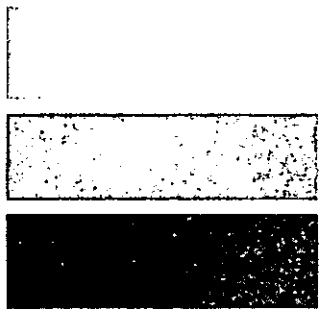
AP42 Section:	11.7
Reference:	11
Title:	Source Evaluation Results, U. S. Ceramic Tile Company, East Sparta, Ohio, August 11, 1993, Envisage Environmental Incorporated, Richfield, OH, September 1, 1993.

AP-42 Section 11.7
Reference 11
Report Sect. 4
Reference 7

SOURCE EVALUATION RESULTS

PREPARED BY



Envisage Environmental Incorporated

P.O. Box 152 Richfield, Ohio 44286
Phone (216) 526-0990

Envisage Environmental Incorporated

September 1, 1993

Mr. William Geier
Ceramics U. S.
10233 Sandyville Road SE
East Sparta, Ohio 44626

Dear Mr. Geier:

The following report is the result of the emission evaluation conducted August 11, 1993 at the above facility. On this date a total of three, one hour test runs were conducted to determine the particulate, sulfur dioxide, nitrogen oxides, and hydrogen fluoride emissions of the #5 Fast Fire Kiln.

The results are true and accurate to the degree specified in the pertinent sections of the Code of Federal Regulations in force at the time of the tests concerning source sampling.

I look forward to answering any questions you may have and assisting you in the future.

Respectfully submitted,

Robert C. Hovan
Sr. Project Leader
ENVISAGE ENVIRONMENTAL INC.

P.O. Box 152 Richfield, Ohio 44286 Phone (216) 526-0990 Fax (216) 526-8555

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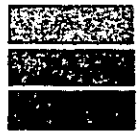

Envisage Environmental Incorporated

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Phone (216) 526-0990

INTRODUCTION

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P.O. Box 152 Richfield, Ohio 44286
Phone (216) 526-0990

INTRODUCTION

On August 11, 1993, Envisage Environmental Inc. conducted a particulate, sulfur dioxide, nitrogen oxide, and hydrogen fluorides emission evaluation at the US Ceramic Tile Company, East Sparta, Ohio. The testing was performed at the #5 Fast Fire Kiln exhaust stack.

The purpose of the evaluation was to determine the emission rates of the above compounds from the unit to determine compliance with OEPA regulations. The Envisage testing team consisted of Messrs. Greg Sinkovich, Todd Aderholt, David Donelson, Eric Hevener, and Patrick Saavedra. The Ohio Environmental Protection Agency was represented by Mr. Andy Pasko. Mr. William Geier, US Ceramic Tile Company, coordinated the testing.

Results are presented in this report for pounds per hour of emissions as well as various velocity, volumetric, and temperature measurements associated with these tests.

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DESCRIPTION OF PROGRAM

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The testing was conducted at the #5 Fast Fire Kiln Exhaust stack. The emission test consisted of three (3) test runs at each location of USEPA Methods 1 - 5, 6, 7E, 13A. Each of the three tests were performed over a sixty (60) minute period.

The particulate and fluorides samples were taken from the gas stream isokinetically. The entire length of the probe was heated and attached to a standard EPA Method 1-5 sample train. The hot box temperature was maintained between 223 and 273 degrees Fahrenheit. Exit gas temperature of the impingers was maintained below 68 degrees Fahrenheit with an ice bath. The nozzle, probe and connecting glassware were cleaned before testing and at the conclusion of each test run.

The sulfur dioxide sampling was conducted using an EPA Method 4 sampling train with the following solutions; impinger #1 contained 100ml. of 80% IPA, impingers 2 & 3 contained 3% hydrogen peroxide. The gas stream was sample at a constant rate for sixty (60) minutes. Analysis was performed by the barium-thorin titration method.

The nitrogen oxides sampling consisted of a nitrogen oxides chemiluminescent, model NA 510-2 monitor. Calibration of the monitor was conducted using EPA traceability protocol 1 gases. Calibration is conducted before and after each test run.

Leak checks of the pitot tube lines and the sample train were all acceptable by EPA regulations.

Flue gas analysis was conducted by drawing an integrated air bag sample and analyzing it for CO_2, O_2, and CO on a Hays Republic Model 621A "Orsat" Portable Gas Analyzer. The average of these readings for each run were used in calculating the emission rates.

Calibration of the equipment used, including the dry gas meter, temperature measuring devices, orifice meter, and the "S" type pitot tube was conducted within 60 days of the test date.

All analytical procedures were performed in accordance with the methods specified in the Code of Federal Regulations, Title 40, Part 60, Volume 43. Blanks were collected and analyzed on all of the reagents used in the evaluation.

The example equations included in this report uses the figures from Run

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TEST RESULTS SUMMARY

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TEST RESULTS SUMMARY

US Ceramics

East Sparta, Ohio

#5 Fast Fire Kiln Exhaust

Particulate, Nitrogen Oxides, Sulfur Dioxide, and Hydrogen Fluorides

Emission Evaluation

Conducted - August 11, 1993

PARAMETER	RUN # 1	RUN # 2	RUN # 3	
Particulate Emissions				PM
Pounds/hour	0.0706	0.0792	0.0582	0.0694
Grains/dscf	2.22E-03	2.61E-03	1.85E-03	
Hydrogen Fluorides Emissions				HF
Pounds/hour	0.1218	0.1035	0.0467	0.0907
Grains/dscf (UG/M3)	3.83E-03 (.008)	3.41E-03 (.009)	1.48E-03 (.003)	~~.007~~
Sulfur Dioxide Emissions				SO2
Pounds/hour	0.0913	0.0887	0.1164	0.0988
PPM	2.47	2.51	3.17	
Nitrogen Oxides Emissions				NOx
Pounds/hour	0.3809	0.3795	0.3843	0.3816
PPM	14.33	14.95	14.58	
System Flow Rates				
Feet/second	20.51	19.68	19.93	
ACFM	6,040	5,797	5,870	
DSCFM	3,707	3,539	3,676	
Moisture Content				
Volume percent	5.96	6.45	4.16	
Sample Location Temperature				
Degrees Fahrenheit	320	320	320	

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TEST RESULTS
DETAILED

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TEST RESULTS

US Ceramics

#5 Fast Fire Kiln Exhaust

Particulate, Nitrogen Oxides and Hydrogen Fluorides Emission Evaluation

	DATE: August 11, 1993	Symbol	Units	RUN # 1	RUN # 2	RUN # 3
	Time of Day			0922 1023	1041 1144	1202 1304
1	Gas Volume-dry,std.	Vmstd	cu. ft.	37.47	35.45	35.92
2	Condensate Vapor Vol.	Vwstd	cu. ft.	2.38	2.44	1.56
3	Gas Stream Moisture	Bws	vol.dec	0.0596	0.0645	0.0416
4	Mol.Wt-flue gas (dry)	Msd	lb/lb mo.	28.92	28.92	28.94
5	Mol.Wt-flue gas (wet)	Ms	lb/lb mo.	28.27	28.22	28.48
6	Flue Gas Velocity	Vs	ft/sec	20.51	19.68	19.93
7	Flue Gas Volume-Actual	ACFM	cu. ft.	6,040	5,797	5,870
8	Flue Gas Volume-Std.	DSCFM	cu. ft.	3,707	3,539	3,676
9	Particulate Conc.	Cs				
	- Particulate		gr/dscf	2.22E-03	2.61E-03	1.85E-03
	- Hydrogen Fluorides		gr/dscf	3.83E-03	3.41E-03	1.48E-03
	- NOx		lb/dscf	1.71E-06	1.79E-06	1.74E-06
10	Emission Rate	E				
	- Particulate		lb/hr	0.0706	0.0792	0.0582
	- Hydrogen Fluorides		lb/hr	0.1218	0.1035	0.0467
	- NOx		lb/hr	0.3809	0.3795	0.3843
11	Isokinetic Rate	I	%	107.8	106.8	104.2

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SO2 LABORATORY SUMMARY

US Ceramics

#5 Fast Fire Kiln Exhaust

Particulate, Nitrogen Oxides and Hydrogen Fluorides Emission Evaluation

DATE: August 11, 1993	Symbol	Units	RUN # 1	RUN # 2	RUN # 3
12 Normality of Ba(ClO4)2	N	meq/ml	0.0100	0.0100	0.0100
13 Volume of solution	Vsln	ml	250.0	190.0	250.0
14 Volume aliquot titrant	Va	ml	5.00	5.00	5.00
15 Volume Ba(ClO4)2 Blank	Vtb	ml	0.0	0.0	0.0
16 Volume Ba(ClO4)2 Sampl	Vt	ml	0.43	0.58	0.55
17 Concentration SO2	Cso2	lb/scf	4.10E-07	4.18E-07	5.28E-07
18 Concentration SO2	PPM	ppmV	2.47	2.51	3.17
19 Emission Rate SO2	Eso2	lb/hr	0.0913	0.0887	0.1164

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OPERATIONAL PARAMETERS

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8/11/93

12

RE: Fast-Fire Kiln No. 5
Calculation of Kiln through-put during Emmissions Testing:

Production rate

28 Cycles/Min = 112 tiles/min.

112 x 60 min. = 6,720 tiles/hour

6,720 ÷ 8 pcs./sq.ft = 840 sq. ft./hr.

840 # x 3.0 lbs/sq.ft. = 2,520 LBS./HR.

$\frac{2520}{2000}$ = 1.26 Tons/hr.

* Production is 2,520 LBS/HR. OR 1.26 TONS/HR.

J.W. Geier
8/11/93.

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SAMPLE POINT LOCATION DIAGRAM

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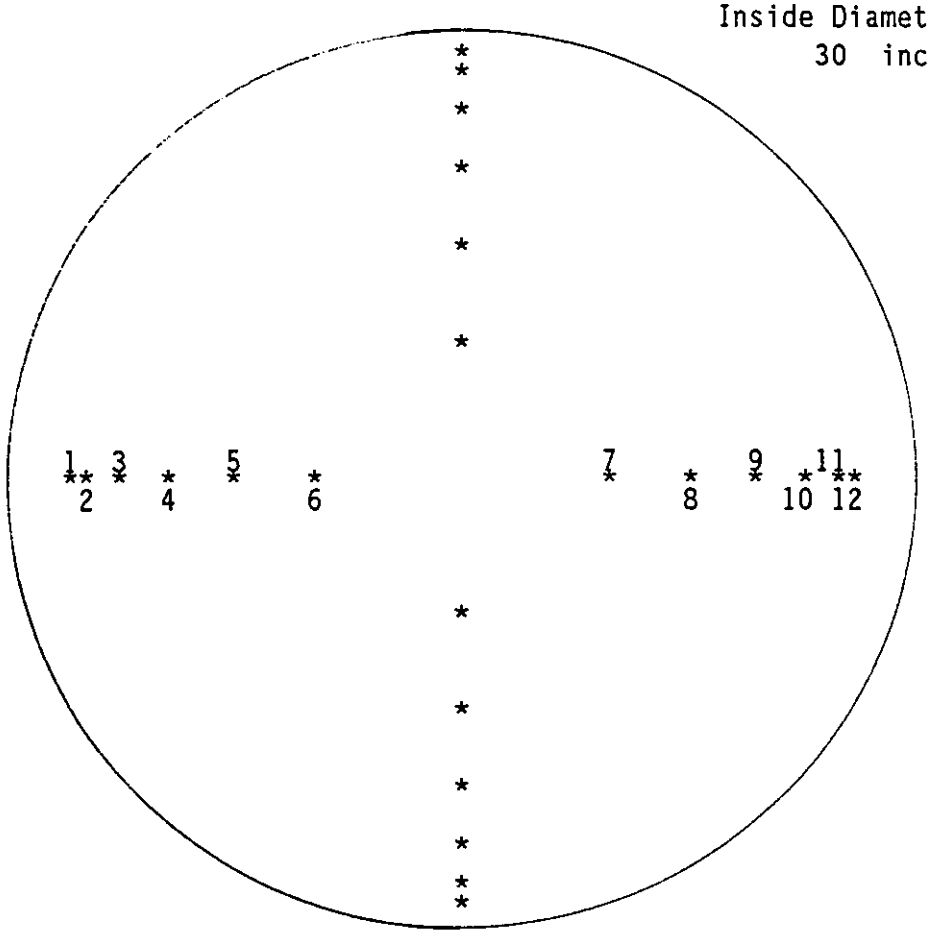
SAMPLE POINT LOCATIONS

U. S. Ceramics Company
East Sparta, Ohio
#5 Fast Fire Kiln

Inside Diameter:
30 inches



Point #	Distance From Inside Wall	Point #	Distance From Inside Wall
1	29.0 inches	7	10.7 inches
2	28.0 inches	8	7.5 inches
3	26.5 inches	9	5.3 inches
4	24.7 inches	10	3.5 inches
5	22.5 inches	11	2.0 inches
6	19.3 inches	12	1.0 inches

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SAMPLING TRAIN DIAGRAM

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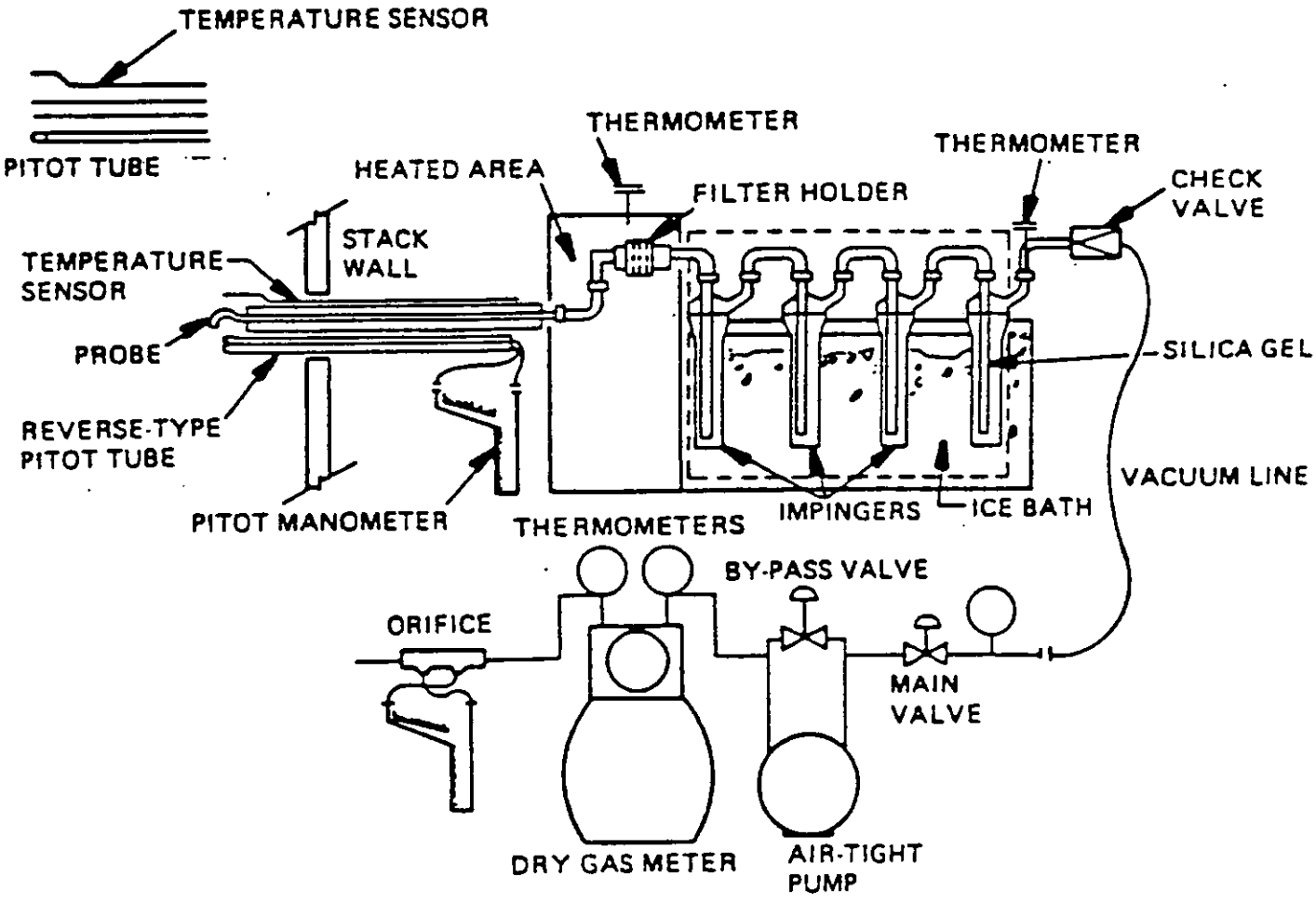
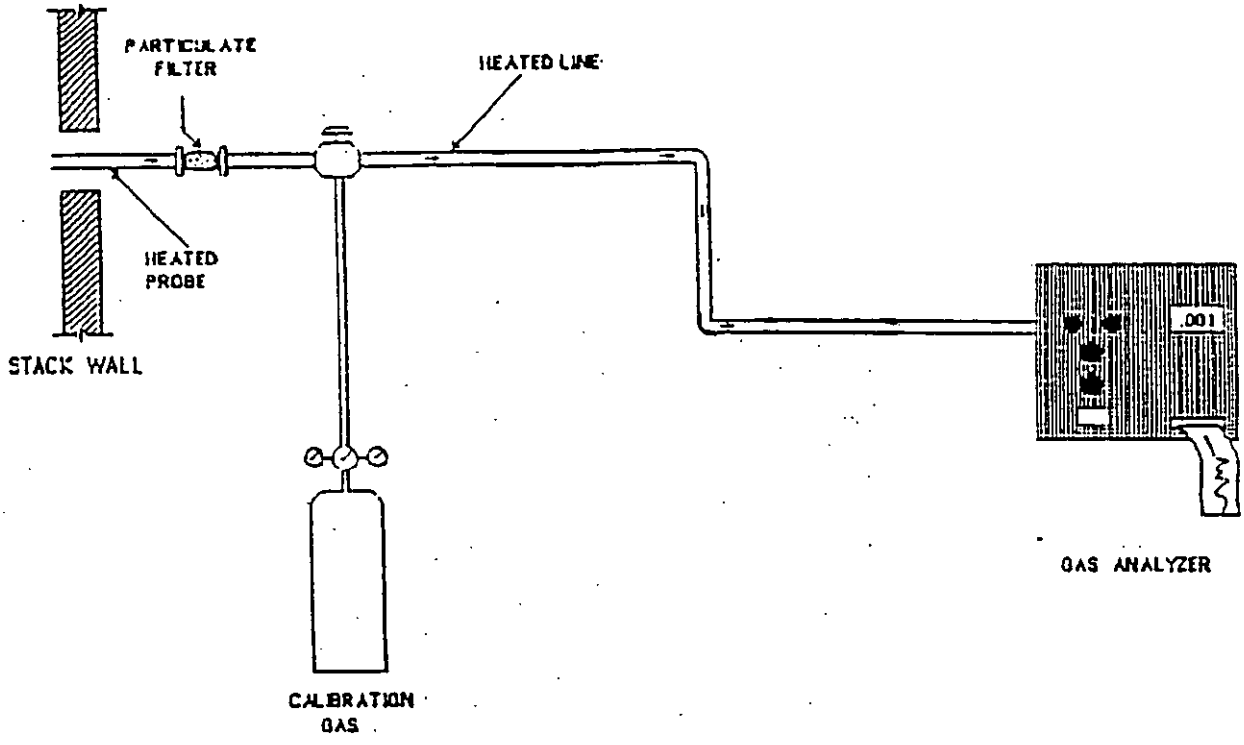
EPA METHOD 5 PARTICULATE SAMPLE TRAIN



EPA CONSTANT EMISSION MONITOR SAMPLE TRAIN



LABORATORY SECTION

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Phone (216) 526-0990

LABORATORY SUMMARY SHEET

US Ceramics

#5 Fast Fire Kiln Exhaust

Particulate, Nitrogen Oxides and Hydrogen Fluorides Emission Evaluation

	DATE: August 11, 1993	Symbol	Units	RUN # 1	RUN # 2	RUN # 3
1	Sampling Time	t	minutes	60.0	60.0	60.0
2	Barometric Pressure	Pb	in. Hg	28.85	28.85	28.85
3	Static Pressure	Pg	in. H2O	-0.05	-0.05	-0.05
	Stack Pressure	Ps	in. Hg	28.85	28.85	28.85
4	Gas Meter Volume	Vm	cu. ft.	41.21	39.51	40.81
5	Stack Area	A	sq. ft.	4.91	4.91	4.91
6	Nozzle Diameter	Dn	dec. in.	0.375	0.375	0.375
7	Meter Temperature		degrees F	101.5	109.0	120.0
		Tm	degrees R	561.5	569.0	580.0
8	Stack Temperature		degrees F	320.0	320.0	319.0
		Ts	degrees R	780.0	780.0	779.0
9	Velocity Head	^P	in. H2O	0.292	0.280	0.285
10	Orifice Pressure	^H	in. H2O	1.15	1.05	1.10
11	Carbon dioxide	CO2	%	1.0	1.0	1.1
12	Oxygen	O2	%	19.0	19.0	19.0
13	Carbon monoxide	CO	%	0.0	0.0	0.0
14	Nitrogen	N2	%	80.0	80.0	79.9
15	Pitot Coefficient	Cp		0.84	0.84	0.84
16	Water Collected	Vlc	ml	50.5	51.9	33.1
	Sample Weight:	Mn				
17	- Particulate		g	0.0054	0.0060	0.0043
18	- Hydrogen Fluorides		mg	9.31	7.84	3.45
19	- Nitrogen Oxides		ppm	14.33	14.95	14.58

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LABORATORY SUMMARY SHEET

US Ceramics

#5 Fast Fire Kiln Exhaust

Sulfur Dioxide Emission Evaluation

DATE: August 11, 1993	Symbol	Units	RUN # 1	RUN # 2	RUN # 3
1 Sampling Time	t	minutes	60.0	60.0	60.0
2 Barometric Pressure	Pb	in. Hg	28.85	28.85	28.85
3 Static Pressure	Pg	in. H2O	-0.05	-0.05	-0.05
Stack Pressure	Ps	in. Hg	28.85	28.85	28.85
4 Gas Meter Volume	Vm	cu. ft.	39.97	41.28	40.96
5 Stack Area	A	sq. ft.	4.91	4.91	4.91
6 Meter Temperature		degrees F	87.5	102.4	108.6
	Tm	degrees R	547.5	562.4	568.6
7 Orifice Pressure	^H	in. H2O	1.21	1.21	1.21
8 Carbon dioxide	CO2	%	1.0	1.0	1.1
9 Oxygen	O2	%	19.0	19.0	19.0
10 Carbon monoxide	CO	%	0.0	0.0	0.0
11 Nitrogen	N2	%	80.0	80.0	79.9
12 Pitot Coefficient	Cp		0.84	0.84	0.84
Water Collected	ml		14.4	13.1	17.3
13 Gas Volume-dry,std.	Vmstd	cu. ft.	37.28	37.48	36.79
14 Condensate Vapor Vol.	Vwstd	cu. ft.	0.68	0.62	0.81
15 Gas Stream Moisture	Bws	vol.dec	0.0179	0.0162	0.0217
16 Mol.Wt-flue gas (dry)	Msd	lb/lb mo.	28.92	28.92	28.94
17 Mol.Wt-flue gas (wet)	Ms	lb/lb mo.	28.73	28.75	28.70

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PLANT U.S. Ceramics

DATE August 11, 1993

RUN NO. 1

CASE NO. 48

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED			
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN	
936	0.6031	0.6015	0.0016	FILTER
N/A	N/A	N/A	N/A	IMPINGERS
51	100.3324	100.3286	0.0038	PROBE *

* Corrected for Acetone Blank

VOLUME OF LIQUID WATER COLLECTED			
	IMPINGER VOLUME (ml)	SILICA GEL WEIGHT (g)	
FINAL	245	236.7	
INITIAL	200	231.2	
NET LIQUID COLLECTED	45	5.5	
TOTAL NET VOLUME	50.5	g *	ml

* Convert weight of water to volume by dividing weight increase by density of water:

$$\frac{\text{Increase g}}{(1\ \text{g/ml})} = \text{Volume Water, ml}$$

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PLANT U.S. Ceramics

DATE August 11, 1993

RUN NO. 2

CASE NO. 64

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED			
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN	
802	0.5912	0.5903	0.0009	FILTER
N/A	N/A	N/A	N/A	IMPINGERS
94	101.5882	101.5831	0.0051	PROBE *

* Corrected for Acetone Blank

VOLUME OF LIQUID WATER COLLECTED			
	IMPINGER VOLUME (ml)	SILICA GEL WEIGHT (g)	
FINAL	245	238.1	
INITIAL	200	231.2	
NET LIQUID COLLECTED	45	6.9	
TOTAL NET VOLUME	51.9	g *	ml

* Convert weight of water to volume by dividing weight increase by density of water:

$$\frac{\text{Increase g}}{(1\ \text{g/ml})} = \text{Volume Water, ml}$$

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PLANT	U.S. Ceramics
DATE	August 11, 1993
RUN NO.	3
CASE NO.	81

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED			
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN	
830	0.5871	0.5865	0.0006	FILTER
N/A	N/A	N/A	N/A	IMPINGERS
411	100.0740	100.0703	0.0037	PROBE *

* Corrected for Acetone Blank

VOLUME OF LIQUID WATER COLLECTED			
	IMPINGER VOLUME (ml)	SILICA GEL WEIGHT (g)	
FINAL	230	234.3	
INITIAL	200	231.2	
NET LIQUID COLLECTED	30	3.1	
TOTAL NET VOLUME	33.1	g *	ml

* Convert weight of water to volume by dividing weight increase by density of water:

$$\frac{\text{Increase g}}{(1\ \text{g/ml})} = \text{Volume Water, ml}$$

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ORSAT ANALYSIS WORK SHEET

DATE: 8-11-93

LOCATION: US Ceramics #5 Fast Fire Kiln

OPERATOR: E.H.

RUN # 1

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2	1.0	1.0	1.1	1.1	1.0	1.0	1.03
O_2	20.0	19.0	20.1	19.0	20.0	19.0	19.0
CO	20.0	0	20.1	0	20.0	0	0

RUN # 2

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2	1.1	1.1	1.0	1.0	1.0	1.0	1.03
O_2	20.1	19.0	20.0	19.0	20.0	19.0	19.0
CO	20.1	0	20.0	0	20.0	0	0

RUN # 3

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2	1.1	1.1	1.1	1.1	1.1	1.1	1.1
O_2	20.1	19.0	20.1	19.0	20.1	19.0	19.0
CO	20.1	0	20.1	0	20.1	0	0

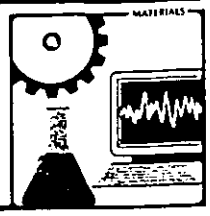
COMMENTS: _____

FEAT2

Envisage Environmental Incorporated

ANALYTICAL SERVICES
SINCE 1945
Division of Rexham Industries Corp.

MATERIALS LABORATORY
7650 HUB PARKWAY, CLEVELAND, OHIO 44125
PHONE: (216) 447-1550 FAX: (216) 447-0716



Envisage Environmental
6940 Miller Rd.
Brecksville, OH 44141

Attn: Frank Hezoucky

AUG 27

Date: 26 August 1993
Report#: 08243-4
Lab#: 11436-11438
PO#:

Client Description: Liquid J/N 93-1745

Parameter Units in mg/l	Sample ID Run #1	Sample ID Run #2	Sample ID Run #3
HF	38.0	32.0	15.0

..SL ANALYTICAL SERVICES CERTIFIES THE ABOVE ANALYSIS TO BE THE TRUE RESULTS ON THE DESIGNATED SAMPLES.

Steven M. Podolan

REPORTING OFFICER

Steven M. Podolan

EMISSION SAMPLING EQUIPMENT SPECIFICATIONS

Envisage Environmental Incorporated
P.O. Box 152 Richfield, Ohio 44286
Phone (216) 526-0990

Control Unit (meter box)	Equipment Designation
__Envisage Environmental Inc.	Control Unit #'s MB 08 & 09
X Andersen Samplers	Control Unit #'s MB 01 - 02
__Remanufactured RAC	Control Unit #'s MB 03 - 07
__DuPont Constant Flow Pumps	Control Unit #'s MB 01 - 05

Sample Box	
X EEI	SB 01, 02 & 05 - 07
__Remanufactured RAC	SB 03 & 04
__EEI Special Design	SB 08 - 11

Impingers - per sample train (each set changed for each test run)

X EEI	3 Modified Smith Greenburg type
X EEI	1 Smith Greenburg type

Probes	length	lining type
__EEI	2 foot	SS, PYREX, QUARTZ
X EEI	3 foot	SS, PYREX, QUARTZ
__EEI	5 foot	SS, PYREX, QUARTZ
__EEI	3 foot	SS, PYREX, QUARTZ
__EEI	7 foot	SS, PYREX, QUARTZ
__EEI	10 foot	SS, PYREX, QUARTZ
__EEI	12 foot	SS, PYREX, QUARTZ
__EEI	15 foot	SS, PYREX, QUARTZ
__EEI	24 foot	SS, PYREX, QUARTZ

Temperature Sensors	Equipment Designation
__Omega Engineering	PY 01 & 02
__Thermo Electric	PY 03 - 08
X Fluke 51	PY 01 - 05
__Fisher Scientific	Mercury in Glass
__Fisher Scientific	Bimetallic

Pressure Gauges	Type
X Dwyer Incline Manometer	Oil, 0 - 10 in. water
__Dwyer Magnehelic	Magnetic/Mechnical 0 - 1 in. water
__Dwyer Magnehelic	Magnetic/Mechnical 0 - 10 in. water
__Dwyer "U" Tube Manometer	Mercury, 36 inches
__Dwyer "U" Tube Manometer	Water, 72 inches
__Dwyer Microtector (micro-manometer)	Water, 0 - 10 inches of water
__Davis Electromanometer	Electric, .001 - .100 in. water

Chemicals and Reagents	
X 3% H_2O_2	Deionized/Distilled
X 80% IPA	Reagent Grade (<0.001% residual)
X Silica Gel	6 - 16 Mesh
X Stopcock Grease	Acetone insoluble & heat resistant
__Acetone	Reagent Grade
__5% Sodium Hydroxide	Mixed

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Control Unit (meter box)	Equipment Designation
__Envisage Environmental Inc.	Control Unit #'s MB 08 & 09
_X_Andersen Samplers	Control Unit #'s MB 01 - 02
__Remanufactured RAC	Control Unit #'s MB 03 - 07
__DuPont Constant Flow Pumps	Control Unit #'s MB 01 - 05

Sample Box	
_X_EEI	SB 01, 02 & 05 - 07
__Remanufactured RAC	SB 03 & 04
__EEI Special Design	SB 08 - 11

Impingers - per sample train (each set changed for each test run)

_X_EEI	3 Modified Smith Greenburg type
_X_EEI	1 Smith Greenburg type

Probes	length	lining type
__EEI	2 foot	SS, PYREX, QUARTZ
_X_EEI	3 foot	SS, PYREX, QUARTZ
__EEI	5 foot	SS, PYREX, QUARTZ
__EEI	7 foot	SS, PYREX, QUARTZ
__EEI	10 foot	SS, PYREX, QUARTZ
__EEI	12 foot	SS, PYREX, QUARTZ
__EEI	15 foot	SS, PYREX, QUARTZ
__EEI	24 foot	SS, PYREX, QUARTZ

Temperature Sensors	Equipment Designation
__Omega Engineering	PY 01 & 02
__Thermo Electric	PY 03 - 08
_X_Fluke 51	PY 01 - 05
__Fisher Scientific	Mercury in Glass
__Fisher Scientific	Bimetallic

Pressure Gauges	Type
_X_Dwyer Incline Manometer	Oil, 0 - 10 in. water
__Dwyer Magnehelic	Magnetic/Mechnical 0 - 1 in. water
__Dwyer Magnehelic	Magnetic/Mechnical 0 - 10 in. water
__Dwyer "U" Tube Manometer	Mercury, 36 inches
__Dwyer "U" Tube Manometer	Water, 72 inches
__Dwyer Microtector (micro-manometer)	Water, 0 - 10 inches of water
__Davis Electromanometer	Electric, .001 - .100 in. water

Chemicals and Reagents	
_X_Water	Deionized/Distilled
_X_Acetone	Reagent Grade (<0.001% residual)
_X_Silica Gel	6 - 16 Mesh
_X_Stopcock Grease	Acetone insoluble & heat resistant
__Nitric Acid	Reagent Grade
__.1 N Sulfuric Acid	Reagent Grade
__Methylene Chloride	Reagent Grade
__5% HNO_3 / 10% H_2O_2	Reagent Grade
__Sodium Hydroxide	Reagent Grade
__$KMNO_4$ /Sodium Hydroxide	

Envisage Environmental Incorporated
P.O. Box 152 Richfield, Ohio 44286
Phone (216) 526-0990

FIELD DATA SHEETS

Envisage
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Phone (216) 526-0990

FIELD DATA

PLANT U.S. Ceramics

DATE 8-11-93

SAMPLING LOCATION #5 Fast Fire Kiln

SAMPLE METHOD 1-6, 13A, 7

OPERATOR E.H.

AMBIENT TEMPERATURE 80's

BAROMETRIC PRESSURE 28.85

STATIC PRESSURE -.05"

PROBE LENGTH 3'

NOZZLE I.D. .375"

ASSUMED MOISTURE 2%

METER BOX NUMBER #6

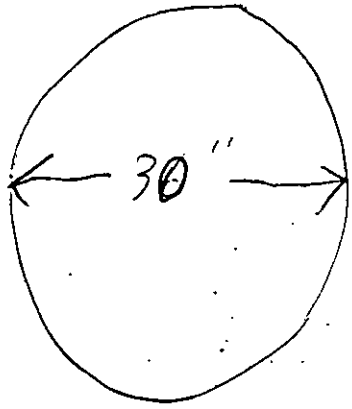
METER ΔH@ 1.45"

C FACTOR .9

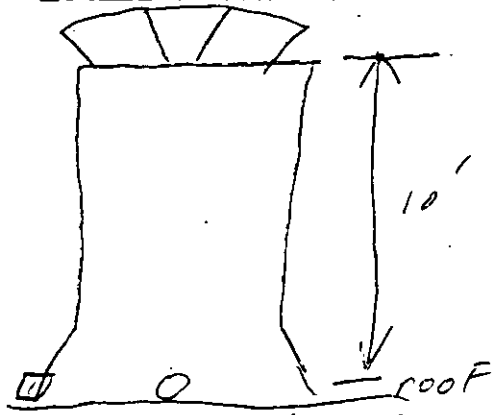
PITOT CORRECTION FACTOR .84

HEATER BOX SETTING 248 ± 25°

TRAVERSE POINT DIAGRAM



LOCATION SKETCH



TEST TEAM MEMBERS G.S., P.S., D.D., T.A., E.H.

PLANT U.S. Ceramics DATE 8-11-93 RUN # 1 CASE # 7 LOCATION 75 Foot Fire Kiln page 1 of 1

POINT NUMBER	SAMPLE TIME	GAS METER READING	VELOCITY Δp	VELOCITY HEAD √Δp	ORIFICE PRESSURE	STACK TEMP	GAS METER TEMP IN	GAS METER TEMP OUT	PUMP VACUUM	FILTER HOLDER	IMPINGER TEMP
	0 (9:22)	567.11	.08	.283	1.1	316	90	88	1.0	237	53
2	25	568.84	.07	.265	.94	319	94	90	1.0	240	53
3	5	570.32	.08	.253	1.1	321	100	90	1.0	244	53
4	25	572.25	.085	.292	1.15	321	102	92	1.0	250	53
5	10	573.89	.085	.297	1.15	324	104	92	1.0	249	53
6	125	575.61	.09	.300	1.2	323	105	92	1.0	251	53
7	15	577.25	.09	.300	1.2	322	106	92	1.0	246	53
8	175	579.12	.1	.316	1.3	320	108	94	1.0	247	53
9	20	581.00	.11	.332	1.45	319	109	94	1.0	243	53
10	225	582.90	.125	.354	1.65	321	111	95	1.0	252	53
11	25	585.00	.125	.354	1.65	323	112	95	1.0	247	53
12	275	586.92	.13	.361	1.7	320	114	97	1.0	249	53
1	30	589.11	.07	.265	.94	316	109	95	1.0	250	53
2	325	590.79	.07	.265	.94	321	112	96	1.0	252	53
3	35	591.95	.06	.245	.80	319	112	98	1.0	253	53
4	375	593.70	.06	.245	.90	322	113	99	1.0	247	53
5	40	595.07	.065	.255	.95	324	110	98	1.0	248	53
6	425	596.71	.07	.265	.94	322	110	95	1.0	244	53
7	45	598.11	.07	.265	.94	321	110	100	1.0	253	53
8	475	597.67	.08	.283	1.1	319	109	100	1.0	255	53
9	50	601.57	.09	.300	1.2	319	109	100	1.0	253	53
10	525	603.11	.09	.300	1.2	315	109	100	1.0	249	53
11	55	604.85	.09	.300	1.2	316	109	100	1.0	249	53
12	575	606.61	.095	.292	1.15	316	110	100	1.0	246	53
	60 (10:23)	608.32									

SAMPLE TRAIN LEAK CHECKS
PRE-TEST 0 CFM @ 15 "Hg POST-TEST 0 CFM @ 7 "Hg

PITOT TUBE LEAK CHECKS
PRE-TEST #2 0 @ 6.5
#1 0 @ 6.7
POST-TEST #2 0 @ 6.3
#1 0 @ 6.1

41.21 .292 1.15 320 101.5

33

31

methat 5

static
-.05

PLANT U.S. Ceramics DATE 8-11-93 RUN 2 CASE# 84 LOCATION #5 Feed Kiln page 1 of 1

POINT NUMBER	SAMPLE TIME	GAS METER READING	VELOCITY Δp	VELOCITY HEAD √Δp	ORIFICE PRESSURE	STACK TEMP	GAS METER TEMP IN	GAS METER TEMP OUT	PUMP VACUUM	FILTER HOLDER	IMPINGER TEMP
1.	0/10:41	608.71	.06	.245	.80	314	100	98	1.0	239	55
2.	2.5	610.34	.05	.224	.66	318	104	100	1.0	242	55
3	5	611.68	.05	.224	.66	321	109	101	1.0	244	55
4	7.5	613.00	.06	.245	.80	319	110	102	1.0	251	55
5	10	614.54	.06	.245	.80	319	111	102	1.0	249	55
6	12.5	616.00	.06	.245	.80	320	111	102	1.0	248	55
7	15	617.41	.065	.255	.85	322	111	103	1.0	250	55
8	17.5	618.97	.065	.255	.85	322	112	102	1.0	253	55
9	20	620.47	.07	.265	.94	321	112	102	1.0	251	55
10	22.5	622.01	.07	.265	.94	320	112	103	1.0	251	55
11	25	623.63	.08	.283	1.1	322	113	103	1.0	248	55
12	27.5	625.25	.09	.300	1.2	324	114	103	1.0	245	55
1	30	627.02	.08	.283	1.1	314	110	100	1.0	250	55
2	32.5	628.71	.09	.300	1.2	317	115	102	1.0	252	55
3	35	630.52	.1	.316	1.3	321	117	103	1.0	252	55
4	37.5	632.09	.1	.316	1.3	321	117	103	1.0	254	55
5	40	633.91	.1	.316	1.3	320	118	105	1.0	244	55
6	42.5	635.52	.095	.308	1.25	318	118	105	1.0	247	55
7	45	637.62	.095	.308	1.25	319	114	104	1.0	251	55
8	47.5	639.41	.10	.316	1.3	318	120	109	1.0	253	55
9	50	641.26	.1	.316	1.3	320	121	109	1.0	255	55
10	52.5	643.11	.09	.300	1.2	324	123	110	1.0	256	55
11	55	645.00	.09	.300	1.2	324	124	110	1.0	249	55
12	57.5	646.65	.104	.283	1.1	323	125	110	1.0	246	55
	60/1:44	648.22									

SAMPLE TRAIN LEAK CHECKS
PRE-TEST 0 CFM @ 15 "Hg POST-TEST 0 CFM @ 9 "Hg

PITOT TUBE LEAK CHECKS
PRE-TEST #2 OK 6.1 POST-TEST #2 OK 6.7
#4 OK 6.5 #4 OK 6.7

(39.51) (.280) (1.05) (320) (109)

34

32

melhat 5

PLANT U.S. Ceramics DATE 8-11-93 RUN# 3 CASE# 1 LOCATION #5 Fast Fire Kiln page 1 of 1

POINT NUMBER	SAMPLE TIME	GAS METER READING	VELOCITY Δp	VELOCITY HEAD √Δp	ORIFICE PRESSURE	STACK TEMP	GAS METER TEMP IN	GAS METER TEMP OUT	PUMP VACUUM	FILTER HOLDER	IMPINGER TEMP
1	0/12:02	648.64	.06	.245	.80	310	110	106	1.0	245	58
2	2.5	650.20	.07	.265	.94	316	112	110	1.0	250	58
3	5	651.69	.07	.265	.94	319	118	110	1.0	252	58
4	7.5	653.31	.07	.265	.94	321	119	111	1.0	252	58
5	10	655.00	.08	.283	1.1	320	120	111	1.0	249	58
6	12.5	656.72	.08	.283	1.1	318	124	112	1.0	250	58
7	15	658.41	.09	.300	1.2	319	128	113	1.0	247	58
8	17.5	659.99	.09	.300	1.2	322	129	114	1.0	251	58
9	20	661.92	.08	.283	1.1	324	129	114	1.0	253	58
10	22.5	663.65	.04	.283	1.1	325	124	114	1.0	250	58
11	25	665.37	.10	.316	1.3	325	130	115	1.0	248	58
12	27.5	667.42	.12	.346	1.6	322	130	115	1.0	245	58
1	30	669.32	.06	.243	.78	314	124	112	1.0	240	58
2	32.5	670.79	.07	.265	.94	316	129	114	1.0	243	58
3	35	672.51	.06	.243	.80	319	130	115	1.0	245	58
4	37.5	673.92	.06	.243	.80	322	129	116	1.0	247	58
5	40	675.39	.07	.265	.94	322	124	117	1.0	249	58
6	42.5	676.95	.07	.265	.94	320	128	117	1.0	250	58
7	45	678.60	.08	.283	1.1	321	128	117	1.0	252	58
8	47.5	680.40	.08	.283	1.1	318	127	117	1.0	249	59
9	50	682.12	.08	.283	1.1	317	127	117	1.0	246	58
10	52.5	683.85	.08	.283	1.1	317	128	118	1.0	244	58
11	55	685.61	.11	.316	1.3	320	129	119	1.0	240	58
12	57.5	687.51	.11	.316	1.3	321	128	119	1.0	240	58
	60/1:01	689.45									

SAMPLE TRAIN LEAK CHECKS
PRE-TEST @ 15 in Hg 14 cfm POST-TEST @ 15 in Hg 9 cfm

PITOT TUBE LEAK CHECKS
PRE-TEST #2 @ 6.1 POST-TEST #2 @ 5.9
#1 @ 6.3 #1 @ 5.8

(40.81) (.285) (1.1) (319.5) (120)

33

melhat 5

PLANT US Ceramic DATE 8-11-93 RUN 1 CASE #49 LOCATION #5 Kiln Exhaust

Sample Time	Gas Meter Reading	Flow Rate Setting	Gas Meter Temperature In	Gas Meter Temperature Out	Pump Vacuum	Impinger Temperature
0/9:22	781.17	1.21	79	79	3.0	60
5	783.44		82	76	3.0	60
10	786.65		87	75	3.0	58
15	790.09		92	76	3.0	58
20	793.28		94	76	3.0	58
25	796.69		97	79	3.0	58
30	800.42		99	81	3.0	60
35	803.79		100	82	3.0	60
40	807.14		101	82	3.0	60
45	810.63		102	83	3.0	60
50	814.13		103	84	3.0	60
55	817.62		105	86	3.0	58
60/10:23	821.14		--			
	39.97		~~95.08~~	~~79.72~~		
			87.5			

System Leak Checks: Pre-Test 0 CFM @ 15 "Hg
Post-Test 0 CFM @ 12 "Hg

Purge 821.22 – 826.78

method 8.4 36

PLANT U.S. Ceramics DATE 8-11-93 RUN 2 CASE #99 LOCATION #5 Kiln ~~Exhaust~~

Sample Time	Gas Meter Reading	Flow Rate Setting	Gas Meter Temperature In	Gas Meter Temperature Out	Pump Vacuum	Impinger Temperature
0/10:41	826.90	1.21	99	91	3.0	61
5	830.30		107	90	3.0	61
10	833.73		110	91	3.0	59
15	837.21		111	92	3.0	59
20	840.62		111	92	3.0	58
25	844.07		111	92	3.0	58
30	847.57		113	93	3.0	60
35	851.02		113	94	3.0	60
40	854.60		114	95	3.0	60
45	857.90		116	96	3.0	60
50	861.45		116	97	3.0	61
55	864.80		116	98	3.0	61
60/11:43	868.18		--			
	41.28			102.4		

System Leak Checks: Pre-Test 0 CFM @ 13 "Hg
Post-Test 0 CFM @ 11 "Hg

Purge 868.30 — 874.90

method #4

PLANT U.S. Ceramic DATE 8-11-93 RUN # 3 CASE # 21 LOCATION #5 Kiln Exhaust

Sample Time	Gas Meter Reading	Flow Rate Setting	Gas Meter Temperature In	Gas Meter Temperature Out	Pump Vacuum	Impinger Temperature
0/12:02	875.00	1.21	97	98	2.0	60
5	877.64		112	99	2.0	60
10	880.97		116	99	2.0	59
15	884.47		117	100	2.0	58
20	887.97		119	100	2.0	59
25	891.48		119	101	2.0	59
30	894.97		119	101	2.0	59
35	898.46		120	101	2.0	59
40	901.96		119	102	2.0	60
45	905.45		120	102	2.0	60
50	908.99		120	102	2.0	60
55	912.45		121	102	2.0	60
60/	915.96		--			
	40.96			108.6		

System Leak Checks: Pre-Test 0 CFM @ 15 "Hg
Post-Test 0 CFM @ 13 "Hg

purge 916.16 - 921.90

STRIP CHART RECORDINGS

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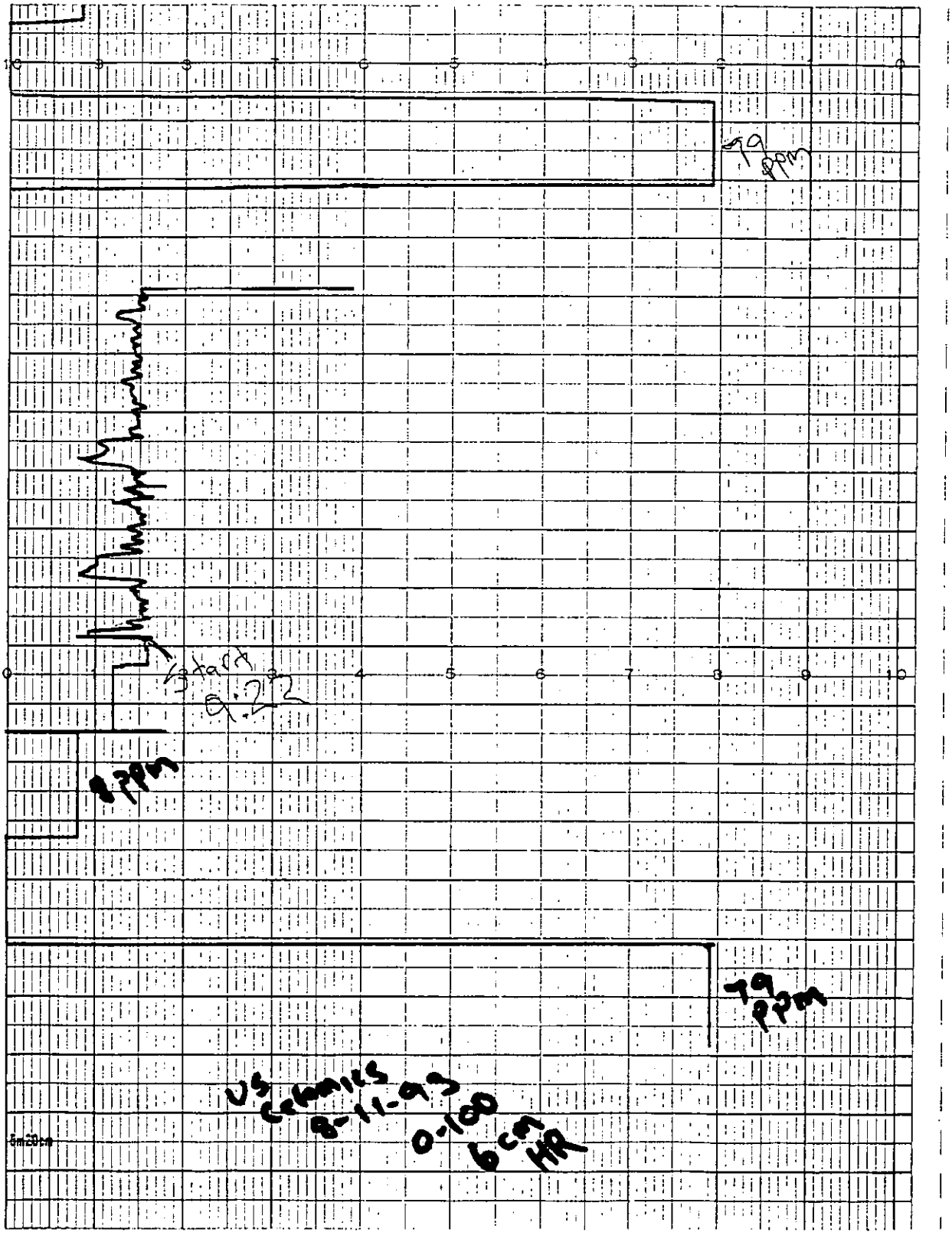
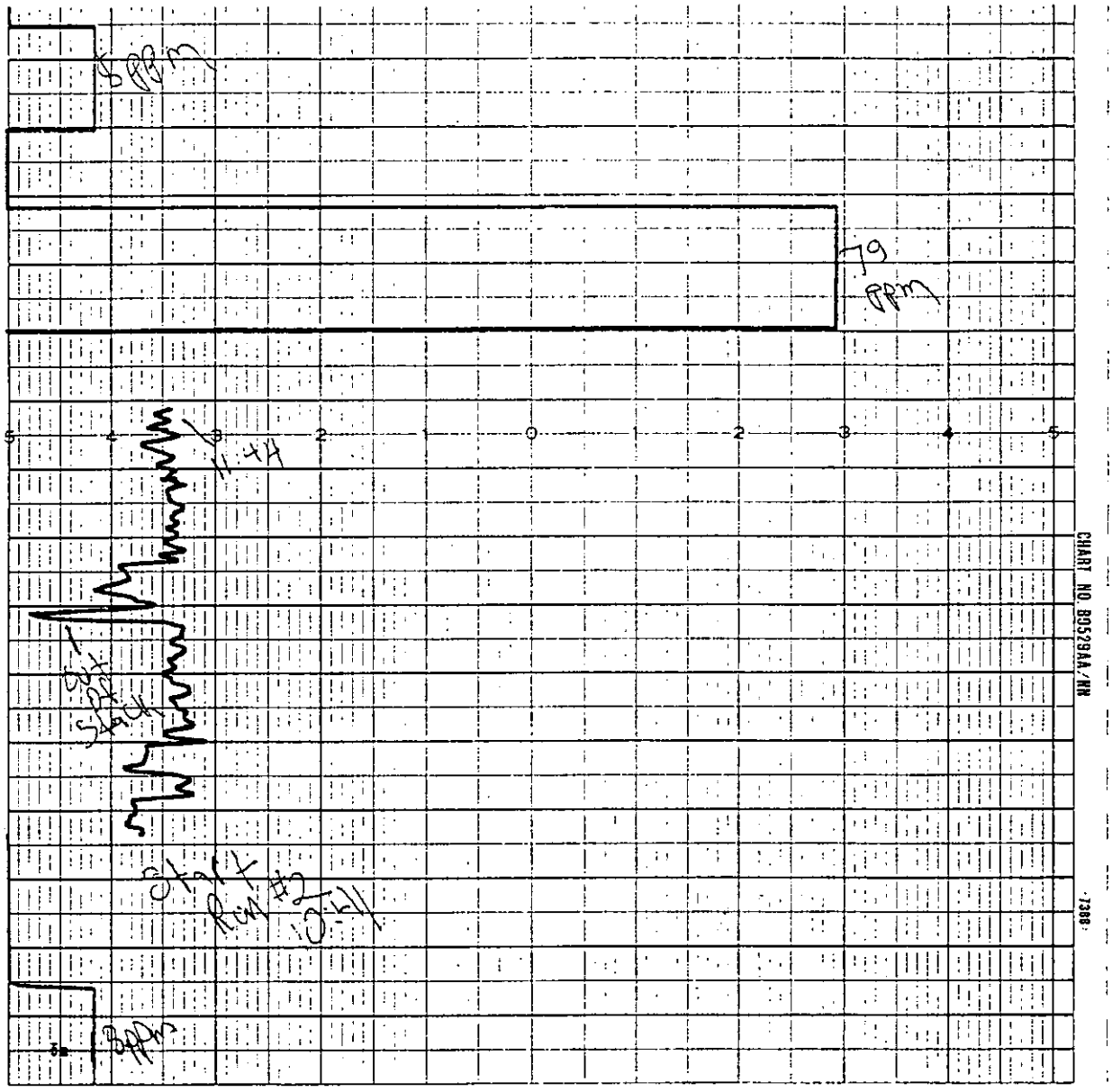
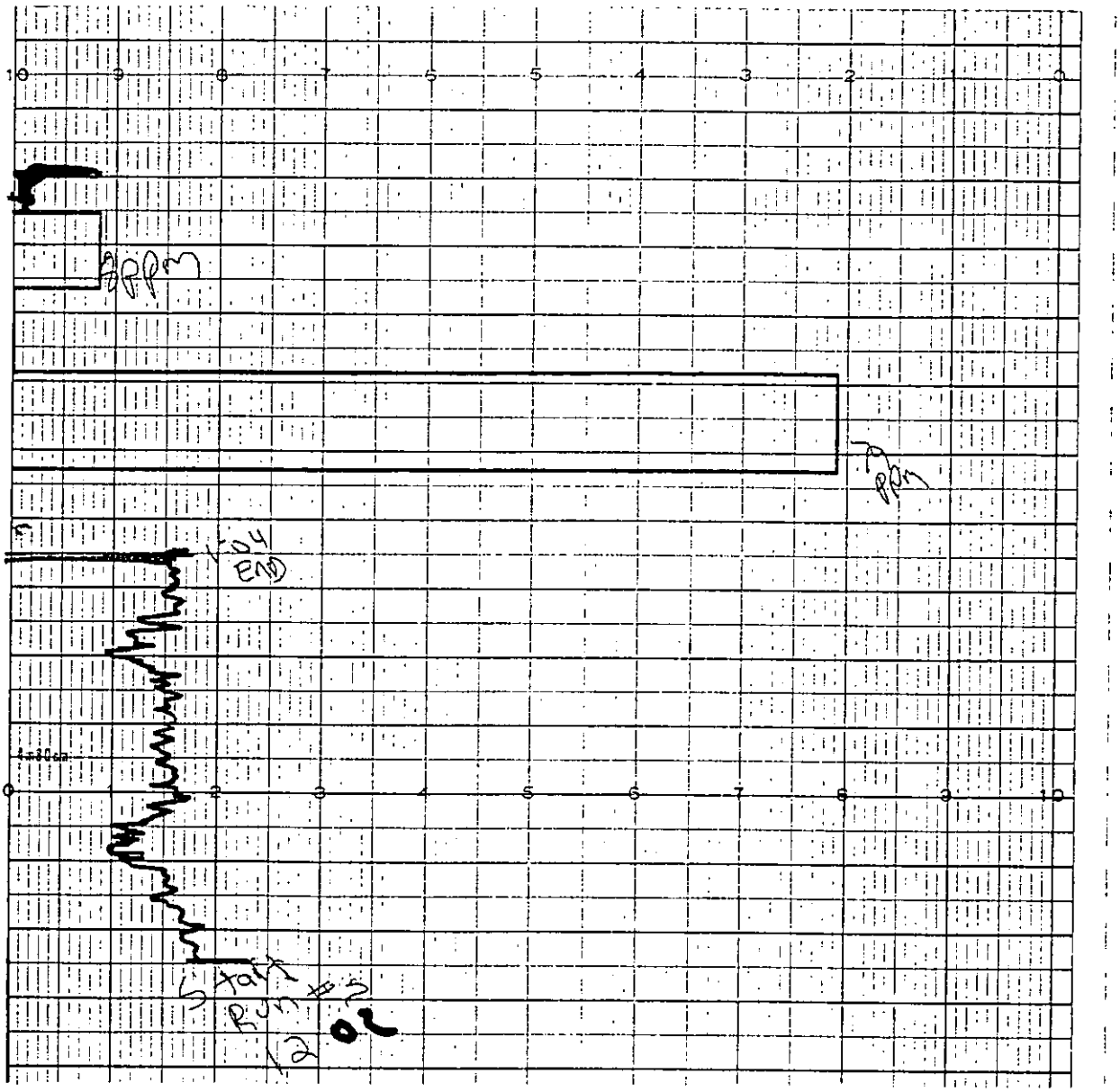

79 ppm
79 ppm
US Geomics
8-11-93
0-100
6 cm
HR


5 PPM
79 PPM
5
4
3
2
1
0
1
2
3
4
5
11:44
Start
Run #2
10:41
5 PPM
CHART NO. B0529AA/RN
-7366-


10
9
8
7
6
5
4
3
2
1
0
APP3
APP
1-04
END
0
1
2
3
4
5
6
7
8
9
10
START
RUN #2
12 OZ

CALIBRATION SECTION

Envisage
Environmental
Incorporated
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Phone (216) 526-0990

CALIBRATION FREQUENCY

The frequency of calibration is dictated by the Code of Federal Regulations, Volume 42, Number 160, August 18, 1977. The regulations state that you must "use methods and equipment which have been approved by the Administrator to calibrate the orifice meter, pitot tube, dry gas meter, and probe heater. Recalibrate after each test".

The methods of calibration are determined from "maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment," published by the U.S.EPA Office of Air Program Publications APTD-0576. Per the above listed regulations, the equipment was checked after the stack test and values of Y, Cp(Test), and nozzle diameter had not appreciably changed from the acceptable tolerances.

NOZZLE DIAMETER CALIBRATION

I.D. of nozzles are checked immediately prior to and immediately following the stack test. If the prior deviation exceeds $\pm$.001 inches on an average or $\pm$.002 inches maximum, the nozzle is reworked.

BAROMETER CALIBRATION

The aneroid barometers used by Envisage are calibrated to our mercury in glass barometer which is NBS traceable. Calibration occurs before and after each field use.

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METER BOX CALIBRATION

Meter Box Number: RAC #6

Calibration Date: June 29, 1993

$$Y = \frac{V_t \; P_b \; (T_m + 460)}{V_m \left[P_b + \frac{\Delta H}{13.6} \right] (T + 460)}$$

$$\Delta H_@ = \frac{0.0317 \; \Delta H}{P_b \; (Tm + 460)} \left[\frac{(T_t + 460) \; t}{V_t} \right]$$

Delta H (^H)	in. H2O	0.5	1.0	3.0	5.0	7.0
Pres.Barometer (P_b)	in. Hg	29.45	29.45	29.45	29.45	29.45
Vol.Meter Box (V_m)	cu. ft.	4.456	6.425	11.052	14.277	16.853
Vol.Test Meter(V_t)	cu. ft.	4.476	6.286	10.836	13.958	16.441
Temp. Meter Box (T_m)	^oF	83.0	89.3	95.4	98.2	103.8
	^oR	543.0	549.3	555.4	558.2	563.8
Temp. Test Meter (T_t)	^oF	81.0	81.0	81.0	81.0	81.0
	^oR	541.0	541.0	541.0	541.0	541.0
Time (t)	minutes	10.0	10.0	10.0	10.0	10.0
METER FACTOR (Y)		1.007	0.991	0.999	0.996	0.999
- Average				1.00		
METER COEFFICIENT ($^H_@$)		1.448	1.451	1.449	1.448	1.447
- Average				1.45		

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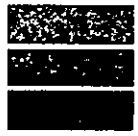
THERMOCOUPLE CALIBRATION

DATE: July 6, 1993

Type: K Sensor #	low Reading	Ref	Medium Reading	Ref	High Reading	Ref	Average Deviation
1	45	45	84	84	172	172	0
2	45	45	84	84	172	172	0
3	48	48	86	86	174	174	0
4	48	49	86	86	178	178	0.33
5	48	48	87	88	187	187	0.67
6	49	49	87	87	191	191	0
7	47	47	87	87	169	170	0.33
8	47	47	87	87	155	155	0
9	46	46	90	90	165	165	0
10	48	48	90	90	165	165	0
11	49	49	91	91	185	184	0.33
12	49	49	91	91	176	176	0
13	50	50	89	89	175	175	0
14	51	51	89	89	174	174	0
15	50	50	84	84	174	174	0
16	53	53	85	85	172	172	0
17	48	49	85	85	170	170	0.33
18	46	47	82	83	170	170	0.67
19	45	45	81	81	168	169	0.33
20	45	45	84	84	168	168	0
21	47	47	84	85	166	164	0.67
22	47	47	88	88	166	166	0
23	49	49	88	89	171	172	0.67
24	49	49	89	89	171	171	0



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METER BOX CALIBRATION

Meter Box Number: Anderson #1

Calibration Date: June 29,1993

$$Y = \frac{V_t \; P_b \; (T_m + 460)}{V_m \left| P_b + \frac{\Delta H}{13.6} \right| (T + 460)}$$

$$\Delta H_@ = \frac{0.0317 \; \Delta H}{P_b \; (Tm + 460)} \left| \frac{(T_t + 460) \; t}{V_t} \right|$$

Delta H (^H)	in. H2O	0.5	1.0	3.0	5.0	7.0
Pres.Barometer (P_b)	in. Hg	29.45	29.45	29.45	29.45	29.45
Vol.Meter Box (V_m)	cu. ft.	4.880	6.966	12.192	15.961	18.674
Vol.Test Meter(V_t)	cu. ft.	4.768	6.736	11.823	15.266	17.779
Temp. Meter Box (T_m)	^oF	88.0	95.7	100.7	106.9	110.2
	^oR	548.0	555.7	560.7	566.9	570.2
Temp. Test Meter (T_t)	^oF	78.0	78.0	78.0	78.0	78.0
	^oR	538.0	538.0	538.0	538.0	538.0
Time (t)	minutes	10.0	10.0	10.0	10.0	10.0
METER FACTOR (Y)		0.994	0.996	1.003	0.995	0.992
- Average				1.00		
METER COEFFICIENT ($^H_@$)		1.250	1.236	1.193	1.179	1.210
- Average				1.21		

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"S" TYPE PITOT TUBE CALIBRATION

"S" Type Pitot Tube (Probe) # 302 - 3 ft Probe

Calibration Date: July 6, 1993

$$C_p = C_{std} \sqrt{\frac{\Delta p_{std}}{\Delta p_p}}$$ (EPA Equation 2-2)

where:

C_p = Coefficient of Type S pitot tube, dimensionless

C_{std} = Coefficient of Standard Pitot Tube (0.99), dimensionless

Δp_{std} = Velocity head measured by standard pitot tube, inches H_2O

Δp_p = Velocity head measured by Type S pitot tube, inches H_2O

	Δp_{std}	Δp_p	C_p
Side A	0.23	0.32	0.839
Side B	0.23	0.32	0.839
Side A	0.46	0.63	0.846
Side B	0.46	0.63	0.846
Side A	0.82	1.14	0.840
Side B	0.82	1.14	0.840

Average - 0.84

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AIRCO

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Fax: 313-399-2912

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CERTIFICATE OF ANALYSIS - EPA PROTOCOL GAS MIXTURE

CUSTOMER: Weldinghouse Inc.

CYLINDER #: LL11263
CYLINDER PRESSURE: 2000psig
LABORATORY: Royal Oak, MI

CERTIFICATION DATE: 8-10-92
EXPIRATION DATE: 2-10-93
REFERENCE #: 503490

MIXTURE COMPONENT	ACTUAL MIXTURE CONCENTRATION	NIST SRM NO.	NIST SRM SERIAL#	NIST SRM CONC.
Nitric oxide	8.62ppm	2629a	FF28616	19.3ppm

BALANCE GAS: Nitrogen

GAS ANALYZER:
MAKE: Beckman MODEL: 951a SERIAL#: 0100648
PRINCIPAL: Chemiluminescence
LAST MULTIPOINT CALIBRATION DATE: 7-15-92

R=REFERENCE STANDARD Z=ZERO GAS S=SAMPLE GAS

1ST ANALYSIS: DATE 8-3-92 ANALYST MK

1) Z 00.0	R 95.1	S 42.6	CONC (1)	8.65ppm
2) R 95.2	Z 00.0	S 42.6	CONC (2)	8.64ppm
3) R 95.1	S 42.4	Z 00.0	CONC (3)	8.60ppm
			AVE CONC	8.63ppm NO;8.97ppm NOx

2ND ANALYSIS: DATE 8-10-92 ANALYST MK

1) Z 00.0	R 94.9	S 42.6	CONC (1)	8.66ppm
2) R 94.8	Z 00.0	S 42.2	CONC (2)	8.59ppm
3) R 94.7	S 42.2	Z 00.0	CONC (3)	8.60ppm
			AVE CONC	8.62ppm NO;8.95ppm NOx

THIS CALIBRATION STANDARD HAS BEEN CERTIFIED VERSUS EPA TRACEABILITY PROTOCOL NO. 1, PROCEDURE G1, AND ANALYSES PERFORMED PER SECTION 3.0.4.

CERTIFIED CONCENTRATION: 8.62ppm NO; 8.96ppm NOx in nitrogen balance

APPROVED BY Michael E. Kelley
LABORATORY MANAGER

AIRCO

Airco Special Gases
2009 Bellaire Avenue
Royal Oak
Michigan 48067
Telephone: 313-399-8020
Fax: 313-399-2912

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CERTIFICATE OF ANALYSIS - EPA PROTOCOL GAS MIXTURE

CUSTOMER: Weldinghouse Inc.

CYLINDER #: LL10329
CYLINDER PRESSURE: 2000psig
LABORATORY: Royal Oak, MI

CERTIFICATION DATE: 3-27-92
EXPIRATION DATE: 9-27-93
REFERENCE #: 479299

MIXTURE COMPONENT	ACTUAL MIXTURE CONCENTRATION	NIST SRM NO.	NIST SRM SERIAL#	NIST SRM CONC.
Nitric oxide	80ppm	1684b	CLM2161	94.9ppm

BALANCE GAS: Nitrogen

GAS ANALYZER:
MAKE: Beckman MODEL: 951a SERIAL#: 0100648
PRINCIPAL: Chemiluminescence
LAST MULTIPOINT CALIBRATION DATE: 2-14-92

R=REFERENCE STANDARD Z=ZERO GAS S=SAMPLE GAS

1ST ANALYSIS: DATE 3-20-92 ANALYST MK

1) Z 00.0	R 94.9	S 78.0	CONC (1)	78.0ppm
2) R 94.9	Z 00.0	S 78.0	CONC (2)	78.0ppm
3) R 94.9	S 78.0	Z 00.0	CONC (3)	78.0ppm
			AVE CONC	78.0ppm NO/78.3ppm NOx

2ND ANALYSIS: DATE 3-27-92 ANALYST MK

1) Z 00.0	R 95.0	S 78.1	CONC (1)	78.0ppm
2) R 94.9	Z 00.0	S 78.0	CONC (2)	78.0ppm
3) R 94.9	S 78.0	Z 00.0	CONC (3)	78.0ppm
			AVE CONC	78.0ppm NO/78.3ppm NOx

THIS CALIBRATION STANDARD HAS BEEN CERTIFIED VERSUS EPA TRACEABILITY PROTOCOL NO. 1, PROCEDURE G1, AND ANALYSES PERFORMED PER SECTION 3.0.4.

CERTIFIED CONCENTRATION: 78.0ppm NO; 78.3ppm NOx in nitrogen balance

APPROVED BY Michael E. Kelley
LABORATORY MANAGER

EMISSION SAMPLING NOMENCLATURE

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Phone (216) 526-0990

SAMPLING NOMENCLATURE

A	=	Cross sectional area of stack or duct, $ft.^2$.
A_n	=	Cross sectional area of nozzle entry plane, $ft.^2$.
B_{ws}	=	Water vapor in gas stream, proportion by volume.
C	=	Nomograph correction factor, dimensionless.
C_s	=	Concentration of particulate matter in gas stream, dry basis-corrected to standard conditions, gr/dscf.
D_n	=	Nominal diameter of probe nozzle entry plane, in.
E	=	Particulate Emission Rate, lb./hr.
$\hat{}H$	=	Average pressure differential across orifice, in. of H_2O.
$\hat{}H_@$	=	Orifice meter calibration factor, in. of H_2O.
I	=	Percent of isokinetic sampling, %.
K_p	=	Pitot tube constant, 85.49 ft./sec.
M_d	=	Molecular weight of gas, dry basis, lb./lb.-mole.
M_n	=	Total amount of particulate matter collected, g.
M_s	=	Molecular weight of gas, wet basis, lb./lb.-mole.
M_w	=	Molecular weight of water, 18 lb./lb.-mole.
P_{bar}	=	Barometric pressure, in. of H_g.
P_g	=	Pressure differential from gas stream to atmosphere, (static pressure) in. of H_2O.
P_s	=	Absolute gas stream pressure, $(P_{bar} + P_g/13.6)$ in. of H_g.
P_{std}	=	Absolute pressure at standard conditions, 29.92 in. of H_g.
P_w	=	Density of water, 0.0022 lb./ml.

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SAMPLING NOMENCLATURE - continued

$\hat{P}_{avg}$	=	Average of the square roots of the velocity head readings, in. of H_2O.
Q	=	Volumetric flow rate at gas stream conditions, A.C.F.M.
Q_{std}	=	Dry volumetric gas flow rate corrected to standard conditions, D.S.C.F.M.
R	=	Ideal gas constant, 21.85 in. of H_g-ft^3 / °R-lb.-mole.
t	=	Total sampling time, minutes.
T_m	=	Average dry gas meter temperature, °R.
T_s	=	Average absolute gas stream temperature, °R.
T_{std}	=	Standard absolute temperature, 528° rankine.
V_{lc}	=	Volume of water collected in impingers and silica gel, ml.
V_m	=	Volume of gas sample measured at meter box (meter conditions), $ft.^3$.
$V_{m(std)}$	=	Volume of gas sample measured at meter box (corrected to standard conditions), $ft.^3$.
V_s	=	Average gas stream velocity, ft./sec.
$V_{w(std)}$	=	Volume of water vapor in gas sample (standard conditions), $ft.^3$.
13.6	=	Specific gravity of mercury (H_g).
$\%CO_2$	=	Percent by volume of CO_2 in gas stream (dry basis).
$\%O_2$	=	Percent by volume of O_2 in gas stream (dry basis).
%CO	=	Percent by volume of CO in gas stream (dry basis).
$\%N_2$	=	Percent by volume of N_2 in gas stream (dry basis).

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EMISSION SAMPLING CALCULATIONS

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1) Volume of dry gas sampled through meter box at standard conditions,

53

$$V_{m(std)} = V_m \left[\frac{T_{std}}{T_m} \right] \left[\frac{P_b + \frac{\Delta H}{13.6}}{P_{std}} \right]$$

(EPA Equation 5-1)

Where:

$V_{m(std)}$ = Volume of gas sample measured at meter box (corrected to standard conditions), ft^3.

V_m = Volume of gas sample measured at meter box (meter conditions), ft^3.

T_{std} = Standard absolute temperature, 528^o Rankine.

T_m = Average dry gas meter temperature, ^oR.

P_{bar} = Barometric Pressure, in. Hg.

ΔH = Average pressure differential across orifice, in. H_2O.

13.6 = Specific gravity of mercury (Hg).

P_{std} = Absolute pressure at standard conditions, 29.92 in. Hg.

Example: Run 1

V_m = 41.21 ft^3

T_m = 561.5 ^oR

ΔH = 1.15 in. H_2O

P_{bar} = 28.85 in. Hg

$$V_{m(std)} = 41.21 \left[\frac{528.0}{561.5} \right] \left[\frac{28.85 + \frac{1.15}{13.6}}{29.92} \right]$$

$$= 41.21 \quad (0.9403) \quad (0.9670)$$

$$= 37.48 \ ft^3$$

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2) Volume of water vapor collected at standard conditions,

$$V_{w(std)} = V_{lc} \left| \frac{P_w}{M_w} \right| \left| \frac{(R)(T_{std})}{P_{std}} \right|$$

(EPA Equation 5-2)

Where:

$V_{w(std)}$ = Volume of water vapor in gas sample (standard conditions) ft^3.
V_{lc} = Volume of water collected in impingers & silica gel, ml.
P_w = Density of water, 0.0022 lb/ml.
M_w = Molecular weight of water, 18 lb/lb-mole.
R = Ideal gas constant, 21.85 in. Hg-ft^3/ ^oR-lb-mole.
T_{std} = Standard absolute temperature, 528 ^{o} Rankine.
P_{std} = Absolute pressure at standard conditions, 29.92 in. Hg.

Example: Run 1

V_{lc} = 50.5 ml

$$V_{w(std)} = 50.5 \left| \frac{0.0022}{18.0} \right| \left| \frac{(21.85)(528.0)}{29.92} \right|$$

= 2.38 ft^3

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3) Moisture content of gas stream,

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$$

(EPA Equation 5-3)

Where:

B_{ws} = Water vapor in gas stream, proportion by volume.

$V_{w(std)}$ = Volume of water vapor in gas sample (standard conditions) ft^3.

$V_{m(std)}$ = Volume of gas sample measured at meter box (corrected to standard conditions), ft^3.

Example: Run 1

$V_{w(std)}$ = 2.38 ft^3

$V_{m(std)}$ = 37.48 ft^3

$$B_{ws} = \frac{2.38}{37.48 + 2.38}$$

$$= 0.0596$$

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4) Dry Molecular Weight of gas in gas stream,

$M_d = 0.440\ (\%CO_2) + 0.320\ (\%O_2) + 0.280\ (\%N_2 + \%CO)$

(EPA Equation 3-2)

Where:

M_d = Molecular weight of gas, dry basis, lb/lb-mole.

0.440 = Molecular weight of CO_2 divided by 100.

0.320 = Molecular weight of O_2 divided by 100.

0.280 = Molecular weight of N_2 or CO (same for both compounds) divided by 100.

$\%\ CO_2$ = Percent by volume of CO_2 in gas stream (dry basis).

$\%\ O_2$ = Percent by volume of O_2 in gas stream (dry basis).

% CO = Percent by volume of CO in gas stream (dry basis).

$\%\ N_2$ = Percent by volume of N_2 in gas stream (dry basis).

Example: Run 1

$\%\ CO_2$ = 1.0

$\%\ O_2$ = 19.0

% CO = 0.0

$\%\ N_2$ = 80.0

$M_d = 0.440\ (\ 1.0\ ) + 0.320\ (\ 19.0\ ) + 0.280\ (\ 80.0\ )$

$= 0.453 + 6.080 + 22.392$

$= 28.92$ lb/lb-mole

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5) Molecular Weight of gas in gas stream,

$$M_s = M_d (1 - B_{ws}) + M_w (B_{ws})$$

(EPA Equation 2-5)

Where:

M_s = Molecular weight of gas, wet basis, lb/lb-mole.

M_d = Molecular weight of gas, dry basis, lb/lb-mole.

B_{ws} = Water vapor in gas stream, proportion by volume.

M_w = Molecular weight of water, 18 lb/lb-mole.

Example: Run 1

M_d = 28.92 lb/lb-mole

B_{ws} = 0.0596

M_s = 28.92 (1 - 0.0596) + 18 (0.0596)

= 27.200 + 1.074

= 28.27 lb/lb-mole

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6) Average Gas Stream Velocity,

$$V_s = K_p \; C_p \; \Delta P_{avg} \sqrt{\frac{T_s}{P_s \; M_s}}$$

(EPA Equation 2-9)

Where:

V_s = Average gas stream velocity, ft/sec.

K_p = Pitot tube constant, $85.49 \; \frac{ft}{sec} \left[\frac{(lb/lb\text{-}mole)(in.Hg)}{(^oR)(in.H_2O)} \right]^{1/2}$

C_p = Pitot tube coefficient, dimensionless.

ΔP_{avg} = Average of the square roots of the velocity head readings, ($\sqrt{\Delta p}$) ($in.H_2O$).

T_s = Average absolute gas stream temperature, ^oR.

P_s = Absolute gas stream pressure, ($P_{bar} + P_g/13.6$) in.Hg.

P_{bar} = Barometric Pressure, in. Hg.

P_g = Pressure differential from gas stream to atmosphere, (static pressure) $in.H_2O$.

M_s = Molecular weight of gas, wet basis, lb/lb-mole.

Example: Run 1

C_p = 0.84

ΔP_{avg} = 0.292 $in.H_2O^{1/2}$

T_s = 780.0 ^oR

P_s = $P_{bar} + P_g/13.6$ = 28.85 + -0.05 /13.6 = 28.85 in.Hg

M_s = 28.27 lb/lb-mole

$$V_s = (85.49)(0.84)(0.292)\sqrt{\frac{780.0}{(28.85)(28.27)}}$$

$$= 20.51 \text{ ft/sec}$$

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7) Volumetric Flow Rate at Gas Stream Conditions,

$Q = A \times V_s \times 60$

Where:

Q = Volumetric flow rate at gas stream conditions, A.C.F.M.

A = Cross sectional area of stack or duct, ft^2.

V_s = Average gas stream velocity, ft/sec.

60 = Conversion factor from seconds to minutes.

Example: Run 1

A = 4.91 ft^2

V_s = 20.51 ft/sec

Q = (4.91) (20.51) 60

= 6,040 ACFM

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8) Volumetric Flow Rate at Standard Conditions,

$$Q_{sd} = 60 \quad (1 - B_{ws}) \quad V_s \quad A \left| \frac{T_{std}}{T_s} \right| \left| \frac{P_s}{P_{std}} \right| \quad 60$$

(EPA Equation 2-10)

Where:

Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, S.C.F.M.

60 = Conversion factor from seconds to minutes.

B_{ws} = Water vapor in gas stream, proportion by volume.

V_s = Average gas stream velocity, ft/sec.

A = Cross sectional area of stack or duct, ft^2.

T_{std} = Standard absolute temperature, 528 ^{o} Rankine.

T_s = Average absolute gas stream temperature, ^oR.

P_s = Absolute gas stream pressure, $(P_{bar} + P_g/13.6)$ in.Hg.

P_{bar} = Barometric Pressure, in. Hg.

P_g = Pressure differential from gas stream to atmosphere, (static pressure) in.H_2O.

P_{std} = Absolute pressure at standard conditions, 29.92 in. Hg.

Example: Run 1

B_{ws} = 0.0596

V_s = 20.51 ft/sec

A = 4.91 ft^2

T_s = 780.0 ^oR

P_s = $P_{bar} + P_g /13.6$ = 28.85 + -0.05 /13.6 = 28.85 in.Hg

$$Q_{sd} = 60 \quad (1 - 0.0596) \quad (\quad 20.51 \quad) \quad (\quad 4.91 \quad) \left(\frac{528.0}{780.0} \right) \left(\frac{28.85}{29.92} \right)$$

= 3,707 SCFM

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9) Gas Stream Particulate Concentration,

$$C_s = 15.43 \text{ gr./g} \left| \frac{M_n}{V_{m(std)}} \right|$$

(EPA Equation 5-6)

Where:

C_s = Concentration of particulate matter in gas stream, dry basis-corrected to standard conditions, gr/dscf.

M_n = Total amount of particulate matter collected in probe wash and on filter, g.

$V_{m(std)}$ = Volume of gas sample measured at meter box (corrected to standard conditions), ft^3.

Example: Run 1

M_n = 0.0054

$V_{m(std)}$ = 37.48 ft^3

$$C_s = 15.43 \left| \frac{0.0054}{37.48} \right|$$

= 2.22E-03 gr/dscf

10) Particulate Emission Rate,

$$E = Q_{sd} \; C_s \left[\frac{1 \text{ pound}}{7000 \text{ grains}}\right] \left[\frac{60 \text{ minutes}}{1 \text{ hour}}\right]$$

Where:

E = Particulate Emission Rate, lb/hr.

Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, S.C.F.M.

C_s = Concentration of particulate matter in gas stream, dry basis-corrected to standard conditions, gr/dscf.

Example: Run 1

Q_{sd} = 3,707 ft^3

C_s = 0.0022 gr/dscf

$$E = (\ 3,707\ )\ (\ 0.0022\ ) \left[\frac{60}{7000}\right]$$

$$= 0.07 \text{ lb/hr}$$

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11) Percent of Isokinetic Sampling,

$$I = \frac{100\ T_s \left[K_3\ V_{lc} + \left[\frac{V_m}{T_m} \right] \left[P_{bar} + \frac{\Delta H}{13.6} \right] \right]}{60\ A_n\ V_s\ P_s\ t} \qquad 63$$

(EPA Equation 5-7

Where:

I = Percent of Isokinetic sampling, %.

T_s = Average absolute gas stream temperature, ^oR.

K_3 = Constant, 0.002669 in.Hg-ft^3/ml-^oR.

V_{lc} = Volume of water collected in impingers & silica gel, ml.

V_m = Gas sample volume measured at meter box (meter conditions), ft^3.

T_m = Average dry gas meter temperature, ^oR.

P_{bar} = Barometric Pressure, in. Hg.

ΔH = Average pressure differential across orifice, in. H_2O.

t = Total sampling time, minutes.

V_s = Average gas stream velocity, ft/sec.

P_s = Absolute gas stream pressure, in.Hg.

D_n = Nominal diameter of probe nozzle tip, inches.

A_n = Cross sectional area of nozzle, ft^2.

Example: Run 1

T_s	=	780.0	^oR	ΔH	=	1.15 in.H_2O
V_{lc}	=	50.5	ml	t	=	60.0 min.
V_m	=	41.21	ft^3	V_s	=	20.51 ft/sec
T_m	=	561.5	^oR	P_s	=	28.85 in.Hg
A_n	=	0.0007669	ft^2	P_{bar}	=	28.85 in.Hg

$$I = \frac{780.0\ (\ 100\ ) \left[0.002669\ (\ 50.5\ ) + \left[\frac{41.21}{561.5} \right] \left[28.85 + \frac{1.15}{13.6} \right] \right]}{60\ (0.0007669\ )\ (\ 20.51\ )\ (\ 28.85\ )\ (\ 60.0\ )}$$

$$= 107.8\ \%$$

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Gas Stream Hydrogen Fluoride Concentration,

$$C_s = 15.43 \text{ gr./g} \left| \frac{M_n}{V_{m(std)}} \right|$$

(EPA Equation 5-6)

Where:

C_s = Concentration of HF matter in gas stream, dry basis-corrected to standard conditions, gr/dscf.

M_n = Total amount of HF matter collected

$V_{m(std)}$ = Volume of gas sample measured at meter box (corrected to standard conditions), ft^3.

Example: Run 1

M_n = 0.0093

$V_{m(std)}$ = 37.48 ft^3

$$C_s = 15.43 \left| \frac{0.0093}{37.48} \right|$$

= 0.0038 gr/dscf

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HF Emission Rate,

$$E = Q_{sd} \; C_s \left[\frac{1 \text{ pound}}{7000 \text{ grains}}\right] \left[\frac{60 \text{ minutes}}{1 \text{ hour}}\right]$$

Where:

E = HF Emission Rate, lb/hr.

Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, S.C.F.M.

C_s = Concentration of HF matter in gas stream, dry basis-corrected to standard conditions, gr/dscf.

Example: Run 1

Q_{sd} = 3,707 ft^3

C_s = 0.0038 gr/dscf

$$E = (\; 3,707 \;) \; (\; 0.0038 \;) \left[\frac{60}{7000}\right]$$

$$= 0.12 \text{ lb/hr}$$

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Gas Stream Sulfur dioxide Concentration (ppm),

$$PPM = C_{SO_2} \left| \frac{M.V.}{M.W.} \right| \times 10^6$$

Where:

PPM = Concentration of sulfur dioxide emissions, ppmV.

C_{SO_2} = Concentration of sulfur dioxide, dry basis corrected to standard conditions, lb/dscf.

M.V. = Molar volume at standard conditions of 68° Fahrenheit and 29.92" Hg, 0.849531 ft^3/mole.

M.W. = Molecular weight of sulfur dioxide (64.0628 g /453.59 g/lb), 0.141235 lb/mole.

Example: Run 1

C_{SO_2} = 4.1E-07 lb/dscf

$$PPM = 4.1E\text{-}07 \left| \frac{0.848953}{0.141235} \right| \times 10^6$$

= 2.47 ppmV

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Gas Stream Sulfur dioxide Concentration (lb/dscf),

$$C_{SO_2} = K_2 \frac{(V_t - V_{tb})\ N\ \left|- \frac{Vsln}{Va} -\right|}{V_{m(std)}}$$

(EPA Equation 6-2)

Where:

C_{SO_2} = Concentration of sulfur dioxide, dry basis corrected to standard conditions, lb/dscf.

K_2 = Constant, 7.061×10^{-5} lb/meq.

V_t = Volume of barium perchlorate titrant used for the sample, ml (average of replicate titrations).

V_{tb} = Volume of barium perchlorate titrant used for the blank, ml.

N = Normality of barium perchlorate titrant, milliequivalents/ml.

V_{sln} = Total volume of solution in which the sulfur dioxide sample is contained, ml.

V_a = Volume of aliquot titrated, ml.

$V_{m(std)}$ = Volume of gas sample measured at meter box (corrected to standard conditions), ft^3.

Example: Run 1

V_t	=	0.43	ml
V_{tb}	=	0.0	ml
N	=	0.0100	meq/ml
V_{sln}	=	250.0	ml
V_a	=	5.0	ml
$V_{m(std)}$	=	37.47	ft^3

$$C_{SO_2} = 7.061 \times 10^{-5} \frac{(0.4 - 0.0)\ 0.0100\ \left|- \frac{250.0}{5.0} -\right|}{37.47}$$

$$= \frac{0.0041 \times 10^{-4}}{} \text{ lb/dscf}$$

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Sulfur dioxide Emission Rate,

$$E_{SO_2} = C_{SO_2} \; Q_{sd} \left[\frac{60 \text{ minutes}}{1 \text{ hour}} \right]$$

Where:

E_{SO_2} = Sulfur Dioxide Emission Rate, lb/hr.

Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, S.C.F.M.

C_{SO_2} = Concentration of sulfur dioxide, dry basis corrected to standard conditions, lb/dscf.

Example: Run 1

Q_{sd} = 3,707 SCFM

C_{SO_2} = 4.1E-07 lb/dscf

E_{SO_2} = (4.1E-07) (3,707) (60)

= 0.0913 lb/hr

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For Office Use Only

Check-Appropriate Box(es)

___ Air Discharge

___ Water Discharge to New Source Treatment Works

___ Solid Waste Disposal Facility

___ Hazardous Waste Disposal Facility

For Office Use Only

PTI Application No. 15-992

Date Received _____

Premise No. 15 76070016 P057

OHIO ENVIRONMENTAL PROTECTION AGENCY
Application for Permit to Install

Romany Ceramics
Applicant's Name

P. O. Box 338
Mailing Address

East Sparta	Stark	Ohio	44626	216-866-5531
City	County	State	Zip Code	Telephone Number

Glen E. Johnstone or Jeffrey L. Dicken EPA Coordinator 216-866-5531
Person to contact (Name and Title and Telephone Number)

Southwest area of Building 301 of the Romany wall tile plant
Location of Proposed Facility (State the location as completely and precisely as possible)*

10233 Sandyville Road S. E.

East Sparta	Pike	Stark	44626
City or Township		County	Zip Code

3253
Standard Industrial Classification Code

Directions: A Permit to Install is required for new or modified source of pollution under the provisions of OAC Rule 3745-31. An application cannot be considered complete unless all applicable questions are answered and the required information has been submitted. This application must be signed in accordance with OAC Rule 3745-31-04(B) or it cannot be accepted.

Applicants for permits involving air emissions or wastewater treatment facilities will be required to pay a permit to install fee as shown in Section 3745.11(B) and (C) of the Ohio Revised Code. This fee is payable fifteen days after the date of final issuance of the permit.

Name of new or modified source or facility: #5 Fast Fire Kiln

Product of new or modified source/facility: Ceramic wall tile

Will the proposed source/facility involve any of the following: Check all that apply.

A. x Air Discharge
B. ___ Wastewater Treatment Works
C. ___ Solid Waste Disposal Facility
D. ___ Hazardous Waste Disposal Facility

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*Example: "The source will be constructed on a 20 Acre plot to be located on Franklin Township Road No. 17, approximately 1½ miles north of the intersection of State Route 99 and Franklin Township Road No. 17."

EPA-3150

OHIO ENVIRONMENTAL PROTECTION AGENCY

INSTALLATION SCHEDULE

TO ACCOMPANY APPLICATION FOR PERMIT TO INSTALL

THIS FORM CONSTITUTES PART OF THE APPLICATION OF:

FACILITY NAME: Romany Ceramics

ADDRESS: 10233 Sandyville Road S. E., East Sparta, Ohio 44626

FOR A PERMIT TO INSTALL THE FOLLOWING AIR CONTAMINANT SOURCE:

IDENTIFICATION: #5 Fast Fire Kiln

DESCRIPTION: Gas fired roller hearth kiln approximately 120' long 6' wide

THE INSTALLATION OF THE ABOVE AIR CONTAMINANT SOURCE IS PLANNED TO FOLLOW THE TIME SCHEDULE DESCRIBED BELOW:

	DATE
1. EQUIPMENT ORDERED	July 1992
2. COMMENCE CONSTRUCTION	Mid-October 1992
3. STARTUP	January 1993
4. PERFORMANCE TESTING	February 1993

SEP 2 1 1992

92

Under OAC 3745-31-04, These signatures shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Richard R. Talbot — September 17, 1992
Authorized Signature (for facility) — Date

Vice President of Manufacturing
Title

10233 Sandyville Road S.E., P. O. Box 338, East Sparta, Ohio 44626
Address

For Wastewater Treatment Plants:

Signature of General Contractor or Agent Performing installation, if selected. — Date

Company

Address

SEP 2 1 1992

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#5 FAST FIRE KILN

1. Glazed ceramic wall tile

2. Materials

   A. Bright Glazes
   Glaze Frits
   Wollastonite
   A400 Nepheline Syenite
   Flint
   Zinc Oxide
   Superpax (Zircon)
   Ball Clay
   Soapstone
   Inorganic Pigments

   B. Matte Glazes
   Glaze Frits
   Ball Clay
   Talc
   Barium Carbonate
   Dolomite
   Nepheline Syenite
   Zinc Oxide
   Flint
   Alumina
   Superpax
   Inorganic Pigment

3. New installation

4. No

5. Yes

6. There should be no air contaminants

7. No

8. Yes

9. No

10. No

11. None

12. No

13. Equipment will be assembled in house of commercial component parts and fabrications

For Official Use Only

Premise No. 15 96 070016

Source No. P057

KILN

APPENDIX A, PROCESS

PROCESS DATA

1. Name of process Fast Fire Line

2. End product of this process Ceramic wall tile

3. Primary process equipment Roller hearth kiln

   Your identification Fast Fire #5 Year Installed 1992-93

4. Manufacturer Romany Ceramics Make or Model

5. Capacity of equipment (lbs./hr): Rated 2250 Max. 2250

6. Method of exhaust ventilation: [X] Stack [] Window fan [] Roof vent
   [] Other, describe

   Are there multiple exhausts? [] Yes [X] No

OPERATING DATA

7. Normal operating schedule: 24 hrs./day, 7 days/wk., 50 wks./year.

8. Percent annual production (finished units) by season:
   Winter 25 Spring 25 Summer 25 Fall 25

9. Hourly production rates (lbs.): Average 2250 Maximum 2250

10. Annual production (indicate units) 18,900,000
    Projected percent annual increase in production

11. Type of operation: [X] Continuous [] Batch

12. If batch, indicate Minutes per cycle Minutes between cycles

13. Materials used in process:

List of Raw Materials	Principal Use	Amount (lbs./hr.)
Talc)		
Clay)		
Wollastonite)	Tile Body	2250
Pyrophyllite)		
Water)		

14. A PROCESS FLOW DIAGRAM MUST BE INCLUDED WITH THIS APPENDIX. Show entry and exit points of all raw materials, intermediate products, by-products and finished products. Label all materials including airborne contaminants and other waste materials. Label the process equipment and control equipment.

(continued on reverse side)

SEP 2 1 9

EPA 3100

KILN B-1

FOR OFFICIAL USE ONLY

Premise No.___/___/___/_____
Source No.___/____
Application No.____/_____ APPENDIX B;

FUEL BURNING EQUIPMENT

(Boilers, Heaters, and Steam Generators)

1. Manufacturer Romany Ceramics (In House) Model No. RHK
2. Your identification #5 Fast Fire Kiln Year Installed 1992-93
3. Input capacities (10^6 BTU/hr.): Rated_____ Max._____ Normal_____
   Output capacities (lbs.-steam/hr.): Rated_____ Max._____ Normal_____
   Note: Indicate units if different than above.
4. Percent used for: Space heat_____% Process_____% Power_____%
5. Normal Operating schedule: 24 hrs./day, 7 days/wk., 52 wks./year
6. Type of fuels fired: ☐Coal ☐Oil ☒Natural gas ☐Wood ☐LPG ☐Other, Specify_____
7. Type of draft: ☐Natural ☐Induced ☒Forced
8. Combustion Monitoring: ☐Fuel/air ratio ☐O_2 ☐Smoke ☐Other, Specify_____

COAL FIRED UNITS

9. Type of firing: ☐Hand-fired ☐Underfeed stoker ☐Traveling grate ☐Chain grate ☐Spreader stoker ☐Cyclones ☐Pulverized-dry bottom ☐Pulverized-wet bottom ☐Other, specify_____
10. Fly ash reinjection: ☐Yes ☐No

OIL FIRED UNITS

11. Type of oil: ☐No.2 ☐No.6 ☐Other, specify_____
12. Automization ☐Oil pressure ☐Steam pressure ☐Compressed air ☐Rotary cup ☐Other, specify_____
13. Oil preheater: ☐Yes, Temp.__^{0}F ☐No

Operation of an air contaminant source without an effective permit to operate is prohibited pursuant to 3704.05 Ohio Revised Code. EPA-3101

RECEIVED
SEP 21 1992

STACK DATA

16. Your stack identification #5 Fast Fire Kiln Exhaust

17. Are other sources vented to this stack? ☐ Yes ☒ No
    If yes, identify sources _____

18. Type: Round, top inside diameter dimension 30"
    Rectangular, top inside dimensions (L) _____ x (W) _____

19. Height: Above roof 20 ft., above ground 40 ft.

20. Exit gas: Temp. 370 °F, Volume 20564 ACFM, Velocity 4000 ft./min.

21. Continuous monitoring equipment ☐ Yes ☐ No
    If yes, indicate type _____, Manufacturer _____
    Make or Model _____, Pollutant(s) monitored _____

22. Emission data: Emissions from this source have been determined and such data is included with this appendix: ☐ Yes ☒ No
    If yes, check method: ☐ Stack Test ☐ Emission factor

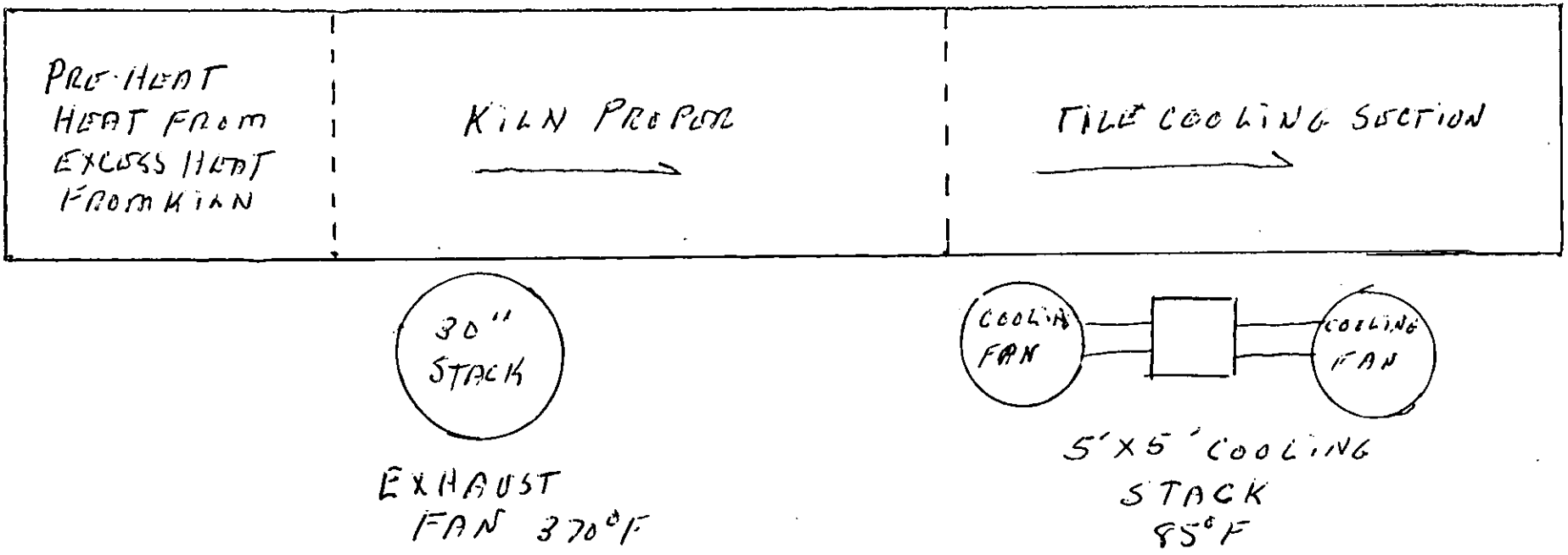
Completed by Glen E. Johnstone, Date 9/17/92

EPA-3101

78

SEP 2 1 1992

#5 FIRST FIRE BOILER REMAIN KILN



United States Ceramic Tile Company

August 12, 1993

Mr. Daniel J. Schiltz
Canton City Health Department
Air Pollution Control Division
420 Market Avenue North
Canton, Ohio 44702

FILE IN PTI FILE

Subject: Ohio EPA P.T.I No.15-992
Ceramic Wall Tile Kiln
Date of Issuance: March 24, 1993

Dear Mr. Schiltz;

In accordance with special terms and conditions, Page 6, Paragraph 1, we are herewith submitting monthly analysis of samples of our body mix taken to determine sulfur content.

The test data attached is for the months of April, May and June 1993. Please note that the P.T.I. (modification) was issued on March 24, 1993. Installation was completed on April 28, 1993, and reported accordingly on May 3, 1993. Hence test data for only April to June inclusive.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

UNITED STATES CERAMIC TILE COMPANY

Bill Geier

William C. Geier
EPA Co-ordinator

WCG/bas
Enclosures

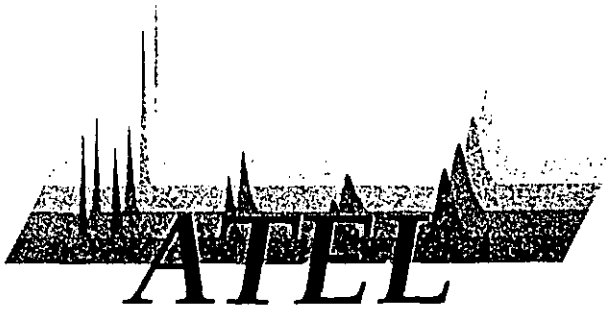
10233 Sandyville Rd SE • P.O. Box 338 • East Sparta, OH 44626 • 216/866-5531 • FAX 216/866-5340

FAST FIRE KILN NO.5

BODY MIX SULFUR CONTENT

1993	PPM	% SULFUR
April	85	0.0085
May	110	0.011
June	73	0.0073

* copies of lab reports attached hereto



Aqua Tech Environmental Laboratories Inc.

To: ROMANY CERAMICS
PO BOX 338
EAST SPARTA OH 44626

Attn: JEFF DICKEN

Client # : I0030
Your Sample ID: PRESS #1 AS REC'D
Sample Matrix : SOLID
PO #:

Lab # : 10-93-107208
Login Date : 04/08/93
Date Reported: 04/20/93
Date Printed : 04/21/93

COLLECTION INFORMATION

Date/Time/By: 04/07/93 09:00 LOCKER
Location : BODY

Report Approved By: Jeffrey A. Smith
Jeffrey A. Smith

Analysis	Result	Units	Analyst	EPA Method No.	Date of Analysis	Run Number
10-93-107208						
SULFUR (as S)	85	PPM	SRT		04/15/93	04000373

181 S. MAIN ST. • P.O. BOX 436 • MARION, OH 43301-0436
PHONE 614-382-5991 • 1-800-783-5991 • FAX 614-382-1420

8/

Rcd 5/24/93

Aqua Tech Environmental Laboratories Inc.

To: ROMANY CERAMICS
PO BOX 338
EAST SPARTA OH 44626

Attn: JEFF DICKEN

Client # : I0030
Your Sample ID: PRESS #1
Sample Matrix : SOLID
PO #:

Lab # : 10-93-110878
Login Date : 05/18/93
Date Reported: 05/21/93
Date Printed : 05/21/93

COLLECTION INFORMATION

Date/Time/By: 05/05/93 12:00 LOCKER
Location :

Report Approved By: Jeffrey A. Smith

Jeffrey A. Smith

Analysis	Result	Units	Analyst	EPA Method No.	Date of Analysis	Run Number
10-93-110878						
SULFUR (as S)	110	PPM	SRT		05/20/93	05000450

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PHONE 614-382-5991 • 1-800-783-5991 • FAX 614-382-1420

Aqua Tech Environmental Laboratories Inc.

To: ROMANY CERAMICS
PO BOX 338
EAST SPARTA OH 44626

Attn: BILL GEIER

Client # : I0030
Your Sample ID: PRESS #1 (BODY)
Sample Matrix : SOLID
PO #:

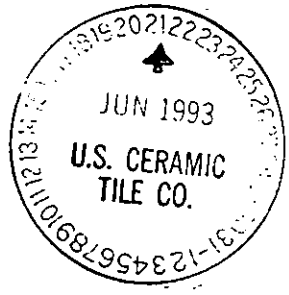
Lab # : 10-93-112989
Login Date : 06/10/93
Date Reported: 06/17/93
Date Printed : 06/17/93

COLLECTION INFORMATION
Date/Time/By: 06/04/93 10:00 LOCKER
Location :

Report Approved By: Jeffrey A. Smith

Jeffrey A. Smith

Analysis	Result	Units	Analyst	EPA Method No.	Date of Analysis	Run Number
10-93-112989						
SULFUR (as S)	73	PPM	SRT		06/15/93	06000315



181 S. MAIN ST. • P.O. BOX 436 • MARION, OH 43301-0436
PHONE 614-382-5991 • 1-800-783-5991 • FAX 614-382-1420

APPLICATION NUMBER: 15 76 07 0016 P057

FACILITY NAME: ROMANY CERAMICS INC.

EQUIPMENT DESCRIPTION: 5 MMBTU/HR NATURAL GAS FIRED CERAMIC TILE KILN

COMPANY ID: #5 FAST FIRE KILN

SPECIAL TERMS & CONDITIONS

1. The following rules of the Ohio Administrative Code establish the applicable emission limitations and/or control requirements of this source:

   3745-17-07
   3745-17-11
   3745-31-05

   (This condition in no way limits the applicability of other requirements of the Ohio Administrative Code to this source.)

2. Allowable Emission Limitation(s)

   The emissions from this source shall not exceed the following:

   0.02 lb PM/MMBTU
   0.07 lb PM/hour
   0.438 tons PM/year
   0.02 lb CO/MMBTU
   0.07 lb CO/hour
   0.438 tons CO/year
   0.1 lb NOx/MMBTU
   0.35 lb NOx/hour
   2.19 tons NOx/year
   0.9 lb SO_2/hour
   4 tons SO_2/year

3. The sulfur content of the body mix shall not exceed 0.02% by weight. Monthly analyses shall be taken of a representative sample of the body mix to determine sulfur content. A summary of these test results shall be submitted in semi-annual reports to the Canton City Health Department, Division of Air Pollution Control, 420 Market Avenue North, Canton, Ohio 44702, phone (216) 489-3385. The reports shall be submitted by February 15 and August 15 of each year and shall cover the previous six (6) calendar months (July through December and January through June, respectively).

4. The average hourly production rate of this source shall not exceed 2250 lb/hour.

PREPARED BY: DANIEL J. SCHILTZ

DATE PREPARED: APRIL 6, 1994

APPENDIX K

OEPA STACK TEST REVIEW SUMMARY FORM

APPLICATION NUMBER 15 76 07 0016 P057

FACILITY NAME ROMANY CERAMICS

SOURCE DESCRIPTION (OR SCC CODE) FAST FIRE KILN NO.5

CONTROL EQUIPMENT NONE

DATE(S) OF TEST 8-11-93

FINAL TEST REPORT RECEIVED ON 9-8-93

POLLUTANT(S) TESTED	PART.,	SO_2,	NO_x,	HF
TEST METHOD	5	6	7E	13A

TEST FIRM ENVISAGE ENVIRONMENTAL INC

EMISSION RATES-:	PART	SO_2	NO_x	HF (lb/hr)		PART	SO_2	NO_x	HF lb/hr
ACTUAL (lb(s)/hr)	.0694	.0988	.3815	.007	ALLOWABLE--	.10	.90	.50	0.50

OPERATING RATES-:

DURING TEST-- 1.26 TPH MAXIMUM--

EMISSION FACTOR---

COMMENTS: PARTICULATES ARE 30% UNDER ALLOWABLE; SO_2 IS 89% UNDER ALLOWABLE; NO_x IS 24% UNDER ALLOWABLE; HF IS 98.6% UNDER ALLOWABLE.

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

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

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

9-8-93
DATE OF REVIEW

Andy Parks
REVIEWED BY

- BASED ON 3 RUN AVERAGE
-- SPECIFY APPLICABLE UNITS
--- SPECIFY ... UNITS OF MASS. INPUT

85

MEMO: ROMANY CERAMICS (RC)
STACK TEST - 8/11/93
15 76 07 0034 - KILN NO. 5

The subject company recently completed the installation of a new gas fired kiln with their PTI permit in hand. A stack test was conducted on this kiln by Envisage Environmental, Inc. as a prerequisite toward obtaining a PTO for this kiln (No. 5).

In view of Ohio EPA's movement toward added concern for fluoride emissions, tests were conducted to determine levels for particulates (Method 5), SO_2 (Method 6), NO_x (Method 7E) and fluorides (Method 13A).

The staff from Envisage at the test site included:

1. Greg Sinkovich, crew chief
2. Pat Saravedra
3. Eric Hevener
4. Todd Aderholt
5. Dave Donelson

Greg and I each had a walkie-talkie radio for communications during the stack tests.

Bill Geier, the environmental coordinator from RC, obtained the material process weight rate through the No. 5 kiln during the stack test period. The tile processed through the kiln was 1.26 tons/hr.

An SO_2 audit sample from USEPA was given to Greg for audit analysis. He will contact this agency with the test results of the audit sample within a week.

VE readings were taken for three hours. No particulate matter was observed coming from the kiln No. 5 stack. The other three parameters were gases.

A fiber glass filter was used in the collection train. The nozzle diameter was .375". The probe was stainless steel with a pyrex liner. Each traverse had 12 test points and sampled 2½ minutes for a total of 60 minutes/test of three tests.

The sampling train impingers had 100 CC of distilled water in No. 1 100 CC of H_2O_2 in impingers No. 2 and 3 for converting SO_2 to sulfates (SO_4) and the 4th impinger had 100 grams of silica gel, a desiccant.

The probe and box temperatures were 248°F ± 25°.

The past test leak checks were:

	CFM loss	Vacuum Hg"
No. 1	0	7
No. 2	0	9
No. 3	0	9

The kiln has no control device of any kind thereon for control of those substances tested for on this stack test.

While at the plant, Bill showed me an area at a large bag house which had accumulated several tons of particulate matter over several years during the course of particulate transfer from the bag house to a collecting - removal source. This area was totally cleaned now. The previous condition was brought to Bill's attention during my last plant inspection.

Bill is a new man on the job of environmental coordinator. He seems to have taken a very positive attitude about environmental responsiveness. He said his superiors feel the same way that he does regarding EPA concern.

The tests ran off pretty smoothly without any glitches.

ANDY PASKO

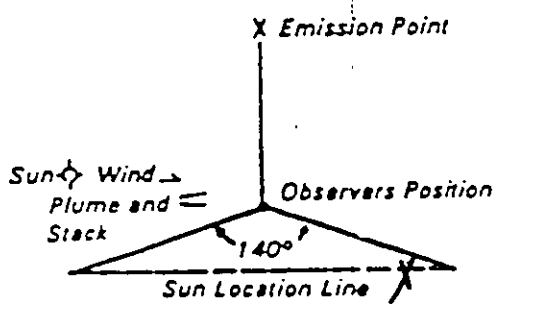
AP0813RC.TL

#1

Visible Emission Observation Form

SOURCE NAME	ROMANY CERAMICS
ADDRESS	
CITY	E. SPARTA
STATE	OHIO
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	KILN NO 5
OPERATING MODE	ON
CONTROL EQUIPMENT	NONE
OPERATING MODE	—
DESCRIBE EMISSION POINT	STACK Disch.
START	
STOP	
HEIGHT ABOVE GROUND LEVEL START	N40'
STOP	
HEIGHT RELATIVE TO OBSERVER START	N38'
STOP	
DISTANCE FROM OBSERVER START	N/100'
STOP	
DIRECTION FROM OBSERVER START	N
STOP	
DESCRIBE EMISSIONS START	
STOP	
EMISSION COLOR START	
STOP	
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☒ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	1 DIA FROM STOP STACK
DESCRIBE BACKGROUND START	BLUE-WHITE SKY
STOP	
BACKGROUND COLOR START	BL-W
STOP	
SKY CONDITIONS START	N 60% 0 CST
STOP	
WIND SPEED START	CALM
STOP	
WIND DIRECTION START	
STOP	
AMBIENT TEMP. START	75°F
STOP	
WET BULB TEMP.	
RH,percent	

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-11-93	9:15 AM	10:23

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

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	CINDY LASKO
OBSERVER'S SIGNATURE	Cindy Lasko
DATE	8-11-93
ORGANIZATION	
CERTIFIED BY	
DATE	88
VERIFIED BY	
DATE	

COMMENTS

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

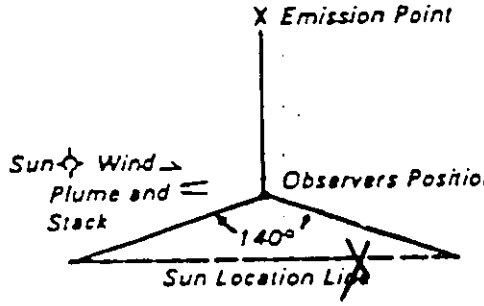
#2

Visible Emission Observation Form

SOURCE NAME: ROMANY CERAMICS	OBSERVATION DATE: 8-11-93	START TIME: 10:41	STOP TIME: 11:44
ADDRESS:			
CITY: E. SPARTA	STATE: OHIO	ZIP:	
PHONE:	SOURCE ID NUMBER:		
PROCESS EQUIPMENT: KILN #5	OPERATING MODE:		
CONTROL EQUIPMENT: None	OPERATING MODE:		
DESCRIBE EMISSION POINT: START STACK DISC STOP			
HEIGHT ABOVE GROUND LEVEL: START 40' STOP	HEIGHT RELATIVE TO OBSERVER: START 38' STOP		
DISTANCE FROM OBSERVER: START 100' STOP	DIRECTION FROM OBSERVER: START N STOP		
DESCRIBE EMISSIONS: START STOP			
EMISSION COLOR: START STOP	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐		
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐		
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 1-DIA FROM STOP STACK			
DESCRIBE BACKGROUND: START BLUE-WHITE SKY STOP			
BACKGROUND COLOR: START BL-W STOP	SKY CONDITIONS: START N STOP 80% 80'CST		
WIND SPEED: START 1-2MPH STOP	WIND DIRECTION: START SW STOP		
AMBIENT TEMP.: START 78°F STOP	WET BULB TEMP.	RH,percent	

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

Source Layout Sketch — Draw North Arrow



AVERAGE OPACITY FOR HIGHEST PERIOD

NUMBER OF READINGS ABOVE % WERE

RANGE OF OPACITY READINGS: MINIMUM MAXIMUM

1-800-444-1984 WORDS

OBSERVER'S NAME (PRINT): ANDY PASKO

COMMENTS

OBSERVER'S SIGNATURE: Andy Pasko — DATE: 8/11/93

ORGANIZATION

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS — SIGNATURE

CERTIFIED BY — DATE 89

TITLE — DATE

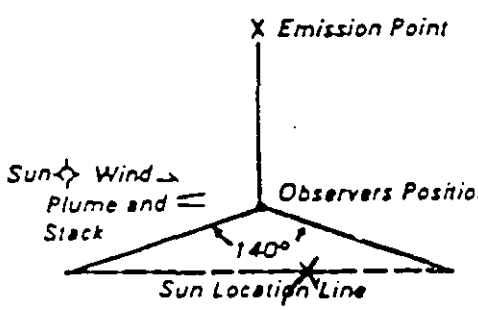
VERIFIED BY — DATE

#3

Visible Emission Observation Form

SOURCE NAME	ROMANY CERAMICS
ADDRESS	
CITY	E. SPARTA
STATE	OHIO
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	KILN NO. 5
OPERATING MODE	ON
CONTROL EQUIPMENT	NONE
OPERATING MODE	—
DESCRIBE EMISSION POINT START	STACK
DESCRIBE EMISSION POINT STOP	DISCK
HEIGHT ABOVE GROUND LEVEL START	40'
HEIGHT ABOVE GROUND LEVEL STOP	
HEIGHT RELATIVE TO OBSERVER START	30'
HEIGHT RELATIVE TO OBSERVER STOP	
DISTANCE FROM OBSERVER START	100'
DISTANCE FROM OBSERVER STOP	
DIRECTION FROM OBSERVER START	E
DIRECTION FROM OBSERVER STOP	
DESCRIBE EMISSIONS START	
DESCRIBE EMISSIONS STOP	
EMISSION COLOR START	
EMISSION COLOR STOP	
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☐	NO
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	1-DIA FROM
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	STACK
DESCRIBE BACKGROUND START	BLUE-WHITE SKY
DESCRIBE BACKGROUND STOP	
BACKGROUND COLOR START	WHITE
BACKGROUND COLOR STOP	
SKY CONDITIONS START	85% CST
SKY CONDITIONS STOP	
WIND SPEED START	2-4 MPH
WIND SPEED STOP	
WIND DIRECTION START	SW
WIND DIRECTION STOP	
AMBIENT TEMP. START	
AMBIENT TEMP. STOP	
WET BULB TEMP.	
RH,percent	

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
8-11-93	12:02 PM	1:04

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

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	ANDY PASKO
OBSERVER'S SIGNATURE	Andy Pasko
DATE	8/11/93
ORGANIZATION	
CERTIFIED BY	
DATE	90
VERIFIED BY	
DATE	

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

8/11/93

RE: Fast-Fire Kiln No. 5
Calculation of Kiln through-put during Emmissions Testing:

Production rate

28 cycles/min = 112 tiles/min.

112 x 60 min. = 6,720 tiles/hour

6,720 ÷ 8 pcs./sq.ft = 840 sq.ft./hr.

840 # x 3.0 lbs/sq.ft. = 2,520 LBS./hr.

$\frac{2520}{2000}$ = 1.26 Tons/hr.

* Production is 2,520 LBS/hr. OR 1.26 Tons/hr.

8/11/93.