cartridge		~65 grams XAD-2 Resin		472.2****
U-Connector (A)				
1st Impinger				
(2-L** Short-stem Mod-GBS)		Empty	493.0	
U-Connector (B)				
2nd Impinger (Mod-GBS)		100 mLs	473.9	573.1
U-Connector (C)		ASTM Type II Water		
3rd Impinger (GBS)		100 mLs	481.0	583.3
U-Connector (D)		ASTM Type II Water		
4th Impinger (Mod-GBS)		Empty	469.9	
U-Connector (E)				
5th Impinger (Mod-GBS)**		~200 g indicating silica gel		708.5
U-Connector (F)**		~200 g indicating silica gel		
6th Impinger (Mod-GBS)				
Impinger Outlet Connector				

Note: Components in italics used only with MRI-style organic module. Do not use for PAHs.

* Nozzle openings covered with hexane-rinsed aluminum foil, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with hexane-rinsed aluminum foil before and after sampling.

** Optional for low/high particulate/moisture gas streams as applicable.

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with hexane-rinsed aluminum foil.

**** Cartridge weighed with blank-offs in place; then, covered with aluminum foil to seal out light during storage and sampling.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 2 Sampling Train No. SV-2 Sample Box No. 011512
Transfer for Recovery:

Relinquished By _____ Received By J. M. Cam Date/Time 11-10-93 1430
Sample box recovery person(s): J. M. Cam Date 11-10-93
Probe recovery person(s): _____ Date _____

RESIN CARTRIDGE AND IMPINGERS RECOVERY

Impinger:	XAD Cartridge	1st	2nd	3rd	4th	5th	6th
Final Wt.(g)	475.4	567.3	574.6	581.0	471.3	727.1	
Initial Wt.(g)	472.2	493.0	573.1	583.3	469.9	708.5	
Net Wt.(g)	3.2	74.3	1.5	(2.3)	1.4	18.6	
Description and color:	white	clear	clear	clear	clear	ao	
		>>>>>>				% Blue	

[Total Condensate Collected (g): 96.7]

Impingers: XAD Cartridge >>>>>>>>>> 1-4 <<<<<<<<<<<<

Sample Number: 2039 2040 <--Recovery of 2nd-4th Impingers and
Sample Bottle Tare Wt.(g) 497.9 U-connectors C-E Optional
Sample Bottle Gross Wt.(g) 765.1 Before Rinses
Components Rinsed**: 1st-4th impingers, U-connectors A-E

Sample Bottle Final Wt.(g) 879.3 After Rinses**
Net Sample Wt.(g) 381.4

FILTER RECOVERY AND TRAIN RINSES

FILTER
Sample Number: 2037 Description and Color: dirty white*

TRAIN RINSES Sample Number: 2036/038 203PA***
Sample Bottle Tare Wt.(g) 174.6 172.7 175.2
Components Rinsed***: nozzle, probe liner, cyclone/flask or bypass, filter holder, short 90° connector, condenser, thermowell U-connector

Sample Bottle Final Wt.(g) 251.1 232.5 244.4
Net Sample Wt.(g) 76.5 59.8 69.2

* Pour any residual condensate from condenser into cartridge inlet, replace blank-offs and remove aluminum foil, then weigh; replace aluminum foil to cover entire cartridge.
** Methanol/methylene chloride (1:1 v/v) rinses (3X).
*** Methanol/methylene chloride (1:1 v/v) rinses with brushing (with 5 minute soaks of underlined components) 3X or more until clean.

COMMENTS:
* Filter support tacky on front, see sample 203PA
** Back half of filter holder rinsed into ~~carbon~~ impinger solution
*** Filter support rinse using MeOH/MeCl

FILE NAME - semiv2
RUN # - m5svkn2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:20:31

Initial Meter Volume (Cubic Feet)=	565.230	
Final Meter Volume (Cubic Feet)=	667.834	
Meter Factor=	1.021	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Feet)=	104.759	
Gas Volume (Dry Standard Cubic Feet)=	100.421	
Barometric Pressure (in Hg)=	29.30	
Static Pressure (Inches H20)=	-0.12	
Percent Oxygen=	18.8	
Percent Carbon Dioxide=	1.8	
Moisture Collected (ml)=	96.7	
Percent Water=	4.3	
Average Meter Temperature (F)=	81	
Average Delta H (in H20)=	1.32	
Average Delta P (in H20)=	0.071	
Average Stack Temperature (F)=	428	
Dry Molecular Weight=	29.04	
Wet Molecular Weight=	28.56	
Average Square Root of Delta P (in H20)=	0.2453	
% Isokinetic=	100.5	
Pitot Coefficient=	0.83	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (Inches)=	0.417	
Stack Axis #1 (Inches)=	68.0	
Stack Axis #2 (Inches)=	68.0	
Rectangular Stack		
Stack Area (Square Feet)=	32.11	
Stack Velocity (Actual, Feet/min)=	1,081	
Flow Rate (Actual, Cubic ft/min)=	34,708	
Flow rate (Standard, Wet, Cubic ft/min)=	20,202	
Flow Rate (Standard, Dry, Cubic ft/min)=	19,325	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0000	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (gr/scf)=	0.0000	0.0000 0.0000
Particulate Loading, Actual (gr/cu ft)=	0.0000	
Emission Rate (lb/hr)=	0.00	

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - semiv2
RUN # - m5svkn2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:20:33

Initial Meter Volume (Cubic Meters)=	16.005	
Final Meter Volume (Cubic Meters)=	18.910	
Meter Factor=	1.021	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	2.966	
Gas Volume (Dry Standard Cubic Meters)=	2.844	
Barometric Pressure (mm Hg)=	744	
Static Pressure (mm H20)=	-3	
Percent Oxygen=	18.8	
Percent Carbon Dioxide=	1.8	
Moisture Collected (ml)=	96.7	
Percent Water=	4.3	
Average Meter Temperature (C)=	27	
Average Delta H (mm H20)=	33.4	
Average Delta P (mm H20)=	1.8	
Average Stack Temperature (C)=	220	
Dry Molecular Weight=	29.04	
Wet Molecular Weight=	28.56	
Average Square Root of Delta P (mm H20)=	1.2362	
% Isokinetic=	100.5	
Pitot Coefficient=	0.83	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (mm)=	10.59	
Stack Axis #1 (Meters)=	1.727	
Stack Axis #2 (Meters)=	1.727	
Rectangular Stack		
Stack Area (Square Meters)=	2.983	
Stack Velocity (Actual, m/min)=	329	
Flow rate (Actual, Cubic m/min)=	983	
Flow rate (Standard, Wet, Cubic m/min)=	572	
Flow rate (Standard, Dry, Cubic m/min)=	547	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0000	Corr. to 7% O2 &	12% CO2
Particulate Loading, Dry Std. (mg/cu m)=	0.0	0.0	0.0
Particulate Loading, Actual (mg/cu m)=	0.0		
Emission Rate (kg/hr)=	0.00		

No Back Half Analysis

FILE NAME - semiv2
RUN # - m5svkn2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:20:34

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.005	0.09	417	73	72
2	0.075	1.45	403	74	72
3	0.150	2.60	407	75	73
4	0.110	2.20	435	81	74
5	0.100	2.00	434	83	77
6	0.010	0.18	412	79	78
7	0.010	0.22	414	80	78
8	0.030	0.54	431	81	79
9	0.050	0.91	434	81	79
10	0.135	2.45	439	84	80
11	0.005	0.09	400	80	78
12	0.020	0.40	391	80	79
13	0.065	1.10	431	81	79
14	0.125	2.40	432	83	80
15	0.125	2.40	434	86	81
16	0.125	2.30	433	82	82
17	0.130	2.40	436	84	82
18	0.080	1.45	441	85	82
19	0.065	1.10	440	86	83
20	0.030	0.54	439	86	83
21	0.125	2.30	442	84	84
22	0.120	2.18	440	86	83
23	0.060	0.99	441	88	84
24	0.030	0.50	440	88	84
25	0.005	0.10	436	87	85

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.0000	0.0000	0.0000	0.0000

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	0.0000	0.0000	0.0	0.0000
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

Lk Rate (cfm)	Time (min)
0.0080	70.0000
0.0060	105.0000

FIELD DATA

RUN NO. SV-3
PROJECT NO. 4601.01.05.01
PLANT Golden Brick
DATE 11-10-93
SAMPLING LOCATION Kiln
SAMPLE TYPE SV - Integrated
OPERATOR Whitmire
FILTER NO.
RECORD DATA EVERY 7 MIN.
UMBILICAL/SAMPLER HOOKUP UH-3

PROBE NO. UL-1
PROBE LENGTH AND TYPE 8' - Quartz
SAMPLE BOX NO. 011995
METER BOX NO. N-7
TEMP. CONTROLLER NO. N-7
TEMP. METER NO. N-7
THERMOCOUPLE I.D. NO. 96-6A
UMBILICAL CORD I.D. NO. N-125-5
UMBILICAL CORD I.D. NO. —
NOZZLE NO. SV-3

NOZZLE DIA. 0.419
ASSUMED MOISTURE % 10%
METER ΔH @ 1.853
METER CORRECTION 1.021
PITOT NO. M-1
PITOT COEFFICIENT .8400
BAROMETRIC PRESSURE 29.3
SITE TO BARO. ELEVATION (ft.) —
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -0.12

SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1521	1956				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1524	1957			
VACUUM, In. Hg	≥15"	≥14"	≥15"		≥15"
CFM	.002	.005			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME ~~760.062~~ 670.062
FINAL VOLUME 784.002
LEAK CHECK VOLUME —
ADJUSTED FINAL VOLUME 784.002

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Dwinow - 0.005

RUN NO. SV 3
DATE 11/10/93

SAMPLING LOCATION KILN STACK
PROJECT NO.

p. ____ of ____
OPERATOR WHITMIRE

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft³ INITIAL 760.062 / 670.062 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F (MT1)	OUTLET ($T_{m\,out}$), °F (MT2)	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F	XAD	
	0.00	1553															
D-1	7	1600	676.106	676.22	0.135	2.43	2.43	440	80	78	10	60	240	256	254	57	
D-2	14	1607	682.158	682.50	0.135	2.43	2.43	441	81	79	11	48	233	259	253	46	
A → D-3	21	1618	689.767	687.85	0.135	2.44	2.43	443	84	80	11	49	235	256	254	46	
D-4	28	1625	692.639	691.10	0.030	0.54	0.55	436	83	81	4	47	228	257	250	48	
D-5	35	1632	695.260	694.21	0.025	0.45	0.50	436	83	81	5	50	229	255	252	50	
	0	1639			~~0.140~~	~~2~~		~~438~~	~~82~~	~~81~~							
B-1	7	1646	701.451	701.295	0.140	2.54	2.54	438	82	81	13	46	232	257	254	49	
B-2	14	1653	707.779	707.445	0.145	2.64	2.64	440	86	83	12	49	227	258	255	49	
B-3	21	1700	713.174	711.985	0.105	1.91	1.91	440	87	84	6	51	226	259	254	49	
B-4	28	1707	717.416	716.610	0.065	1.18	1.18	443	88	84	9	49	225	258	253	49	
B-5	35	1714	720.048	719.631	0.025	0.45	0.45	442	88	84	5	50	228	258	253	50	
		1737			~~0.010~~			~~429~~	~~85~~								
E-1	7	1744	721.722	721.445	0.010	0.18	0.18	429	85	85	5	54	233	255	252	49	
E-2	14	1751	724.845	724.552	0.035	0.64	0.64	432	85	84	7	48	232	255	253	48	
E-3	21	1758	727.388	729.085	0.075	1.36	1.36	443	85	84	9	47	230	258	255	48	
E-4	28	1805	735.716	735.450	0.145	2.63	2.63	445	87	85	12	50	227	258	255	48	
E-5	35	1812	741.836	741.954	0.135	2.45	2.43	446	90	85	12	52	229	258	255	49	
		1829			~~0.010~~	~~0.18~~		~~431~~	~~87~~	~~86~~							
C-1	7	1836	743.512	743.735	0.010	0.18	0.18	431	87	86	5	47	233	255	251	45	
C-2	14	1843	745.188	745.655	0.010	0.18	0.18	430	86	86	5	45	232	255	255	45	
C-3	21	1850	747.879	748.240	0.025	0.45	0.45	436	86	86	6	45	234	255	253	45	
C-4	28	1858	752.970	753.505	0.085	1.73	1.73	440	87	86	9	45	233	258	254	46	
C-5	35	1904	759.539	759.372	0.155	2.83	2.83	441	88	86	13	49	228	257	255	47	
A-1	7	1919	761.910	761.789	0.020	0.36	0.36	981	87	86	5	47	227	257	249	47	
A-2	14	1926	766.218	766.250	0.065	1.22	1.22	417	87	86	8	47	232	259	253	48	
A-3	21	1933	771.994	771.995	0.120	2.19	2.19	442	88	86	11	49	227	259	254	49	
A-4	28	1940	779.176	779.350	0.185	3.39	3.39	443	90	86	14	53	229	258	254	49	
A-5	35	1947	784.188	784.002	0.090	1.64	1.64	444	91	86	8	56	225	258	255	52	

COMMENTS A SHUT DOWN AT 16:09 RESTARTED AT 16:13

A 131

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05.01
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No.3

Run No. 3 Sampling Train No. SV-1 Sample Box No. 011995
Set up person(s): J. McC Date 11-10-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By J McC Received By _____ Date/Time 11-10-93 1400

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)*** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	*			
Female Probe Blank-off				
Cyclone**	*			
Flask**				
90° Bypass**	*			
Filter Holder Front	F-102	Filter Type:		
Filter Holder Back		Whatman QM-A		
Short 90° Connector		LF7		
Condenser		Thermocouple No.:		
Thermowell U-Connector				
XAD-2 Resin Cartridge		~65 grams XAD-2 Resin		476.9****
U-Connector (A)				
1st Impinger				
(2-L** Short-stem Mod-GBS)		Empty	466.7	
U-Connector (B)				
2nd Impinger (Mod-GBS)		100 mLs	461.2	569.2
U-Connector (C)		ASTM Type II Water		
3rd Impinger (GBS)		100 mLs	472.9	571.7
U-Connector (D)		ASTM Type II Water		
4th Impinger (Mod-GBS)		Empty	468.9	
U-Connector (E)				
5th Impinger (Mod-GBS)**		~200 g indicating silica gel		733.4
U-Connector (F)**		~200 g indicating silica gel		
~~6th Impinger (Mod-GBS)~~				
Impinger Outlet Connector				

Note: Components in italics used only with MRI-style organic module. Do not use for PAHs.

* Nozzle openings covered with hexane-rinsed aluminum foil, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with hexane-rinsed aluminum foil before and after sampling.

** Optional for low/high particulate/moisture gas streams as applicable.

*** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with hexane-rinsed aluminum foil.

**** Cartridge weighed with blank-offs in place; then, covered with aluminum foil to seal out light during storage and sampling.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED SW-846, M0010 - SEMIVOLATILE ORGANICS TRAIN FOR SV-POHCs (MM5SV)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 3 Sampling Train No. SV-1 Sample Box No. 011995
Transfer for Recovery:

Relinquished By _____ Received By J M. Co Date/Time 11-10-93 2040
Sample box recovery person(s): JMcCo / J. Sc Date 11-10-93
Probe recovery person(s): _____ Date _____

RESIN CARTRIDGE AND IMPINGERS RECOVERY

Impinger:	XAD Cartridge	1st	2nd	3rd	4th	5th	6th
Final Wt.(g)	477.4	546.8	571.1	572.1	473.2	764.9	
Initial Wt.(g)	~~479~~ 476.9	466.7	569.2	571.7	468.9	733.4	
Net Wt.(g)	0.5	80.1	1.9	.4	4.3	31.5	

[Total Condensate Collected (g): 118.7]

Description and color:	clear	clear	clear	clear	clear	15	
		>>>>>>				% Blue	

Impingers: XAD Cartridge >>>>>>>>> 1-4 <<<<<<<<<<<

Sample Number: 3039 3040 <--Recovery of 2nd-4th Impingers and
Sample Bottle Tare Wt.(g) 497.5 U-connectors C-E Optional
Sample Bottle Gross Wt.(g) 769.7 Before Rinses
Components Rinsed**: 1st-4th impingers, U-connectors A-E

Sample Bottle Final Wt.(g) 854.7 After Rinses
Net Sample Wt.(g) 357.2

FILTER RECOVERY AND TRAIN RINSES

FILTER
Sample Number: 3037 Description and Color: dirty white

TRAIN RINSES Sample Number: 3036/038 3038A
Sample Bottle Tare Wt.(g) 171.8 175.9 NR
Components Rinsed***: nozzle, probe liner, cyclone/flask or bypass, filter holder, short 90° connector, condenser, thermowell U-connector

Sample Bottle Final Wt.(g) ~~280.6~~ 240.0 ~~[illegible]~~
Net Sample Wt.(g) ~~240.0~~ 108.8 64.1 ~~237.8~~ Final wt.

* Pour any residual condensate from condenser into cartridge inlet, replace blank-offs and remove aluminum foil, then weigh; replace aluminum foil to cover entire cartridge.
** Methanol/methylene chloride (1:1 v/v) rinses (3X).
*** Methanol/methylene chloride (1:1 v/v) rinses with brushing (with 5 minute soaks of underlined components) 3X or more until clean.

COMMENTS:

FILE NAME - semiv3
RUN # - m5svkn3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:46:59

Initial Meter Volume (Cubic Feet)=	670.062
Final Meter Volume (Cubic Feet)=	784.002
Meter Factor=	1.021
Final Leak Rate (cu ft/min)=	0.005
Net Meter Volume (Cubic Feet)=	116.333
Gas Volume (Dry Standard Cubic Feet)=	110.755
Barometric Pressure (in Hg)=	29.30
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	17.8
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	118.7
Percent Water=	4.8
Average Meter Temperature (F)=	85
Average Delta H (in H20)=	1.54
Average Delta P (in H20)=	0.085
Average Stack Temperature (F)=	438
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.53
Average Square Root of Delta P (in H20)=	0.2707
% Isokinetic=	100.5
Pitot Coefficient=	0.83
Sampling Time (Minutes)=	175.0
Nozzle Diameter (Inches)=	0.419
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,200
Flow Rate (Actual, Cubic ft/min)=	38,537
Flow rate (Standard, Wet, Cubic ft/min)=	22,184
Flow Rate (Standard, Dry, Cubic ft/min)=	21,118

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0000		
Particulate Loading, Dry Std. (gr/scf)=	0.0000	0.0000	0.0000
Particulate Loading, Actual (gr/cu ft)=	0.0000		
Emission Rate (lb/hr)=	0.00		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - semiv3
RUN # - m5svkn3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:47:01

Initial Meter Volume (Cubic Meters)=	18.973
Final Meter Volume (Cubic Meters)=	22.200
Meter Factor=	1.021
Final Leak Rate (cu m/min)=	0.0001
Net Meter Volume (Cubic Meters)=	3.294
Gas Volume (Dry Standard Cubic Meters)=	3.136
Barometric Pressure (mm Hg)=	744
Static Pressure (mm H20)=	-3
Percent Oxygen=	17.8
Percent Carbon Dioxide=	2.2
Moisture Collected (ml)=	118.7
Percent Water=	4.8
Average Meter Temperature (C)=	29
Average Delta H (mm H20)=	39.1
Average Delta P (mm H20)=	2.1
Average Stack Temperature (C)=	226
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.53
Average Square Root of Delta P (mm H20)=	1.3643
% Isokinetic=	100.5
Pitot Coefficient=	0.83
Sampling Time (Minutes)=	175.0
Nozzle Diameter (mm)=	10.64
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	366
Flow rate (Actual, Cubic m/min)=	1,091
Flow rate (Standard, Wet, Cubic m/min)=	628
Flow rate (Standard, Dry, Cubic m/min)=	598

Particulate Loading - Front Half

		Corr. to 7% O2	& 12% CO2
Particulate Weight (g)=	0.0000		
Particulate Loading, Dry Std. (mg/cu m)=	0.0	0.0	0.0
Particulate Loading, Actual (mg/cu m)=	0.0		
Emission Rate (kg/hr)=	0.00		

No Back Half Analysis

FILE NAME - semiv3
RUN # - m5svkn3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/27/89
03-07-1994 08:47:01

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.135	2.43	440	80	78
2	0.135	2.43	441	81	79
3	0.135	2.43	443	84	80
4	0.030	0.55	436	83	81
5	0.025	0.50	436	83	81
6	0.140	2.54	438	82	81
7	0.145	2.64	440	86	83
8	0.105	1.91	440	87	84
9	0.065	1.18	443	88	84
10	0.025	0.45	442	88	84
11	0.010	0.18	429	85	85
12	0.035	0.64	432	85	84
13	0.075	1.36	443	85	84
14	0.145	2.63	445	87	85
15	0.135	2.43	446	90	85
16	0.010	0.18	431	87	86
17	0.010	0.18	430	86	86
18	0.025	0.45	436	86	86
19	0.095	1.73	440	87	86
20	0.155	2.83	441	88	86
21	0.020	0.36	431	87	86
22	0.065	1.22	417	87	86
23	0.120	2.19	442	88	86
24	0.185	3.39	443	90	86
25	0.090	1.64	444	91	86

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	0.0000	0.0000	0.0000	0.0000

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	0.0000	0.0000	0.0	0.0000
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0000
Impinger Blank (mg/ml)= 0.0000

A.2.4 Kiln Volatile Organic Compounds

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Buldin Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 1 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. Y-0784
Temperature Controller No. NR- Dual Omega 2610
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 3697 Sample No. 1067
Tenax/Charcoal Tube No. 2155 Sample No. 1068

Field Blank Tenax Tube No. 1556 Sample No. 1025
Field Blank Tenax/Charcoal Tube No. 469 Sample No. 1076

Trip Blank Tenax Tube No. 277E Sample No. 1077
Trip Blank Tenax/Charcoal Tube No. 230E Sample No. 1078

Condensate Sample No. None collected

Leak Check from Probe Inlet:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.2 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1520	0.00	16.6	142	10.8	12.0	130
1525	4.98	16.3	141.3	10.4	12.0	130
1530	10.06	16.1	141.5	10.2	12.0	130
1535	15.10	15.9	141.1	10.1	12.0	130
1540	20.00					

COMMENTS: Field Blanks exposed at 1544
Temp. meter for DGM - Y1336
Silica gel new & probe purged before sampling.

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Belden Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 1 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. V-0784
Temperature Controller No. NR-Dv210mlg2610
Temperature Meter No. V-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 239E Sample No. 1069
Tenax/Charcoal Tube No. 652 Sample No. 1070

Field Blank Tenax Tube No. 1556 Sample No. 1075
Field Blank Tenax/Charcoal Tube No. 469 Sample No. 1076

Trip Blank Tenax Tube No. 277E Sample No. 1077
Trip Blank Tenax/Charcoal Tube No. 230E Sample No. 1078

Condensate Sample No. None collected.

Leak Check from Probe Inlet:
Before Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.
After Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.0 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1550	0.00	15.5	140.6	10.7	12.0	130
1555	5.02	15.2	145.3	10.2	12.0	130
1600	10.01	15.0	145.1	10.3	12.0	130
1605	14.99	14.6	144.7	10.1	12.0	130
1610	20.00					

COMMENTS: Temp. meter for DGM - Y1336

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA ERB
Facility Budd Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 1 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. Y-0784
Temperature Controller No. NA-Dwl Omega 6100
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 1890 Sample No. 1071
Tenax/Charcoal Tube No. 191 Sample No. 1072

Field Blank Tenax Tube No. 1556 Sample No. 1075
Field Blank Tenax/Charcoal Tube No. 469 Sample No. 1076

Trip Blank Tenax Tube No. 277E Sample No. 1077
Trip Blank Tenax/Charcoal Tube No. 230E Sample No. 1078

Condensate Sample No. None Collected

Leak Check from Probe Inlet:
Before Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.
After Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.2 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1620	0.00	13.9	144.7	10.5	12.0	130
1625	5.03	13.6	145.2	9.4	12.0	130
1630	9.99	13.5	145.0	9.3	120	130
1635	15.02	13.4	144.6	9.2	120	130
1640	20.00					

COMMENTS: Temp. meter for DGM-Y-1336

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Belden Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 1 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. Y-0784
Temperature Controller No. NA-DV21 Omega 6100
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 612 Sample No. 1073
Tenax/Charcoal Tube No. 3066 Sample No. 1074

Field Blank Tenax Tube No. 1556 Sample No. 1075
Field Blank Tenax/Charcoal Tube No. 469 Sample No. 1076

Trip Blank Tenax Tube No. 277E Sample No. 1077
Trip Blank Tenax/Charcoal Tube No. 230E Sample No. 1078

Condensate Sample No. None Collected

Leak Check from Probe Inlet:
Before Sampling NA in. Hg change at NA in. Hg vacuum for _____ sec.
After Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.0 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1650	0.00	13.2	144.7	9.8	12.0	130
1655	5.01	12.9	145.2	9.2	12.0	130
1700	10.04	12.7	145.5	8.8	12.0	130
1705	15.00	12.6	145.3	8.7	12.0	130
1710	20.00					

COMMENTS: Temp. Meter for DGM - Y-1336

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Baldwin Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 2 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. Y-0784
Temperature Controller No. NR-D021 Omega 6100
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 955 Sample No. 2067
Tenax/Charcoal Tube No. 2190 Sample No. 2068

Field Blank Tenax Tube No. 2153 Sample No. 2075
Field Blank Tenax/Charcoal Tube No. 167 Sample No. 2076

Trip Blank Tenax Tube No. 2026 Sample No. 2077
Trip Blank Tenax/Charcoal Tube No. 1806 Sample No. 2078

Condensate Sample No. None Collected

Leak Check from Probe Inlet:
Before Sampling See Run #1 in. Hg change at _____ in. Hg vacuum for _____ sec.
After Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.2 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1715	0.00	12.4	145.2	9.4	12.0	130
1720	5.01	12.1	145.1	9.3	12.0	130
1725	10.02	12.1	145.0	9.4	12.0	130
1730	15.05	12.0	145.2	9.2	12.0	130
1735	20.00					

COMMENTS: Temp. Meter for DGM - Y-1336
Probe purged before sampling.

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Belden Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) ~~29.2~~ 29.16 NA
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 2 Date 11-11-93
Operator J. Surmanski
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. V-2
Temperature Meter No. Y-0784
Temperature Controller No. NR-D121Dmig26100
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 635 Sample No. 2069
Tenax/Charcoal Tube No. 1819 Sample No. 2070

Field Blank Tenax Tube No. 2153 Sample No. 2075
Field Blank Tenax/Charcoal Tube No. 167 Sample No. 2076

Trip Blank Tenax Tube No. 2026 Sample No. 2077
Trip Blank Tenax/Charcoal Tube No. 1806 Sample No. 2078

Condensate Sample No. None Collected

Leak Check from Probe Inlet:
Before Sampling ND in. Hg change at _____ in. Hg vacuum for _____ sec.
After Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling _____ in. Hg change at _____ in. Hg vacuum for _____ sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1745	0.00	12.1	145.3	9.1	12.0	130
1750	4.47	12.0	145.4	8.8	12.0	130
1755	9.99	18.2	145.3	8.3	12.0	130
1800	15.00	12.3	145.6	8.1	12.0	130
1805	20.00					

COMMENTS: Temp. meter for DGM - Y-1336
Field Blanks exposed at 1810

VOST SAMPLING DATA
SW-846, METHOD 0030

Project No. 4601.01.05.01
Client US EPA EIB
Facility Bulan Brick Co. Plant #6
Source Kiln #3
Sampling Location Kiln #3 Stack
Barometric Pressure (in. Hg) NA
Site to Barometer Elevation (ft) NA
Corrected BP (0.1 in/100 ft) 29.16
Desired Probe/STL Temperature (°C) 140
Desired Flow Rate (Liters/min) 1.0
Desired Sample Volume (Liters) 20
Heated Sample Transfer Line Length (in) 30

Run No. 2 Date 11-11-93
Operator J. Surman
VOST Console No. 1
VOST Unit No. 5
Meter Calibration Factor (Y) 1.007
Tenax Inlet Thermocouple No. ~~Y-0784~~ V-27
Temperature Meter No. Y-0784
Temperature Controller No. NA Dual Omega 6100
Temperature Meter No. Y-0784
Probe Length (in) 36
Probe Liner Material Glass
Liner Material Teflon

Tenax Tube No. 232E Sample No. 2071
Tenax/Charcoal Tube No. 2761 Sample No. 2072

Field Blank Tenax Tube No. 2153 Sample No. 2075
Field Blank Tenax/Charcoal Tube No. 167 Sample No. 2076

Trip Blank Tenax Tube No. 2026 Sample No. 2077
Trip Blank Tenax/Charcoal Tube No. 1806 Sample No. 2078

Condensate Sample No. None Collected

Leak Check from Probe Inlet:
Before Sampling NA in. Hg change at _____ in. Hg vacuum for _____ sec.
After Sampling 0 in. Hg change at 23.6 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23.8 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 12.4 in. Hg vacuum for 60 sec.

Clock Time 24-Hr	Dry Gas Meter Reading (L)	Dry Gas Meter Temp. (°C)	Probe/STL Temp. (°C)	Tenax Inlet Temp. (°C)	Pump Vacuum (in. Hg)	Rotameter Setting
1815	0.00	12.7	144.8	8.4	12.0	130
1820	5.05	12.5	145.5	8.0	12.0	130
1825	10.03	12.4	145.3	7.9	12.0	130
1830	15.02	12.4	145.4	7.8	12.0	130
1835	20.00					

COMMENTS: Temp. meter for DGM - Y-1336
Silicagel ~15% exhausted.

A 146

A.2.5 Kiln Inorganic/Organic Gases

A 148

Name: Run 1 Kiln
Date: 11/11/93

Time	CO2 (%)	CO (ppm)	NOx (ppm)	SO2 (ppm)	THC (ppm)
1035	1.94	46.5	16.5	17.8	2.15
1036	1.93	47.5	16.5	19.3	2.15
1037	1.91	48.3	16.5	20.3	2.20
1038	1.91	48.5	16.5	21.3	1.95
1039	1.91	48.0	16.5	21.5	1.75
1040	1.93	47.5	16.5	21.5	1.75
1041	1.94	47.3	16.5	21.5	1.75
1042	1.95	46.5	16.5	22.0	1.85
1043	1.95	47.0	16.0	22.3	2.05
1044	1.94	47.3	16.0	22.8	1.85
1045	1.93	48.3	16.5	23.3	1.80
1046	1.94	51.5	16.0	22.5	1.80
1047	2.00	49.0	16.0	21.5	1.90
1048	2.01	46.0	16.5	24.0	1.80
1049	1.93	45.5	16.5	24.8	1.85
1050	1.90	45.8	16.5	24.5	2.05
1051	1.91	46.8	16.0	24.0	2.15
1052	1.93	46.8	16.5	23.3	2.15
1053	1.93	46.8	16.5	23.0	2.15
1054	1.93	46.3	16.0	22.5	2.15
1055	1.93	46.5	16.0	22.0	2.10
1056	1.93	46.0	16.0	21.8	2.05
1057	1.94	46.0	16.5	22.0	1.95
1058	1.94	46.3	16.0	22.0	1.90
1059	1.94	45.8	16.0	22.0	2.15
1100	1.93	45.3	16.5	22.0	2.05
1101	1.93	45.0	16.5	21.5	2.10
1102	1.93	45.0	16.5	21.0	2.05
1103	1.93	44.8	16.5	20.8	1.95

Name: Run 2 Kiln
Date: 11/11/93

Time	CO2 (%)	CO (ppm)	NOx (ppm)	SO2 (ppm)	THC (ppm
1311	2.04	48.5	26.0	55.8	1.05
1312	2.05	48.8	26.0	56.5	1.00
1313	2.06	49.8	26.0	57.8	1.05
1314	2.06	51.5	26.0	58.8	1.05
1315	2.08	51.5	26.0	59.8	1.00
1316	2.08	51.0	26.0	61.0	1.00
1317	2.08	50.8	26.0	61.0	1.05
1318	2.06	50.5	26.0	61.5	0.95
1319	2.05	51.3	26.0	61.8	0.95
1320	2.05	51.5	26.0	62.3	0.90
1321	2.05	52.5	26.0	62.5	0.90
1322	2.04	51.5	26.0	63.3	0.85
1323	2.01	50.3	26.0	63.3	0.85
1324	2.03	49.5	26.0	62.0	0.75
1325	2.03	49.3	26.0	61.8	0.75
1326	2.03	49.5	26.0	61.3	0.80
1327	2.03	49.5	26.0	61.3	0.80
1328	2.03	50.0	26.0	61.0	0.75
1329	2.03	50.3	26.0	61.0	0.80
1330	2.03	50.5	26.0	61.0	0.95
1331	2.03	50.8	26.0	61.0	0.95
1332	2.01	50.5	26.0	61.0	1.05
1333	2.00	50.3	26.0	61.5	1.00
1334	1.99	49.8	26.0	61.0	0.95
1335	1.99	50.0	26.0	61.0	1.00
1336	2.00	50.8	26.0	61.0	1.05
1337	2.00	51.0	26.0	61.5	1.20
1338	1.99	51.3	26.0	61.0	1.25
1339	1.99	52.0	26.0	60.5	1.20

Name: Run 3 Kiln
Date: 11/11/93

Time	CO2 (%)	CO (ppm)	NOx (ppm)	SO2 (ppm)	THC (ppm)
1527	1.98	44.0	25.5	61.5	1.90
1528	1.98	43.8	25.5	61.5	1.95
1529	1.98	43.5	25.5	61.5	1.80
1530	1.99	43.8	25.5	61.0	1.85
1531	1.96	43.3	25.5	60.5	1.80
1532	1.96	43.0	25.5	60.0	1.75
1533	1.96	43.3	25.5	59.3	1.65
1534	1.96	47.3	25.5	51.0	1.85
1535	2.04	44.3	25.5	59.5	2.00
1536	2.01	43.0	25.5	63.8	2.25
1537	1.94	44.3	25.5	60.8	2.15
1538	1.93	45.3	25.5	59.5	2.20
1539	1.94	45.5	25.5	59.5	1.95
1540	1.96	46.0	25.5	59.8	1.75
1541	1.95	44.8	25.5	60.0	1.70
1542	1.95	44.5	25.5	60.3	1.65
1543	1.93	43.3	25.5	60.3	1.85
1544	1.93	43.0	25.5	60.5	1.90
1545	1.93	42.8	25.5	60.3	1.90
1546	1.95	43.5	25.5	60.0	1.90
1547	1.94	42.8	25.5	60.0	1.95
1548	1.93	42.5	25.5	60.0	2.05
1549	1.93	42.5	25.5	60.3	2.15
1550	1.93	42.5	25.5	59.8	2.15
1551	1.93	42.5	25.5	59.8	2.05
1552	1.91	42.5	25.5	59.5	2.10
1553	1.93	42.3	25.5	60.0	1.90
1554	1.95	43.5	25.5	60.0	2.15
1555	1.93	42.3	25.5	60.5	2.25

1104	1.93	45.0	16.5	21.0	1.85	1340	2.00	53.5	26.0	60.8	1.10	1556	1.93	42.3	25.5	60.8	1.95
1105	1.91	45.8	16.0	21.3	1.65	1341	2.00	54.0	26.0	60.8	1.05	1557	1.93	42.0	25.5	61.0	1.60
1106	1.91	45.3	16.5	21.5	1.65	1342	2.01	52.0	26.0	60.5	1.05	1558	1.91	41.5	25.0	61.3	1.65
1107	1.91	45.0	16.0	21.8	1.65	1343	2.01	50.8	26.0	60.3	1.30	1559	1.90	42.3	25.0	60.8	1.75
1108	1.91	44.5	16.0	22.0	1.65	1344	2.01	50.5	26.0	60.5	1.65	1600	1.89	42.0	25.0	60.0	1.75
1109	1.90	44.3	16.0	22.0	1.80	1345	2.01	50.5	26.0	60.3	1.90	1601	1.89	42.3	25.0	59.0	1.80
1110	1.91	44.3	16.0	21.8	1.85	1346	2.01	50.3	26.0	60.3	1.75	1602	1.89	42.0	25.0	58.8	1.95
1111	1.91	44.5	16.0	21.5	1.90	1347	2.00	49.5	26.0	60.0	1.45	1603	1.89	41.8	25.0	58.5	2.15
1112	1.90	44.5	16.0	22.8	1.40	1348	2.00	48.5	26.0	60.0	1.25	1604	1.90	41.8	25.0	58.8	2.55
1113	0.86	20.3	12.0	24.0	1.55	1349	1.99	48.5	26.0	60.0	1.15	1605	1.89	41.8	25.0	59.0	2.35
1115	1.88	44.3	16.0	31.3	2.20	1350	2.00	48.8	26.0	60.5	1.50	1606	1.88	41.5	25.0	58.3	2.10
1116	1.89	44.5	16.0	30.0	2.25	1351	2.00	48.8	26.0	61.3	1.60	1607	1.85	41.5	25.0	58.3	2.15
1117	1.89	44.3	16.5	29.5	2.30	1352	1.53	43.0	25.0	44.5	1.95	1608	1.84	41.3	25.0	58.0	2.15
1118	1.89	44.5	16.0	30.5	2.00	1353	1.40	39.3	17.0	25.0	1.65	1609	1.89	43.5	25.0	58.3	2.15
1119	1.88	44.0	16.5	28.8	1.95	1354	1.38	37.5	20.0	32.8	1.85	1610	1.54	36.8	24.5	48.0	3.15
1120	1.88	44.8	16.0	30.8	1.85	1355	1.83	39.8	17.5	52.5	1.60	1611	1.49	34.5	17.0	33.3	2.50
1121	1.86	44.3	16.0	32.8	1.80	1356	2.19	47.0	22.5	78.3	1.60	1612	1.93	39.3	22.5	66.3	2.40
1122	1.86	44.0	16.0	32.0	2.00	1357	2.05	45.0	25.0	67.0	1.30	1613	1.45	34.8	20.0	40.5	2.60
1123	1.86	43.8	16.0	33.8	2.25	1358	2.04	45.0	26.0	64.8	1.35	1614	1.90	38.5	22.0	64.0	2.15
1124	1.86	43.5	16.0	35.5	2.65	1359	2.05	45.0	26.0	63.8	1.25	1615	1.85	40.3	24.5	59.0	1.90
1125	1.86	43.3	16.0	37.0	2.45	1400	2.05	44.8	26.0	63.3	1.20	1616	1.85	41.0	25.0	57.8	1.95
1126	1.85	43.5	16.0	36.5	2.20	1401	2.05	44.5	26.0	63.3	1.30	1617	1.88	41.3	25.0	58.5	2.05
1127	1.84	42.8	16.0	37.0	1.85	1402	2.04	43.8	26.0	63.5	1.35	1618	1.88	41.0	25.0	58.8	2.20
1128	1.84	42.5	16.0	37.0	1.85	1403	2.03	43.5	26.0	63.8	1.30	1619	1.89	41.5	25.0	58.8	2.15
1129	1.85	42.3	16.0	38.8	1.90	1404	2.00	43.5	26.0	62.8	1.20	1620	1.89	41.5	25.0	58.8	2.25
1130	1.64	40.3	16.0	35.8	2.80	1405	2.05	46.8	26.0	61.5	1.35	1621	1.89	41.5	25.0	58.8	2.15
1131	1.03	31.3	11.0	10.3	3.65	1406	2.01	45.3	26.0	61.3	1.30	1622	1.89	41.5	25.0	59.3	2.10
1132	1.70	36.0	11.0	35.8	2.85	1407	2.03	46.3	26.0	61.5	1.35	1623	1.89	41.5	25.0	59.0	2.30
1133	1.16	31.8	11.0	18.8	3.20	1408	2.00	46.0	26.0	61.0	1.30	1624	1.88	41.5	25.0	59.0	2.25
1134	1.94	37.3	11.5	44.5	2.20	1409	2.00	47.0	26.0	60.8	1.30	1625	1.88	41.5	25.0	58.8	2.20
1135	1.93	39.8	11.0	47.5	1.80	1410	2.00	48.3	26.0	60.8	1.30	1626	1.88	41.8	25.0	58.8	2.30
1136	1.86	40.3	13.5	43.3	1.75	1411	2.00	49.8	26.0	60.5	1.35	1627	1.88	41.8	25.0	58.8	2.25
1137	1.95	42.3	16.0	44.3	1.80	1412	2.01	49.5	26.0	60.5	1.15	1628	1.86	41.5	25.0	58.5	2.35

1138	2.04	44.8	16.0	47.3	1.85	1413	2.01	49.5	26.0	60.5	1.10	1629	1.98	46.5	25.0	58.5	2.30
1139	2.01	44.0	16.0	48.5	1.80	1414	2.01	49.3	26.0	60.5	1.10	1630	1.86	41.5	25.0	58.5	2.35
1140	1.99	44.8	16.0	48.3	1.95	1415	2.03	49.3	26.0	60.8	1.05	1631	1.86	41.3	25.0	58.3	2.35
1141	1.99	44.8	16.0	48.5	1.85	1416	2.04	49.5	26.0	61.0	0.95	1632	1.86	41.3	25.0	58.3	2.25
1142	1.99	44.3	16.0	48.3	1.90	1417	2.06	50.5	26.0	61.5	1.15	1633	1.88	41.8	25.0	58.5	2.35
1143	2.00	44.0	16.0	48.8	1.95	1418	2.05	49.8	26.0	61.0	1.25	1634	1.89	42.0	25.0	58.5	2.45
1144	2.00	44.0	16.0	48.5	1.85	1419	2.08	50.5	26.0	60.5	1.20	1635	1.90	41.8	25.0	58.5	2.40
1145	2.01	43.5	16.0	48.8	1.85	1420	2.16	53.5	26.0	60.5	1.10	1636	1.89	41.8	25.0	58.8	2.35
1146	2.01	43.3	16.0	49.5	1.90	1421	2.08	49.5	26.0	60.3	1.10	1637	1.89	41.8	25.0	58.8	2.30
1147	2.01	43.5	16.0	49.3	1.75	1422	2.09	49.3	26.0	60.8	1.15	1638	1.89	41.8	25.0	58.8	2.45
1148	2.01	43.5	16.0	49.3	1.65	1423	2.08	49.3	26.0	60.8	1.20	1639	1.88	42.0	25.0	58.8	2.65
1149	2.01	43.5	16.0	49.0	1.60	1424	2.04	48.3	26.0	60.8	1.30	1640	1.88	41.5	25.0	58.8	2.50
1150	2.01	43.5	16.0	49.3	1.70	1425	2.03	48.8	26.0	60.5	1.25	1641	1.88	42.0	25.0	58.8	2.45
1151	2.00	43.3	16.0	49.8	1.65	1426	2.18	57.5	26.0	60.3	1.25	1642	1.86	42.3	25.0	58.8	2.45
1152	2.01	43.5	16.0	50.0	1.70	1427	2.04	49.5	26.0	60.0	1.20	1643	1.86	42.3	25.0	58.5	2.50
1153	2.01	43.5	16.0	50.0	1.60	1428	2.09	56.0	26.0	60.0	1.15	1644	1.86	42.0	25.0	58.5	2.30
1154	2.04	44.8	16.0	49.8	1.55	1429	2.08	53.5	26.0	60.0	1.20	1645	1.86	42.0	25.0	58.3	2.40
1155	2.03	43.8	16.0	50.5	1.75	1430	2.05	52.5	26.0	60.3	1.20	1646	1.86	42.0	25.0	58.0	2.35
1156	2.03	43.8	16.0	50.8	1.70	1431	2.06	51.5	26.0	60.5	1.20	1647	1.88	42.0	25.0	57.8	2.40
1157	2.03	43.8	16.0	51.3	1.80	1432	2.05	51.0	26.0	60.5	1.35	1648	1.88	42.3	25.0	57.8	2.35
1158	2.03	43.8	16.0	51.3	1.70	1433	2.05	50.5	26.0	60.5	1.35	1649	1.88	42.5	25.0	57.8	2.55
1159	2.03	43.5	16.0	51.5	1.65	1434	2.11	53.3	26.0	61.0	1.20	1650	1.89	41.5	25.0	58.3	2.40
1200	2.04	43.5	16.0	51.5	1.55	1435	2.10	53.5	26.0	61.8	1.25	1651	1.91	41.0	25.0	58.8	2.40
1201	2.04	43.8	16.0	52.5	1.40	1436	2.06	50.3	26.0	62.5	1.35	1652	1.90	41.3	25.0	59.5	2.40
1202	2.04	44.0	16.0	52.5	1.45	1437	2.09	51.5	26.0	62.5	1.30	1653	1.90	41.3	25.0	59.8	2.45
1203	2.03	44.0	16.0	53.3	1.85	1438	2.06	49.3	26.0	62.8	1.35	1654	1.90	41.3	25.0	60.3	2.55
1204	2.03	44.3	16.0	53.3	2.05	1439	2.05	49.0	26.0	62.5	1.45	1655	1.90	41.0	25.0	60.5	2.50
1205	2.03	44.0	16.0	53.5	2.20	1440	2.08	49.8	26.0	63.0	1.30	1656	1.90	41.8	25.0	60.3	2.60
1206	2.03	44.3	16.0	53.5	2.25	1441	2.06	48.0	26.0	63.0	1.15	1657	1.89	41.3	25.0	60.5	2.50
1207	2.03	44.8	16.0	53.5	2.10	1442	2.06	47.0	26.0	63.0	1.25	1658	1.89	41.3	25.0	60.5	2.40
1208	2.01	45.0	16.0	53.5	1.90	1443	2.06	47.5	26.0	63.3	1.30	1659	1.89	41.8	25.0	60.5	4.20
1209	2.03	45.5	16.0	53.5	2.20	1444	2.05	47.5	26.0	62.8	1.20	1700	1.88	41.3	25.0	61.0	3.75
1210	2.03	46.3	16.0	53.5	2.30	1445	2.04	47.5	26.0	62.3	1.20	1701	1.88	41.0	25.0	60.5	3.00

1211	2.03	46.3	16.0	53.5	2.30	1446	2.04	46.8	26.0	61.5	1.25	1702	1.86	41.0	25.0	60.0	3.05
1212	2.03	46.0	16.0	53.8	2.20	1447	2.04	47.0	26.0	61.3	1.35	1703	1.86	41.3	25.0	60.0	3.10
1213	2.04	46.3	16.0	53.8	2.15	1448	2.08	49.0	26.0	60.5	1.25	1704	1.86	41.3	25.0	59.5	3.00
1214	2.04	46.8	16.0	54.0	2.15	1449	2.04	48.8	26.0	60.5	1.15	1705	1.86	41.0	25.0	59.0	3.05
1215	2.05	46.5	16.0	54.5	2.10	1450	2.05	50.5	26.0	60.8	1.15	1706	1.86	41.3	25.0	59.0	2.90
1216	2.06	46.5	16.0	55.3	2.00	1451	2.04	51.3	26.0	60.8	1.25	1707	1.86	41.3	25.0	58.8	2.90
1217	2.06	47.3	16.0	55.0	1.90	1452	2.04	50.0	25.5	60.5	1.10	1708	1.86	41.5	25.0	59.3	2.95
1218	2.08	46.5	16.0	55.3	1.85	1453	2.04	50.8	26.0	60.8	1.20	1709	1.85	41.5	25.0	59.5	3.10
1219	2.06	45.8	16.0	55.5	1.85	1454	2.09	53.0	26.0	61.0	1.20	1710	1.85	41.3	25.0	59.5	2.95
1220	2.08	45.5	16.0	55.5	2.00	1455	2.11	54.0	26.0	61.0	1.20	1711	1.85	41.3	25.0	59.5	2.90
1221	2.06	46.5	16.0	55.3	2.00	1456	2.03	49.3	26.0	61.0	1.20	1712	1.85	41.3	25.0	59.5	3.10
1222	2.06	46.3	16.0	55.3	1.95	1457	2.03	49.5	26.0	60.8	1.25	1713	1.86	41.8	25.0	59.5	3.05
1223	2.04	45.0	16.0	55.0	2.00	1458	2.03	50.0	26.0	60.5	1.30	1714	1.85	41.5	25.0	59.5	3.10
1224	2.04	45.0	16.0	54.3	2.20	1459	2.06	52.5	26.0	60.3	1.35	1715	1.85	41.8	25.0	59.8	3.00
1225	2.05	45.8	16.0	54.0	2.20	1500	2.04	49.0	26.0	60.8	1.30	1716	1.84	41.8	25.0	60.0	3.05
1226	2.05	47.0	16.0	54.0	2.15	1501	2.04	48.5	26.0	60.8	1.20	1717	1.85	41.8	25.0	60.0	3.05
1227	2.06	47.3	16.0	54.3	2.00	1502	2.04	47.5	25.5	60.5	1.15	1718	1.85	41.5	25.0	59.8	3.10
1228	2.08	46.5	16.0	54.5	2.05	1503	2.04	46.5	26.0	60.5	1.20	1719	1.84	41.5	25.0	59.8	3.00
1229	2.08	46.0	16.0	55.0	2.10	1504	2.03	46.0	25.5	60.5	1.25	1720	1.84	41.3	25.0	59.8	3.15
1230	2.08	45.8	16.0	55.5	2.10	1505	2.03	45.3	25.5	60.3	1.35	1721	1.84	41.3	25.0	59.5	3.15
1231	2.06	44.5	16.0	55.5	2.20	1506	2.01	44.8	26.0	60.3	1.30	1722	1.83	41.5	25.0	59.0	3.20
1232	2.06	44.8	16.0	55.3	2.30	1507	2.01	45.0	25.5	60.5	1.40	1723	1.84	41.3	25.0	59.0	3.20
1233	2.06	45.8	16.0	55.0	2.45	1508	2.01	45.3	25.5	60.8	1.35	1724	1.84	41.3	25.0	59.0	3.20
1234	2.06	45.5	16.0	54.8	2.20	1509	2.01	45.0	26.0	61.3	1.30	1725	1.84	41.0	25.0	59.3	3.30
1235	2.06	43.8	16.0	54.8	2.05	1510	2.01	44.8	26.0	61.3	1.30	1726	1.84	41.3	25.0	59.3	3.20
1236	2.06	43.8	16.0	55.0	2.10	1511	2.00	44.8	26.0	61.8	1.30	1727	1.83	41.0	25.0	59.3	3.25
Minim	0.86	20.30	11.00	10.30	1.40	Minim	1.38	37.50	17.00	25.00	0.75	Minim	1.45	34.50	17.00	33.30	1.60
Maxim	2.08	51.50	16.50	55.50	3.65	Maxim	2.19	57.50	26.00	78.30	1.95	Maxim	2.04	47.30	25.50	66.30	4.20
Avera	1.95	44.50	15.84	39.14	1.99	Avera	2.02	49.00	25.74	60.54	1.21	Avera	1.88	41.92	24.97	59.01	2.41

Concentration of Methane and Ethane
determined by GC/FID in Kiln Stack Emissions November 11, 1993

TIME	CONCENTRATION (ppmv)	
1203	5.7	< 3
1205	7.4	< 3
1352	5.5	< 3
1354	4.6	< 3
1612	4.6	< 3
1615	4.9	< 3
1658	4.8	< 3
1701	5.0	< 3
1707	5.3	< 3

REFERENCE METHOD MONITORS

PERFORMANCE SPECIFICATION

KILN

Calibration Error Check

Cal. gas value	Measured value	% Error	Pass/Fail
	CO_2		
6.20	6.20	0	Pass
11.98	11.95	0.3	Pass
0	0.13	1.1	Pass
	CO		
424	424	0	Pass
218	221	0.7	Pass
102	102	0	Pass
0	0.3	0.1	Pass
	NO_x		
448	454	1.3	Pass
248	254	1.3	Pass
124	127	0.7	Pass
0	6.5	1.6	Pass
	SO_2		
380	380	0	Pass
239	241	0.5	Pass
103	100	0.8	Pass
0	0.0	0	Pass
	THC		
90.2	90.7	0.6	Pass
51.3	50.4	1.6	Pass
29.5	29.4	0.3	Pass
0	0	0	Pass

KILN

Response Time Checks

Analyzer	Rise time (sec)	Fall time (sec)
CO_2	63	52
CO	65	75
NO_x	80	110
SO_2	74	69
THC	40	45

Dryer Response Time Check

Analyzer	Rise time (sec)	Fall time (sec)
THC	95	106

KILN

Bias Check

Cal. gas value	Measured value	% Error	Pass/Fail
	CO_2		
6.20	6.13	0.6	Pass
	CO		
218	225	1.7	Pass
	NO_x		
238	248	2.2	Pass
	SO_2		
230	239	2.7	Pass
	THC		
51.3	50.8	0.6	Pass

Percent Drift (Run 1)

	Initial	Final	% Error	Pass/Fail
		CO_2		
Zero	0.13	0.13	0	Pass
Span	11.95	11.93	0.2	Pass
		CO		
Zero	0.3	0.5	0.04	Pass
Span	425	426	0.2	Pass
		NO_x		
Zero	6.5	6.0	0.1	Pass
Span	454	454	0	Pass
		SO_2		
Zero	0.0	0.0	0	Pass
Span	380	380	0	Pass
		THC		
Zero	0.0	0.7	0.8	Pass
Span	90.7	90.6	0.1	Pass

KILN

Percent Drift (Run 2)

	Initial	Final	% Error	Pass/Fail
		CO_2		
Zero	0.13	0.12	0.1	Pass
Span	11.93	11.95	0.2	Pass
		CO		
Zero	0.5	0.8	0.1	Pass
Span	426	422	0.9	Pass
		NO_x		
Zero	6.0	5.4	0.3	Pass
Span	454	452	0.4	Pass
		SO_2		
Zero	0.0	0.2	0.1	Pass
Span	380	381	0.3	Pass
		THC		
Zero	0.7	0.6	0.1	Pass
Span	90.6	90.5	0.1	Pass

KILN

Percent Drift (Run 3)

	Initial	Final	% Error	Pass/Fail
		CO_2		
Zero	0.12	0.10	0.2	Pass
Span	11.95	11.94	0.1	Pass
		CO		
Zero	0.8	0.0	0.2	Pass
Span	422	423	0.2	Pass
		NO_x		
Zero	5.4	5.0	0.1	Pass
Span	452	446	1.3	Pass
		SO_2		
Zero	0.2	0.0	0.1	Pass
Span	381	378	0.8	Pass
		THC		
Zero	0.6	0.7	0.1	Pass
Span	90.5	90.6	0.1	Pass

213-585-2154
FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

5700 SOUTH ALAMEDA STREET • LOS ANGELES, CALIFORNIA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 092193-1

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	1667b	CLM-005042	47.3 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT PROPANE ANALYZER MAKE-MODEL-S/N HP 5890 SERIES II S/N 3310A48533

ANALYTICAL PRINCIPLE GC/ FLAME IONIZATION LAST CALIBRATION DATE 07/08/93

FIRST ANALYSIS DATE 09/28/93 SECOND ANALYSIS DATE

Z 0	R 58386	C 63294	CONC. 51.3 ppm	Z	R	C	CONC.
R 59250	Z 0	C 64278	CONC. 51.3 ppm	R	Z	C	CONC.
Z 0	C 64093	R 59056	CONC. 51.3 ppm	Z	C	R	CONC.
U/M uV		MEAN TEST ASSAY	51.3 ppm	U/M uV		MEAN TEST ASSAY	

THIS CYLINDER NO. SA 8784
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 09/28/93
EXPIRATION DATE 03/28/95 TERM 18 MONTHS

CERTIFIED CONCENTRATION

PROPANE	51.3 ppm
ZERO AIR	BALANCE

ANALYZED BY KELLY GALLAGHER *CERTIFIED BY* DOUG GRANT

213 585-2154
FAX # 213 585-0582

LIQUID CARBONIC
SPECIALTY GAS CORPORATION
5700 SOUTH ALAMEDA STREET • LOS ANGELES, CALIFORNIA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 021293-3

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	vs. 1668b	SA 5909	95.3 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT PROPANE ANALYZER MAKE-MODEL-S/N HP 5890 Series II S/N 3108A34409

ANALYTICAL PRINCIPLE GC/ Thermal Conductivity LAST CALIBRATION DATE 10/26/92

FIRST ANALYSIS DATE 03/04/93 SECOND ANALYSIS DATE

Z 0	R 738	C 703	CONC. 90.8 ppm	Z	R	C	CONC.
R 742	Z 0	C 701	CONC. 90.0 ppm	R	Z	C	CONC.
Z 0	C 693	R 735	CONC. 89.9 ppm	Z	C	R	CONC.
U/M uV		MEAN TEST ASSAY	90.2 ppm	U/M uV		MEAN TEST ASSAY	

THIS CYLINDER NO. SA 5736
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 03/02/93
EXPIRATION DATE 09/02/94

CERTIFIED CONCENTRATION

PROPANE	90.2 ppm
ZERO AIR	BALANCE

ANALYZED BY K.A. GALLAGHER CERTIFIED BY K.T. YOUNG

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FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	GMIS	vs 1667b	579140	29.8 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT PROPANE GMIS ANALYZER MAKE-MODEL-S/N HP 5890 Series II S/N 3108A34409

ANALYTICAL PRINCIPLE GC/ Thermal Conductivity LAST CALIBRATION DATE 04/15/93

FIRST ANALYSIS DATE 05/24/93 SECOND ANALYSIS DATE

Z 0	R 208	C 206	CONC.	29.5 ppm	Z	R	C	CONC.
R 208	Z 0	C 205	CONC.	29.4 ppm	R	Z	C	CONC.
Z 0	C 205	R 206	CONC.	29.7 ppm	Z	C	R	CONC.
U/M uV		MEAN TEST ASSAY		29.5 ppm	U/M uV		MEAN TEST ASSAY	

THIS CYLINDER NO. SA 6981
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 05/24/93
EXPIRATION DATE 11/24/94

CERTIFIED CONCENTRATION

PROPANE	29.5 ppm
ZERO AIR	BALANCE

ANALYZED BY Kelly Gallagher CERTIFIED BY

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FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

5700 SOUTH ALEMEDA STREET • LOS ANGELES, CALIFORNIA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 072693-1

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON DIOXIDE GMIS	vs 1674b	282185	5.01 %

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON DIOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-730

ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 06/06/93

FIRST ANALYSIS DATE 08/09/93 SECOND ANALYSIS DATE

Z 0.00	R 5.02	C 6.20	CONC. 6.19 %	Z	R	C	CONC.
R 5.02	Z 0.00	C 6.22	CONC. 6.21 %	R	Z	C	CONC.
Z 0.00	C 6.20	R 5.02	CONC. 6.19 %	Z	C	R	CONC.
U/M %		MEAN TEST ASSAY	6.20 %	U/M %		MEAN TEST ASSAY	

THIS CYLINDER NO. SGAL 1312
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/09/93
EXPIRATION DATE 02/09/95 TERM 18 MONTHS

CERTIFIED CONCENTRATION

CARBON DIOXIDE	6.20 %
NITROGEN	BALANCE

ANALYZED BY Maria E. Rochon MARIA E. ROCHON

CERTIFIED BY Ty Tripett TY TRIPETT

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FAX # 213 585-0582

LIQUID CARBONIC

SPECIALTY GAS CORPORATION

5700 SOUTH ALAMEDA STREET • LOS ANGELES, CALIFORNIA 90058

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER SG 469266

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs 2636a	SGAL 2276	236 ppm

ANALYZER READINGS

R = REFERENCE STANDARD *Z = ZERO GAS* *C = GAS CANDIDATE*

1. COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S.N Siemens Ultramat 5E S/N A12-729

ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 06/06/92

FIRST ANALYSIS DATE 08/24/92 SECOND ANALYSIS DATE 08/31/92

Z 0	R 236	C 102	CONC.	102 ppm	Z 0	R 236	C 102	CONC.	102 ppm
R 236	Z 0	C 102	CONC.	102 ppm	R 236	Z 0	C 102	CONC.	102 ppm
Z 0	C 102	R 236	CONC.	102 ppm	Z 0	C 102	R 236	CONC.	102 ppm
U/M ppm		MEAN TEST ASSAY		102 ppm	U/M ppm		MEAN TEST ASSAY		102 ppm

THIS CYLINDER NO. SA 4810
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 1650 PSIG
CERTIFICATION DATE 08/31/92
EXPIRATION DATE 02/28/94

CERTIFIED CONCENTRATION

CARBON MONOXIDE	102 ppm
NITROGEN	BALANCE

ANALYZED BY Maria E. Rochon
MARIA E. ROCHON

CERTIFIED BY
KWAN T. YOUNG

A 164

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LIQUID CARBONIC

CYLINDER GAS PRODUCTS

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 092193-1

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs 2636	SA 4709	238 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-729

ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 09/02/93

FIRST ANALYSIS DATE 09/29/93 SECOND ANALYSIS DATE 10/06/93

Z 0	R 238	C 217	CONC. 217 ppm	Z 0	R 238	C 218	CONC. 218 ppm
R 238	Z 0	C 217	CONC. 217 ppm	R 239	Z 0	C 218	CONC. 217 ppm
Z 0	C 217	R 238	CONC. 217 ppm	Z 0	C 218	R 238	CONC. 218 ppm
U/M ppm		MEAN TEST ASSAY	217 ppm	U/M ppm		MEAN TEST ASSAY	218 ppm

THIS CYLINDER NO. SA 8628
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 1650 PSIG
CERTIFICATION DATE 10/06/93
EXPIRATION DATE 10/06/96 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	218 ppm
NITROGEN	BALANCE

ANALYZED BY MARIA E. ROCHON

CERTIFIED BY KWAN T. YOUNG

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LIQUID CARBONIC

CYLINDER GAS PRODUCTS

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 052893-1+2

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE	GMIS	vs 1687b	SGAL 1147	1030 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N Beckman 951A S/N 0101354

ANALYTICAL PRINCIPLE Chemiluminescence LAST CALIBRATION DATE 05/27/93

FIRST ANALYSIS DATE 06/08/93 SECOND ANALYSIS DATE 06/18/93

Z 0	R 961	C 417	CONC. 447 ppm	Z 0	R 963	C 419	CONC. 448 ppm
R 963	Z 0	C 418	CONC. 447 ppm	R 963	Z 0	C 419	CONC. 448 ppm
Z 0	C 418	R 963	CONC. 447 ppm	Z 0	C 419	R 963	CONC. 448 ppm
U/M mV		MEAN TEST ASSAY	447 ppm	U/M mV		MEAN TEST ASSAY	448 ppm

THIS CYLINDER NO. SA5884
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 06/18/93
EXPIRATION DATE 12/18/94 TERM 18 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	448 ppm
NITROGEN	BALANCE
NOx	462 ppm

ANALYZED BY Maria Rochon
MARIA ROCHON

CERTIFIED BY Kelly Gallagher
KELLY GALLAGHER

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LIQUID CARBONIC

CYLINDER GAS PRODUCTS
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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER none

REFERENCE STANDARD

COMPONENT		NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE	GMIS	vs 1685b	SA 5692	237 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N Beckman 951A S/N 0101354

ANALYTICAL PRINCIPLE Chemiluminescence LAST CALIBRATION DATE 05/27/93

FIRST ANALYSIS DATE 07/29/93 SECOND ANALYSIS DATE 08/05/93

Z 0	R 918	C 960	CONC. 248 ppm	Z 0	R 928	C 967	CONC. 247 ppm
R 918	Z .0	C 960	CONC. 248 ppm	R 929	Z 1	C 969	CONC. 247 ppm
Z 0	C 960	R 918	CONC. 248 ppm	Z 1	C 972	R 927	CONC. 249 ppm
U/M mV		MEAN TEST ASSAY	248 ppm	U/M mV		MEAN TEST ASSAY	248 ppm

THIS CYLINDER NO. SA 8493
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/05/93
EXPIRATION DATE 02/05/95 TERM 18 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	248 ppm
NITROGEN	BALANCE
NOx	250 ppm

ANALYZED BY KELLY GALLAGHER CERTIFIED BY KWAN TAK YOUNG

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FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER none

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
SULFUR DIOXIDE GMIS	vs 1661a	SGAL 2737	243 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT SULFUR DIOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N C1-009

ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 02/18/93

FIRST ANALYSIS DATE 04/20/93 SECOND ANALYSIS DATE 04/27/93

Z 0	R 243	C 239	CONC. 239 ppm	Z 0	R 243	C 238	CONC. 238 ppm
R 243	Z 0	C 239	CONC. 239 ppm	R 243	Z 0	C 239	CONC. 239 ppm
Z 0	C 239	R 243	CONC. 239 ppm	Z 0	C 239	R 243	CONC. 239 ppm
U/M ppm		MEAN TEST ASSAY	239 ppm	U/M ppm		MEAN TEST ASSAY	239 ppm

THIS CYLINDER NO. SA 5811
HAS BEEN CERTIFIED ACCORDING TO SECTION 3.0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 04/27/93
EXPIRATION DATE 10/27/94

CERTIFIED CONCENTRATION

SULFUR DIOXIDE	239 ppm
NITROGEN	BALANCE

ANALYZED BY Kelly Gallagher KELLY GALLAGHER

CERTIFIED BY KWAN TAK YOUNG

Scott Specialty Gases, Inc.

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Midwest Research
425 Volker Blvd
Kansas City, MO 64110-0570

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 002276
Scott Project # 01-41110-002

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number	AAL8604	**Certification Date**	09-15-92	**General Exp. Date**	03-15-9
Cylinder Pressure	2000 psig	**Previous Certification Dates**	None	**Acid Rain Exp. Date**	03-15-9

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Sulfur Dioxide	103 ppm	±2% NIST Directly Traceable
Balance Gas: Nitrogen		

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	10-24-92	ALM020364	150 ppm SO_2 in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
SO2: Horiba/CFA321A/56437102	07-24-92	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Sulfur Dioxide	Date: 09-08-92 Response Units: Volts Z1=0.0000 R1=0.3724 T1=0.4110 R2=0.3763 Z2=0.0000 T2=0.4112 Z3=0.0000 T3=0.4109 R3=0.3746 Avg. Conc. of Cust. Cyl. 102 ppm	Date: 09-15-92 Response Units: Volts Z1=0.0000 R1=0.5817 T1=0.3983 R2=0.5772 Z2=0.0000 T2=0.3992 Z3=0.0000 T3=0.3997 R3=0.5797 Avg. Conc. of Cust. Cyl. 103 ppm	Concentration=$A+Bx+Cx^2+Dx^3+Ex^4$ r=0.99999 Constants: A=0.0000E+00 B=0.0000E+00 C=0.0000E+00 D=0.0000E+00 E=0.0000E+00

Special Notes If this product is used for Acid Rain Rule compliance under 40 CFR Part 75, the Acid Rain Expiration Date applies per Appendix H. If for use with other than 40 CFR Part 75 compliance, the General Expiration Date applies.

Analyst Christine Rush

Scott Specialty Gases, Inc.

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Midwest Research
425 Volker Blvd
Kansas City, MO 64110-0570

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 002276
Scott Project # 01-41110-001

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number	ALM017908	**Certification Date**	09-10-92	**General Exp. Date**	03-10-9
Cylinder Pressure	2000 psig	**Previous Certification Dates**	None	**Acid Rain Exp. Date**	03-10-9

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Sulfur Dioxide	380 ppm	±1% NIST Directly Traceable
Balance Gas: Nitrogen		

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	10-22-92	1L3063	497 ppm SO_2 in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
SO_2: Horiba/CFA321A/56437102	07-22-92	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Sulfur Dioxide	Date: 09-03-92 Response Units: Volts Z1=0.0000 R1=0.9677 T1=0.3530 R2=0.9666 Z2=0.0000 T2=0.3543 Z3=0.0000 T3=0.3532 R3=0.9608 Avg. Conc. of Cust. Cyl. 378 ppm	Date: 09-10-92 Response Units: Volts Z1=0.0000 R1=0.4772 T1=0.3637 R2=0.4758 Z2=0.0000 T2=0.3619 Z3=0.0000 T3=0.3630 R3=0.4749 Avg. Conc. of Cust. Cyl. 381 ppm	Concentration= $A+Bx+Cx^2+Dx^3+Ex^4$ r=0.99999 Constants: A=0.0000E+00 B=0.0000E+00 C=0.0000E+00 D=0.0000E+00 E=0.0000E+00

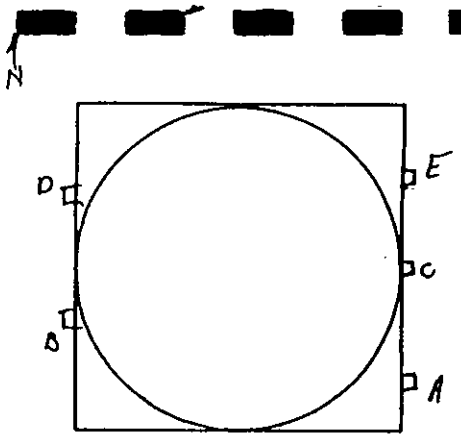
Special Notes If this product is used for Acid Rain Rule compliance under 40 CFR Part 75, the Acid Rain Expiration Date applies per Appendix H. If for use with other than 40 CFR Part 75 compliance, the General Expiration Date applies.

Analyst Christine Rush

A.2.6 Kiln HCl/HF/PM

FIELD DATA

RUN NO.	Run 1	PROBE NO.	VL-4	NOZZLE DIA.	.418
PROJECT NO.	4601	PROBE LENGTH AND TYPE	8ft glass	ASSUMED MOISTURE %	10
PLANT	Belden Brick #6	SAMPLE BOX NO.	~~011496~~ 011515	METER ΔH@	1.829
DATE	11/9/93	METER BOX NO.	N-13	METER CORRECTION	1.016
SAMPLING LOCATION	Kiln Stack	TEMP. CONTROLLER NO.	N-13	PITOT NO.	5-12
SAMPLE TYPE	PH-1	TEMP. METER NO.	N-13	PITOT COEFFICIENT	.8159
OPERATOR	Edwards	THERMOCOUPLE I.D. NO.	96-2	BAROMETRIC PRESSURE	29.3
FILTER NO.		UMBILICAL CORD I.D. NO.	N-25-4	SITE TO BARO. ELEVATION (ft.)	—
RECORD DATA EVERY	7 MIN.	UMBILICAL CORD I.D. NO.	—	CORRECTED B.P. (0.1 in./100 ft.)	—
UMBILICAL/SAMPLER HOOKUP	U/H-9	NOZZLE NO.		STATIC PRESSURE	-.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1302	1925				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1311	1725	1735	1986	
VACUUM, In. Hg	≥15"	>12	≥15"	212	≥15"
CFM	.004	.006	0.005	0.002	
VOLUMES					
FINAL					
INITIAL				286.871	
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 202.080

FINAL VOLUME 286.871

LEAK CHECK VOLUME ~~0.015~~ #

ADJUSTED FINAL VOLUME 286.~~856~~ 871

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MFN

RUN NO. PH 1
DATE 11/9/93

SAMPLING LOCATION Kiln Stack
PROJECT NO. 4601

p. 1 of
OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft³ INITIAL 202.080 DESIRED	ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F
	1407														
	3.5			203.23	0.035			432	75	74	3.5	51	360	256	360
A-1	7.0	1437	204.46	204.48	0.065	0.37	0.37	430	75	75	5.0	49	350	257	356
2	14.0	1444	207.71	207.74	0.13	0.70	0.70	432	75	76	8.0	51	332	256	342
3	21.0	1451	212.31	212.25	0.16	1.40	1.40	432	79	75	11.0	49	329	255	345
4	28.0	1458	217.42	217.36	0.115	1.73	1.75	433	83	76	7.5	53	337	259	335
5	35.0	1505	221.77	221.78	—	1.24	1.25	—	—	—	—	—	—	—	—
		1517		221.781			0.10								
C-1	7.0	1524	222.19	223.02	0.001	0.01	~~0.07~~	420	79	78	2.0	56	348	255	349
2	14.0	1531	224.01	224.07	0.020	0.21	0.10	422	80	78	2.2	54	358	255	346
3	21.0	1538	226.24	226.11	0.030	0.32	0.32	429	81	78	3.0	54	333	253	345
4	28.0	1545	229.87	229.82	0.080	0.86	0.87	435	82	79	6.0	47	340	257	345
5	35.0	1552	234.86	234.66	0.150	1.63	1.63	438	86	80	9.5	48	328	253	339
X		1643		234.663	~~0.005~~	~~0.05~~									
E 1	7.0	1650	235.57	235.58	0.005	0.05	0.05	428	78	77	2.0	52	353	252	361
2	14.0	1657	237.59	237.48	0.025	0.29	0.27	430	78	77	3.0	47	346	251	363
3	21.0	1704	240.45	240.36	0.050	0.53	0.53	436	79	77	4.0	45	334	255	358
4	28.0	1711	244.07	244.05	0.080	0.86	0.86	439	81	78	6.0	48	332	253	355
5	35.0	1718	249.36	249.228	0.170	1.83	1.80	441	85	79	11.0	44	351	257	346
		1753		249.228											
B 1	7.0	1800	253.98	524.12	0.130	1.40	1.40	439	81	80	8.0	41	365	252	370
2	14.0	1807	258.86	258.97	0.145	1.56	1.55	440	82	79	9.0	39	366	258	372
3	21.0	1814	262.92	263.10	0.100	1.08	1.08	444	86	80	7.0	40	375	259	369
4	28.0	1821	266.07	266.36	0.060	0.64	0.65	445	88	81	5.0	42	362	256	372
5	35.0	1828	268.65	268.90	0.040	0.43	0.43	443	88	81	4.0	41	364	256	362

COMMENTS

1) Due to train problem with other samplers we have shut down
Restart @ 14:31

RUN NO. PH-1

DATE

SAMPLING LOCATION

PROJECT NO.

p. 2 of

OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft^3 INITIAL 268.906 DESIRED	GAS METER READING (V_m), ft^3 ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
	0	1840															
D 1	2.0	1847	273.55	273.58	0.130	1.41	1.40	437	83	82	8.5	39	383	252	392		
2	14.0	1854	278.37	278.48	0.140	1.52	1.54	441	86	82	9.0	38	364	253	377		
3	21.0	1903	282.45	282.53	0.100	1.08	1.04	443	88	82	7.0	39	363	254	378		
4	28.0	1910	285.03	285.12	0.040	0.43	0.40	442	89	82	4.0	40	380	259	383		
5	35.0	1917	286.86	286.871	0.02	0.21	0.20	438	87	82	3.0	38	377	256	381		

COMMENTS

A 175

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601-01-05-01 RUN NO. N/A
SAMPLE NO. Ambient Check DATE 11/9/93
PLANT SAMPLING LOCATION Belden Brick Testing Trailer
ANALYSIS TIME (24hr-CLOCK) 1935
SAMPLE TYPE (BAG, GRAB) Grab
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE —0— CHANGE IN 4 MIN.
PIPETTES —0— CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE —0— CHANGE IN 4 MIN.
PIPETTES —0— CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 0.0 2 0.0 3 0.0	0.0	1 0.0 2 0.0 3 0.0	0.0	1 0.0 2 0.0 3 0.0	0.0	0.0
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 20.8 2 20.8 3 20.8	20.8	1 20.8 2 20.8 3 20.8	20.8	1 20.8 2 20.8 3 20.8	20.8	20.8

R-16 SEV SUMMIT sheet 02/01

Acceptance Criteria

CO_2 >4% .3% by Volume
≤4% .2% by Volume

O_2 ≥15% .2% by Volume
<15% .3% by Volume

Comments:

Sample consists of ambient air sucked within the testing trailer as a Quality check of the Hays Republic ORSAT device.

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601-01-05-01 RUN NO. PH-1
SAMPLE NO. _____ DATE 11/9/93
PLANT SAMPLING LOCATION Kiln Stack
ANALYSIS TIME (24hr-CLOCK) 2025
SAMPLE TYPE (BAG, GRAB) Bag
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 ~~1.4~~ 1.0 2 1.0 3 1.0	1.0	1 1.0 2 1.0 3 1.0	1.0	1 1.2 2 1.2 3 1.2	1.2	1.1
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 18.8 2 19.0 3 19.0	17.9	1 19.0 2 19.0 3 19.0	18.0	1 18.8 2 18.8 3 18.8	17.6	17.8

91-16 SEV SURMAN wksht 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2 , AND HF TRAIN (MM5PH)
FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 1 Sampling Train No. PH-1 Sample Box No. 010515
Set up person(s): Jg McC Date 11-9-93
Transfer to Sampler: Sample Box Leak Check: _____cfm @ _____in.Hg vacuum

Relinquished By Jg McC Received By Jim Simon Date/Time 11-9-93 7:30

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	•			
Female Probe Blank-off				
90° Bypass	•	Filter Type:		
Filter Holder Front	—	Whatman QM-A		
Filter Holder Back	—	Filter I.D.No.:		
Short 90° Connector		1		
1st Impinger				
(Short-stem Mod-GBS)	I-221	50 mLs	482.5	529.5
U-Connector (A)		0.1 N H_2SO_4		
2nd Impinger (GBS)		100 mLs	477.9	576.0
U-Connector (B)		0.1 N H_2SO_4		
3rd Impinger (GBS)		100 mLs	471.7	570.2
U-Connector (C)		0.1 N H_2SO_4		
4th Impinger (Mod-GBS)		Empty	466.6	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs	457.7	552.2
U-Connector (E)		0.1 N NaOH		
6th Impinger (Mod-GBS)		100 mLs	486.8	586.4
U-Connector (F)		0.1 N NaOH		
7th Impinger (Mod-GBS)		~200 g indicating		762.4
Impinger Outlet Connector		silica gel		

* Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2 , AND HF TRAIN (MM5PH)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 1 Sampling Train No. PH-1 Sample Box No. 011515

TRAIN PURGE WITH ASCARITE-FILTERED AIR

Condensation in front-half? No Purged By
Date/Start Time Stop Time Purge Rate: (delta H =)
Transfer for Recovery: Moisture Removed?

Relinquished By Received By J.McC Date/Time 11-9-93 8200
Sample box recovery person(s): J. McC Date 11-9-93
Probe recovery person(s): Mark Whitmer Date 11-9-93

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th
Final Wt. (g)	558.8	601.9	577.5	468.2	551.9	587.8	777.4
Initial Wt. (g)	529.5	576.0	570.2	466.6	552.2	586.4	762.4
Net Wt. (g)	29.3	25.9	7.3	1.6	(0.3)	1.4	15.0

[Total Condensate Collected (g): 80.8]

Description and color:	clear	clear	clear	clear	clear	clear	90
Impingers:	>>>>>>>>>>>>>	1-3	<<<<<<<<	>>>>>>>	4-6	<<<<<<<<<<<<<<<	% Blue

Sample Number: 1024 1026
Sample Bottle Tare Wt. (g) 259.9 262.2
Sample Bottle Gross Wt. (g) 558.5 459.8 Before Rinses
Components Rinsed*: filter support, filter holder back, short 90° connector, 1st-3rd impingers, U-connectors A-C; 4th-6th impingers, U-connectors D-F
Sample Bottle Gross Wt. (g) 627.3 524.7 After Rinses
Net Sample Wt. (g) 367.4 262.5 For HCl, Cl_2 , and HF Computations
Sample Mixed, Then:
Aliquot Sample Number: >>>>>>>>>>> 1025 >>>>>>>>>>> 1027 For Chloride
Sample Bottle Tare Wt. (g) 99.1 99.2
Sample Bottle Final Wt. (g) 524.2 202.1 419.6 204.5 After Aliquots
Net Sample Wt. (g) 264.3 103.0 157.4 105.3

FRONT HALF RECOVERY

Sample Number: 1022 1023
Sample Bottle Tare Wt. (g) 173.2
Filter Description and Color: dirty white
Components Rinsed**: nozzle, probe liner, bypass, filter holder front
Sample Bottle Gross Wt. (g) 368.6 w/Acetone Rinses
Net Acetone Sample Wt. (g) 195.4
Sample Bottle Final Wt. (g) ~~w/added Water Rinses~~
Net Water Sample Wt. (g)

* ASTM Type I water rinses (2X). Thoroughly mix sample and rinses before aliquoting.
** Acetone rinses with brushing (3X or more) until clean. If any residue remains, follow with ASTM Type I water rinses with brushing.

COMMENTS:

FILE NAME - phcl1
RUN # - M5PCLKN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:50:43

Initial Meter Volume (Cubic Feet)=	202.080	
Final Meter Volume (Cubic Feet)=	286.871	
Meter Factor=	1.016	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Feet)=	86.148	
Gas Volume (Dry Standard Cubic Feet)=	82.567	
Barometric Pressure (in Hg)=	29.30	
Static Pressure (Inches H20)=	-0.12	
Percent Oxygen=	17.8	
Percent Carbon Dioxide=	1.1	
Moisture Collected (ml)=	80.8	
Percent Water=	4.4	
Average Meter Temperature (F)=	80	
Average Delta H (in H20)=	0.87	
Average Delta P (in H20)=	0.081	
Average Stack Temperature (F)=	436	
Dry Molecular Weight=	28.89	
Wet Molecular Weight=	28.41	
Average Square Root of Delta P (in H20)=	0.2640	
% Isokinetic=	78.3	
Pitot Coefficient=	0.82	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (Inches)=	0.418	
Stack Axis #1 (Inches)=	68.0	
Stack Axis #2 (Inches)=	68.0	
Rectangular Stack		
Stack Area (Square Feet)=	32.11	
Stack Velocity (Actual, Feet/min)=	1,146	
Flow Rate (Actual, Cubic ft/min)=	36,805	
Flow rate (Standard, Wet, Cubic ft/min)=	21,243	
Flow Rate (Standard, Dry, Cubic ft/min)=	20,307	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0496	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (gr/scf)=	0.0092	0.0405 0.1009
Particulate Loading, Actual (gr/cu ft)=	0.0051	
Emission Rate (lb/hr)=	1.61	

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - phcl1
RUN # - M5PCLKN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:50:44

Initial Meter Volume (Cubic Meters)=	5.722	
Final Meter Volume (Cubic Meters)=	8.123	
Meter Factor=	1.016	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	2.439	
Gas Volume (Dry Standard Cubic Meters)=	2.338	
Barometric Pressure (mm Hg)=	744	
Static Pressure (mm H20)=	-3	
Percent Oxygen=	17.8	
Percent Carbon Dioxide=	1.1	
Moisture Collected (ml)=	80.8	
Percent Water=	4.4	
Average Meter Temperature (C)=	27	
Average Delta H (mm H20)=	22.0	
Average Delta P (mm H20)=	2.1	
Average Stack Temperature (C)=	224	
Dry Molecular Weight=	28.89	
Wet Molecular Weight=	28.41	
Average Square Root of Delta P (mm H20)=	1.3306	
% Isokinetic=	78.3	
Pitot Coefficient=	0.82	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (mm)=	10.62	
Stack Axis #1 (Meters)=	1.727	
Stack Axis #2 (Meters)=	1.727	
Rectangular Stack		
Stack Area (Square Meters)=	2.983	
Stack Velocity (Actual, m/min)=	349	
Flow rate (Actual, Cubic m/min)=	1,042	
Flow rate (Standard, Wet, Cubic m/min)=	602	
Flow rate (Standard, Dry, Cubic m/min)=	575	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0496	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (mg/cu m)=	21.2	92.8	231.3
Particulate Loading, Actual (mg/cu m)=	11.7		
Emission Rate (kg/hr)=	0.73		

No Back Half Analysis

FILE NAME - phcl1
RUN # - M5PCLKN1
LOCATION - KILN
DATE - 11-09-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 09:50:45

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.035	0.37	432	75	74
2	0.065	0.70	430	75	75
3	0.130	1.40	432	75	76
4	0.160	1.73	432	79	75
5	0.115	1.25	433	83	76
6	0.001	0.10	420	79	78
7	0.020	0.10	422	80	78
8	0.030	0.32	429	81	78
9	0.080	0.87	435	82	79
10	0.150	1.63	438	86	80
11	0.005	0.05	428	78	77
12	0.025	0.27	430	78	77
13	0.050	0.53	436	79	77
14	0.080	0.86	439	81	78
15	0.170	1.80	441	85	79
16	0.130	1.40	439	81	80
17	0.145	1.55	440	82	79
18	0.100	1.08	444	86	80
19	0.060	0.65	445	88	81
20	0.040	0.43	443	88	81
21	0.130	1.40	437	83	82
22	0.140	1.54	441	86	82
23	0.100	1.04	443	88	82
24	0.040	0.40	442	89	82
25	0.020	0.20	438	87	82

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.0962	1.0916	0.0002	0.0044

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	91.8015	91.7563	230.0	0.0452
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

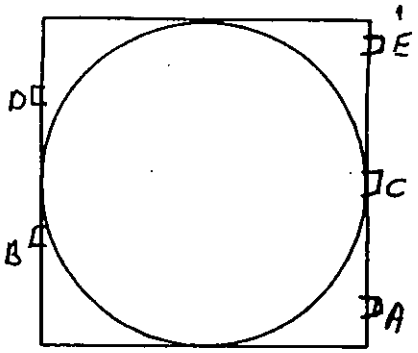
Lk Rate (cfm)	Time (min)
0.0060	35.0000
0.0050	35.0000
0.0020	105.0000

FIELD DATA

RUN NO. 2
PROJECT NO. 4601-01-05-01
PLANT Belden Brick
DATE 11/10/93
SAMPLING LOCATION Kiln Stack
SAMPLE TYPE PH
OPERATOR Edwards
FILTER NO.
RECORD DATA EVERY 7 MIN.
UMBILICAL/SAMPLER HOOKUP UH 9

PROBE NO. UL-4
PROBE LENGTH AND TYPE Quartz / 8'
SAMPLE BOX NO. 011515
METER BOX NO. N13
TEMP. CONTROLLER NO. N 13
TEMP. METER NO. N 13
THERMOCOUPLE I.D. NO. 96-2
UMBILICAL CORD I.D. NO. N 1254
UMBILICAL CORD I.D. NO. —
NOZZLE NO. PHC1-1

NOZZLE DIA. .417
ASSUMED MOISTURE % 4.4
METER ΔH @ 1.829
METER CORRECTION 1.016
PITOT NO. S-12
PITOT COEFFICIENT .8159
BAROMETRIC PRESSURE 29.26
SITE TO BARO. ELEVATION (ft.) —
CORRECTED B.P. (0.1 in./100 ft.) —
STATIC PRESSURE -0.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	0842	1215				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	0838	1210		1408	
VACUUM, In. Hg	≥15"	≥19	≥15"	≥15"	≥15"
CFM	.008	.007		.010	
VOLUMES					
FINAL			~~397.866~~		
INITIAL			~~287.300~~		
DIFFERENCE			~~60.566~~ ~~0.434~~		

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, In. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME 287.300
FINAL VOLUME 394.783
LEAK CHECK VOLUME ~~0.434~~
ADJUSTED FINAL VOLUME 394.349

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RUN NO. 2
DATE 11/10/93

SAMPLING LOCATION Kiln Stack
PROJECT NO. 4601

p. 1 of
OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft^3 INITIAL 287.300 DESIRED	GAS METER READING ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
	0	0942															
E1	7	0949	289.33	289.50	0.015	0.27	0.28	390	76	75	3.0	43	317	252	383		
E2	14	0956	291.96	292.10	0.025	0.45	0.43	390	76	75	4.0	42	353	257	359		
E3	21	1003	296.15	296.13	0.065	1.15	1.10	410	77	75	7.0	42	349	259	357		
E4	28	1010	301.30	301.15	0.100	1.73	1.70	433	81	76	10.0	44	321	256	340		
E5	35	1017	306.45	306.245	0.100	1.73	1.75	439	81	76	10.0	46	331	260	335		
		1026															
A1	7	1033	309.05	309.00	0.025	0.44	0.44	420	81	78	4.0	53	322	257	331		
A2	14	1040	312.89	312.85	0.055	0.96	0.98	429	82	78	6.5	50	314	255	330		
A3	21	1047	318.79	318.52	0.130	2.26	2.26	437	85	79	14.0	48	322	258	321		
A4	28	1054	325.46	325.24	0.165	2.88	2.90	437	89	80	19.0	50	310	253	311		
A4	35	1101	331.15	331.166	0.120	2.09	2.10	440	89	81	14.0	55	298	258	331		
		1128															
C1	7	1135	333.16	333.16	0.015	0.26	0.26	422	80	79	3.0	59	353	252	345		
C2	14	1142	335.48	335.52	0.020	0.35	0.35	422	79	78	3.0	55	324	254	322		
C3	21	1149	338.31	338.36	0.030	0.52	0.52	431	80	79	4.0	56	300	264	312		
C4	28	1156	341.97	342.01	0.050	0.87	0.87	433	83	79	6.0	55	312	255	320		
C5	35	1203	347.99	347.866	0.135	2.35	2.35	436	86	80	15.0	55	302	254	307		
		1236		348.300													
D1	7	1243	353.85	353.81	0.115	2.00	2.00	430	80	80	12	50	301	253	308		
D2	14	1250	359.26	359.18	0.110	1.90	1.90	439	83	80	11.5	49	346	259	323		
D3	21	1257	365.88	365.80	0.080	1.38	1.40	445	87	80	7.5	52	322	260	318		
D4	28	1304	367.17	367.22	0.040	0.69	0.69	440	89	81	5.0	53	321	254	318		
D5	35	1311	370.02	370.088	0.030	0.52	0.52	439	89	82	4.0	53	322	258	319		
		1322															
B1	7	1329	375.80	375.84	0.125	2.16	2.16	443	85	83	14.0	51	335	255	350		
B2	14	1336	381.73	381.75	0.130	2.26	2.25	442	88	84	15.0	51	325	252	328		
B3	21	1343	386.81	386.81	0.095	1.66	1.65	443	92	84	10.0	51	320	254	326		
B4	28	1350	391.34	391.40	0.075	1.31	1.31	442	94	85	8.0	51	329	257	332		
COMMENTS																	
B5	35	1357	394.66	394.783	0.040	0.70	0.70	439	95	86	5.0	51	316	253	335		

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OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601 RUN NO. PH 2
SAMPLE NO. _____ DATE 11/10/93
PLANT SAMPLING LOCATION Kiln Stack
ANALYSIS TIME (24hr-CLOCK) 2043
SAMPLE TYPE (BAG, GRAB) BAG
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE -0- CHANGE IN 4 MIN.
PIPETTES -0- CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 1.8 2 1.8 3 1.8	1.8	1 1.8 2 1.8 3 1.8	1.8	1 1.8 2 1.8 3 1.8	1.8	1.8
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 19.6 2 19.8 3 19.8	17.9	1 19.8 2 19.8 3 19.8	18.0	1 19.8 2 19.8 3 19.8	18.0	18.0

91-16 SEV SURMAN wkshr 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2 , AND HF TRAIN (MM5PH)

FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 2 Sampling Train No. PH-1 Sample Box No. 011515
Set up person(s): J. M. C. Date 11-9-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By J. M. C. Received By _____ Date/Time 11-10-93 715

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
Sampling Nozzle (Quartz)	*			
Probe (Liner-Glass)	•			
Female Probe Blank-off				
90° Bypass	•	Filter Type:		
Filter Holder Front	—	Whatman QM-A		
Filter Holder Back	—	Filter I.D.No.:		
Short 90° Connector		10		
1st Impinger				
(Short-stem Mod-GBS)	I-221	50 mLs	482.5	534.9
U-Connector (A)		0.1 N H_2SO_4		
2nd Impinger (GBS)		100 mLs	477.9	577.6
U-Connector (B)		0.1 N H_2SO_4		
3rd Impinger (GBS)		100 mLs	471.7	571.0
U-Connector (C)		0.1 N H_2SO_4		
4th Impinger (Mod-GBS)		Empty	466.6	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs	451.7	550.0
U-Connector (E)		0.1 N NaOH		
6th Impinger (Mod-GBS)		100 mLs	486.8	589.1
U-Connector (F)		0.1 N NaOH		
7th Impinger (Mod-GBS)		~200 g indicating		777.5
Impinger Outlet Connector	UH-9	silica gel		

• Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2, AND HF TRAIN (MM5PH)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 2 Sampling Train No. PH-1 Sample Box No. 011515

TRAIN PURGE WITH ASCARITE-FILTERED AIR

Condensation in front-half? _____ Purged By _____
Date/Start Time _____ _____ Stop Time _____ Purge Rate: (delta H = _____)
Transfer for Recovery: Moisture Removed? _____

Relinquished By _____ Received By J. M. C. Date/Time 11-10-93 1500
Sample box recovery person(s): J. M. C. / J. Sw. Date 11-10-93
Probe recovery person(s): _____ Date _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th
Final Wt. (g)	577.3	606.9	581.1	470.4	550.3	591.3	795.3
Initial Wt. (g)	534.9	577.6	571.0	466.6	550.0	589.1	777.5
Net Wt. (g)	42.4	29.3	10.1	3.8 ~~4.4~~	.3	2.2	17.8

[Total Condensate Collected (g): ~~90.5~~ 105.9]

Description and color:	clear	clear	clear	clear	clear	clear	20
Impingers:	>>>>>>>>>>>>> 1-3	<<<<<<<<	>>>>>>>	4-6 <<<<<<<<<<<<<<<			% Blue

Sample Number:	2024		2026	
Sample Bottle Tare Wt. (g)	262.5		260.7	
Sample Bottle Gross Wt. (g)	586.6		462.6*	Before Rinses
Components Rinsed*: filter support, filter holder back, short 90° connector, 1st-3rd impingers, U-connectors A-C			4th-6th impingers, U-connectors D-F	
Sample Bottle Gross Wt. (g)	643.5		521.0	After Rinses
Net Sample Wt. (g)	381.0		260.3	For HCl, Cl_2, and HF Computations
Sample Mixed, Then:				
Aliquot Sample Number:	>>>>>>>>>>>	2025	>>>>>>>>>>>	2027 For Chloride
Sample Bottle Tare Wt. (g)		99.0		99.6
Sample Bottle Final Wt. (g)	530.6	211.3	417.8	202.9 After Aliquots
Net Sample Wt. (g)	268.1	112.3	157.1	103.3

FRONT HALF RECOVERY

Sample Number:	2022	2023
Sample Bottle Tare Wt. (g)	173.2	Filter Description and Color:
Components Rinsed**: nozzle, probe liner, bypass, filter holder front		dirty white
Sample Bottle Gross Wt. (g)	298.8 w/Acetone Rinses	
Net Acetone Sample Wt. (g)	_____	
Sample Bottle Final Wt. (g)	_____ w/added Water Rinses	
Net Water Sample Wt. (g)	125.6	

* ASTM Type I water rinses (2X). Thoroughly mix sample and rinses before aliquoting.
** Acetone rinses with brushing (3X or more) until clean. If any residue remains, follow with ASTM Type I water rinses with brushing.

COMMENTS:
* calculated from impinger weights (38 + 98.6 + 104.5 + 260.7) − 5.0 = 462.6

FILE NAME - phcl2
RUN # - M5HCLKN2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 10:11:07

Initial Meter Volume (Cubic Feet)=	287.300		
Final Meter Volume (Cubic Feet)=	394.783		
Meter Factor=	1.016		
Multiple leak checks, see end of printout		Leak Correction=	0.0000
Net Meter Volume (Cubic Feet)=	109.203		
Gas Volume (Dry Standard Cubic Feet)=	104.337		
Barometric Pressure (in Hg)=	29.26		
Static Pressure (Inches H20)=	-0.12		
Percent Oxygen=	18.8		
Percent Carbon Dioxide=	1.8		
Moisture Collected (ml)=	105.9		
Percent Water=	4.6		
Average Meter Temperature (F)=	82		
Average Delta H (in H20)=	1.31		
Average Delta P (in H20)=	0.076		
Average Stack Temperature (F)=	431		
Dry Molecular Weight=	29.04		
Wet Molecular Weight=	28.54		
Average Square Root of Delta P (in H20)=	0.2610		
% Isokinetic=	100.8		
Pitot Coefficient=	0.82		
Sampling Time (Minutes)=	175.0		
Nozzle Diameter (Inches)=	0.417		
Stack Axis #1 (Inches)=	68.0		
Stack Axis #2 (Inches)=	68.0		
Rectangular Stack			
Stack Area (Square Feet)=	32.11		
Stack Velocity (Actual, Feet/min)=	1,128		
Flow Rate (Actual, Cubic ft/min)=	36,230		
Flow rate (Standard, Wet, Cubic ft/min)=	20,994		
Flow Rate (Standard, Dry, Cubic ft/min)=	20,036		

Particulate Loading - Front Half

Particulate Weight (g)=	0.0473	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0070	0.0444	0.0465
Particulate Loading, Actual (gr/cu ft)=	0.0039		
Emission Rate (lb/hr)=	1.20		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - phcl2
RUN # - M5HCLKN2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 10:11:09

Initial Meter Volume (Cubic Meters)=	8.135	
Final Meter Volume (Cubic Meters)=	11.179	
Meter Factor=	1.016	
Multiple leak checks, see end of printout		Leak Correction= 0.0000
Net Meter Volume (Cubic Meters)=	3.092	
Gas Volume (Dry Standard Cubic Meters)=	2.954	
Barometric Pressure (mm Hg)=	743	
Static Pressure (mm H20)=	-3	
Percent Oxygen=	18.8	
Percent Carbon Dioxide=	1.8	
Moisture Collected (ml)=	105.9	
Percent Water=	4.6	
Average Meter Temperature (C)=	28	
Average Delta H (mm H20)=	33.4	
Average Delta P (mm H20)=	1.9	
Average Stack Temperature (C)=	222	
Dry Molecular Weight=	29.04	
Wet Molecular Weight=	28.54	
Average Square Root of Delta P (mm H20)=	1.3154	
% Isokinetic=	100.8	
Pitot Coefficient=	0.82	
Sampling Time (Minutes)=	175.0	
Nozzle Diameter (mm)=	10.59	
Stack Axis #1 (Meters)=	1.727	
Stack Axis #2 (Meters)=	1.727	
Rectangular Stack		
Stack Area (Square Meters)=	2.983	
Stack Velocity (Actual, m/min)=	344	
Flow rate (Actual, Cubic m/min)=	1,026	
Flow rate (Standard, Wet, Cubic m/min)=	594	
Flow rate (Standard, Dry, Cubic m/min)=	567	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0473	Corr. to 7% O2 & 12% CO2
Particulate Loading, Dry Std. (mg/cu m)=	16.0	101.9 106.7
Particulate Loading, Actual (mg/cu m)=	8.8	
Emission Rate (kg/hr)=	0.54	

No Back Half Analysis

FILE NAME - phcl2
RUN # - M5HCLKN2
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 10:11:10

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.015	0.28	390	76	75
2	0.025	0.43	390	76	75
3	0.065	1.10	410	77	75
4	0.100	1.70	433	81	76
5	0.100	1.75	439	81	76
6	0.025	0.44	420	81	78
7	0.055	0.98	429	82	78
8	0.130	2.26	437	85	79
9	0.165	2.90	437	89	80
10	0.120	2.10	440	89	81
11	0.015	0.26	422	80	79
12	0.020	0.35	422	79	78
13	0.030	0.52	431	80	79
14	0.050	0.87	433	83	79
15	0.135	2.35	436	86	80
16	0.115	2.00	430	80	80
17	0.110	1.90	439	83	80
18	0.080	1.40	445	87	80
19	0.040	0.69	440	89	81
20	0.030	0.52	439	89	82
21	0.125	2.16	443	85	83
22	0.130	2.25	442	88	84
23	0.095	1.65	443	92	84
24	0.075	1.31	442	94	85
25	0.040	0.70	439	95	86

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.1240	1.1171	0.0002	0.0067

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	88.5456	88.5050	177.0	0.0406
IMPINGERS	0.0000	0.0000	0.0	0.0000

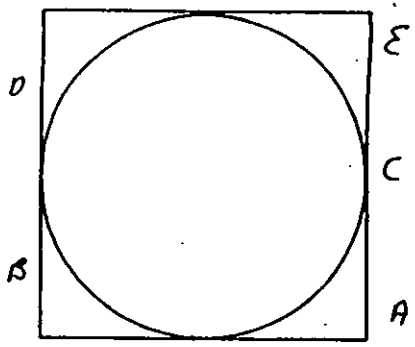
Probe Rinse Blank (mg/ml)= 0.0001
Impinger Blank (mg/ml)= 0.0000

Multiple leak checks used. Final readings for each segment are listed below

Lk Rate (cfm)	Time (min)
0.0070	70.0000
0.0100	105.0000

FIELD DATA

RUN NO.	3	PROBE NO.	VL-4	NOZZLE DIA.	.417
PROJECT NO.	4601	PROBE LENGTH AND TYPE	8 ft Quartz	ASSUMED MOISTURE %	4.4
PLANT	Belden Brick	SAMPLE BOX NO.	012003	METER ΔH@	1.829
DATE	11/10/93	METER BOX NO.	N-13	METER CORRECTION	1.016
SAMPLING LOCATION	Brick Kiln Stack	TEMP. CONTROLLER NO.	N-13	PITOT NO.	S-12
SAMPLE TYPE	PH-3	TEMP. METER NO.	N-13	PITOT COEFFICIENT	.8159
OPERATOR	Edwards	THERMOCOUPLE I.D. NO.	96-2	BAROMETRIC PRESSURE	29.26
FILTER NO.		UMBILICAL CORD I.D. NO.	N-125-4	SITE TO BARO. ELEVATION (ft.)	
RECORD DATA EVERY	7 MIN.	UMBILICAL CORD I.D. NO.		CORRECTED B.P. (0.1 in./100 ft.)	
UMBILICAL/SAMPLER HOOKUP	UH-33	NOZZLE NO.	PHCL-1	STATIC PRESSURE	-0.12



SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)	1538	1955				
PASS/FAIL		PASS				

PITOT LEAK CHECK ≥ 3" H_2O

	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)						
PASS/FAIL						

SAMPLE TRAIN LEAK CHECKS

	INITIAL	FINAL	INITIAL	FINAL	INITIAL
TIME (24 hr)	1534	1955			
VACUUM, in. Hg	≥15"	7/12	≥15"		≥15"
CFM	.005	.006			
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

SAMPLE TRAIN LEAK CHECKS

	FINAL	INITIAL	FINAL	INITIAL	FINAL
TIME (24 hr)					
VACUUM, in. Hg		≥15"		≥15"	
CFM					
VOLUMES					
FINAL					
INITIAL					
DIFFERENCE					

INITIAL VOLUME	395.400
FINAL VOLUME	499.517
LEAK CHECK VOLUME	0
ADJUSTED FINAL VOLUME	499.517

A 191

RUN NO. PH-3
DATE 11/10/93

SAMPLING LOCATION Kiln Stack
PROJECT NO. 4601

p. 1 of
OPERATOR Edwards

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr.)	GAS METER READING (V_m), ft³ INITIAL 395.400 DESIRED	GAS METER READING (V_m), ft³ ACTUAL	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMP. (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VAC., in. Hg	IMPINGER TEMP., °F	SAMPLE BOX TEMP., °F	PROBE TEMP., °F	FILTER TEMP., °F		
B 1	7	1600	401.13	401.08	0.125	2.14	2.14	442	78	78	9.0	47	314	259	331		
B 2	14	1609	406.98	406.98	0.130	2.23	2.25	443	81	78	10.0	49	313	258	330		
B 3	21	1618 ~~1614~~	412.40	412.96	~~0.140~~	1.90	2.00	444	88	79	10.0	48	320	256	326		
B 4	28	1625 ~~1621~~	416.24	416.80	0.055	0.95	0.90	439	86	81	6.0	53	320	254	342		
B 5	35	1632 ~~1628~~	419.52	420.090	0.040	0.69	0.65	439	87	81	5.0	53	323	254	346		
	0	1639															
D 1	7	1646 ~~1634~~	424.97	425.11	0.110	1.92	1.90	433	84	81	8.0	48	333	259	358		
D 2	14	1653 ~~1646~~	430.66	430.60	0.120	2.09	2.05	441	89	82	9.0	49	325	257	343		
D 3	21	~~1661~~ 1700	435.61	435.59	0.090	1.57	1.57	440	93	83	7.0	47	321	255	343		
D 4	28	1707	438.91	438.97	0.040	0.70	0.70	442	94	84	5.0	46	318	254	347		
D 5	35	1714	441.77	441.778	0.030	0.52	0.50	441	92	84	4.0	46	327	253	359		
		1739		441.900													
C 1	7	1744	443.55	443.51	0.010	0.17	0.17	433	86	85	3.0	48	324	258	347		
C 2	14	1751	445.20	445.18	0.010	0.17	0.18	436	86	85	3.0	46	319	257	353		
C 3	21	1758	447.52	447.54	0.020	0.34	0.35	441	87	85	4.0	45	325	255	361		
C 4	28	1805	451.55	451.28	0.06	1.04	1.05	446	89	86	8.0	43	330	257	358		
C 5	35	1812	457.50	456.370	0.130	2.26	2.26	448	93	87	11.0	44	329	256	351		
		1829															
A 1	7	1836	460.11	459.52	0.025	0.43	0.43	439	88	87	4.0	39	327	253	362		
A 2	14	1843	464.48	464.40	0.070	1.23	1.23	437	89	87	7.0	39	328	259	363		
A 3	21	1850	469.97	469.98	0.110	1.93	1.95	443	93	88	9.0	41	324	260	357		
A 4	28	1857	476.41	476.47	0.150	2.64	2.65	442	94	87	11.5	43	314	256	348		
A 5	35	1904	480.82	481.415	0.070	1.23	1.25	442	99	89	6.0	43	318	260	344		
		1912															
E 1	7	1919 ~~1912~~	482.48	482.95	0.010	0.17	0.15	439	91	88	3.0	40	321	253	354		
2	14	1926	485.38	485.39	0.030	0.54	0.54	416	90	88	4.0	39	319	253	356		
3	21	1933	489.09	489.10	0.050	0.88	0.88	439	91	88	5.5	39	323	256	359		
4	28	1940	494.32	494.23	0.100	1.75	1.75	441	91	88	8.0	40	325	260	358		

COMMENTS A) - SHUTdown at 1609, Restart 1613

~~Ap = 0.055 AT B5~~
Ap = 0.110 AT B5

A 192

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2 , AND HF TRAIN (MM5PH)

FIELD LABORATORY SETUP DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 3 Sampling Train No. PH-2 Sample Box No. 012003
Set up person(s): J. McC / J. Sum Date 11-10-93
Transfer to Sampler: Sample Box Leak Check: _____ cfm @ _____ in.Hg vacuum

Relinquished By J M C Received By _____ Date/Time 11-10-93 1400

TRAIN COMPONENT	COMPONENT NO.	LOADING DATA	Initial Weights (grams)** Empty	Loaded
Sampling Nozzle (Quartz)	•			
Probe (Liner-Glass)	•			
Female Probe Blank-off				
90° Bypass	*	Filter Type:		
Filter Holder Front	—	Whatman QM-A		
Filter Holder Back	—	Filter I.D.No.:		
Short 90° Connector		LF9		
1st Impinger				
(Short-stem Mod-GBS)		50 mLs	488.0	538.0
U-Connector (A)		0.1 N H_2SO_4		
2nd Impinger (GBS)		100 mLs	472.2	572.2
U-Connector (B)		0.1 N H_2SO_4		
3rd Impinger (GBS)		100 mLs	477.6	577.4
U-Connector (C)		0.1 N H_2SO_4		
4th Impinger (Mod-GBS)		Empty	470.1	
U-Connector (D)				
5th Impinger (Mod-GBS)		100 mLs	457.6	558.6
U-Connector (E)		0.1 N NaOH		
6th Impinger (Mod-GBS)		100 mLs	477.7	578.4
U-Connector (F)		0.1 N NaOH		
7th Impinger (Mod-GBS)		~200 g indicating		742.3
Impinger Outlet Connector		silica gel		

• Nozzle openings covered with parafilm, and nozzle placed in ziplock bag before and after sampling. Probe liner outlet sealed with glass female blank-off, and probe liner inlet sealed with Teflon tape and Swagelok cap before and after sampling. Sample box inlet covered (not sealed) with aluminum foil before and after sampling.

** Initial weights of additional components exchanged during the run also entered here. All exchange component openings covered with parafilm.

Component Changes After Setup And Before Recovery And Other Comments:

MODIFIED METHODS 5/26A/0050 - PARTICULATES, HCl, Cl_2, AND HF TRAIN (MM5PH)
FIELD LABORATORY SAMPLE RECOVERY DATA

MRI Project No. 4601.01.05
Client/Source: Belden Brick Company
Source Location: Sugar Creek, Ohio
Sampling Location: Kiln Stack No. 3

Run No. 3 Sampling Train No. PH-2 Sample Box No. 012003

TRAIN PURGE WITH ASCARITE-FILTERED AIR

Condensation in front-half? _____ Purged By _____
Date/Start Time _____ Stop Time _____ Purge Rate: (delta H = _____)
Transfer for Recovery: Moisture Removed? _____

Relinquished By _____ Received By J.M.C. Date/Time 11-10-93 2030
Sample box recovery person(s): J.M.C. Date 11-11-93
Probe recovery person(s): _____ Date _____

BACK HALF RECOVERY

Impinger:	1st	2nd	3rd	4th	5th	6th	7th
Final Wt. (g)	545.9	617.9	597.1	475.6	559.9	581.3	762.0
Initial Wt. (g)	538.0	572.2	577.4	470.1	558.6	578.4	742.3
Net Wt. (g)	7.9	45.7	19.7	5.5	1.3	2.9	19.7

[Total Condensate Collected (g): 102.7]

Description and color: _____ _____ _____ _____ _____ _____ 50
Impingers: >>>>>>>>>>>>> 1-3 <<<<<<<< >>>>>>> 4-6 <<<<<<<<<<<<<< % Blue

Sample Number: 3024 3026
Sample Bottle Tare Wt. (g) 262.2 261.9
Sample Bottle Gross Wt. (g) 576.6 465.9 Before Rinses
Components Rinsed*: filter support, filter holder back, short 90° connector, 1st-3rd impingers, U-connectors A-C; 4th-6th impingers, U-connectors D-F
Sample Bottle Gross Wt. (g) 675.0 549.7 After Rinses
Net Sample Wt. (g) 412.8 287.8 For HCl, Cl_2, and HF Computations
Sample Mixed, Then:
Aliquot Sample Number: >>>>>>>>>>> 3025 >>>>>>>>>>> 3027 For Chloride
Sample Bottle Tare Wt. (g) 99.6 99.0
Sample Bottle Final Wt. (g) 549.9 215.0 435.9 ~~214~~ 212.8 After Aliquots
Net Sample Wt. (g) 287.7 115.4 174.0 113.8

FRONT HALF RECOVERY

Sample Number: 3022 3023
Sample Bottle Tare Wt. (g) 173.0
Components Rinsed**: nozzle, probe liner, bypass, filter holder front
Filter Description and Color: light beige
Sample Bottle Gross Wt. (g) 310.9 w/Acetone Rinses
Net Acetone Sample Wt. (g) _____
Sample Bottle Final Wt. (g) _____ w/added Water Rinses
Net Water Sample Wt. (g) 137.9

* ASTM Type I water rinses (2X). Thoroughly mix sample and rinses before aliquoting.
** Acetone rinses with brushing (3X or more) until clean. If any residue remains, follow with ASTM Type I water rinses with brushing.

COMMENTS:

FILE NAME - PHCL3
RUN # - M5HCLKN3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89 .
03-07-1994 10:49:59

Initial Meter Volume (Cubic Feet)=	395.400
Final Meter Volume (Cubic Feet)=	499.517
Meter Factor=	1.016
Final Leak Rate (cu ft/min)=	0.006
Net Meter Volume (Cubic Feet)=	105.783
Gas Volume (Dry Standard Cubic Feet)=	100.101
Barometric Pressure (in Hg)=	29.26
Static Pressure (Inches H20)=	-0.12
Percent Oxygen=	18.0
Percent Carbon Dioxide=	2.0
Moisture Collected (ml)=	105.1
Percent Water=	4.7
Average Meter Temperature (F)=	87
Average Delta H (in H20)=	1.25
Average Delta P (in H20)=	0.072
Average Stack Temperature (F)=	440
Dry Molecular Weight=	29.04
Wet Molecular Weight=	28.52
Average Square Root of Delta P (in H20)=	0.2526
% Isokinetic=	100.5
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	175.0
Nozzle Diameter (Inches)=	0.417
Stack Axis #1 (Inches)=	68.0
Stack Axis #2 (Inches)=	68.0
Rectangular Stack	
Stack Area (Square Feet)=	32.11
Stack Velocity (Actual, Feet/min)=	1,097
Flow Rate (Actual, Cubic ft/min)=	35,241
Flow rate (Standard, Wet, Cubic ft/min)=	20,222
Flow Rate (Standard, Dry, Cubic ft/min)=	19,269

Particulate Loading - Front Half

Particulate Weight (g)=	0.0600	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0092	0.0431	0.0554
Particulate Loading, Actual (gr/cu ft)=	0.0050		
Emission Rate (lb/hr)=	1.52		

No Back Half Analysis

* * METRIC UNITS * *

FILE NAME - PHCL3
RUN # - M5HCLKN3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 10:50:00

Initial Meter Volume (Cubic Meters)=	11.196
Final Meter Volume (Cubic Meters)=	14.144
Meter Factor=	1.016
Final Leak Rate (cu m/min)=	0.0002
Net Meter Volume (Cubic Meters)=	2.995
Gas Volume (Dry Standard Cubic Meters)=	2.834
Barometric Pressure (mm Hg)=	743
Static Pressure (mm H20)=	-3
Percent Oxygen=	18.0
Percent Carbon Dioxide=	2.0
Moisture Collected (ml)=	105.1
Percent Water=	4.7
Average Meter Temperature (C)=	31
Average Delta H (mm H20)=	31.8
Average Delta P (mm H20)=	1.8
Average Stack Temperature (C)=	226
Dry Molecular Weight=	29.04
Wet Molecular Weight=	28.52
Average Square Root of Delta P (mm H20)=	1.2729
% Isokinetic=	100.5
Pitot Coefficient=	0.82
Sampling Time (Minutes)=	175.0
Nozzle Diameter (mm)=	10.59
Stack Axis #1 (Meters)=	1.727
Stack Axis #2 (Meters)=	1.727
Rectangular Stack	
Stack Area (Square Meters)=	2.983
Stack Velocity (Actual, m/min)=	335
Flow rate (Actual, Cubic m/min)=	998
Flow rate (Standard, Wet, Cubic m/min)=	573
Flow rate (Standard, Dry, Cubic m/min)=	546

Particulate Loading - Front Half

Particulate Weight (g)=	0.0600	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (mg/cu m)=	21.2	98.7	126.9
Particulate Loading, Actual (mg/cu m)=	11.6		
Emission Rate (kg/hr)=	0.69		

No Back Half Analysis

FILE NAME - PHCL3
RUN # - M5HCLKN3
LOCATION - KILN
DATE - 11-10-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
03-07-1994 10:50:01

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.125	2.14	442	78	78
2	0.130	2.25	443	81	78
3	0.110	2.00	444	88	79
4	0.055	0.90	439	86	81
5	0.040	0.65	439	87	81
6	0.110	1.90	433	84	81
7	0.120	2.05	441	89	82
8	0.090	1.57	440	93	83
9	0.040	0.70	442	94	84
10	0.030	0.50	441	92	84
11	0.010	0.17	433	86	85
12	0.010	0.18	436	86	85
13	0.020	0.35	441	87	85
14	0.060	1.05	446	89	86
15	0.130	2.26	448	93	87
16	0.025	0.43	439	88	87
17	0.070	1.23	437	89	87
18	0.110	1.95	443	93	88
19	0.150	2.65	442	97	87
20	0.070	1.25	442	99	89
21	0.010	0.15	439	91	88
22	0.030	0.54	416	90	88
23	0.050	0.88	439	91	88
24	0.100	1.75	441	91	88
25	0.100	1.77	444	99	88

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.0873	1.0844	0.0002	0.0027

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	110.8962	110.8388	189.0	0.0573
IMPINGERS	0.0000	0.0000	0.0	0.0000

Probe Rinse Blank (mg/ml)= 0.0007
Impinger Blank (mg/ml)= 0.0000

A 198

A.3 DRYER FIELD DATA FORMS

A 200

A.3.1 Dryer Organic Gases

A 202

RUN 1 Dryer		RUN 2 Dryer		RUN 3 Dryer	
Time	THC (ppm)	Time	THC (ppm)	Time	THC (ppm)
1035	64.6	1311	84.3	1527	89.1
1036	66.0	1312	84.9	1528	89.6
1037	67.1	1313	85.2	1529	89.8
1038	68.1	1314	85.2	1530	89.2
1039	67.7	1315	86.8	1531	90.8
1040	67.6	1316	86.5	1532	91.4
1041	68.1	1317	86.2	1533	88.8
1042	68.7	1318	84.8	1534	87.9
1043	68.6	1319	85.1	1535	88.6
1044	68.8	1320	85.3	1536	89.9
1045	69.5	1321	84.1	1537	90.3
1046	70.6	1322	84.5	1538	91.4
1047	71.0	1323	84.3	1539	90.4
1048	71.4	1324	85.0	1540	89.8
1049	71.5	1325	85.7	1541	89.1
1050	72.7	1326	86.1	1542	90.8
1051	73.8	1327	84.7	1543	92.4
1052	75.2	1328	84.8	1544	90.6
1053	74.3	1329	84.2	1545	89.1
1054	73.5	1330	84.4	1546	87.7
1055	72.1	1331	84.7	1547	88.8
1056	71.1	1332	85.0	1548	88.4
1057	70.3	1333	84.2	1549	88.7
1058	68.9	1334	86.5	1550	88.9
1059	67.1	1335	86.4	1551	88.4
1100	67.5	1336	85.4	1552	88.1
1101	66.7	1337	85.4	1553	89.3
1102	65.6	1338	85.5	1554	89.2
1103	64.6	1339	84.7	1555	88.9
1104	64.7	1340	86.4	1556	88.9
1105	64.0	1341	87.3	1557	88.8
1106	63.4	1342	86.6	1558	89.7
1107	63.0	1343	85.8	1559	90.8
1108	62.7	1344	84.3	1600	91.2
1109	61.8	1345	86.5	1601	91.5
1110	62.7	1346	86.7	1602	91.6
1111	61.4	1347	83.3	1603	91.4
1112	60.6	1348	78.8	1604	90.8
1113	60.0	1349	80.6	1605	90.8
1114	59.7	1350	85.7	1606	91.2
1115	59.3	1351	78.3	1607	91.0
1116	59.5	1352	66.6	1608	89.6

1117	59.1	1353	63.8	1609	90.8
1118	59.4	1354	67.9	1610	91.4
1119	59.5	1355	73.8	1611	66.8
1120	59.4	1356	75.5	1612	61.3
1121	59.1	1357	82.5	1613	72.4
1122	59.1	1358	86.1	1614	86.1
1123	58.7	1359	85.3	1615	84.9
1124	58.7	1400	86.3	1616	90.4
1125	58.4	1401	89.0	1617	91.6
1126	57.9	1402	89.2	1618	92.6
1127	55.6	1403	89.0	1619	92.5
1128	54.4	1404	88.4	1620	92.6
1129	55.6	1405	87.3	1621	93.5
1130	47.4	1406	87.9	1622	93.5
1131	49.4	1407	88.4	1623	93.6
1132	75.7	1408	89.3	1624	93.9
1133	86.8	1409	88.9	1625	93.8
1134	84.1	1410	89.8	1626	94.2
1135	85.0	1411	88.9	1627	94.5
1136	91.5	1412	87.9	1628	94.8
1137	94.1	1413	86.4	1629	94.1
1138	95.0	1414	85.5	1630	94.0
1139	95.3	1415	86.1	1631	94.0
1140	94.8	1416	86.9	1632	93.0
1141	94.2	1417	85.8	1633	93.2
1142	93.8	1418	85.6	1634	93.7
1143	92.6	1419	85.7	1635	93.5
1144	94.9	1420	85.1	1636	93.4
1145	95.2	1421	85.5	1637	93.5
1146	93.9	1422	86.1	1638	93.3
1147	93.8	1423	86.2	1639	93.7
1148	94.2	1424	85.2	1640	93.4
1149	93.7	1425	84.6	1641	93.7
1150	93.0	1426	85.2	1642	93.3
1151	93.2	1427	86.3	1643	92.2
1152	92.6	1428	85.3	1644	93.1
1153	93.9	1429	84.6	1645	93.7
1154	94.2	1430	84.3	1646	93.2
1155	93.4	1431	84.7	1647	94.0
1156	93.4	1432	85.1	1648	93.9
1157	93.5	1433	86.3	1649	94.5
1158	92.7	1434	85.8	1650	93.8
1159	94.2	1435	84.7	1651	93.2
1200	94.1	1436	84.7	1652	93.1
1201	95.1	1437	86.6	1653	93.3

1202	95.1	1438	86.3	1654	94.6
1203	96.5	1439	87.9	1655	95.3
1204	96.8	1440	89.2	1656	94.9
1205	96.5	1441	88.8	1657	95.5
1206	96.8	1442	86.8	1658	94.6
1207	97.1	1443	87.2	1659	94.9
1208	97.4	1444	88.8	1700	94.9
1209	97.0	1445	88.5	1701	95.0
1210	95.9	1446	89.0	1702	95.4
1211	94.3	1447	89.9	1703	94.9
1212	95.0	1448	88.6	1704	94.9
1213	95.7	1449	88.8	1705	95.5
1214	96.4	1450	88.6	1706	95.1
1215	94.9	1451	87.4	1707	95.5
1216	95.8	1452	87.1	1708	96.1
1217	97.2	1453	86.8	1709	95.5
1218	96.6	1454	87.3	1710	95.0
1219	95.0	1455	88.4	1711	94.8
1220	95.9	1456	88.2	1712	94.1
1221	96.2	1457	87.0	1713	94.3
1222	95.3	1458	87.1	1714	94.8
1223	95.6	1459	87.2	1715	96.1
1224	96.7	1500	88.9	1716	96.6
1225	96.6	1501	87.4	1717	95.9
1226	95.7	1502	87.1	1718	95.3
1227	95.9	1503	86.6	1719	95.4
1228	95.8	1504	87.4	1720	96.6
1229	95.8	1505	88.4	1721	96.4
1230	96.0	1506	89.7	1722	95.8
1231	95.0	1507	89.0	1723	96.0
1232	94.2	1508	88.7	1724	95.1
1233	94.3	1509	88.8	1725	94.3
1234	94.0	1510	87.6	1726	96.0
1235	94.0	1511	87.8	1727	96.5
1236	94.0				
Average	80.2		85.6		91.9
Minimum	47.4		63.8		61.3
Maximum	97.4		89.9		96.6

Concentration of Methane and Ethane
determined by GC/FID in Dryer Stack Emissions November 11, 1993

	CONCENTRATION (ppmv)	
TIME	METHANE	ETHANE
1122	104	8.1
1133	123	9.1
1136	116	8.1
1138	120	8.8
1219	141	11
1225	117	10
1316	77	6.5
1319	116	9.2
1322	71	5.2
1358	117	9.2
1402	80	6.1
1405	80	3.9
1445	98	7.0
1448	86	6.5
1713	106	7.6

FILE NAME - DRYERV1
RUN # - DRYERV1
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:54:16

Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	0.00
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (in H20)=	0.655
Average Stack Temperature (F)=	100
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (in H20)=	0.8060
Pitot Coefficient=	0.84
Stack Axis #1 (Inches)=	57.0
Stack Axis #2 (Inches)=	57.0
Circular Stack	
Stack Area (Square Feet)=	17.72
Stack Velocity (Actual, Feet/min)=	2,847
Flow Rate (Actual, Cubic ft/min)=	50,449
Flow rate (Standard, Wet, Cubic ft/min)=	46,325
Flow Rate (Standard, Dry, Cubic ft/min)=	44,361

* * METRIC UNITS * *

Barometric Pressure (mm Hg)=	740.
Static Pressure (mm H20)=	0
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (mm H20)=	16.6
Average Stack Temperature (C)=	38
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (mm H20)=	4.0619
Pitot Coefficient=	0.84
Stack Axis #1 (Meters)=	1.448
Stack Axis #2 (Meters)=	1.448
Circular Stack	
Stack Area (Square Meters)=	1.646
Stack Velocity (Actual, m/min)=	868
Flow rate (Actual, Cubic m/min)=	1,429
Flow rate (Standard, Wet, Cubic m/min)=	1,312
Flow rate (Standard, Dry, Cubic m/min)=	1,256

FILE NAME - DRYERV1
RUN # - DRYERV1
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:54:17

Point #	Delta P (in. H20)	Stack T (F)
1	0.750	98
2	0.710	100
3	0.740	101
4	0.770	101
5	0.750	101
6	0.520	96
7	0.600	99
8	0.660	100
9	0.690	100
10	0.680	101
11	0.620	100
12	0.370	100

FILE NAME - DRYVEL2
RUN # - dryerv2
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:48:28

Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	0.00
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (in H20)=	0.618
Average Stack Temperature (F)=	100
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (in H20)=	0.7719
Pitot Coefficient=	0.84
Stack Axis #1 (Inches)=	57.0
Stack Axis #2 (Inches)=	57.0
Circular Stack	
Stack Area (Square Feet)=	17.72
Stack Velocity (Actual, Feet/min)=	2,726
Flow Rate (Actual, Cubic ft/min)=	48,314
Flow rate (Standard, Wet, Cubic ft/min)=	44,370
Flow Rate (Standard, Dry, Cubic ft/min)=	42,490

* * METRIC UNITS * *

Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	0
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (mm H20)=	15.7
Average Stack Temperature (C)=	38
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (mm H20)=	3.8902
Pitot Coefficient=	0.84
Stack Axis #1 (Meters)=	1.448
Stack Axis #2 (Meters)=	1.448
Circular Stack	
Stack Area (Square Meters)=	1.646
Stack Velocity (Actual, m/min)=	831
Flow rate (Actual, Cubic m/min)=	1,368
Flow rate (Standard, Wet, Cubic m/min)=	1,256
Flow rate (Standard, Dry, Cubic m/min)=	1,203

FILE NAME - DRYVEL2
RUN # - dryerv2
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:48:29

Point #	Delta P (in. H20)	Stack T (F)
1	0.780	98
2	0.760	100
3	0.780	101
4	0.840	101
5	0.720	101
6	0.420	96
7	0.710	99
8	0.740	100
9	0.690	100
10	0.490	101
11	0.320	100
12	0.170	99

FILE NAME - DRYVEL3
RUN # - dryerv3
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:58:05

Barometric Pressure (in Hg)=	29.13
Static Pressure (Inches H20)=	0.00
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (in H20)=	0.642
Average Stack Temperature (F)=	100
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (in H20)=	0.7910
Pitot Coefficient=	0.84
Stack Axis #1 (Inches)=	57.0
Stack Axis #2 (Inches)=	57.0
Circular Stack	
Stack Area (Square Feet)=	17.72
Stack Velocity (Actual, Feet/min)=	2,794
Flow Rate (Actual, Cubic ft/min)=	49,502
Flow rate (Standard, Wet, Cubic ft/min)=	45,476
Flow Rate (Standard, Dry, Cubic ft/min)=	43,548

* * METRIC UNITS * *

Barometric Pressure (mm Hg)=	740
Static Pressure (mm H20)=	0
Percent Oxygen=	17.6
Percent Carbon Dioxide=	2.2
Percent Water=	4.2
Average Delta P (mm H20)=	16.3
Average Stack Temperature (C)=	38
Dry Molecular Weight=	29.06
Wet Molecular Weight=	28.59
Average Square Root of Delta P (mm H20)=	3.9866
Pitot Coefficient=	0.84
Stack Axis #1 (Meters)=	1.448
Stack Axis #2 (Meters)=	1.448
Circular Stack	
Stack Area (Square Meters)=	1.646
Stack Velocity (Actual, m/min)=	851
Flow rate (Actual, Cubic m/min)=	1,402
Flow rate (Standard, Wet, Cubic m/min)=	1,288
Flow rate (Standard, Dry, Cubic m/min)=	1,233

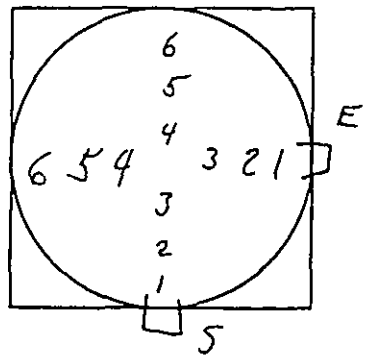
FILE NAME - DRYVEL3
RUN # - dryerv3
LOCATION - dryer
DATE - 11-11-93
PROJECT # - 4601.01.05.01

PROG.=VER 06/09/89
02-13-1995 13:58:06

Point #	Delta P (in. H20)	Stack T (F)
1	0.820	99
2	0.740	100
3	0.740	100
4	0.810	100
5	0.750	99
6	0.440	98
7	0.720	100
8	0.760	100
9	0.720	100
10	0.580	100
11	0.380	99
12	0.240	99

VELOCITY TRAVERSE DATA

Project No. 4601-01-05-01
Run No. Traverse #1 Date 11/11/93
Plant Belden Brick
Sampling Location Dryer Stack
Operator(s) Edwards and Neil
Barometric Pressure, in. Hg
Site to Barometer Elevation ft.
Corrected Barometric Pressure
Pitot No. Pitot Cp .84
T/C No. Temp. Meter No.
Stack Area, sq.ft.
Static Pressure, in. H_2O
Assumed Moisture, %
Assumed $\%CO_2$ Assumed $\%O_2$
Initial Pitot Leak Check Pass
Final Pitot Leak Check Pass
Comments:



Traverse Point Layout

Start Time 1012 End Time 1020

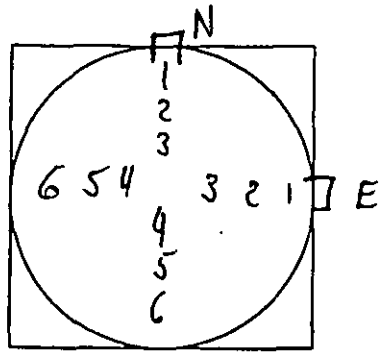
TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	
E1	0.75			
E2	0.71			
E3	0.74			
E4	0.77			
E5	0.75			
E6	0.52			
S1	~~0.39~~.60			
S2	~~0.68~~.66			
S3	~~0.68~~.69			
S4	~~0.68~~.68			
S5	0.62			
S6	0.37			

TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	

93-3 SEV sur frm 020393

VELOCITY TRAVERSE DATA

Project No. 4601-01-05-01
Run No. Traverse #2 Date 11/11/93
Plant Belden Brick
Sampling Location Dryer Stack
Operator(s) Edwards + Neil
Barometric Pressure, in. Hg
Site to Barometer Elevation ft.
Corrected Barometric Pressure
Pitot No. M5 Pitot Cp .84
T/C No. 48-10 Temp. Meter No.
Stack Area, sq.ft.
Static Pressure, in. H_2O
Assumed Moisture, %
Assumed $\%CO_2$ Assumed $\%O_2$
Initial Pitot Leak Check PASS
Final Pitot Leak Check PASS
Comments:



Traverse Point Layout

Start Time End Time

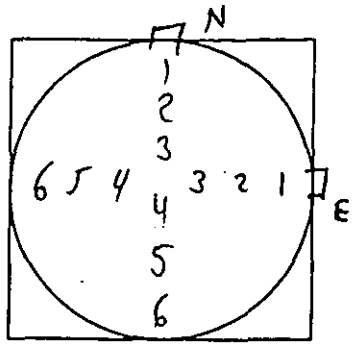
TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	
E 1	0.78	98		
2	0.76	100		
3	0.78	101		
4	0.84	101		
5	0.72	101		
6	0.42	96		

TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	
N 1	0.71	99		
2	0.74	100		
3	0.69	100		
4	0.49	101		
5	0.32	100		
6	0.17	99		

93-3 SEV sur frm 023393

VELOCITY TRAVERSE DATA

Project No. 4601-01-05-01
Run No. Traverse #3 Date 11/11/93
Plant Belden Brick
Sampling Location Dryer Stack
Operator(s) Edwards + Neil
Barometric Pressure, in. Hg 29.126
Site to Barometer Elevation — ft.
Corrected Barometric Pressure —
Pitot No. M5 Pitot Cp .84
T/C No. 48-10 Temp. Meter No.
Stack Area, sq.ft.
Static Pressure, in. H_2O
Assumed Moisture, %
Assumed $\%CO_2$ Assumed $\%O_2$
Initial Pitot Leak Check PASS
Final Pitot Leak Check PASS
Comments:



Traverse Point Layout

Start Time End Time

TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	
E 1	0.82	99		
2	0.74	100		
3	0.74	100		
4	0.81	100		
5	0.75	99		
6	0.44	98		

TRAVERSE POINT NUMBER	VELOCITY HEAD, Δp in. H_2O	STACK TEMP. °F	ROTATION ANGLE α	
N 1	0.72	100		
2	0.76	100		
3	0.72	100		
4	0.58	100		
5	0.38	99		
6	0.24	99		

93-3 SEV sur frm 020393

DRYER—TOTAL HYDROCARBON

Calibration Error Check

Cal. gas value	Measured value	% Error	Pass/Fail
90.20	90.2	0	Pass
51.3	50.8	1.0	Pass
29.5	29.1	1.4	Pass
0	0	0	Pass

Bias Check

Cal. gas value	Measured value	% Error	Pass/Fail
51.3	51.1	0.4	Pass

Percent Drift

Initial		Final	% Error	Pass/Fail
		Run 1		
Span	90.20	91.32	1.2	Pass
Zero	0	0.6	0.7	Pass
		Run 2		
Span	91.32	91.12	0.2	Pass
Zero	0.6	0.4	0.2	Pass
		Run 3		
Span	91.12	91.24	0.1	Pass
Zero	0.4	0.8	0.4	Pass

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4601-01-05-01 RUN NO. N/A
SAMPLE NO. Ambient Check DATE 11/9/93
PLANT SAMPLING LOCATION Belden Brick Testing Trailer
ANALYSIS TIME (24hr-CLOCK) 1935
SAMPLE TYPE (BAG, GRAB) Grab
OPERATOR Edwards

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE —0— CHANGE IN 4 MIN.
PIPETTES —0— CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE —0— CHANGE IN 4 MIN.
PIPETTES —0— CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 0.0 2 0.0 3 0.0	0.0	1 0.0 2 0.0 3 0.0	0.0	1 0.0 2 0.0 3 0.0	0.0	0.0
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 20.8 2 20.8 3 20.8	20.8	1 20.8 2 20.8 3 20.8	20.8	1 20.8 2 20.8 3 20.8	20.8	20.8

91-16 SEV SURMAN wksh 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

Sample consists of ambient air sucked within the testing trailer as a Quality check of the Hays Republic ORSAT device.

A 217

DATA LOGGER RECORDS

Act Analytical
Notations are
A. Neilich
11/28/94

Dryer

```
Filename:RUN1
Name:RUN1
Date:11-11-1993
Location:BELDON BRICK
Project #:4601-01-05-01
Operator:BG
            0
          THC
07:51:2   24.90
07:51:3   24.91
07:51:4   24.90
07:51:5   24.90
07:52:0   24.90
07:52:1   24.89
07:52:1 INIT. ZERO
 0  THC  24.89
08:14:4   57.01
08:14:5   57.05
08:15:0   57.16
08:15:1   57.05
08:15:1 INIT. SPAN
 0  THC  57.05     90.20
08:16     46.96
08:16      61.9
08:17     43.00
08:17      50.8
LINEARITY CHECK PROPANE 50.3 PPM--BG [11-11-1993 -- 08:17:28]
08:18     43.00
08:18      50.8
08:19     43.00
08:19      50.8
THC PASSED AT 50.8 PPM--BG [11-11-1993 -- 08:19:09]
LINEARITY CHECK 29.5 PPM PROPANE--BG [11-11-1993 -- 08:19:44]
08:20     38.95
08:20      39.4
08:21     35.28
08:21      29.1
08:22     35.27
08:22      29.1
08:23     35.27
08:23      29.1
THC PASSED AT 29.1 PPM--BG [11-11-1993 -- 08:23:39]
08:24     34.78
08:24      27.7
08:25     25.00
08:25       0.3
08:26     24.86
08:26      -0.1
08:27     24.84
08:27      -0.1
```

Zero reading RMN 11/28/94

Span reading RMN 11/28/94

Cylinder No. ~~SA5969~~ 5736 RMN (90.2ppm)

Cylinder No. SA8784 (51.3ppm)
(51.3 value correctly used during calculation of calibration error)

Cylinder No. SA 6981 (29.5ppm)

08:28	-0.1
08:29	24.83
08:29	-0.2
08:30	24.81
08:30	-0.2
08:31	24.82
08:31	-0.2
08:32	24.80
08:32	-0.3
08:33	24.82
08:33	-0.2
08:34	24.81
08:34	-0.2
10:26	66.95
10:26	118.0
10:27	55.40
10:27	35.6

10:28	49.11
10:28	67.9
10:29	47.72
10:29	64.0
10:30	46.85
10:30	61.6
10:31	46.32
10:31	60.1
10:32	46.59
10:32	50.9
10:33	47.15
10:33	62.4
10:34	47.67
10:34	63.9
10:35	48.32
10:35	65.7

BEGIN RUN 1--BG [11-11-1993 -- 10:35:56]

Dryer Run 1

10:36	48.82	— Data Logger Reading
10:36	67.1	— ppm
10:37	49.20	
10:37	68.2	
10:38	49.57	
10:38	69.2	
10:39	49.43	
10:39	68.8	
10:40	49.39	
10:40	68.7	
10:41	49.58	
10:41	69.2	
10:42	49.77	
10:42	69.8	
10:43	49.76	
10:43	69.8	

10:44	[illegible]
10:45	50.05
10:45	70.6
10:46	50.45
10:46	[illegible]
10:48	[illegible]
10:49	50.77
10:49	72.8
10:50	51.21
10:50	73.8
10:51	51.53
10:51	74.9
10:52	52.07
10:52	76.2
10:53	51.78
10:53	75.4
10:54	51.48
10:54	74.6
10:55	50.98
10:55	73.2
10:56	50.65
10:56	72.2
10:57	50.35
10:57	71.4
10:58	49.86
10:58	70.0
10:59	49.20
10:59	68.2
11:00	49.35
11:00	68.6
11:01	49.08
11:01	67.8
11:02	48.68
11:02	66.7
11:03	48.33
11:03	65.8
11:04	48.35
11:04	65.8
11:05	48.12
11:05	65.1
11:06	47.89
11:06	64.5
11:07	47.77
11:07	64.2
11:08	47.64
11:08	63.8
11:09	47.34
11:09	63.0
11:10	47.64
11:10	63.8
11:11	47.20

11:12	[illegible]
11:13	46.63
11:13	61.1
11:14	46.60
11:14	60.9
11:15	46.45
11:15	60.5
11:16	46.52
11:16	60.7
11:17	46.37
11:17	60.2
11:18	46.47
11:18	60.5
11:19	46.53
11:19	60.7
11:20	46.47
11:20	60.5
11:21	46.38
11:21	60.3
11:22	46.39
11:22	60.3
11:23	46.22
11:23	59.8
11:24	46.23
11:24	59.9
11:25	46.14
11:25	59.6
11:26	45.95
11:26	59.1
11:27	45.14
11:27	56.8
11:28	44.72
11:28	55.6
11:29	45.14
11:29	56.8
11:30	42.24
11:30	48.7
11:31	42.92
11:31	50.6
11:32	52.25
11:32	76.7
11:33	56.19
11:33	87.8
11:34	55.26
11:34	85.2
11:35	55.56
11:35	86.0
[illegible]	[illegible]

[illegible]	53.79
11:37	95.1
11:38	59.11
[illegible]	[illegible]
[illegible]	[illegible]
11:44	59.08
11:44	95.9
11:45	59.17
11:45	96.2
11:46	58.72
11:46	94.9
11:47	58.70
11:47	94.8
11:48	58.81
11:48	95.1
11:49	58.63
11:49	94.6
11:50	58.41
11:50	94.0
11:51	58.46
11:51	94.1
11:52	58.27
11:52	93.6
11:53	58.72
11:53	94.9
11:54	58.84
11:54	95.2
11:55	58.53
11:55	94.4
11:56	58.55
11:56	94.4
11:57	58.57
11:57	94.5
11:58	58.28
11:58	93.6
11:59	58.83
11:59	95.2
12:00	58.78
12:00	95.1
12:01	59.14
12:01	96.1
12:02	59.15
12:02	96.1
12:03	59.64
12:03	97.5
12:04	59.73
12:04	97.7
12:05	59.64
12:05	97.5
12:06	59.75

12:07	59.34
12:07	98.0
12:08	59.97
12:08	98.4
12:09	59.33
12:09	98.0
12:10	59.44
12:10	96.9
12:11	53.87
12:11	95.3
12:12	59.12
12:12	96.0
12:13	59.34
12:13	96.6
12:14	59.62
12:14	97.4
12:15	59.07
12:15	95.9
12:16	59.38
12:16	96.7
12:17	59.83
12:17	98.1
12:18	59.68
12:18	97.6
12:19	59.11
12:19	96.0
12:20	59.43
12:20	59.50

12:23	59.31
12:23	96.5
12:24	59.71
12:24	97.7
12:25	59.68
12:25	97.6
12:26	59.37
12:26	96.7
12:27	59.42
12:27	96.3
12:28	59.39
12:28	96.8
12:29	59.39
12:29	96.8
12:30	59.43
12:30	97.0
12:31	59.12
12:31	96.0
12:32	58.82
[illegible]	[illegible]

12:33 95.2

12:34 58.75
12:34 95.0

[illegible]UN [illegible][11-11-1993 -- 12:37:39] End Run 1

12:40 43.05
12:40 50.9
12:41:0 25.44
12:41:1 25.47
12:41:2 25.42
12:41:3 24.87
12:41:4 24.71
12:41:5 24.66
12:42:0 24.64
12:42:1 24.61
12:42:2 24.76
12:42:3 25.60
12:42:4 25.86
12:42:5 25.95
12:42:5FINAL ZERO
0 THC 25.95
12:46:0 58.55
12:46:1 58.63
12:46:2 58.50
12:46:3 58.51

12:46:4 58.67
12:46:5 58.55
12:47:0 57.76
12:47:0FINAL SPAN
0 THC 57.76 90.20

Filename:RUN2

Name:RUN2

[illegible]NOBROCK01

13:11	55.59
13:11	84.0

BEGIN RUN 2--BG [11-11-1993 -- 13:11:13]

Run 2 dryer

13:12	55.80
13:12	84.6
13:13	55.91
13:13	84.9
13:14	55.93
13:14	85.0
13:15	56.46
13:15	86.5
13:16	56.39
13:16	86.3
13:17	56.28
13:17	86.0
13:18	55.78
13:18	84.6
13:19	55.88
13:19	84.9
13:20	55.94
13:20	85.0
13:21	55.55
13:21	83.9
13:22	55.69
13:22	84.3
13:23	55.60
13:23	84.1
13:24	55.85
13:24	84.8
13:25	56.09
13:25	85.4
13:26	56.25
13:26	85.9
13:27	55.73
13:27	84.4

13:29	55.37
13:29	84.0
13:30	55.63
13:30	84.2
13:31	55.75
13:31	84.5
13:32	55.86
13:32	84.8
13:33	55.53
13:33	84.0
13:34	56.37
13:34	86.2
13:35	56.33
13:35	86.1
13:36	55.99
13:36	85.2
13:37	55.99
13:37	85.2
13:38	56.01
13:38	85.2
13:39	55.73
13:39	84.5
13:40	56.35
13:40	86.2
13:41	56.64
13:41	87.0
13:42	56.40
13:42	86.3
13:43	56.13
13:43	85.6
13:44	55.61
13:44	84.1
13:45	56.39
13:45	86.3
13:46	56.44
13:46	86.5
13:47	55.26
13:47	83.1
13:48	53.67
13:48	78.6
13:49	54.31
13:49	80.4
13:50	56.09
13:50	85.5
13:51	53.50
13:51	78.1
13:52	49.44
13:52	66.6
13:53	48.45
13:53	63.8
13:54	49.37
13:54	67.8

13:56	52.55
13:56	75.4
13:57	54.98
13:57	82.3
13:58	56.23
13:58	85.9
13:59	55.96
13:59	85.1
14:00	56.29
14:00	86.0
14:01	57.23
14:01	83.7
14:02	57.31
14:02	88.9
14:03	57.24
14:03	88.7
14:04	57.03
14:04	88.1
14:05	56.64
14:05	87.0
14:06	56.85
14:06	87.6
14:07	57.03
14:07	88.1
14:08	57.35
14:08	89.0
14:09	57.20
14:09	88.6
14:10	57.51
14:10	89.5
14:11	57.22
14:11	88.7
14:12	56.86
14:12	87.7
14:13	56.35
14:13	86.2
14:14	56.01
14:14	85.2
14:15	56.22
14:15	85.8
14:16	56.50
14:16	86.6
14:17	56.14
14:17	85.6
14:18	56.05
14:18	85.4
14:19	56.09
14:19	85.5
14:20	55.89
14:20	84.9
14:21	56.04
14:21	85.3
14:22	56.22
14:22	[illegible]

14:23	86.0
14:24	55.91
14:24	85.0
14:25	55.72
14:25	84.4
14:26	55.91
14:26	85.0
14:27	56.30
14:27	86.1
14:28	55.94
14:28	85.0
14:29	55.72
14:29	84.4
14:30	55.59
14:30	84.0
14:31	55.75
14:31	84.5
14:32	55.89
14:32	84.9
14:33	56.31
14:33	86.1
14:34	56.13
14:34	85.6
14:35	55.73
14:35	84.4
14:36	55.75
14:36	84.5
14:37	56.40
14:37	86.3
14:38	56.32
14:38	86.1
14:39	56.85
14:39	87.6
14:40	57.30
14:40	88.9
14:41	57.19
14:41	88.6
14:42	56.49
14:42	86.6
14:43	56.60
14:43	86.9
14:44	57.16
14:44	88.5
14:45	57.07
14:45	88.2
14:46	57.26
14:46	88.8
14:47	57.56
14:47	89.6
14:48	57.10
14:48	88.3
14:49	57.19
14:49	88.6

14:50		
14:51	56.70	
14:51	87.2	
14:52	56.58	
14:52	86.8	
14:53	56.47	
14:53	86.5	
14:54	56.64	
14:54	87.0	
14:55	57.05	
14:55	88.2	
14:56	56.96	
14:56	87.9	
14:57	56.55	
14:57	86.8	
14:58	56.58	
14:58	86.9	
14:59	56.62	
14:59	87.0	
15:00	57.20	
15:00	88.6	
15:01	56.67	
15:01	87.1	
15:02	56.57	
15:02	86.8	
15:03	56.40	
15:03	86.3	
15:04	56.69	
15:04	87.2	
15:05	57.03	
15:05	88.1	
15:06	57.48	
15:06	89.4	
15:07	57.25	
15:07	88.7	
15:08	57.14	
15:08	88.4	
15:09	57.18	
15:09	88.6	
15:10	56.74	
15:10	87.3	
15:11	56.83	
15:11	87.6	END RUN #2 - dryer
15:12	57.12	
15:12	88.4	
15:13	56.65	
15:13	87.0	
15:14	57.00	
15:14	88.0	
15:15	57.37	
15:15	89.1	
15:16	57.57	
15:16	89.7	
15:17	57.10	

[illegible]	88.1	
15:19	56.74	
15:19	87.3	
15:20	57.20	
15:20	88.6	
15:21	57.59	
15:21	89.7	
15:22	57.89	
15:22	90.6	
15:23	57.77	
15:23	90.2	
15:24	57.32	
15:24	88.9	
15:25	56.77	
15:25	87.4	
15:26	56.91	
15:26	87.8	
15:27	57.28	Begin Run 3 — Dryer
15:27	88.3	
15:28	57.45	
15:28	89.3	
15:29	57.53	
15:29	89.5	
15:30	57.30	
15:30	88.9	
15:31	57.88	
15:31	90.5	
15:32	58.09	
15:32	91.1	
15:33	57.17	
15:33	88.5	
15:34	56.85	
15:34	87.6	
15:35	57.10	
15:35	88.3	
15:36	57.57	
15:36	89.7	
15:37	57.70	
15:37	90.0	
15:38	58.07	
15:38	91.1	
15:39	57.73	
15:39	90.1	
15:40	57.51	
15:40	89.5	
15:41	57.27	
15:41	88.8	
15:42	57.88	
15:42	90.5	
15:43	58.44	
15:43	92.1	
15:44	57.80	

15:45	57.27
15:45	88.8
15:46	56.79
15:46	87.4
15:47	57.18
15:47	88.6
15:48	57.02
15:48	88.1
15:49	57.15
15:49	88.5
15:50	57.22
15:50	88.7
15:51	57.03
15:51	88.1
15:52	56.93
15:52	87.8
15:53	57.36
15:53	89.1
15:54	57.31
15:54	88.9
15:55	57.21
15:55	88.6
15:56	57.21
15:56	88.6
15:57	57.19
15:57	88.6
15:58	57.49
15:58	89.4
15:59	57.89
15:59	90.6
16:00	58.03
16:00	90.9
16:01	58.13
16:01	91.3
16:02	58.14
16:02	91.3
16:03	58.09
16:03	91.1
16:04	57.86
16:04	90.5
16:05	57.88
16:05	90.5
16:06	58.03
16:06	91.0
16:07	57.95
16:07	90.7
16:08	57.46
16:08	89.4
16:09	57.86
16:09	90.5
16:10	58.10
16:10	91.2
16:11	49.51
16:11	66.8

16:12	61.4
16:13	51.46
16:13	72.3
16:14	56.23
16:14	85.9
16:15	55.83
16:15	84.7
16:16	57.74
16:16	90.1
16:17	58.16
16:17	91.3
16:18	58.49
16:18	92.3
16:19	58.48
16:19	92.2
16:20	58.49
16:20	92.3
16:21	58.81
16:21	93.2
16:22	58.82
16:22	93.2
16:23	58.84
16:23	93.3
16:24	58.94
16:24	93.5
16:25	58.93
16:25	93.5
16:26	59.06
16:26	93.9
16:27	59.15
16:27	94.1
16:28	59.26
16:28	94.4
16:29	59.01
16:29	93.7
16:30	58.99
16:30	93.7
16:31	58.98
16:31	93.6
16:32	58.64
16:32	92.7
16:33	58.70
16:33	92.8
16:34	58.88
16:34	93.4
16:35	58.81
16:35	93.2
16:36	58.77
16:36	93.1
16:37	58.81
16:37	93.2
16:38	58.75
16:38	93.0

16:40	58.77
16:40	93.1
16:41	58.89
16:41	93.4
16:42	58.73
16:42	92.9
16:43	58.37
16:43	91.9
16:44	58.68
16:44	92.8
16:45	58.89
16:45	93.4
16:46	58.70
16:46	92.8
16:47	58.98
16:47	93.7
16:48	58.96
16:48	93.6
16:49	59.15
16:49	94.1
16:50	58.92
16:50	93.5
16:51	58.70
16:51	92.9
16:52	58.69
16:52	92.8
16:53	58.73
16:53	92.9
16:54	59.20
16:54	94.3
16:55	59.44
16:55	95.0
16:56	59.29
16:56	94.5
16:57	59.53
16:57	95.2
16:58	59.21
16:58	94.3
16:59	59.29
16:59	94.5
17:00	59.30
17:00	94.6
17:01	59.34
17:01	94.7
17:02	59.49
17:02	95.1
17:03	59.29
17:03	94.5
17:04	59.30
17:04	94.6
17:05	59.51
17:05	95.2

17:07	59.51
17:07	95.1
17:08	59.71
17:08	95.7
17:09	59.53
17:09	95.2
17:10	59.33
17:10	94.7
17:11	59.28
17:11	94.5
17:12	59.04
17:12	93.8
17:13	59.08
17:13	93.9
17:14	59.27
17:14	94.5
17:15	59.71
17:15	95.7
17:16	59.90
17:16	96.3
17:17	59.65
17:17	95.5
17:18	59.44
17:18	95.0
17:19	59.48
17:19	95.1
17:20	59.90
17:20	96.3
17:21	59.83
17:21	96.0
17:22	59.63
17:22	95.5
17:23	59.68
17:23	95.6
17:24	59.38
17:24	94.8
17:25	59.08
17:25	93.9
17:26	59.70
17:26	95.7
17:27	59.87
17:27	96.2
END RUN 3--BG [11-11-1993 -- 17:27:19]	
17:28	48.33
17:28	64.9
17:30:1	26.43
17:30:2	26.41
17:30:3	26.42
17:30:3FINAL ZERO	
0 THC	26.42
17:32:2	57.74
17:32:3	57.71
17:32:4	57.54
17:32:5	57.57
17:32:5FINAL SPAN	
0 THC	57.[illegible]

— End Run 3, dryer

THC Analyzer

- Linearity check
- Response time check

```
16:30      0.27
16:30      0.04
Filename:prelim
Name:prelim
Date:11-10-1993
Location:SELDON BRICK
Project #:4601-01-05-01
Operator:BG
              0
             THC
16:35:2     0.00
16:35:3     0.00
16:35:4     0.00
16:35:5     0.00
16:36:0     1.20
16:36:1     1.45
16:36:2     2.59
16:36:3     3.71
16:36:4     3.70
16:36:5     3.70
16:36:5 INIT. ZERO
 0  THC    3.70
17:01:4    26.91
17:01:5    26.94
17:02:0    26.93
17:02:1    26.91
17:02:2    26.90
17:02:3    26.90
17:02:4    26.89
17:02:5    26.87
17:03:0    26.88
17:03:0 INIT. ZERO
 0  THC    26.88
17:05:1    65.22
17:05:2    65.16
17:05:3    65.29
17:05:4    65.40
17:05:5    65.20
17:05:5 INIT. SPAN
 0  THC    65.20      90.20
17:07      52.42
17:07      64.9
17:08      43.52
17:08      50.9
17:09      48.52
17:09      50.9
LINEARITY CHECK- PROPANE 51.3 PPM [11-10-1993 -- 17:09:35]
17:10      48.57
17:10      51.1
```

--:10:04]

17:11 44.1

17:12 39.34

17:12 29.3

LINEARITY CHECK 29.5 PPM--BG [11-10-1993 -- 17:12:16]

17:13 39.36

17:13 29.4

CHC PASSED AT 29.5 PPM--BG [11-10-1993 -- 17:13:0-]

17:14 42.03

17:14 35.6

17:15 65.29

17:15 90.4

7:16 65.47

7:16 90.8

7:17 65.49

7:17 90.9

7:18 65.55

7:18 91.0

7:19 65.60

7:19 91.1

7:20 65.59

7:20 91.1

7:21 65.66

7:21 91.3

7:22 65.66

7:22 91.3

7:23 65.64

7:23 91.2

17:24 65.54

17:24 91.0

17:25 39.96

17:25 30.8

17:26 62.89

17:26 84.7

17:27 75.36

17:27 114.1

17:28 74.11

17:28 111.2

BEGIN RISE TIME [11-10-1993 -- 17:28:25]

17:29 64.92

17:29 89.5

END RISE TIME [11-10-1993 -- 17:30:00]

17:30 64.73

17:30 89.1

BEGIN FALL TIME [11-10-1993 -- 17:30:18]

17:31 63.71

17:31 86.7

BIAS CHECK WAS 89.5 PPM--PASS BG [11-10-1993 -- 17:31:01]

17:32 64.25

17:32 88.0

17:33 65.40

17:33 90.7

END FALL TIME [11-10-1993 -- 17:33:07]

17:34 35.39

-A 238

APPENDIX B.

PROCESS OPERATING DATA

PROCESS DATA

THE BELDEN BRICK COMPANY

PLANT # 6

SUGARCREEK, OHIO 44681

FOR MONDAY 11/8/93

THROUGH FRIDAY 11/12/93

PREPARED BY:

JOHN C. JENSEN
ENVIRONMENTAL ENGINEER
THE BELDEN BRICK COMPANY

Filename:
PLT6_EPA

THE BELDEN BRICK COMPANY
SUGARCREEK OHIO
PLANT INFORMATION

DATE:
Tuesday
11/9/93

PLANT NUMBER..... 6

KILN NUMBER..... 3 DRYER TUNNELS #'S...6. 7. & 8 to 1 stack

RAW MATERIAL..... 50% # 4 Shale From Shanesville Pit # 2
50% # 4 Shale From Shanesville Pit # 3

PROCESS WEIGHT	BOTTOM	TOP 4 courses	TOTAL
TYPE OF BRICK.....	503-505	Acid Brick	
KILN SCHEDULE..... (cars/day)	10	10	
BRICK PER CAR.....	2496	976	3472
SIZE BRICK.....	Standard	Standard	
BRICK WEIGHT (lbs)..	4.7462	6.0525	
PROCESS WEIGHT..... (lbs/hr)	4936	2461	
TOTAL PROCESS WEIGHT (Kiln).....			7397

DRYER		Tues	Wed	Thur
Pull Times.....	Dryer # 8	5:50 AM		7:10 AM
	Dryer # 6	8:10 AM	5:30 AM	9:30 AM
	Dryer # 7	10:30 AM	7:50 AM	11:50 AM
	Dryer # 8	12:50 PM	10:10 AM	2:10 PM
	Dryer # 6	3:00 PM	12:30 PM	4:30 PM
	Dryer # 7	5:20 PM	2:50 PM	6:50 PM
	Dryer # 8	7:40 PM	5:10 PM	11:30 PM
	Dryer # 6		7:30 PM	
	Dryer # 7		9:50 PM	
	Dryer # 8			
Exit Temp.....		269	265	274
Inlet Temp (stack).....		95	100	100

KILN # 3	Tues	Wed	Thur
Gas Consumption (24hrs-cu.ft.)	230560	228,000	218,880
Inlet Temp.....	106	124	140
Peak Temp.....	2040	2040	2031
Push Times.....	5:50 AM	5:30 AM	7:10 AM
	8:10 AM	7:50 AM	9:30 AM
	10:30 AM	10:10 AM	11:50 AM
	12:50 AM	12:30 PM	2:10 PM
	3:00 PM	2:50 PM	4:30 PM
	5:20 PM	5:10 PM	6:50 PM
	7:40 PM	7:30 PM	11:30 PM
		9:50 PM	

503-505
Standard
Cored

THE BELDEN BRICK COMPANY
PLANT # 6 SUGARCREEK OHIO
BRICK WEIGHTS (LBS)

DATE:
Monday
11/8/93

	Green Brick B/4 Dryer	Dried Brick B/4 Kiln	Fired Brick
1	5.5492	4.7542	4.4690
2	5.5688	4.7422	4.4632
3	5.6050	4.7488	4.4656
4	5.5778	4.7362	4.4734
5	5.5836	4.7386	4.4718
6	5.5442	4.7264	4.4714
7	5.5628	4.7610	4.4592
8	5.5722	4.7404	4.4508
9	5.5720	4.7410	4.4726
10	5.5906	4.7736	4.4552
Average...	5.5726	4.7462	4.4652

Loss of wgt in dryer..... 0.8264

% Wgt lost..... 14.83%

loss of wgt in kiln..... 0.2810

% Wgt lost..... 5.92%

Acid
Singles
Solids

THE BELDEN BRICK COMPANY
PLANT # 6 SUGARCREEK OHIO
BRICK WEIGHTS (LBS)

DATE:
Monday
11/8/93

	Green Brick B/4 Dryer	Dried Brick B/4 Kiln	Fired Brick
1	7.0544	6.0860	5.6532
2	7.0124	6.0678	5.6586
3	7.0590	6.1132	5.6700
4	6.9950	6.0104	5.6910
5	6.9944	6.0244	5.6818
6	7.1330	6.0384	5.6560
7	7.0484	6.0186	5.7018
8	6.9942	6.0104	5.6506
9	7.0306	6.0858	5.6566
10	7.0132	6.0702	5.6720
Average...	7.0335	6.0525	5.6692

Loss of wgt in dryer..... 0.9809

% Wgt lost..... 13.95%

loss of wgt in kiln..... 0.3834

% Wgt lost..... 6.33%

Filename:
TRK_LOADS.EPA

Ave Load = 25 Ton

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
RECORD OF TRUCKLOADS RECEIVED

DATE:
Tuesday
11/9/93

	SHALE		CLAY		
TIME	S'ville Pit # 2	S'ville Pit # 3	S'ville Pit # 2	Moomaw Pit # 1	Wallick Pit # 6
7:20 AM	X				
7:70 AM					X
8:00 AM	X				
8:15 AM			X		
8:32 AM		X			
9:15 AM					X
9:25 AM	X				
9:40 AM				X	
10:00 AM		X			
10:30 AM	X				X
11:00 AM		X			
11:10 AM			X		
12:15 PM	X				
1:00 PM					X
1:10 PM			X		
1:45 PM			X		
2:00 PM					X
2:20 PM				X	
2:30 PM					X
TOTALS					
LOADS	5	3	4	2	6
TONS	125	75	100	50	150

TOTAL TONS FIRECLAY RECEIVED..... 300

CONDITION
==========
Empty
1/4 Full
1/2 Full
3/4 Full
Full
==========

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
RECORD OF BIN CONDITION

DATE:
Tuesday
11/9/93

COARSE BINS

	SHALE		CLAY		
	S'ville Pit # 2	S'ville Pit # 3	S'ville Pit # 2	Moomaw Pit # 1	Wallick Pit # 6
Beginning of Shift			Full	Full	Full
End of Shift			1/2 Full	Full	1/2 Full

FINES BINS

Beginning of Shift					Empty
End of Shift					3/4 Full

NOTES:

Began grinding at 7:00 AM

Electrical power failure from 7:59 AM till 8:14 AM

Grinding plant worked straight through lunch

Shut down grinding plant at 3:00 PM

Grinding plant operated for 8 hours

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
FIRECLAY SCREENS PRODUCTION

DATE:
Tuesday
11/9/93

Pully RPM.....	37.726
Pully Diameter inches..	16
Belt Width inches.....	20
Belt Speed FPM.....	157
Empty Tub Wgt pounds...	20.25

*Sample should be taken every 15 minutes.
*Sample should be taken for 10 seconds.
*Part of sample should be bagged every 1-1/2 hours.
*Sampling should continue for 4 hours.

TIME	NET WEIGHT	SAMPLED BAGGED (Y/N)	SAMPLE NUMBER
7:52 AM	247.75		
8:29 AM	251.75	* Time extended due to power failure	
8:44 AM	232.25		
8:59 AM	234.75		
9:14 AM	233.75		
9:29 AM	241.75	Yes, time marked on bag	
9:44 AM	236.75		
9:59 AM	244.75		
10:14 AM	237.75		
10:29 AM	251.75		
10:44 AM	241.75		
10:59 AM	237.75	Yes, time marked on bag	
11:14 AM	231.75		
11:29 AM	236.25		
11:44 AM	245.75		
11:59 AM	227.75		
12:14 PM	234.75	Yes, time marked on bag	

Ave Wgt..... 239.34

Ton/Hr..... 43.08

Total tons of fireclay ground (in 8 hours)..... 344.65

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
FIRECLAY DUST COLLECTOR

DATE:
TUESDAY
11/9/93

This represents the weight of dust collected during the above date

Hopper under dust collector should be emptied and cleaned before test begins.

Hopper under dust collector should be emptied and cleaned after test ends. That dust must also be weighed and logged on report.

Empty Weight Hopper # 1 12400

Empty Weight Hopper # 2 12400

HOPPER NUMBER	TIME HOPPER FILLED	GROSS HOPPER WEIGHT	FULL HOPPER WEIGHT
1	10:00 AM	14000	1600
2	1:00 PM	14080	1680
1	3:00 PM	14140	1740
2	3:15 PM	12920	520

Total dust removed from dust collector (lbs)..... 5540

Filename:
TRK_LOADS.EPA

Ave Load = 25 Ton

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
RECORD OF TRUCKLOADS RECEIVED

DATE:
Thursday
11/11/93

	SHALE		CLAY		
TIME	S'ville Pit # 2	S'ville Pit # 3	S'ville Pit # 2	Moomaw Pit # 1	Wallick Pit # 6
7:00 AM		X			
7:20 AM			X		
7:23 AM	X				
8:00 AM			X		
8:05 AM		X			
8:45 AM	X				X
9:33 AM				X	
10:00 AM					X
10:17 AM			X		
10:40 AM					X
10:55 AM			X		
11:25 AM		X			
12:01 PM					X
12:25 PM			X		
1:30 PM			X		
1:45 PM			X		
2:15 PM	X				
2:40 PM					X
TOTALS					
LOADS	3	3	7	1	5
TONS	75	75	175	25	125

TOTAL TONS FIRECLAY RECEIVED..... 325

CONDITION
==========
Empty
1/4 Full
1/2 Full
3/4 Full
Full
==========

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
RECORD OF BIN CONDITION
==========

DATE:
Thursday
11/11/93
==========

COARSE BINS

	SHALE		CLAY		
	S'ville Pit # 2	S'ville Pit # 3	S'ville Pit # 2	Moomaw Pit # 1	Wallick Pit # 6
Beginning of Shift			1/2 Full	Full	3/4 Full
End of Shift			1/2 Full	1/2 Full	3/4 Full

FINES BINS

Beginning of Shift					3/4 Full
End of Shift					3/4 Full

NOTES:

Began grinding at 7:00 AM

Grinding plant worked straight through lunch

Shut down grinding plant at 2:40 PM

Grinding plant operated for 7-3/4 hours

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
FIRECLAY SCREENS PRODUCTION

DATE:
Thursday
11/11/93

Pully RPM..... 37.726

Pully Diameter inches.. 16

Belt Width inches..... 20

Belt Speed FPM..... 157

Empty Tub Wgt pounds... 20.25

*Sample should be taken every 15 minutes.
*Sample should be taken for 10 seconds.
*Part of sample should be bagged every 1-1/2 hours.
*Sampling should continue for 4 hours.

TIME	NET WEIGHT	SAMPLED BAGGED (Y/N)	SAMPLE NUMBER
7:30 AM	251.25		
7:45 AM	250.75		
8:00 AM	242.75		
8:15 AM	235.25		
8:30 AM	227.75		
8:45 AM	228.75	Yes, time marked on bag	
9:00 AM	236.25		
9:15 AM	226.75		
9:30 AM	226.25		
9:45 AM	242.25		
10:00 AM	241.75		
10:15 AM	238.75	Yes, time marked on bag	
10:30 AM	241.75		
10:45 AM	224.25		
11:00 AM	231.75		
11:15 AM	224.50		
11:30 AM	220.75	Yes, time marked on bag	

Ave Wgt..... 234.79

Ton/Hr..... 42.26

Total tons of fireclay ground (in 8 hours)..... 338.10

THE BELDEN BRICK COMPANY
PLANT # 6 - GRINDING PLANT
FIRECLAY DUST COLLECTOR

DATE:
Thursday
11/11/93

This represents the weight of dust collected during the above date

Hopper under dust collector should be emptied and cleaned before test begins.

Hopper under dust collector should be emptied and cleaned after test ends. That dust must also be weighed and logged on report.

Empty Weight Hopper # 1 12400

Empty Weight Hopper # 2 12400

HOPPER NUMBER	TIME HOPPER FILLED	GROSS HOPPER WEIGHT	FULL HOPPER WEIGHT
1	10:00 AM	13820	1420
2	12:30 PM	14040	1640
1	1:45 PM	13740	1340
2	2:50 PM	13780	1380
1	3:10 PM	12780	380

Total dust removed from dust collector (lbs)..... 6160

APPENDIX C.

ANALYTICAL RESULTS

C.1 SAMPLE LOG
C.2 FILTER AND BEAKER TARE WEIGHTS
C.3 GRINDING/SCREENING RESULTS
- C.3.1 Grinding/Screening Baghouse Inlet PM/PM-10
- C.3.2 Grinding/Screening Baghouse Outlet PM/PM-10
- C.3.3 Grinding/Screening Ambient PM-10
- C.3.4 Grinding/Screening Product Material Sieve/Moisture Analysis

C.4 KILN RESULTS
- C.4.1 Kiln PM/PM-10
- C.4.2 Kiln Condensible PM
- C.4.3 Kiln Multiple Metals/PM
- C.4.4 Kiln Semivolatile Organic Compounds
- C.4.5 Kiln Volatile Organic Compounds
- C.4.6 Kiln HCl/HF/PM

C 2

C.1 SAMPLE LOG

MRI

MIDWEST RESEARCH INSTITU
Suite 35
401 Harrison Oaks Boule
Cary, North Carolina 27513-2
Telephone (919) 677-024
FAX (919) 677-006

November 11, 1993

To: M. St. Germain, M. Whitacre, A. Mainey

From: R. Marinshaw

Subject: Request for Analysis of Samples From Belden Brick Emission Test
MRI Project No. 4601-01

Under EPA Contract No. 68-D2-0159, Work Assignment I-01, an emission test was conducted at the Belden Brick Company Plant No. 6, Sugarcreek, Ohio, during the week of November 8, 1993. The attached tables list all of the samples and analyses required. Please refer to the site-specific test plan, dated October 22, 1993, for a detailed description of the test locations, test methods, and QA requirements for the test.

Please take note that the complete charge numbers for this emission test are as follows:

Field test	4601-01-05-01
VOST analysis	4601-01-05-02
Semi-VOST analysis	4601-01-05-03
Metals analysis	4601-01-05-04
QA/QC	4601-01-05-05
Reporting	4601-01-05-06

1.0 PARTICULATE MATTER

Three Method 201A runs were conducted on the inlet to the baghouse for the grinding/screening room, and two Method 201A runs were conducted on the outlet to the grinding/screening room fabric filter. These samples are to be analyzed for PM less than or equal to 10 micrometers (μm) and PM greater than 10 μm. In addition, Hi-Vol samplers were used to sample ambient PM-10 inside the grinding/screening room (three runs) and outside the grinding/screening room (three runs on the east side and two runs on the west side). The Hi-Vol filters must be analyzed for two runs at each of the three locations.

The kiln was sampled for PM emissions using three sampling trains. Three Method 201/202 runs were conducted. These samples must be analyzed for PM less than or equal to 10 μm, PM greater than 10 μm, condensible inorganic PM, and condensible organic PM. Three Method 26A runs were conducted, and the samples from this train must be analyzed for filterable PM. Finally, three Method 0029 runs were conducted. The samples from these runs must also be analyzed for filterable PM. Please note that the filters for the Method 201A train are to be weighed, heated to 320°F, and reweighed. Table 1 summarizes the PM samples from the grinding/screening room and kiln that must be analyzed.

TABLE 1. PM SAMPLES FOR ANALYSIS

Sample	Run 1	Run 2	Run 3
Grinding/Screening Room fabric filter inlet--Method 201A			
Preseparator rinse (d > 10μ)	1001	2001	3001
Cyclone rinse (d ≤ 10μ)	1002	2002	3002
In-stack filter (d ≤ 10μ)	1003	2003	3003
Grinding/Screening Room fabric filter outlet--Method 201A			
Preseparator rinse (d > 10μ)	1006	2006	NA
Cyclone rinse (d ≤ 10μ)	1007	2007	NA
In-stack filter	1008	2008	NA
Grinding/Screening Room ambient--Hi-Vol sampler			
Hi-Vol filter #____ (Inside)	1011	2011	3011
Hi-Vol filter #____ (Outside--east)	1013	2013	3013
Hi-Vol filter #____ (Outside--west)	4011	5011	NA
Kiln Stack--Method 201A/202			
Preseparator rinse (d > 10μ)	1014	2014	3014
Cyclone rinse (d ≤ 10μ)	1015	2015	3015
Front-half rinse	1017	2017	3017
Out-stack filter (d ≤ 10μ) [a]	1018	2018	3018
Condensate and water rinse	1019	2019	3019
Back-half rinse (Methylene chloride)	1020	2020	3020
Kiln Stack--Method 26A			
Front-half rinse (acetone)	1022	2022	3022
Filter	1023	2023	3023
Kiln Stack--Method 0029 (Multi-metals)			
Front half rinse (acetone)	1065	2065	3065
Filter	1030	2030	3030

TABLE 2. (Continued)

Sample	Run 1	Run 2	Run 3
Reagent Blanks			
Acetone (Method 201A)	1047	NA	NA
Out-stack filter (Method 201A)	1049	NA	NA
Methylene chloride (Method 202)	1062	NA	NA
Hi-Vol filter	1050	NA	NA
Acetone (Method 26A)	1051	NA	NA
Filter (Method 26A)	1052	NA	NA
Filter (Method 0029)	1056	NA	NA

[a]Filters for Method 201A train must be weighed, heated to 320°F, and reweighed.

2.0 PROCESS SAMPLES

Three process samples were collected from the conveyor that transports from the grinding/screening room to the fine material storage bins. These samples must be analyzed for moisture. In addition, a sieve analysis must be conducted on these samples according to the procedures described in AP-42, Appendix E, *Procedures for Laboratory Analysis of Surface/Bulk Dust Loading Samples*. Table 2 summarizes the process samples to be analyzed.

TABLE 2. GRINDING/SCREENING ROOM PROCESS SAMPLES

Sample	Run 1	Run 2	Run 3
Grinding/Screening Room--fine material conveyor			
Process sample	1012	2012	3012
Process sample	1013	2013	3013

3.0 VOST

The kiln was sampled for volatile organic compounds using a Method 0030 (VOST) sampling train. Three runs were conducted. Trap pairs 2, 4, and 6 must be analyzed according to Method 8240 for the compounds listed in Figure 5-9 of the test plan. In addition, one pair of field blank traps and one pair of trip blank traps must be analyzed. There was no VOST condensate. Table 3 summarizes the VOST samples for analysis.

TABLE 3. VOST SAMPLES FOR ANALYSIS

Sample	Sample
Kiln Stack--Method 0030 (VOST)	
Pair 1 Tnx	1067
Pair 1 T/C	1068
Pair 2 Tnx[a]	1069
Pair 2 T/C[a]	1070
Pair 3 Tnx	1071
Pair 3 T/C	1072
Pair 4 Tnx[a]	1073
Pair 4 T/C[a]	1074
Pair 5 Tnx	2067
Pair 5 T/C	2068
Pair 6 Tnx[a]	2069
Pair 6 T/C[a]	2070
Pair 7 Tnx	2071
Pair 7 T/C	2072
Field blank Tnx[b]	1075
Field blank T/C[b]	1076
Trip blank Tnx[b]	1077
Trip blank T/C[b]	1078
Field blank Tnx[b]	2075
Field blank T/C[b]	2076
Trip blank Tnx[b]	2077
Trip blank T/C[b]	2078

[a]Trap pairs 2, 4 and 6 to be analyzed.
[b]One pair of field and trip blanks to be analyzed.

4.0 Semi-VOST

The kiln was sampled for semi-volatile organic compounds using a Method 0010 (semi-VOST) sampling train. Three runs were conducted. Please note that the back half samples were split into two fractions. The two sample fractions for Run 1 (1038 and 1038A) should be analyzed separately; for each of the other two runs, the two fractions should be combined for the analysis. The samples must be analyzed for the compounds listed in Figure 5-11 of the test plan. Table 4 summarizes the semi-VOST samples for analysis.

TABLE 4. SEMI-VOST SAMPLES FOR ANALYSIS.

Sample	Run 1	Run 2	Run 3
Kiln Stack--Method 0010 (semi-VOST)			
Front-half rinse	1036	2036	3036
Filter	1037	2037	3037
Back-half rinse	1038[a]	2038[b]	3038[b]
Back-half rinse	1038A[a]	2038A[b]	3038A[b]
XAD Cartridge #_____	1039	2039	3039
Condensate	1040	2040	3040
Blanks			
Methanol	1061	NA	NA
Methylene chloride	1062	NA	NA
XAD Cartridge #_____	1063	NA	NA

[a]Analyze each fraction of back half rinse sample separately.
[b]Combine both back half rinse sample fractions for analysis.

5.0 Hydrogen Fluoride/Hydrogen Chloride (HF/HCl)

The kiln was sampled for HF/HCl using Method 26A. Three runs were conducted. The front half of the sampling train is to be analyzed for PM as shown in Table 1. The HF/HCl aliquots from the sampling train are to be sent to Galbraith Laboratory for analysis. Table 5 summarizes the HF/HCl samples for analysis.

TABLE 5. HF/HCl SAMPLES FOR ANALYSIS

Sample	Run 1	Run 2	Run 3
Kiln Stack--Method 26A			
XX024 Aliquot (Cl_2/HF)	1025	2025	3025
XX026 Aliquot (Cl_2/HF)	1027	2027	3027
Blanks			
0.1N H_2SO_4	1053	NA	NA
0.1N NaOH	1054	NA	NA

6.0 Metals

The kiln was sampled for metals using Method 0029. Three runs were conducted. The front half of the sampling train is to be analyzed separately for PM as shown in Table 1 prior to the metals analysis. The front and back halves of the sampling train should be analyzed separately for the following 11 metals: arsenic, cadmium, cobalt, chromium, beryllium, antimony, lead, mercury, manganese, nickel, and selenium. Please note that the samples from the back half of the sampling train (Impingers 1 to 3) were split into two fractions. The two sample fractions for Run 1 (1031 and 1031A) should be analyzed separately; for each of the other two runs, the two back half fractions should be combined for the analysis. Table 5 summarizes the metals samples for analysis.

TABLE 6. METALS SAMPLES FOR ANALYSIS

Sample	Run 1	Run 2	Run 3
Kiln Stack--Method 0029			
Front-half 0.1N HNO_3	1029	2029	3029
Filter	1030	2030	3030
Acetone rinse residue	1065	2065	3065
Impingers 1-3 (HNO_3/H_2O_2)	1031[a]	2031[b]	3031[b]
Impingers 1-3 (HNO_3/H_2O_2)	1031A[a]	2031A[b]	3031A[b]
Impinger 4 + 0.1N HNO_3 rinse	1032	2032	3032
Impingers 5-6 Acid $KMnO_4$	1033	2033	3033
Impingers 5-6 8N HCl rinse	1034	2034	3034
Blanks			
0.1 N HNO_3	1055	NA	NA
Filter	1056	NA	NA
5% HNO_3/10% H_2O_2	1057	NA	NA
4% $KMnO_4$/10% H_2SO_4	1058	NA	NA
ASTM Type I water	1059	NA	NA
8N HCl + 200ml H_2O	1060	NA	NA

[a]Analyze each fraction of back half (Impingers 1 to 3) sample separately.
[b]Combine both back half (Impingers 1 to 3) sample fractions for analysis.

C.2 FILTER AND BEAKER TARE WEIGHTS

BEAKER TARE WEIGHT DATA

MRI Project No. 4601.01.05.01
Sampling Team Leader: Szydlo Analyst: Szydlo
Beaker Size and Type: 150-mL borosilicate glass
Beaker Treatment: Following cleaning according to test protocol, heat at 105° C for 3 hours; desiccate; weigh to a constant weight
Weight Unit: grams

Date/Time:	11-19-93 1300	11-19-93 1315	11-19-93 1330	
Balance Check Weight Value:	100	100	100	
Balance Reads:	100.0076	100.0076	100.0076	
Beaker No.	First Weighing	Second Weighing	Third Weighing	Average Weight or Weight to be Used as the Tare
1015	92.9929	92.9930	92.9930	92.9930
1014	98.9159	98.9160	98.9160	98.9160
2002	86.2143	86.2143	86.2143	86.2143
2006	106.5735	106.5736	106.5736	106.5736
2017	102.5881	102.5881	102.5881	102.5881
~~1017~~	~~88.5529~~	~~88.5530~~	~~88.5530~~	~~88.5530~~
2014	102.5185	102.5186	102.5187	102.5186
1001	82.0441	82.0441	82.0442	82.0441
3001	102.0715	102.0715	102.0716	102.0715
2015	83.9239	83.9240	83.9241	83.9240
3014	84.1140	84.1140	84.1141	84.1140
3017	106.6630	106.6631	106.6632	106.6631
3002	115.6979	115.6979	115.6978	115.6978
1017	117.3722	117.3723	117.3722	117.3722
Balance Check Balance Reads:	100.0079	100.0078	100.0079	

COMMENTS:

BEAKER TARE WEIGHT DATA

MRI Project No. 4601.01.05.01
Sampling Team Leader: Szydlo Analyst: Szydlo
Beaker Size and Type: 150-mL borosilicate glass
Beaker Treatment: Following cleaning according to test protocol, heat at 105° C for 3 hours; desiccate; weigh to a constant weight
Weight Unit: grams

Date/Time:	11-19-93/1300	11-19-93/1315	11-19-93/1330	
Balance Check Weight Value:	100g	100g	100.g	
Balance Reads:	100.0076g	100.0076	100.0076	
Beaker No.	First Weighing	Second Weighing	Third Weighing	Average Weight or Weight to be Used as the Tare
3065	99.2742	99.2743	99.2743	99.2743
1065	92.5408	92.5408	92.5409	92.5408
2065	103.6734	103.6735	103.6735	103.6735
MM-13	116.3934	116.3934	116.3935	116.3939
1022	91.7563	91.7563	91.7564	91.7563
2022	88.5048	88.5050	88.5051	88.5050
3022	110.8388	110.8388	110.8388	110.8388
1051	89.0244	89.0245	89.0245	89.0245
3002	115.6771	115.6770	115.6770	115.6770
3015	112.9871	112.9872	112.9872	112.9872
2001	112.0051	112.0051	112.0051	112.0051
1006	103.3151	103.3150	103.3151	103.3151
1002	108.8607	108.8606	108.8606	108.8606
2007	85.1241	85.1241	85.1240	85.1241
1007	101.3539	101.3540	101.3540	101.3540
~~1017~~	~~117.3722~~	~~117.3722~~	~~117.3721~~	~~117.3722~~
1022	114.6456	114.6455	114.6455	114.6455
Balance Check Balance Reads:	100.0076	100.0076	100.0076	

COMMENTS:

FILTER TARE WEIGHT DATA

MRI Project No. 4601-01-05-01
Sampling Team Leader: Szydlo Analyst: EDWARDS / HARMON
Filter Size and Type: 4.9-inch diameter Whatman QM-A, quartz fiber
Filter Treatment: Heat at 105° C for 3 hours; desiccate; weigh to a constant weight
Weight Unit: grams

Date/Time:	11/3/93 0911	11/3/93 1431	11/4/93 0950	
Balance Check Weight Value:	1.0000 g	1.0000 g	1.0000 g	
Balance Reads:	1.0000	1.0000 g	1.0000 g	
Filter No.	First Weighing	Second Weighing	Third Weighing	Average Weight or Weight to be Used as the Tare
SF 1	0.2867	0.2868	0.2868	
2	0.2888	0.2889	0.2889	
3	0.2873	0.2874	0.2874	
4	0.2861	0.2861	0.2861	
5	0.2880	0.2880	0.2880	
6	0.2794	0.2794	0.2794	
7	0.2841	0.2842	0.2842	
8	0.2873	0.2874	0.2873	
9	0.2875	0.2876	0.2875	
10	0.2912	0.2913	0.2913	
Balance Check Balance Reads:	1.0000 g	1.0001 g	1.0000 g	

COMMENTS:

FILTER TARE WEIGHT DATA

MRI Project No. 4601-01-05-01
Sampling Team Leader: Szydlo Analyst: Edwards/HARMON
Filter Size and Type: 4.9-inch diameter Whatman QM-A, quartz fiber
Filter Treatment: Heat at 105° C for 3 hours; desiccate; veigh to a constant veight
Weight Unit: grams

Date/Time:	11/3/93 0838	11/3/93 1354	11/4/93 1015	
Balance Check Weight Value:	1.0000 g	1.0000 g	1.0000 g	
Balance Reads:	1.0000 g	1.0009 g	1.0000 g	
Filter No.	First Weighing	Second Weighing	Third Weighing	Average Weig or Weight to be Used as the Tar
LF 1	1.0912	1.0915	1.0916	
2	1.0673	1.0676	1.0677	
3	1.1065	1.1067	1.1067	
4	1.1101	1.1103	1.1103	
5	1.0829	1.0831	1.0830	
6	1.1000	1.1002	1.1002	
7	1.0927	1.0928	1.0929	
8	1.1021	1.1022	1.1024	
9	1.0843	1.0844	1.0846	
10	1.1170	1.1171	1.1172	
Balance Check Balance Reads:	1.0000 g	1.0010 g	1.0000 g	

COMMENTS:

FILTER TARE WEIGHT DATA

MRI Project No: 4601-01-05-01
Sampling Team Leader: Sylo Sylo Analyst: Edwards / HARMON
Filter Size and Type: 4.9-inch diameter Whatman QM-A, quartz fiber
Filter Treatment: Heat at 105° C for 3 hours; desiccate; weigh to a constant weight
Weight Unit: grams

Date/Time:	11/3/93 0939	11/3/93 1417	11/4/93 1006	
Balance Check Weight Value:	1.0000 g	1.0000 g	1.0000 g	
Balance Reads:	1.0000	1.0000 g	1.0000 g	Average Weig or Weight to be Used as the Tar
Filter No.	First Weighing	Second Weighing	Third Weighing	
LF 11	1.1081	1.1086	1.1085	
12	1.0778	1.0783	1.0784	
13	1.1028	1.1033	1.1034	
14	1.1056	1.1061	1.1060	
15	1.0933	1.0937	1.0937	
16	1.0978	1.0982	1.0981	
17	1.1008	1.1011	1.1010	
18	1.0965	1.0970	1.0968	
19	1.1127	1.1131	1.1129	
20	1.1098	1.1102	1.1101	
Balance Check Balance Reads:	1.0000 g	1.0001 g	1.0000 g	

COMMENTS:

FILTER TARE WEIGHT DATA

MRI Project No. 4601-01-05-01
Sampling Team Leader: SZUDLO Analyst: HARMON
Filter Size and Type: 4.9-inch diameter Whatman QM-A, quartz fiber
Filter Treatment: Heat at 105° C for 3 hours; desiccate; veigh to a constant weight
Weight Unit: grams

Date/Time:	11/3/93 1505	11/3/93 1620	11/4/93 0935	
Balance Check Weight Value:	1.0000 g	1.0000 g	1.0000 g	
Balance Reads:	1.0000 g	1.0000 g	1.0000 g	
Filter No.	First Weighing	Second Weighing	Third Weighing	Average Weight or Weight to be Used as the Tare
SSF-1	0.1484	0.1485	0.1485	
SSF-2	0.1541	0.1542	0.1541	
SSF-3	0.1477	0.1479	0.1478	
SSF-4	0.1466	0.1467	0.1467	
SSF-5	0.1526	0.1526	0.1526	
SSF-6	0.1504	0.1505	0.1505	
SSF-7	0.1460	0.1460	0.1459	
SSF-8	0.1487	0.1488	0.1486	
SSF-9	0.1485	0.1485	0.1484	
SSF-10	0.1483	0.1484	0.1483	
Balance Check Balance Reads:	1.0000 g	1.0000 g	1.0000 g	

COMMENTS:

FILTER TARE WEIGHT DATA

MRI Project No. 4601-01-05-01
Sampling Team Leader: STYDLO Analyst: HARMON
Filter Size and Type: 4.9-inch diameter Whatman QM-A, quartz fiber
Filter Treatment: Heat at 105° C for 3 hours; desiccate; veigh to a constant weight
Weight Unit: grams

Date/Time:	11/3/93 1514	11/3/93 1634	11/4/93 0927	
Balance Check Weight Value:	1.0000 g	1.0000 g	1.0000 g	
Balance Reads:	1.0000 g	1.0000 g	1.0000 g	
Filter No.	First Weighing	Second Weighing	Third Weighing	Average Weigh or Weight to be Used as the Ta
SSF-11	0.1486	0.1485	0.1485	
SSF-12	0.1542	0.1541	0.1542	
SSF-13	0.1525	0.1524	0.1525	
SSF-14	0.1495	0.1494	0.1496	
SSF-15	0.1541	0.1540	0.1541	
SSF-16	0.1485	0.1486	0.1486	
SSF-17	0.1446	0.1447	0.1446	
SSF-18	0.1446	0.1447	0.1446	
SSF-19	0.1487	0.1488	0.1487	
SSF-20	0.1510	0.1511	0.1510	
Balance Check Balance Reads:	1.0000 g	1.0000 g	1.0000 g	

COMMENTS:

C.3 GRINDING/SCREENING RESULTS

C.3.1 Grinding/Screening Baghouse Inlet PM/PM-10

FILTER PARTICULATE MATTER ANALYSIS DATA

MRI Project No. 4601.01.05.01 Client: EPA - Emission Inventory Branch (EIB)

Sampling Location: ~~Kiln~~ Baghouse Inlet Facility: Belden Brick Co., Sugar Creek, Ohio

Analyst: Szydlo

Filter samples ~~heated at 160° C for 2-3 hours~~ desiccated for 48 hours, desiccated, and weighed to a constant weight.

FILTER + SAMPLE: Run No. B Inlet #1 Filter No. SF2 Sample No. 1003

		Date	Time
Gross Wt. (g)	.3705	11-22-93	0800
Gross Wt. (g)	.3706	11-22-93	1400
Gross Wt. (g)	.3705	11-23-93	0800
Gross Wt. (g)	.3705	11-23-93	1400

Filter + Sample Gross Wt. used for data entry (g) .3705
Filter Tare Wt. from tare weight data (g) .2889

COMMENTS:

FILTER + SAMPLE: Run No. B Inlet #2 Filter No. SF3 Sample No. 2003

		Date	Time
Gross Wt. (g)	.3323	11-22-93	0800
Gross Wt. (g)	.3322	11-22-93	1400
Gross Wt. (g)	.3323	11-23-93	0800
Gross Wt. (g)	.3323	11-23-93	1400

Filter + Sample Gross Wt. used for data entry (g) .3323
Filter Tare Wt. from tare weight data (g) .2874

COMMENTS:

FILTER + SAMPLE: Run No. B Inlet #3 Filter No. SF6 Sample No. 303

		Date	Time
Gross Wt. (g)	0.3842	11-22-93	0800
Gross Wt. (g)	0.3841	11-22-93	1400
Gross Wt. (g)	0.3843	11-23-93	0800
Gross Wt. (g)	0.3842	11-23-93	1400

Filter + Sample Gross Wt. used for data entry (g) ~~.3842~~ .03241
Filter Tare Wt. from tare weight data (g) .2794

COMMENTS:

NOTE: Control filter weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01
Sampling Location: ~~Kiln~~ Baghouse Inlet 1

Client: Emission Measurement Branch (EIB)
Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. 1 Beaker No. 1001 Sample No. 1001

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 232.0
Beaker Tare Wt. (g) 82.0
Sample + Rinses Wt. (g) 150
Water Wt. (A) from Recovery Data: (g) —
Acetone Wt. (g) 150
Acetone Wt./0.79 = mLs Acetone (B): 190

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 86.1700	12-06-93	0800
Gross Wt. (g) 86.1699	12-06-93	1200
Gross Wt. (g) 86.1699	12-06-93	1700
Gross Wt. (g)		

Beaker + Acetone Residue Gross Wt. used for data entry (g) 86.1699
Beaker Tare Wt. from tare weight data (g) 82.0441

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 1 Beaker No. 1002 Sample No. 1002

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 228.9
Beaker Tare Wt. (g) 109.9
Sample + Rinses Wt. (g) 120
Water Wt. (A) from Recovery Data: (g) —
Acetone Wt. (g) 120
Acetone Wt./0.79 = mLs Acetone (B): 150

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 109.2394	12-06-93	0800
Gross Wt. (g) 109.2394	12-06-93	1200
Gross Wt. (g) 109.2394	12-06-93	1700
Gross Wt. (g)		

Beaker + Acetone Residue Gross Wt. used for data entry (g) 109.2394
Beaker Tare Wt. from tare weight data (g) 108.8606

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 1 Beaker No. _____ Sample No. _____

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) _____
Beaker Tare Wt. (g) _____
Sample + Rinses Wt. (g) _____
Water Wt. (A) from Recovery Data: (g) _____
Acetone Wt. (g) _____
Acetone Wt./0.79 = mLs Acetone (B): _____

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g)		
Gross Wt. (g)		
Gross Wt. (g)		
Gross Wt. (g)		

Beaker + Acetone Residue Gross Wt. used for data entry (g) _____
Beaker Tare Wt. from tare weight data (g) _____

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = _____ mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: ~~Kiln~~ Facility: Belden Brick Co., Sugar Creek, OH

Baghouse Inlet 2 Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. 2 Beaker No. 2001 Sample No. 2001

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)	232.0	Gross Wt. (g)	115.8779	12-06-93	0800
Beaker Tare Wt. (g)	112.0	Gross Wt. (g)	115.8777	12-06-93	1200
Sample + Rinses Wt. (g)	120	Gross Wt. (g)	115.8775	12-06-93	1700
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	120				

Acetone Wt./0.79 = mLs Acetone (B): 151.9

Beaker + Acetone Residue Gross Wt. used for data entry (g) 115.8777

Beaker Tare Wt. from tare weight data (g) 112.0051

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 2 Beaker No. 2002 Sample No. 2002

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)	162.8	Gross Wt. (g)	86.4035	12-06-93	0800
Beaker Tare Wt. (g)	86.2	Gross Wt. (g)	86.4033	12-06-93	1200
Sample + Rinses Wt. (g)	76.6	Gross Wt. (g)	86.4034	12-06-93	1700
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	76.6				

Acetone Wt./0.79 = mLs Acetone (B): 97

Beaker + Acetone Residue Gross Wt. used for data entry (g) 86.4034

Beaker Tare Wt. from tare weight data (g) 86.2143

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. _____ Beaker No. _____ Sample No. _____

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)		Gross Wt. (g)			
Beaker Tare Wt. (g)		Gross Wt. (g)			
Sample + Rinses Wt. (g)		Gross Wt. (g)			
Water Wt. (A) from Recovery Data: (g)		Gross Wt. (g)			
Acetone Wt. (g)					

Acetone Wt./0.79 = mLs Acetone (B): _____

Beaker + Acetone Residue Gross Wt. used for data entry (g) _____

Beaker Tare Wt. from tare weight data (g) _____

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = _____ mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: ~~Kiln~~ Baghouse Inlet 3 Facility: Belden Brick Co., Sugar Creek, OH
Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. 3 Beaker No. 3001 Sample No. 3001

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	164.6	Gross Wt. (g)	106.4319	12-06-97	0815
Beaker Tare Wt. (g)	102.1	Gross Wt. (g)	106.4318	12-06-97	1215
Sample + Rinses Wt. (g)	62.5	Gross Wt. (g)	106.4318	12-06-97	1715
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	62.5				
Acetone Wt./0.79 = mLs Acetone (B):	79.1				

Beaker + Acetone Residue Gross Wt. used for data entry (g) 106.4318
Beaker Tare Wt. from tare weight data (g) 102.0715
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 3 Beaker No. 3002 Sample No. 3002

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	169.4	Gross Wt. (g)	115.8773	12-06-97	0815
Beaker Tare Wt. (g)	115.7	Gross Wt. (g)	115.8773	12-06-97	1215
Sample + Rinses Wt. (g)	53.7	Gross Wt. (g)	115.8773	12-06-97	1715
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	53.7				
Acetone Wt./0.79 = mLs Acetone (B):	68				

Beaker + Acetone Residue Gross Wt. used for data entry (g) 115.8773
Beaker Tare Wt. from tare weight data (g) 115.6978
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. _____ Beaker No. _____ Sample No. _____

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)		Gross Wt. (g)			
Beaker Tare Wt. (g)		Gross Wt. (g)			
Sample + Rinses Wt. (g)		Gross Wt. (g)			
Water Wt. (A) from Recovery Data: (g)		Gross Wt. (g)			
Acetone Wt. (g)					
Acetone Wt./0.79 = mLs Acetone (B):					

Beaker + Acetone Residue Gross Wt. used for data entry (g) _____
Beaker Tare Wt. from tare weight data (g) _____
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = _____ mg/mL

COMMENTS

Control beaker weight data and balance check data are on another form.

C.3.2 Grinding/Screening Baghouse Outlet PM/PM-10

FILTER PARTICULATE MATTER ANALYSIS DATA

MRI Project No. 4601.01.05.01 Client: EPA - Emission Inventory Branch (EIB)

Sampling Location: ~~Kiln~~ Baghouse Outlet Facility: Belden Brick Co., Sugar Creek, Ohio

Analyst: Szydlo

Filter samples ~~heated at 130° C for 2-3 hours~~ dessicated for 48 hours, desiccated, and weighed to a constant weight.

FILTER + SAMPLE: Run No. B.Outlet #1 Filter No. SF1 Sample No. 1008

		Date	Time
Gross Wt. (g)	0.2895	11-22-93	0800
Gross Wt. (g)	0.2894	11-22-93	1400
Gross Wt. (g)	0.2894	11-23-93	0800
Gross Wt. (g)	0.2894	11-23-93	1400

Filter + Sample Gross Wt. used for data entry (g) 0.2894

Filter Tare Wt. from tare weight data (g) 0.2868

COMMENTS:

FILTER + SAMPLE: Run No. B.Outlet #2 Filter No. SF4 Sample No. 3008

		Date	Time
Gross Wt. (g)	.2882	11-22-93	0800
Gross Wt. (g)	.2881	11-23-93	0400
Gross Wt. (g)	.2883	11-23-93	0800
Gross Wt. (g)	.2882	11-23-93	1400

Filter + Sample Gross Wt. used for data entry (g) .2882

Filter Tare Wt. from tare weight data (g) .2861

COMMENTS:

FILTER + SAMPLE: Run No. _____ Filter No. _____ Sample No. _____

		Date	Time
Gross Wt. (g)			
Gross Wt. (g)			
Gross Wt. (g)			
Gross Wt. (g)			

Filter + Sample Gross Wt. used for data entry (g) _____

Filter Tare Wt. from tare weight data (g) _____

COMMENTS:

NOTE: Control filter weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: ~~Kiln~~ Baghouse Outlet 1 Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. 1 Beaker No. 1006 Sample No. 1006

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) _____
Beaker Tare Wt. (g) _____
Sample + Rinses Wt. (g) _____
Water Wt. (A) from Recovery Data: (g) _____
Acetone Wt. (g) _____
Acetone Wt./0.79 = mLs Acetone (B): _____

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 103.3258	12-06-93	0830
Gross Wt. (g) 103.3257	"	1230
Gross Wt. (g) 103.3257	"	1730
Gross Wt. (g) _____		

Beaker + Acetone Residue Gross Wt. used for data entry (g) 103.3257
Beaker Tare Wt. from tare weight data (g) 103.3151
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = _____ mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 1 Beaker No. 1007 Sample No. 1007

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 146.7
Beaker Tare Wt. (g) 101.3
Sample + Rinses Wt. (g) 45.3
Water Wt. (A) from Recovery Data: (g) —
Acetone Wt. (g) 45.3
Acetone Wt./0.79 = mLs Acetone (B): 57.0

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 101.3540	12-06-93	0830
Gross Wt. (g) 101.3541	12-06-93	1230
Gross Wt. (g) 101.3541	12-06-93	1730
Gross Wt. (g) _____		

Beaker + Acetone Residue Gross Wt. used for data entry (g) 101.3541
Beaker Tare Wt. from tare weight data (g) 101.3540
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. _____ Beaker No. _____ Sample No. _____

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) _____
Beaker Tare Wt. (g) _____
Sample + Rinses Wt. (g) _____
Water Wt. (A) from Recovery Data: (g) _____
Acetone Wt. (g) _____
Acetone Wt./0.79 = mLs Acetone (B): _____

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) _____		
Gross Wt. (g) _____		
Gross Wt. (g) _____		
Gross Wt. (g) _____		

Beaker + Acetone Residue Gross Wt. used for data entry (g) _____
Beaker Tare Wt. from tare weight data (g) _____
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = _____ mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: ~~Kiln~~ Baghouse Outlet #2 Facility: Belden Brick Co., Sugar Creek, OH
Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. 2 Beaker No. 2006 Sample No. 2006

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	193.1	Gross Wt. (g)	106.5817	12-06-93	0830
Beaker Tare Wt. (g)	106.6	Gross Wt. (g)	106.5818	"	1230
Sample + Rinses Wt. (g)	86.5	Gross Wt. (g)	106.5817	"	1730
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	86.5				

Acetone Wt./0.79 = mLs Acetone (B): 109.5
Beaker + Acetone Residue Gross Wt. used for data entry (g) 106.5817
Beaker Tare Wt. from tare weight data (g) 106.5735
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. 2 Beaker No. 2007 Sample No. 2007

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	135.7	Gross Wt. (g)	85.1248	12-06-93	0830
Beaker Tare Wt. (g)	85.1	Gross Wt. (g)	85.1246	"	1230
Sample + Rinses Wt. (g)	30.6	Gross Wt. (g)	85.1247	"	1730
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)			
Acetone Wt. (g)	30.6				

Acetone Wt./0.79 = mLs Acetone (B): 39
Beaker + Acetone Residue Gross Wt. used for data entry (g) 85.1247
Beaker Tare Wt. from tare weight data (g) 85.1241
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. ____ Beaker No. ____ Sample No. ____

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)		Gross Wt. (g)			
Beaker Tare Wt. (g)		Gross Wt. (g)			
Sample + Rinses Wt. (g)		Gross Wt. (g)			
Water Wt. (A) from Recovery Data: (g)		Gross Wt. (g)			
Acetone Wt. (g)					

Acetone Wt./0.79 = mLs Acetone (B): ____
Beaker + Acetone Residue Gross Wt. used for data entry (g) ____
Beaker Tare Wt. from tare weight data (g) ____
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = ____ mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

C.3.3 Grinding/Screening Ambient PM-10

Tare Weights

4601-01-05-01

Filter Number	First Weigh Weight (mg)	First Weigh By	First Weigh Date	Audit Weight (mg)	Audit Difference (mg)	Audit Meets Q.A. ?	Audit By	Audit Date	Reweigh Weight (mg)	Reweigh By	Reweigh Date
9342001	4321.60	DG	10-27-93	4321.55	0.05	Yes	33	11/1/93			
002	4353.90			4353.90	0.00						
003	4308.90			4309.00	0.10						
004	4347.25			4347.20	0.05						
005	4332.45			4332.30	0.15						
006	4313.40			4313.20	0.20						
007	4339.45			4339.45	0.00						
008	4374.85			4374.75	0.10						
009	4322.25			4322.25	0.00						
010	4322.90			4322.80	0.10						

Note: * By Audit Weight Indicates Audit of Reweigh

Comments:

Final Weights

4601-01-05

Filter Number	First Weigh Weight (mg)	By	Date	Audit Weight (mg)	Difference (mg)	Meets Q.A. ?	By	Date	Reweigh Weight (mg)	By	Date
9342 001	4643.10	DG	12-2-93	4642.80	0.30	yes	ZZ	12/3/93			
002	4362.35			4362.20	0.15						
003	4756.70			4756.40	0.30						
004	4363.45			4363.15	0.30						
005	4362.55			4362.50	0.05						
006	4339.70			4339.65	0.05						
007	4338.45			4338.55	0.10						
008	4373.45			4373.45	0.00						
009	4332.05			4331.80	0.25						
010	4364.10			4363.90	0.20						

Note: • By Audit Weight Indicates Audit of Reweigh

Comments:

MIDWEST RESEARCH INSTITUTE

Project/Acct. No. _____ Date/Time 7/12/94

Project Title Belden Brick

Signature [signature] Verified by _____ (signature/date)

Phone Contact ☐
Meeting Notes ☐
Work Sheet ☒

Page __ of __

Run# Filter #	Run#	TARE (mg)	Final (mg)	NET (mg)
001	1-IN	4321.60	4643.10	321.5
002	1E	4353.90	4362.35	8.45
003	2-IN	4308.90	4756.70	447.8
004	2E	4347.25	4363.45	16.2
005	1W	4332.45	4362.55	30.1
006	2W	4313.40	4339.70	26.3
007		4339.45	4338.45	(1)
008	Blank	4379.85	4373.45	(1.4)
009	3E	4322.25	4332.05	9.8
010	3W	4322.90	4364.10	41.2

Ambient Air Sample, not in the weight calc.

MRI

C.3.4 Grinding/Screening Product Material Sieve/Moisture Analysis

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 1
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-9-93 @ 0927 (4012)

Total Sample Weight: 4251.6
(Excl. Container)
Number of Splits: 3

Oven Temperature 105°C
Date In 12-6-93 Date Out 12-7-93
Time In 1330 Time Out 1000
Drying Time 20hr 30min
Split Sample Balance:
Make Sartorius
Capacity 4100g
Smallest Division 0.1g.

Split Sample Weight (before drying)
Pan + Sample: 649.7
Pan: 163.4
Wet Sample: 486.3

Material Weight (after drying)
Pan + Material: 628.1
Pan: 163.4
Dry Sample: 464.7

MOISTURE CONTENT:
(A) Wet Sample Wt. 486.3
(B) Dry Sample Wt. 464.7
(C) Difference Wt. 21.6

$\frac{C \times 100}{A}$ = 4.44 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	460.7
20 min:	525.5
30 min:	530.4
40 min:	535.1

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh	467.4	469.6	2.2	0.47
20 mesh	416.3	553.6	137.3	29.5
40 mesh	393.5	502.3	108.8	23.4
100 mesh	352.6	458.2	105.6	22.7
140 mesh	347.6	369.4	21.8	4.69
200 mesh	498.5	513.4	14.9	3.20
Pan	460.7	535.1	74.4	16.0

Net Weight <20 mesh: 465.0
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight <200 Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 16.0 %

*Indicate Units with all Weights

4/78

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 1
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-9-93 :1059 (4012)

Total Sample Weight: 3522.0 g.
(Excl. Container)
Number of Splits: 3

Oven Temperature 105 °C
Date In 12-6-93 Date Out 12-7-93
Time In 1345 Time Out 1000
Drying Time 20 hr 15 min
Split Sample Balance:
Make Sartorius
Capacity 4100g
Smallest Division 0.1g.

Split Sample Weight (before drying)
Pan + Sample: 741.7
Pan: 162.7
Wet Sample: 579.0

Material Weight (after drying)
Pan + Material: 716.5
Pan: 162.7
Dry Sample: 553.8

MOISTURE CONTENT:
(A) Wet Sample Wt. 579.0
(B) Dry Sample Wt. 553.8
(C) Difference Wt. 25.2

$\frac{C \times 100}{A}$ = 4.35 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	382.5
20 min:	424.6
30 min:	450.5
40 min:	459.4

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh	466.3	468.5	2.2	0.40
20 mesh	436.5	626.1	189.6	34.2
40 mesh	399.5	527.9	128.4	23.2
100 mesh	344.2	455.0	110.8	20.0
140 mesh	353.2	378.9	25.7	4.64
200 mesh	354.7	374.7	20.0	3.61
Pan	382.5	459.4	76.9	13.9

Net Weight <20 mesh: 553.6
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 13.9 %

*Indicate Units with all Weights

4/78

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 1
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-9-93 @ 1214 (4012)

Total Sample Weight: 3778.3 g.
(Excl. Container)
Number of Splits: 3

Oven Temperature 105 °C
Date In 12-6-93 Date Out 12-7-93
Time In 1350 Time Out 1000
Drying Time 20 hr 10 min
Split Sample Balance:
Make Sartorius
Capacity 4100g
Smallest Division 0.1g

Split Sample Weight (before drying)
Pan + Sample: 583.4
Pan: 161.0
Wet Sample: 422.4

Material Weight (after drying)
Pan + Material: 565.5
Pan: 161.0
Dry Sample: 404.5

MOISTURE CONTENT:
(A) Wet Sample Wt. 422.4
(B) Dry Sample Wt. 404.5
(C) Difference Wt. 17.9

$\frac{C \times 100}{A}$ = 4.24 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	460.7
20 min:	523.3
30 min:	527.4
40 min:	529.6

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh	467.5	469.1	1.6	0.39
20 mesh	416.3	536.9	120.6	29.8
40 mesh	393.9	487.2	93.3	23.0
100 mesh	352.9	442.8	89.9	22.2
140 mesh	347.8	364.9	17.1	4.22
200 mesh	498.6	512.3	13.7	3.38
Pan	460.7	529.6	68.9	17.0

Net Weight <20 mesh: 405.1
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight <200 Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 17.0 %

*Indicate Units with all Weights

4/78

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 2
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-4-93 @ 0845 (4013)

Total Sample Weight: 4409.1 g.
(Excl. Container)
Number of Splits: 3

Oven Temperature 105 °C
Date In 12-6-93 Date Out 12-7-93
Time In 1415 Time Out 1000
Drying Time 19 hr 45 min
Split Sample Balance:
Make Sartorius
Capacity 4100 g
Smallest Division 0.1 g

Split Sample Weight (before drying)
Pan + Sample: 750.4
Pan: 160.5
Wet Sample: 589.9

Material Weight (after drying)
Pan + Material: 729.2
Pan: 160.5
Dry Sample: 568.7

MOISTURE CONTENT:
(A) Wet Sample Wt. 589.9
(B) Dry Sample Wt. 568.7
(C) Difference Wt. 21.2

$\frac{C \times 100}{A}$ = 3.59 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	382.5
20 min:	472.0
30 min:	483.7
40 min:	487.2

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh	465.0	467.4	2.4	0.42
20 mesh	436.0	615.8	179.8	31.6
40 mesh	400.0	520.5	120.5	21.2
100 mesh	344.4	454.0	109.6	19.3
140 mesh	353.3	381.7	28.4	5.00
200 mesh	354.8	377.7	22.9	4.03
Pan	382.5	487.2	104.7	18.4

Net Weight <20 mesh: 568.3
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight <200 Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 18.4 %

*Indicate Units with all Weights

4/78

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 2
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-11-93 @ 1015 (4013)

Total Sample Weight: 4839.7
(Excl. Container)
Number of Splits: 3

Oven Temperature 105°C
Date In 12-6-93 Date Out 12-7-93
Time In 1440 Time Out 1000
Drying Time 19 hr 20 min
Split Sample Balance:
Make Sartorius
Capacity 4100
Smallest Division 0.1 g

Split Sample Weight (before drying)
Pan + Sample: 683.5
Pan: 165.6
Wet Sample: 517.9

Material Weight (after drying)
Pan + Material: 665.5
Pan: 165.6
Dry Sample: 499.9

MOISTURE CONTENT:
(A) Wet Sample Wt. 517.9
(B) Dry Sample Wt. 499.9
(C) Difference Wt. 18.0

$\frac{C \times 100}{A}$ = 3.48 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	460.7
20 min:	540.8
30 min:	543.0
40 min:	544.6

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh	467.9	470.0	2.1	0.42
20 mesh	416.2	600.8	184.6	36.9
40 mesh	394.3	503.0	108.7	21.7
100 mesh	352.9	441.8	88.9	17.8
140 mesh	347.7	364.7	17.0	3.40
200 mesh	498.5	513.8	15.3	3.06
Pan	460.7	544.6	83.9	16.8

Net Weight <20 mesh: 500.5
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 16.8 %

*Indicate Units with all Weights

4/78

MIDWEST RESEARCH INSTITUTE

Silt and Moisture Analysis*

Run No. 2
MRI Project No. 4601-01

Recorded by DG

Material: Fire Clay

Sample No: 11-11-93 @ 1130 (4013)

Total Sample Weight: 40352 g
(Excl. Container)
Number of Splits: 3

Oven Temperature 105°C
Date In 12-6-93 Date Out 12-7-93
Time In 1425 Time Out 1000
Drying Time Ahr 35 min
Split Sample Balance:
Make Sartorius
Capacity 4100 g
Smallest Division 0.1 g

Split Sample Weight (before drying)
Pan + Sample: 625.2
Pan: 159.2
Wet Sample: 466.0 g

Material Weight (after drying)
Pan + Material: 609.0
Pan: 159.2
Dry Sample: 449.8 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 466.0 g
(B) Dry Sample Wt. 449.8 g
(C) Difference Wt. 16.2 g

$\frac{C \times 100}{A}$ = 3.48 % Moisture

Sieving

Time: Start:	Weight (Pan Only)
Initial (Tare):	382.4
20 min:	462.7
30 min:	465.0
40 min:	468.3

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				DG
10 mesh	465.5	467.1	1.6	3.56
20 mesh	435.8	575.5	139.7	31.0
40 mesh	406.2	497.2	91.0	21.6
100 mesh	344.4	431.5	87.1	19.4
140 mesh	353.3	375.0	21.7	4.82
200 mesh	354.8	371.8	17.0	3.78
Pan	382.4	468.3	85.9	19.1

Net Weight <20 mesh: 450.0
Net Weight <200 mesh:

% Silt = $\frac{\text{Net Weight <200 Mesh}}{\text{Total Net Weight}}$ X 100 = _____ X 100 = 19.1 %

*Indicate Units with all Weights

4/78

C.4 KILN RESULTS

C.4.1 Kiln PM/PM-10

FILTER PARTICULATE MATTER ANALYSIS DATA

MRI Project No. 4601.01.05.01 **Client:** EPA - Emission Inventory Branch (EIB)

Sampling Location: Kiln - PM10 **Facility:** Belden Brick Co., Sugar Creek, Ohio

Analyst: Szydlo

Filter samples heated at 160° C for 2-3 hours, desiccated, and weighed to a constant weight.

FILTER + SAMPLE: Run No. KPM-10#1 Filter No. LF8 Sample No. 1018

		Date	Time
Gross Wt. (g)	1.1037	12-01-93	0807
Gross Wt. (g)	1.1033	"	"
Gross Wt. (g)	1.1037	"	0837
Gross Wt. (g)	1.1037	"	"

Filter + Sample Gross Wt. used for data entry (g) 1.1037
Filter Tare Wt. from tare weight data (g) 1.1022

COMMENTS:

FILTER + SAMPLE: Run No. KPM-10#2 Filter No. LF14 Sample No. 2013

		Date	Time
Gross Wt. (g)	1.1060	12-01-93	0807
Gross Wt. (g)	1.1061	"	"
Gross Wt. (g)	1.1060	"	0837
Gross Wt. (g)	1.1060	"	"

Filter + Sample Gross Wt. used for data entry (g) 1.1060
Filter Tare Wt. from tare weight data (g) 1.1059

COMMENTS:

FILTER + SAMPLE: Run No. KPM-10#3 Filter No. LF15 Sample No. 3018

		Date	Time
Gross Wt. (g)	1.0952	12-01-93	0800
Gross Wt. (g)	1.0952	"	"
Gross Wt. (g)	1.0952	"	0830
Gross Wt. (g)	1.0952	"	"

Filter + Sample Gross Wt. used for data entry (g) 1.0952
Filter Tare Wt. from tare weight data (g) 1.0937

COMMENTS:

NOTE: Control filter weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: Kiln - PM101 Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. Kiln P10-1 Beaker No. 1017 Sample No. 1017

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	249.0	Gross Wt. (g) 117.3745	12-03-93	1400
Beaker Tare Wt. (g)	117.0	Gross Wt. (g) 117.3744	12-03-93	2000
Sample + Rinses Wt. (g)	132.0	Gross Wt. (g) 117.3744	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 117.3744	12-04-93	1400
Acetone Wt. (g)	132.0			

Acetone Wt./0.79 = mLs Acetone (B): 167.1

Beaker + Acetone Residue Gross Wt. used for data entry (g) 117.3744

Beaker Tare Wt. from tare weight data (g) 117.3722

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-1 Beaker No. 1015 Sample No. 1015

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	253.0	Gross Wt. (g) 92.9950	12-03-93	1400
Beaker Tare Wt. (g)	93.0	Gross Wt. (g) 92.9947	12-03-93	2000
Sample + Rinses Wt. (g)	160.0	Gross Wt. (g) 92.9947	12-04-94	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 92.9948	12-04-94	1400
Acetone Wt. (g)	160.0			

Acetone Wt./0.79 = mLs Acetone (B): ~~176.0~~ 202.5

Beaker + Acetone Residue Gross Wt. used for data entry (g) 92.9948

Beaker Tare Wt. from tare weight data (g) 92.9930

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-1 Beaker No. 1014 Sample No. 1014

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	197.2	Gross Wt. (g) 98.9283	12-03-93	1400
Beaker Tare Wt. (g)	99.0	Gross Wt. (g) 98.9282	12-03-93	2000
Sample + Rinses Wt. (g)	98.2	Gross Wt. (g) 98.9282	12-04-94	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 98.9281	12-04-94	1400
Acetone Wt. (g)	98.2			

Acetone Wt./0.79 = mLs Acetone (B): 124.3

Beaker + Acetone Residue Gross Wt. used for data entry (g) 98.9282

Beaker Tare Wt. from tare weight data (g) 98.9160

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = — mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: Kiln Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. Kiln P10-2 Beaker No. 2017 Sample No. 2017

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	188.0	Gross Wt. (g) 102.6626	12-03-93	1400
Beaker Tare Wt. (g)	102.6	Gross Wt. (g) 102.6628	12-03-93	2000
Sample + Rinses Wt. (g)	85.4	Gross Wt. (g) 102.6627	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 102.6627	12-04-93	1400
Acetone Wt. (g)	85.4			

Acetone Wt./0.79 = mLs Acetone (B): 108.1

Beaker + Acetone Residue Gross Wt. used for data entry (g) 102.6627

Beaker Tare Wt. from tare weight data (g) 102.5881

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0001 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-2 Beaker No. 2015 Sample No. 2015

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	156.4	Gross Wt. (g) 83.9242	12-03-93	1400
Beaker Tare Wt. (g)	83.9	Gross Wt. (g) 83.9241	12-03-93	2000
Sample + Rinses Wt. (g)	72.5	Gross Wt. (g) 83.9240	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 83.9241	12-04-93	1400
Acetone Wt. (g)	72.5			

Acetone Wt./0.79 = mLs Acetone (B): 197.9

Beaker + Acetone Residue Gross Wt. used for data entry (g) 83.9241

Beaker Tare Wt. from tare weight data (g) 83.9240

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0001 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-2 Beaker No. 2014 Sample No. 2014

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

			Date	Time
Beaker + Sample + Rinses Wt. (g)	166.1	Gross Wt. (g) 102.5228	12-03-93	1400
Beaker Tare Wt. (g)	102.5	Gross Wt. (g) 102.5226	12-03-93	2000
Sample + Rinses Wt. (g)	63.6	Gross Wt. (g) 102.5224	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g) 102.5225	12-04-93	1400
Acetone Wt. (g)	63.6			

Acetone Wt./0.79 = mLs Acetone (B): 80.5

Beaker + Acetone Residue Gross Wt. used for data entry (g) 102.5226

Beaker Tare Wt. from tare weight data (g) 102.5186

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0001 mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: Kiln Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. Kiln P10-3 Beaker No. 3017 Sample No. 3017

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	248.7	Gross Wt. (g)	106.6633	12-03-93	1400
Beaker Tare Wt. (g)	106.7	Gross Wt. (g)	106.6634	12-03-93	2000
Sample + Rinses Wt. (g)	142.0	Gross Wt. (g)	106.6634	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)	106.6634	12-04-93	1400
Acetone Wt. (g)	142.0				
Acetone Wt./0.79 = mLs Acetone (B):	179.7				

Beaker + Acetone Residue Gross Wt. used for data entry (g) 106.6634
Beaker Tare Wt. from tare weight data (g) 106.6631
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = ~~N/A~~ 0.0001 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-3 Beaker No. 3015 Sample No. 3015

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	199.7	Gross Wt. (g)	112.9900	12-03-93	1400
Beaker Tare Wt. (g)	113.0	Gross Wt. (g)	112.9902	12-03-93	2000
Sample + Rinses Wt. (g)	86.7	Gross Wt. (g)	112.9901	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)	112.9901	12-04-93	1400
Acetone Wt. (g)	86.7				
Acetone Wt./0.79 = mLs Acetone (B):	109.7				

Beaker + Acetone Residue Gross Wt. used for data entry (g) 112.9901
Beaker Tare Wt. from tare weight data (g) 112.9872
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = ~~N/A~~ 0.0003 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. Kiln P10-3 Beaker No. ~~3015~~ 3014 Sample No. ~~3015~~ 3014

Sample Volume + Acetone Rinses of Bottle:		Beaker + Sample Residue Weights:		Date	Time
Beaker + Sample + Rinses Wt. (g)	167.4	Gross Wt. (g)	84.1221	12-03-93	1400
Beaker Tare Wt. (g)	84.1	Gross Wt. (g)	84.1219	12-03-93	2000
Sample + Rinses Wt. (g)	83.3	Gross Wt. (g)	84.1220	12-04-93	0800
Water Wt. (A) from Recovery Data: (g)	—	Gross Wt. (g)	84.1220	12-04-93	1400
Acetone Wt. (g)	83.3				
Acetone Wt./0.79 = mLs Acetone (B):	105.4				

Beaker + Acetone Residue Gross Wt. used for data entry (g) 84.1220
Beaker Tare Wt. from tare weight data (g) ~~112.9872~~ 84.1140
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = ~~N/A~~ 0.0001 mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

C.4.2 Kiln Condensible PM

GALBRAITH LABORATORIES, INC.

PHONE 615/546-1335 FAX 615/546-7209

LABORATORY REPORT

S. Szydlo
Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri 64110

Sample Received: 12/06/93
Report Date: 12/21/93
Purchase Order #: 011064

Sample ID	Lab ID	Analysis	Results	
1019	E-3337	Volume Received	198	mls.
		pH	2.52	
		Aqueous Layer mc	1.40	mg.
		Aqueous Layer mr	164.7	mg.
		Aqueous Layer mi	168.1	mg.
		Organic Layer mo	N.A.	
		CPM = (mo+mi-mc)	166.7	mg.
1020	E-3338	Volume Received	211	mls.
		pH	1.91	
		Aqueous Layer mc	N.A.	
		Aqueous Layer mr	N.A.	
		Aqueous Layer mi	N.A.	
		Organic Layer mo	54.8	mg.
		CPM = (mo+mi-mc)	54.8	mg.
2019	E-3339	Volume Received	233	mls.
		pH	2.55	
		Aqueous Layer mc	1.53	mg.
		Aqueous Layer mr	181.7	mg.
		Aqueous Layer mi	184.9	mg.
		Organic Layer mo	N.A.	
		CPM = (mo+mi-mc)	183.4	mg.
2020	E-3340	Volume Received	191	mls.
		pH	2.56	
		Aqueous Layer mc	N.A.	
		Aqueous Layer mr	N.A.	
		Aqueous Layer mi	N.A.	
		Organic Layer mo	15.3	mg.
		CPM = (mo+mi-mc)	15.3	mg.

LETTER AND SHIPMENTS BY U.S. MAIL — P.O. BOX 51610, KNOXVILLE, TN 37950-1610, OTHER CARRIERS — 2323 SYCAMORE DR., KNOXVILLE, TN 37921-1750
ESTABLISHED 1950

GALBRAITH LABORATORIES, INC.

PHONE 615/546-1335 FAX 615/546-7209

LABORATORY REPORT
S. Szydlo/Midwest Research Institute

Sample ID	Lab ID	Analysis	Results	
3019	E-3341	Volume Received	230	mg.
		pH	2.61	
		Aqueous Layer mc	0.47	mg.
		Aqueous Layer mr	159.5	mg.
		Aqueous Layer mi	162.3	mg.
		Organic Layer mo	N.A.	
		CPM = (mo+mi-mc)	161.8	mg.
3020	E-3342	Volume Received	212	mg.
		pH	2.60	
		Aqueous Layer mc	N.A.	
		Aqueous Layer mr	N.A.	
		Aqueous Layer mi	N.A.	
		Organic Layer mo	10.4	mg.
		CPM = (mo+mi-mc)	10.4	mg.
1066A	E-3343	Volume Received	115	mls.
1066B	E-3344	Volume Received	110	mls.

mc = 0.0205 x conc. SO_4 mg/ml x mls. of sample

$$mi = mr \times \frac{\text{vol. of sample}}{\text{volume of sample} - \text{mls. aliquot taken for } SO_4}$$

Authorized Release of Data:

Project Manager

CM:sla

LETTER AND SHIPMENTS BY U.S. MAIL — P.O. BOX 51610, KNOXVILLE, TN 37950-1610. OTHER CARRIERS — 2323 SYCAMORE DR., KNOXVILLE, TN 37921-1750

C.4.3 Kiln Multiple Metals/PM

FILTER PARTICULATE MATTER ANALYSIS DATA

MRI Project No. 4601.01.05.01 **Client:** EPA - Emission Inventory Branch (EIB)

Sampling Location: Kiln **Facility:** Belden Brick Co., Sugar Creek, Ohio

Analyst: Szydlo

Filter samples ~~heated at 160° C for 2-3 hours~~, desiccated, and weighed to a constant weight. Dessicated for 24 hrs

FILTER + SAMPLE: Run No. MMSMM-1 Filter No. LF5 Sample No. 1030

		Date	Time
Gross Wt. (g)	1.0942	11-21-93	1200
Gross Wt. (g)	1.0939	11-21-93	1800
Gross Wt. (g)	1.0939	11-22-93	0800
Gross Wt. (g)	1.0939	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.0939
Filter Tare Wt. from tare weight data (g) 1.0830

COMMENTS:

FILTER + SAMPLE: Run No. MMSMM-3 Filter No. LF6 Sample No. 3030

		Date	Time
Gross Wt. (g)	1.1287	11-21-93	1200
Gross Wt. (g)	1.1284	11-21-93	1800
Gross Wt. (g)	1.1283	11-22-93	0800
Gross Wt. (g)	1.1284	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.1285
Filter Tare Wt. from tare weight data (g) 1.1002

COMMENTS:

FILTER + SAMPLE: Run No. MMSMM-2 Filter No. LF4 Sample No. 2030

		Date	Time
Gross Wt. (g)	1.1212	11-21-93	1200
Gross Wt. (g)	1.1205	11-21-93	1800
Gross Wt. (g)	1.1204	11-22-93	0800
Gross Wt. (g)	1.1205	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.1205
Filter Tare Wt. from tare weight data (g) 1.1103

COMMENTS:

NOTE: Control filter weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01
Sampling Location: Kiln

Client: Emission Measurement Branch (EIB)
Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. MM5-1 Beaker No. 1065 Sample No. 1065

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 262.0
Beaker Tare Wt. (g) 92.5
Sample + Rinses Wt. (g) 169.5
Water Wt. (A) from Recovery Data: (g) 0.0
Acetone Wt. (g) 169.5
Acetone Wt./0.79 = mLs Acetone (B): 214.5

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 92.6267	12-02-93	1230
Gross Wt. (g) 92.6267	"	1300
Gross Wt. (g) 92.6266	"	1330
Gross Wt. (g) 92.6266	"	1400

Beaker + Acetone Residue Gross Wt. used for data entry (g) 92.~~6266~~ 5844
Beaker Tare Wt. from tare weight data (g) 92.5408
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0037 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. MM5-2 Beaker No. 2065 Sample No. 2065

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 296.2
Beaker Tare Wt. (g) 103.7
Sample + Rinses Wt. (g) 192.5
Water Wt. (A) from Recovery Data: (g) 0.0
Acetone Wt. (g) 192.5
Acetone Wt./0.79 = mLs Acetone (B): 243.7

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 103.7065	12-02-93	1235
Gross Wt. (g) 103.7063	"	1305
Gross Wt. (g) 103.7064	"	1335
Gross Wt. (g) 103.7066	"	1405

Beaker + Acetone Residue Gross Wt. used for data entry (g) 103.7065
Beaker Tare Wt. from tare weight data (g) 103.6735
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0037 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. MM-5-3 Beaker No. 3065 Sample No. 3065

Sample Volume + Acetone Rinses of Bottle:

Beaker + Sample + Rinses Wt. (g) 226.9
Beaker Tare Wt. (g) 99.3
Sample + Rinses Wt. (g) 127.6
Water Wt. (A) from Recovery Data: (g) 0.0
Acetone Wt. (g) 127.6
Acetone Wt./0.79 = mLs Acetone (B): 160.8

Beaker + Sample Residue Weights:

	Date	Time
Gross Wt. (g) 99.3347	12-02-93	1240
Gross Wt. (g) 99.3345	"	1310
Gross Wt. (g) 99.3348	"	1340
Gross Wt. (g) 99.3346	"	1410

Beaker + Acetone Residue Gross Wt. used for data entry (g) 99.3346
Beaker Tare Wt. from tare weight data (g) 99.2743
Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0037 mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

BLANKS (FRONT-HALF PARTICULATE MATTER) ANALYSIS DATA

MRI Project No. 4601.01.05.01 Client: EPA/Emission Measurement Branch
Sampling Location: Kiln Facility: Belden Brick, Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight. Filters heated at 105° C for 2-3 hours, desiccated, and weighed to a constant weight.

ACETONE BLANK DETERMINATION: Run No.(s): 1M-1 Beaker No. MM-131 Sample No. 1065
Acetone Volume Evaporated: Beaker + Evaporated Acetone Residue Weights:

			Date	Time
Beaker + Acetone Wt.(g) 265.2	Gross Wt.(g)	116.3952	12-02-93	1400
Beaker Tare Wt.(g) 116.4000	Gross Wt.(g)	116.3946	"	1430
Acetone Wt.(g) 148.8	Gross Wt.(g)	116.3946	"	1500
Acetone Wt./0.79 = mLs Acetone (A): 188.35	Gross Wt.(g)	116.3946	"	1530

Beaker + Acetone Residue Gross Wt. used for blank determination (g) 116.3946
Beaker Tare Wt. from tare weight data (g) 116.3936.9
Net Wt.(B), Residue in Beaker (g) .0007

Acetone Blank (B x 1000/A): 0.0037 mg/mL for data entry or for computing combined blank
COMMENTS:

WATER BLANK DETERMINATION: Run No.(s): —— Beaker No. ~~MM-131~~ Sample No. ~~2065~~
Water Volume Evaporated: Beaker + Evaporated Water Residue Weights:

			Date	Time
Beaker + Water Wt.(g)	Gross Wt.(g)			
Beaker Tare Wt.(g)	Gross Wt.(g)			
Water Wt.(g)	Gross Wt.(g)			
Water Wt. = mLs Water (A):	Gross Wt.(g)			

Beaker + Water Residue Gross Wt. used for blank determination (g)
Beaker Tare Wt. from tare weight data (g)
Net Wt.(B), Residue in Beaker (g)

Water Blank (B x 1000/A): mg/mL for data entry or for computing combined blank
COMMENTS:

FILTER BLANK: Run No.(s): 1 Filter No. LF19 Sample No. 1056

	Date	Time
Gross Wt.(g) 1.1129	12-02-93	1500
Gross Wt.(g) 1.1129	"	
Gross Wt.(g) 1.1128	"	
Gross Wt.(g) 1.1129	"	1600

Filter Gross Wt. (A) used for blank determination (g) 1.1129
Filter Tare Wt. (B) from tare weight data (g) 1.1129
Net Filter Wt. (A-B) Difference (g) 0.000

Filter Blank (±): grams for data entry (retain minus sign if value is negative)
COMMENTS:

NOTE: Control filter and beaker weight data and balance check data are on another form.

Interoffice Communication

MIDWEST RESEARCH INSTITUTE

March 14, 1994

To: R. Morenshaw

cc. R. Neulicht
A. Carender

From: A. Mainey

Re: **Metals analysis Summary for the EIB Emissions Test at Plant 6 Belden Brick Company in Sugarcreek, Ohio (Project No. 4601-01-05-04)**

INTRODUCTION

The Emissions Inventory Branch (EIB) emissions test for the Belden Brick kiln required metals analysis of the kiln stack gases. These samples were digested using Method 29 and SW-846 methods as specified in the Draft Test Plan, dated October 22, 1993.

A total of eleven metals are reported as analyzed in the stack gas samples received from the emissions test (Reference Tables 1 and 2). All data were obtained using CVAA (for Hg) and ICP-AES for all other analytes.

SAMPLE PREPARATION METHODS

The stack gas samples and blank reagents from the emissions test at the Belden brick kiln were digested using Draft Method 29 as indicated in the Draft Test Plan. Boric acid addition was not utilized as specified in the Test Plan, since the ICP was fitted with a Hydrofluoric acid (HF) resistant inlet system prior to analysis. The boric addition was previously used to allow ICP analysis without risk of damaging (HF etching) the torch.

In addition, the front-half filter, probe rinse and back-half impinger samples were digested and analyzed separately as requested by the program manager. The flow chart presented in the test plan (page 5-15) designates that these FH and BH samples are proportionally combined and then analyzed.

Further digestion was performed for mercury (Hg) in the stackgas samples using SW-846 Method 7470. This method was slightly modified in order to allow sufficient digest volume for multimetals analysis by ICP.

STACK GAS ANALYSIS

Multiple metals analysis was performed on a Thermo-Jarrell Ash Model 61E ICP-AES and Hg was analyzed using a PSA Merlin Plus Mercury Analyzer. Analysis methods utilized for multiple metals and mercury are SW-846 Methods 6010A and 7470, respectively. Each instrument was calibrated and verified using a calibration check standard (from an alternate supplier), prior to analysis of stackgas samples. In addition, method continuing calibration standards and blanks were routinely analyzed to verify calibration of the instrument.

An HF resistant inlet system to the ICP was utilized for the analysis of front-half digests containing HF, in order to prevent damage to the standard inlet system of the ICP.

Quarterly instrumental detection limits (IDL's) for each analytical system were utilized during these analyses. The quarterly IDLs are determined from seven analyses of a low standard on three non-consecutive days.

METALS ANALYTICAL RESULTS

Tables 1 and 2 present metals analysis results for the Belden Brick emissions test. There was a discrepancy between the traceability records and the identifier on the samples. Results are reported using the identifier on the actual samples.

The method blanks are used for monitoring potential laboratory contribution during processing and analysis. Levels of analytes in the method blank were beneath the detection limit for most analytes. The few analytes detected were close to the detection limit (i.e. less than approximately 2 times the MDL).

Reagent blanks were also analyzed to monitor potential for contribution from reagent supplies and equipment used in sample collection. All backhalf and Hg impinger reagents were detected near or less than the instrumental DL. Results for the filter and acetone rinse reagent blanks were detected near concentrations found in the train samples. These levels, as reported in Table 1 (1056/MMBI R. Blanks) were not expected. Available historical data for the front-half reagent blank results were faxed to you on March 10, 1994 to provide background information.

INSTRUMENTAL QUALITY CONTROL

Instrument calibration was verified using multielement standards obtained from an alternate supplier than those used for calibration. In addition, all correlation coefficient requirements were met per the analytical method. Instrumental drift was monitored throughout each analysis at less than 7% for all analytes (method criteria is $\pm 10\%$ from target). All initial calibration verification analyses met SW-846 Method 6010A and Method 7470 criteria and were within 5% from the target concentration (method criteria is $\pm 10\%$ from target).

In addition, the interference check standard results (ICP only) were within the limits set by Method 6010A (method criteria is ±20% from target). Serial dilution tests were not required per Method 6010A, due to the low levels in the resulting digest by ICP.

METHOD QUALITY CONTROL

Method quality control results are reported in Table 3 (for ICP analytes) and Table 5 (for Hg). Accuracy was monitored using spiked laboratory reagents (LCS), recoveries ranged 93% to 111% (criteria is 70 - 130%). Further accuracy was monitored using a front-half representative NIST filter containing certified levels of Cd, Mn and Pb. The resulting front-half recoveries ranged 70% to 110%, with the exception of Pb, which was at a target level below ICP detection capability.

Precision, based on duplicate samples were not a requirement for this work, based on QA/QC objectives in the Draft test plan. However, precision was monitored for Hg analysis, results for duplicate analysis were less than 5% relative percent difference.

GENERAL SUMMARY

Metals analyses were performed for all samples from the Belden Brick kiln stack gases for the Emissions Inventory Branch. These results as reported in appended Tables, met all QA/QC objectives in the test plan. One difficulty is noted; results for the filter/acetone reagent blank had higher levels than expected, for most analytes. These levels are near those reported for the stackgas samples.

Project No.: 4601-01-05-04
Preparation Method: Draft Method 29
Analysis Method: SW-846 Methods 6010A/7470
Instrumentation: TJA Model 61E ICP-AES and PSA Merlin Plus Hg Analyzer
Analytes: See below

TABLE 1. EIB WA # 1 BELDON BRICK EMISSIONS TEST -- Metals Analysis Summary

Front-half Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se	CVAA Hg
Microwave Method Blank	02881	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	< 1.26	< 8.51	< 2.33	< 3.23	1.18
Microwave Method Blank	02894	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	< 1.26	< 8.51	< 2.33	< 3.23	2.43
1056/MMBI (Filter/Acet. R.Blk)*	02883	ug	< 4.67	< 0.09	5.93*	5.62*	4.40*	2.18*	22.5*	155*	19.6*	12.9*	2.15
1055 (0.1N HNO3 R. Blank)	02895	ug	< 4.67	< 0.09	< 0.24	< 1.17	< 1.23	< 0.28	3.51	< 8.51	< 2.33	< 3.23	< 1.00
1029/1030/1065	02884	ug	< 4.67	< 0.09	7.52	6.01	35.8	7.70	32.5	152	21.0	23.4	1.73
2029/2030/2065	02885	ug	< 4.67	< 0.09	7.65	5.56	21.9	5.63	27.2	156	18.6	17.2	1.37
3029/3030/3065	02886	ug	< 4.67	< 0.09	6.36	5.56	22.2	5.48	27.2	157	17.9	18.1	11
Hg Prep Method Blank	02921	ug											2.26

* Results are higher than expected for sample 1056/MMBI (filter and acetone reagent blanks), since levels for these reagent blanks are elevated compared to historical data.

Back-half Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se	CVAA Hg
Method Blk/Cookdown Blk	02888	ug	2.49	< 0.030	0.099	< 0.350	< 0.340	0.047	< 0.520	< 2.88	< 1.46	< 3.03	< 1.00
1057/1055	02890	ug	< 1.89	< 0.033	0.160	< 0.382	0.589	0.228	2.08	< 3.14	< 1.59	< 3.31	0.637
1031	02889	ug	< 1.97	< 0.034	2.63	6.21	405	48.3	207	12.3	2.03	28.7	15.9
2031	02891	ug	< 1.96	0.034	6.31	27.2	2067	172	1133	7.77	1.92	32.9	4.86
3031	02892	ug	< 1.97	< 0.034	0.593	0.430	7.13	5.99	9.11	6.15	2.44	57.1	17.3
3031A	02893	ug	< 2.33	< 0.040	0.533	10.9	520	56.7	359	< 3.870	< 1.962	7.33	0.098

Notes:

"<" indicates a sample result below the method DL.
All analyses reported are from ICP analysis results except for Hg which is taken from CVAA analyis results.
Bold values represent field samples, all others are laboratory generated QC samples.

Project No.: 4601-01-05-04
Preparation Method: Draft Method 29/SW-846 7470
Analysis Method: SW-846 Method 7470
Instrumentation: PSA Merlin Plus Hg Analyzer
Analytes: Hg

TABLE 2. EIB WA # 1 BELDON BRICK EMISSIONS TEST -- Metals Analysis Summary

Impingers 4 - 6, Hg Results:

Sample ID	Barcode ID	CVAA Hg	Units
Method Blank	02921	2.26*	ug
1058 Reagent Blank	02904	0.150	ug
1059 Reagent Blank	02905	< 0.20	ug
1060 Reagent Blank	02906	0.294	ug
1032	02907	0.353	ug
2032	02908	0.132	ug
3032	02909	0.394	ug
1033	02910	5.72	ug
2033	02911	5.04	ug
3033	02912	4.28	ug
1034	02913	< 0.22	ug
2034	02914	0.264	ug
3034	02915	0.238	ug

"<" indicates a sample result is below the method DL.
Bold values represent field samples, all others are laboratory generated QC samples.

* The method blank level is near the DL

Project: 4601-01-05-04
Analyst: S. Cogbill
Data Analyst: R. Friesen
Analytes: See below
Analysis Date: 12/93

Preparation Method: Draft Method 29
Analysis Method: SW-846 Method 6010A
Instrumentation.: TJA Model 61E ICP-AES

TABLE 3 QC Summary for Multiple Metals ICP Analysis of FH and BH Samples for EIB WA#1 BELDON BRICK EMISSIONS TEST

Front-Half QC Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se
LCS	02882	ug	100.090	97.839	108.330	105.460	105.340	106.960	109.580	110.330	106.820	102.250
LCS Spike Level		ug	100	100	100	100	100	100	100	100	100	100
LCS % Recovery:			100.1%	97.8%	108.3%	105.5%	105.3%	107.0%	109.6%	110.3%	106.8%	102.3%
NIST 2676c Ic**	02896	ug	< 4.67	< 0.09	0.672	< 1.17	< 1.23	2.315	< 1.26	< 8.51	< 2.33	< 3.23
NIST 2676c Ic Spike Level		ug	NA	NA	0.954	NA	NA	2.11	NA	7.47	NA	NA
NIST % Recovery:			NA	NA	70.4%	NA	NA	109.7%	NA	0.0%	NA	NA

** The NIST filter digested was low level. The Pb concentration was below the quarterly IDL and therefore shows low recovery.

Back-Half QC Results:

Sample ID	Barcode ID	Units	As	Be	Cd	Co	Cr	Mn	Ni	Pb	Sb	Se
LCS	02897	ug	101.690	96.588	107.730	104.530	103.990	104.340	107.180	107.560	103.640	101.040
LCS Spike Level		ug	100	100	100	100	100	100	100	100	100	100
LCS % Recovery:			101.7%	96.6%	107.7%	104.5%	104.0%	104.3%	107.2%	107.6%	103.6%	101.0%

"<" indicates a sample result below the method DL.

% RPD = | Found 1 - Found 2 | / {(Found 1 + Found 2) / 2 } * 100

LCS % Recovery = LCS Found / LCS Spike Level * 100

Project: 4601-01-05-04
Analyst: R. Friesen
Data Analyst: R. Friesen
Analyte: Hg
Analysis Date: 12/01/93

Preparation Method: SW-846 Method 7470A (Modified)
Instrumentation: PSA Merlin Plus Mercury Analyzer
Instrument ID No.: 012111-5
Instrument Datafile: HGDC01.R01
Lotus File: 4601HG.WK1

TABLE 4 QC Summary for Hg CVAA Analysis of FH and BH Samples for EIB WA#1 BELDON BRICK EMISSIONS TEST

Sample ID	Reported Average Conc.	Units	% Recovery	% RPD*	
1055 (digest) MS	49.2	ug	98.3%	----	
7470 LCS	49.3	ug	98.6%	----	Front-half Results
FH LCS (digest)	1074	ug	107.4%	----	
3029/3030/3065 (digest)	**11.0**	ug	----	**4.3%**	
BH MB/Ckdn Blk (digest)	< 1.00	ug	----	----	
BH LCS (digest)	985	ug	98.5%	----	
1031	**15.9**	ug	----	**1.5%**	Back-half Results
2031	**4.86**	ug	----	**1.3%**	
3031	**17.3**	ug	----	**0.8%**	
1055/1057 BH Blank	**0.637**	ug	----	----	
1055/1057 MS	49.2	ug	94.2%	----	
1033	**5.72**	ug	----	**4.6%**	
2033	**5.04**	ug	----	**1.7%**	
3033	**4.28**	ug	----	**1.9%**	Impinger 4 - 6 Results
1058 MS	48.4	ug	93.3%	----	
1059 MS	50.3	ug	98.4%	----	
1060 MS	48.7	ug	94.8%	----	

Bold Sample IDs represent field samples, all others are lab QC samples.
"<" indicates a sample result below the method DL.
"digest" means that the Hg aliquot is taken from a previously digested sample.
*RPD Relative Percent Difference. This is calculated only if the instrument response is greater than 10 times the IDL.

C.4.4 Kiln Semivolatile Organic Compounds

INTEROFFICE MEMORANDUM

MIDWEST RESEARCH INSTITUTE

January 5, 1994

To: R. Marinshaw

From: W. Whitacre

Subject: Results of Semivolatile Analysis, EIB, Belden Brick Emission Test, MRI PRoject No. 4601-01

This memo describes the analysis for semivolatile organic analytes in samples collected from the Belden Brick, Kiln. Supporting information is attached to this memo in tabular format.

SAMPLE RECEIPT

Samples were received on November 15, 1993, the samples were stored at 4°C prior to extraction. Reagent blanks were received with the MM5 samples. These blanks were archived in the cold room.

SAMPLE PREPARATION

The MM5 samples were extracted according to EPA SW-846 Method 0010. The extractions were started on November 16, 1993 and GC/MS analysis completed on December 1, 1993. All holding times were met for extraction and analysis.

For the MM5 samples, the XAD/filter were combined, fortified with the 8270 Base/Neutral and Acid surrogate spiking mix, and Soxhlet-extracted with methylene chloride (Method 3540). The front half rinse, back half rinse, and condensate were combined in a separatory funnel and extracted with methylene chloride (Method 3510). The two extracts were combined and concentrated using Kuderna-Danish and nitrogen evaporation to a volume of 10 mL. The samples were split, 5 mL for archive and 5 mL were further concentrated to 1 mL.

Three additional samples labeled filter support rinse were collected in the field. These rinses were spiked with the surrogate spiking mixes and concentrated by Kuderna-Danish and nitrogen evaporation to 10 mL. The samples were split, 5 mL for archive and 5 mL were further concentrated to 1 mL.

The samples were analyzed by quadruple gas chromatography/mass spectrometry (GC/MS), on the TRIO-1A using a

DB-5 60-m column according to SW-846 Method 8270. Two of the MM5 sample trains were diluted. Run 1 was injected twice for a duplicate injection.

RESULTS

The results of the semivolatile analysis and the surrogate recoveries of the MM5 and filter support rinse samples are presented in Tables 1 and 2. Detection limits are based upon the concentration of the lowest calibration standard. All surrogate recoveries meet the Quality Assurance Project Plan (QAPjP) objective of 50 to 150 percent for the MM5 samples. During the analysis of the filter support rinses, the internal standard areas decreased by a factor of three. This is attributed to sample matrix effects since the extracts were a black color with visible particles suspended in the solvent. The lower internal standard areas affected the surrogate recoveries and the majority were outside the method objective. These samples could be subject to cleanup (e.g., Florisil or GPC) and reanalyzed to improve surrogate recovery and internal standard response. This additional work is outside the scope of this project.

During the extraction of the XAD/filter samples, a XAD method blank, 28425, and one XAD QA spike, 00482, were also extracted. A water QA spike, 00483, was extracted with the condensate samples. The method blank contained five compounds. A Performance Audit Sample (PAS), 00481, provided by D. Hooton was analyzed by GC/MS. The results and surrogate recoveries of the blank and QA samples were given in Tables 3 and 4. Both the PAS and the spikes met the objective of 50 to 150 percent.

QUALITY CONTROL

For the initial calibration curve analyzed on October 25, 1993, all CCC's and SPCC's passed Method criteria. Two analytes were greater than 30 percent REF (Benzidine at 42 percent and 3,3'-dichlorobenzidine at 30.1 percent).

All CCC's and SPCC's for the CCAL (continuing calibration check) analyzed on November 30, 1993 passed Method criteria. Four analytes were greater than 30 percent difference from the initial calibration curve (benzoic acid at 47 percent, 2,4-dinitrophenol at 30.3 percent, 3,'dichlorobenzidine at 30.1 percent, and benzidine at 86 percent).

All CCC's and SPCC's for the CCAL (continuing calibration check) analyzed on December 1, 1993 passed Method criteria. One analyte was greater than 30 percent difference from the initial calibration curve (benzidine at 62 percent).

The method blank contained four compounds, three of which were also found in the samples. The amounts in the blank are lower than the samples. The compounds and amounts in the blank are: benzoic acid 64 μg, naphthalene 3.1 μg, 2-hydroxyace-

TABLE 1. SEMIVOLATILE RESULTS (ug)

Analyte	Run 1	Run 1 RI	Run 2	Run 3	1038a (a)	2038a (a)	3038a (a)
Phenol	13	13	13	8.7	<2	<2	<2
Aniline	<2	<2	<2	<2	<2	<2	<2
Bis(2-chloroethyl)ether	<2	<2	<2	<2	<2	<2	<2
2-Chlorophenol	<2	<2	<2	<2	<2	<2	<2
1,3-Dichlorobenzene	<2	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	4.8	4.8	4.9	9.7	<2	<2	<2
Benzyl alcohol	<2	<2	<2	<2	<2	<2	<2
1,2-Dichlorobenzene	<2	<2	<2	<2	<2	<2	<2
2-Methylphenol	2.1	2.2	<2	<2	<2	<2	<2
2,2'-oxybis(1-Chloropropane)	<2	<2	<2	<2	<2	<2	<2
4-Methylphenol	<2	<2	<2	<2	<2	<2	<2
N-Nitrosodipropylamine	<2	<2	<2	<2	<2	<2	<2
Hexachloroethane	<2	<2	<2	<2	<2	<2	<2
Nitrobenzene	<2	<2	<2	<2	<2	<2	<2
Isophorone	<2	<2	<2	<2	<2	<2	<2
2-Nitrophenol	<2	<2	<2	<2	<2	<2	<2
2,4-Dimethylphenol	<2	<2	<2	<2	<2	<2	<2
Benzoic acid	<2	<2	<2	623	<2	<2	<2
Bis(2-chloroethoxy)methane	<2	<2	<2	<2	<2	<2	<2
2-Chloroacetophenone	<2	<2	<2	<2	<2	<2	<2
2,4-Dichlorophenol	<2	<2	<2	<2	<2	<2	<2
1,2,4-Trichlorobenzene	<2	<2	<2	<2	<2	<2	<2
Naphthalene	6	6	12	8.5	<2	<2	<2
4-Chloroaniline	<2	<2	<2	<2	<2	<2	<2
2,6-Dichlorophenol	<2	<2	<2	<2	<2	<2	<2
Hexachlorobutadiene	<2	<2	<2	<2	<2	<2	<2
4-Chloro-3-methylphenol	<2	<2	<2	<2	<2	<2	<2
2-Hydroxyacetophenone	<2	<2	<2	<2	<2	<2	<2
2-Methylnaphthalene	4.8	4.9	11	7.4	<2	<2	<2
Hexachlorocyclopentadiene	<2	<2	<2	<2	<2	<2	<2
2,4,6-Trichlorophenol	<2	<2	<2	<2	<2	<2	<2
2,4,5-Trichlorophenol	<2	<2	<2	<2	<2	<2	<2
2-Chloronaphthalene	<2	<2	<2	<2	<2	<2	<2
2-Nitroaniline	<2	<2	<2	<2	<2	<2	<2
Dimethylphthalate	<2	<2	<2	<2	<2	<2	<2
Acenaphthylene	<2	<2	<2	<2	<2	<2	<2
2,6-Dinitrotoluene	<2	<2	<2	<2	<2	<2	<2
2,3,4,6-Tetrachlorophenone	<2	<2	<2	<2	<2	<2	<2
3-Nitroaniline	<2	<2	<2	<2	<2	<2	<2
Acenaphthene	<2	<2	<2	<2	<2	<2	<2
2,4-Dinitrophenol	<2	<2	<2	<2	<2	<2	<2
4-Nitrophenol	<2	<2	<2	<2	<2	<2	<2
Dibenzofuran	<2	<2	<2	<2	<2	<2	<2

TABLE 1. SEMIVOLATILE RESULTS (continued)

Analyte	Run 1	Run 1 RI	Run 2	Run 3	1038a (a)	2038a (a)	3038a (a)
2,4-Dinitrotoluene	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	53	53	23	18	<2	<2	<2
4-Chlorophenylphenyl ether	<2	<2	<2	<2	<2	<2	<2
Fluorene	<2	<2	<2	<2	<2	<2	<2
4-Nitroaniline	<2	<2	<2	<2	<2	<2	<2
4,6-Dinitro-2-methylphenol	<2	<2	<2	<2	<2	<2	<2
N-Nitrosodiphenylamine	<2	<2	<2	<2	<2	<2	<2
4-Bromophenyl-phenylether	<2	<2	<2	<2	<2	<2	<2
Hexachlorobenzene	<2	<2	<2	<2	<2	<2	<2
Pentachlorophenol	<2	<2	<2	<2	<2	<2	<2
Phenanthrene	<2	<2	<2	<2	<2	<2	<2
Anthracene	<2	<2	<2	<2	<2	<2	<2
Carbazole	<2	<2	<2	<2	<2	<2	<2
Di-n-butyl phthalate	13	13	14	31	<2	<2	<2
Fluoranthene	<2	<2	<2	<2	<2	<2	<2
Benzidine	<2	<2	<2	<2	<2	<2	<2
Pyrene	<2	<2	<2	<2	<2	<2	<2
Butylbenzyl phthalate	2	<2	2.2	3	<2	<2	<2
3,3'-Dichlorobenzidine	<2	<2	<2	<2	<2	<2	<2
Benzo(a)anthracene	<2	<2	<2	<2	<2	<2	<2
Chrysene	<2	<2	<2	<2	<2	<2	<2
Bis(2-ethylhexyl) phthalate	77	77	240	510	<2	<2	<2
Di-n-octyl phthalate	<2	<2	<2	10	<2	<2	<2
Benzo(b)fluoranthene	<2	<2	<2	<2	<2	<2	<2
Benzo(k)fluoroanthene	<2	<2	<2	<2	<2	<2	<2
Benzo(a)pyrene	<2	<2	<2	<2	<2	<2	<2
Indeno(1,2,3-cd)pyrene	<2	<2	<2	<2	<2	<2	<2
Dibenz(a,h)anthracene	<2	<2	<2	<2	<2	<2	<2
Benzo(g,h,i)perylene	<2	<2	<2	<2	<2	<2	<2

(a) These samples are filtered support rises. The extracts were black and the sample matrix interfered with analysis. The internal standard areas were low and surrogate recovery did not meet objectives.

TABLE 2. SURROGATE RECOVERY, %

Analyte	Sample ID						
	Run 1	Run 1 RI	Run 2	Run 3	1038A	2038A	3038A
D4-1-2-Dichlorobenzene	57	57	72	67	31[a]	29[a]	32[a]
D5-Nitrobenzene	63	61	73	67	64	49[a]	56
2-Fluorobiphenyl	76	76	83	82	128	340[a]	495[a]
D14-4-Terphenyl	94	91	91	102	280[a]	423[a]	485[a]
2-Fluorophenol	62	62	75	68	39[a]	42[a]	42[a]
D6-Phenol	60	61	75	68	13[a]	13[a]	10[a]
D4-2-Chlorophenol	60	61	71	67	6.4[a]	47[a]	48[a]
2,4,6-Tribromophenol	106	115	111	118	220[a]	528[a]	650[a]

[a]Do not meet method objective of 50 to 150 percent. Samples extracts were dark in color and internal standard response was less than required.
These difficulties are due to the sample matrix.

TABLE 3. SEMIVOLATILE QA RESULTS (ug)

Analyte	Method blank	00481	Percent recovery	00482	Percent recovery	00483	Percent recovery
Phenol	<2	308	92	39	58	10	30
Aniline	<2	<2		<2		<2	
Bis(2-chloroethyl)ether	<2	<2		<2		<2	
2-Chlorophenol	<2	316	95	39	58	22	67
1,3-Dichlorobenzene	<2	597	90	76	57	34	50
1,4-Dichlorobenzene	<2	615	92	79	59	36	55
Benzyl alcohol	<2	597	90	77	57	29	45
1,2-Dichlorobenzene	<2	589	88	74	55	35	54
2-Methylphenol	<2	<2		<2		<2	
2,2'-oxybis(1-Chloropropane)	<2	<2		<2		<2	
4-Methylphenol	<2	5.3		<2		<2	
N-Nitrosodipropylamine	<2	<2		<2		<2	
Hexachloroethane	<2	592	89	71	53	30	45
Nitrobenzene	<2	584	88	80	60	46	70
Isophorone	<2	584	88	86	64	50	76
2-Nitrophenol	<2	320	96	43	64	23	71
2,4-Dimethylphenol	<2	337	101	15	22	17	52
Benzoic acid	64	<2		85		<2	
Bis(2-chloroethoxy)methane	<2	<2		<2		<2	
2-Chloroacetophenone	<2	<2		<2		<2	
2,4-Dichlorophenol	<2	331	99	<2	65	24	74
1,2,4-Trichlorobenzene	<2	606	91	82	61	41	62
Naphthalene	3.1	326	98	46	69	24	71
4-Chloroaniline	<2	<2		<2		<2	
2,6-Dichlorophenol	<2	<2		<2		<2	
Hexachlorobutadiene	<2	617	93	82	61	37	56
4-Chloro-3-methylphenol	<2	323	97	49	73	25	77
2-Hydroxyacetophenone	3.2	<2		<2		<2	
2-Methylnaphthalene	<2	554	83	81	60	45	68
Hexachlorocyclopentadiene	<2	607	91	42	3	18	27
2,4,6-Trichlorophenol	<2	350	105	54	81	27	83
2,4,5-Trichlorophenol	<2	<2		<2		<2	
2-Chloronaphthalene	<2	604	91	93	70	51	76
2-Nitroaniline	<2	<2		<2		<2	
Dimethylphthalate	<2	<2		<2		<2	
Acenaphthylene	<2	360	108	59	88	31	94
2,6-Dinitrotoluene	<2	662	99	128	96	58	88
2,3,4,6-Tetrachlorophenone	<2	<2		<2		<2	
3-Nitroaniline	<2	<2		<2		<2	
Acenaphthene	<2	337	101	57	85	29	88
2,4-Dinitrophenol	<2	200	60	<2	0	167	5
4-Nitrophenol	<2	289	87	57	85	9	27
Dibenzofuran	<2	574	86	104	78	56	85

TABLE 3. SEMIVOLATILE QA RESULTS (continued)

Analyte	Method blank	00481	Percent recovery	00482	Percent recovery	00483	Percent recovery
2,4-Dinitrotoluene	<2	632	95	128	96	58	88
Diethyl phthalate	<2	<2		<2		<2	
4-Chlorophenylphenyl ether	<2	<2		<2		<2	
Fluorene	<2	354	106	67	100	33	100
4-Nitroaniline	<2	<2		<2		<2	
4,6-Dinitro-2-methylphenol	<2	280	84	19	29	21	65
N-Nitrosodiphenylamine	<2	<2		<2		<2	
4-Bromophenyl-phenylether	<2	<2		<2		<2	
Hexachlorobenzene	<2	620	93	119	89	63	95
Pentachlorophenol	<2	365	110	38	57	29	88
Phenanthrene	<2	345	104	66	99	32	97
Anthracene	<2	339	102	63	94	31	92
Carbazole	<2	<2		<2		<2	
Di-n-butyl phthalate	<2	<2		<2		<2	
Fluoranthene	<2	358	108	71	106	35	106
Benzidine	<2	<2		<2		<2	
Pyrene	<2	342	103	69	103	35	105
Butylbenzyl phthalate	<2	<2		<2		<2	
3,3'-Dichlorobenzidine	<2	<2		<2		<2	
Benzo(a)anthracene	<2	314	94	62	93	30	90
Chrysene	<2	292	88	58	87	28	86
Bis(2-ethylhexyl) phthalate	17	<2		14		<2	
Di-n-octyl phthalate	<2	<2		<2		<2	
Benzo(b)fluoranthene	<2	352	106	73	109	31	92
Benzo(k)fluoroanthene	<2	318	95	63	94	29	89
Benzo(a)pyrene	<2	336	101	59	88	27	82
Indeno(1,2,3-cd)pyrene	<2	332	100	62	93	28	85
Dibenz(a,h)anthracene	<2	352	106	65	97	29	88
Benzo(g,h,i)perylene	<2	265	80	49	73	22	70

TABLE 4. QA SURROGATE RECOVERY, %

Analyte	Sample ID		
	Method blank	00482	00483
D4-1,2-Dichlorobenzene	51	56	45[A]
D5-Nitrobenzene	55	62	67
2-Fluorobiphenyl	60	73	66
D14-4-Terphenyl	100	93	67
2-Fluorophenol	49[a]	49[a]	41[a]
D6-Phenol	51	54	27[a]
D4-2-Chlorophenol	50	52	60
2,4,6-Tribromophenol	67	98	92

[a]Do not meet method objective of 50 to 150 percent.

tophenone 3.2 μg, and bis(2-ethyl hexyl)phthalate 17 μg, benzoic acid is found Run 3 at 623 μg, naphthalene--Runs 1 through 3 at 6 to 12 μg, and bis(2-ethylhexyl)phthalate Runs 1 through 3 at 77 to 510 μg. Benzoic acid and bis(2-ethylhexyl)phthalate were found in the XAD spike sample 00482.

C 86

C.4.5 Kiln Volatile Organic Compounds

.C 88

MIDWEST RESEARCH INSTITUTE

INTEROFFICE COMMUNICATION

To: Rick Marinshaw and Roy Neulicht **Date:** December 20, 1993

From: Margie St. Germain

Subject: EIB Brick Kiln, VOST Analysis Report, Project No. 4601-0105-02

The quantitation data for the submitted samples from the EIB Brick Kiln are attached. As indicated in the test plan, dated October 22, 1993, SW-846 Method 5041 was followed using the target analyte listing from SW-846 Method 8240. The method objectives listed in Sections 7.16 and 7.17 were met, except for those objectives that appear as footnotes on the attached data forms. All supporting raw data are organized according to analysis dates, are stored in Room 300-W, and are ready for archival.

The following chronological listing is a summary of key events that affect the data reporting and quality.

1. Roy Neulicht approved three requested method changes on October 29, 1993.
   a. Bromoform does not have to meet the method objective of the minimum average relative response factor (RRF) of 0.250. The average RRF for bromoform on the Tenax/charcoal traps was 0.193 for the calibration curve. All other standards met the minimum RRF for bromoform.
   b. Standards from a previous project were available for use so that costs for EIB could be reduced. One client-requested compound (1,2-dichloroethene) was not in the standard. We reviewed data for indications of the presence of 1,2-dichloroethene and did not find any in the field samples.
   c. d6-Benzene was substituted for d4-Benzene.

2. Samples were received on November 15, 1993, in good condition. Eleven trap pairs were received, including two field blank pairs, two trip blank pairs, and seven sample pairs.

3. The 48-hour preliminary report was waived due to instrument difficulties, as discussed with Roy Neulicht on November 16, 1993. Roy Neulicht and Rick Marinshaw were briefed on the project status on a daily basis.

4. Tenax calibration curve was extended with two standards on November 18, 1993, and two more standards on November 19, 1993. The purpose was to bracket the

high levels of benzene in the samples. The addition of calibration points to the curve for high level samples is allowed by Method 5041.

5. The preliminary results for Sample 1069 were facsimiled to Rick Marinshaw for review on November 19, 1993. The results for the sample were comparable to the previous studies, as discussed with Rick Marinshaw on November 19, 1993.

6. As discussed with Rick Marinshaw on November 20, 1993, the benzene results on the Tenax traps ranged from 1,048 ng to 25,800 ng (est.). The remaining analyte amounts on the Tenax traps were reproducible. Rick indicated that we will not be analyzing the remaining samples.

7. Sample 1073 contained very high levels of benzene and the instrument detector was saturated. The benzene result should be considered a minimum value.

8. Since the Tenax samples contained high levels of analytes, several system blanks were required to ensure that the analytical system was free of sample contamination.

9. Sample analyses were completed on November 23, 1993; all analyses were performed within the 14-day holding time.

Assessment of Data Quality

The method was followed and the objectives were met except for the following:

1. Chloromethane, bromomethane, and iodomethane were observed in the system blank samples. The source of the contamination was identified as the methanol which was used to prepare the internal standard solution and the internal standard/surrogate solution. Chloromethane was observed in the samples at 10 times the amount found in the system blanks. Bromomethane was observed in the samples at the same level or below that found in the system blank. Iodomethane was not required by the client.

2. The calibration curve ranged from 20 ng to 3,000 ng for the Tenax trap analysis, with an extension for benzene up to 15,000 ng. Four compounds (chloromethane, bromomethane, 1,1,2-trichlorotrifluoroethane, and methylene chloride) did not meet the calibration curve objective of 30% RSD.

   The calibration curve ranged from 20 ng to 1,000 ng for the Tenax/charcoal trap curve. Eight compounds (chloromethane, bromomethane, dichlorodifluoromethane, methylene chloride, carbon disulfide, benzene, 1,1,2-trichloroethane, and chloroethane) did not meet the 30% RSD objective.

All values below 20 ng are considered estimates.

3. Two additional standards with benzene and internal standards were analyzed in order to quantitate the high level of benzene in one sample. Since the benzene peak was saturated in these two standards, the average response factor was not calculated for these two points. The calibration standards were used to estimate the level of benzene found in the sample using a single point calibration.

4. A high bias was observed in the performance audit samples (PAS) for several analytes.

   For the Tenax trap analysis, three compounds (carbon tetrachloride, *cis*-1,3-dichloropropene, and *trans*-1,3-dichloropropene) did not meet the 70% to 130% objective listed in the project plan. As discussed with D. Hooton, the analysis proceeded since it was a screening analysis for emission factors. These three analytes were not observed in the samples.

   For the Tenax/charcoal trap analysis, five compounds in one PAS and eight compounds in a second PAS did not meet the 70% to 130% objective listed in the project plan. The results for the two PAS were consistent with each other. The affected compounds were 1,1-dichloroethane, 1,2-dichloroethane, *trans*-1,2-dichloroethane, carbon tetrachloride, 1,2-dichloropropane, *cis*-1,3-dichloropropene, dibromochloromethane, and *trans*-1,3-dichloropropene. The results were discussed with D. Hooton on November 24, 1993. These compounds were not observed in the samples.

The attached data are organized into four sections.

A. Sample Receipt
B. Quality Control Sample Data: Tenax Only
C. Quality Control Sample Data: Tenax/Charcoal
D. Sample Data

4601-01-05-02

VOST Sample Receipt

7 Large St. Kern

☐ CHAIN OF CUSTODY RECORD
☑ SAMPLE TRACEABILITY RECORD

Container (Cooler) No. VOST

Page 1 of 1 Transfer No.

Checked by (Initials)/Date

Lock or Seal Intact (Yes or No)/Time

Field Sample Custodian: James Surman

Storage Requirements:
- ☑ Ice water, ≤ 4°C
- ☐ Dry ice
- ☐ Room Temp., ≤ 26°C
- ☐ Other: _____

1067 Pr 1 Tnx 4601-01 ✓	1068 Pr 1 T/C 4601-01 ✓	1069 Pr 2 Tnx 4601-01 ✓	✓ Remarks:
1070 Pr 2 T/C 4601-01 ✓	1071 Pr 3 Tnx 4601-01 ✓	1072 Pr 3 T/C 4601-01 ✓	✓ Remarks:
1073 Pr 4 Tnx 4601-01 ✓	1074 Pr 4 T/C 4601-01 ✓	1075 Fd B Tnx 4601-01 ✓	✓ Remarks:
1076 Fd B T/C 4601-01 ✓	1077 Tr B Tnx 4601-01 ✓	1078 Tr B T/C 4601-01 ✓	✓ Remarks:
2067 ✓ Pr 1 Tnx 4601-01	2068 Pr 1 T/C 4601-01 ✓	2069 Pr 2 Tnx 4601-01 ✓	✓ Remarks:
2070 ✓ Pr 2 T/C 4601-01	2071 Pr 3 Tnx 4601-01 ✓	2072 Pr 3 T/C 4601-01 ✓	✓ Remarks:
2075 Fd B Tnx 4601-01 ✓	2076 Fd B T/C 4601-01 ✓	2077 Tr B Tnx 4601-01 ✓	✓ Remarks:
2078 Tr B T/C 4601-01 ✓			✓ Remarks:
11-24-93 Sample numbers match, but pair # designations do not match. [illegible] the intended communications [illegible] 12-14-93			Remarks:
NO condensate samples			Remarks:
Note! Samples 2073 & 2074 were not collected. Trays are blank, sampling stopped after 7th pair.			Remarks:

Sample Transfers:

Relinquished By:	Received By:	Date	Time	No.	Reason for Transfer:
[signature]	[signature]	11/15/93	0930	1	
				2	
				3	
				4	

93-4 SEV sum wkshl 020293

SAMPLE RECEIPT CHECKLIST

MRI Project No. 4601-01-05

Instructions are on the back of the checklist.
Samples Received by: ROD HENRY Date: 11/15/93
Airbill No. N/A Chain-of-Custody No. N/A

Yes/No

Y 1. Is the shipping container intact?
What kind of container is it? COOLER

Y 2. Chain-of-custody form present? Record number above.

N 3. Chain-of-custody form properly filled out?

N/A 4. Airbill present? Record number above.

N 5. Were samples under some kind of custody seal?
What kind of custody seals were used:
____ a. Bottle sealed?
____ b. Bag sealed?
____ c. Cooler sealed?
____ d. Other? Specify____
If there are custody seal numbers verify them versus the chain-of-custody form or if they are not on the form, record them on the form or versus the sample number.

N/A 6. Were the custody seals intact?

Y 7. All sample containers intact, none broken or leaking?

Y 8. Does the chain-of-custody form or sample inventory indicate the type of sample and the sample container? If not, indicate on the form or below.

Y 9. Ice packs or ice still frozen?
____ If no, are samples still cold? Contact project leader to see if the sample temperature needs to be measured.

Y 10. All samples on chain-of-custody form, sample inventory, or packing list accounted for? Do the actual sample labels or tags match all the paperwork? If not, describe on the form or below any discrepancies by listing the numbers on the containers versus the numbers on the chain-of-custody form.

Y 11. Sample labels permanently affixed? If not, affix the label permanently.

Y 12. Did you sign, date, and complete all areas of every form received with the samples?

Y 13. Did you store samples as indicated by the project leader?

N 14. Did you indicate where samples are stored on the chain-of-custody form?

COMMENTS AND ANY REMARKS AS SPECIFIED ABOVE:

THIS FORM HAS BEEN COMPLETED ON 12-14-93 FROM NOTES AND SAMPLE TRACEABILITY RECORD.
#3 - ONE FILTER WAS NUMBERED INCORRECTLY - 2019, AND CHANGED TO READ 2019 LF19.
SAMPLES WERE STORED IN SITE

Attach any additional pages needed for comments.

MRI-A\ZS310.SOP

ORIGINALS TO M. ST. GERMAIN
12-14-93

INSTRUCTIONS

1. Fill in the form completely. For areas where a Yes/No response is not applicable, mark the area "N/A".

2. Wherever possible indicate all problems on the chain-of-custody form or sample inventory. Any negative answer to the questions should be explained. If there is not enough room on the chain-of-custody form, write the explanations on this form and attach any additional sheets needed.

3. Check off each sample received on the sample inventory or chain-of-custody form. If there is not a client-supplied inventory, generate an inventory by listing:

    a. Shipper.

    b. Sample type.

    c. Sample shipping container.

    d. Sample container.

    e. Each sample name with the information on the sample label.

4. Indicate on the chain-of-custody form where samples are stored.

5. If there are any problems that affect the integrity of the sample (e.g., unsigned chain-of-custody form, chain-of-custody form in error, mislabeled samples, broken samples, contaminated samples, leaking samples, etc.), tell the project leader immediately. The sample custodian or project leader must:

    a. Inform the client immediately.

    b. Take any action indicated by client.

    c. Document the action in a telephone contact report and telefax the report that day to the client.

    d. File the phone contact report in the sample receipt file.

6. Create a sample receipt file. Place this form, accompanying comments, the packing list, chain-of-custody forms, the airbill, and any phone contact reports in the sample receipt file. Within one working day, deliver the sample receipt file to the document control officer.

MRI

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November 11, 1993

To: M. St. Germain, M. Whitacre, A. Mainey

From: R. Marinshaw

Subject: Request for Analysis of Samples From Belden Brick Emission Test
MRI Project No. 4601-01

Under EPA Contract No. 68-D2-0159, Work Assignment I-01, an emission test was conducted at the Belden Brick Company Plant No. 6, Sugarcreek, Ohio, during the week of November 8, 1993. The attached tables list all of the samples and analyses required. Please refer to the site-specific test plan, dated October 22, 1993, for a detailed description of the test locations, test methods, and QA requirements for the test.

Please take note that the complete charge numbers for this emission test are as follows:

Field test	4601-01-05-01
VOST analysis	4601-01-05-02
Semi-VOST analysis	4601-01-05-03
Metals analysis	4601-01-05-04
QA/QC	4601-01-05-05
Reporting	4601-01-05-06

1.0 PARTICULATE MATTER

Three Method 201A runs were conducted on the inlet to the baghouse for the grinding/screening room, and two Method 201A runs were conducted on the outlet to the grinding/screening room fabric filter. These samples are to be analyzed for PM less than or equal to 10 micrometers (μm) and PM greater than 10 μm. In addition, Hi-Vol samplers were used to sample ambient PM-10 inside the grinding/screening room (three runs) and outside the grinding/screening room (three runs on the east side and two runs on the west side). The Hi-Vol filters must be analyzed for two runs at each of the three locations.

The kiln was sampled for PM emissions using three sampling trains. Three Method 201/202 runs were conducted. These samples must be analyzed for PM less than or equal to 10 μm, PM greater than 10 μm, condensible inorganic PM, and condensible organic PM. Three Method 26A runs were conducted, and the samples from this train must be analyzed for filterable PM. Finally, three Method 0029 runs were conducted. The samples from these runs must also be analyzed for filterable PM. Please note that the filters for the Method 201A train are to be weighed, heated to 320°F, and reweighed. Table 1 summarizes the PM samples from the grinding/screening room and kiln that must be analyzed.

3.0 VOST

The kiln was sampled for volatile organic compounds using a Method 0030 (VOST) sampling train. Three runs were conducted. Trap pairs 2, 4, and 6 must be analyzed according to Method 8240 for the compounds listed in Figure 5-9 of the test plan. In addition, one pair of field blank traps and one pair of trip blank traps must be analyzed. There was no VOST condensate. Table 3 summarizes the VOST samples for analysis.

TABLE 3. VOST SAMPLES FOR ANALYSIS

Sample	Sample
Kiln Stack--Method 0030 (VOST)	
Pair 1 Tnx	1067
Pair 1 T/C	1068
Pair 2 Tnx[a]	1069
Pair 2 T/C[a]	1070
Pair 3 Tnx	1071
Pair 3 T/C	1072
Pair 4 Tnx[a]	1073
Pair 4 T/C[a]	1074
Pair 5 Tnx	2067
Pair 5 T/C	2068
Pair 6 Tnx[a]	2069
Pair 6 T/C[a]	2070
Pair 7 Tnx	2071
Pair 7 T/C	2072
Field blank Tnx[b]	1075
Field blank T/C[b]	1076
Trip blank Tnx[b]	1077
Trip blank T/C[b]	1078
Field blank Tnx[b]	2075
Field blank T/C[b]	2076
Trip blank Tnx[b]	2077
Trip blank T/C[b]	2078

[a]Trap pairs 2, 4 and 6 to be analyzed.
[b]One pair of field and trip blanks to be analyzed.

4.0 Semi-VOST

The kiln was sampled for semi-volatile organic compounds using a Method 0010 (semi-VOST) sampling train. Three runs were conducted. Please note that the back half samples were split into two fractions. The two sample fractions for Run 1 (1038 and 1038A) should be analyzed separately; for each of the other two runs, the two fractions should be combined for the analysis. The samples must be analyzed for the compounds listed in Figure 5-11 of the test plan. Table 4 summarizes the semi-VOST samples for analysis.

TABLE 4. SEMI-VOST SAMPLES FOR ANALYSIS.

Sample	Run 1	Run 2	Run 3
Kiln Stack--Method 0010 (semi-VOST)			
Front-half rinse	1036	2036	3036
Filter	1037	2037	3037
Back-half rinse	1038[a]	2038[b]	3038[b]
Back-half rinse	1038A[a]	2038A[b]	3038A[b]
XAD Cartridge #_____	1039	2039	3039
Condensate	1040	2040	3040
Blanks			
Methanol	1061	NA	NA
Methylene chloride	1062	NA	NA
XAD Cartridge #_____	1063	NA	NA

[a]Analyze each fraction of back half rinse sample separately.
[b]Combine both back half rinse sample fractions for analysis.

3218-78

MRI Project No.: 4601-0.1 Performed by (name/date): R Roman 11-18-93
Title/Purpose: VOST -TUX

Continued from: start Continued to: 3218-79 Entered by: RER 11-19-93 Verified by:
Witnessed by: Reviewed by: Validated by:
Witnessed by:

(signature/date) (initials/date) (initials/date)

1 H18CC1 (7411) Auto static mass calibration S.D= 0.0196 passed
DM: 320

H18CC2 (7415) Dynamic mass calibration S.D = 0.0182 passed
5 DM: 320 5
IS ref # = 2615-17-5
H18Q1 (0751) BFB Tuning 50ng/col, 2615-17-6, 2nd Air Leak
passed 527+528+529 -500
had some cummins: check out water absorber added a heated line to vost
10 H18C1 (0809) Blank VOST Tube checking to see if clean 10
low level contamination Rerunning

H18C2 (0844) Blank VOST Tube checking to see if clean with
IS+surrogate IS(128) 2550441@658, IS(114) 2231914@813, IS(117) 2393226@1165
15 low volatile Bromomethane chloromethane 15
H18C3 (0931) Blank VOST 2nd methanol
appears to have Bromomethane ≈ to low STD leaning curve

H18Q2 (1009) 20ng on Column VOST
20 IS(128) 527106@675, I, IS(114) 4155873@812, IS(117) 3931845@1165

H18Q3 (1044) 50ng on column VOST
IS(128) 2938578@802, IS(114) 2222945@816, IS(117) 1896060@1168

25 H18Q4 (1124) 100ng on column VOST
IS(128) 2572248@7081, IS(114) 1581001@816, IS(117) 1330837@1168

H18Q5 (1204) 250ng on column VOST
IS(128) 226221@615, IS(114) 1789548@810, IS(117) 1712177@1166

30
H18Q6 (1238) 500ng on column VOST
IS(128) 163028@682, IS(114) 1629708@794, IS(117) 1469216@1162

H18Q7 (1312) 1000 ng on column VOST
35 IS(128) 211705@691 IS(114) 1789194@734, IS(114) 1515573 carried passed 35

MRI Project No.: 4601-01 Performed by (name/date): R Rowan 11-18-97
Title/Purpose: VOST - TUX

Continued from: 3215-79 Continued to: Entered by: NER 11-18-97 Verified by:
Witnessed by: Reviewed by: Validated by:
Witnessed by:
(signature/date) (initials/date) (initials/date)

1 M18C8 (1437) check STD VOST 2nd Injected 1
IS(128) 198387 @ 695, IS(114) 1941977 @ 810, IS(117) 1520606 @ 1163
did not add surrogate S above 170% all between 90-140%

5 M18C5 (1553) VOST Method Blank 5
IS(128) 198829 @ 691, IS(114) 1759472 @ 803, IS(117) 1808170 @ 1164

M18C6( ) VOST Method Blank no I.S.
IS(128) , IS(114) , IS(117)

10 10

M18C7 (1725) VOST Method Blank
IS(128) 144151 @ 682, IS(114) 1174243 @ 802, IS(117) 1236798 @ 1162

M18C8 (1822) Sample PR2 TUX 4601-01 1069 TNIM 239 E
15 IS(128) 171812 @ 695, IS(114) 1442840 @ 810, IS(117) 1551158 1st 15 2645-18-4 15

M18Q8 (1920) RFB Tunning 50 ng/ml, 2615-17-6, 2nd dir Inj
passed 523 + 524 + 525 - 560

20 M18Q9 (1924) 200 ng STD 20
IS(128) 218027 @ 715, IS(105) 1745 @ 722, IS(117) 469504

M18Q10 (2010) 2000 ng STD Leveling curve due to high conc in sample
IS(128) 276123 @ 714, IS(114) 1409000 @ 821, IS(117) 614111

25 25

M18Q11 (2052) 3000 ng STD
IS(128) 341548 @ 715, IS(114) 1744495 @ 826, IS(117) 854143

30 30

NER 11-18-97 35

3218- 80

MRI Project No.: 4601-01 Performed by (name/date): R Rowan 11-17-93
Title/Purpose: Vost

Continued from: [illegible] Continued to: 3218-81 Entered by: [illegible] Verified by:
Witnessed by: Reviewed by: [illegible] Validated by:
Witnessed by:

(signature/date) (initials/date) (initials/date)

1 H19Q1 (759) 50ng/ml, 2615-17-6, 2nd Dir Inj 1
passed 471 1472+473 - 450 No SC-43 Run

H19C1 (824) Vost Method Blank some low contamination IS 2615-17-4
5 IS(128) 125243 @ 761, IS(114) 1073411 @ 876, IS(117) 501786 @ 1230 5

H19C2 (925) Vost Method Blank IS 2615-17-4
IS(128) 156676 @ 754, IS(114) 1407750 @ 870, IS(117) 754446 @ 1225
NOR 11-17-93
10 IS for samples + Blanks = 2615-17-4 250ng std = 2615-18-1 10
IS for STD = 2615-16-5

H19C3 (1015) Vost Method Blank
IS(128) 156909 @ 754, IS(114) 1442670 @ 871, IS(117) 930667 @ 1225
15 15

K19Q2 (11:21) 250ng std 2615-18-1 + 1µl IS
IS(128) = 147500 @ 754 IS(114) = 1,195,033 @ 870 IS(117) = 1,042,894 @ 1224 low IS areas
K19Q3 (12:31) 250ng std 2615-18-1 + 1µl IS
20 IS(128) = 249502 @ 752 IS(114) = 2,265,653 @ 867 IS(117) = 2,249,307 @ 1221 ok 20
CCC + SPCC passed objectives; std looks good.
H19C4 (1352) Vost Method Blank 1st C.S. 2615-17-4
IS(128) 124828 @ 754, IS(114) 1154102 @ 869, IS(117) 654228 @ 1220
IS's are low - clean, except for 4 gases and 2 water-sol apdo
25 H19C5 (1437) Vost Trip Blank 25
IS(128) = 222521 @ 753 IS(114) 1957132 @ 869 IS(117) = 1983142 @ 1222
Clean + IS are ok

K19C6 (1547) Sample 1075 FBK TNX# 1556 + 1µl IS
30 IS(128) 233452 @ 755, IS(114) 2041605 @ 870, IS(117) 2070270 @ 1224 30
H19C7 (1550) Sample 1072 Tr Blk TNX# 2776 1st IS
IS(128) 219787 @ 755, IS(114) 2041334 @ 871, IS(117) 2072217
K19C8 (1622) Sample 1073 Run1 Pr 4 TNX# 612 + 1µl IS
IS(128) 372053 @ 755, IS(114) 3924647 @ 867, IS(117) 7543584 @ 1222
35 35

MRI Project No.: 4601-01 Performed by (name/date): L Rosano 11-19-93
Title/Purpose: VOST

Continued from: 3218-80 Continued to: End Entered by: MMW 11-19-93 Verified by:
Witnessed by: Reviewed by: Validated by:
Witnessed by:
(signature/date) (initials/date) (initials/date)

1 M19C9(1751) VOST Method Blank
IS(128)= 223376 IS(114)= 1798465 IS(117)= 2006558
Benzene = 450,000 ng ≅ 40ng

M19C10(18) Sample 2069 P/2 TRX 0675
5 IS(128)= 516561 IS(114)= 3590238 IS(117)= 3481499 5
Benzene = 21862166 ~2500 ng

K19Q4(1900) High level benzene std + 1µl IS/surr 3µl = 9000ng
IS(128)= 532058 IS(114)= 5071501 IS(117)= 4658345
Ø = 78,010,496 saturated 5µl = 15,000ng

10 K19Q5(1922) High level benzene std + 1µl IS/surr 10
IS(128)= 680973 IS(114)= IS(117)=
Ø = saturated
MMW 11-22-93

Run additional standards from due to high level of benzene in sample also IS running high in sample & last two stds bellow due to Benzene

20 20

Standard preparation for high level benzene. MMW 3218:81A

Methanol: Lot No BC367 B+J
Benzene: Lot No 9522#2 Jaychemco

25 25

Balance check Before 50mg = 0.0498g
20mg = 0.0200g
After 30mg = 0.0300g

30 Add ~5ml methanol to a clean 10ml volumetric. Weigh in 30mg pure benzene. Dilute to the mark with methanol. 30

Actual weight = 0.0318g Conc = 3.18mg/ml

35 35

3210- 82

MRI Project No.: 7401-01-05-02 Performed by (name/date): R Roman 11-17-93
Title/Purpose: VOST curve - T/C

Continued from: start Continued to: 3/24-93 Entered by: Verified by:
Witnessed by: Reviewed by: Validated by:
Witnessed by:

(signature/date) (initials/date) (initials/date)

1 M22CC1(725) Auto Stat. Mass Calibration scan 15 SD: 0 v17
DM=320 passed

M22CC2(0730) Dynamic Mass Calibration SD: 0.0155 passed
5 DM=320

M22Q1(735) BFB Tuning 50ng std, 2615-17-6, 2nd Dir Inj
passed 468+469+470 - 450 DM: 320

10 M22C1(753) VOST Blank checking system
FS(128) 92944 e 755, FS(114) 523580 e 772, FS(117) 462141 e 1226
IS low so ~~performing~~ up DM to 320 + running BFB again

M22Q2 (0830) BFB Tuning 50ng std, 2615-17-4 2nd Dir Inj
15 passed 468+469+470 - 450 DM=320

M22C2(0850) VOST Blank checking system
FS(128) 119443 e 763, FS(114) 696541 e 980, FS(117) 617870 e 1235

20 M22C3(953) VOST Blank checking system
FS(128) 172481 e 766, FS(114) 1022515 e 872, FS(117) 842454 e 1232
Spikes flow was not on

M22C4( ) VOST Blank
25 128= 300800 114= 2211403 117= 2360455
78= 218055 ≈ 16ng ok Blank clean

✓ K22Q3 (13:19) 20 ng std: 1µl 2615-18-2 + 1µl 2615-16-5, T/C
128= 300921 114= 3,250,255 117=

30

✓ K22Q4 (14:49) T/C 50ng std: 1µl 2615-17-1 + 1µl (D6) 2615-17-5 + 1µl (15) 2615-16-5
128= 529543 114= 4719087 117= 3944074

35

35

MRI Project No.: 4401-01-05-02 Performed by (name/date): [illegible]
Title/Purpose: Vost Curve T/C

Continued from: Continued to: Entered by: [illegible] Verified by:
Witnessed by: Reviewed by: [illegible] Validated by:
Witnessed by:
(signature/date) (initials/date) (initials/date)

✓ K22 Q5 (1540) T/C 250ng std: ~~1µl~~ 15,1µl 2615-16-5 + 1.2µl 2615-16-1
128= 426273 114= 3775898 117= 3229264
noted high silicone bkg – what happened!
– high in Q3 + dropping –

K22 Q6 (1618) T/C 500ng std: 2.4µl 2615-18-1 + 15,1µl 2615-16-5
128= 410475 114= 3208680 117= 2322969

K22 Q7 (1654) T/C 1000ng std: 5µl 2615-18-1 + 15,1µl 2615-16-5
128= 386027 114= 2539252 117=

K22 Q5 (1272) T/C System blank: 1µl 2615-18-4
128= [illegible] 114= [illegible] 117= [illegible]
[illegible] 2-Methoxy, 4-Methyl-2 Pentanone high in 1,2 Dichloroethane [illegible]

K22 C4 (1875) performance sample
128: [illegible] IS(114) [illegible], IS(117) [illegible]

4 curve had high background did not run as is.

MRI Project No.: 4601-01-05-02 Performed by (name/date): R Romero 11-23-93
Title/Purpose: Vost T/C

Continued from: 97417 Continued to: 3715-45 Entered by: RAR 11-23-93 Verified by:
Witnessed by: Reviewed by: Validated by:
Witnessed by:

(signature/date) (initials/date) (initials/

√ M23G1 (0907) AFB Tunning 50 mg/ml, 2415-17-6, 2nd air Inj passed source 538-500 No FC was run

M23C1 (0939) System Blank : Int IS 4 Surr Source 2415-17-4 IS(128): 408.376 e 925, IS(114) 438 1432 e 933, IS(117): 4,304 4506 e 1237

√ M23Q2 (1054) 20 mg STD 2415-14-2, Int IS 2415-14-5 Int IS(128) 4158 6.25e 921, IS(114) 3307310e 935, IS(117) 3305.9561234

√ M23Q3 (1139) 50 mg STD 2415-17-1 Int IS 2415-14-5 Int IS(128) 348 318e 921, IS(114) 3530221e 935, IS(117) 2807620e 1237 curve passes using M23Q2 + M23Q3 for low STDs

M23Lin (1221) Vost method Blank IS 2415-17-4 IS(128) 345175e 921, IS(114) 3121293e 934, IS(117) 2375506e 1234

√ M23Q4 (1341) 240 mg STD 2415-14-5, IS 2415-14-1 Int passed IS(128) 355141 e 915, IS(114) 2465464e 934, IS(117) 2647441e 1231

√ M23C4 (1421) Performance audit sample 2nd + Int IS 2415-5-1 2415-7 IS(128) 347279e 922, IS(114) 2462686e 934, IS(117) 2197272e 1232 passed

√ M23C5 (1515) Vost Blank IS Surr Mix Int 2415-7-4 IS(128) 272339e 917, IS(114) 2439436e 932, IS(117) 2315574e 1230 Vost Blank clean

M23C6 (1705) Tr B T/C 2078 IS + Surr 2415-17-4 Int IS(128) = 349635, IS(114) = 3154425, IS(117) = 3133246 e 1237 T/C 1806

M23C7 (1745) Fo B T/C 2074 IS + Surrogate 2415-17-4 Int IS(128) = 375345 e 915, IS(114) = 3175546 e 931, IS(117) = 3045046 e 1238 1826 RAR 11-23-93

√ M23C8 (1826) Sample PR2 T/C 2070 IS + Surrogate 2415-8-4 Int 1826 IS(128) 561199 e 48814, IS(114) 3647848 e 930, IS(117) 3685436

MRI Project No.: 4601-01-05-02 Performed by (name/date): R Rowan 11-23-95
Title/Purpose:

Continued from: 3215-94 Continued to: End Entered by: [illegible] 11-23-95 Verified by:
Witnessed by: Reviewed by: [illegible] Validated by:
Witnessed by:

(signature/date) (initials/date) (initials/date)

1 ✓ M23 C9(1918) Sample TR B T/C 1077 IS Surrogate [illegible]
IS(128) = 4120752 e 913 , IS(114) = 2874413 e 930 , IS(112) 3018467 e 1297
Tube 230 E

5 ✓ M23 C10(1951) FD B T/C # 1076 IS Surrogate 2415-18-1 Tube # 461
IS(128): 3417482 e 814 , IS(114) = 2925441 e 930 , IS(112) 2841317 e 1293

✓ M23C11 (2027) Pre T/C # 1077 IS Surr 2415-18-1 Tube # 652
IS(128): 4371403 e 911 , IS(114) = 4123674 e 928 , IS(112) = 3887421 e 1297

10 ✓ M23C12 (2101) Pre T/C # 1074 IS Surr 2415-18-1 Tube # 3064
IS(128): 7457378 e 913 , IS(114): 4455586 e 930, IS(112) 4113158 e 1297

15

* Top of vast tube was not screw on right

✓ M23Q5 (M2158) 7-Day STD 2415-18-1 ES 2415-16-5 ind
Lost header file will copy header file from M2304
20 Run STD due to increase in I.S. area in sample
BFB passed within this run
IS(128): 7041754 e 918 , IS(112): 3,918616 1293, IS(114): 3547302 e 932

Vast Desorber
25 Spitter Temp = 180
vast Heater Temp 170
heated purged line coming off desorber @ 120°C
The sparger vessel in OJ wrapped with heat tape @ 40°C

30

35

4601-01-05-02

Quality Control Sample Results
Tenax Only

MRI-AWM4601-01

BFB TUNE CHECK REPORT
1986 CLP Criteria

Datafile : K18Q1

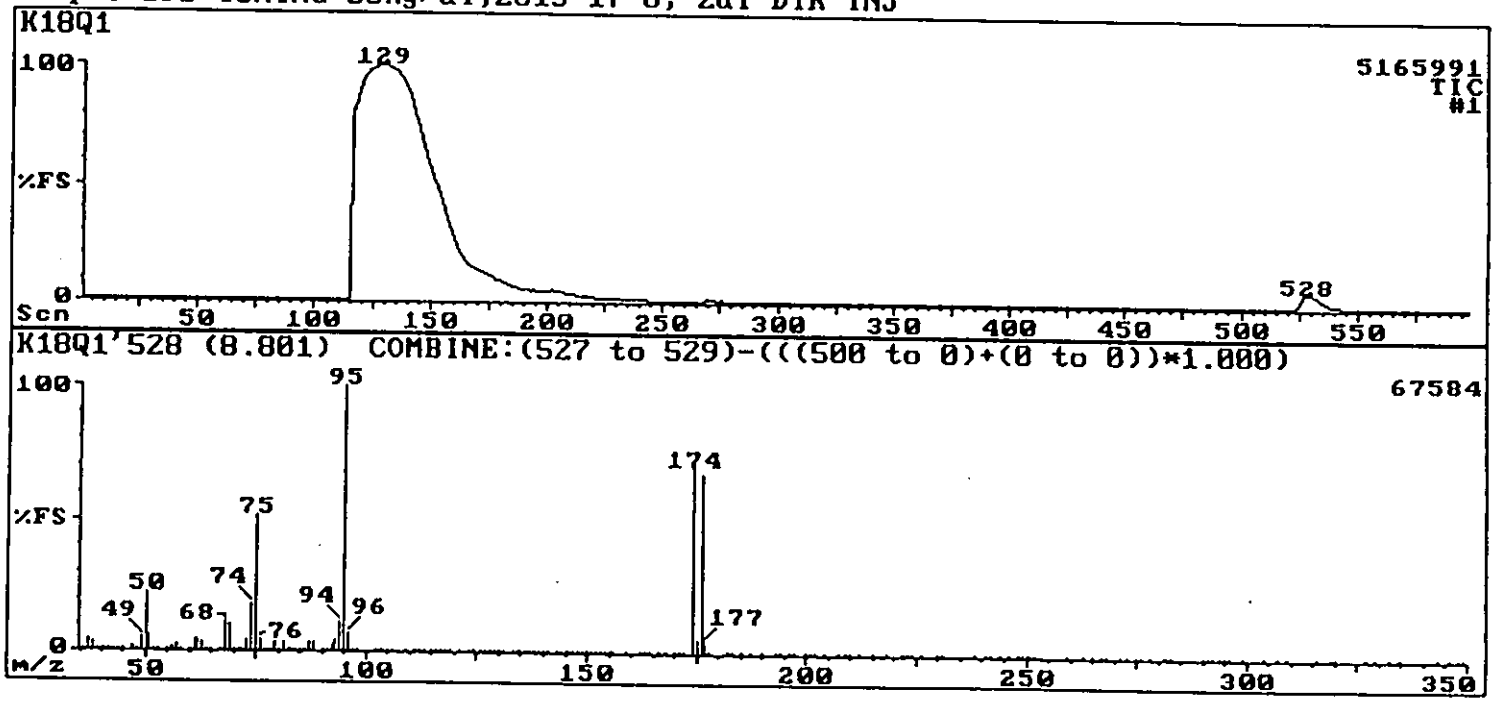
Analysis Date : 11/18/93
Analysis Time : 0751

BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
50	15.0 - 40.0% OF MASS 95	22.54	PASS
75	30.0 - 60.0% OF MASS 95	51.14	PASS
95	Base Peak, 100% relative abundance	100.00	PASS
96	5.0 - 9.0% of mass 95	7.01	PASS
173	Less than 2.0% of mass 174	0.00(0.0)1	PASS
174	Greater then 50.0% of mass 95	70.08	PASS
175	5.0 - 9.0% of mass 174	5.45(7.8)1	PASS
176	>95.0 but < 101.0% of mass 174	67.80(96.8)1	PASS
177	5.0 - 9.0% of mass 176	4.29(6.3)2	PASS

ok mcc 11/24/93

11/18/93 MIDWEST RESEARCH INSTITUTE VOA MD800 S/N 14046 Inst:MD800-C 0751
Sample:BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ



BFB TUNE CHECK REPORT
1986 CLP Criteria

Datafile : K18Q8

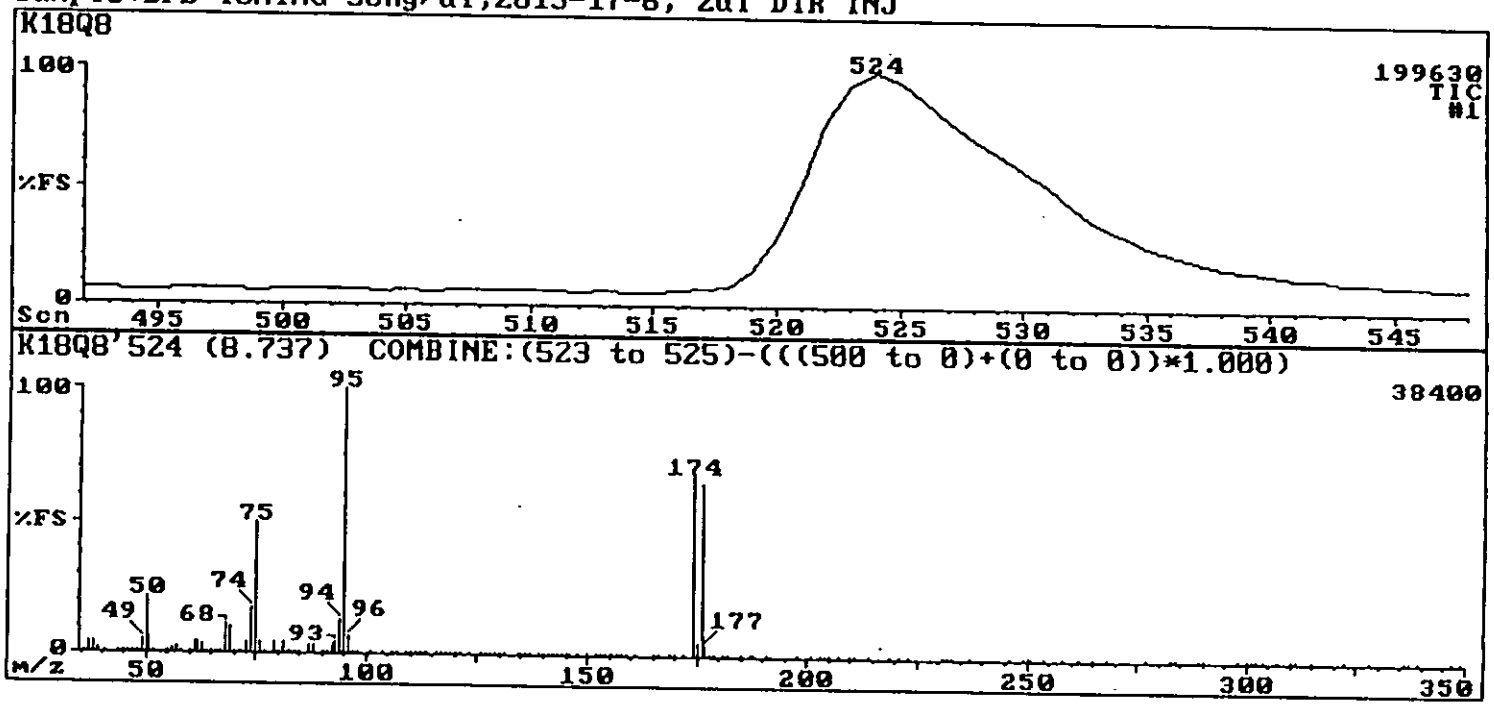
Analysis Date : 11/18/93
Analysis Time : 1920

BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
50	15.0 - 40.0% OF MASS 95	21.00	PASS
75	30.0 - 60.0% OF MASS 95	50.00	PASS
95	Base Peak, 100% relative abundance	100.00	PASS
96	5.0 - 9.0% of mass 95	6.63	PASS
173	Less than 2.0% of mass 174	0.00(0.0)1	PASS
174	Greater then 50.0% of mass 95	68.67	PASS
175	5.0 - 9.0% of mass 174	5.04(7.3)1	PASS
176	>95.0 but < 101.0% of mass 174	65.33(95.1)1	PASS
177	5.0 - 9.0% of mass 176	4.42(6.8)2	PASS

Mullig 11-24-93

11/18/93 MIDWEST RESEARCH INSTITUTE VOA MD800 S/N 14046 Inst:MD800-C 1920
Sample:BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ



INITIAL CALIBRATION CHECK

Result Filename: ICAL_K18 TNX trap UCST
Date proccessed: 11/18/93
Time proccessed: 1439
Date analyzed : 11/18/93
Time injected : 1009

Revised 11/24/93 mlwang

LAB FILE ID: RF20.0=K18Q2 RF50.0=K18Q3 RF250.0=K18Q5 RF500.0=K18Q6
RF999.9=K18Q7

COMPOUND	FG	RF 20.0	RF 50.0	RF 250.0	RF 500.0	RF 999.9	MEAN	LINEARITY*
3 Chloromethane	SPC	21.958	54.605	8.470	11.675	6.974	20.736	95.6 %
4 Dichlorofluoromethane		1.788	1.474	1.215	1.093	0.836	1.281	28.5 %
5 Bromomethane		11.639	24.446	3.575	4.891	2.568	9.424	96.7 %
6 Acetonitrile		2.845	2.946	3.035	3.030	1.672	2.706	21.5 %
7 Acrylonitrile		4.315	2.827	2.139	2.446	1.523	2.650	39.5 %
8 Vinyl Chloride	C	3.327	3.754	2.929	3.508	3.021	3.308	10.3 %
9 Chloroethane		1.218	2.353	1.860	2.067	1.849	1.869	22.3 %
10 Iodomethane		7.135	6.385	1.154	1.522	0.813	3.402	90.8 %
11 Trichlorofluoromethan		2.096	2.515	1.854	1.218	1.205	1.778	32.0 %
12 Methylene Chloride		5.594	2.381	1.899	1.896	1.684	2.691	61.1 %
13 Acetone		4.863	5.013	3.582	4.525	3.528	4.302	16.4 %
14 Carbon Disulfide		9.344	6.197	6.177	6.795	5.954	6.893	20.4 %
15 1,1-Dichloroethene	C	2.525	3.270	2.639	3.265	2.314	2.803	15.7 %
16 1,1-Dichloroethane	SPC	2.306	2.322	3.251	2.807	2.591	2.655	14.8 %
17 1,2-Dichloroethene (t		2.186	1.456	0.000	0.000	0.000	1.821	28.4 %
18 t-1,2-Dichloroethene		2.671	1.456	1.742	2.263	1.828	1.992	24.0 %
19 Chloroform	C	3.996	4.978	4.367	4.374	3.134	4.170	16.2 %
20 1,2-Dichloroethane		3.488	3.527	4.076	4.894	3.227	3.842	17.3 %
22 2-Butanone		0.621	0.501	0.762	0.768	0.553	0.641	18.9 %
23 1,1,1-Trichloroethane		0.550	0.412	0.476	0.471	0.287	0.439	22.4 %
24 Carbon Tetrachloride		0.346	0.327	0.328	0.323	0.288	0.323	6.6 %
26 Vinyl Acetate		0.380	0.155	0.121	0.092	0.074	0.164	75.7 %
27 Bromodichloromethane		0.571	0.526	0.525	0.495	0.302	0.484	21.8 %
28 1,2-Dichloropropane	C	0.348	0.253	0.334	0.325	0.294	0.311	12.2 %
29 cis-1,3-Dichloroprope		0.578	0.480	0.429	0.437	0.357	0.456	17.8 %
30 Trichloroethene		0.430	0.375	0.387	0.398	0.445	0.407	7.2 %
31 2-Chloroethyl vinyl e		0.054	0.017	0.016	0.035	0.009	0.026	69.6 %
32 Dibromochloromethane		0.420	0.354	0.392	0.335	0.211	0.343	23.5 %
33 Dibromomethane		0.221	0.180	0.204	0.119	0.208	0.186	21.8 %
34 Dibromoethane		0.485	0.372	0.433	0.369	0.313	0.395	16.7 %
35 1,1,2-Trichloroethane		0.400	0.310	0.356	0.306	0.211	0.317	22.2 %
36 1,4-Dichloro-2-butene		0.003	0.003	0.005	0.010	0.005	0.005	53.7 %
37 Benzene		1.585	1.396	1.288	1.374	1.613	1.451	9.7 %
38 trans-1,3-Dichloropro		0.483	0.362	0.318	0.326	0.249	0.348	24.8 %
39 Bromoform	SPC	0.321	0.237	0.308	0.288	0.226	0.276	15.4 %
43 4-Methyl-2-Pentanone		0.380	0.515	0.530	0.732	0.404	0.512	27.3 %
44 2-Hexanone		0.273	0.370	0.383	0.526	0.312	0.373	25.9 %
45 Tetrachloroethene		0.339	0.444	0.338	0.349	0.516	0.397	20.1 %
46 1,1,2,2-Tetrachloroet	SPC	0.401	0.308	0.321	0.508	0.467	0.401	22.0 %
47 Toluene	C	1.581	1.902	1.525	1.725	2.041	1.755	12.3 %
48 Chlorobenzene	SPC	0.950	0.981	1.042	1.080	1.088	1.028	5.9 %
49 Ethylbenzene	C	0.360	0.324	0.300	0.373	0.397	0.351	11.1 %
50 Styrene		0.403	0.298	0.367	0.508	0.477	0.411	20.5 %
51 m-/p-Xylene		0.863	0.821	0.927	1.218	1.164	0.998	18.1 %

52	o-Xylene		0.373	0.323	0.392	0.529	0.501	0.424	20.7	%
53	Hexachloroethane		0.126	0.118	0.126	0.194	0.208	0.154	27.8	% 5
54	1,2-Dbromo-3-chloropr		0.020	0.029	0.033	0.061	0.024	0.033	47.7	% 5
2	1,2-Dichloroethane-d4	S	3.081	3.029	3.792	4.006	2.635	3.309	17.3	% ✓
25	Benzene-d6	S	1.619	1.270	1.515	1.282	1.022	1.342	17.4	% ✓
41	4-Bromofluorobenzene	S	0.338	0.238	0.291	0.337	0.337	0.308	14.3	% ✓
42	Toluene-d8	S	1.477	1.576	1.348	1.508	1.809	1.544	11.0	% ✓

% = %Relative Standard Deviation, C_TYPE = 0;
# = Corelation Coefficient, C_TYPE = 1;
• = Mean Square Error, C_TYPE = 2.

G = Gaseous analyte.
W = Water-soluble analyte.

1. Method objective for CCC compounds includes %RSD less than 30%.
2. Presence of the analyte in the methanol and Internal Standard solution affected the calculation of the relative response factors (RRFs) in the two low standards
3. Same as 2. Methylene chloride not observed in samples
4. Response was linear over the calibration range
5. Compound not required by the client.

Extended calibration curve for benzene on TRX UCST Mewing 11/20

		Benzene Area	IS Area (DFB)	RRF	
11/18	20 ng			1.585	
	50 ng			1.396	
	250 ng			1.288	
	500 ng			1.374	
	1000 ng	9,026,136	1,398,971	1.613	
	2000 ng	17,523,530 ~~16,233,359~~	1,057,806 ~~1,110,421~~	2.674 1.440	
	3000 ng	24,278,490	960,122	2.107	
11/19	9000 ng	77,916,666	5,075,360	0.426	saturated
11/19	15,000 ng	98,096,448	6,833,599	0.239	saturated

Quantitation Results
==========

Date : 12/01/93
Time : 1539

Raw Filename : K18C4
Sample Description: CHECK STD 2ul INJECTION ON VOST

Analysis Time: 1437
Analysis Date: 11/18/93

Lab Name: MRI
User: RER

Meeting 11-18-93 Verbal w/ D. Horton ok. to run samples
%A = Conc/4

Compound	RT	QM	AREA	Conc		REV	
Chloromethane	4.32	50	1854283	115.105	ng	30 (2)	
Dichlorofluoromethane	4.05	85	0	0.000	ng	0	
Bromomethane	5.37	94	887869	121.274	ng	81 (2)	
Acetonitrile	8.07	41	0	0.000	ng	0	
Acrylonitrile	9.15	53	168755	81.974	ng	91	
Vinyl Chloride	4.50	62	0	0.000	ng	0	
Chloroethane	6.00	64	0	0.000	ng	0	
Iodomethane	7.75	142	422556	159.890	ng	68 (2)	
Trichlorofluoromethane	6.53	101	0	0.000	ng	0	
Methylene Chloride	8.60	84	672128	321.540	ng	93	80✓
Acetone	8.07	43	0	0.000	ng	0	
Carbon Disulfide	7.83	76	0	0.000	ng	0	
1,1-Dichloroethene	7.35	96	1029557	472.878	ng	91	118✓
1,1-Dichloroethane	9.95	63	1065782	516.655	ng	98	129✓
1,2-Dichloroethene (total)	9.05	96	698791	493.923	ng	96	124✓
t-1,2-Dichloroethene	9.05	96	774094	500.184	ng	88	125✓
Chloroform	11.77	83	1647997	508.713	ng	99	127✓
1,2-Dichloroethane	12.80	62	1395290	467.436	ng	93	117✓
2-Butanone	11.30	43	428032	95.761	ng	98 (3)	
1,1,1-Trichloroethane	12.03	97	1550763	506.501	ng	97	126✓
Carbon Tetrachloride	12.35	117	1238399	550.709	ng	98	138
Vinyl Acetate	10.18	43	0	0.000	ng	0	
Bromodichloromethane	14.99	83	1510885	447.871	ng	99	112✓
1,2-Dichloropropane	14.44	63	955772	441.057	ng	97	110✓
cis-1,3-Dichloropropene	15.85	75	1733705	545.269	ng	99	136
Trichloroethene	14.02	130	23981	8.451	ng✓	96	
2-Chloroethyl vinyl ether	15.64	63	7179	39.222	ng	74	
Dibromochloromethane	18.15	129	1074224	449.859	ng	98	112✓
Dibromomethane	14.65	93	15229	11.727	ng✓	0	
Dibromoethane	18.39	107	15407	5.602	ng✓	87	
1,1,2-Trichloroethane	17.34	97	973291	440.925	ng	66	110✓
1,4-Dichloro-2-butene	22.44	124	23566	671.046	ng	89 (3)	
Benzene	12.72	78	33261	3.287	ng	54	
trans-1,3-Dichloropropene	16.97	75	1420303	586.035	ng	99	144
Bromoform	21.24	173	821218	427.108	ng	97	107
4-Methyl-2-Pentanone	16.18	43	2369381	764.868	ng	95 (3)	
2-Hexanone	17.89	43	2084937	924.585	ng	95 (3)	
Tetrachloroethene	17.65	164	12197	5.076	ng✓	96	100✓
1,1,2,2-Tetrachloroethane	22.30	83	970178	399.914	ng	99	
Toluene	16.54	91	50317	4.740	ng✓	94	
Chlorobenzene	19.47	112	41239	6.631	ng✓	89	
Ethylbenzene	19.70	106	62460	29.446	ng	99 (3)	
Styrene	20.85	104	337238	135.771	ng	90 (3)	
m-/p-Xylene	19.97	106	264140	43.737	ng	94 (3)	
o-Xylene	20.84	106	206787	80.659	ng	98 (3)	
Hexachloroethane	23.85	117	0	0.000	ng	0	
1,2-Dbromo-3-chloropropane	27.49	157	368162	1820.383	ng	99	
==========							
1,2-Dichloroethane-d4	12.80	65	44976	17.498	ng	40 (4)	

Benzene-d6	12.65	84	7196	0.769	ng	76
4-Bromofluorobenzene	21.99	95	63081	33.853	ng	100
Toluene-d8	16.40	98	28844	3.089	ng	78

(4)

1) %A = % Accuracy, where circled values were outside of the test objective

2) Methanol ~~contained~~ used for the internal standard contained several impurities

3) Carryover of analyte in instrumental system. The high level standard was analyzed immediately prior to this analysis.

4) Analyst did not add surrogate to the sample.

Quantitation Results
==========

Date : 12/01/93
Time : 1539

Raw Filename : K18C7
Sample Description: VOST METHOD BLANK, TNX

Analysis Time: 1725
Analysis Date: 11/18/93

Lab Name: MRI
User: RER

HC Mulcay 11-24-93

Compound	RT	QM	AREA	Conc		REV
Chloromethane	4.10	50	493652	43.204	ng	22
Dichlorofluoromethane	3.48	85	0	0.000	ng	0
Bromomethane	5.07	94	193280	37.221	ng ✓	53
Acetonitrile	8.52	41	0	0.000	ng	0
Acrylonitrile	9.43	53	0	0.000	ng	0
Vinyl Chloride	4.32	62	0	0.000	ng	0
Chloroethane	5.67	64	0	0.000	ng	0
Iodomethane	7.82	142	0	0.000	ng	0
Trichlorofluoromethane	6.27	101	0	0.000	ng	0
Methylene Chloride	8.38	84	0	0.000	ng	0
Acetone	7.62	43	0	0.000	ng	0
Carbon Disulfide	7.88	76	0	0.000	ng	0
1,1-Dichloroethene	7.42	96	0	0.000	ng	0
1,1-Dichloroethane	10.03	63	0	0.000	ng	0
1,2-Dichloroethene (total)	9.18	96	0	0.000	ng	0
t-1,2-Dichloroethene	9.18	96	0	0.000	ng	0
Chloroform	11.78	83	0	0.000	ng	0
1,2-Dichloroethane	12.52	62	12459	5.885	ng	70
2-Butanone	11.10	43	0	0.000	ng	0
1,1,1-Trichloroethane	12.12	97	0	0.000	ng	0
Carbon Tetrachloride	12.45	117	0	0.000	ng	0
Vinyl Acetate	10.18	43	0	0.000	ng	0
Bromodichloromethane	15.04	83	0	0.000	ng	0
1,2-Dichloropropane	14.50	63	0	0.000	ng	0
cis-1,3-Dichloropropene	15.94	75	0	0.000	ng	0
Trichloroethene	14.08	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	15.64	63	0	0.000	ng	0
Dibromochloromethane	18.24	129	0	0.000	ng	0
Dibromomethane	14.73	93	0	0.000	ng	0
Dibromoethane	18.47	107	0	0.000	ng	0
1,1,2-Trichloroethane	17.42	97	0	0.000	ng	0
1,4-Dichloro-2-butene	22.54	124	0	0.000	ng	0
Benzene	12.58	78	30890	4.575	ng ✓	66
trans-1,3-Dichloropropene	17.05	75	0	0.000	ng	0
Bromoform	21.32	173	0	0.000	ng	0
4-Methyl-2-Pentanone	16.24	43	0	0.000	ng	0
2-Hexanone	17.84	43	10692	5.798	ng ✓	85
Tetrachloroethene	17.74	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	22.40	83	0	0.000	ng	0
Toluene	16.89	91	7144	0.823	ng	52
Chlorobenzene	19.55	112	0	0.000	ng	0
Ethylbenzene	19.67	106	899	0.518	ng	65
Styrene	20.89	104	3141	1.546	ng	67
m-/p-Xylene	19.97	106	2056	0.416	ng ✓	84
o-Xylene	20.82	106	2337	1.115	ng ✓	80
Hexachloroethane	23.85	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	27.50	157	1330	8.042	ng ✓	62
1,2-Dichloroethane-d4	12.48	65	483977	265.468	ng	74 ✓

12.50	84				
21.99	95	1322398	211.895	ng	100 ✓
16.32	98	557877	366.133	ng	100 ✓
		1503846	196.962	ng	92 ✓

BFB TUNE CHECK REPORT
1986 CLP Criteria

Datafile : K19Q1

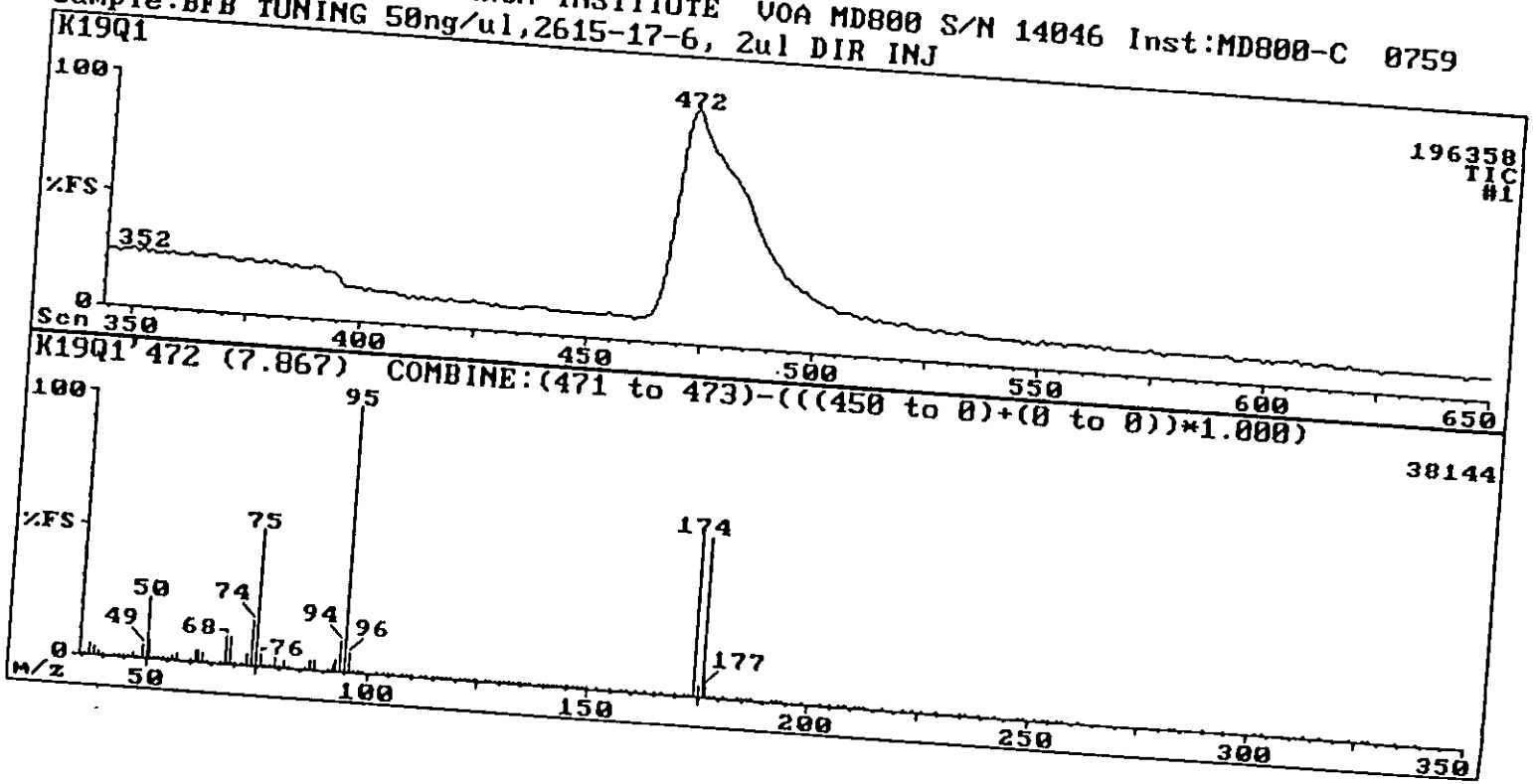
Analysis Date : 11/19/93
Analysis Time : 0759

BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
50	15.0 - 40.0% OF MASS 95	22.82	PASS
75	30.0 - 60.0% OF MASS 95	51.68	PASS
95	Base Peak, 100% relative abundance	100.00	PASS
96	5.0 - 9.0% of mass 95	6.75	PASS
173	Less than 2.0% of mass 174	0.16(0.3)1	PASS
174	Greater then 50.0% of mass 95	61.07	PASS
175	5.0 - 9.0% of mass 174	4.70(7.7)1	PASS
176	>95.0 but < 101.0% of mass 174	59.73(97.8)1	PASS
177	5.0 - 9.0% of mass 176	4.15(7.0)2	PASS

Mullen 11-24-93

11/19/93 MIDWEST RESEARCH INSTITUTE VOA MD800 S/N 14046 Inst:MD800-C 0759
Sample:BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ



Quantitation Results
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Date : 12/01/93
Time : 1543

Raw Filename : K19C5
Sample Description: VOST METHOD BLANK I.S.2615-18-4, TNX

Analysis Time: 1437
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

AL Miller 11-24-93

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.13	50	1470197	81.447	ng	28
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.32	94	552261	67.320	ng	69✓
Acetonitrile	10.98	41	0	0.000	ng	0
Acrylonitrile	10.13	53	10381	4.500	ng	80
Vinyl Chloride	6.82	62	0	0.000	ng	0
Chloroethane	7.22	64	0	0.000	ng	0
Iodomethane	8.62	142	248562	83.937	ng	46✓(1)
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	9.48	84	31277	13.353	ng	85✓
Acetone	8.48	43	0	0.000	ng	0
Carbon Disulfide	8.63	76	0	0.000	ng	0
1,1-Dichloroethene	7.00	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.67	62	0	0.000	ng	0
2-Butanone	12.23	43	20205	4.022	ng	80✓
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	11.08	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	15.40	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	15.35	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	14.00	78	0	0.000	ng	0
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0
Bromoform	22.20	173	0	0.000	ng	0
~~4-Methyl-2-Pentanone~~	~~17.15~~	~~43~~	~~15805~~	~~3.893~~	~~ng~~	~~94~~ ND
2-Hexanone	18.84	43	32783	11.093	ng	95✓
Tetrachloroethene	18.62	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.79	91	0	0.000	ng	0
Chlorobenzene	20.42	112	0	0.000	ng	0
Ethylbenzene	20.69	106	3200	1.151	ng	86✓
Styrene	21.82	104	5755	1.768	ng	78✓
m-/p-Xylene	20.92	106	7196	0.909	ng	86✓
o-Xylene	21.82	106	4095	1.219	ng	85✓
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.74	157	2612	9.855	ng	65✓
1,2-Dichloroethane-d4	13.63	65	788264	273.689	ng	80✓

Benzene-d6	13.67	84	2380656	226.493	ng	100 ✓
4-Bromofluorobenzene	22.95	95	864531	354.016	ng	100 ✓
Toluene-d8	17.37	98	2322695	189.807	ng	93 ✓

(1) Compound not required by client
~~(2) False positive result~~ MW 4
ND = not detected

DAILY CALIBRATION CHECK

Date proccessed: 11/19/93
Time proccessed: 1323

CCAL Filename : K19Q3 Date analyzed : 11/19/93
Time injected : 1231
ICAL Filename : ICAL_K18 Date analyzed : 11/18/93
Time injected : 1009

AB Mellsop 11-19-93

	COMPOUND	FLAG	RF MEAN	RF 250	%D
3	Chloromethane	SPC	20.736	13.823	33.3
4	Dichlorofluoromethane		1.281	0.922	28.0
5	Bromomethane		9.424	5.319	43.6 G
6	Acetonitrile		2.705	3.912	-44.6 W
7	Acrylonitrile		2.650	2.935	-10.7
8	Vinyl Chloride	C	3.308	2.509	24.2
9	Chloroethane		1.869	1.979	-5.9
10	Iodomethane		3.402	3.505	-3.0
11	Trichlorofluoromethane		1.778	2.125	-19.6
12	Methylene Chloride		2.691	1.897	29.5
13	Acetone		4.302	3.151	26.7
14	Carbon Disulfide		6.893	4.933	28.4
15	1,1-Dichloroethene	C	2.803	2.598	7.3
16	1,1-Dichloroethane	SPC	2.655	2.893	-8.9
17	1,2-Dichloroethene (total)		1.821	1.679	7.8
18	t-1,2-Dichloroethene		1.992	1.743	12.5
19	Chloroform	C	4.170	4.468	-7.1
20	1,2-Dichloroethane		3.842	4.191	-9.1
22	2-Butanone		0.641	0.771	-20.2
23	1,1,1-Trichloroethane		0.439	0.432	1.5
24	Carbon Tetrachloride		0.322	0.277	14.0
26	Vinyl Acetate		0.164	0.169	-3.1
27	Bromodichloromethane		0.484	0.464	4.1
28	1,2-Dichloropropane	C	0.311	0.295	5.1
29	cis-1,3-Dichloropropene		0.456	0.400	12.3
30	Trichloroethene		0.407	0.384	5.5
31	2-Chloroethyl vinyl ether		0.026	0.021	20.1
32	Dibromochloromethane		0.343	0.363	-6.0
33	Dibromomethane		0.186	0.180	3.6
34	Dibromoethane		0.394	0.379	3.9
35	1,1,2-Trichloroethane		0.317	0.320	-1.0
36	1,4-Dichloro-2-butene		0.005	0.010	-107.9 low LCP ①
37	Benzene		1.451	1.222	15.8
38	trans-1,3-Dichloropropene		0.348	0.314	9.7
39	Bromoform	SPC	0.276	0.284	-3.1
43	4-Methyl-2-Pentanone		0.512	0.546	-6.6
44	2-Hexanone		0.373	0.404	-8.3
45	Tetrachloroethene		0.397	0.337	15.2
46	1,1,2,2-Tetrachloroethane	SPC	0.401	0.493	-23.0
47	Toluene	C	1.755	1.360	22.5
48	Chlorobenzene	SPC	1.028	0.941	8.5
49	Ethylbenzene	C	0.351	0.382	-9.0

50	Styrene		0.411	0.515	-25.4	
51	m-/p-Xylene		0.998	1.023	-2.5	
52	o-Xylene		0.424	0.476	-12.4	
53	Hexachloroethane		0.154	0.150	3.0	
54	1,2-Dbromo-3-chloropropane		0.033	0.050	-49.1	1
2	1,2-Dichloroethane-d4	S	3.309	3.751	-13.4	
25	Benzene-d6	S	1.342	1.527	-13.9	
41	4-Bromofluorobenzene	S	0.308	0.340	-10.2	
42	Toluene-d8	S	1.543	1.169	24.3	

G = gaseous analyte
W = water soluble analyte.

1 compound not required by the client.

Quantitation Results
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Date : 12/01/93
Time : 1543

Raw Filename : K19C9
Sample Description: VOST METHOD BLANK,TNX (After high level sample)

Analysis Time: 1721
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

mmy 11-24-93

Compound	RT	QM	AREA	Conc		REV
Chloromethane	4.83	50	1673052	90.299	ng	27
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.10	94	463446	55.039	ng	89✓
Acetonitrile	10.60	41	0	0.000	ng	0
Acrylonitrile	10.18	53	0	0.000	ng	0
Vinyl Chloride	5.37	62	0	0.000	ng	0
Chloroethane	6.97	64	0	0.000	ng	0
Iodomethane	8.62	142	134819	44.355	ng	60✓
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	9.47	84	17439	7.254	ng	83
Acetone	8.32	43	0	0.000	ng	0
Carbon Disulfide	10.30	76	0	0.000	ng	0
1,1-Dichloroethene	6.87	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.67	62	0	0.000	ng	0
2-Butanone	12.22	43	29460	6.388	ng	89✓
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	12.22	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	15.40	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	15.57	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	13.73	78	373633	35.789	ng	95✓
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0
Bromoform	22.20	173	0	0.000	ng	0
4-Methyl-2-Pentanone	17.75	43	0	0.000	ng	0
2-Hexanone	18.84	43	23295	7.786	ng	84✓
Tetrachloroethene	18.62	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.52	91	20869	1.482	ng	82✓
Chlorobenzene	20.45	112	75569	9.159	ng	93✓
Ethylbenzene	20.67	106	4955	1.761	ng	89✓
Styrene	21.84	104	12984	3.940	ng	73✓
m-/p-Xylene	20.94	106	11758	1.467	ng	86✓
o-Xylene	21.80	106	3892	1.144	ng	83✓
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.74	157	5139	19.151	ng	66✓
1,2-Dichloroethane-d4	13.62	65	749266	253.451	ng	88✓

Benzene-d6	13.67	84	2214826	229.508	ng	100 ✓
4-Bromofluorobenzene	22.97	95	1045472	422.872	ng	100 ✓
Toluene-d8	17.37	98	2230384	180.034	ng	95 ✓

4601-01-05-02

Quality Control Sample Results
Tenax/Charcoal

MRI-A\M4601-01

BFB TUNE CHECK REPORT
1986 CLP Criteria

Datafile : K22Q2

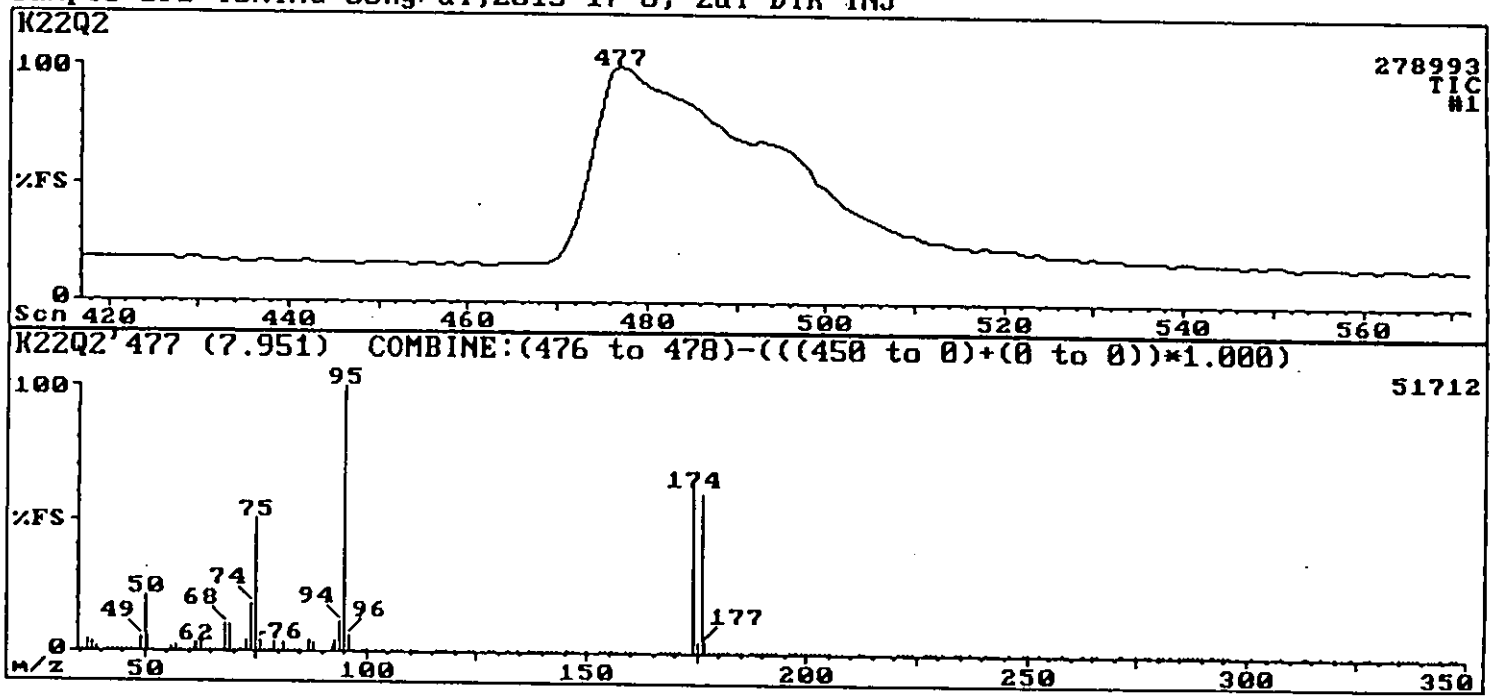
Analysis Date : 11/22/93
Analysis Time : 0830

BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
50	15.0 - 40.0% OF MASS 95	21.53	PASS
75	30.0 - 60.0% OF MASS 95	50.50	PASS
95	Base Peak, 100% relative abundance	100.00	PASS
96	5.0 - 9.0% of mass 95	6.25	PASS
173	Less than 2.0% of mass 174	0.00(0.0)1	PASS
174	Greater then 50.0% of mass 95	62.38	PASS
175	5.0 - 9.0% of mass 174	4.67(7.5)1	PASS
176	>95.0 but < 101.0% of mass 174	59.90(96.0)1	PASS
177	5.0 - 9.0% of mass 176	3.96(6.6)2	PASS

11-24-93

11/22/93 MIDWEST RESEARCH INSTITUTE VOA MD800 S/N 14046 Inst:MD800-C 0830
Sample:BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ



BFB TUNE CHECK REPORT
1986 CLP Criteria

Datafile : K23Q1

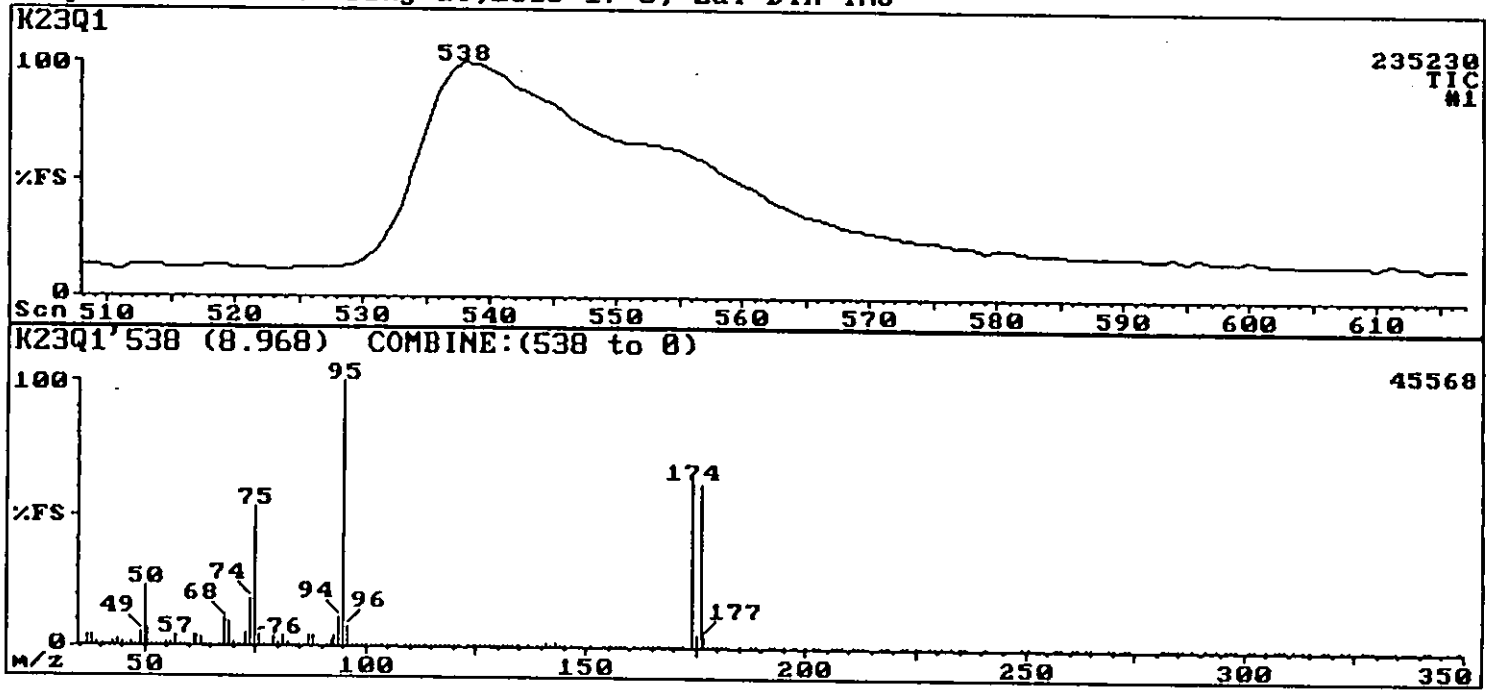
Analysis Date : 11/23/93
Analysis Time : 0907

BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ

M/E	ION ABUNDANCE CRITERIA	ABUNDANCE	TUNE
50	15.0 - 40.0% OF MASS 95	22.75	PASS
75	30.0 - 60.0% OF MASS 95	53.37	PASS
95	Base Peak, 100% relative abundance	100.00	PASS
96	5.0 - 9.0% of mass 95	7.51	PASS
173	Less than 2.0% of mass 174	0.00(0.0)1	PASS
174	Greater then 50.0% of mass 95	63.48	PASS
175	5.0 - 9.0% of mass 174	5.06(8.0)1	PASS
176	>95.0 but < 101.0% of mass 174	61.24(96.5)1	PASS
177	5.0 - 9.0% of mass 176	4.32(7.1)2	PASS

mlw 11-24-93

11/23/93 MIDWEST RESEARCH INSTITUTE VOA MD800 S/N 14046 Inst:MD800-C 0907
Sample:BFB TUNING 50ng/ul,2615-17-6, 2ul DIR INJ



INITIAL CALIBRATION CHECK

Result Filename: ICAL_K22
Date proccessed: 11/23/93
Time proccessed: 1339
Date analyzed : 11/23/93
Time injected : 1056

T/C

LAB FILE ID: RF20.0=K23Q2 RF50.0=K23Q3 RF240.0=K22Q5 RF500.0=K22Q6
RF999.9=K22Q7

	COMPOUND	FG	RF 20.0	RF 50.0	RF 240.0	RF 500.0	RF 999.9	RF MEAN	LINEARITY*
✓3	Chloromethane	SPC	85.719	53.595	8.640	5.244	5.676	31.775	114.6 %G ②
4	Dichlorofluoromethane		4.485	0.820	0.499	0.492	0.492	1.358	129.2 %G ④
✓5	Bromomethane		22.706	15.240	2.925	1.755	1.881	8.901	107.6 %G ②
6	Acetonitrile		3.363	3.664	1.946	1.544	1.109	2.325	48.6 %W ④
7	Acrylonitrile		3.374	3.151	2.211	1.957	1.539	2.446	32.2 %W ④
✓ 8	Vinyl Chloride	C ①	4.028	2.865	2.406	2.165	2.321	2.757	27.5 %G
✓ 9	Chloroethane		3.965	2.617	1.554	1.344	1.352	2.166	52.4 %G
10	Iodomethane		8.150	4.809	0.813	0.593	0.507	2.974	114.7 %G ② ④
✓11	Trichlorofluoromethan		2.042	1.396	0.964	1.035	0.677	1.223	42.9 %G
✓12	Methylene Chloride		3.284	2.158	1.495	1.534	1.501	1.995	38.8 % ③
✓13	Acetone		3.205	4.107	0.682	1.586	4.311	2.778	57.2 %W
✓14	Carbon Disulfide		7.341	6.091	3.421	3.898	3.830	4.916	34.8 %G
✓15	1,1-Dichloroethene	C	2.112	2.286	2.074	1.722	1.659	1.971	13.6 %
✓16	1,1-Dichloroethane	SPC	2.679	2.603	2.364	2.399	2.196	2.448	7.9 %
✓17	1,2-Dichloroethene (t		2.149	2.517	1.540	1.438	1.705	1.870	24.2 %
✓18	t-1,2-Dichloroethene		2.149	2.535	1.540	1.438	1.705	1.873	24.5 %
✓19	Chloroform	C	4.260	4.217	3.141	3.110	2.782	3.502	19.6 %
✓20	1,2-Dichloroethane		3.604	4.538	3.698	3.082	2.472	3.479	22.1 %
✓22	2-Butanone		0.728	0.851	0.495	0.364	0.324	0.553	41.5 %W
✓23	1,1,1-Trichloroethane		0.361	0.425	0.363	0.383	0.379	0.382	6.8 %
✓24	Carbon Tetrachloride		0.216	0.247	0.250	0.242	0.226	0.236	6.1 %
✓26	Vinyl Acetate		0.093	0.122	0.169	0.052	0.021	0.091	63.4 %W
✓27	Bromodichloromethane		0.495	0.497	0.417	0.339	0.231	0.396	28.5 %
✓28	1,2-Dichloropropane	C	0.254	0.280	0.273	0.241	0.217	0.253	10.1 %
✓29	cis-1,3-Dichloroprope		0.409	0.473	0.387	0.342	0.279	0.378	19.3 %
✓30	Trichloroethene		0.435	0.432	0.361	0.374	0.409	0.402	8.4 %
31	2-Chloroethyl vinyl e		0.030	0.017	0.010	0.016	0.046	0.024	61.7 % REF ④
✓32	Dibromochloromethane		0.314	0.331	0.307	0.234	0.140	0.265	29.8 %
33	Dibromomethane		0.201	0.177	0.158	0.117	0.116	0.154	24.2 % ④
34	Dibromoethane		0.364	0.389	0.362	0.298	0.196	0.322	24.2 % ④
✓35	1,1,2-Trichloroethane		0.331	0.317	0.282	0.214	0.140	0.257	30.9 %
36	1,4-Dichloro-2-butene		0.012	0.011	0.012	0.011	0.011	0.012	5.3 % ④
✓37	Benzene		2.449	1.749	1.216	1.244	1.452	1.622	31.4 %
✓38	trans-1,3-Dichloropro		0.273	0.333	0.300	0.249	0.183	0.267	21.2 %
✓39	Bromoform	SPC	0.185	0.207	0.234	0.196	0.143	0.193	17.4 %
✓43	4-Methyl-2-Pentanone		0.587	0.870	0.487	0.534	0.510	0.598	26.2 %W
✓44	2-Hexanone		0.420	0.554	0.341	0.395	0.403	0.422	18.7 %W
✓45	Tetrachloroethene		0.367	0.582	0.359	0.428	0.495	0.446	21.0 %
✓46	1,1,2,2-Tetrachloroet	SPC	0.456	0.479	0.412	0.420	0.419	0.437	6.7 %
✓47	Toluene	C	1.808	2.131	1.417	1.632	1.959	1.789	15.5 %
✓48	Chlorobenzene	SPC	0.927	1.012	0.916	0.924	0.941	0.944	4.1 %
✓49	Ethylbenzene	C	0.415	0.443	0.375	0.408	0.440	0.416	6.6 %
✓50	Styrene		0.470	0.497	0.418	0.445	0.481	0.462	6.7 %
✓51	m-/p-Xylene		1.107	1.170	1.011	1.071	1.102	1.092	5.3 %

✓52	o-Xylene		0.482	0.519	0.443	0.469	0.504	0.483	6.1 %
53	Hexachloroethane		0.119	0.145	0.154	0.160	0.168	0.149	12.5 %
54	1,2-Dbromo-3-chloropr		0.066	0.084	0.071	0.078	0.090	0.078	12.5 %
✓ 2	1,2-Dichloroethane-d4	S	3.459	4.117	3.150	2.598	2.102	3.085	25.2 %
✓25	Benzene-d6	S	1.576	1.071	1.218	1.125	1.720	1.342	21.5 %
✓41	4-Bromofluorobenzene	S	0.403	0.335	0.296	0.285	0.294	0.323	15.2 %
✓42	Toluene-d8	S	1.530	1.705	1.293	1.508	1.814	1.570	12.7 %

% = %Relative Standard Deviation, C_TYPE = 0;
# = Corelation Coefficient, C_TYPE = 1;
* = Mean Square Error, C_TYPE = 2.

G = gaseous analytes
W = water-soluble analytes

① Method objective for CCC compounds includes %RSD less than 30%.

② Presence of the analyte in the method and internal standard solution affected the calculation of the relative response factors (RRFs) in the low level standards.

③ Same as ②. methylene chloride not observed in the samples.

④ Compound not required by the client.

DAILY CALIBRATION CHECK

Date proccessed: 11/23/93
Time proccessed: 1450

T/C

CCAL Filename : K23Q4 Date analyzed : 11/23/93
Time injected : 1341
ICAL Filename : ICAL_K22 Date analyzed : 11/23/93
Time injected : 1056

memo 11-23-93 ok to run. see end of day std

	COMPOUND	FLAG	RF MEAN	RF 240	%D
3	Chloromethane	SPC	31.775	9.845	69.0
4	Dichlorofluoromethane		1.358	0.728	46.4
5	Bromomethane		8.901	2.987	66.4
6	Acetonitrile		2.325	4.325	-86.0
7	Acrylonitrile		2.446	2.305	5.8
8	Vinyl Chloride	C	2.757	2.802	-1.6
9	Chloroethane		2.166	1.803	16.8
10	Iodomethane		2.974	0.965	67.6
11	Trichlorofluoromethane		1.223	1.678	-37.3
12	Methylene Chloride		1.995	1.623	18.6
13	Acetone		2.778	2.799	-0.7
14	Carbon Disulfide		4.916	5.192	-5.6
15	1,1-Dichloroethene	C	1.970	1.945	1.3
16	1,1-Dichloroethane	SPC	2.448	2.891	-18.1
17	1,2-Dichloroethene (total)		1.870	1.781	4.7
18	t-1,2-Dichloroethene		1.873	1.946	-3.9
19	Chloroform	C	3.502	3.991	-14.0
20	1,2-Dichloroethane		3.479	4.256	-22.3
22	2-Butanone		0.553	0.877	-58.6
23	1,1,1-Trichloroethane		0.382	0.404	-5.8
24	Carbon Tetrachloride		0.236	0.271	-14.9
26	Vinyl Acetate		0.091	0.075	17.7
27	Bromodichloromethane		0.396	0.491	-24.1
28	1,2-Dichloropropane	C	0.253	0.322	-27.5 high
29	cis-1,3-Dichloropropene		0.378	0.406	-7.5
30	Trichloroethene		0.402	0.415	-3.3
31	2-Chloroethyl vinyl ether		0.024	0.030	-24.9
32	Dibromochloromethane		0.265	0.380	-43.1
33	Dibromomethane		0.154	0.186	-21.3
34	Dibromoethane		0.322	0.417	-29.7
35	1,1,2-Trichloroethane		0.257	0.341	-32.9
36	1,4-Dichloro-2-butene		0.012	0.011	3.0
37	Benzene		1.622	1.381	14.8
38	trans-1,3-Dichloropropene		0.267	0.282	-5.5
39	Bromoform	SPC	0.193	0.278	-43.8
43	4-Methyl-2-Pentanone		0.598	0.674	-12.8
44	2-Hexanone		0.422	0.441	-4.5
45	Tetrachloroethene		0.446	0.397	11.1
46	1,1,2,2-Tetrachloroethane	SPC	0.437	0.454	-3.9
47	Toluene	C	1.789	1.543	13.8
48	Chlorobenzene	SPC	0.944	1.014	-7.5
49	Ethylbenzene	C	0.416	0.395	5.1

50	Styrene		0.462	0.449	2.8
51	m-/p-Xylene		1.092	1.066	2.4
52	o-Xylene		0.483	0.484	-0.1
53	Hexachloroethane		0.149	0.157	-5.2
54	1,2-Dbromo-3-chloropropane		0.078	0.075	2.9
2	1,2-Dichloroethane-d4	S	3.085	3.764	-22.0
25	Benzene-d6	S	1.342	1.588	-18.3
41	4-Bromofluorobenzene	S	0.323	0.337	-4.5
42	Toluene-d8	S	1.570	1.354	13.7

Quantitation Results

Date : 12/01/93
Time : 1552

Raw Filename : K23C5
Sample Description: VOST BLANK IS SUR MIX 1ul 2615-28-4, T/C

Analysis Time: 1515
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.73	50	2269221	65.502	ng	22 (1)
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	7.13	94	782628	80.640	ng	64 (1)
Acetonitrile	10.98	41	0	0.000	ng	0
Acrylonitrile	11.15	53	37497	14.058	ng	86 (1)
Vinyl Chloride	6.25	62	0	0.000	ng	0
Chloroethane	7.88	64	0	0.000	ng	0
Iodomethane	9.73	142	145202	44.776	ng	30 (1)
Trichlorofluoromethane	8.30	101	0	0.000	ng	0
Methylene Chloride	10.55	84	55159	25.365	ng	73
Acetone	10.47	43	0	0.000	ng	0
Carbon Disulfide	9.77	76	0	0.000	ng	0
1,1-Dichloroethene	8.57	96	0	0.000	ng	0
1,1-Dichloroethane	12.02	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.12	96	0	0.000	ng	0
Chloroform	13.93	83	0	0.000	ng	0
1,2-Dichloroethane	14.87	62	0	0.000	ng	0
2-Butanone	13.22	43	0	0.000	ng	0
1,1,1-Trichloroethane	14.14	97	0	0.000	ng	0
Carbon Tetrachloride	14.47	117	0	0.000	ng	0
Vinyl Acetate	12.13	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.50	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.45	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.97	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.83	78	198065	12.514	ng	85 ✓
trans-1,3-Dichloropropene	19.00	75	0	0.000	ng	0
Bromoform	23.35	173	6519	3.461	ng	74
4-Methyl-2-Pentanone	18.18	43	74330	11.436	ng	93 ✓
2-Hexanone	19.89	43	140233	30.529	ng	94 ✓
Tetrachloroethene	19.74	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.37	83	35948	7.561	ng	96 ✓
Toluene	18.82	91	0	0.000	ng	0
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	21.77	106	2371	0.524	ng	79 ✓
Styrene	22.94	104	26077	5.185	ng	90 ✓
m-/p-Xylene	22.02	106	11589	0.976	ng	89 ✓
o-Xylene	22.90	106	7786	1.481	ng	84 ✓
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.34	157	12226	14.460	ng	88 ✓
1,2-Dichloroethane-d4	14.70	65	1061080	315.451	ng	85 ✓

Benzene-d6	14.75	84	3382591	258.254	ng	100 ✓
4-Bromofluorobenzene	24.09	95	1122291	319.788	ng	100 ✓
Toluene-d8	18.47	98	3163660	185.249	ng	93 ✓

(1) False positive

Quantitation Results
==========

Date : 12/01/93
Time : 1552

Raw Filename : K23C4
Sample Description: PREFORMANCE ADUIT SAMPLE 2ul + 1ulIS, T/C

Analysis Time: 1421
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

nominal amount = 100
mwg 11-23-93

Compound	RT	QM	AREA	Conc		REV	% A = 100
Chloromethane	5.73	50	2751051	62.339	ng	29	
Dichlorofluoromethane	5.40	85	0	0.000	ng	0	
Bromomethane	7.15	94	968512	78.341	ng	61	
Acetonitrile	10.62	41	89824	27.813	ng	15	
Acrylonitrile	11.15	53	72771	21.418	ng	79	
Vinyl Chloride	6.25	62	0	0.000	ng	0	
Chloroethane	7.80	64	0	0.000	ng	0	
Iodomethane	9.72	142	248315	60.111	ng	78	
Trichlorofluoromethane	8.13	101	0	0.000	ng	0	
Methylene Chloride	10.62	84	1305476	471.280	ng	97	118
Acetone	9.40	43	0	0.000	ng	0	
Carbon Disulfide	9.77	76	0	0.000	ng	0	
1,1-Dichloroethene	8.75	96	20144	7.361	ng	0	
1,1-Dichloroethane	12.05	63	2026479	596.023	ng	98	149
1,2-Dichloroethene (total)	11.13	96	1363192	524.965	ng	96	131
t-1,2-Dichloroethene	11.15	96	1474374	566.658	ng	92	142
Chloroform	13.84	83	2400061	493.485	ng	99	123
1,2-Dichloroethane	14.90	62	2290804	474.147	ng	95	118
2-Butanone	13.29	43	31180	4.918	ng ✓	71	
1,1,1-Trichloroethane	14.15	97	2044185	466.526	ng	98	116
Carbon Tetrachloride	14.49	117	1464108	540.381	ng	98	135
Vinyl Acetate	12.13	43	0	0.000	ng	0	
Bromodichloromethane	17.07	83	2104587	463.798	ng	99	116
1,2-Dichloropropane	16.54	63	1531215	527.680	ng	97	132
cis-1,3-Dichloropropene	17.95	75	2354791	543.156	ng	99	136
Trichloroethene	16.12	130	30929	6.704	ng	96	
2-Chloroethyl vinyl ether	17.72	63	12871	47.407	ng	74	
Dibromochloromethane	20.29	129	1589541	522.416	ng	98	131
Dibromomethane	16.77	93	0	0.000	ng	0	
Dibromoethane	20.54	107	0	0.000	ng	0	
1,1,2-Trichloroethane	19.43	97	1500296	509.303	ng	65	127
1,4-Dichloro-2-butene	24.54	124	615	4.681	ng ✓	68	
Benzene	14.85	78	225361	12.112	ng ✓	48	
trans-1,3-Dichloropropene	19.04	75	1853117	604.105	ng	99	151
Bromoform	23.39	173	1112792	502.511	ng	97	125
4-Methyl-2-Pentanone	18.24	43	580540	110.717	ng	95	
2-Hexanone	19.92	43	588842	158.908	ng	96	
Tetrachloroethene	19.79	164	8510	2.174	ng	94	
1,1,2,2-Tetrachloroethane	24.39	83	1587775	413.984	ng	99	103
Toluene	18.84	91	37249	2.373	ng	69	
Chlorobenzene	21.59	112	0	0.000	ng	0	
Ethylbenzene	21.82	106	12603	3.450	ng	96	
Styrene	22.97	104	83054	20.471	ng	94	
m-/p-Xylene	22.07	106	46017	4.802	ng	91	
o-Xylene	22.95	106	34132	8.048	ng	91	
Hexachloroethane	25.90	117	14799	11.311	ng	46	
1,2-Dbromo-3-chloropropane	30.37	157	30777	45.121	ng	92	
1,2-Dichloroethane-d4	14.74	65	1193574	278.559	ng	75 ✓	

Benzene-d6	14.80	84	3999376	259.741	ng	100 ✓
4-Bromofluorobenzene	24.12	95	749763	264.825	ng	100 ✓
Toluene-d8	18.52	98	3310867	240.318	ng	94 ✓

DAILY CALIBRATION CHECK

Date proccessed: 11/24/93
Time proccessed: 0819 T/L

CCAL Filename : K23Q5 Date analyzed : 11/23/93
Time injected : 1341
ICAL Filename : ICAL_K22 Date analyzed : 11/23/93
Time injected : 1056

End of day standard passed ok [illegible] 11/24/93

	COMPOUND	FLAG	RF MEAN	RF 240	%D
3	Chloromethane	SPC	31.775	11.376 ✓	64.2
4	Dichlorofluoromethane		1.358	0.652	52.0
5	Bromomethane		8.901	3.978	55.3
6	Acetonitrile		2.325	2.649	-13.9
7	Acrylonitrile		2.446	2.057	15.9
8	Vinyl Chloride	C	2.757	2.836	-2.9 ✓
9	Chloroethane		2.166	17.957	-729.0
10	Iodomethane		2.974	1.503	49.5
11	Trichlorofluoromethane		1.223	1.973	-61.4
12	Methylene Chloride		1.995	1.805	9.5
13	Acetone		2.778	2.005	27.8
14	Carbon Disulfide		4.916	5.810	-18.2
15	1,1-Dichloroethene	C	1.970	1.657	15.9 ✓
16	1,1-Dichloroethane	SPC	2.448	2.910 ✓	-18.9
17	1,2-Dichloroethene (total)		1.870	1.775	5.1
18	t-1,2-Dichloroethene		1.873	1.939	-3.5
19	Chloroform	C	3.502	4.052	-15.7 ✓
20	1,2-Dichloroethane		3.479	4.106	-18.0
22	2-Butanone		0.553	0.687	-24.3
23	1,1,1-Trichloroethane		0.382	0.378	1.0
24	Carbon Tetrachloride		0.236	0.257	-8.6
26	Vinyl Acetate		0.091	0.199	-117.7
27	Bromodichloromethane		0.396	0.457	-15.6
28	1,2-Dichloropropane	C	0.253	0.290	-14.5 ✓
29	cis-1,3-Dichloropropene		0.378	0.399	-5.5
30	Trichloroethene		0.402	0.418	-4.1
31	2-Chloroethyl vinyl ether		0.024	0.029	-21.0
32	Dibromochloromethane		0.265	0.356	-34.3
33	Dibromomethane		0.154	0.233	-51.7
34	Dibromoethane		0.322	0.386	-19.9
35	1,1,2-Trichloroethane		0.257	0.324	-26.3
36	1,4-Dichloro-2-butene		0.012	0.015	-33.7
37	Benzene		1.622	1.351	16.7
38	trans-1,3-Dichloropropene		0.267	0.305	-13.9
39	Bromoform	SPC	0.193	0.291 ✓	-50.8
43	4-Methyl-2-Pentanone		0.598	0.578	3.2
44	2-Hexanone		0.422	0.406	3.7
45	Tetrachloroethene		0.446	0.381	14.6
46	1,1,2,2-Tetrachloroethane	SPC	0.437	0.538 ✓	-23.0
47	Toluene	C	1.789	1.479	17.3 ✓
48	Chlorobenzene	SPC	0.944	1.042 ✓	-10.4
49	Ethylbenzene	C	0.416	0.406	2.6 ✓

50	Styrene		0.462	0.538	-16.4
51	m-/p-Xylene		1.092	1.141	-4.4
52	o-Xylene		0.483	0.526	-8.8
53	Hexachloroethane		0.149	0.174	-17.0
54	1,2-Dbromo-3-chloropropane		0.078	0.096	-23.9
2	1,2-Dichloroethane-d4	S	3.085	3.532	-14.5
25	Benzene-d6	S	1.342	1.657	-23.5
41	4-Bromofluorobenzene	S	0.323	0.368	-14.1
42	Toluene-d8	S	1.570	1.363	13.2

4601-01-05-02

Sample Results

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Quantitation Results

Date : 12/01/93
Time : 1544

Raw Filename : K19C7
Sample Description: TR BL TNX 1077

Analysis Time: 1550
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.22	50	1674631	93.940	ng	31
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.32	94	584532	72.150	ng	81
Acetonitrile	10.97	41	0	0.000	ng	0
Acrylonitrile	10.18	53	14059	6.171	ng	85
Vinyl Chloride	6.87	62	0	0.000	ng	0
Chloroethane	7.40	64	0	0.000	ng	0
Iodomethane	8.67	142	180363	61.673	ng	43
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	9.50	84	42240	18.261	ng	91
Acetone	8.52	43	0	0.000	ng	0
Carbon Disulfide	8.63	76	0	0.000	ng	0
1,1-Dichloroethene	7.02	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.72	62	0	0.000	ng	0
2-Butanone	12.27	43	29149	5.565	ng	84
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	12.27	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	15.40	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	16.54	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	13.78	78	106433	8.976	ng	82
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0
Bromoform	22.20	173	0	0.000	ng	0
4-Methyl-2-Pentanone	17.17	43	11323	2.670	ng	94
2-Hexanone	18.87	43	25130	8.141	ng	92
Tetrachloroethene	18.62	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.57	91	0	0.000	ng	0
Chlorobenzene	20.42	112	0	0.000	ng	0
Ethylbenzene	20.70	106	2708	0.933	ng	84
Styrene	21.87	104	5142	1.512	ng	77
m-/p-Xylene	20.97	106	7131	0.863	ng	84
o-Xylene	21.84	106	3132	0.892	ng	85
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.80	157	0	0.000	ng	0
1,2-Dichloroethane-d4	13.67	65	820109	288.328	ng	76

Benzene-d6	13.70	84	2517194	229.655	ng	100 ✓
4-Bromofluorobenzene	23.00	95	827928	324.600	ng	100 ✓
Toluene-d8	17.40	98	2424762	189.716	ng	94 ✓

Quantitation Results

Date : 12/01/93
Time : 1552

Raw Filename : K23C9
Sample Description: SAMPLE TR B T/C 1078 IS& SURROGATE 26

Analysis Time: 1914
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.55	50	4008813	76.037	ng	43
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	6.97	94	861536	58.332	ng	90 ✓
Acetonitrile	10.52	41	0	0.000	ng	0
Acrylonitrile	11.15	53	0	0.000	ng	0
Vinyl Chloride	6.78	62	0	0.000	ng	0
Chloroethane	7.38	64	0	0.000	ng	0
Iodomethane	9.62	142	143886	29.156	ng	67 ✓
Trichlorofluoromethane	8.00	101	0	0.000	ng	0
~~Methylene Chloride~~	~~10.48~~	~~84~~	~~19275~~	~~5.824~~	~~ng~~	~~74~~ (1)
Acetone	9.70	43	0	0.000	ng	0
Carbon Disulfide	9.77	76	0	0.000	ng	0
1,1-Dichloroethene	8.63	96	0	0.000	ng	0
1,1-Dichloroethane	11.47	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.02	96	0	0.000	ng	0
~~Chloroform~~	~~13.94~~	~~83~~	~~229~~	~~0.039~~	~~ng~~	~~51~~ (1)
1,2-Dichloroethane	14.79	62	0	0.000	ng	0
2-Butanone	13.15	43	37264	5.821	ng	89 ✓
1,1,1-Trichloroethane	14.14	97	0	0.000	ng	0
Carbon Tetrachloride	14.47	117	0	0.000	ng	0
Vinyl Acetate	11.35	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.52	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.64	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	19.42	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.79	78	2178751	115.970	ng	99 ✓
trans-1,3-Dichloropropene	19.04	75	0	0.000	ng	0
Bromoform	23.37	173	0	0.000	ng	0
4-Methyl-2-Pentanone	18.80	43	0	0.000	ng	0
2-Hexanone	19.85	43	0	0.000	ng	0
Tetrachloroethene	19.79	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.39	83	0	0.000	ng	0
Toluene	18.59	91	65677	3.036	ng	89 ✓
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	22.00	106	20072	3.988	ng	93 ✓
Styrene	22.92	104	10647	1.905	ng	79 ✓
m-/p-Xylene	22.00	106	26653	2.019	ng	92 ✓
o-Xylene	22.89	106	4037	0.691	ng	81 ✓
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.37	157	0	0.000	ng	0
1,2-Dichloroethane-d4	14.65	65	1200713	234.562	ng	93 ✓

Benzene-d6	14.72	84	3265062	210.006	ng	100 ✓
4-Bromofluorobenzene	24.07	95	1505852	386.058	ng	100 ✓
Toluene-d8	18.43	98	3606374	189.999	ng	93 ✓

(1) Either positive Hung
(1)(2) Not detected

Quantitation Results

Date : 12/01/93
Time : 1544

Raw Filename : K19C6
Sample Description: FD B TNX 1075

Analysis Time: 1514
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.22	50	1433300	78.509	ng	33
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.28	94	529854	63.862	ng	74 ✓
Acetonitrile	11.04	41	0	0.000	ng	0
Acrylonitrile	10.14	53	14610	6.262	ng	81 trace
Vinyl Chloride	6.82	62	0	0.000	ng	0
Chloroethane	7.57	64	0	0.000	ng	0
Iodomethane	8.67	142	196403	65.576	ng	43 ✓
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	9.48	84	37353	15.768	ng	89 ✓
Acetone	8.43	43	0	0.000	ng	0
Carbon Disulfide	8.63	76	0	0.000	ng	0
1,1-Dichloroethene	6.75	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.70	62	0	0.000	ng	0
2-Butanone	12.25	43	7122	1.353	ng	84 ✓
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	12.25	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	15.40	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	16.54	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	13.77	78	0	0.000	ng	0
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0
Bromoform	22.20	173	0	0.000	ng	0
4-Methyl-2-Pentanone	17.15	43	12354	2.908	ng	94 ✓
2-Hexanone	18.87	43	27167	8.785	ng	92 ✓
Tetrachloroethene	18.62	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.84	91	0	0.000	ng	0
Chlorobenzene	20.42	112	0	0.000	ng	0
Ethylbenzene	20.70	106	0	0.000	ng	0
Styrene	21.85	104	7419	2.178	ng	77 ✓
m-/p-Xylene	20.94	106	10120	1.222	ng	88 ✓
o-Xylene	21.82	106	0	0.000	ng	0
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.74	157	0	0.000	ng	0
1,2-Dichloroethane-d4	13.65	65	821898	282.154	ng	85 ✓

Benzene-d6	13.69	84	2492031	226.269	ng	100 ✓
4-Bromofluorobenzene	22.99	95	889258	348.016	ng	100 ✓
Toluene-d8	17.40	98	2427152	189.560	ng	94 ✓

Quantitation Results
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Date : 12/01/93
Time : 1553

Raw Filename : K23C10
Sample Description: SAMPLE FD B T/C 1076 IS & SURROGATE 2

Analysis Time: 1951
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
~~Chloromethane~~	~~5.82~~	~~50~~	~~2226493~~	~~50.549~~	~~ng~~	~~34~~ (1)
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	7.08	94	612537	49.642	ng	50 ✓
Acetonitrile	11.43	41	0	0.000	ng	0
Acrylonitrile	11.33	53	0	0.000	ng	0
Vinyl Chloride	6.25	62	0	0.000	ng	0
Chloroethane	7.60	64	0	0.000	ng	0
~~Iodomethane~~	~~9.58~~	~~142~~	~~72337~~	~~17.545~~	~~ng~~	~~0~~ (1)
Trichlorofluoromethane	8.57	101	0	0.000	ng	0
~~Methylene Chloride~~	~~10.43~~	~~84~~	~~36678~~	~~13.266~~	~~ng~~	~~70~~ (1)
Acetone	9.62	43	0	0.000	ng	0
Carbon Disulfide	9.77	76	0	0.000	ng	0
1,1-Dichloroethene	8.62	96	0	0.000	ng	0
1,1-Dichloroethane	12.02	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.12	96	0	0.000	ng	0
~~Chloroform~~	~~13.74~~	~~83~~	~~585~~	~~0.121~~	~~ng~~	~~30~~ (2)
1,2-Dichloroethane	14.72	62	0	0.000	ng	0
~~2-Butanone~~	~~13.22~~	~~43~~	~~36879~~	~~5.696~~	~~ng~~	~~61~~ (1)
1,1,1-Trichloroethane	14.14	97	0	0.000	ng	0
Carbon Tetrachloride	14.47	117	0	0.000	ng	0
Vinyl Acetate	12.13	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.52	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.75	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	19.42	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.79	78	425173	22.377	ng	92 ✓
trans-1,3-Dichloropropene	19.04	75	0	0.000	ng	0
Bromoform	23.37	173	0	0.000	ng	0
4-Methyl-2-Pentanone	18.22	43	0	0.000	ng	0
2-Hexanone	19.92	43	0	0.000	ng	0
Tetrachloroethene	19.79	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.39	83	0	0.000	ng	0
Toluene	18.59	91	43654	2.145	ng	86 ✓
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	22.00	106	12380	2.614	ng	92 ✓
~~Styrene~~	~~22.92~~	~~104~~	~~6028~~	~~1.146~~	~~ng~~	~~78~~ (1)
m-/p-Xylene	22.00	106	16735	1.347	ng	91 ✓
o-Xylene	22.92	106	2440	0.444	ng	69 ✓
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.37	157	0	0.000	ng	0
1,2-Dichloroethane-d4	14.65	65	1172904	274.260	ng	89 ✓

MLC 11-24-94

Benzene-d6	14.72	84	3422922	217.684	ng	100
4-Bromofluorobenzene	24.05	95	1166369	317.819	ng	100
Toluene-d8	18.43	98	3479814	194.854	ng	94

(1) ~~False positive~~ Interference, mass spectrum did not meet criteria
(2) Not detected

/

Quantitation Results
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Date : 12/01/93
Time : 1539

Raw Filename : K18C8
Sample Description: SAMPLE PR 2 TNX 4601-01, Sample # 1069

Mary 11-19-9

Analysis Time: 1822
Analysis Date: 11/18/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
~~Chloromethane~~	~~4.35~~	~~50~~	~~21490170~~	~~1505.996~~	~~ng~~	~~30~~ (1)
Dichlorofluoromethane	3.48	85	0	0.000	ng	0
Bromomethane	5.47	94	2521017	388.741	ng	95 ✓
Acetonitrile	8.45	41	140422	75.424	ng	56 (2)
Acrylonitrile	9.25	53	0	0.000	ng	0
Vinyl Chloride	3.95	62	0	0.000	ng	0
Chloroethane	4.23	64	0	0.000	ng	0
~~Iodomethane~~	~~7.68~~	~~142~~	~~491499~~	~~209.954~~	~~ng~~	~~55~~ (3)
Trichlorofluoromethane	6.27	101	0	0.000	ng	0
Methylene Chloride	8.62	84	0	0.000	ng	0
Acetone	7.87	43	2941974	993.771	ng	90 (2)
Carbon Disulfide	7.88	76	0	0.000	ng	0
1,1-Dichloroethene	7.40	96	0	0.000	ng	0
1,1-Dichloroethane	10.03	63	0	0.000	ng	0
1,2-Dichloroethene (total)	9.18	96	0	0.000	ng	0
t-1,2-Dichloroethene	9.18	96	0	0.000	ng	0
Chloroform	11.78	83	0	0.000	ng	0
1,2-Dichloroethane	12.75	62	0	0.000	ng	0
2-Butanone	11.32	43	342674	92.093	ng	98 ✓
1,1,1-Trichloroethane	12.12	97	0	0.000	ng	0
Carbon Tetrachloride	12.45	117	0	0.000	ng	0
Vinyl Acetate	10.18	43	0	0.000	ng	0
Bromodichloromethane	15.04	83	0	0.000	ng	0
1,2-Dichloropropane	14.50	63	0	0.000	ng	0
cis-1,3-Dichloropropene	15.94	75	0	0.000	ng	0
Trichloroethene	14.08	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	15.65	63	0	0.000	ng	0
Dibromochloromethane	18.24	129	0	0.000	ng	0
Dibromomethane	14.73	93	0	0.000	ng	0
Dibromoethane	18.47	107	0	0.000	ng	0
1,1,2-Trichloroethane	17.42	97	0	0.000	ng	0
1,4-Dichloro-2-butene	22.54	124	0	0.000	ng	0
Benzene	12.75	78	20164531	2394.070	ng	99 ✓
trans-1,3-Dichloropropene	17.05	75	0	0.000	ng	0
Bromoform	21.32	173	0	0.000	ng	0
4-Methyl-2-Pentanone	15.90	43	0	0.000	ng	0
2-Hexanone	17.87	43	0	0.000	ng	0
Tetrachloroethene	17.64	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	22.40	83	0	0.000	ng	0
Toluene	16.50	91	1147236	102.810	ng	98 ✓
Chlorobenzene	19.55	112	0	0.000	ng	0
Ethylbenzene	19.67	106	60693	27.219	ng	98 ✓
Styrene	20.84	104	30893	11.832	ng	76 ✓
m-/p-Xylene	19.94	106	297208	46.817	ng	95 ✓
o-Xylene	20.80	106	107623	39.935	ng	98 ✓
Hexachloroethane	23.85	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	27.47	157	0	0.000	ng	0
1,2-Dichloroethane-d4	12.65	65	598187	262.729	ng	66 ✓

Benzene-d6	12.67	84	1844778	236.941	ng	92 ✓
4-Bromofluorobenzene	21.97	95	687668	351.079	ng	100 ✓
Toluene-d8	16.37	98	1881057	191.649	ng	94 ✓

(1) The ion ratio for m/z 50 and 52 does not positively confirm the presence of chloromethane

(2) ~~False positive result~~ mmy 10/4/93 High background coelutes with the target analyte. Detection limit may be higher than the method due to matrix related interference. The amount provided is a high estimate

(3) ~~False positive result~~ mmy 10/4/93 Sulfur dioxide coelutes with chloroethane.

Quantitation Results
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Date : 12/01/93
Time : 1553

Raw Filename : K23C11
Sample Description: SAMPLE PR2 T/C 1070 IS & SURROGATE 26

Analysis Time: 2027
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
~~Chloromethane~~	~~5.04~~	~~50~~	~~8689950~~	~~99.018~~	~~ng~~	~~35~~ (1)
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	7.15	94	0	0.000	ng	0
Acetonitrile	11.02	41	0	0.000	ng	0
Acrylonitrile	11.37	53	0	0.000	ng	0
Vinyl Chloride	6.47	62	0	0.000	ng	0
~~Chloroethane~~	~~7.60~~	~~64~~	~~6777457~~	~~1132.853~~	~~ng~~	~~59~~ (1)
Iodomethane	9.70	142	266661	32.460	ng	63 ✓
Trichlorofluoromethane	8.62	101	0	0.000	ng	0
~~Methylene Chloride~~	~~10.45~~	~~84~~	~~103334~~	~~18.758~~	~~ng~~	~~35~~ (1)
Acetone	9.62	43	0	0.000	ng	0
Carbon Disulfide	9.80	76	571899	42.116	ng	91 ✓
~~1,1-Dichloroethene~~	~~9.37~~	~~96~~	~~906~~	~~0.166~~	~~ng~~	~~37~~ (2)
1,1-Dichloroethane	11.94	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.37	96	0	0.000	ng	0
Chloroform	13.69	83	0	0.000	ng	0
1,2-Dichloroethane	14.74	62	0	0.000	ng	0
2-Butanone	13.10	43	89776	9.581	ng	82 ✓
1,1,1-Trichloroethane	14.04	97	46018	7.106	ng	85 ✓
Carbon Tetrachloride	14.42	117	0	0.000	ng	0
Vinyl Acetate	12.72	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.52	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.02	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	19.42	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.77	78	4152714	151.025	ng	99 ✓
trans-1,3-Dichloropropene	19.04	75	0	0.000	ng	0
Bromoform	23.37	173	0	0.000	ng	0
4-Methyl-2-Pentanone	18.22	43	0	0.000	ng	0
2-Hexanone	19.82	43	17368	2.640	ng	84 trace
Tetrachloroethene	19.79	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.39	83	0	0.000	ng	0
Toluene	18.55	91	77412	2.777	ng	83 ✓
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	21.97	106	38731	5.972	ng	93 ✓
Styrene	22.89	104	8100	1.125	ng	80 ✓
m-/p-Xylene	21.97	106	46681	2.744	ng	95 ✓
o-Xylene	22.87	106	5097	0.677	ng	78 ✓
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.37	157	0	0.000	ng	0
1,2-Dichloroethane-d4	14.62	65	1871803	219.666	ng	98

Benzene-d6	14.69	84	4744476	208.500	ng	100
4-Bromofluorobenzene	24.04	95	1873716	372.769	ng	100
Toluene-d8	18.42	98	5232962	213.941	ng	92

(1) ~~False positive~~ Many Interference coeluted with analyte. Mass spectrum did not meet criteria

(2) Not detected

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Quantitation Results
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Date : 12/01/93
Time : 1544

Raw Filename : K19C8
Sample Description: SAMPLE 1073 RUN1 PAR4 TNX 612 +1ul I.

Analysis Time: 1637
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	4.93	50	1584177	53.379	ng	43
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.10	94	313663	23.256	ng	86 ✓
Acetonitrile	10.05	41	0	0.000	ng	0
Acrylonitrile	10.07	53	0	0.000	ng	0
Vinyl Chloride	5.37	62	0	0.000	ng	0
Chloroethane	6.52	64	0	0.000	ng	0
Iodomethane	8.53	142	0	0.000	ng	0
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	10.98	84	0	0.000	ng	0
~~Acetone~~	~~8.70~~	~~43~~	~~7766489~~	~~1261.417~~	~~ng~~	~~98~~ (1)
Carbon Disulfide	8.63	76	0	0.000	ng	0
1,1-Dichloroethene	8.25	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.77	62	0	0.000	ng	0
2-Butanone	12.12	43	2088265	207.277	ng	97 ✓
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	12.12	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	13.77	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.09	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	13.84	78	96912008	4249.583	ng	79 (2)
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0.
Bromoform	22.20	173	0	0.000	ng	0
4-Methyl-2-Pentanone	17.09	43	267261	36.812	ng	93 ✓
2-Hexanone	18.80	43	816802	154.551	ng	96 ✓
Tetrachloroethene	18.64	164	20557	3.650	ng	92 ✓
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.49	91	3914193	157.326	ng	98 ✓
Chlorobenzene	20.42	112	458138	31.433	ng	97 ✓
Ethylbenzene	20.67	106	204192	41.073	ng	99 ✓
Styrene	21.82	104	270184	46.412	ng	86 ✓
m-/p-Xylene	20.92	106	891734	63.002	ng	95 ✓
o-Xylene	21.79	106	344497	57.334	ng	99 ✓
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.72	157	55227	116.513	ng	84 ✓
1,2-Dichloroethane-d4	13.67	65	1661676	350.916	ng	34 ✓

Benzene-d6	13.68	84	4227901	200.558	ng	40
4-Bromofluorobenzene	22.95	95	1688253	386.581	ng	100
Toluene-d8	17.35	98	4192940	191.602	ng	93

(1) ~~False positive~~ Interference coeluted with analyte. Mass spectrum did not meet criteria

(2) Benzene estimation based on a single point calibration

$$\text{Calculation} = \frac{\text{Area of Benzene}}{\text{Area of IS (DFB)}} \times \frac{250\text{ ng}}{\text{RRF}} = \text{Amt of Benzene (ng)}$$

Based on 9,000 ng std:

$$\text{Amt of Benzene} = \frac{96,912,008}{3,928,651} \times \frac{250\text{ ng}}{0.426} = 14,476\text{ ng}$$

Based on 15,000 ng std:

$$\text{Amt of Benzene} = \frac{96,912,008}{3,928,651} \times \frac{250\text{ ng}}{0.239} = 25,803\text{ ng}$$

These estimates are biased low because the ~~mass~~ peak is saturating the mass spectrometric detector.

Quantitation Results
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Date : 12/01/93
Time : 1554

Raw Filename : K23C12
Sample Description: PR4 T/C 1074 IS & SURROGATE 2815-18-4

Analysis Time: 2101
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.77	50	13491634	139.097	ng	30
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	7.15	94	0	0.000	ng	0
Acetonitrile	11.10	41	0	0.000	ng	0
Acrylonitrile	11.07	53	0	0.000	ng	0
Vinyl Chloride	6.60	62	0	0.000	ng	0
Chloroethane	7.58	64	0	0.000	ng	0
Iodomethane	9.73	142	285277	31.420	ng	71 ✓
Trichlorofluoromethane	8.60	101	0	0.000	ng	0
Methylene Chloride	10.48	84	136897	22.485	ng	47
Acetone	9.65	43	0	0.000	ng	0
Carbon Disulfide	9.82	76	765476	51.006	ng	93 ✓
1,1-Dichloroethene	9.32	96	0	0.000	ng	0
1,1-Dichloroethane	12.37	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.33	96	0	0.000	ng	0
Chloroform	13.72	83	0	0.000	ng	0
1,2-Dichloroethane	14.79	62	0	0.000	ng	0
2-Butanone	13.10	43	169501	16.454	ng	83 ✓
1,1,1-Trichloroethane	14.09	97	0	0.000	ng	0
Carbon Tetrachloride	14.47	117	0	0.000	ng	0
Vinyl Acetate	11.65	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.52	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.60	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	19.67	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.80	78	3338979	110.449	ng	99 ✓
trans-1,3-Dichloropropene	19.04	75	0	0.000	ng	0
Bromoform	23.37	173	0	0.000	ng	0
4-Methyl-2-Pentanone	17.50	43	0	0.000	ng	0
~~2-Hexanone~~	~~19.87~~	~~43~~	~~11916~~	~~1.701~~	~~ng~~	~~77~~ (1)
Tetrachloroethene	19.79	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.39	83	0	0.000	ng	0
Toluene	18.59	91	129877	4.377	ng	80 ✓
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	21.79	106	8997	1.303	ng	94 ✓
Styrene	22.92	104	23648	3.084	ng	85 ✓
m-/p-Xylene	22.02	106	75014	4.141	ng	94 ✓
o-Xylene	22.90	106	9659	1.205	ng	82 ✓
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.37	157	0	0.000	ng	0
1,2-Dichloroethane-d4	14.65	65	1974792	209.692	ng	97 ✓

Benzene-d6	14.74	84	5834115	233.198	ng	100 ✓
4-Bromofluorobenzene	24.07	95	2019056	377.290	ng	100 ✓
Toluene-d8	18.45	98	5754170	220.963	ng	93 ✓

(1) ~~False positive~~ Always Interference coeluted with analyte. Mass spectrum did not meet objective

Quantitation Results
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Date : 12/01/93
Time : 1545

Raw Filename : K19C10
Sample Description: SAMPLE 2069 PR2 TNX 635

Analysis Time: 1803
Analysis Date: 11/19/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
~~Chloromethane~~	~~5.00~~	~~50~~	~~1215303~~	~~28.994~~	~~ng~~	~~45~~ (1)
Dichlorofluoromethane	4.53	85	0	0.000	ng	0
Bromomethane	6.08	94	245951	12.912	ng	75 ✓
Acetonitrile	10.07	41	0	0.000	ng	0
Acrylonitrile	10.08	53	0	0.000	ng	0
Vinyl Chloride	5.37	62	0	0.000	ng	0
Chloroethane	6.52	64	0	0.000	ng	0
Iodomethane	8.53	142	0	0.000	ng	0
Trichlorofluoromethane	7.10	101	0	0.000	ng	0
Methylene Chloride	9.48	84	0	0.000	ng	0
~~Acetone~~	~~8.85~~	~~43~~	~~22116248~~	~~2543.338~~	~~ng~~	~~98~~ (1)
Carbon Disulfide	8.63	76	0	0.000	ng	0
1,1-Dichloroethene	8.25	96	0	0.000	ng	0
1,1-Dichloroethane	10.92	63	0	0.000	ng	0
1,2-Dichloroethene (total)	10.02	96	0	0.000	ng	0
t-1,2-Dichloroethene	10.02	96	0	0.000	ng	0
Chloroform	12.72	83	0	0.000	ng	0
1,2-Dichloroethane	13.72	62	0	0.000	ng	0
2-Butanone	12.12	43	3057771	331.858	ng	98 ✓
1,1,1-Trichloroethane	13.02	97	0	0.000	ng	0
Carbon Tetrachloride	13.33	117	0	0.000	ng	0
Vinyl Acetate	12.12	43	0	0.000	ng	0
Bromodichloromethane	15.94	83	0	0.000	ng	0
1,2-Dichloropropane	15.40	63	0	0.000	ng	0
cis-1,3-Dichloropropene	16.80	75	0	0.000	ng	0
Trichloroethene	14.97	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	16.54	63	0	0.000	ng	0
Dibromochloromethane	19.12	129	0	0.000	ng	0
Dibromomethane	15.64	93	0	0.000	ng	0
Dibromoethane	19.35	107	0	0.000	ng	0
1,1,2-Trichloroethane	18.29	97	0	0.000	ng	0
1,4-Dichloro-2-butene	23.37	124	0	0.000	ng	0
Benzene	13.72	78	21861060	1048.145	ng	99 ✓
trans-1,3-Dichloropropene	17.90	75	0	0.000	ng	0
Bromoform	22.20	173	0	0.000	ng	0
4-Methyl-2-Pentanone	16.57	43	0	0.000	ng	0
2-Hexanone	18.79	43	472509	90.960	ng	95 ✓
Tetrachloroethene	18.62	164	21831	3.944	ng	91 ✓
1,1,2,2-Tetrachloroethane	23.24	83	0	0.000	ng	0
Toluene	17.49	91	4272875	174.730	ng	98 ✓
Chlorobenzene	20.42	112	0	0.000	ng	0
Ethylbenzene	20.65	106	222968	45.630	ng	98 ✓
Styrene	21.80	104	0	0.000	ng	0
m-/p-Xylene	20.90	106	1049303	75.424	ng	95 ✓
o-Xylene	21.79	106	386663	65.471	ng	99 ✓
Hexachloroethane	24.72	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	28.70	157	0	0.000	ng	0
1,2-Dichloroethane-d4	13.58	65	1545385	231.074	ng	91 ✓

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Benzene-d6	13.63	84	4423584	229.441	ng	100 ✓
4-Bromofluorobenzene	22.95	95	1676817	390.641	ng	100 ✓
Toluene-d8	17.35	98	4064813	188.978	ng	93 ✓

(1) ~~False positive~~ Interference eluted with analyte. Mass spectrum did not meet criteria. Amount provided is a high value.

Quantitation Results

Date : 12/01/93
Time : 1554

Raw Filename : K23C8
Sample Description: SAMPLE PR2 T/C 2070 IS& SURROGATE 261

Analysis Time: 1826
Analysis Date: 11/23/93

Lab Name: MRI
User: RER

Compound	RT	QM	AREA	Conc		REV
Chloromethane	5.75	50	17478092	243.193	ng	47
Dichlorofluoromethane	5.40	85	0	0.000	ng	0
Bromomethane	7.02	94	2176831	108.120	ng	85
Acetonitrile	11.05	41	0	0.000	ng	0
Acrylonitrile	11.37	53	0	0.000	ng	0
Vinyl Chloride	6.63	62	0	0.000	ng	0
~~Chloroethane~~	~~7.58~~	~~64~~	~~1806049~~	~~368.637~~	~~ng~~	~~60~~
Iodomethane	9.73	142	619062	92.021	ng	64
Trichlorofluoromethane	8.52	101	0	0.000	ng	0
~~Methylene Chloride~~	~~10.48~~	~~84~~	~~65811~~	~~14.500~~	~~ng~~	~~31~~
Acetone	9.72	43	0	0.000	ng	0
Carbon Disulfide	9.80	76	283818	25.523	ng	89
1,1-Dichloroethene	8.85	96	0	0.000	ng	0
1,1-Dichloroethane	12.35	63	0	0.000	ng	0
1,2-Dichloroethene (total)	11.12	96	0	0.000	ng	0
t-1,2-Dichloroethene	11.35	96	0	0.000	ng	0
Chloroform	13.80	83	0	0.000	ng	0
1,2-Dichloroethane	14.79	62	0	0.000	ng	0
2-Butanone	13.12	43	107614	13.323	ng	91
1,1,1-Trichloroethane	14.09	97	27427	4.913	ng	78
Carbon Tetrachloride	14.47	117	0	0.000	ng	0
Vinyl Acetate	11.47	43	0	0.000	ng	0
Bromodichloromethane	17.05	83	0	0.000	ng	0
1,2-Dichloropropane	16.52	63	0	0.000	ng	0
cis-1,3-Dichloropropene	17.93	75	0	0.000	ng	0
Trichloroethene	16.10	130	0	0.000	ng	0
2-Chloroethyl vinyl ether	17.82	63	0	0.000	ng	0
Dibromochloromethane	20.27	129	0	0.000	ng	0
Dibromomethane	16.77	93	0	0.000	ng	0
Dibromoethane	20.54	107	0	0.000	ng	0
1,1,2-Trichloroethane	20.04	97	0	0.000	ng	0
1,4-Dichloro-2-butene	24.50	124	0	0.000	ng	0
Benzene	14.79	78	3760026	158.626	ng	99
trans-1,3-Dichloropropene	19.04	75	0	0.000	ng	0
Bromoform	23.37	173	0	0.000	ng	0
4-Methyl-2-Pentanone	18.15	43	40922	4.640	ng	88
2-Hexanone	19.85	43	101659	16.310	ng	95
Tetrachloroethene	19.79	164	0	0.000	ng	0
1,1,2,2-Tetrachloroethane	24.39	83	0	0.000	ng	0
Toluene	18.59	91	99641	3.773	ng	87
Chlorobenzene	21.59	112	0	0.000	ng	0
Ethylbenzene	22.00	106	59234	9.640	ng	94
Styrene	22.92	104	24824	3.638	ng	82
m-/p-Xylene	22.00	106	71343	4.426	ng	94
o-Xylene	22.90	106	10068	1.411	ng	82
Hexachloroethane	25.90	117	0	0.000	ng	0
1,2-Dbromo-3-chloropropane	30.30	157	23193	20.215	ng	88
1,2-Dichloroethane-d4	14.65	65	1590172	227.882	ng	92

Benzene-d6	14.72	84	4213728	214.809	ng	100 ✓
4-Bromofluorobenzene	24.05	95	1823288	382.871	ng	100 ✓
Toluene-d8	18.43	98	4539925	195.910	ng	93 ✓

(1) ~~False positive~~ Missing Interference coeluted with analyte. Mass spectrum did not meet criteria

VOST DETECTION LIMITS

Source/analyte	ng/trap	
	Tenax	T/C
Chloromethane	<7.1	<9.7
Dichlorofluoromethane	<12.63	<3.85
Bromomethane	<8.5	<4.0
Acetonitrile	0.0	0.0
Acrylonitrile	<13.88	<4.76
Vinyl chloride	<6.8	<4.9
Chloroethane	<8.1	<3.8
Iodomethane	<38.22	<19.11
Trichlorofluoromethane	<10.9	<3.1
Methylene chloride	<15.86	<33.4
Acetone	<28.5	<24.9
Carbon disulfide	<9.0	<2.8
1,1-Dichloroethene	<9.3	<4.8
1,1-Dichloroethane	<8.0	<3.0
1,2-Dichloroethene (total)	0.0	0.0
t-1,2-Dichloroethene	<8.2	<2.6
Chloroform	<9.7	<2.1
1,2-Dichloroethane	<9.1	<4.5
2-Butanone	<18	<13.8
1,1,1-Trichloroethane	<2.6	<1.3
Carbon tetrachloride	<2.0	<3.9
Vinyl acetate	<4.8	<3.7
Bromodichloromethane	<0.5	<0.7
1,2-Dichloropropane	<1.1	<1.7
cis-1,3-Dichloropropene	<1.7	<2.4
Trichloroethene	<0.8	<1.1
2-Chloroethyl vinyl ether	<7.69	<2.8
Dibromochloromethane	<1.4	<1.4
Dibromomethane	<5.47	<1.84
Dibromoethane	<3.78	<1.29
1,1,2-Trichloroethane	<1.3	<1.1
1,4-Dichloro-2-butene	<8.41	<2
Benzene	<3.8	<8.9
trans-1,3-Dichloropropene	<2.3	<2.2
Bromoform	<2.1	<3.3
4-Methyl-2-Pentanone	<1.6	<3.0
2-Hexanone	<5.2	<4.7
Tetrachloroethene	<0.8	<2.0
1,1,2,2-Tetrachloroethane	<1.8	<1.9
Toluene	<0.6	<2.1
Chlorobenzene	<0.6	<0.9
Ethylbenzene	<1.2	<1.3
Styrene	<1.4	<1.9
m-/p-Xylene	<0.6	<0.7
o-Xylene	<0.4	<1.0
Hexachloroethane	<2.48	<0.75
1,2-Dibromo-3-chloropropane	<15.32	<5.19

VOST RAW DATA

Source/analyte	Catch, ng							
	Run							
	1		2		3		Field blank	
	Tenax	T/C	Tenax	T/C	Tenax	T/C	Tenax	T/C
Chloromethane (a)	1505.996 b	99.018 d	53.379	139.067	28.994 d	243.193	78.509	50.549 d
Dichlorofluoromethane	<12.63	<3.85	<12.63	<3.85	<12.63	<3.85	<12.63	<3.85
Bromomethane (a)	388.741	<4.0	23.256	<4.0	12.912	108.12	63.862	49.642
Acetonitrile	75.424 c	0	0	0	0	0	0	0
Acrylonitrile	<13.88	<4.76	<13.88	<4.76	<13.88	<4.76	6.262	<4.76
Vinyl chloride	<15.09	<3.35	<6.8	<4.9	<6.8	<4.9	<6.8	<4.9
Chloroethane	<18.47	1132.853 d	<8.1	<3.64 f	<8.1	368.637 d	<8.1	<3.8
Iodomethane (a)	209.954 a	32.46	<38.22	31.42	<38.22	92.021	65.576	17.545 d
Trichlorofluoromethane	<5.02	<3.1	<10.9	<3.1	<10.9	<3.1	<10.9	<3.1
Methylene chloride	<15.86	18.758 d	<15.86	22.485	<15.86	14.588 d	15.768	13.226 d
Acetone	993.771 a	<24.9	1261.417 a	<24.9	2543.338 d	<24.9	<28.5	<24.9
Carbon disulfide	<22.72	42.116	<9.0	51.006	<9.0	25.523	<9.0	<2.8
1,1-Dichloroethene	<22.62	<4.8	<9.3	<4.8	<9.3	<4.8	<9.3	<4.8
1,1-Dichloroethane	<8.81	<3.0	<8.0	<3.0	<8.0	<3.0	<8.0	<3.0
1,2-Dichloroethene (total)	0	0	0	0	0	0	0	0
t-1,2-Dichloroethene	<6.9	<2.6	<8.2	<2.6	<8.2	<2.6	<8.2	<2.6
Chloroform	<5.96	<2.1	<9.7	<2.1	<9.7	<2.1	<9.7	0.121 d
1,2-Dichloroethane	<6.90	<4.5	<9.1	<4.5	<9.1	<4.5	<9.1	<4.5
2-Butanone	92.093	9.581	207.277	16.454	331.858	13.323	1.353	5.696 d
1,1,1-Trichloroethane	<14.04	7.106	<2.6	<0.82 f	<2.6	4.913	<2.6	<1.3
Carbon tetrachloride	<7.49	<3.9	<2.0	<3.9	<2.0	<3.9	<2.0	<3.9
Vinyl acetate	<3.94	<3.7	<4.8	<3.7	<4.8	<3.7	<4.8	<3.7
Bromodichloromethane	<4.51	<0.7	<0.5	<0.7	<0.5	<0.7	<0.5	<0.7
1,2-Dichloropropane	<1.68	<1.7	<1.1	<1.7	<1.1	<1.7	<1.1	<1.7
cis-1,3-Dichloropropene	<3.82	<2.4	<1.7	<2.4	<1.7	<2.4	<1.7	<2.4
Trichloroethene	<3.87	<1.1	<0.8	<1.1	<0.8	<1.1	<0.8	<1.1
2-Chloroethyl vinyl ether	<7.69	<2.8	<7.69	<2.8	<7.69	<2.8	<7.69	<2.8

VOST RAW DATA (continued)

Source/analyte	Catch, ng							
	Run							
	1		2		3		Field blank	
	Tenax	T/C	Tenax	T/C	Tenax	T/C	Tenax	T/C
Dibromochloromethane	<3.13	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Dibromomethane	<5.47	<1.84	<5.47	<1.84	<5.47	<1.84	<5.47	<1.84
Dibromoethane	<3.78	<1.29	<3.78	<1.29	<3.78	<1.29	<3.78	<1.29
1,1,2-Trichloroethane	<3.87	<1.1	<1.3	<1.1	<1.3	<1.1	<1.3	<1.1
1,4-Dichloro-2-butene	<8.41	<2	<8.41	<2	<8.41	<2	<8.41	<2
Benzene	2394.07	151.025	4249.583 a	110.449	1048.145 e	158.626	<3.8	22.377
trans-1,3-Dichloropropene	<3.51	<2.2	<2.3	<2.2	<2.3	<2.2	<2.3	<2.2
Bromoform	<2.88	<3.3	<2.1	<3.3	<2.1	<3.3	<2.1	<3.3
4-Methyl-2-Pentanone	<3.95	<3.0	36.812	<3.0	<1.6	4.64	2.908	<3.0
2-Hexanone	<8.78	2.64	154.551	1.701 d	90.96	16.31	8.785	<4.7
Tetrachloroethene	<3.52 f	<2.0	3.65	<2.0	3.944	<2.0	<0.8	<2.0
1,1,2,2-Tetrachloroethane	<10.18	<1.9	<1.8	<1.9	<1.8	<1.9	<1.8	<1.9
Toluene	102.81	2.777	157.326	4.377	174.73	3.773	<0.6	2.145
Chlorobenzene	<2.94	<0.9	31.433	<0.9	<0.6	<0.9	<0.6	<0.9
Ethylbenzene	27.219	5.972	41.073	1.303	45.63	9.64	<1.2	2.614
Styrene	11.832	1.125	46.412	3.084	<1.4	3.638	2.178	1.146 d
m-/p-Xylene	46.817	2.744	63.002	4.141	75.424	4.426	1.222	1.347
o-Xylene	39.935	0.677	57.334	1.205	65.471	1.411	<0.4	0.444
Hexachloroethane	<2.48	<0.75	<2.48	<0.75	<2.48	<0.75	<2.48	<0.75
1,2-Dibromo-3-chloropropane	<15.32	<5.19	116.513	<5.19	<15.32	20.215	<15.32	<5.19

(a) Results invalid due to contaminated blank sample.

(b) The ion ratio for m/z 50 and 52 does not positively confirm the presence of chloromethane.

(c) High background coelutes with the target analyte; detection limit may be higher due to matrix related interference; results biased high.

(d) Interference coeluted with analyte; mass spectrum did not meet criteria.

(e) Results biased low due to mass peak saturating the mass spectrometric detector.

(f) One-half of method detection limit

VOST DATA--BLANK CORRECTED

	Catch, ng					
	Run					
	1		2		3	
Source/analyte	Tenax	T/C	Tenax	T/C	Tenax	T/C
Chloromethane (a)	1427.487 b	48.469 d		88.518	d	192.644
Dichlorofluoromethane						
Bromomethane (a)	324.879					58.478
Acetonitrile	75.424 c					
Acrylonitrile						
Vinl chloride						
Chloroethane		1132.853 d		f		368.637 d
Iodomethane (a)	144.378 a	14.915		13.875		74.476
Trichlorofluoromethane						
Methylene chloride		d				d
Acetone	993.771 a		1261.417 a		2543.338 d	
Carbon disulfide		42.116		51.006		25.523
1,1-Dichloroethene						
1,1-Dichloroethane						
1,2-Dichloroethene (total)						
t-1,2-Dichloroethene						
Chloroform						
1,2-Dichloroethane						
2-Butanone	90.74		205.924	10.758	330.505	
1,1,1-Trichloroethane		7.106				4.913
Carbon tetrachloride						
Vinyl acetate						
Bromodichloromethane						
1,2-Dichloropropane						
cis-1,3-Dichloropropene						
Trichloroethene						
2-Chloroethyl vinyl ether						
Dibromochloromethane						
Dibromomethane						
Dibromoethane						
1,1,2-Trichloroethane						
1,4-Dichloro-2-butene						
Benzene	2394.07	128.648	4249.583 a	88.072	1048.145 e	136.249
trans-1,3-Dichloropropene						
Bromoform						
4-Methyl-2-Pentanone			33.904			4.64
2-Hexanone			145.766	d	82.175	16.31
Tetrachloroethene			3.65		3.944	
1,1,2,2-Tetrachloroethane						
Toluene	102.81	0.632	157.326	2.232	174.73	1.628
Chlorobenzene						
Ethylbenzene	27.219	3.358	41.073		45.63	7.026
Styrene	9.654		44.234	1.938		2.492
m-/p-Xylene	45.595	1.397	61.78	2.794	74.202	3.079
o-Xylene	39.935		57.334	0.761	65.471	0.967
Hexachloroethane						
1,2-Dibromo-3-chloropropane			116.513			20.215

C.4.6 Kiln HCl/HF/PM

FILTER PARTICULATE MATTER ANALYSIS DATA

MRI Project No. 4601:01.05.01 **Client:** EPA - Emission Inventory Branch (EIB)

Sampling Location: Kiln **Facility:** Belden Brick Co., Sugar Creek, Ohio

Analyst: Szydlo

Filter samples ~~heated at 120° C for 2-3 hours~~, desiccated, and weighed to a constant weight. dessicated for 48 hrs.

FILTER + SAMPLE: Run No. PHCl-1 Filter No. LF1 Sample No. 1023

		Date	Time
Gross Wt. (g)	1.0968	11-21-93	1200
Gross Wt. (g)	1.0962	11-21-93	1800
Gross Wt. (g)	1.0962	11-22-93	0800
Gross Wt. (g)	1.0962	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.0962
Filter Tare Wt. from tare weight data (g) 1.0916

COMMENTS:

FILTER + SAMPLE: Run No. PHCl-2 Filter No. LF10 Sample No. 2023

		Date	Time
Gross Wt. (g)	1.1247	11-21-93	1200
Gross Wt. (g)	1.1240	11-21-93	1800
Gross Wt. (g)	1.1240	11-22-93	0800
Gross Wt. (g)	1.1240	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.1240
Filter Tare Wt. from tare weight data (g) 1.1171

COMMENTS:
The Petri dish for this filter was broken during storage. There is a possibility that small pieces of glass were included in the filter fabric.

FILTER + SAMPLE: Run No. PHCl-3 Filter No. LF9 Sample No. 3023

		Date	Time
Gross Wt. (g)	1.0883	11-21-93	1200
Gross Wt. (g)	1.0873	11-21-93	1800
Gross Wt. (g)	1.0872	11-22-93	0800
Gross Wt. (g)	1.0873	11-22-93	1300

Filter + Sample Gross Wt. used for data entry (g) 1.0873
Filter Tare Wt. from tare weight data (g) 1.0844

COMMENTS:

NOTE: Control filter weight data and balance check data are on another form.

FRONT-HALF RINSES PARTICULATE MATTER ANALYSIS DATA

MRI Project No.: 4601.01.05.01 Client: Emission Measurement Branch (EIB)
Sampling Location: Kiln Facility: Belden Brick Co., Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight.

FRONT-HALF RINSES: Run No. PH-1 Beaker No. 1022 Sample No. 1022

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)	296.2	Gross Wt. (g)	91.8016	12-03-94	0800
Beaker Tare Wt. (g)	114.6	Gross Wt. (g)	91.8014	"	0900
Sample + Rinses Wt. (g)	181.6	Gross Wt. (g)	91.8015	"	1000
Water Wt. (A) from Recovery Data: (g)	0.0	Gross Wt. (g)	91.8015	"	1100
Acetone Wt. (g)	181.6				

Acetone Wt./0.79 = mLs Acetone (B): 229.9

Beaker + Acetone Residue Gross Wt. used for data entry (g) 91.8015

Beaker Tare Wt. from tare weight data (g) 91.7563

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0007 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. PH-2 Beaker No. 2022 Sample No. 2022

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)	228.1	Gross Wt. (g)	88.5456	12-03-94	0800
Beaker Tare Wt. (g)	88.5	Gross Wt. (g)	88.5457	"	0900
Sample + Rinses Wt. (g)	139.6	Gross Wt. (g)	88.5456	"	1000
Water Wt. (A) from Recovery Data: (g)	0.0	Gross Wt. (g)	88.5455	"	1100
Acetone Wt. (g)	139.6				

Acetone Wt./0.79 = mLs Acetone (B): 176.7

Beaker + Acetone Residue Gross Wt. used for data entry (g) 88.5456

Beaker Tare Wt. from tare weight data (g) 88.5050

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0007 mg/mL

COMMENTS:

FRONT-HALF RINSES: Run No. PH-3 Beaker No. 3022 Sample No. 3022

Sample Volume + Acetone Rinses of Bottle: Beaker + Sample Residue Weights:

				Date	Time
Beaker + Sample + Rinses Wt. (g)	260.0	Gross Wt. (g)	110.8963	12-03-94	0800
Beaker Tare Wt. (g)	110.8	Gross Wt. (g)	110.8962	"	0900
Sample + Rinses Wt. (g)	149.2	Gross Wt. (g)	110.8962	"	1000
Water Wt. (A) from Recovery Data: (g)	0.0	Gross Wt. (g)	110.8962	"	1100
Acetone Wt. (g)	149.2				

Acetone Wt./0.79 = mLs Acetone (B): 188.8

Beaker + Acetone Residue Gross Wt. used for data entry (g) 110.8962

Beaker Tare Wt. from tare weight data (g) 110.8388

Combined Blank = ((Water Blank x A) + (Acetone Blank x B))/(A + B) = 0.0007 mg/mL

COMMENTS

NOTE: Control beaker weight data and balance check data are on another form.

BLANKS (FRONT-HALF PARTICULATE MATTER) ANALYSIS DATA

MRI Project No. 4601.01.05.01 Client: EPA/Emission Measurement Branch
Sampling Location: Kiln Facility: Belden Brick, Sugar Creek, OH

Analyst: Szydlo

Acetone and water samples evaporated at ambient temperature and pressure in an enclosure with filtered air; then, desiccated and weighed to a constant weight. Filters heated at 105° C for 2-3 hours, desiccated, and weighed to a constant weight.

ACETONE BLANK DETERMINATION: Run No.(s): PH-1 Beaker No. 1051 Sample No. 1022

Acetone Volume Evaporated: Beaker + Evaporated Acetone Residue Weights:

				Date	Time
Beaker + Acetone Wt.(g)	203.9	Gross Wt.(g)	89.0246	12-03-94	1300
Beaker Tare Wt.(g)	89.0	Gross Wt.(g)	89.0247	"	1
Acetone Wt.(g)	114.9	Gross Wt.(g)	89.0245	"	1
Acetone Wt./0.79 = mLs Acetone (A):	145.4	Gross Wt.(g)	89.0245	"	1500

Beaker + Acetone Residue Gross Wt. used for blank determination (g) 89.0246
Beaker Tare Wt. from tare weight data (g) 89.0245
Net Wt.(B), Residue in Beaker (g) .0001

Acetone Blank (B x 1000/A): 0.0007 mg/mL for data entry or for computing combined blank
COMMENTS:

WATER BLANK DETERMINATION: Run No.(s): — Beaker No. — Sample No. ____

Water Volume Evaporated: Beaker + Evaporated Water Residue Weights:

				Date	Time
Beaker + Water Wt.(g)	—	Gross Wt.(g)			
Beaker Tare Wt.(g)		Gross Wt.(g)			
Water Wt.(g)		Gross Wt.(g)			
Water Wt. = mLs Water (A):		Gross Wt.(g)			

Beaker + Water Residue Gross Wt. used for blank determination (g) ____
Beaker Tare Wt. from tare weight data (g) ____
Net Wt.(B), Residue in Beaker (g) ____

Water Blank (B x 1000/A): ____ mg/mL for data entry or for computing combined blank
COMMENTS: No DI water was used for particulate removal.

FILTER BLANK: Run No.(s): 1023 Filter No. LF12 Sample No. 1052

		Date	Time
Gross Wt.(g)	1.0792	11-21-93	1200
Gross Wt.(g)	1.0786	11-21-93	1800
Gross Wt.(g)	1.0785	11-22-93	0800
Gross Wt.(g)	1.0785	11-22-93	1300

Filter Gross Wt. (A) used for blank determination (g) 1.0785
Filter Tare Wt. (B) from tare weight data (g) 1.0783
Net Filter Wt. (A-B) Difference (g) .0002

Filter Blank (±): ____ grams for data entry (retain minus sign if value is negative)
COMMENTS:

NOTE: Control filter and beaker weight data and balance check data are on another form.

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PHONE 615/546-1335 FAX 615/546-7209

LABORATORY REPORT

S. Szydlo
Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri 64110

Sample Received: 12/06/93
Report Date: 12/15/93

Sample ID	Lab ID	Analysis	Sample Vol. ml	Results	
1025	E-3331	Chloride	110	18.7	µg/ml
		HCl/Sample		2117	µg
2025	E-3333	Chloride	112	21.3	µg/ml
		HCl/Sample		2449	µg
3025	E-3335	Chloride	114	19.6	µg/ml
		HCl/Sample		2302	µg
Independent Check Standard		98.4% Recovery			
Matrix Spike		97.0% Recovery			
1027	E-3332	Chloride	106	0.6	µg/ml
		Cl_2		128	µg
2027	E-3334	Chloride	110	1.0	µg/ml
		Cl_2		216	µg
3027	E-3336	Chloride	120	0.7	µg/ml
		Cl_2		169	µg
Independent Check Standard		102.5% Recovery			
Matrix Spike		94.1% Recovery			

Notes: The remainder of your results will follow.

CM:le

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LABORATORY REPORT

S. Szydlo
Midwest Research Institute
425 Volker Blvd.
Kansas City, Missouri 64110

Reanalysis Request: 04/28/94
Previous Lab I.D. E-3331-36
Report Date: 05/03/94

SAMPLE ID	LAB ID	ANALYSIS	RESULTS		
1025	G-460	Fluoride	276	mg/L	Mg 31969
1027	G-461	Fluoride	5.5	mg/L	613.9
2025	G-462	Fluoride	369	mg/L	43518
2027	G-463	Fluoride	6.4	mg/L	741
3025	G-464	Fluoride	311	mg/L	37333
3027	G-465	Fluoride	4.3	mg/L	543

CM:pd

2323 Sycamore Drive
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APPENDIX D.

QUALITY ASSURANCE RECORDS

D.1 AMBIENT FILTER EQUILIBRIUM/CALIBRATION DATA
D.2 SAMPLE TRAIN CALIBRATION DATA
D.3 QA/QC AUDIT REPORT

D 2

D.1 AMBIENT FILTER EQUILIBRIUM/CALIBRATION DATA

D 4

HIVOL DATA

4601-01-05-01

Filter Equilibration Data

Equilibration Period End Date	End Time	Begin Date	Begin Time	Temperature (°C) Max.	Min.	Avg.	Meets Q.A. ?	Relative Humidity (%) Max.	Min.	Avg.	Meets Q.A. ?	By
10-28-93	0930	10-28-93	0930	23.2	23.1	23.1	Yes	47.0	46.1	46.6	Yes	DG
11/1/93	0930	10/31/93	0930	23.5	23.3	23.4	yes	46.9	45.1	46.0	yes	[illegible]
12-2-93	1300	12-1-93	1300	23.5	23.3	23.4	Yes	46.0	45.0	45.5	Yes	[illegible]
12/3/93	1330	12/2/93	1330	23.5	23.3	23.4	yes	46.0	45.2	45.6	yes	[illegible]

Comments:

4601-01-05-

Balance Check Data

Date	Time	Balance Data: Balance Type	Balance Data: MRI I.D. No.	Calibration Data: Class S Weight (mg)	Calibration Data: Balance Reading (mg)	Calibration Data: Difference (mg)	Calibration Data: Meets Q.A. ?	By
10-29-93	0930	Mettler	7216	1,000.00	1,000.00	.00	Yes	DG
				3,000.00	2,999.85	.15	↓	↓
				5,000.00	4999.85	.15	↓	↓
11/1/93	0930	Mettler	7216	1,000.00	1,000.00	0.00	Yes	[illegible]
				3,000.00	2999.85	0.15	↓	↓
				5,000.00	4999.90	0.10	↓	↓
12-2-93	1300	Mettler	7214	1,000.00	1,000.00	0.00	Yes	DG
				3,000.00	2,999.80	0.20	↓	↓
				5,000.00	4999.85	0.15	↓	↓
12/3/93	1330	Mettler	7216	1,000.00	1000.00	0.00	Yes	[illegible]
				3,000.00	2999.85	0.15	Yes	[illegible]
				5,000.00	4999.90	0.10	Yes	[illegible]

Comments:

D.2 SAMPLE TRAIN CALIBRATION DATA

DRY GAS METER SAMPLE CALIBRATION DATA

DATE:		11/17/93
CALIBRATED BY:		HARMON
METER BOX NUMBER:		VOST-1
BAROMETER PRESSURE:	RUN1	29.47
	RUN2	29.47
	RUN3	29.47
WET TEST METER NUMBER:	X-2538	
WET TEST METER PRESSURE DROP:	RUN1	1.8
	RUN2	1.8
	RUN3	1.8
ROTAMETER SETTING:	RUN1	75
	RUN2	75
	RUN3	75
WET TEST METER GAS VOLUME:	RUN1	15
	RUN2	15
	RUN3	15
DRY TEST METER GAS VOLUME:	RUN1	
	INITIAL:	0
	FINAL:	15.01
	VOLUME=	15.01
	RUN2	
	INITIAL:	15.01
	FINAL:	29.97
	VOLUME=	14.96
	RUN3	
	INITIAL:	29.97
	FINAL:	45.11
	VOLUME=	15.14
WET TEST METER GAS TEMP:	RUN1	76
	RUN2	76
	RUN3	76

----------DRY TEST METER----------

INLET GAS TEMP:	RUN1	76.9
	RUN2	77.3
	RUN3	78
TIME OF RUN:	RUN1	902.7
	RUN2	914.5
	RUN3	911.5
AVERAGE RATIO:	RUN1	1.005507
	RUN2	1.00962
	RUN3	.998918

LITERS PER MINUTE=	RUN1	.9976736
	RUN2	.98152
	RUN3	.996599
	Y=	1.004681

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT # 4601010501 Orifice # A4
Date: 11/15/93 Orifice K: .46644
Operator: NEAL Previous Y: 1.027
Console # N12

	Run 1	Run 2	Run 3
Initial DGM Volume	507.400	513.445	519.515
Final DGM Volume	513.445	519.515	525.595
Net DGM Volume (Vm)	6.045	6.070	6.080
DGM Temperature, Deg.F:			
Initial Inlet	80	80	81
Final Inlet	80	81	82
Initial Outlet	73	74	75
Final Outlet	74	75	76
Average DGM Temperature (tm)	76.8	77.5	78.5
Time, seconds	600	600	600
Orifice Delta H, inches w.c.	1.200	1.200	1.200
Barometric Pressure., in.Hg	29.47	29.47	29.47
Critical Orifice Inlet Temp., Deg.F:			
Initial	67	68	68
Final	68	68	68
Average Critical Orifice Inlet Temp.	67.5	68.0	68.0
Pump Vacuum, in.Hg	19	19	19
Critical Orifice Volume (Vcr (std))	5.987	5.984	5.984
DGM Volume (Vm (std))	5.874	5.890	5.882
DGM Calibration Factor (Y)	1.019	1.016	1.016
Orifice Delta H@	1.836	1.835	1.831
Average DGM Calibration Factor (Y)	1.017		
Average Orifice Delta H@	1.834		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.21	.11	.09
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	.07		
Tolerance (Average) Result	PASS		

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT #	4601010501	Orifice #	A5
Date:	11/15/93	Orifice X:	.42229
Operator:	HARMON	Previous Y:	1.018
Console #	N13		

	Run 1	Run 2	Run 3
Initial DGM Volume	569.300	574.863	580.438
Final DGM Volume	574.863	580.438	586.025
Net DGM Volume (Vm)	5.563	5.575	5.587
DGM Temperature, Deg.F:			
Initial Inlet	82	81	81
Final Inlet	81	82	82
Initial Outlet	75	77	78
Final Outlet	77	77	78
Average DGM Temperature (tm)	78.3	79.3	79.8
Time, seconds	600	600	600
Orifice Delta H, inches w.c.	.925	.925	.930
Barometric Pressure, in.Hg	29.47	29.47	29.47
Critical Orifice Inlet Temp., Deg.F:			
Initial	67	68	68
Final	68	68	68
Average Critical Orifice Inlet Temp.	67.5	68.0	68.0
Pump Vacuum, in.Hg	19	19	19
Critical Orifice Volume (Vcr (std))	5.421	5.419	5.419
DGM Volume (Vm (std))	5.382	5.389	5.395
DGM Calibration Factor (Y)	1.007	1.006	1.004
Orifice Delta H@	1.717	1.717	1.724
Average DGM Calibration Factor (Y)	1.006		
Average Orifice Delta H@	1.719		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.15	.02	.14
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	1.01		
Tolerance (Average) Result	PASS		

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT # 4601010501 Orifice # A5
Date: 11/16/93 Orifice K: .42239
Operator: HARMON Previous Y: 1.000
Console # N8

	Run 1	Run 2	Run 3
Initial DGM Volume	54.900	60.506	66.128
Final DGM Volume	60.506	66.128	71.760
Net DGM Volume (Vm)	5.606	5.622	5.632
DGM Temperature, Deg.F:			
Initial Inlet	83	80	81
Final Inlet	81	81	81
Initial Outlet	77	77	78
Final Outlet	77	77	78
Average DGM Temperature (tm)	79.5	78.8	79.3
Time, seconds	600	100	600
Orifice Delta H, inches w.c.	.980	.980	.980
Barometric Pressure., in.Hg	29.41	29.41	29.41
Critical Orifice Inlet Temp., Deg.F:			
Initial	69	70	70
Final	70	70	71
Average Critical Orifice Inlet Temp.	69.5	70.0	70.5
Pump Vacuum, in.Hg	19	19	19
Critical Orifice Volume (Vcr (std))	5.400	5.398	5.395
DGM Volume (Vm (std))	5.406	5.429	5.431
DGM Calibration Factor (Y)	.999	.994	.992
Orifice Delta H@	1.827	1.832	1.831
Average DGM Calibration Factor (Y)	.996		
Average Orifice Delta H@	1.830		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.34	.13	.21
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	.74		
Tolerance (Average) Result	PASS		

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT # 4601010501 Orifice # A4
Date: 11/16/93 Orifice K: .46644
Operator: HARMON Previous Y: 1.021
Console # N7

	Run 1	Run 2	Run 3
Initial DGM Volume	810.100	816.208	822.329
Final DGM Volume	816.208	822.329	828.456
Net DGM Volume (Vm)	6.108	6.121	6.127
DGM Temperature, Deg.F:			
Initial Inlet	83	82	82
Final Inlet	83	83	83
Initial Outlet	78	79	79
Final Outlet	79	79	80
Average DGM Temperature (tm)	80.8	80.8	81.0
Time, seconds	600	600	600
Orifice Delta H, inches w.c.	1.200	1.200	1.200
Barometric Pressure.. in.Hg	29.41	29.41	29.41
Critical Orifice Inlet Temp., Deg.F:			
Initial	69	70	70
Final	70	70	71
Average Critical Orifice Inlet Temp.	69.5	70.0	70.5
Pump Vacuum, in.Hg	19	19	19
Critical Orifice Volume (Vcr (std))	5.963	5.961	5.958
DGM Volume (Vm (std))	5.880	5.892	5.895
DGM Calibration Factor (Y)	1.014	1.012	1.011
Orifice Delta H@	1.833	1.834	1.835
Average DGM Calibration Factor (Y)	1.012		
Average Orifice Delta H@	1.834		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.21	.05	.15
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	.87		
Tolerance (Average) Result	PASS		

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT #	4601010501	Orifice #	A5
Date:	11/17/93	Orifice K:	.42239
Operator:	HARMON	Previous Y:	1.021
Console #	N6		

	Run 1	Run 2	Run 3
Initial DGM Volume	970.600	976.083	981.587
Final DGM Volume	976.083	981.587	987.103
Net DGM Volume (Vm)	5.483	5.504	5.516
DGM Temperature, Deg.F:			
Initial Inlet	78	78	79
Final Inlet	78	79	80
Initial Outlet	74	75	76
Final Outlet	75	75	76
Average DGM Temperature (tm)	76.3	76.8	77.8
Time, seconds	600	600	600
Orifice Delta H, inches w.c.	1.000	1.000	1.000
Barometric Pressure., in.Hg	29.47	29.47	29.47
Critical Orifice Inlet Temp., Deg.F:			
Initial	69	70	7[illegible]
Final	70	70	70
Average Critical Orifice Inlet Temp.	69.5	70.0	7[illegible]
Pump Vacuum, in.Hg	19	19	1[illegible]
Critical Orifice Volume (Vcr (std))	5.411	5.409	5.409
DGM Volume (Vm (std))	5.330	5.346	5.348
DGM Calibration Factor (Y)	1.015	1.012	1.011
Orifice Delta H@	1.872	1.872	1.869
Average DGM Calibration Factor (Y)	1.013		
Average Orifice Delta H@	1.871		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.23	.10	.13
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	.81		
Tolerance (Average) Result	PASS		

METHOD 5 CONSOLE CALIBRATION WITH CRITICAL ORIFICE

PROJECT # 4601010501 Orifice # A4
Date: 11/17/93 Orifice K: .46644
Operator: HARMON Previous Y: 1.010
Console # N9

	Run 1	Run 2	Run 3
Initial DGM Volume	129.200	135.255	141.300
Final DGM Volume	135.255	141.300	147.363
Net DGM Volume (Vm)	6.055	6.045	6.063
DGM Temperature, Deg.F:			
Initial Inlet	81	81	82
Final Inlet	82	82	83
Initial Outlet	77	77	78
Final Outlet	77	78	78
Average DGM Temperature (tm)	79.3	79.5	80.3
Time, seconds	600	600	600
Orifice Delta H, inches w.c.	1.250	1.250	1.250
Barometric Pressure., in.Hg	29.47	29.47	29.47
Critical Orifice Inlet Temp., Deg.F:			
Initial	69	70	70
Final	70	70	70
Average Critical Orifice Inlet Temp.	69.5	70.0	70.0
Pump Vacuum, in.Hg	19	19	19
Critical Orifice Volume (Vcr (std))	5.976	5.973	5.973
DGM Volume (Vm (std))	5.857	5.845	5.856
DGM Calibration Factor (Y)	1.020	1.022	1.020
Orifice Delta H@	1.911	1.912	1.909
Average DGM Calibration Factor (Y)	1.021		
Average Orifice Delta H@	1.911		
+/- 2% From Average Y Criteria:			
Percent Difference From Average Y	.05	.12	.07
Tolerance Result	PASS	PASS	PASS
+/- 5% From Previous Y Criteria:			
Percent Difference From Previous Y	1.03		
Tolerance (Average) Result	PASS		

ORIFICE BRACKETING WORKSHEET

Project	46010105	CONSOLE #	N9
Date	11/17/93	Orifice No. 1	A3
Operator	HARMON	Orifice NO.1 K factor	.5507
Orfice Number	A4	Orifice No. 2	A6
Orfice Y factor	1.021	Orifice NO.2 K factor	.3573

	Orfice #1	Orfice #2
Final DGM Volume	155.632	160.464
Inital DGM Volume	148.500	155.300
Net DGM Volume (Vm)	7.132	4.664
In/Out DGM Temp.		
Inlet		
initial	80.0	81.0
final	82.0	82.0
Outlet		
initial	78.0	78.0
final	79.0	79.0
Avg. DGM Temp	79.8	80.0
Time, sec.	600.0	600.0
Orifice DH, in. H2O	1.80	.69
Baro. Press., in. Hg	29.47	29.47
Room temp., Deg. F	70.0	70.0
Pump Vacuum, in. Hg	19	19
Vcr (std)	7.049	4.574
Vm (std)	6.900	4.498
Y Factor (bracket)	1.022	1.017
+/- 2% criteria		
Percent of Y	.07	.41
	PASS	PASS

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes ____ no

Pitot tube openings damaged? ____ yes (explain below) ✓ no

α_1 = 4 ° (<10°), α_2 = 3 ° (<10°)

β_1 = 1 ° (<5°), β_2 = 2 ° (<5°)

γ = 2 °, θ = 0 °, A = 0.7100 (in.)

z = A sin γ = 0.0248 (in.); (<0.125 in.)

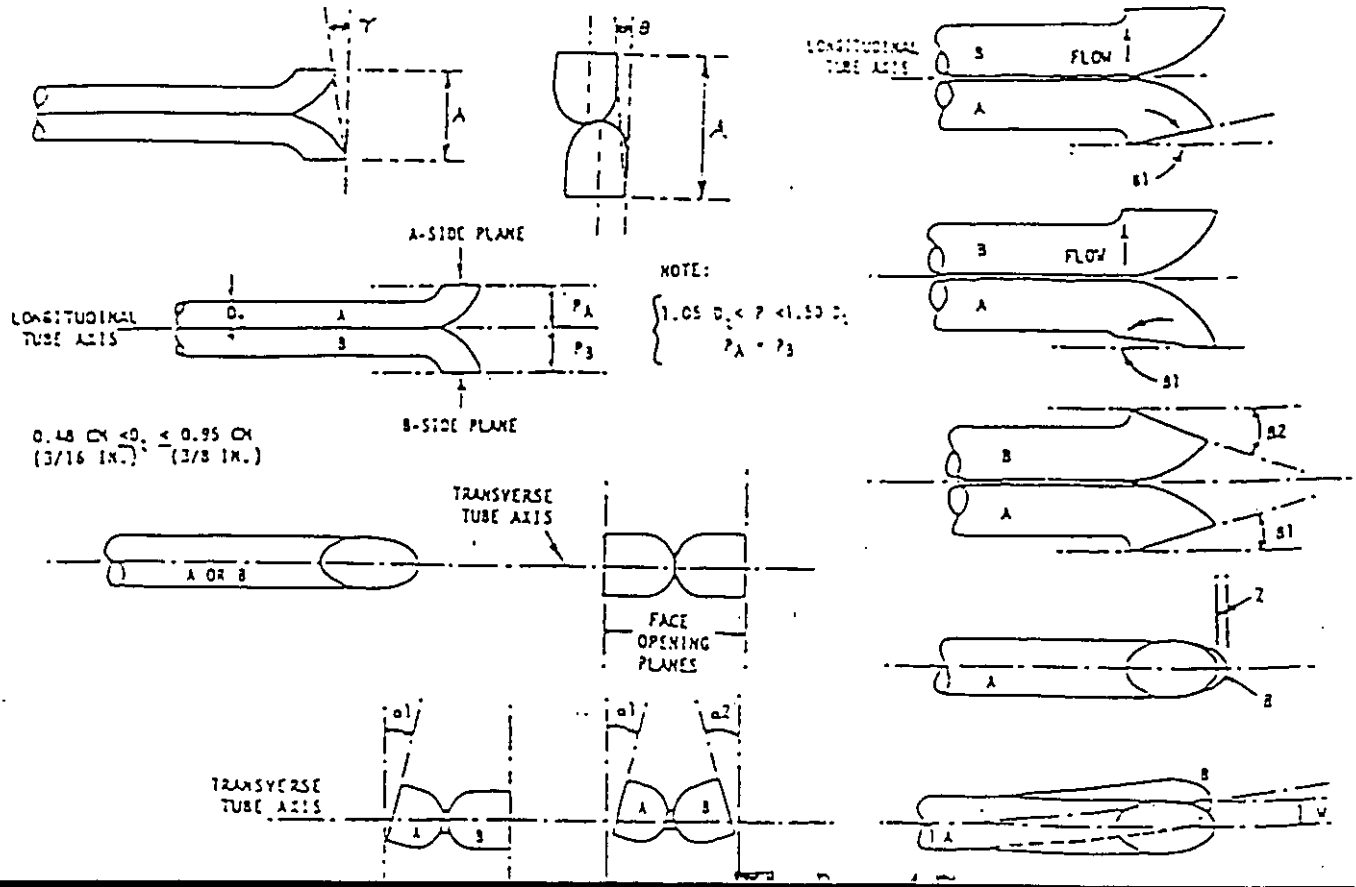
w = A sin θ = 0 (in.); (<0.03125 in.)

P_A = 0.3550 (in.), P_B = 0.3550 (in.), D_t = 0.2505 (in.)

Comments: _____

Calibration required? ____ yes ✓ no

PITOT TUBE # M-2 DATE 11/16/93 NAME Edwards



TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes ____ no

Pitot tube openings damaged? ____ yes (explain below) ✓ no

α_1 = 1 ° (<10°), α_2 = 2 ° (<10°)

β_1 = 0 ° (<5°), β_2 = 2 ° (<5°)

γ = 1 °, θ = 0 °, A = 0.6345 (in.)

z = A sin γ = 0.0111 (in.); (<0.125 in.)

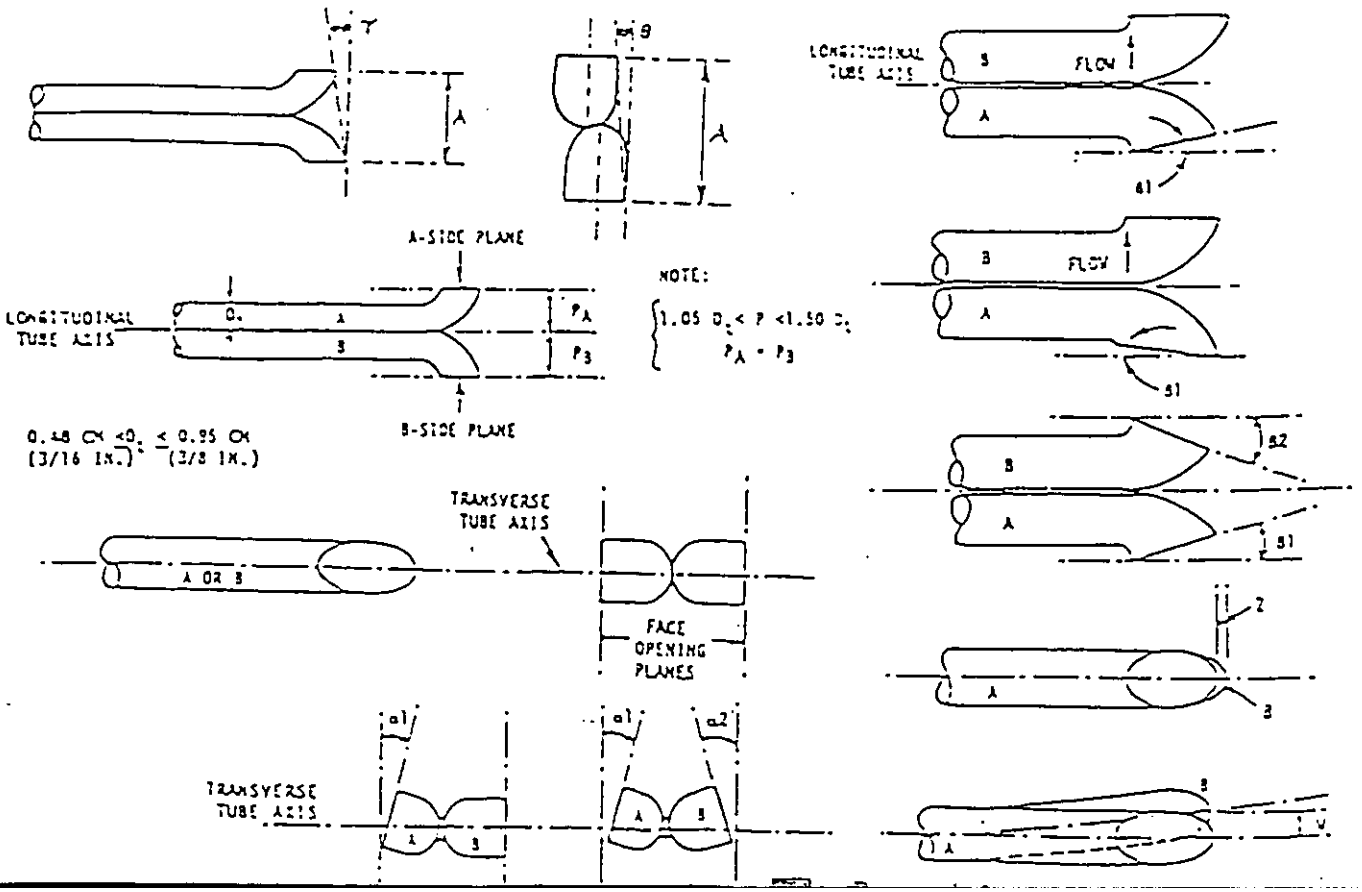
w = A sin θ = 0 (in.); (<0.03125 in.)

P_A = 0.3170 (in.), P_B = 0.3175 (in.), D_t = 0.2655 (in.)

Comments: ____

Calibration required? ____ yes ✓ no

PITOT TUBE # M-1 DATE 11-16-93 NAME Edwards



TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 2 ° (<10°), α_2 = 3 ° (<10°)

β_1 = 1 ° (<5°), β_2 = 2 ° (<5°)

γ = 1 °, θ = 0 °, A = 0.7600 (in.)

z = A sin γ = 0.0133 (in.); (<0.125 in.)

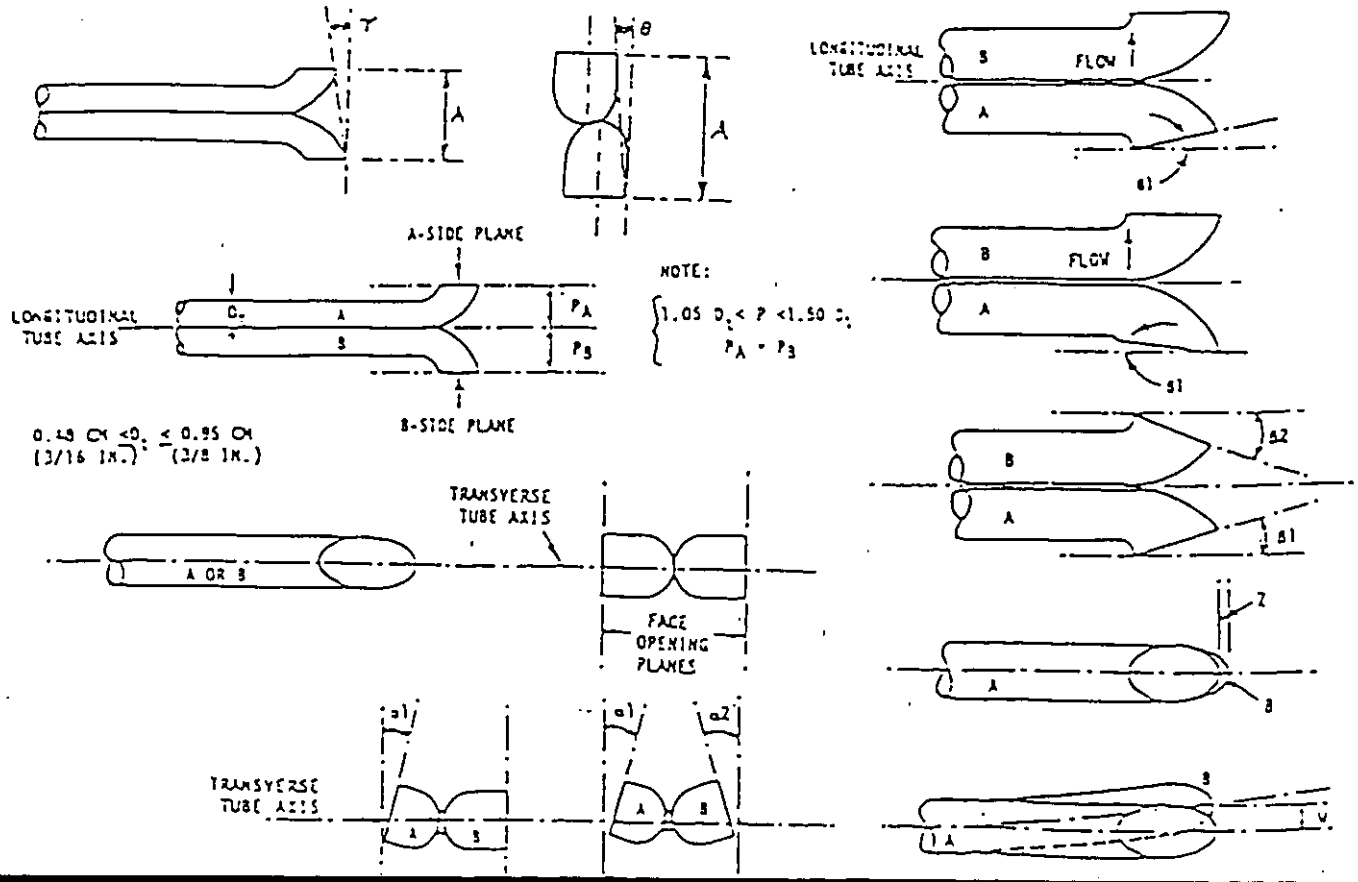
w = A sin θ = 0 (in.); (<0.03125 in.)

P_A = _____ (in.), P_B = _____ (in.), D_t = 0.2545 (in.)

Comments: _____

Calibration required? _____ yes ✓ no

PITOT TUBE # 5-8 DATE 11/16/93 NAME Edwards



TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes ____ no

Pitot tube openings damaged? ____ yes (explain below) ✓ no

α_1 = 4 ° (<10°), α_2 = 2 ° (<10°)

β_1 = 1 ° (<5°), β_2 = 2 ° (<5°)

γ = 2 °, θ = 0 °, A = 0.6350 (in.)

z = A sin γ = 0.0222 (in.); (<0.125 in.)

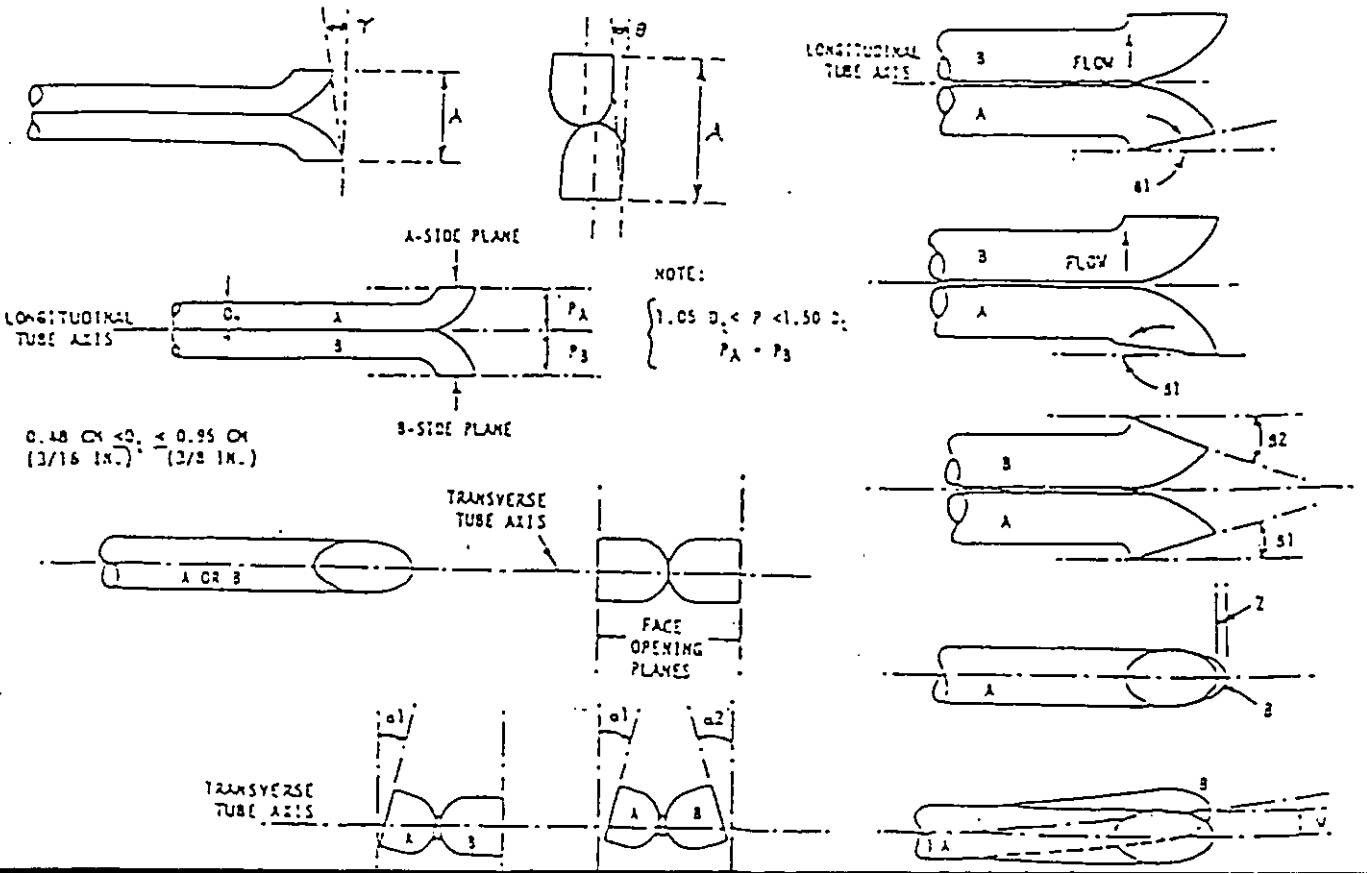
w = A sin θ = 0.0 (in.); (<0.03125 in.)

P_A = 0.3170 (in.), P_B = 0.3180 (in.), D_t = 0.2500 (in.)

Comments: ____

Calibration required? ____ yes ✓ no

PITOT TUBE # 5-12 DATE 11/16/93 NAME Edwards



TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes ____ no

Pitot tube openings damaged? ____ yes (explain below) ✓ no

α_1 = 4 ° (<10°), α_2 = 2 ° (<10°)

β_1 = 1 ° (<5°), β_2 = 2 ° (<5°)

γ = 2 °, θ = 1 °, A = .6975 (in.)

z = A sin γ = 0.0243 (in.); (<0.125 in.)

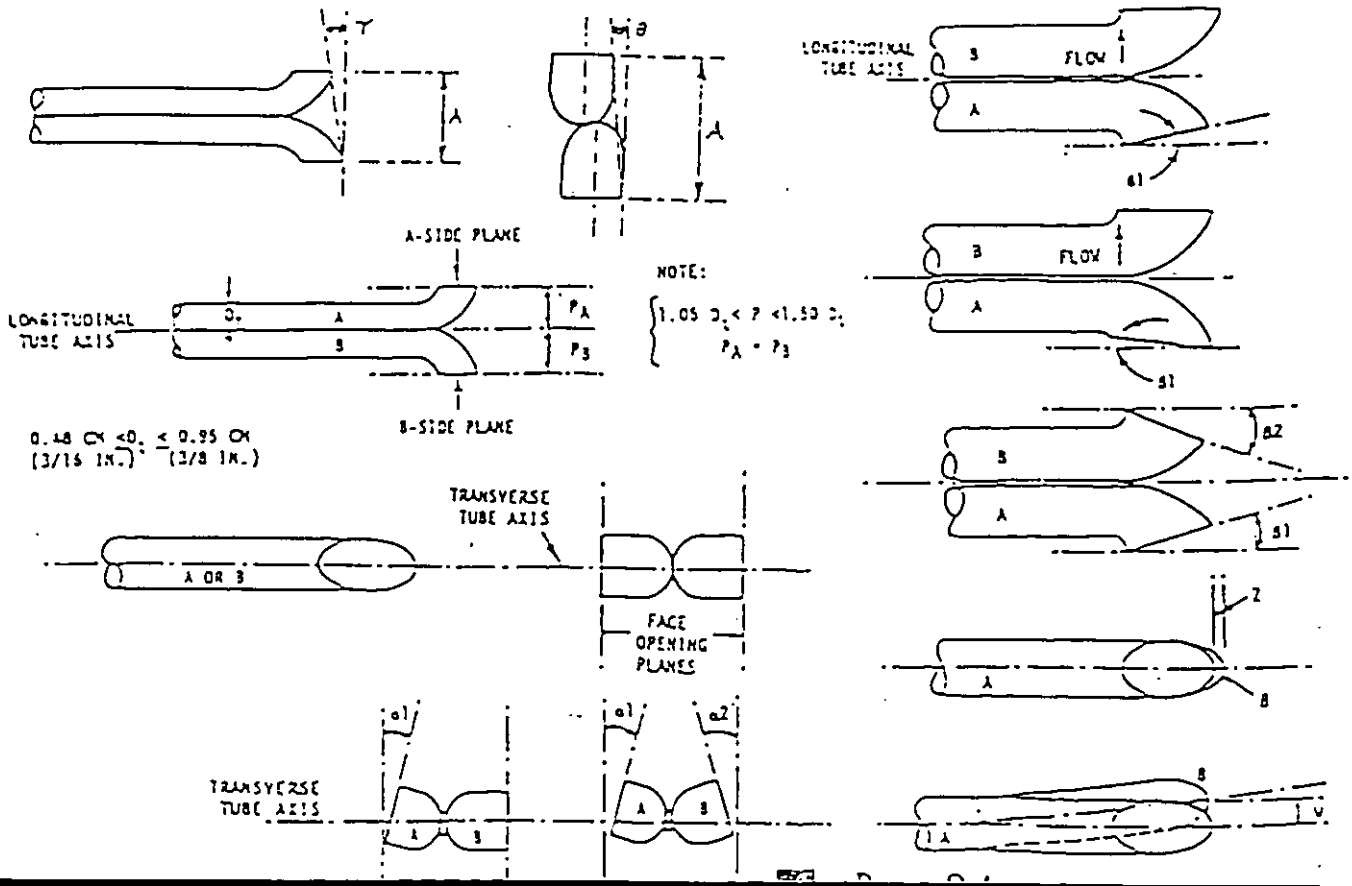
w = A sin θ = 0.0122 (in.); (<0.03125 in.)

P_A = 0.3555 (in.), P_B = 0.3420 (in.), D_t = .2565 (in.)

Comments: ____

Calibration required? ____ yes ✓ no

PITOT TUBE # P-15 DATE 11/16/93 NAME Edwards



TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 2 ° (<10°), α_2 = 0 ° (<10°)

β_1 = 2 ° (<5°), β_2 = 3 ° (<5°)

γ = 2 °, θ = 2 °, A = 0.7130 (in.)

z = A sin γ = 0.0288 (in.); (<0.125 in.)

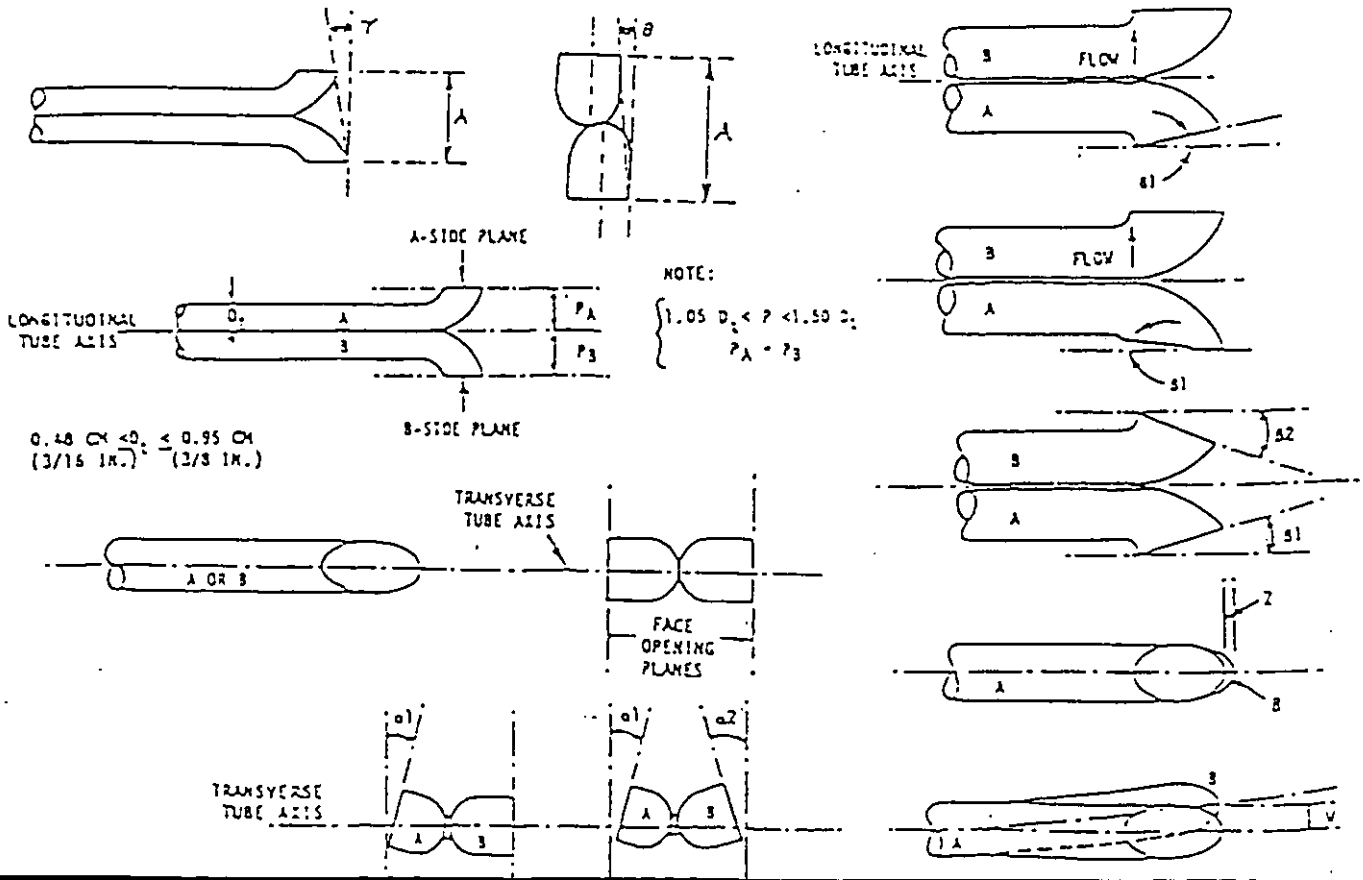
w = A sin θ = 0.02488 (in.); (<0.03125 in.)

P_A = 0.3505 (in.), P_B = 0.3625 (in.), D_t = 0.2545 (in.)

Comments: _____

Calibration required? _____ yes ✓ no

PITOT TUBE # M-5 DATE 11/15/93 NAME Edwards



GOOSENECK THERMOCOUPLE CALIBRATION DATA FORM

Date 11/16/93 Job Number 4601-01-05-01

Ambient Temp. 70° F Barometer 29.41 in.Hg

Calibrator Edwards Reference Thermometer 4268K

Pyrometer No. Y-0815 Serial Number 14-990-5A

Calibration Method: Ambient Water Bath with ASTM Thermometer

Goose-neck T.C. No.	Leak Check & Check Valve Pass/No-Pass	Reference Thermometer Temperature F	Pyrometer Temperature F	Temperature Difference +/- 2 deg F
31	PASS	68°	67.8	0.2°
8	PASS	68	68.0	0.0
12	PASS	68°	67.4	0.6
9	PASS	68°	68.0	0.0
11	PASS	68°	68.0	0.0
35	PASS	68°	67.8	0.2
36	PASS	68°	67.8	0.2
39	PASS	68°	68.0	0.0
4	PASS	68°	68.0	0.0
2	PASS	68°	67.8	0.2
32	PASS	68°	66.8	1.2
30	PASS Leak Check Failed Check Valve	68°	67.2	0.8

Note: Gooseneck #30 repaired. Check valve failure has no adverse effect on testing train reliability.

STACK THERMOCOUPLE CALIBRATION DATA FORM

Job No. 4601-01-05-01

Stack Thermocouple No. 96-4

Date 11-16-93

Barometer 29.41 in.Hg

Ambient Temp. 70° F

Pyrometer No. YC815

Calibrator Edwards

Reference Instrument: Heated Stainless Steel Core with Calibrated Pyrometers

Avg. Stack Temp. 430° F

Reference Instrument Temperature F	Pyrometer Temperature F	Temperature Difference F	Temperature Difference % *
126.8	126.2	0.6	0.4732 %
201.0	199.6	1.4	0.6965 %
311.6	313.8	2.2	0.7060 %
398.6	403.2	4.6	1.1540 %

$$* \left[\frac{(\text{ref.temp., F} + 460) - (\text{pyro.temp., F} + 460)}{(\text{ref.temp., F} + 460)} \right] * 100 \leq 1.5\%$$

STACK THERMOCOUPLE CALIBRATION DATA FORM

Job No. 4601-01-05-01

Stack Thermocouple No. 96-7

Date 11-16-93

Barometer ~~Y-0515~~ 29.41 in.Hg

Ambient Temp. 70° F

Pyrometer No. Y0515

Calibrator Edwards

Reference Instrument: Heated Stainless Steel Core with Calibrated Pyrometers

Avg. Stack Temp. 430° F

Reference Instrument Temperature F	Pyrometer Temperature F	Temperature Difference F	Temperature Difference % *
129.2°	129.6°	0.4°	0.3095%
~~129.2~~	~~130.0~~	~~0.8~~	
206.2	207.8	1.6	0.7759%
311.8	313.6	1.8	0.5773%
398.4	402.4	4.0	1.0040%

$$* \left[\frac{(\text{ref.temp., F} + 460) - (\text{pyro.temp., F} + 460)}{(\text{ref.temp., F} + 460)} \right] * 100 \leq 1.5\%$$

STACK THERMOCOUPLE CALIBRATION DATA FORM

Job No. 4601-01-05-01

Stack Thermocouple No. 96-6A

Date 11-16-93

Barometer 29.41 in.Hg

Ambient Temp. 70 F

Pyrometer No. Y0815

Calibrator Edwards

Reference Instrument: Heated Stainless Steel Core with Calibrated Pyrometers

Avg. Stack Temp. 430° F

Reference Instrument Temperature F	Pyrometer Temperature F	Temperature Difference F	Temperature Difference % *
129.2	130.0	0.8	0.6192%
200.0	200.8	0.8	0.4000%
306.4	308.8	2.4	0.7833 %
392.6	395.2	2.6	0.6623%

$$* \left[\frac{(\text{ref.temp., F} + 460) - (\text{pyro.temp., F} + 460)}{(\text{ref.temp., F} + 460)} \right] * 100 \leq 1.5\%$$

STACK THERMOCOUPLE CALIBRATION DATA FORM

Job No. 4601-01-05-01

Stack Thermocouple No. 96-2

Date 11/16/93

Barometer 29.41 in.Hg

Ambient Temp. 70 F

Pyrometer No. Y0815

Calibrator Edwards

Reference Instrument: Heated Stainless Steel Core with Calibrated Pyrometers

Avg. Stack Temp. 430° F

Reference Instrument Temperature F	Pyrometer Temperature F	Temperature Difference F	Temperature Difference % *
128.4	128.8	0.4°	0.3115%
206.2	207.4	1.2°	0.5820%
308.8	309.4	0.6	0.1943%
398.6	400.8	2.2°	0.5519%

$$* \left[\frac{(\text{ref.temp., F} + 460) - (\text{pyro.temp., F} + 460)}{(\text{ref.temp., F} + 460)} \right] * 100 \leq 1.5\%$$

D.3 QA/QC AUDIT REPORT

Interoffice Communication

MIDWEST RESEARCH INSITITUTE

12/5/94

TO: Roy Neulicht, Rick Marinshaw

FROM: Dennis Hooton

RE: Beldon Brick

The QA review and associated action items has been completed for the subject report. These items are summarized below:

1. VOST blank corrections really only impact a few compounds in the volatiles list. These have been summarized in the QA Report (enclosed). I also indicate in the QA report that undetected compounds would be reported as "< ~1-2 ug/dscm." You may want to include the "VOST RAW DATA-KILN" table, provided by Rick a few weeks ago, in the final report appendices, which lists the analytical detection limits (as ng per trap) for each chemical.

2. The SV Lab report was put in final form for the most recent draft.

3. VOST surrogate recoveries were calculated and added to the revised QA Section (Section 5 of the report). In addition, I added results of a performance audit sample to Section 5.

4. Cr and Ni results were verified for all runs and I added a statement to this effect in the QA report. Rick provided "historical" data for field blank metal trains. I could not tell if filters were included in all blank runs; however, Cr blank results for the Brick Kiln study are consistent with past tests and Ni did show a background level similiar to the Brick Kiln blank in 1 of 3 previous tests. These historical data are not discussed in the report and probably don't need to be discussed.

5. I reviewed and edited the QA Section of the Report. The text (4 pages) was retyped and 2 additional tables (VOST surrogate recoveries and VOST audit sample results) were added. The revised copy is enclosed.

6. A QA Audit Summary report is enclosed. I revised the text to reflect the additions and improvements that were made. The general finding of the QA Report is that, with few minor exceptions, the Test Data are complete, traceable, and accurately reported. In general, data quality objectives were met for all analyses.

7. Follow-up items from the draft audit report were addressed, specifically:

- Maximum emission rates for undetected volatile compounds are discussed in the final QA Report (see item 1 above).
- Footnotes in Table 3-19 actually refer to the "VOST RAW DATA" Table provided by Rick. I would recommend that all the footnote references be omitted and that the 4 compounds listed in the QA Report and benzene be simply flagged as "estimated" concentrations due to blank corrections and, in the case of benzene, the use of an extended calibration curve.
- Cd, Co, Pb, Sb, and Se should be flagged as estimated concentrations due to the relatively high background corrections (>50% of the total response in most cases).
- Semivolatile Detection limits should be calculated as English units for the table on page 3-36.

Regarding Rick's memo of 11/11/94, please note the following:

- Footnotes on Table 3-19 should be eliminated and the four chemicals listed in the QA report and benzene should be qualified as "estimated" values.

- Margie's footnote No. 3 for sample No. 1069 refers to chloromethane, not iodomethane. Footnote the chemicals listed below as "estimated" values.

- I would recommend that you report all data, but flag chloromethane, bromomethane, iodomethane, methylene chloride, and benzene as "estimated" values due to analytical difficulties.

- 2-Hexanone may be considered as a non-detect or trace amount (below calibration range) for the first run data.

QA/QC AUDIT REPORT

The subject report (in draft final form) was independently reviewed and representative data were audited by the project QA Coordinator. The review was based primarily on the QA Objectives for Measurement Data (Table 6-2) of the Draft Site-Specific Test Plan/Quality Assurance Plan for Testing at Plant 6 Belden Brick Company, dated October 22, 1993. Derived emission rates were verified by manual calculation on randomly-selected data points for the VOST, metals, semivolatiles, HCl, Cl_2, and HF tests. In addition, analytical performance samples were introduced during sample analyses.

Based on the reviews and audits described above, and with the few exceptions noted below, test results were found to be complete, traceable, and correctly reported. In general, data quality objectives were met for all analyses. Specific comments, review findings, and performance sample results are summarized below by type of analysis.

VOST ANALYSES

- Several additions were made to the VOST sections of the report to complete the QA/QC evaluation, specifically:

1. Surrogate recoveries (as percent of spiked amount added) have been added to the QA/QC section of the report (Table 5-8). Average recoveries for the four surrogates ranged from 79% to 145 %, and the precision of these determinations varied by less than 16% RSD in all cases. The 4-bromofluorobenzene surrogate recovery averaged 145%, slightly above the 130% objective.

2. Based on an instrument detection limit study, stack gas concentrations for undetected compounds would be less than 1-2 ug/dscm.

3. Blank corrections were applied to several of the listed compounds because of background levels found in laboratory method blanks. The blank corrections impact only a few of the listed compounds, as summarized in the table below. Results for these four compounds should therefore be considered as "estimated values" only.

SUMMARY OF COMPOUNDS AFFECTED BY BLANK CORRECTION OF VOST RESULTS

Compound	Blank Correction (ng)	Equivalent to Concentratration (ug/dscm)	Average Reported Concentration (ug/dscm)
Chloromethane	129	6	29
Bromomethane	114	6	6.4
Iodomethane	84	4	4.1
Methylene chloride	29	2	0.3

4. Footnotes (a) through (e) in Table 3-19 "Kiln Emission Test ResultsVOC's (metric units) are not applicable to this table. The footnotes are analyst's comments on specific data points within the VOST analyses, and do not necessarily apply to the summarized data report. However, benzene results should be flagged as estimated or minimum concentrations because sample concentrations exceeded the acceptable calibration range of the instrument. The analyst took action to try to bracket the sample concentrations with additional standards and special techniques to provide better estimates of the high benzene concentrations.

VOST ANALYSES (continued)

- Because chloromethane and bromomethane were found in the system blanks, data for these two analytes were determined by the analyst to be suspect. Chloromethane was found in at least one of the field samples at ~ 10 times the approximate average amount found in the blanks and could possibly be a true emission; however, the majority of field samples appear to have levels of chloromethane and bromomethane roughly equivalent to the background levels demonstrated by the field blanks.

- A performance audit sample (an independent check standard spiked onto a clean VOST trap) was analyzed with the field samples with the following results: methylene chloride, 118% accuracy at 400 ng on-column; 1,1,1-trichloroethane, 117% accuracy at 400 ng on-column; 14 other analytes (not found in the field samples) were correctly identified and reported to within accuracies of 103% to 151% at 400 ng on-column. These results are summarized in Table 5-9 of the report.

- The benzene emission rate for Run 1 was verified from the analytical data and the reported stack data (sample volume and gas flow rate).

SEMIVOLATILE ANALYSES

- Surrogate recoveries for the SV trains met the 50-150% objective for recovery. The additional solvent rinse of the filter support assembly produced discolored matrices and erratic surrogate recoveries, but indicated no significant concentrations of the target analytes upon analysis. Therefore, the data quality objectives were met for the primary sample results.

- An independent audit sample (check standard) was used to spike a laboratory control XAD and water sample prior to co-extraction with the actual field samples. The same check standard was analyzed directly to verify instrument calibration and chemical identification. Out of 43 spiked analytes from the target analyte list, 42 (98%) had accuracies ranging from 80% to 106% by direct analysis (2,4-dinitrophenol was the only exception at 60%), 39 of the 43 spiked analytes were within 50% to 150% for the spiked XAD sample, and 37 of the 43 spiked analytes were within 50% to 150% for the spiked water sample. Complete results for the performance audit samples are presented in Table 5-6.

- Phenol emission rates for Run 1 was verified from the analytical report through the derived emission factors by manual calculation.

METALS ANALYSES

- Front-half results for the metals train samples indicated significant background levels for cadmium, cobalt, chromium, manganese, nickel, lead, antimony, and selenium. The blank levels also appear to represent minimum levels found in all the field samples, indicating that the field samples also have a reproducible background contamination. Based on the blank filter levels, background corrections were applied to the cumulative concentrations (front/back half combination) of the samples prior to deriving emission rates. For chromium, manganese, and nickel, the background corrections are relatively insignificant to the total amount found for the combined front and back half train samples; however, the background corrections for cadmium cobalt, lead, antimony, and selenium represent a significant proportion of the total amounts found (> 50% in most cases). Therefore, derived stack gas concentrations for these 5 elements (Cd, Co, Pb, Sb, Se) should be considered as estimated concentrations.

- Analysis QC samples, including an independent check standard and an ICAP interference check sample, showed accuracies within the QA plan data quality objectives of 90-110% and 75-125%, respectively.

- Analysis of a spiked blank train (both front half and back half) demonstrated recoveries within the 70-130% QA objective.

- Analysis of a NIST Reference Standard filter indicated accuracies of 70-110%.

- Derived emission test results for chromium and nickel were verified from the analytical data and calculation of derived concentrations (ug/dscm) were checked for all 3 runs.

HF, HCl, Cl_2 ANALYSES

Check standards and matrix spikes were analyzed by Galbraith Laboratories as part of the analysis run. These results showed accuracies/recoveries within the 80-120% objective for the chloride analyses; no check standard or matrix spike was indicated for the fluoride analysis.

Duplicate analysis of one sample per matrix was not indicated for the chloride/fluoride analyses; however, the individual results from all 3 runs varied by less than the 30% RPD objective for sample precision.

HF, HCl, and Cl_2 emission rates for Run 1 were verified by manual calculation.

APPENDIX E.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

Reference: Belden Brick Company Plant 6
November 8 to 13, 1993

EMISSION TEST CALCULATIONS--General, filterable PM-10, Run 1, kiln stack

A	=	4,624	= stack area, in sq. in.
A(nz)	=	0.000638	= area of nozzle, in sq. ft.
Bws	=	4.08	= percent moisture, by volume, measured in stack gas
Cp	=	0.8339	= pitot tube coefficient
Delta H	=	0.67	= average pressure differential of orifice meter, in inches water
Delta P	=	0.082	= average velocity head, in inches water
Dia	=	0.342	= nozzle diameter, in inches
Md	=	29.06	= estimated dry molecular weight, in lb/lb-mole
Mfd	=	0.959	= dry mole fraction of stack gas
Ms	=	28.61	= wet molecular weight of stack gas, in lb/lb-mole
P(std)	=	29.92	= standard pressure, in inches Hg
Pbar	=	29.13	= barometric pressure, in inches Hg
Pg	=	-0.12	= stack gas static pressure, in inches water
Ps	=	29.12	= absolute stack pressure, in inches Hg.
Qaw	=	36,992	= wet volumeteric stack flow at stack conditions, in ACFM
Qsd	=	21,704	= volumetric stack flow, in DSCFM.
Theta	=	90	= sampling time, in min.
tm	=	71	= dry gas meter temperature, in degrees F.
ts	=	380	= stack temperature in degree F.
T(std)	=	528	= standard temperature, in degrees Rankine
Vlc	=	37.5	= volume of liquid collected in impingers, in ml
Vm	=	41.664	= volume of gas sampled, in dry ACF
Vm(std)	=	41.472	= volume of dry gas sampled at standard conditions, in SCF
vs	=	19.20	= stack gas velocity, in ft/sec.
Vw(std)	=	1.765	= volume of water vapor at standard conditions, in SCF
Y	=	1.027	= dry gas meter calibration factor
%I	=	106.9	= percent isokinetic of sampling rate

Volume of dry gas sampled at standard conditions

Vm(std) = 17.64*Y*Vm*(Pbar+Delta H/13.6)/(460+tm)
= 41.472

Volume of water vapor at standard conditions

Vw(std) = 0.04707*Vlc
= 1.765

Percent moisture, by volume, measured in stack gas

Bws = 100*Vw(std)/(Vw(std)+Vm(std))
= 4.08

Dry mole fraction of stack gas

Mfd = 1-(Bws/100)
= 0.959

Wet molecular weight of stack gas

Ms = (Md*Mfd)+(0.18*Bws)
= 28.61

Absolute stack gas pressure

Ps = Pbar+(Pg/13.6)
= 29.12

Average stack gas velocity

vs = 85.49*Cp*SQRT((Delta p*(460+ts)/(Ps*ms))
= 20.50

Volumetric flowrate at standard conditions

Qsd = 60/144*Mfd*vs*A*(Tstd/(ts+460))*(Ps/Pstd)
= 21,704

Wet volumetric flowrate at stack gas conditions

Qaw = 60/144*vs*A
= 36,992

Percent isokinetic of sampling rate

%I = Pstd/Tsdt*100/60*((ts+460*Vm(std))/(Ps*vs*Mfd*Theta*A(nz))
= 106.9

PM/PM-10 EMISSIONS--filterable PM-10, Run 1, kiln stack

Mn(pm10)	=	0.0033	= mass collected, in grams
Vm(std)	=	41.472	= volume of dry gas sampled at standard conditions, in SCF
Cs(pm10)	=	0.0012	= particulate concentration, in grains/DSCF
Qsd	=	21,704	= volumetric stack flow, in DSCFM.
E(pm10)	=	0.23	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(pm10)	=	0.066	= emission factor, in lb/ton

PM-10 concentration

Cs(pm10) = 15.432*Mn/Vm(std)
= 0.0012

Emission rate

E(pm10) = 60/7000*Qsd*Cs(pm10)
= 0.23

Emission factor

EF(pm10) = E(pm10)/P
= 0.066

METAL EMISSIONS--chromium, Run 1, kiln stack

M(fh-cr)	=	35.8	= mass collected in front half of sampling train, in ug
M(bh-cr)	=	405	= mass collected in back half of sampling train, in ug
M(fhb-cr)	=	4.4	= mass collected in front half blank, in ug
M(bhb-cr)	=	0.589	= mass collected in back half blank, in ug
M(t-cr)	=	435.8	= blank corrected mass collected, in ug
Vm(std)	=	99.211	= volume of dry gas sampled at standard conditions, in SCF
Cs(cr)	=	6.78E-05	= metal concentration, in grains/DSCF
Qsd	=	20,713	= volumetric stack flow, in DSCFM.
E(cr)	=	0.012	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(cr)	=	0.0035	= emission factor, in lb/ton

Blank-corrected mass

M(t-cr) = (M(fh-cr) - M(fhb-cr)) + (M(bh-cr) - M(bhb-cr))
= 435.8

Metal concentration

Cs(cr) = (15.432/1,000,000)*M(t-cr)/Vm(std)
= 6.78E-05

Emission rate

E(cr) = 60/7000*Qsd*Cs
= 0.012

Emission factor

EF(cr) = E(cr)/P
= 0.0035

SPECIATED VOC EMISSIONS--toluene, Run 1, kiln stack

M(fh-tol)	=	102.81	= mass collected in front half of sampling train, in ng
M(bh-tol)	=	2.777	= mass collected in back half of sampling train, in ng
M(fhb-tol)	=	0	= mass collected in front half blank, in ng
M(bhb-tol)	=	2.145	= mass collected in back half blank, in ng
M(t-tol)	=	103.44	= blank corrected mass collected, in ng
Vm(std)	=	0.7050	= volume of dry gas sampled at standard conditions, in SCF
Cs(tol)	=	2.26E-06	= analyte concentration, in grains/DSCF
Qsd	=	21,711	= volumetric stack flow, in DSCFM.
E(tol)	=	0.00042	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(tol)	=	0.00012	= emission factor, in lb/ton

Blank-corrected mass

M(t-tol) = (M(fh-tol) - M(fhb-tol)) + (M(bh-tol) - M(bhb-tol))
= 103.44

Analyte concentration

Cs(tol) = (15.432/1.0 E-9)*M(t-tol)/Vm(std)
= 2.26E-06

Emission rate

E(tol) = 60/7000*Qsd*Cs
= 0.00042

Emission factor

EF(cr) = E(tol)/P
= 0.00012

SEMIVOLATIVE ORGANIC COMPOUND EMISSIONS--phenol, Run 1, kiln stack

M(phenol)	=	13	= mass collected, in ug
Vm(std)	=	102.084	= volume of dry gas sampled at standard conditions, in SCF
Cs(phenol)	=	1.97E-06	= analyte concentration, in grains/DSCF
Qsd	=	20,635	= volumetric stack flow, in DSCFM.
E(phenol)	=	0.00035	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(phenol)	=	0.00010	= emission factor, in lb/ton

Analyte concentration

Cs(phenol) = (15.432/1,000,000)*M(phenol)/Vm(std)
= 1.97E-06

Emission rate

E(phenol) = 60/7000*Qsd*Cs(phenol)
= 0.00035

Emission factor

EF(phenol) = E(phenol)/P
= 0.00010

INORGANIC GAS EMISSIONS--NOx, Run 1, kiln stack

MW(nox)	=	46	= molecular weight of NOx
Cs(nox)	=	15.8	= analyte concentration, in PPM
Qsd	=	21,711	= volumetric stack flow, in DSCFM.
E(nox)	=	2.5	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(nox)	=	0.71	= emission factor, in lb/ton

Emission rate

E(nox) = (60/1,000,000)*(1/385)*MW(nox)*Qsd*Cs(nox)
= 2.5

Emission factor

EF(nox) = E(nox)/P
= 0.71

HF, HCl, Cl2 EMISSIONS--hydrogen fluoride, Run 1, kiln stack

M(hf)	=	31,969	= mass collected, in ug
Vm(std)	=	82.567	= volume of dry gas sampled at standard conditions, in SCF
Cs(hf)	=	0.00598	= analyte concentration, in grains/DSCF
Qsd	=	20,307	= volumetric stack flow, in DSCFM.
E(hf)	=	1.0	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(hf)	=	0.30	= emission factor, in lb/ton

Analyte concentration

Cs(hf) = (15.432/1,000,000)*M(hf)/Vm(std)
= 0.00598

Emission rate

E(hf) = 60/7000*Qsd*Cs(hf)
= 1.0

Emission factor

EF(hf) = E(hf)/P
= 0.30

DRYER EMISSIONS--TOC, Run 2, dryer stack

MW(toc)	=	16	= molecular weight of TOC
Qsd	=	42,487	= volumetric stack flow, in DSCFM.
Bws	=	4.2	= percent moisture, by volume, measured in stack gas
Cs(toc-pw)	=	85.6	= TOC concentration as propane on wet basis, in PPM
Cs(toc-pd)	=	89.4	= TOC concentration as propane on dry basis, in PPM
Cs(toc-md)	=	268.1	= TOC concentration as methane on dry basis, in PPM
E(toc)	=	28	= emission rate, in lb/hr
P	=	3.48	= production rate, in ton/hr
EF(toc)	=	8.2	= emission factor, in lb/ton

TOC concentration as propane on dry basis

Cs(toc-pd) = Cs(toc-pw)/(1-Bws/100)
89.4

TOC concentration as methane on dry basis

Cs(toc-md) = 3*Cs(toc-pd)
268.1

Emission rate

E(toc) = (60/1,000,000)*(1/385)*MW(toc)*Qsd*Cs(toc)
= 28

Emission factor

EF(toc) = E(toc)/P
= 8.2

APPENDIX F.

RESULTS OF RETEST OF DRYER EMISSIONS

Following the emission test conducted by MRI, Belden determined that one of the dryer burners had been malfunctioning during the test. After the burner was repaired, the dryer was retested by CSA Company, which was contracted by Belden to perform the retest. This Appendix consists of the report of that retest of the dryer; the report of the retest is included here at the request of the work assignment manager.

Air Pollution Source Testing

Phone - 216 - 525-5119

CSA COMPANY

Custom Stack Analysis

24385 Center Road
P.O. Box 3750
Alliance, Ohio 44601

March 7, 1995

Mr. John Jensen

Belden Brick, inc.
Sugarcreek, Oh

Dear John,

This is a follow-up of the tests performed on November 11, 1994 for VOC and CO testing of your Plant 6, No. 3 drier stack. In November the VOC and CO emissions were high. It was found to be a problem with the auxillary burner. The burner was repaired and the tests were performed again on March 7, 1995. The emissions now show 0.474 pounds per hour of VOC as Carbon and 1.52 pounds per hour of CO.

The raw data and calculations are enclosed.

Sicerely,

Ernest L. Kolm

PROCESS WEIGHT:

NUM BRICK PER CAR	LBS PER WET BRICK	KILN SCHED CAR/DAY	PROCESS WEIGHT (LBS/HR)	PROCESS WEIGHT (TON/HR)
3472	5.5726	12	9674	4.84

EMISSIONS FROM RETESTS:

POLUTANT	LBS PER HOUR	
VOC.....	0.474	as carbon
CO.....	1.52	

EMISSION FACTOR:

POLUTANT	LBS PER TON
VOC.....	0.31

METHOD 25A CALCULATIONS FOR THC AS CARBON

FOR BELDEN BRICK BY dek GT DATE 3/7/95

C_C = ORGANIC CONCENTRATION AS CARBON, PPMV

C_{meas} = ORGANIC CONCENTRATION AS MEASURED, PPMV

K = CARBON EQUIVALENT CORRECTION FACTOR

K = 2 FOR ETHANE, K = 3 FOR PROPANE, K = 4 FOR BUTANE

$M_C = C_C\ Q_S\ D_C\ 10^{-6}$

M_C = MASS FLOW RATE AS CARBON, LB/HR

Q_S = GAS FLOW, DRY STD FT^3/HR FROM GAS FLOW MEASUREMENT

D_C = 0.0312 LB/FT^3 AT 68 °F

10^{-6} = DECIMAL PERCENT VOLUME CONVERSION FROM PPMV

FUEL GAS 40% H_2 / 60% He

CAL GAS 101.00 PPM as PROPANE

RANGE 0-500

AUTOMATIC CAL TIME 60 MINUTES (T.E.I. MODEL 51)

HEATED SAMPLE LINE TEMP 350 °F

ASSUMED 2,000,000 DSCFH AS Q_S

TEST	TIME	C_{meas}	C_C	M_C
1	10:10/11:11	2.53	7.59	0.474

CSA CO.

CARBON MONOXIDE DATA SHEET-CFR METHOD 10

PLANT BELDEN BRICK DATE 3/7/95 BY SLK GT

LOCATION PLANT 6, No 3 DRIER BAG — STACK ✓

NDIR UNIT T.E MOD.48 RECORDER — RANGE - FLOW 1.1 LPM

SPAN GAS VALUES, CO IN N_2 1) 0 2) 99.6 3) 150 4) 316

	ZERO	SPAN 1	SPAN 2	SPAN 3
INITIAL CALIBRATION	0	316		
FINAL CALIBRATION	0	315		

	TRIAL 1	TRIAL 2	TRIAL 3
TEST 1	10.95		
TEST 2			
TEST 3			

CO_7 (CO CORRECTED TO 7% O_2) = CO (ACTUAL) X (20.9 - 7)/(20.9 - O_2)

TEST 1, _____ X 13.9 /20.9 - _____ = _____ PPM @ 7% O_2

TEST 2, _____ X 13.9 /20.9 - _____ = _____

TEST 3, _____ X 13.9 /20.9 - _____ = _____

TEST 4, _____ X 13.6 /20.9 - _____ = _____

CARBON MONOXIDE MASS CONCENTRATION CALCULATION

CO_L = Qs X %V X D_{CO}

CO_L = POUNDS PER HOUR CARBON MONOXIDE

Qs = GAS FLOW, F^3/HR (FROM M-5 TEST)

%V = DECIMAL PERCENTAGE OF CO (V/V)

D_{CO} = DENSITY OF CO, LB/F^3 = 0.0724

TEST 1 2,000,000* x 10.95 x 10^{-6} x 0.0724 = 1.52 LB/HR

TEST 2 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 3 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 4 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

* ASSUMED BASED ON PRIOR DATA

BELDEN BRICK
PLANT 6, NO 3 DRIER
GT

OFFSET
"0" = 2.8 PPM

START ONE HOUR RUN

CO READING

T = 120°F KILN TEMP

AVG. = .4

** SAMPLE REPORT **
03/07/95 10:06
HIGH = .8 10:04
LOW = .2 10:06
AVG. = .5

** SAMPLE REPORT **
03/07/95 10:08
HIGH = .9 10:06
LOW = .2 10:06
AVG. = .6

** SAMPLE REPORT **
03/07/95 10:10
HIGH = .7 10:08
LOW = .2 10:10
AVG. = .5 3.3

** SAMPLE REPORT **
03/07/95 10:12
HIGH = .4 10:10
LOW =- .6 10:11
AVG. =- .1 2.9

3.6

** SAMPLE REPORT **
03/07/95 10:14
HIGH = .1 10:13
LOW =- .7 10:14
AVG. =- .3 2.5

2.8

** SAMPLE REPORT **
03/07/95 10:16
HIGH =- .1 10:16
LOW =- 1.2 10:15 2.1
AVG. =- .7

6.5

DRIER DOOR OPEN

** SAMPLE REPORT **
03/07/95 10:18
HIGH = 1.0 10:17
LOW = .0 10:16 3.5
AVG. = .7

10.4

** SAMPLE REPORT **
03/07/95 10:20
HIGH = .6 10:18
LOW = .1 10:19 3.0
AVG. = .2

11.2

** SAMPLE REPORT **
03/07/95 10:23
HIGH = .4 10:21
LOW =- 1.5 10:23 2.2
AVG. =- .6

11.2

** SAMPLE REPORT **
03/07/95 10:25
HIGH =- .6 10:25
LOW =- 1.4 10:23
AVG. =- 1.0 1.9

11.5

** SAMPLE REPORT **
03/07/95 10:27
HIGH =- .7 10:25
LOW =- 1.9 10:25
AVG. =- 1.4 1.4

11.1

** SAMPLE REPORT **
03/07/95 10:29
HIGH =- 1.4 10:28
LOW =- 2.1 10:29
AVG. =- 1.7 1.1

10.8

** SAMPLE REPORT **
03/07/95 10:31
HIGH =- 1.1 10:31
LOW =- 2.3 10:29
AVG. =- 1.7 1.1

10.6

** SAMPLE REPORT **
03/07/95 10:33
HIGH =- .7 10:32
LOW =- 1.1 10:31
AVG. =- .9 1.9

11.0

** SAMPLE REPORT **
03/07/95 10:35
HIGH =- .6 10:35
LOW =- 1.1 10:34
AVG. =- .8 2.0

10.9

** SAMPLE REPORT **
03/07/95 10:37
HIGH =- .6 10:35
LOW =- 1.2 10:37
AVG. =- 1.0 1.8

11.8

** SAMPLE REPORT **
03/07/95 10:39
HIGH =- .5 10:39

12.5

[redacted]-F 007

SHEET 1 of 2

03/07/95 10:42
HIGH =- .4 10:41
LOW =- .9 10:40
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:44 12.7
HIGH =- .4 10:42
LOW =- 1.0 10:44
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:46 12.0
HIGH =- .8 10:44
LOW =- 1.6 10:46
AVG. =- 1.2 1.6

** SAMPLE REPORT **
03/07/95 10:48 12.2
HIGH =- .6 10:48
LOW =- 1.7 10:46
AVG. =- 1.1 1.7

** SAMPLE REPORT **
03/07/95 10:50 13.0
HIGH =- .5 10:48
LOW =- .8 10:49
AVG. =- .6 2.2

** SAMPLE REPORT **
03/07/95 10:52 12.6
HIGH =- .1 10:51
LOW =- .7 10:52
AVG. =- .4 2.4

** SAMPLE REPORT **
03/07/95 10:54 12.2
HIGH =- .3 10:53
LOW =- .9 10:52
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 10:56 12.2
HIGH =- .6 10:56
LOW =- 1.0 10:54
AVG. =- .8 2.0

** SAMPLE REPORT **
03/07/95 10:58 11.9
HIGH =- .4 10:57
LOW =- 1.2 10:58
AVG. =- .7 2.1

** SAMPLE REPORT **
03/07/95 11:01 12.2
HIGH =- .7 11:00
LOW =- 1.1 10:59
AVG. =- .9 1.9

** SAMPLE REPORT **
03/07/95 11:03 12.9
HIGH =- .6 11:01
LOW =- 1.2 11:02
AVG. =- .9 1.9

** SAMPLE REPORT **
03/07/95 11:05 12.0
HIGH =- 1.2 11:03
LOW =- 1.6 11:03
AVG. =- 1.4 1.4

** SAMPLE REPORT **
03/07/95 11:07
HIGH =- 1.2 11:06
LOW =- 1.9 11:07
AVG. =- 1.5 1.3

** SAMPLE REPORT **
03/07/95 11:09
HIGH =- 1.3 11:09
LOW =- 1.7 11:07
AVG. =- 1.5 1.3

** SAMPLE REPORT **
03/07/95 11:11
HIGH =- 1.5 11:09
LOW =- 2.0 11:10
AVG. =- 1.8 1.0

END ONE HR RUN

*** ZERO CHECK ***
03/07/95 11:12
03/07/95 11:12 — 2.8 PPM OFFSET

** ZERO ADJUST **
03/07/95 11:14
*** MANUAL ***
Z.HV =-16.0
ZERO =- 1.8
AUTO = 8.6

"0" CAL CO SPAN
0-0 312 - 315
Gas Rdg

T = 121°F KILN TEMP

AVG VDC = 2.53 PPM

AVG CO = 10.95 PPM

BELDEN BRICK, SUGARCREEK, PLANT 6, KILN 3 DRIER, NOVEMBER 17,1994

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CSA CO., PO BOX 3750, ALLIANCE, OH 44601 PH (216)525-5119

FAX (216)525-7908

SOURCE EMISSION TEST
AT
BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
NOVEMBER 17, 1994

Brief of Tests

Tests were performed to determine the carbon monoxide (CO) and total volatile organic (VOC) emissions from the plant 6, kiln 3 drier stack to verify previous data obtained by others. The testing developed into an impromtu mini test program to find the cause of the emissions that were present.

The drier is used to evaporate the moisture from the brick before charging it into the kiln. It is heated by removing the hot air from the cooling section of the kiln and transporting it via. fan and duct to the product discharge end of the drier. Additional heat is added with a natural gas burner located on top of the drier at the product discharge end. The hot air and flue gas pass over the product and discharges through a vane/axial fan to the stack at the product charging end of the kiln. The samples were extracted from the stack below the roof line and the gas flow was measured from sample ports above the roof line.

Results

See table 1 and 2.

Discussion

The testing was originally intended to verify data obtained by others that showed the emissions from this drier to be much higher than those at other sites. Since the data verified these findings showing [redacted] ppmv of CO and [redacted] ppmv VOC as carbon, the drier gas burner was turned off to see if it was the cause. The results showed [redacted] ppmv of CO and [redacted] ppmv of VOC as carbon. This was a decrease of [redacted] percent CO and [redacted] percent VOC.

A fifteen minute integrated sample was taken in the duct from the kiln cooling section to the drier to determine if this was the cause of the remaining emissions. It showed [redacted] PPMV of CO.

Since a very small quantity of fuel oil (diesel fuel) is used as a mold release in forming the clay, the Tedlar bags from the

Method 3 test were tested for benzine, ethylbenzene, toluene and xylene. These are the standard tests performed for fuel oil contaminations. The results were below the detection limits of the chromatograph.

The Tedlar bags were also tested for methane to check for unburned natual gas. The results showed the highest concentration with the drier burner in operation. There were smaller quantities in the kiln cooling section air/gas to the drier.

The pitot traverse at the sample ports located above the roofline are the same sample ports used in prior tests. The velocity profile showed a tangential component of 6-10 degrees at the outer perimeter of the stack with the flow dropping off sharply (within 10 inches from the stack wall) to no flow with a negative flow near the center. A judgement call was made in selecting the pitot traverse points that may not reflect an accurate gas velocity and flow that in turn would cause erroneous mass emission rates. There are no other ports higher up the stack. It may be difficult to obtain a good velocity profile at any location in the stack since the gas is moved by a vane/axial (propeller) type fan with an evase' and control damper located directly below the roof line. Also, the velocity profile will change with movement of the butterfly control damper. A location of two diameters down from the top of the stack would be the most ideal place for the sample ports but this would be difficult and costly to accomplish.

Test Apparatus and Procedures.

(A) Methods 1-4

During each of the two tests, a pitot traverse (Method 1 and 2) was performed simultaneously with CO and VOC tests. The sampling port locations are shown in figure 1A. The traverse point locations are shown in figure 1B.

An integrated sample was withdrawn as per Method 3 to determine the carbon dioxide and oxygen concentrations required for the gas density. The flue gas was sampled from a single point through a stainless steel probe connected to a condenser by neoprene hose as shown in figure 2. The condenser was connected to the sampling module with a teflon hose. The module is designed with a three way valve

to purge the system prior to injecting it into a tedlar bag. This was done at the inlet and stack during each of the VOC tests collecting about two cubic feet of flue gas in each bag. The orsat analysis were performed with the gas contained in the bag shortly after the test was completed.

The Method 4 test was started at the same time as the CO and VOC sample and ran for one hour. The sample train is shown in figure 3. The first and second impinger contained 100 ml of distilled water and the third one was used as a dry trap. They were packed in ice to condense the water vapor from the flue gas with any remaining vapor collected in a Drierite column . The impingers and the Drierite column were weighed prior to and after the test with the weight difference showing the amount of condensate collected. This data along with the flue gas temperature, flue gas composition and meter temperature, pressure and volume were used to calculate the percent moisture by volume.

The flue gas temperature was measured with a type K thermocouple connected to a digital temperature indicator.

Data from the above Methods 1-4 were used to calculate the flue gas volumes at the inlet and stack of the incinerator. The raw data and calculations are shown in Appendix I.

(B) Carbon Monoxide Test Methods

EPA Method 10 was used to measure the CO emission using a Thermal Environmental Instruments Model 48 nondispersive infared analyzer (NDIR). The NDIR was opperated as per manufactures operating instructions.

It was set up to show instantaneous readings recorded on a strip chart recorder and from a one hour integrated sample collected in the Tedlar bag used in Method 3 test. The results obtained from the Tedlar bag were used to report data. The readings of the recorder were used to observe changes during the test.

The instantaneous sample was obtained by withdrawing a sample via stainless steel probe through Teflon tubing using a vacuum/pressure pump discharging to a stainless steel dump tube as shown in figure 4. The flow to the dump tube was held at a higher rate than the internal pump of the analyzer to maintain atmospheric

pressure required to operate the instrument.

All calibrating gases were EPA Protocol.

The Tedlar sample bags were taken to an outside laboratory for analysis of methane, benzine, etylbenzene, toluene and xylene.

(C) VOC Test Methods

EPA Method 25A was used to determine the total volatile organic compounds using a Thermal Environmental Instruments model 51H high temperature flame ionization analyzer (FIA). The FIA was operated as per manufacturers operating instructons.

The sample was withdrawn through a stainlesss steel probe and heated sample line directly to the analyzer as shown in figure 5.

The analyzer output was connected to a serial dot matrix printer. It was programed to print the VOC concentratin high, low and average every five minutes. The five minute averages were used to obtain an average for the one hour run. The analyzer automaticaly calibrated after each run. The results are shown in appendix I.

EPA Protocol gases were used for operating the flame detector and calibrations. A mixture of fourty percent hydrogen and sixty percent helium along with air was used for the fuel and propane in nitrogen was used for the calibration gases.

Submitted by

Ernest L.Kolm

TEST	1	2
DATE	11/17/94	11/17/94
TIME	10:50/11:50	13:13/14:13
EMISSIONS		
CO - PPMV MEASURED	[redacted]	[redacted]
CO - POUNDS/HOUR	[redacted]	[redacted]
VOC - PPMV(MEASURED PROPANE)	[redacted]	[redacted]
VOC - PPMV AS CARBON	[redacted]	[redacted]
VOC - POUNDS/HOUR AS CARBON	[redacted]	[redacted]
STACK GAS CONDITIONS		
TEMPERATURE - ^{o}F	103	164
STATIC PESSURE - IN.H_2O	-.5	-.5
CO_2 - %	2.1	1.8
O_2 - %	18.1	18.3
H_2O - %	2.40	2.55
VELOCITY - FPS	39.07	39.73
STACK AREA - F^2	17.7	17.7
GAS FLOW - ACFM	41494	42191
GAS FLOW - (DSTP) CFH	2225078	2040602
SAMPLE TRAIN CONDITIONS		
PITOT Δ P - IN. H_2O	.440	.411
ORIFICE Δ P - IN. H_2O	2.0	2.0
AVG. METER TEMP - ^{o}F	85	90
METER GAS VOLUME - DSCF	44.09	43.28
BAROMETER - IN. Hg	29.14	29.14

NOTE: TEST 1, DRIER GAS BURNER TURNED ON.
TEST 2, DRIER GAS BURNER TURNED OFF.

BELDEN BRICK, INC.
SUGARCREEK, OHIO
PLANT 6, KILN 3 DRIER
COMPILED DATA

TABLE 1

AIR QUALITY SERVICES, INC.

4527 Clairton Boulevard
Pittsburgh, PA 15236
(412) 881-5630

TABLE I
RESULTS OF THE ANALYSIS OF TEDLAR AIR BAGS
FOR HYDROGEN AND CARBON MONOXIDE CONTENT
CSA COMPANY
POST OFFICE BOX 3750
ALLIANCE, OHIO 44601
SAMPLES COLLECTED BY CSA COMPANY
SAMPLES RECEIVED: NOVEMBER 18, 1994 9:50 AM

PARAMETER	TEDLAR BAG #206 KILN OUT	TEDLAR BAG #207 TEST 2	TEDLAR BAG #213 TEST 1
LABORATORY #	68022	68023	68024
CARBON MONOXIDE (PPM)	[redacted]	[redacted]	[redacted]
METHANE (PPM)	[redacted]	[redacted]	[redacted]
BENZENE (PPM)	<0.1	<0.1	<0.1
TOLUENE (PPM)	<0.2	<0.2	<0.2
XYLENE (PPM)	<0.3	<0.3	<0.3
ETHYL BENZENE (PPM)	<0.1	<0.1	<0.1
TOTAL HYDROCARBON EXPRESSED AS METHANE (PPM)	[redacted]	[redacted]	[redacted]

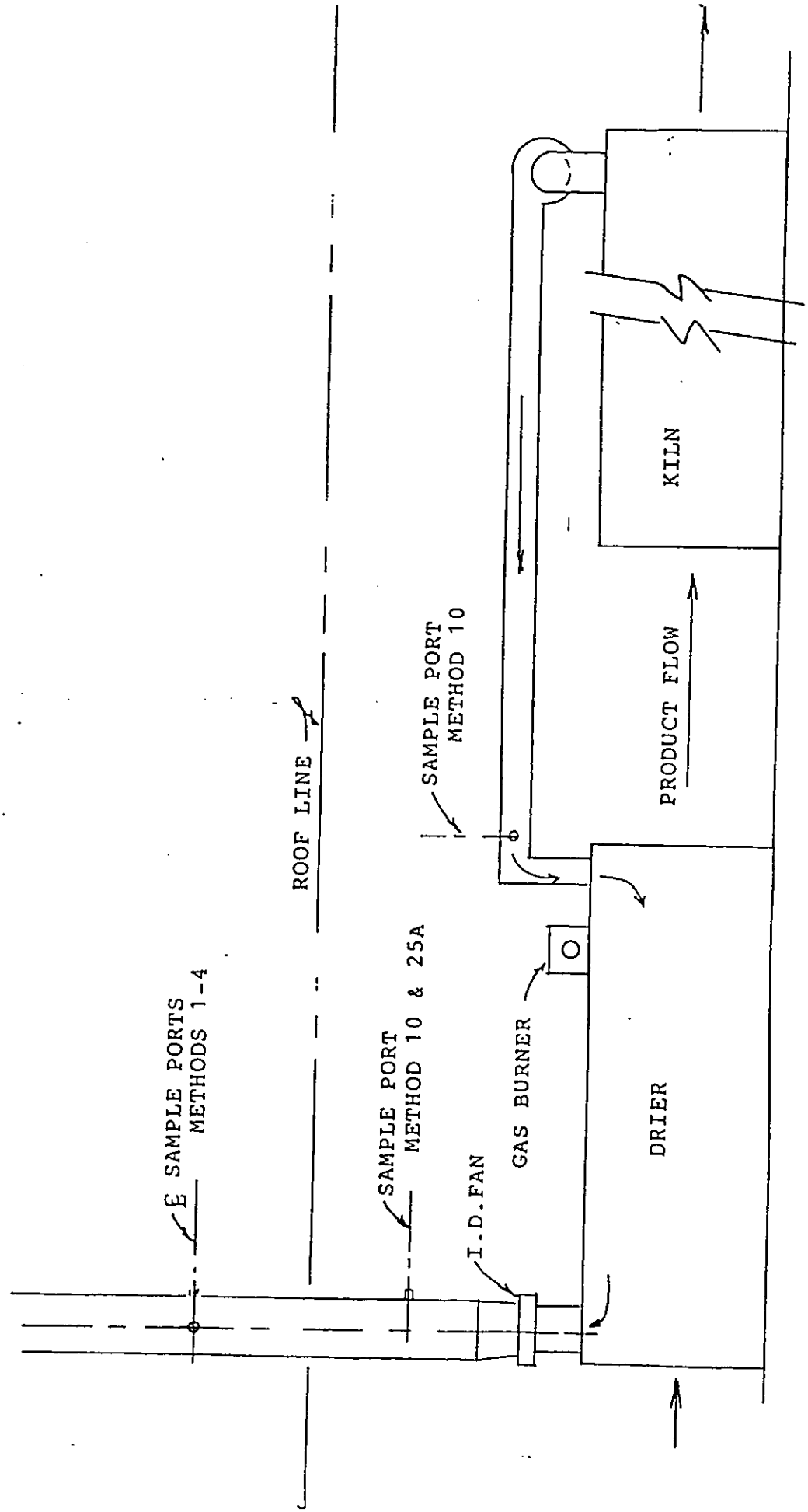
THE SAMPLES WERE ANALYZED BY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR.

BELDEN BRICK

John O. Frohliger [redacted]-F 015

AIR QUALITY SERVICES, INC.

JOB 4557
REPORTED: NOVEMBER 21, 1994



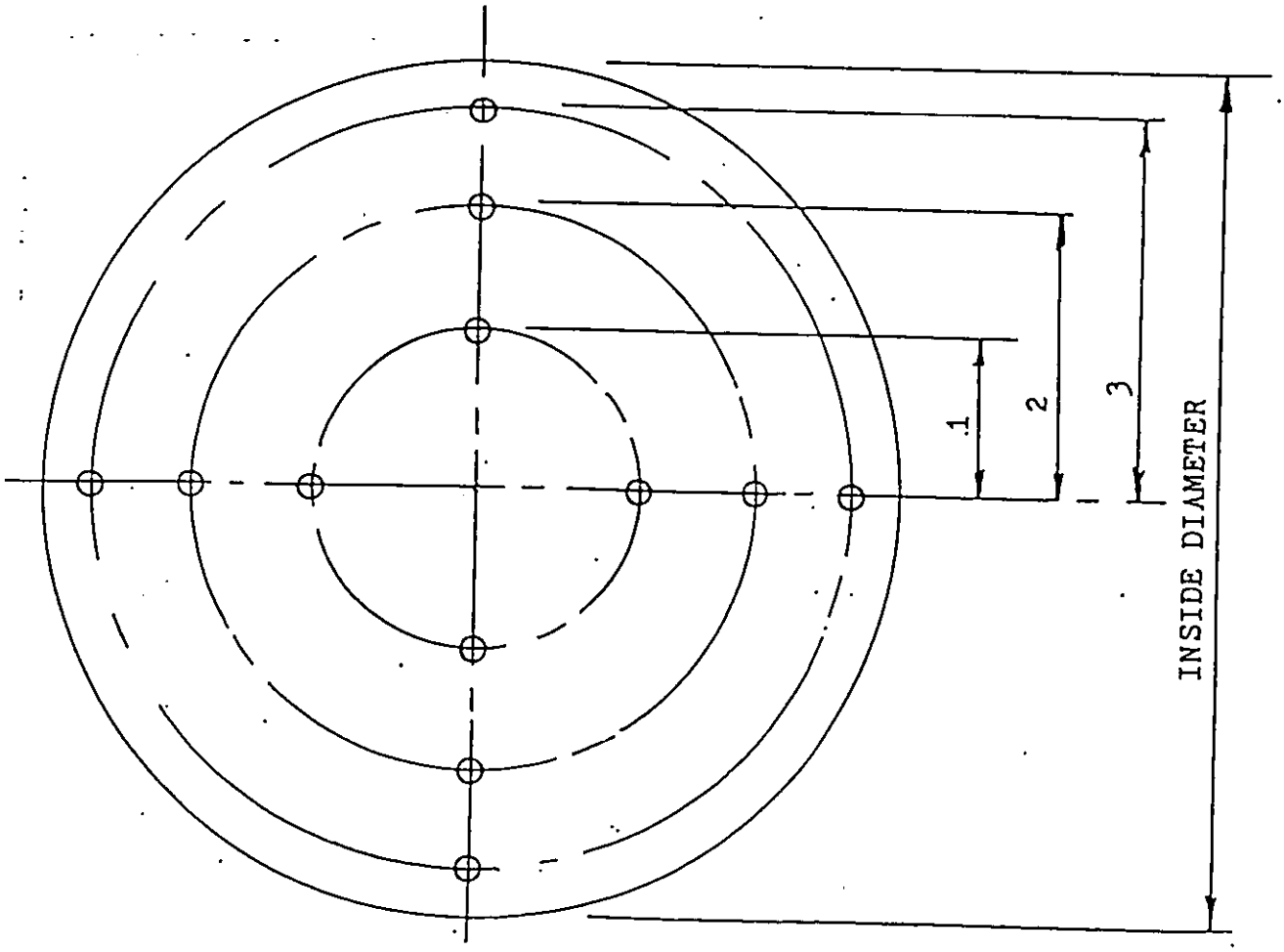
SAMPLE PORT LOCATION

FIGURE 1A

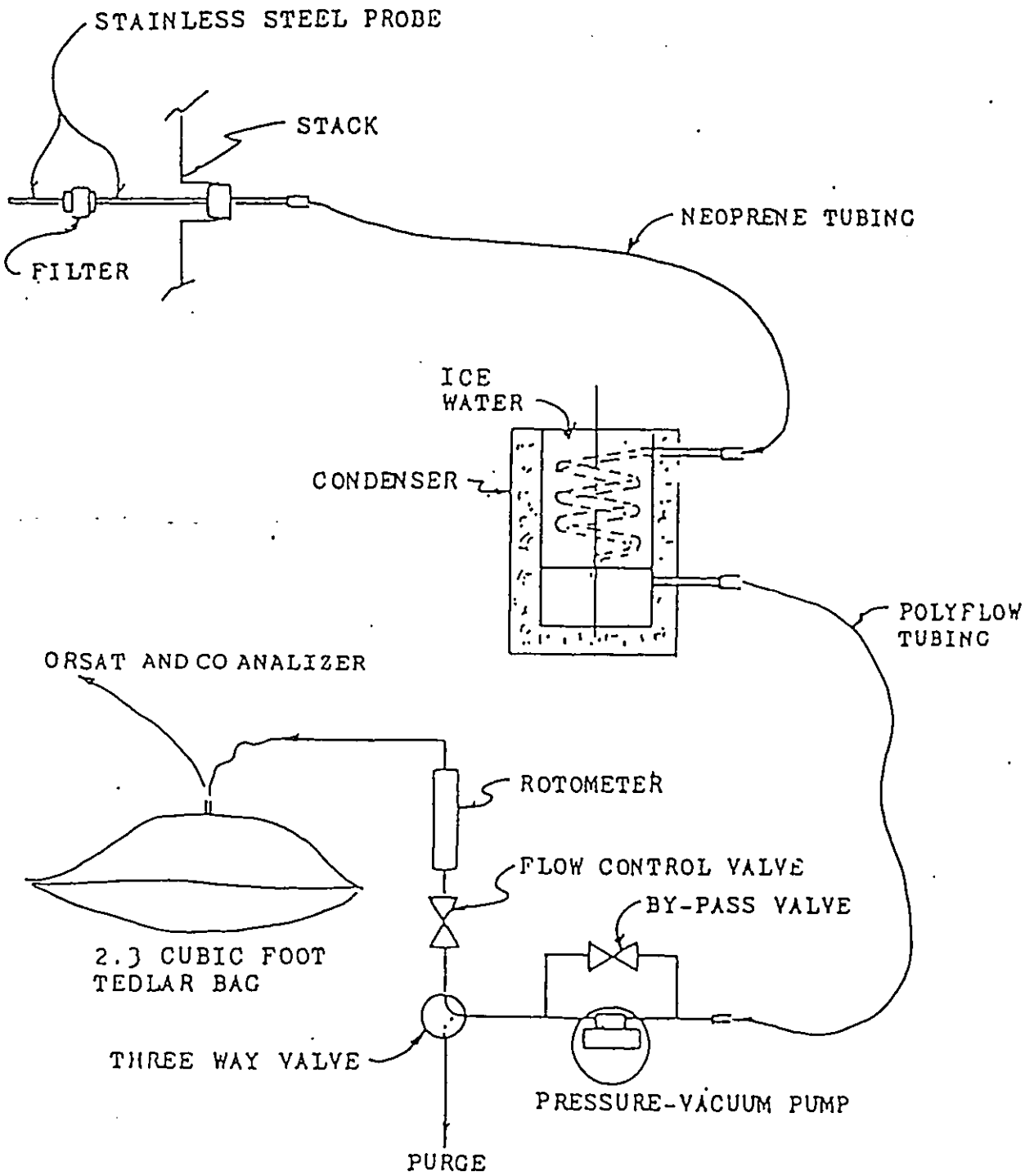
Sample Points For Round Ducts

Diameter of duct in inches = 57
Area = 17.72055
Radius = 28.5
Total No. Of Points = 15

(1)- 10.40673
(2)- 18.02498
(3)- 23.27015

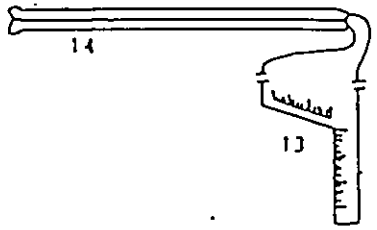


SAMPLE POINT LOCATION

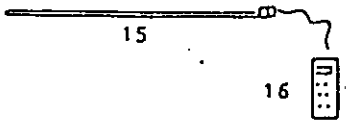


B-F 018

INTEGRATED SAMPLER

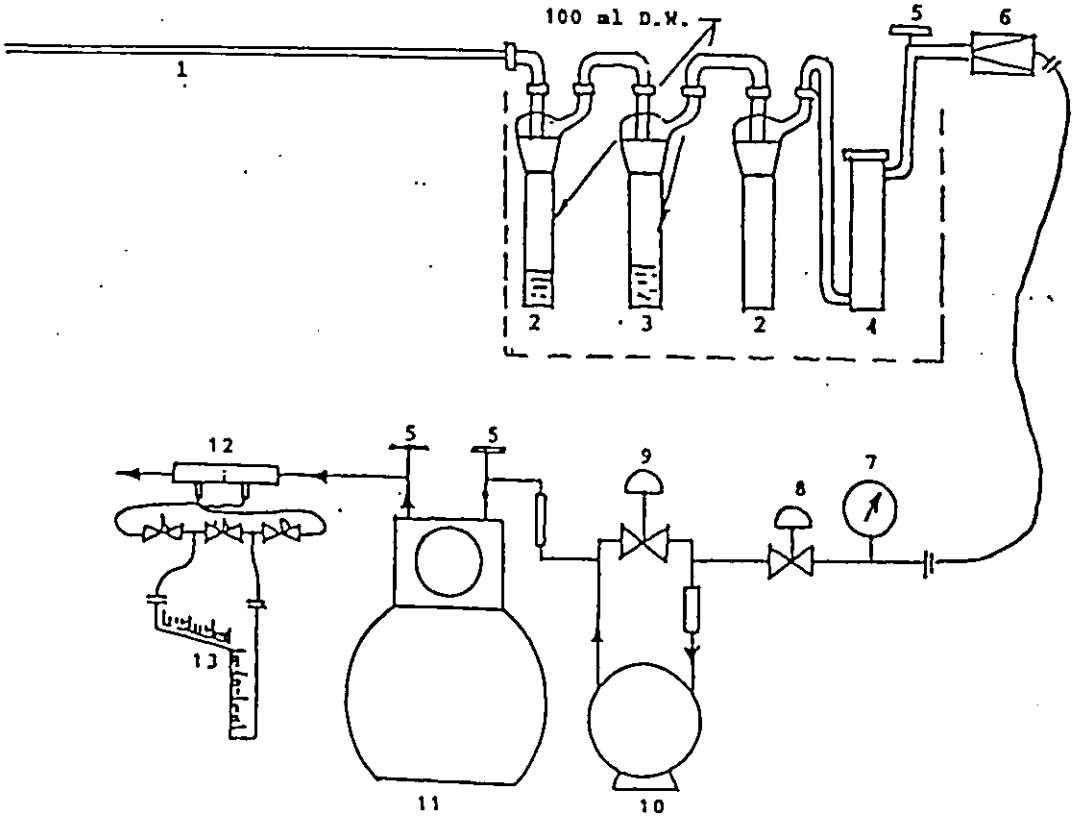


EPA METHOD 2



STACK TEMPERATURE

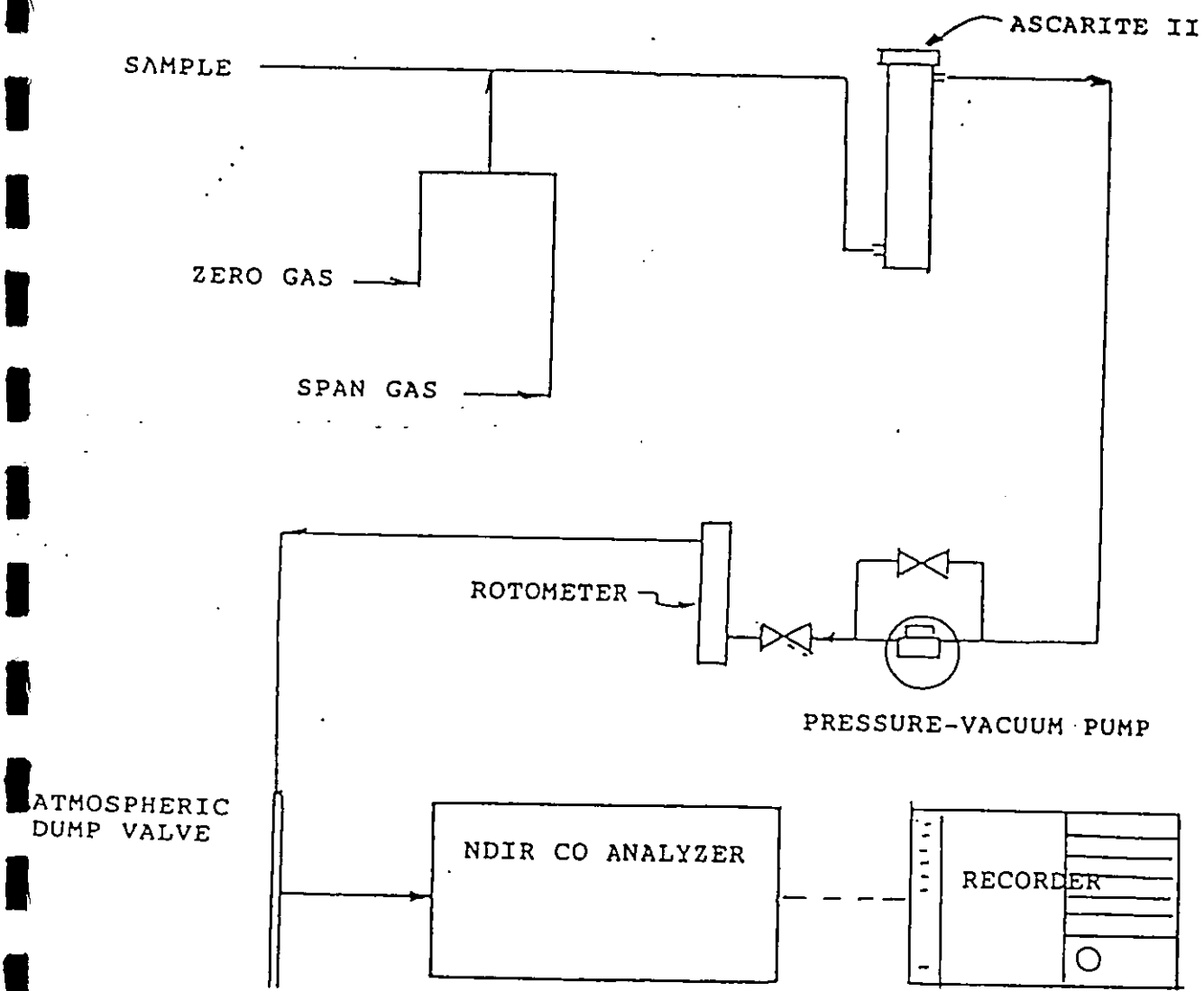
1) PROBE
2) IMPINGER (MODIFIED G-S)
3) IMPINGER (STD. G-S)
4) DESICANT COLUMN
5) THERMOMETER
6) CHECK VALVE
7) VACUMM GAGE
8) COARSE CONTROL VALVE
9) FINE CONTROL VALVE
10) VACUMM PUMP
11) DRY GAS METER
12) ORICICE TUBE
13) MANOMETER
14) PITOT TUBE
15) THERMOCOUPLE
16) DIGITAL TEMPERATURE INDICATOR



EPA METHOD 4 SAMPLE TRAIN

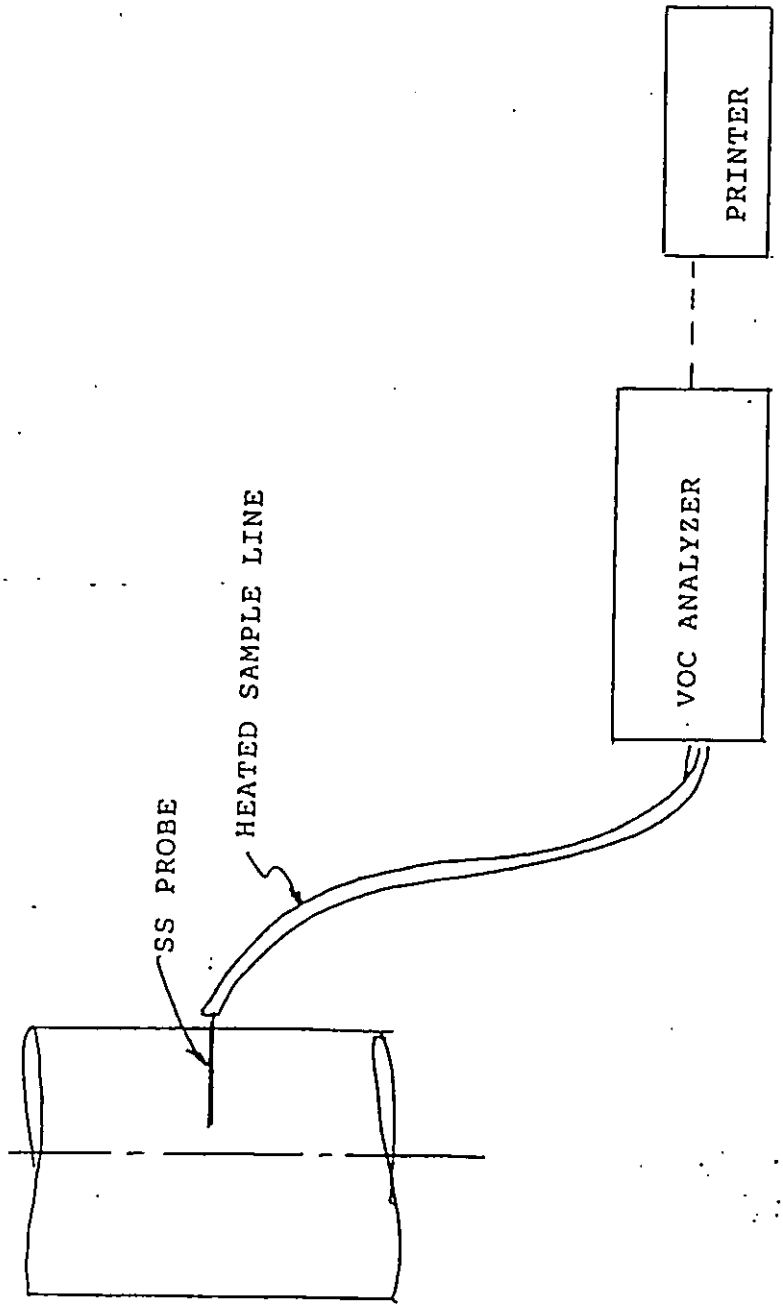
SAMPLING APPARATUS FOR GAS FLOW MEASUREMENT

FIGURE 3



METHOD 10 - CARBON MONOXIDE ANALYSIS

FIGURE 4



METHOD 25A VOC ANALYZER

FIGURE 5

APPENDIX I

METHOD 2, 3 and 4
COMPUTER NOMENCLATURE

SYMBOL	DESCRIPTION	UNITS
VM, FT_3	METER VOLUME	CUBIC FEET
Pb, IN Hg	BAROMETRIC PRESSURE	INCHES MERCURY
ΔH, IN H_2O	ORIFICE DIFFERENTIAL	INCHES WATER
PMA, IN Hg	ABSOLUTE METER PRESSURE	INCHES MERCURY
TM, ^oF	METER TEMPERATURE	DEGREES FARENHE
TS, ^oF	STACK TEMPERATURE	DEGREES FARENHE
PG, IN H2O	STACK STATIC PRESSURE	INCHES WATER
PSA, IN H2O	STACK ABSOLUTE PRESSURE	INCHES MERCURY
CP,	PITOT COEFFICIENT	DIMENSIONLESS
ΔP, IN H2O	AVERAGE SQUARE ROOT OF ΔP	INCHES WATER
%CO2	CARBON DIOXIDE	PERCENT
%O2	OXYGEN	PERCENT
%CO	CARBON MONOXIDE	PERCENT
%N2	NITROGEN	PERCENT
MD	MOLECULAR WEIGHT DRY	DIMENTIONLESS
VCL, ML	VOLUME OF CONDENSATE	MILLILITERS
AS, FT^2	STACK AREA	SQUARE FEET
Θ, MIN	TEST TIME	MINUTES
VMSTP,FT^3	METER VOLUME @ STANDARD TEMP. & PRESS.(DRY)	CUBIC FEET
VWSTP,FT^3	METER VOLUME @ STANDARD TEMP. & PRESS.(WET)	CUBIC FEET
BW%	MOISTURE	PERCENT
MS	MOLECULAR WEIGHT @ STACK CONDITIONS	DIMENSIONLESS
VS, FT/SEC	STACK GAS VELOCITY	FEET/SECOND
QA, FT^3/SEC	STACK GAS VOLUME ACTUAL	ACFM
QS, FT^3/HR	STACK GAS VOLUME @ STD. TEMP. & PRESS.(DRY)	CUBICFEET/HOUR

METHOD 2, 3 & 4 CACULATIONS

DRY MOLECULAR WEIGHT lb/lb mol
$Md = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%O_2)$.

DRY GAS VOLUME (Standard conditions) F^3
VMSTP = (17.71 °R/in.Hg)(VM)((Pb + (PM/13.6))/(TM +460)

VOLUME OF WATER VAPOR (Standard conditions) FT^3
VWSTP = (0.0474 FT^3/ML)(VLC)

MOISTURE CONTENT (Proportion by volume) %
BW% = VMSTP/(VMSTP + VWSTP)

MOLECULAR WEIGHT @ STACK CONDITIONS (Wet basis) lb/lb mol
MS = MD (1-BW) + 18(BW)

GAS VELOCITY ft/sec
VS = (85.48)(CP)(△P) ((TSA/(PSA)(MS))

GAS FLOW (Actual cubic feet /minute) ACFM
QA = (AS)(VS)

GAS FLOW (Dry standard cubic feet/hour)
QS = 3600 (1 - BW)(VS)(AS)((530/(TSA))((PSA)/(29.92))

Y = METER CALIBRATION FACTOR (Dimensionless)

Pb = 29.14

CSA CO. DATA SHEET (METHOD 1-4)

TEST NO. 1 PLANT BELDEN BRICK DATE 11/17/94

LOCATION PLANT 6 NUC DRIER BY ~~SK~~ GT

BAROMETER (P_B) 29.14 AMBIENT TEMP ASSUMED MOISTURE "Y" .99Y

MOUDULE NO. 2031 PROBE NO. — FILTER NO. — HEATER NO. — NOZZLE DIA. —

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	METER TEMP (Tm) OUT	COND TEMP °F	FILTER HEATER TEMP °F	STACK TEMP °F (Ts)	STACK PRESS. (Ps)	VACUUM "Hg	ORIFICE "H_2O (ΔH) (Pm)	VEL HEAD (ΔP)	TIME
1	48.0	68	68	48	10:250	102	-.5	4	2.0	.55	10:50
		83	70	48	11.3	102	-.5	4	2.0	.50	55
		86	74	48	11.2	102	-.5	4	2.0	.45	11:00
		88	76	48	12.0	102	-.5	4	2.0	.40	05
		91	77	45	19.6	102	-.5	4	2.0	.44	10
		93	77	46	10.9	103	-.5	4	2.0	.43	15
		95	79	48	21.9	103	-.5	4	2.0	.44	20
		96	80	48	12.8	103	-.5	4	2.0	.43	25
		98	82	50	13.6	103	-.5	4	2.0	.43	30
		99	83	50	19.3	103	-.5	4	2.0	.42	35
		99	84	50	14.0	104	-.5	4	2.0	.42	40
		99	84	50	14.0	104	-.5	4	2.0	.41	45
	94.9	99	85	50	17.2	104	-.5	4	2.0	.47	50
(Vm)	46.9	91.8	78.4								
AVERAGE		85		****	******	103	-.5	MAX 4	2.0	.44	60 MINUTES

INTEGRATED GAS SAMPLE 2/3 AVG N_2 = 79.8

				AVG
CO_2				2.1
O_2				18.1
CO				

CONDENSATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE	952.9	944.5	8.4
IMPINGER	214.6	200	14.6
GRAND TOTAL			23.0

FILTER WT	PROBE WASH WT	HEAVY METALS WT-mg	
GROSS		As	Hg
TARE		Be	Ni
NET		Cd	
		Cr	
		Pb	

LEAK RATE @ 6 "Hg = <.02

STACK AREA (As) 17.7 ft²

AVG SQ RT ΔP .6638

BAG 205 17 min

57" DIA

AVG VOC 316 ppm

CSA CO. DATA SHEET (METHOD 29)

TEST NO. 2 PLANT BELDEN BRICK DATE 11/7/94

LOCATION PLANT 6 KILN 3 DRIER BY ALK OT

BAROMETER (P_B) 29.14 AMBIENT TEMP ASSUMED MOISTURE "Y" 1998

MOUDULE NO. 2031 PROBE NO. — FILTER NO. — HEATER NO. — NOZZLE DIA. —

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	METER TEMP (Tm) OUT	COND TEMP °F	FILTER HEATER TEMP°F	STACK TEMP °F(Ts)	STACK PRESS. (Ps)	VACUUM "Hg	ORIFICE "H_2O (ΔH) (Pm)	VEL HEAD (ΔP)	TIME
1	94.9	85	85	50	4.4	106	-.5	4	2.0	.41	13:13
		89	82	50	4.2	106		4	2.0	.41	18
		93	82	51	5.0	106		4	2.0	.41	23
		95	83	52	6.0	106		4	2.0	.40	28
		96	84	52	3.9	106		4	2.0	.43	33
		99	84	52	13.7	106		4	2.0	.40	38
		92	84	54	5.3	102	-.5	4	2.0	.42	43
		95	84	54	23.0	102		4	2.0	.41	48
		97	85	54	6	102		4	2.0	.41	53
		99	86	56	5.8	102		4	2.0	.41	58
		99	86	56	7.9	102		4	2.0	.41	03
		100	87	58	4.5	103		4	2.0	.40	08
	141.3	100	88	60	4.9	103	-.5	4	2.0	.42	14:13
(Vm)	46.4	95.3	84.6								
AVERAGE		90		****	******	164	-.5	MAX 4	2.0	.411	60 MINUTES

GAS OFF

KILN EXHAUST BAG 206
14:40 to 14:55

INTEGRATED GAS SAMPLE 2.7 AVG N_2= 79.4

				AVG
CO_2				1.8
O_2				18.3
CO				

CONDENSATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE	981.9	974.4	7.5
IMPINGER	216.6	200	16.6
GRAND TOTAL			24.1

FILTER WT	PROBE WASH WT	HEAVY METALS WT-mg	
GROSS		As	Hg
TARE		Be	Ni
NET		Cd	
		Cr	
		Pb	

LEAK RATE @ 6"Hg= <.02

STACK AREA (As) 17.7 ft²

AVG SQ RT ΔP .6409

Gas Conditions From Methods 1, 2, 3 & 4

DATA INPUT

Pb,In Hg	Barometer	29.14
VM,ft3	Meter Volume	46.9
ΔH,In H2O	Orifice Differential	2
PG,In H20	Stack Static Pressure	-.5
Tm,F	Meter Temperture	85
Ts,F	Stack Temperture	103
CP	Pitot Coefficient	.84
$\sqrt{\Delta P}$,In H20	Average Square Root Of Delta P	.6638
% CO2	Carbon Dioxide	2.1
% O2	Oxygen	18.1
% N	Nitrogen	79.8
VCL,Ml	Volume Of Condensate	23
AS,ft2	Stack Area	17.7

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.29
PSA,In Hg	Absolute Stack Pressure	29.10
MD	Molecular Weight Dry Gas	29.06
MS	Molecular Weight @ Stack Conditions	28.79
VMSTP,ft3	VM Standard Temp.& Press. Dry	44.09
VWSTP,ft3	VM Standard Temp.& Press. Wet	1.08
BWO,%	Moisture	2.40
VS,ft/Sec	Stack Velocity	39.07
QA,ASCFM	Stack Gas Flow (Actual)	41494
QS,ft3/HR	Stack Gas Flow (Dry STP)	2225078

BELDEN BRICK
SUGARCREEK PLANT 6
KILN 3 DRIER STACK
11/17/94
TEST 1

Gas Conditions From Methods 1, 2, 3 & 4

DATA INPUT

Pb,In Hg	Barometer	29.14
VM,ft3	Meter Volume	46.4
ΔH,In H2O	Orifice Differential	2
PG,In H20	Stack Static Pressure	0
Tm,F	Meter Temperture	90
Ts,F	Stack Temperture	164
CP	Pitot Coefficient	.84
$\sqrt{\Delta P}$,In H20	Average Square Root Of Delta P	.6409
% CO2	Carbon Dioxide	1.8
% O2	Oxygen	18.3
% N	Nitrogen	79.9
VCL,Ml	Volume Of Condensate	24.1
AS,ft2	Stack Area	17.7

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.29
PSA,In Hg	Absolute Stack Pressure	29.14
MD	Molecular Weight Dry Gas	29.02
MS	Molecular Weight @ Stack Conditions	28.74
VMSTP,ft3	VM Standard Temp.& Press. Dry	43.28
VWSTP,ft3	VM Standard Temp.& Press. Wet	1.13
BWO,%	Moisture	2.55
VS,ft/Sec	Stack Velocity	39.73
QA,ASCFM	Stack Gas Flow (Actual)	42191
QS,ft3/HR	Stack Gas Flow (Dry STP)	2040602

BELDEN BRICK
SUGARCREEK PLANT 6
KILN 3 DRIER STACK
11/17/94
TEST 2

CSA CO.

CARBON MONOXIDE DATA SHEET-CFR METHOD 10

PLANT Belden Brick DATE 11/17/94 BY [illegible]

LOCATION Plant 6 No 3 Kiln Drier BAG _____ STACK _____

NDIR UNIT T.E MOD.48 RECORDER ✓ RANGE 0-500 FLOW 1.1 lpm

SPAN GAS VALUES, CO IN N_2 1) 99.6 2) 150.0 3) 316 4) _____

	ZERO	SPAN 1	SPAN 2	SPAN 3
INITIAL CALIBRATION	0	99.3	149.7	316
FINAL CALIBRATION				

	TRIAL 1	TRIAL 2	TRIAL 3
TEST 1	[redacted]	Gas Burner On	
TEST 2	[redacted]	Gas Burner Off	
TEST 3			

CO_7 (CO CORRECTED TO 7% O_2) = CO (ACTUAL) X (20.9 - 7)/(20.9 - O_2)

TEST 1, _____ X 13.9 /20.9 - _____ = _____ PPM @ 7% O_2

TEST 2, _____ X 13.9 /20.9 - _____ = _____

TEST 3, _____ X 13.9 /20.9 - _____ = _____

TEST 4, _____ X 13.6 /20.9 - _____ = _____

CARBON MONOXIDE MASS CONCENTRATION CALCULATION

CO_L = Qs X %V X D_{CO}

CO_L = POUNDS PER HOUR CARBON MONOXIDE

Qs = GAS FLOW, F^3/HR (FROM M-5 TEST)

%V = DECIMAL PERCENTAGE OF CO (V/V)

D_{CO} = DENSITY OF CO, LB/F^3 = 0.0724

TEST 1 2225078 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 2 2040602 x [redacted] x 10^{-6} x 0.0724 = [redacted] LB/HR

TEST 3 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

TEST 4 _____ x _____ x 10^{-6} x 0.0724 = _____ LB/HR

METHOD 25A CALCULATIONS FOR THC AS CARBON

FOR Bellman Boiler BY [illegible] DATE 11/17/94

C_c = ORGANIC CONCENTRATION AS CARBON, PPMV

C_{meas} = ORGANIC CONCENTRATION AS MEASURED, PPMV

K = CARBON EQUIVALENT CORRECTION FACTOR

K = 2 FOR ETHANE, K = 3 FOR PROPANE, K = 4 FOR BUTANE

$M_c = C_c\ Q_s\ D_c\ 10^{-6}$

M_c = MASS FLOW RATE AS CARBON, LB/HR

Q_s = GAS FLOW, DRY STD FT^3/HR FROM GAS FLOW MEASUREMENT

D_c = 0.0312 LB/FT^3 AT 68 °F

10^{-6} = DECIMAL PERCENT VOLUME CONVERSION FROM PPMV

FUEL GAS 40% N_2 / 60% He

CAL GAS 951 PPMV PROPANE / N_2

RANGE 0-500

AUTOMATIC CAL TIME 60 MINUTES (T.E.I. MODEL 51)

HEATED SAMPLE LINE TEMP 350 °F

TEST	TIME	C_{meas}	C_c	M_c
1	10:50/11:50	[redacted]	[redacted]	[redacted]
2	13:13/14:13	[redacted]	[redacted]	[redacted]