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

REPORT NO. 93-1148 2902
COMPANY Hoover Co
TITLE Performance
DATE 2-18-93

Question 5- #2B

THE HOOVER COMPANY
CANTON, OHIO

BOILER - MECHANICAL COLLECTOR
PARTICULATE & SULFUR DIOXIDE
EMISSION EVALUATION

CONDUCTED - FEBRUARY 18, 1993

SOURCE EVALUATION RESULTS

PREPARED BY

Envisage Environmental Incorporated

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

Hoover®

Envisage Environmental Incorporated

March 1, 1993

Mr. Gareth Rich
The Hoover Company
101 East Maple Street
Canton, Ohio 44720

Dear Mr. Rich:

The following report is the result of the particulate and sulfur dioxide emission evaluation conducted February 18, 1993 at the Canton, Ohio facility. Two test runs were conducted at the exhaust of the boiler mechanical collector.

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.

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

Respectfully submitted,

Robert C. Hovan
Project Leader
ENVISAGE ENVIRONMENTAL INC.

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

TABLE OF CONTENTS

	PAGE NUMBER
INTRODUCTION	3
TEST RESULTS SUMMARY	5
TEST RESULTS DETAILED	7 - 8
OPERATIONAL PARAMETERS	10
STACK DIAGRAM	11
SAMPLE TRAIN DIAGRAM	13
LABORATORY SECTION	15 - 16
COAL ANALYSIS	18 - 20
FIELD DATA SHEETS	22 - 24
EMISSION SAMPLING NOMENCLATURE	26 - 27

Envisage Environmental Incorporated

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

INTRODUCTION

INTRODUCTION

On February 18, 1993 Envisage Environmental Inc. conducted a particulate and sulfur dioxide emission evaluation at the Hoover Company, Canton, Ohio facility. The testing was performed at the mechanical collector exhaust. The operation of the boiler was monitored throughout the duration of the testing by Hoover Company personnel.

The purpose of the evaluation was to determine the particulate and sulfur dioxide emission rates to ascertain compliance with State and Federal Regulations. The Envisage testing team consisted of Messrs. Robert Hovan and James Gray. Mr. Gareth Rich, Hoover Company, coordinated the testing.

Results are presented in this report for pounds per Actual Heat Input of particulate matter and sulfur dioxide respectively, as well as the various velocity, volumetric and temperature measurements associated with these tests.

TEST RESULTS SUMMARY

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

TEST RESULTS SUMMARY

The Hoover Company

Boiler Exhaust Stack

Particulate and Sulfur Dioxide Emission Evaluation

Conducted - February 18, 1993

PARAMETER	RUN # 1	RUN # 2
Particulate Emissions		
Pounds/Million BTU (Actual Heat Input)	0.1324	0.1338
Pounds/Million BTU (F Factor, 9820)	0.1561	0.1372
Pounds/hour	13.72	13.68
Grains/dscf	0.0777	0.0735
Sulfur Dioxide Emissions		
Pounds/Million BTU (Actual Heat Input)	4.77	5.76
Pounds/Million BTU (F Factor, 9820)	5.62	5.91
Pounds/hour	494.11	589.25
Pounds/DSCF	4.00E-04	4.52E-04
System Flow Rates		
ACFM	49,674	52,534
DSCFM	20,593	21,718
Degrees Fahrenheit	653	664
Moisture Content	7.33	6.71

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

TEST RESULTS DETAILED

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

TEST RESULTS

The Hoover Company

Boiler Exhaust Stack

Particulate and Sulfur Dioxide Emission Evaluation

DATE: February 18, 1993	Symbol	Units	RUN # 1	RUN # 2
Time of Day			1245 1410	1600 1720
1 Gas Volume-dry,std.	Vmstd	cu. ft.	52.36	56.02
2 Condensate Vapor Vol.	Vwstd	cu. ft.	4.14	4.03
3 Gas Stream Moisture	Bws	vol.dec	0.0733	0.0671
4 Mol.Wt-flue gas (dry)	Msd	lb/lb mo.	30.16	30.27
5 Mol.Wt-flue gas (wet)	Ms	lb/lb mo.	29.26	29.45
6 Flue Gas Velocity	Vs	ft/sec	55.19	58.37
7 Flue Gas Volume-Actual	ACFM	cu. ft.	49,674	52,534
8 Flue Gas Volume-Std.	DSCFM	cu. ft.	20,593	21,718
9 Particulate Conc.	Cs			
- Probe		gr/dscf	0.0150	0.0170
- Filter		gr/dscf	0.0628	0.0565
- Total		gr/dscf	0.0777	0.0735
10 Emission Rate	E			
- Probe		lb/hr	2.64	3.17
- Filter		lb/hr	11.08	10.51
- Total		lb/hr	13.72	13.68
11 Isokinetic Rate	I	%	99.5	100.9

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

SO2 LABORATORY SUMMARY

The Hoover Company

Boiler Exhaust Stack

Particulate and Sulfur Dioxide Emission Evaluation

DATE: February 18, 1993	Symbol	Units	RUN # 1	RUN # 2
20 Normality of Ba(ClO4)2	N	meq/ml	0.0103	0.0103
21 Volume of solution	Vsln	ml	244.0	255.0
22 Volume aliquot titrant	Va	ml	0.05	0.05
23 Volume Ba(ClO4)2 Blank	Vtb	ml	0.0	0.0
24 Volume Ba(ClO4)2 Sampl	Vt	ml	5.90	6.83

SO2 TEST RESULTS

The Hoover Company

Boiler Exhaust Stack

Particulate and Sulfur Dioxide Emission Evaluation

DATE: February 18, 1993		Units	RUN # 1	RUN # 2
12 Concentration SO2	Cso2	lb/scf	4.00E-04	4.52E-04
13 Concentration SO2	PPM	ppmV	2405.4	2719.9
14 Emission Rate SO2	Eso2	lb/hr	494.11	589.25

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

OPERATIONAL PARAMETERS

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

TEST DATA SHEET # 3 COAL FIRED - CHAIN GATE | **SERVICE NO.** | **ENGINEER** JRS | **DATE** 2/18/93

CUSTOMER HOOVER | **PLANT** N. CANTON

	TIME	GRATE HEIGHT S	GRATE SPEED H/A	GRATE SPEED DEMD			WIND BOX	OVER FIRE	FURN DRAFT	BLR OUT	PRI DUST OUT	SEC DUST OUT	ZONE 1	ZONE 2	ZONE 3	ZONE 4,5,6		STM FLOW	O2 REC	O2 PORT	OPACITY %	BLR EXIT TEMP		DRUM PSI		
1ST TEST	9:30	11"	35%	4.5			3.2	23	.1	.6	4	7.5	2	2.5	.8	\		63	5.7	6	10	680°		142		
	9:45	11"	35%	4.5			3.2	23	.08	.6	4	7.5	2	2.5	.8	\		63	5.5	5.7	10	680		138		
	10:00	11	35%	4.5			3.2	23	.08	.6	4	7.5	2	2.5	.8	\		63.5	5.3	5.7	11	680		142		
	10:15	11	35%	4.5			3.2	23	.08	.62	4.1	7.5	1.9	2.5	.8	\		64.0	5.3	5.3	10	682		145		
	10:30	11	35	4.5			3.2	23	.09	.7	4.1	7.5	1.9	2.5	.78	\		64.5	5.4	5.2	11	682		144		
	10:45	11	35	4.5			3.2	23	.08	.7	4.1	7.55	1.9	2.5	.78	\		64.0	5.4	5.6	11	683		144		
	11:00	11	35	4.5			3.2	23	.07	.7	4.1	7.5	1.9	2.5	.8	\		63.0	5.5	5.4	11	683		146		
	12:45	11	35	4.5			3.2	23	.06	.7	4.2	7.55	1.9	2.5	.78	\		64.0	5.3	5.0	10.5	681		145		
	1:00	11	35	4.5			3.2	23	.06	.7	4.2	7.55	1.9	2.5	.78	\		63.0	5.3	4.8	11	684		147		
	1:15	11	35	4.5			3.3	23	.06	.65	4.2	7.5	1.9	2.5	.78	\		62.6	5.3	5.0	11	690		147		
SOOT BLOW 1:25	1:30	11	35	4.5			3.3	23	.09	.70	4.3	7.7	1.9	2.5	.78	\		69.0	5.5	5.2	11	695		149		
2ND TEST	1:45	11	35	4.5			3.3	23	.09	.75	4.3	7.7	1.9	2.5	.78	\		62.0	5.3	5.3	12	695		149		
	2:00	11	35	4.5			3.3	23	1.1	.76	4.3	7.7	1.9	2.5	.78	\		69.0	5.2	5.0	13	698		147		
	2:15	11	35	4.5			3.3	23	1.0	.77	4.3	7.7	1.9	2.5	.78	\		64.0	5.2	4.8	13	698		146		

	N	S										
9:50	3841	3497	TEST	1			TEST	1		TEST	2	
10:50	3759	3510			COAL	SCALE		N	18		N	25
12:45	3891	3539			200#	UNITS		S	16		S	24
1:45	3908	3555	TEST	2								
2:15	3916	3563										

COAL SCALE COUNTS TOTAL

54,762,000 BTU/hr

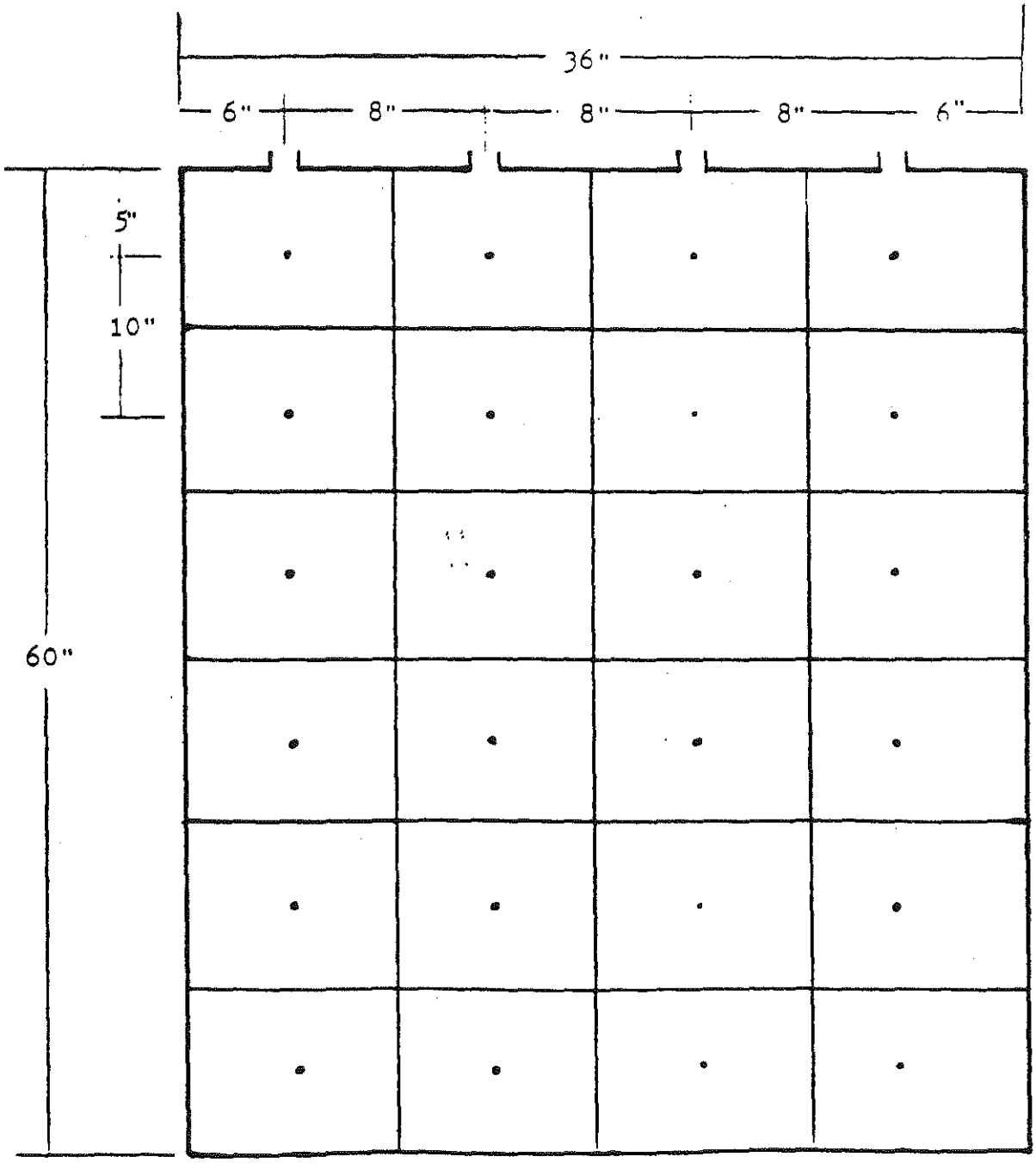
78,199,000 BTU/hr

SAMPLE POINT LOCATION DIAGRAM

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

SAMPLE POINT LOCATIONS

The Hoover Company
North Canton, Ohio
Boiler Exhaust
Particulate Emission Testing



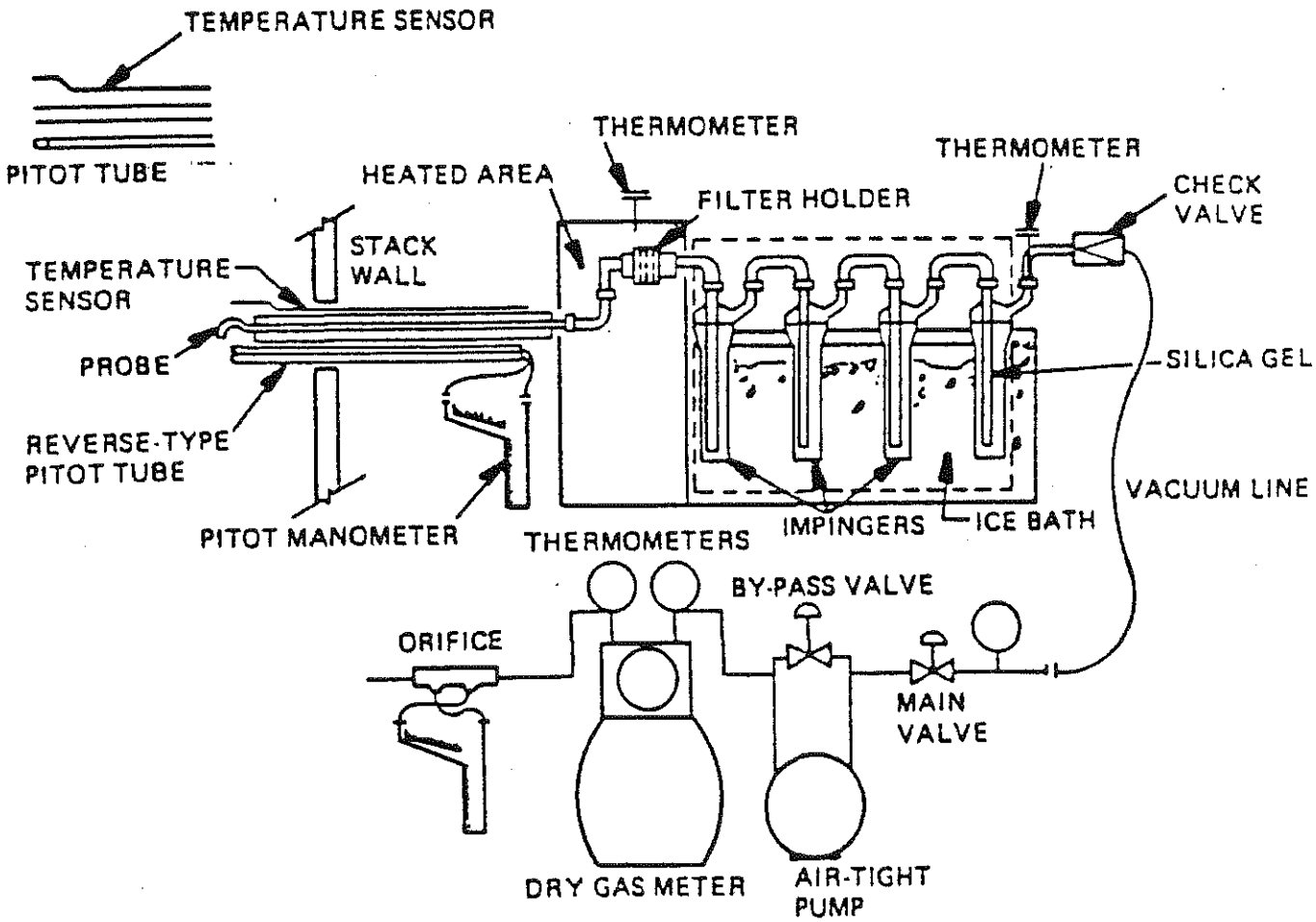
SAMPLE POINT DISTANCES

1) 55 inches
2) 45 inches
3) 35 inches
4) 25 inches
5) 15 inches
6) 5 inches

SAMPLING TRAIN DIAGRAM

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

EPA METHOD 5 PARTICULATE SAMPLE TRAIN



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

LABORATORY SECTION

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

LABORATORY SUMMARY SHEET

The Hoover Company

Boiler Exhaust Stack

Particulate and Sulfur Dioxide Emission Evaluation

DATE: February 18, 1993	Symbol	Units	RUN # 1	RUN # 2
1 Sampling Time	t	minutes	72.0	72.0
2 Barometric Pressure	Pb	in. Hg	28.92	28.92
3 Static Pressure	Pg	in. H2O	-9.60	-9.60
Stack Pressure	Ps	in. Hg	28.21	28.21
4 Gas Meter Volume	Vm	cu. ft.	58.65	62.85
5 Stack Area	A	sq. ft.	15.00	15.00
6 Nozzle Diameter	Dn	dec. in.	0.3125	0.3125
7 Meter Temperature		degrees F	114.2	115.5
	Tm	degrees R	574.2	575.5
8 Stack Temperature		degrees F	653.0	663.5
	Ts	degrees R	1113.0	1123.5
9 Velocity Head	^P	in. H2O	0.662	0.699
10 Orifice Pressure	^H	in. H2O	1.79	2.08
11 Carbon dioxide	CO2	%	11.9	12.9
12 Oxygen	O2	%	6.3	5.2
13 Carbon monoxide	CO	%	0.0	0.0
14 Nitrogen	N2	%	81.8	81.9
15 Pitot Coefficient	Cp		0.84	0.84
16 Water Collected	Vlc	ml	88.0	85.6
Sample Weight:	Mn			
17 - Probe		g	0.0508	0.0618
18 - Filter		g	0.2130	0.2050

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

ORSAT ANALYSIS WORK SHEET

DATE: 2/18/93

LOCATION: Hoover

OPERATOR: J.G.

RUN # 1

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2	11.9	11.9	11.9	11.9	11.9	11.9	11.9
O_2	18.3	6.3	18.3	6.3	18.3	6.3	6.3
CO	18.3	0	18.3	0	18.3	0	0

RUN # 2

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2	12.9	12.9	12.9	12.9	12.9	12.9	12.9
O_2	18.1	5.2	18.1	5.2	18.1	5.2	5.2
CO	18.1	0	18.1	0	18.1	0	0

RUN # _____

	1		2		3		
	ACTUAL	NET	ACTUAL	NET	ACTUAL	NET	AVERAGE
CO_2							
O_2							
CO							

COMMENTS: _____

FH-8-92

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

COAL ANALYSIS

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

COAL ANALYSIS SUMMARY

The Hoover Company

Canton, Ohio

Boiler Exhaust

Particulate and Sulfur Dioxide Emission Evaluation

Conducted - February 18, 1993

ULTIMATE DATA		RUN 1	RUN 2
% H	As Rec'd	5.00	4.80
	Dry	5.50	5.28
% C	As Rec'd	67.22	66.91
	Dry	73.93	73.66
% S	As Rec'd	2.89	3.32
	Dry	3.18	3.66
% N	As Rec'd	1.39	1.33
	Dry	1.53	1.46
% O	As Rec'd	7.89	8.12
	Dry	8.68	8.94
% Ash	As Rec'd	6.53	6.36
	Dry	7.18	7.00
PROXIMATE DATA			
BTU/LB	As Rec'd	12,083	12,074
BTU/LB	Dry	13,290	13,292
MOISTURE %		9.08	9.16
* Pounds of Coal Burned		8,580	8,470
Heat Input		103.67	102.27
F Factor		9870	9788

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

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
2979 E. CENTER ST., CONNEAUT, OH 44030
TELEPHONE: (216) 224-2261
TELEX: 985-606 CT&E COUT
FAX: (216) 224-2808

February 24, 1993

ENVISAGE ENVIRONMENTAL
6940 Miller Road
Brecksville, OH 44141

Sample identification by
ENVISAGE ENVIRONMENTAL

IDENT: 93-1148
Test #1
Hoover

Kind of sample reported to us: Coal

Sample taken at: -----

Sample taken by: Submitted

Date sampled: February 18, 1993

Date received: February 22, 1993

MAR - 1 1993

Analysis Report No. 88-34408

SHORT PROXIMATE - ULTIMATE ANALYSIS

	As Received	Dry Basis	
% Moisture	9.08	xxxxx	
% Carbon	67.22	73.93	
% Hydrogen	5.00	5.50	
% Nitrogen	1.39	1.53	
% Sulfur	2.89	3.18	
% Ash	6.53	7.18	
% Oxygen(diff)	7.89	8.68	
	100.00	100.00	
Btu/lb	12083	13290	MAF 14318

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

K. R. Meier

Manager, Conneaut Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

20

PLEASE ADDRESS ALL CORRESPONDENCE TO:
2979 E. CENTER ST., CONNEAUT, OH 44030
TELEPHONE: (216) 224-2261
TELEX: 985-606 CT&E COUT
FAX: (216) 224-2808

February 24, 1993

ENVISAGE ENVIRONMENTAL
6940 Miller Road
Brecksville, OH 44141

Sample identification by
ENVISAGE ENVIRONMENTAL

IDENT: 93-1148
Sample #2

Kind of sample reported to us: Coal

Sample taken at: -----

Sample taken by: Submitted

Date sampled: February 18, 1993

Date received: February 22, 1993

Analysis Report No. 88-34409

SHORT PROXIMATE - ULTIMATE ANALYSIS

	As Received	Dry Basis	
% Moisture	9.16	xxxxx	
% Carbon	66.91	73.66	
% Hydrogen	4.80	5.28	
% Nitrogen	1.33	1.46	
% Sulfur	3.32	3.66	
% Ash	6.36	7.00	
% Oxygen(diff)	8.12	8.94	
	100.00	100.00	
Btu/lb	12074	13292	MAF 14292

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

K. R. Meier

Manager, Conneaut Laboratory

FIELD DATA SHEETS

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

FIELD DATA

PLANT Hoover

DATE 7/18/93

SAMPLING LOCATION B/R

SAMPLE METHOD 1-5, 6

OPERATOR BH, JG

AMBIENT TEMPERATURE 105°

BAROMETRIC PRESSURE 28.92

STATIC PRESSURE -9.6

PROBE LENGTH 7 ft

NOZZLE I.D. .3125

ASSUMED MOISTURE 6%

METER BOX NUMBER 2

METER ΔH @ 1.44

C FACTOR .84

PITOT CORRECTION FACTOR .84

HEATER BOX SETTING 248 ± 25°

TRAVERSE POINT DIAGRAM

LOCATION SKETCH

TEST TEAM MEMBERS

PLANT Hoover DATE 2/18/93 RUN# 1 CASE# 45 LOCATION B/12 page of

POINT NUMBER	SAMPLE TIME	GAS METER READING	VELOCITY Δp	HEAD √Δp	ORIFICE PRESSURE	STACK TEMP	GAS METER TEMP IN	OUT	PUMP VACUUM	FILTER HOLDER	IMPINGER TEMP
1	0 0930	289.70	.46	.678	1.85	650	101	97	3.0	259	65
2	3	293.0	.56	.748	2.30	657	110	97	3.0	242	66
3	6	294.9	.42	.648	1.70	654	114	97	3.0	224	66
4	9	297.3	.37	.608	1.50	652	118	97	3.0	229	66
5	12	299.5	.26	.51	1.05	643	119	98	3.0	228	66
6	15	301.4	.24	.49	.95	638	119	99	3.0	243	66
1	18	303.2	.42	.648	1.70	650	110	101	3.0	250	66
2	21	305.6	.49	.7	1.95	656	120	101	3.0	257	67
3	24	308.1	.44	.663	1.80	656	124	102	3.0	244	67
4	27	310.6	.42	.648	1.70	653	128	102	3.0	228	67
5	30	313.0	.40	.632	1.60	652	129	103	3.0	228	67
6	33	315.3	.35	.592	1.40	649	129	104	3.0	259	66
1	36	317.8	.44	.663	1.80	650	117	105	3.0	273	67
2	39	319.9	.46	.678	1.85	659	125	105	3.0	264	67
3	42	322.4	.48	.693	1.95	660	130	105	3.0	257	67
4	45	324.9	.50	.707	2.00	657	133	106	3.0	258	67
5	48	327.7	.52	.721	2.10	654	135	106	3.0	226	67
6	51	330.3	.48	.693	1.95	650	137	104	3.5	233	67
1	54	332.9	.42	.648	1.70	648	120	108	3.0	270	67
2	57	335.2	.48	.693	1.95	660	132	107	3.0	273	67
3	60	337.7	.52	.721	2.10	659	134	107	3.0	268	67
4	63	340.5	.52	.721	2.10	659	139	108	3.0	265	68
5	66	343.2	.49	.7	2.00	653	140	108	3.0	264	68
6	69	345.7	.47	.686	1.90	650	140	107	3.0	248	68
	72 1048	348.35									

SAMPLE TRAIN LEAK CHECKS
PRE-TEST 0 CFM @ 17 "Hg POST-TEST 0 CFM @ 5 "Hg

PITOT TUBE LEAK CHECKS
PRE-TEST #2 0@5.2 POST-TEST #2 0@6.4
#4 0@6.1 #4 0@5.8

58.65 .662 1.79 652.96 114.23

23

13

method 5

PLANT Hoover DATE 1/8/93 RUN# 2 CASE# 42 LOCATION B2R page of

POINT NUMBER	SAMPLE TIME	GAS METER READING	VELOCITY Δp	VELOCITY HEAD	VELOCITY √Δp	ORIFICE PRESSURE	STACK TEMP	GAS METER TEMP IN	GAS METER TEMP OUT	PUMP VACUUM	FILTER HOLDER	IMPINGER TEMP
1	0/1243	348.65	.60	.775	2.5	661	101	101	5.0	273	67	
2	3	351.3	.54	.721	2.2	665	103	102	5.0	273	67	
3	6	354.1	.47	.684	2.0	664	108	100	5.0	261	67	
4	9	356.7	.40	.632	1.7	665	112	99	5.0	240	67	
5	12	359.0	.37	.608	1.6	662	115	99	5.0	255	66	
6	15	361.3	.35	.592	1.5	660	117	100	5.0	269	66	
1	18	363.6	.47	.686	2.0	661	113	100	5.0	273	65	
2	21	366.1	.54	.735	2.3	667	120	101	5.5	273	65	
3	24	368.9	.47	.686	2.0	668	124	102	5.0	249	66	
4	27	371.5	.44	.663	1.85	664	128	103	5.0	230	66	
5	30	374.0	.42	.648	1.80	661	128	104	5.0	241	66	
6	33	376.4	.38	.616	1.60	659	129	105	5.0	267	67	
1	36	378.8	.44	.8	2.70	665	118	103	6.5	273	66	
2	39	381.8	.55	.742	2.30	668	130	106	6.0	269	66	
3	42	384.6	.53	.728	2.2	665	134	108	6.0	249	67	
4	45	387.4	.54	.735	2.3	663	136	107	6.0	240	67	
5	48	390.1	.55	.742	2.3	667	137	109	6.0	270	67	
6	51	392.9	.55	.742	2.3	660	138	110	6.0	273	67	
1	54	395.8	.44	.663	1.85	660	120	110	5.0	261	66	
2	57	398.2	.49	.7	2.05	665	132	110	5.0	245	67	
3	60	400.9	.54	.735	2.3	665	137	110	6.0	236	67	
4	63	403.6	.54	.735	2.3	665	141	111	6.0	261	68	
5	66	406.5	.52	.721	2.2	660	142	111	6.0	268	68	
6	69	409.9	.49	.7	2.05	663	141	111	6.0	269	68	
	72/1400	411.495										

Start Reverse →

SAMPLE TRAIN LEAK CHECKS
PRE-TEST 0 CFM @ 15 "Hg POST-TEST 0 CFM @ 10 "Hg

PITOT TUBE LEAK CHECKS
PRE-TEST #2 0 0 3.8 POST-TEST #2 0 0 4.1
#4 0 0 4.5 #4 0 0 4.3

42.845 .649 2.08 663.54 115.513

24

method 5

EMISSION SAMPLING NOMENCLATURE

Envisage Environmental Incorporated
P.O. Box 152 Richfield, Ohio 44286
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.
^H	=	Average pressure differential across orifice, in. of H_2O.
^$H_@$	=	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.

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

SAMPLING NOMENCLATURE - continued

$\sqrt{P}_{avg}$ = 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).

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