

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

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## **Background Report Reference**

**AP-42 Section Number: 9.9.1**

**Background Report Section: 4**

**Reference Number: 65**

**Title: Compliance Emissions Testing of  
Center Ship Loading Dust Collector  
Galena Park Facility**

**Southwestern Laboratories, Inc.  
Houston, TX**

**January 1991**

**RECEIVED**

**MAR 8 1991**

**REGION 7  
TEXAS AIR CONTROL BOARD**

**COMPLIANCE EMISSIONS TESTING OF  
CENTER SHIP LOADING DUST COLLECTOR  
GALENA PARK FACILITY**

**WOODHOUSE CORPORATION  
GALENA PARK, TEXAS**

**January, 1991**

**SwL Customer No. 2-9518-02  
SwL Project No. 54-9010-419**

**This study was conducted by the  
Environmental Analytical Services Division  
of Southwestern Laboratories, Inc.  
Houston, Texas**



# SOUTHWESTERN LABORATORIES



Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

February 4, 1991

Re: Compliance Emissions Testing of  
Center Ship Loading Dust Collector  
Galena Park Facility  
TACB Permit No. C-19563  
SWL Project No. 54-9010-419

Mr. Al Emfinger  
WOODHOUSE CORPORATION  
1606 Clinton Drive  
Galena Park, Texas 77547

Gentlemen:

In accordance with your request, Southwestern Laboratories, Inc. hereby submits our test report covering the compliance emissions test program of the Center Ship Loading Dust Collector at your Galena Park facility. Testing was conducted January 15, 1991.

This report is for the exclusive use of WOODHOUSE CORPORATION and except for submission to Regulatory Agencies, the use of our name relative to the report must receive our prior written approval. Copies of this report should be submitted to the Texas Air Control Board Bellaire, Texas and Austin, Texas offices, and to the appropriate local air pollution control program.

It has been a pleasure working with you and your personnel. Please let us know if you have any questions concerning this report, or if we may be of further service.

Sincerely,

SOUTHWESTERN LABORATORIES, INC.

Robert Daughtry  
Environmental Scientist

Russell J. DiRaimo, P.E.  
Manager  
Environmental Analytical Services

RD:pm

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## INTRODUCTION

Compliance emissions sampling of the Center Ship Loading Dust Collector of WOODHOUSE CORPORATION, Galena Park, Texas was performed by personnel of Southwestern Laboratories, Inc. (SwL) Environmental Analytical Services (EAS) Division. The unit was sampled January 15, 1991. Testing consisted of compliance emissions for particulates and opacity. Present at times during the sample program were: Mr. Al Emfinger and staff of WOODHOUSE CORPORATION and Messrs. Robert Daughtry, John Johnston, and Johnny Reyes of SwL.

Testing was conducted in accordance with requirements contained in Texas Air Control Board (TACB) Permit C-19563. A total of three (3) sample runs were performed. All testing was conducted utilizing TACB and EPA procedures.

## RESULTS

Results of the test program, calculated in accordance with TACB procedures are contained in the Tables section of this report, and are summarized below.

### Compliance Emissions Test

<u>Parameter</u>	<u>Average Emission Rate</u>	<u>TACB Permit and EPA NSPS Allowable Emission Rate</u>	<u>% of Allowable</u>
Particulates-TACB	0.097 lb/hr	1.72 lb/hr	5.6
Particulates-TACB	0.0006 gr/dscf	0.01 gr/dscf	6.0

<u>Parameter</u>	<u>Average Emission Rate</u>	<u>TACB Permit and EPA NSPS Allowable Emission Rate</u>	<u>% of Allowable</u>
Opacity	0%	0%	0
Fugitive Emission Opacity at Ships hull	11.7%	20%	58.5

The Center Loading Ship Dust Collector operated normally during the test program. The grain feed rate averaged 40,000 bushels per hour at three loader legs during the test, which represents maximum loading rate.

#### PROCEDURE

Sampling equipment and procedures were in conformity, except where noted, with Reference Methods 1, 2, 3, 4, 5, and 9 of the Environmental Protection Agency (as contained in 40 CFR 60, "Standards of Performance for New Stationary Sources", Appendix A - Reference Methods), Subpart DD (40 CFR 60) and Chapter 23 of the TACB Laboratory Methods for the Determination of Air Pollutants. All testing was conducted in accordance with agreements reached at the November 12, 1990 Pretest Conference (attended by WOODHOUSE CORPORATION, TACB and SwL personnel).

**COMPLIANCE EMISSIONS TEST****Sample and Velocity Traverses - Method 1**

The exhaust stack was a 23 7/8 x 31 3/4 inch rectangular duct with a 27.25 inch equivalent diameter, at the sampling location. Five (5) three inch diameter sampling ports were provided. Upstream distance from the flow disturbance (duct outlet) to sample ports (Distance A) was 13.6 inches (0.50 duct diameters). Downstream distance from flow disturbance (fan outlet) to sample ports (Distance B) was 54 1/2 inches (2.00 duct diameters). It was determined that a twenty-five (25) point traverse for velocity and particulate sampling (five (5) points from each sampling port) would be appropriate (see Figure No. 1). A check for cyclonic flow within the exhaust stack demonstrated that the flow was parallel to the stack wall.

**Determination of Stack Gas Velocity and Volumetric Flow Rate - Method 2**

Stack gas velocity was measured with an "S" type pitot tube constructed in accordance with "Proper pitot tube sampling nozzle configuration", as specified in the Environmental Protection Agency, "Standards of Performance for New Stationary Sources - Revision to Reference Method 1-8 (FR Thursday August

18, 1977, Part II)." The pitot tube coefficient was determined by a wind tunnel calibration. Temperature measurements were determined by means of a calibrated digital thermometer with a Type "K" thermocouple. A preliminary velocity/temperature profile was taken prior to sampling. This data was used to calculate isokinetic nomograph settings for particulate sampling. Actual flue gas flow rate data were obtained simultaneously with particulate emissions sampling.

#### Gas Analysis and Molecular Weight Determination - Method 3

Grab stack gas samples taken during each sample run were analyzed for CO<sub>2</sub> and O<sub>2</sub> by use of standard Fyrite Gas Analyzers. N<sub>2</sub> was determined by difference. Analysis was performed immediately after sampling. Data were utilized in calculating stack gas molecular weight.

#### Determination of Moisture Content in Stack Gases - Method 4

Preliminary moisture data was assumed to be ambient (approximately 4%). This data was used to calculate isokinetic nomograph settings for particulate sampling.

Actual moisture content of the stack gas was determined by volumetric and gravimetric analysis of the impinger catch from each particulate sample run. Data were used in flue gas exhaust rate calculations.

**Determination of Particulate Emissions - Method 5**

The Center Ship Loading Dust Collector stack was tested January 15, 1991. A total of three (3) sample runs were obtained. A sample train similar to the one described in APTD-0581, complete with 6 foot long, glass lined probe and stainless steel nozzle was used to collect particulate samples. In accordance with EPA 40 CFR 60, Subpart DD requirements, the probe and filter box heaters were not utilized during the sampling program. Impingers 1 and 2 each contained 100 ml of DI water, Impinger 3 was empty, Impinger 4 contained a known weight of silica gel.

In general, each traverse point was sampled for 4 minutes, providing a total run time of 100 minutes.

Prior to and following each sample run, leak checks of the sampling system and pitot tubes were performed. After each sample run, the nozzle, probe liner and filter dome were rinsed with acetone (EPA Method 5 procedures) and the sample containers carefully labelled. Upon completion of each run, all impinger solutions were poured into their respective containers to prevent contamination of the samples.

**Determination of Visible Emissions - Method 9 and Fugitive Emissions**

An observer certified by the TACB Visible Emissions Course obtained three (3) six minute opacity runs on January 15,

1991. Results are shown in Table No. 4. In addition, observations of the actual loading operation at the ships hull was performed to determine the opacity of fugitive emissions. Results are shown in Table No. 5.

### SAMPLE RECOVERY

#### Particulates

Upon return to the laboratory, samples were analyzed in accordance with prescribed techniques. Particulate emissions were calculated in accordance with EPA and TACB procedures. EPA Method 5 and TACB Method No. 23 (dated November, 1986 and issued and received in June, 1989) of the TACB "Laboratory Methods Manual" were used in the analytical program. The probe wash, filter and first impinger catch were included in the determination of particulate emissions. Results of the TACB particulate calculations are contained in Table No. 3.

Copies of all field, laboratory and calculation sheets are included in Section IV of this report.

### CUSTODY OF SAMPLES

After completion of tests, each sample was placed in the custody of the technician for analysis. It was his assigned responsibility to insure that each sample was recorded and correctly analyzed. Analysis of samples was performed either

at the field site or in Southwestern Laboratories' facilities by Environmental/Analytical Services personnel. It was the duty of the Department Manager and Project Manager to answer any procedural queries from SwL's Laboratory Technician. Final responsibility rested with the Department Manager.

### QUALITY ASSURANCE

Southwestern Laboratories maintains a strict Quality Assurance program. Included in this program are: equipment calibration checks such as the meter box gamma check, thermometer and barometer post test check, all performed after each field use; balance calibration checks; analytical calibration checks; and calculation checks. Also included in SwL's Quality Assurance program is its participation in the EPA Inter-Laboratory Source Survey for Methods 3, 5, 6 and 7.

SwL utilizes the "constant weight" method in determining particulate emissions. This requires replicate heating, desiccating and weighing of all samples to ensure complete dryness. Quality assurance data is included with this report.

### DISCUSSION

All sampling was coordinated with WOODHOUSE CORPORATION personnel to ensure that the Center Ship Loading Dust Collector Unit was operating at maximum and stable conditions.

SWL performed equipment setup on January 14, 1991. A preliminary velocity traverse run was performed at this time.

The compliance emissions test was performed on January 15, 1991. Three (3) sample runs were obtained for particulates and opacity.

All the particulate sample runs were within permissible isokinetic limits ( $100\% \pm 10\%$ ). The testing was completed in coordination with WOODHOUSE CORPORATION loading. The Center Ship Loading Dust Collector Unit averaged 40,000 bushels per hour, which represents maximum unit loading rate.

#### SUMMARY

The average emission rate for the three (3) particulate runs was 0.097 lb/hr. This represents 5.6% of the 1.72 lb/hr TACB permit limit. In addition, the average particulate concentration for the three runs was 0.0006 gr/dscf, which represents 6.0% of the 0.01 gr/dscf EPA Subpart DD limit. The average opacity of the three (3) runs was 0.0%, which is within the TACB permit limit of 0.0%. The opacity of the fugitive emissions at the ships hull during loading averaged 11.7%. This represents 58.5% of the EPA Subpart DD limit of 20%. The grain feed averaged 40,000 bushels per hour during the stack tests, which represents maximum loading rate.

TABLE NO. 1

SOURCE IDENTIFICATION

Plant Name: Woodhouse Corporation Phone: (713) 673-7000

Address: 1606 Clinton Drive

City: Galena Park State: Texas Zip: 77547

Plant Manager: \_\_\_\_\_

Plant Representative: Mr. Al Emfinger

Process or Function: Grain loading terminal

Source Identification: Center Ship Loading Dust Collector

Stack or Duct Description: Horizontal, rectangular

Stack Height: -200 ft. Stack Dimension: 23 7/8" x 31 3/4"

Stack Temperature: 77°F Percent Moisture: 1.0%

Sampling Facilities: 5 - 3 inch port holes arranged in a vertical  
pattern

Process (Batch or Continuous): Batch

Normal Operating Capacity: \_\_\_\_\_

Operational Status (Sampling Period): Maximum of 40,000 bushels of grain  
per hour feed rate

Sampling Parameters: Particulates and opacity of duct and fugitive  
opacity at ships hull

Date Tested: January 15, 1991

Signed: Robbie Daughtry

Robbie Daughtry  
SOUTHWESTERN LABORATORIES, INC.

SOUTHWESTERN LABORATORIES

TABLE NO. 2

SUMMARY OF SAMPLING RESULTS - Flow Data

WOODHOUSE CORPORATION  
GALENA PARK, TEXAS

Center Ship Loading Dust Collector  
Compliance Emissions Test

Run No.	Date 1991	Time Period	Net Time (Mins)	Vm (Std) dscf	Ts Stack Temp. °F	Vs Stack Velocity ft/sec	Percent Moisture	ACFM Stack Gas Flow	qsd Dry Stack Gas Flow dscf/hr	% Iso.
1	1-15	0952-1154	100	72.164	73	62.08	0.99	19,608.53	1,127,496.0	108.4
2	1-15	1339-1549	100	69.015	77	62.78	1.07	19,828.60	1,137,905.3	102.7
3	1-15	1855-2058	100	65.673	84	60.39	0.92	19,073.76	1,100,296.6	101.0

TABLE NO. 3

SUMMARY OF SAMPLING RESULTS - TACB Particulate - Total Catch

WOODHOUSE CORPORATION  
GALENA PARK, TEXAS

Center Ship Loading Dust Collector  
Compliance Emissions Test

Run No.	Date 1991	Time Period	TACB Particulates		
			C Total Conc. gr/dscf	PWR Total Emissions lb/hr	
1	1-15	0952-1154	0.0009	0.14	
2	1-15	1339-1549	0.0000	0.00	
3	1-15	1855-2058	0.0010	0.15	
				Average:	0.097

TABLE NO. 4

SUMMARY OF SAMPLING RESULTS - Opacity

WOODHOUSE CORPORATION  
GALENA PARK, TEXAS

Center Ship Loading Dust Collector  
Compliance Emissions Test

<u>Run No.</u>	<u>Date</u> 1991	<u>Time Period</u>	<u>Opacity %</u>
1	1-15	1030-1036	0.0
2	1-15	1420-1426	0.0
3	1-15	1930-1936	0.0

TABLE NO. 5

SUMMARY OF SAMPLING RESULTS - Fugitive Emission Opacity

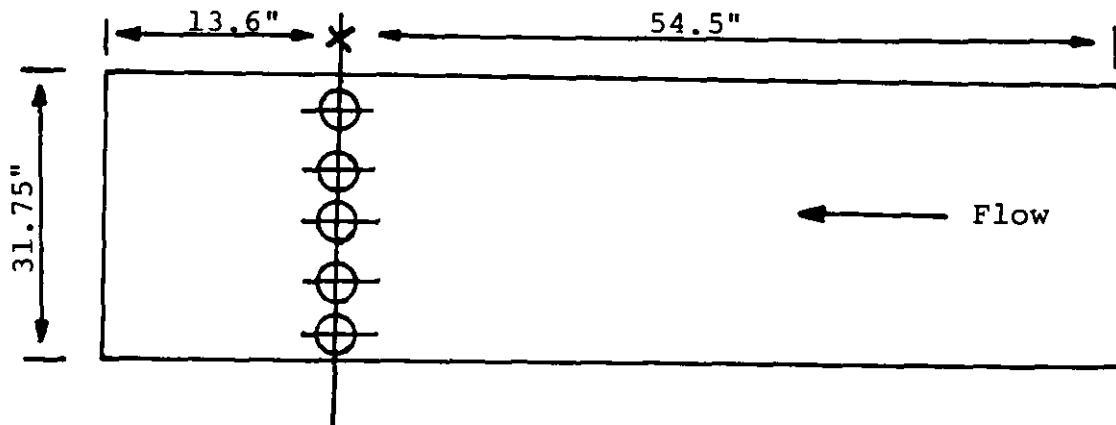
WOODHOUSE CORPORATION  
GALENA PARK, TEXAS

Fugitive Emissions at Ships Hull  
Compliance Emissions Test

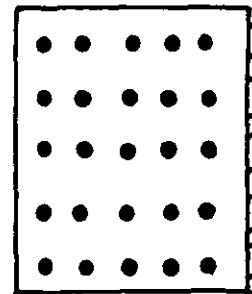
<u>Run No.</u>	<u>Date</u> 1991	<u>Time Period</u>	<u>Opacity %</u>
1	1-15	0952-1154	11.9
2	1-15	1339-1549	11.3
3	1-15	1855-2058	11.9

FIGURE NO. 1

WOODHOUSE CORPORATION  
GALENA PARK, TEXAS  
Center Ship Loading Dust Collector



Traverse Points



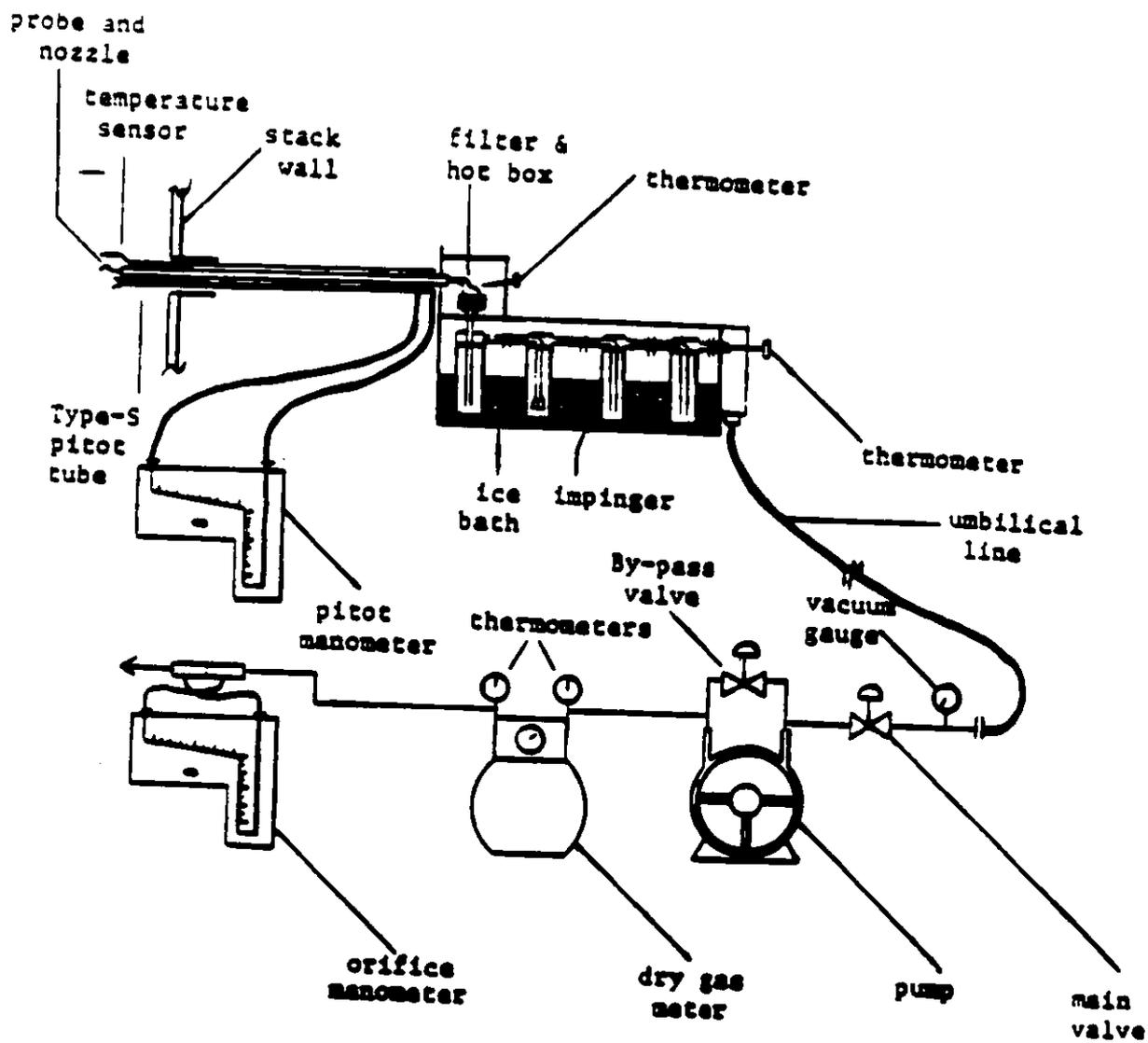
Duct Cross-sections

Rectangular Duct Cross-section is  $23 \frac{7}{8}$ " x  $31 \frac{3}{4}$ "

Therefore equivalent diameter = 27.25 inches

SOUTHWESTERN LABORATORIES  
ENVIRONMENTAL ENGINEERING SERVICES DIVISION

SOURCE SAMPLING TRAIN



E.P.A. Method 5

Source Sampling Train

SOUTHWESTERN LABORATORIES  
VELOCITY TRAVERSE FIELD DATA

Plant: Woodhouse Corp.  
Galena Park, Ia

Date: 1-19-91 Time: \_\_\_\_\_ Run: Prelim.

Source Name: Center Ship Loading Dust Collector

Bar. Pres. \_\_\_\_\_ In. Hg. Stack Pres. 1.5 In. H<sub>2</sub>O

Stack ID 23 1/2 x 31 3/4 Inches Ambient Temp. \_\_\_\_\_ °F

Port Extensions (Inches) (1) \_\_\_\_\_ (2) \_\_\_\_\_

Schematic of  
Cross Section

Point No.	Dia.	Dist. From Ref. Point (inches)	Ts-Stack Temp. °F ΔP-Vel. Head inches H <sub>2</sub> O							
			Ts1	ΔP1	√ΔP1	Ts2	ΔP2	√ΔP2	Ts3	ΔP3
1			A	1.0						
2			M	1.1						
3			B	1.4						
4			L	1.8						
5			E	1.9						
1			N	1.4						
2			T	1.8						
3				2.2						
4				2.5						
5				2.0						
1				1.7						
2				1.9						
3				2.5						
4				2.7						
5				1.6						
1				1.5						
2				1.9						
3				2.7						
4				2.5						
5				2.0						
1				1.2						
2				1.4						
3				2.0						
4				2.4						
5			V	2.0						
			Avg	1.90						

Avg. Ts °R =  $\sum \frac{T_s}{N} + 460 =$

Avg.  $\sqrt{\Delta P} = \sum \frac{\sqrt{\Delta P}}{N} =$

Vs = 85.49 x Cp x Avg.  $\sqrt{\Delta P}$  x  $\sqrt{\frac{\text{Avg. Ts}}{540 \times 1.345}}$

Vs = 85.49 x ( ) x ( ) x  $\sqrt{\frac{1}{1}}$

N = No. of Temp. or ΔP Readings

Pitot leak check - good!

Probe ID 5-B  
B side

Temperature ID Down

Barometer ID A

SOURCE SAMPLING FIELD DATA

PLANT Wood House STACK \_\_\_\_\_  
 DATE 1-15-71 OPER. JMR SAMPLE NO. 1 STACK HEIGHT \_\_\_\_\_  
 STACK DIA. (exle) \_\_\_\_\_ STACK DIA. (port) 2 3/8 x 3 3/4 STACK PRESS. "H<sub>2</sub>O -1.5 BAR. PRESS. "Hg 29.62  
 PROBE NO. 5 B BHPD PTCF 796 DGRY 0.9985 NOZZLE NO. XI 18  
 NOZZLE AREA 1.867 x 10<sup>-4</sup> FILTER NO. 54-322 SILICA GEL NO. 00 INITIAL LEAK RATE 0.06  
 METER NO. UNST 1 AH @ 1.9967 BOX NO. OLD STYLE FINAL LEAK RATE 0.06  
 PROCESS DATA PORT ASSUM. MOIST. 4.0% NOM. REF. PT. 131 PROBE LINER 6 In.

P#	Time	Dry Gas Meter Reading	In. H <sub>2</sub> O		OF	Dry Gas Meter Temp. OF		In. Hg Gauge Line Vacuum	Temp. OF			✓
			ΔP	AH		Inlet	Outlet		Amb.	Stack	Last Imp.	
1	9:52	340.250	1.2	1.70	off	52	52	6	off	68		
2	9:56	342.99	1.0	1.41		54	52	5		68	52	
3	10:00	345.54	1.10	1.55		62	54	5		69	52	
4	10:04	348.17	1.10	1.55		68	54	5		70	52	
5	10:08	350.81	1.15	1.63		74	56	6		75	53	
STOP	10:10-15	353.508	1.30	1.84		74	58	8		75	55	
2	10:19	356.45	1.20	1.70		78	60	6		75	55	
3	10:23	359.41	1.15	1.63		82	60	6		76	55	
4	10:27	362.27	1.50	2.2		86	62	8		77	56	
5	10:31	365.84	2.95	3.60		94	68	10		78	56	
STOP	10:30-40	369.345	.90	1.28		90	70	5		84	56	
2	10:44	371.74	.87	1.25		92	70	5		85	56	
3	10:48	374.99	1.10	1.55		92	70	6		85	56	
4	10:52	378.04	1.30	1.84		94	70	7		85	56	
5	10:56	379.95	1.95	2.60		96	70	10		83	56	
STOP	11:00-11:05	383.345	1.10	1.55		92	72	5		82	56	
2	11:07	385.95	1.10	1.55		92	72	5		83	56	
3	11:11	388.60	1.40	2.0		94	72	7		84	56	
4	11:15	391.61	1.60	2.25		96	72	8		82	56	
5	11:19	394.795	1.95	2.60		68	68	10		80	56	
STOP	11:20-34	398.275	.97	1.38		68	68	5		76	56	
2	11:38	400.72	1.10	1.55		80	68	5		76	56	
3	11:42	403.43	1.40	2.0		82	66	7		77	56	
4	11:46	406.55	1.95	2.60		86	68	10		78	56	
5	11:50	410.05	1.95	2.60		90	68	10		78	56	
STOP	11:54	413.599		1.86		73				78		1.1453

11.28  
28  
32

SAMPLE NET VOL. 73.349 AVG AIR 538 AVG METER TEMP 538 AVG STACK TEMP. °F 538

$$V_n(\text{Std.}) = \frac{73.349 \text{ ft}^3}{(\text{Net Vol.})} \times \frac{0.9985}{(\text{DGRY})} = \frac{528}{583} \times \frac{\text{Std. T (K)}}{\text{AMB (K)}} = \frac{29.76 \text{ Pa}}{29.92 \text{ Std. P}} = \frac{72.164}{13.6} \text{ dsc}$$

Ambient Temp. \_\_\_\_\_ °F      Avg. Meter Temp. \_\_\_\_\_ °R      Meter Pressure (Pa)  $= 29.62 + 1.9 = 31.52$   
 (In. Hg.)      (In. Hg.)      (In. Hg.)

Stack Pressure (Pa) =  $\frac{29.62 + 1.5}{13.6} = 22.51$   
 (in Hg.)

Thermometer ID DOLIC Barometer ID A

Sample 7.02-210  
7.02-0.0

EES 01/9: -16/401

glo

Plant: Woodhouse Corp  
Galena, Pa. Dept.

Box \_\_\_\_\_ Run No. 1 Date: 1-15-81

PARTICULATES: Filter No. 54-327

Wt. Filter - Final \_\_\_\_\_

Wt. Filter - Tare 56.93

Wt. on Filter \_\_\_\_\_

Acetone Wash Particulate \_\_\_\_\_

Weight Partial Particulate \_\_\_\_\_

(IMPP) \_\_\_\_\_

1st Impinger \_\_\_\_\_

2nd & 3rd Impinger \_\_\_\_\_

Impinger Catch-Total \_\_\_\_\_

(IMPI) \_\_\_\_\_

Weight Total Particulate \_\_\_\_\_

(GPC) \_\_\_\_\_

MOISTURE: Flask 1 Flask 2 Flask 3

Impinger Wash H<sub>2</sub>O \_\_\_\_\_

Final Volume 102 100 —

Initial Volume 100 100 —

Net Increase 2 — —

Total Water Collected (TWW) 15.4 ml

Silica Gel No. 20

Final Weight 266.6

Initial Weight 253.2

Net Increase (TG) 13.4

Vm(Std) 72.164

$$\text{Moisture} = \frac{(0.04707 \times \text{TWW}) \times 100}{V_m(\text{Std}) + (0.04707 \times \text{TWW})} =$$

$$\frac{72.487800}{72.88887800} = 1.07\% \text{ H}_2\text{O}$$

ORSAT:

Time \_\_\_\_\_

CO<sub>2</sub> \_\_\_\_\_

O<sub>2</sub> \_\_\_\_\_

CO \_\_\_\_\_

MOLECULAR WEIGHT: (MWSG) g/g mole

H<sub>2</sub>O 18.015 x 18 = 324.27

CO<sub>2</sub> 44.01 x — = —

O<sub>2</sub> 32.00 x 0.210 = 6.72

CO 28.01 x — = —

N<sub>2</sub> 28.02 x 0.790 = 22.1358

(Converted to ml by dividing by the density of water (1 g/ml))

28.73

MS 01/S1-16/402A

SOUTHWESTERN LABORATORIES, INC.  
SOURCE SAMPLING CALCULATIONS

RUN NO: 1

PLANT: Wood House Corp.

Galena Park Texas

DATE: 1-15-91

.00018667

PARTICULATE

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P \text{ avg.}} \times \sqrt{\frac{T_s \text{ avg.}}{MWSG \times P_s}} = 85.49 \times .796 \times 1.145 \times \sqrt{\frac{538}{28.73 \times 29.51}}$$

$$=$$

$$= 62.070 \text{ ft/sec.}$$

$$ACFM = V_s \times 60 \times A_s =$$

$$Q_{sd} = 60 \times \left(1.00 - \frac{\%H_2O}{100}\right) \times ACFM \times \frac{528}{T_s \text{ avg.}} \times \frac{P_s}{29.92} =$$

$$=$$

$$=$$

$$C_s = \frac{IMPP}{V_m \text{ (Std)}} \times 15.43 =$$

$$PMR_s = C_s \times \frac{Q_{sd}}{7000} =$$

$$C = \frac{GPC}{V_m \text{ (Std)}} \times 15.43 =$$

$$PMR = C \times \frac{Q_{sd}}{7000} =$$

$$I = \frac{0.09450 \times T_s \times V_m \text{ (Std)}}{P_s \times V_s \times A_n \times \theta \times \left(1.00 - \frac{\%H_2O}{100}\right)} = \frac{0.09450 \times 538 \times 72.164}{29.51 \times 62.070 \times 1.8667 \times 10^{-7} \times 100 \times 1.00} = 103.4$$

SOURCE SAMPLING FIELD DATA

PLANT North House STACK \_\_\_\_\_  
 DATE 1-15-91 OPER. JMK/AG SAMPLE NO. 2 STACK HEIGHT \_\_\_\_\_  
 STACK DIA. (exit) 23 3/4 x 31 3/4 STACK DIA. (port) \_\_\_\_\_ STACK PRESS. "H<sub>2</sub>O -1.5 BAR. PRESS. "Hg 29.64  
 PROBE NO. 5B BSIDE PTCF 796 DGMET 0.9985 NOZZLE NO. XI 185  
 NOZZLE AREA 1.861 x 10<sup>-4</sup> FILTER NO. 54-328 SILICA GEL NO. 50 INITIAL LEAK RATE < 0.1  
 METER NO. UNIST 1 ΔH @ 1.4967 BOX NO. 01D Sule FINAL LEAK RATE < 0.002  
 PROCESS DATA POOT ASSUM. MOIST. 4.0% NOM. REF. PT. 1.40 PROBE LINER Glass

Pt	Clock Time	Fe <sup>3</sup> Dry Gas Meter Reading	In. H <sub>2</sub> O		of Probe Temp.	Dry Gas Meter Temp. of		In. Hg Gauge Line Vacuum	Temp. of		
			ΔP	ΔH		Inlet	Outlet		Box	Ts Stack	Lane Imp.
1	1339	413.758	.69	.92	76 OFF	56	58	5	N/A	76	60
2	1343	415.92	.65	.86		60	59	5		76	
3	1347	418.97	.86	1.1		64	59	6		76	60
4	1351	420.15	1.1	1.46		72	61	8		76	
5	1355	422.63	.97	1.3		78	63	7		76	62
1	1359	425.09	1.2	1.6		78	66	8		78	
2	1403	427.79	1.2	1.6		81	67	8		78	62
3	1412	430.62	1.6	2.05		86	68	11		78	
4	1416	433.59	1.6	2.06		90	70	11		80	64
5	1420	436.73	1.5	2.0		92	71	11		81	
1	1424	440.16	.92	1.2		93	74	7		81	62
2	1430	442.48	.96	1.39		95	75	7		81	
3	1434	444.95	1.4	1.87		95	77	9		84	62
4	1438	448.01	1.9	2.05		97	78	13		85	
5	1442	451.324	2.2	2.295		80	72	18		83	62
1	1446	454.048	1.2	1.6		73	69	8		79	
2	1512	456.77	1.2	1.6		77	69	8		78	60
3	1516	459.52	1.3	1.73		82	70	9		78	
4	1520	462.32	1.9	2.54		88	71	14		79	58
5	1524	465.55	2.3	3.0		92	71	20		81	
1	1528	469.035	.94	1.25		90	72	7		79	58
2	1533	471.43	1.2	1.6		92	73	8		80	
3	1537	474.17	1.4	1.87		94	74	10		80	60
4	1541	477.10	2.0	2.65		96	75	15		82	
5	1545	480.58	2.3	3.1		100	76	21		82	
1	1549	484.385		1.94		77				79	11573

SAMPLE NET VOL.      AVG ΔH      AVG METER TEMP      AVG STACK TEMP. °F

$$V_m(\text{Std.}) = \frac{70.627 \text{ ft}^3}{(\text{Net Vol.})} \times \frac{0.9985}{(\text{DGMET})} = \frac{528}{538} \times \frac{\text{Std. T (R)}}{\text{AMB (R)}} = \frac{22.77 \text{ Ft}}{29.92 \text{ Std. P}} = 68.863 \text{ sec}$$

Ambient Temp. \_\_\_\_\_ °F      Avg. Meter Temp. \_\_\_\_\_ °F      Meter Pressure (Pa) =  $\frac{29.64 + 1.84}{13.6} = 22.78$

Stack Pressure (Pa) =  $\frac{29.64 + 1.5}{13.6} = 22.53$

Thermometer ID D-17P      Barometer ID A  
 TC-5-1.

SRS  
 Fyke 7001-210  
 7002-00

Plant: wood house corp.  
Galena Park Texas

Box \_\_\_\_\_ Run No. 2 Date: 1-15-81

PARTICULATES: Filter No. 54-328

Wt. Filter - Final \_\_\_\_\_

Wt. Filter - Tare 156.48

Wt. on Filter \_\_\_\_\_

Acetone Wash Particulate \_\_\_\_\_

Weight Partial Particulate \_\_\_\_\_

(IMPP) \_\_\_\_\_

1st Impinger \_\_\_\_\_

2nd & 3rd Impinger \_\_\_\_\_

Impinger Catch-Total \_\_\_\_\_

(IMPI) \_\_\_\_\_

Weight Total Particulate \_\_\_\_\_

(GPC) \_\_\_\_\_

MOISTURE: Flask 1 Flask 2 Flask 3

Impinger Wash H<sub>2</sub>O \_\_\_\_\_

Final Volume 102 100 —

Initial Volume 100 100 —

Net Increase 2 — —

Total Water Collected (TWW) 15.9 ml

$$\text{Moisture} = \frac{(0.04707 \times \text{TWW}) \times 100}{V_m(\text{Std}) + (0.04707 \times \text{TWW})} =$$

ORSAT:

ime \_\_\_\_\_

CO<sub>2</sub> \_\_\_\_\_

O<sub>2</sub> \_\_\_\_\_

O \_\_\_\_\_

Converted to ml by dividing by the density of water (1 g/ml)

Silica Gel No. 50

Final Weight 280.7

Initial Weight 266.8

Net Increase (IG) 13.9

V<sub>m</sub>(Std) 68.863

$$\frac{74.841300}{69.61141300} = 1.1\% \text{ H}_2\text{O}$$

MOLECULAR WEIGHT: (MWSG) g/g mole

H<sub>2</sub>O -.011 x 18 = .198

CO<sub>2</sub> -.989 x — x 44 = —

O<sub>2</sub> -.989 x .210 x 32 = 6.6461

CO — x — x 28 = —

N<sub>2</sub> -.989 x .790 x 28 = 21.8767

$$\text{MWSG} = 28.72$$

HS 01/S1-16/402A

SOUTHWESTERN LABORATORIES, INC.  
SOURCE SAMPLING CALCULATIONS

RUN NO:   Z  

PLANT:   Woodhouse Corp.  

  Galena Park Texas  

DATE:   1-15-91  

PARTICULATE

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P} \text{ avg.} \times \sqrt{\frac{T_s \text{ avg.}}{MWSG \times P_s}} = 85.49 \times .796 \times 1.157 \times \sqrt{\frac{539.5}{28.72 \times 29.53}}$$

$$=$$

$$= 62.796 \text{ ft/sec.}$$

$$ACFM = V_s \times 60 \times A_s =$$

$$Q_{sd} = 60 \times \left(1.00 - \frac{\%H_2O}{100}\right) \times ACFM \times \frac{528}{T_s \text{ avg.}} \times \frac{P_s}{29.92} =$$

$$=$$

$$=$$

$$C_s = \frac{IMPP}{V_m (Std)} \times 15.43 =$$

$$PMR_s = C_s \times \frac{Q_{sd}}{7000} =$$

$$C = \frac{GPC}{V_m (Std)} \times 15.43 =$$

$$PMR = C \times \frac{Q_{sd}}{7000} =$$

$$I = \frac{0.09450 \times T_s \times V_m (Std)}{P_s \times V_s \times A_n \times \theta \times \left(1.00 - \frac{\%H_2O}{100}\right)} = \frac{0.09450 \times 539.5 \times 68.863}{29.53 \times 62.796 \times 1.8667 \times 10^{-4} \times .989 \times 100} = 102.6\%$$

SOURCE SAMPLING FIELD DATA

PLANT Wood House STACK  
 DATE 1-15-91 OPER. JMR/MA SAMPLE NO. 3 STACK HEIGHT  
 STACK DIA. (exit) \_\_\_\_\_ STACK DIA. (port) 3.59 x 3.74 STACK PRESS. "H<sub>2</sub>O -1.5 BAR. PRESS. "Hg 29.64  
 PROBE NO. 5B REIDE PTCF 796 DGMET 0.9985 NOZZLE NO. XI 185  
 NOZZLE AREA 1.82 x 10<sup>-4</sup> FILTER NO. 54-261 SILICA GEL NO. 71 INITIAL LEAK RATE <.06  
 METER NO. UNIT 1 AH @ 1.9967 BOX NO. OLD STYLE FINAL LEAK RATE <.02  
 PROCESS DATA Perf. ASSUM. MOIST. 4.07 NOM. REF. PT. L40 PROBE LINER Glass

Pt	Clock Time	Fe <sub>3</sub> Dry Gas Meter Reading	In. H <sub>2</sub> O		OF Probe Temp.	Dry Gas Meter Temp. OF		In. Hg Gauge Line Vacuum	Temp. OF			✓
			ΔP	AH		Inlet	Outlet		Rox	Ts Stack	Last Imp.	
1	1855	484.587	.80	1.08	OFF	54	56	6	0A	68		
2	1858	486.79	.85	1.12		56	56	6 1/2		69	62	
3	1903	487.02	.85	1.12		62	56	6 1/2		70		
4	1907	491.10	1.05	1.40		72	60	7 1/2		74	60	
5	1911	493.69	1.05	1.40		78	64	7 1/2		74		
1	1921	496.654	1.25	1.65		82	66	8		74	58	
2	1929	498.67	1.20	1.60		86	68	8		74		
3	1933	501.27	1.15	1.52		92	70	7 1/2		73	56	
4	1932	503.87	1.60	2.10		96	70	9		75		
5	1941	507.92	1.80	2.4		102	74	9 1/2		78	56	
1	1949	510.220	.78	1.05		98	76	6		79		
2	1953	512.49	.78	1.05		98	76	6		79	58	
3	1957	514.65	.87	1.15		100	78	6 1/2		80		
4	2001	516.99	1.60	2.10		102	78	9		80	58	
5	2008	520.09	1.80	2.4		106	80	9 1/2		81		
1	2015	523.388	1.30	1.72		98	80	12		80	60	
2	2019	526.09	1.20	1.60		100	80	11		79		
3	2023	528.88	1.30	1.72		103	81	12		79	60	
4	2027	531.17	1.80	2.40		108	82	15		80		
5	2031	534.98	1.80	2.40		111	82	21		80	62	
1	2038	538.387	.99	1.31		106	83	9		79		
2	2042	540.97	1.10	1.48		107	83	10		79	60	
3	2046	543.47	1.30	1.82		109	84	12		79		
4	2050	546.47	1.70	2.26		111	85	17		80	60	
5	2054	549.34	1.84	2.50	U	113	88	13	✓	80		
STOP	2058	552.726		1.69			84			77		1.1156

SAMPLE NET VOL.                      AVG AH                      AVG METER TEMP                      AVG STACK TEMP. OF                      AVG ΔP

$V_m(\text{Std.}) = \frac{128.129 \text{ ft}^3}{(\text{Net Vol.})} \times \frac{0.9985}{(\text{DGMET})} = \frac{528}{544} \frac{\text{Std. T (R)}}{\text{AMB (R)}} = \frac{29.76 \text{ Pa}}{29.92 \text{ Std. P}} = \frac{65.623}{13.6} \text{ dsc}$

Ambient Temp. \_\_\_\_\_ °F      Avg. Meter Temp. \_\_\_\_\_ °F      Meter Pressure (Pa) =  $\frac{29.64 + 1.69}{13.6} = \frac{29.76}{13.6}$  (In. Hg.)

Stack Pressure (Pa) =  $\frac{29.64 + -1.5}{13.6} = \frac{27.53}{13.6}$  (in Hg.)

Thermometer ID DORC      Barometer ID A

TC-5-1

Used original filter  
 Retri dist marked out

File 702-210  
 702-0-0

EES 01/91-16/401

Plant: Woodhouse Corp  
Galena Park Texas

Box \_\_\_\_\_ Run No. 3 Date: 1-15-91

PARTICULATES: Filter No. 57-261

Wt. Filter - Final \_\_\_\_\_  
 Wt. Filter - Tare \_\_\_\_\_  
 Wt. on Filter \_\_\_\_\_  
 Acetone Wash Particulate \_\_\_\_\_  
 Weight Partial Particulate \_\_\_\_\_

(IMPP) \_\_\_\_\_

1st Impinger \_\_\_\_\_

2nd & 3rd Impinger \_\_\_\_\_

Impinger Catch-Total \_\_\_\_\_

(IMPI) \_\_\_\_\_

Weight Total Particulate \_\_\_\_\_

(GPC) \_\_\_\_\_

MOISTURE:	Flask 1	Flask 2	Flask 3
Impinger Wash H <sub>2</sub> O			
Final Volume	<u>100</u>	<u>100</u>	_____
Initial Volume	<u>100</u>	<u>100</u>	_____
Net Increase	<u>00</u>	_____	_____
Total Water Collected (TWW)	<u>13</u> ml		

Silica Gel No. 71

Final Weight 260.3

Initial Weight 247.3

Net Increase (TG) 13

Vm(Std) 65.673

$$\text{Moisture} = \frac{(0.04707 \times \text{TWW}) \times 100}{V_m(\text{Std}) + (0.04707 \times \text{TWW})} =$$

$$\frac{61.191}{66.28491} = 0.97\% \text{H}_2\text{O}$$

ORSAT:

Time	_____	_____	_____
O <sub>2</sub>	_____	_____	_____
O <sub>2</sub>	_____	_____	_____
O	_____	_____	_____

MOLECULAR WEIGHT: (MWSG) g/g mole

H<sub>2</sub>O - .009 x 18 = .162

CO<sub>2</sub> - .001 x 44 = .044

O<sub>2</sub> - .001 x 32 = .032

CO \_\_\_\_\_ x 28 = \_\_\_\_\_

N<sub>2</sub> - .001 x 28 = .028

Converted to ml by dividing by the density of water (1 g/ml)

28.74

SOUTHWESTERN LABORATORIES, INC.  
SOURCE SAMPLING CALCULATIONS

RUN NO: 3

PLANT: Woodhouse Corp

Galena Park Texas

DATE: 1-15-91

PARTICULATE

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P \text{ avg.}} \times \sqrt{\frac{T_s \text{ avg.}}{MWSG \times P_s}} = 85.49 \times 0.796 \times 1.116 \times \sqrt{\frac{537}{28.74 \times 29.53}}$$

$$= 60.409 \text{ ft/sec}$$

ACFM =  $V_s \times 60 \times A_s =$

$$Q_{sd} = 60 \times \left(1.00 - \frac{\%H_2O}{100}\right) \times ACFM \times \frac{528}{T_s \text{ avg.}} \times \frac{P_s}{29.92} =$$

$$C_s = \frac{IMPP}{V_m \text{ (Std)}} \times 15.43 =$$

$$PMR_s = C_s \times \frac{Q_{sd}}{7000} =$$

$$C = \frac{GPC}{V_m \text{ (Std)}} \times 15.43 =$$

$$PMR = C \times \frac{Q_{sd}}{7000} =$$

$$I = \frac{0.09450 \times T_s \times V_m \text{ (Std)}}{P_s \times V_s \times A_n \times \theta \times \left(1.00 - \frac{\%H_2O}{100}\right)} = \frac{109450 \times 537 \times 65.673}{29.53 \times 60.409 \times 1.8667 \times 10^{-4} \times 100 \times 0.991} = 101.07$$

Project: Woodhouse Compressor  
Galena Park Texas

SWL Project No: 54-2070-419  
 Lab Analysis Date: 1-21-91

Source: Center Ship Loading Dust collector

Field Sampling Date: 1-15-91

Analyst: JMO JH

Field Sampling Crew: JMO JR JJ

Calib. Date: \_\_\_\_\_

Calib. Check Date: \_\_\_\_\_

	Acetone Probe Wash	1st Imp in DI H <sub>2</sub> O		Blank S.
Run No:	A-30	A-325		A-259 <sup>DI H<sub>2</sub>O</sup> Blk
Final Wt.	95.8467	99.3300		107.3023
Tare Wt.	95.8471	99.3258		107.3044
Difference	-0.0004	0.0042		-0.0021
Aliquot Adj.	100	100		100
Blank Corr.	Negl.	Negl.		
Residual Wt.	Negl.	0.0042		Negl.
Run 2	A-264	A-7		A-402 <sup>Acetone</sup> Blk.
Final Wt.	104.9214	105.6993		100.3921
Tare Wt.	104.9229	105.7000		100.3857
Difference	-0.0085	-0.0007		-0.0036
Aliquot Adj.	100	100		100
Blank Corr.	Negl.	Negl.		
Residual Wt.	Negl.	Negl.		Negl.
Run 3	A-408	A-341		
Final Wt.	98.4704	99.5235		
Tare Wt.	98.4688	99.5209		
Difference	0.0016	0.0025		
Aliquot Adj.	100	100		
Blank Corr.	Negl.	Negl.		
Residual Wt.	0.0016	0.0025		

Southwestern Laboratories  
Environmental Analytical Services Division  
Houston, Texas

E.P.A. Method 5 Analytical Data

Samp	Net	Avg	Avg Meter	Avg Stack	Avg sq rt	Meter P	Stack P				As	An
Time	Vol.	delta H	Temp.	Temp.	delta P	Pm	Ps				(sq ft)	(sq ft)
(min)	(cu ft)	(in. H2O)	(F)	(F)	(in. H2O)	(in. Hg)	(in. Hg)	DGMCF	Cp			
100	73.349	1.86	73	78	1.1453	29.76	29.51	0.9985	0.796		5.264	1.8667E-04
100	70.627	1.84	77	79	1.1573	29.78	29.53	0.9985	0.796		5.264	1.8667E-04
100	68.129	1.69	84	77	1.1156	29.76	29.53	0.9985	0.796		5.264	1.8667E-04

Tot. H2O	Collect	Orsat Data	IMPP	GPC
(mL)	%CO2	%O2	%N2	(grams)
15.4	0.0	21.0	179.0	0.0000
15.9	0.0	21.0	179.0	0.0000
13.0	0.0	21.0	179.0	0.0016

E.P.A. Method 5 Flow Calculations

E.P.A. Method 5 Particulate Calculation

- 1  $V_s \text{ ft/sec} = 85.49 \times C_p \times (\text{avg sq rt delta P}) \times [ \text{avg } T_s / (\text{MWSG} \times P_s) ]^{1/2}$
- 2  $\text{ACFM ft}^3/\text{min} = V_s \text{ ft/sec} \times 60 \text{ sec/min} \times A_s \text{ sqft}$
- 3  $Q_{sd} = 60 \times (1.00 - (\%H_2O/100)) \times \text{ACFM} \times (528 / \text{avg } T_s)$
- 4  $IX = (0.0945 \times T_s \times V_m(\text{std})) / [ P_s \times V_s \times A_n \times \text{Time} \times (1.00 - (\%H_2O/100)) ]$

Vm Std.	% H2O	MWSG	Vs	ACFM	Qsd	I	Cs	PMRs	Cpt	PMRpt
dscf		g/g mole	ft/sec		dscf/hr	%	gr/dscf	lb/hr	gr/dscf	lb/hr
72.164	0.99	28.732	62.08	19,608.53	1,127,496.0	108.4	0.0000	0.00	0.0009	0.14
69.015	1.07	28.724	62.78	19,828.60	1,137,905.3	102.7	0.0000	0.00	0.0000	0.00
65.673	0.92	28.740	60.39	19,073.26	1,100,296.6	101.0	0.0004	0.06	0.0010	0.15

*GRG*

SOURCE NAME: Outlet for Grain handling duct

OBSERVER: JED

ADDRESS: Wood House Corp Galena Park Jr.

DATE: 1-15-91

Point of Emission: outlet duct

OBSERVATION POINT Shop Next to East Rail

STACK DISTANCE FROM ~60' HEIGHT ~120'

WIND - SPEED ~5-10 mph DIRECTION out west

SKY CONDITION Cloudy

COLOR OF EMISSION N/A

RELATIVE HUMIDITY \_\_\_\_\_

BACKGROUND sky / Grey metal framework

AMBIENT AIR TEMPERATURE ~52°

CERTIFICATION DATE \_\_\_\_\_

SUMMARY OF AVERAGE OPACITY

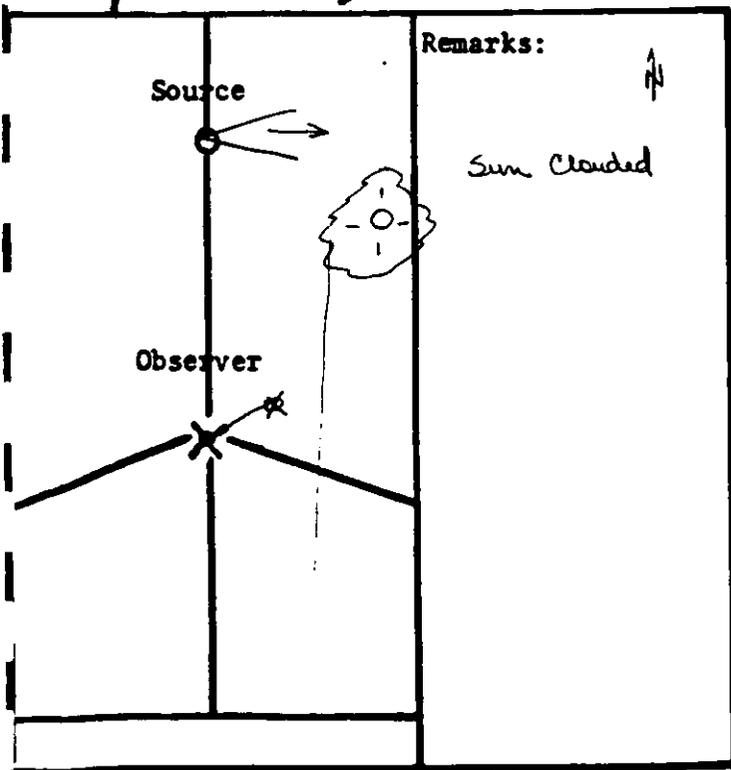
Set Number	Time Start--End	Opacity	
		Sum	Average
1	10-30 - 1036	0	0

Observer

Sun

Wind

Plume & Stack



Remarks:

Sun Clouded

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

Evaluator's Signature

*Robert Dwyer*

SOURCE NAME: Ductlet for Gas tracks duct  
 ADDRESS: Woodhouse Corp. Galena Park, TX  
 Point of Emission: Ductlet Duct

OBSERVER: JRP  
 DATE: 1-15-91

OBSERVATION POINT Ship Next to East Rail

STACK DISTANCE FROM 60' HEIGHT 120'

WIND - SPEED 5-10 mph DIRECTION outly west

SKY CONDITION Cloudy

COLOR OF EMISSION N/A

RELATIVE HUMIDITY \_\_\_\_\_

BACKGROUND sky / big metal frame work

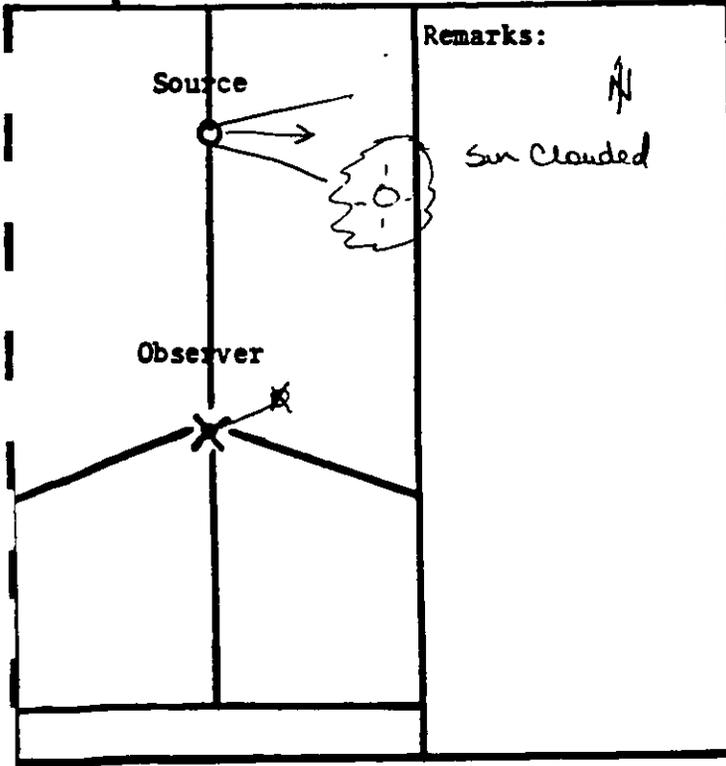
AMBIENT AIR TEMPERATURE ~60°F

CERTIFICATION DATE \_\_\_\_\_

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average
2	1420-1426	0	0

Observer  Sun  Wind  Plume & Stack



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

Evaluator's Signature

Robert Doughty

VISIBLE EMISSION OBSERVATION FORM

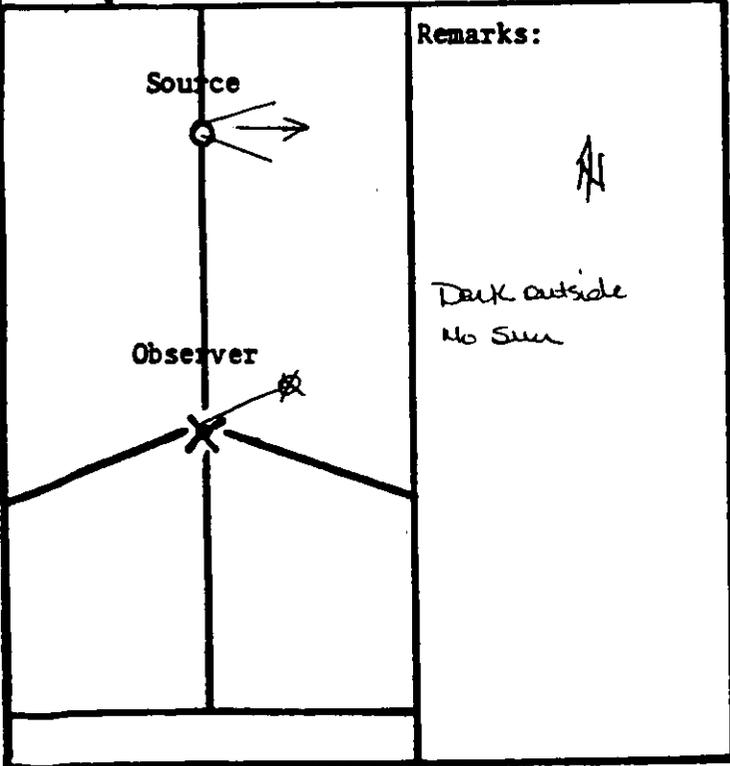
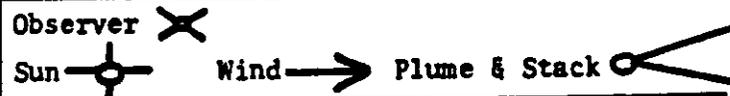
SOURCE NAME: Outlet from Air Gran. loading dock  
 ADDRESS: Woodhouse Corp. Galena Park, Tx.  
 Point of Emission: Outlet Street

OBSERVER: JA 1-15-91  
 DATE: 1-15-91

OBSERVATION POINT Ship next to East Rail  
 STACK DISTANCE FROM 160' HEIGHT 170'  
 WIND - SPEED 5-10 mph DIRECTION Out west  
 SKY CONDITION Cloudy Dark  
 COLOR OF EMISSION N/A  
 RELATIVE HUMIDITY \_\_\_\_\_  
 BACKGROUND Grey metal framework (lights)  
 AMBIENT AIR TEMPERATURE 70°F  
 CERTIFICATION DATE \_\_\_\_\_

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average
3	1930-1936	0	0



Remarks:  
 AI  
 Dark outside  
 No Sun

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

Evaluator's Signature  
Robbie Dwyer

SOURCE NAME: Gran 866149 2 Ship Hull

OBSERVER: JAD

ADDRESS: Woodhouse Camp Galena Park, IL

DATE: 1-15-91

Point of Emission: Ship Hull

OBSERVATION POINT on ship next to East Rail

STACK DISTANCE FROM ~50' HEIGHT level

WIND - SPEED 5-10 mph DIRECTION outly west

SKY CONDITION Cloudy

COLOR OF EMISSION lt. Brown

RELATIVE HUMIDITY \_\_\_\_\_

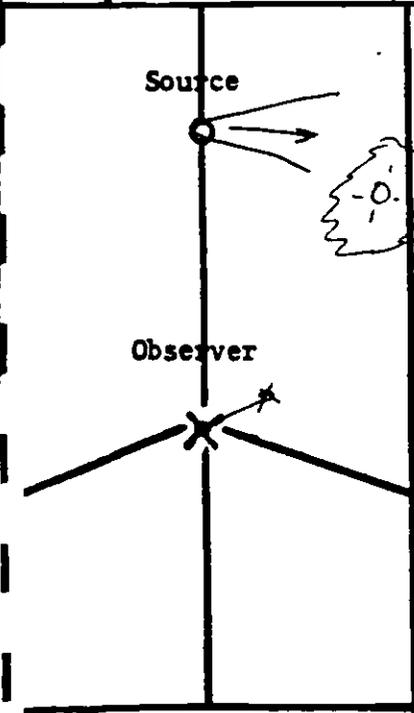
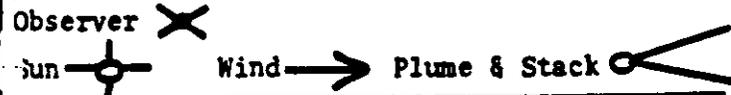
BACKGROUND Red metal work on ship

AMBIENT AIR TEMPERATURE 52°F

CERTIFICATION DATE \_\_\_\_\_

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start--End	Opacity	
		Sum	Average
	scattered times		11.9
	During Run 1		



Remarks: NI  
Sun clouded

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

Evaluator's Signature  
Robert Doughty

SOURCE NAME: Chem loads @ Ship Hull  
 ADDRESS: Woodhouse Corp Garland park La  
 Point of Emission: Ship Hull

OBSERVER: JRP  
 DATE: 1-15-91

OBSERVATION POINT on ship next to east rail

STACK DISTANCE FROM ~50' HEIGHT level

WIND - SPEED 5-10 mph DIRECTION out & west

SKY CONDITION cloudy

COLOR OF EMISSION lt. Brown

RELATIVE HUMIDITY \_\_\_\_\_

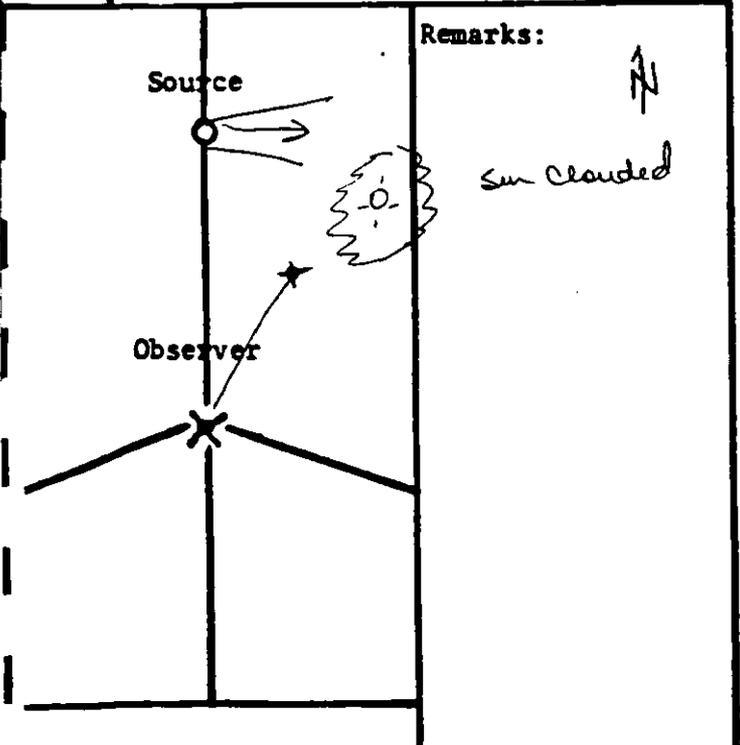
BACKGROUND Red metal work on ship

AMBIENT AIR TEMPERATURE ~60°F

CERTIFICATION DATE \_\_\_\_\_

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average
	<u>scattered times</u>		<u>11.3</u>
	<u>Duty Run 2</u>		



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

Evaluator's Signature  
Robb Doughty

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME: Green Truck @ Ship Hull

OBSERVER: JRP

ADDRESS: Woodhouse Corp Galena Park, La

DATE: 1-15-91

Point of Emission: Ship Hull

OBSERVATION POINT on Ship Next to East Rail

STACK DISTANCE FROM 150' HEIGHT level

WIND - SPEED 5-10 mph DIRECTION out west

SKY CONDITION cloudy Dark

COLOR OF EMISSION Lt Brown

RELATIVE HUMIDITY \_\_\_\_\_

BACKGROUND Red metal work on Ship (light)

AMBIENT AIR TEMPERATURE -70°F

CERTIFICATION DATE \_\_\_\_\_

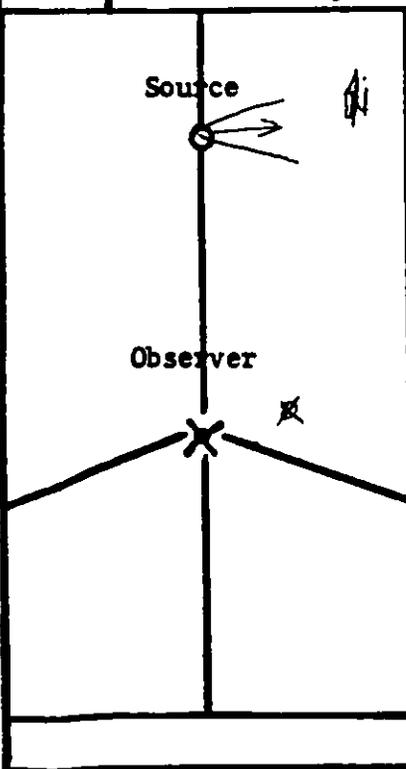
SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average
	<u>Scattered Int</u>		<u>11.9</u>
	<u>Long Run 3</u>		

Observer

Sun

Wind  → Plume & Stack



Remarks:

Dark outside  
No Sun

	0	15	30	45		0	15	30	45
0	10	15	15	15	30				
1	10	10	10	10	31				
2					32				
3					33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
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26					56				
27					57				
28					58				
29					59				

Evaluator's Signature

Robb Dwyer

## DEFINITIONS

Standard Conditions: 68° and 29.92 inches of mercury

Stack Conditions: Stack temperature, pressure and moisture

## NOMENCLATURE

ACFM	Volumetric stack gas flow in cubic feet per minute at stack conditions
AMT	Average temperature at meter in degrees Rankin
AN	Area of nozzle in square feet
As	Area of stack in square feet
C	Total pollutant concentration in grains per dry standard cubic feet
CFM	Cubic feet per minute
CO <sub>2</sub>	Carbon Dioxide
CO	Carbon Monoxide
Cp	Pitot tube correction factor or (PTCF)
Cs	Partial pollutant concentration in grains or grams per dry standard cubic foot (total less impinger catch)
De	Equivalent stack diameter of rectangular stack $(De = \frac{2LW}{L+W})$
DGMCF	Dry gas meter correction factor
DI	Deionized water
dscf	dry standard cubic feet
EA	Excess Air (expressed as percent)
°F	Temperature in degrees Fahrenheit
GPC	Grams of particulate caught (total)

NOMENCLATURE (Cont'd)

g	Grams
gr	Grains
Hg	Mercury
H <sub>2</sub> O	Water
I	Isokinetics as percent
IMPI	Grams of particulate caught in impinger
IMPP	Grams of particulate caught before impinger (total less impinger catch)
MWSG	Molecular weight of stack gas in grams/gram-mole (g/g-mole) or pounds/pound-mole (lb/lb-mole)
N <sub>2</sub>	Nitrogen
O <sub>2</sub>	Oxygen
Pb	Barometric pressure in inches of mercury
Pm	Meter pressure in inches of mercury
ppm	Parts per million (Volume/Volume or mass/mass)
P <sub>r</sub>	Barometric pressure of reference barometer
Ps	Absolute pressure in stack in inches of mercury
PMR	True pollutant mass rate in pounds per hour
PMRs	Pollutant mass rate for the "front half" in pounds per hour (total less impinger catch)
Qsd	Dry volumetric stack gas flow rate corrected to standard conditions in dscf/hr
°R	Temperature in degrees Rankin (equivalent to °F + 460°)
Std.P	Pressure at standard conditions (29.92 inches of mercury)

NOMENCLATURE (Cont'd)

Std.T	Temperature at standard conditions (528 °R)
TG	Total weight of water collected in silica gel, in grams
T <sub>r</sub>	Temperature of reference thermometer
T <sub>s</sub>	Stack gas temperature in degrees Rankin
T <sub>t</sub>	Temperature of test thermometer
TWW	Total water wash volume collected in impingers and silica gel, in milliliters (ml) NOTE: Density of H <sub>2</sub> O equals 1 g/ml
V <sub>m</sub> (Std)	Total gas sampled converted to standard conditions, dry basis, in cubic feet
V <sub>s</sub>	Stack gas velocity in feet per second
ΔH	Velocity head orifice reading in inches of water
ΔP	Stack gas velocity head in inches of water
θ	Sample time in minutes

**SOUTHWESTERN LABORATORIES**

**SOUTHWESTERN LABORATORIES, INC.**  
SOURCE SAMPLING CALCULATIONS

FLOW CALCULATIONS

$$V_s \text{ ft/sec} = 85.49 \times C_p \times \sqrt{\Delta P^1 \text{ avg. (in H}_2\text{O)}} \times \sqrt{\frac{T_s \text{ avg. (}^\circ\text{R)}}{MWSG \text{ (lb/lb-mole)} \times P_s \text{ (in Hg)}}$$

Pitot Tube Constant  
 Pitot Tube Correction Factor  
 Stack Temperature  
 Molecular Weight of the Stack Gas  
 Stack Pressure

$$85.49 \frac{\text{ft}}{\text{sec}} \left[ \frac{(\text{lb/lb-mole})(\text{in Hg})}{(R)(\text{in H}_2\text{O})} \right]^{\frac{1}{2}}$$

Pitot Tube Constant

$$ACFM \text{ ft}^3/\text{min} = V_s \text{ (ft/sec)} \times 60 \text{ sec/min} \times A_s \text{ (ft}^2\text{)}$$

$$Q_{sd} \text{ dscf/hr} = 60 \text{ min/hr} \times \left(1.00 - \frac{\%H_2O}{100}\right) \times ACFM \text{ (ft}^3/\text{min)} \times \frac{528}{T_s \text{ avg (}^\circ\text{R)}} \times \frac{P_s \text{ (in Hg)}}{29.92}$$

Area of the Stack  
 Standard Temperature  
 Stack Pressure  
 Percent Moisture  
 Stack Temperature  
 Standard Pressure

68 °F = 528 °R

PARTICULATE CALCULATIONS

$$C_s \text{ grains/dscf} = \frac{IMPP \text{ (grams)}}{V_m \text{ (Std)}} \times 15.43 \text{ (grains/grams)}$$

Filter + Probe Wash  
 Volume of Air Pulled Through the Meter Box @ Standard Conditions (dscf)

$$PMR_s \text{ lb/hr} = C_s \text{ (grains/dscf)} \times \frac{Q_{sd} \text{ (dscf/hr)}}{7000 \text{ (grains/lb)}}$$

$$C \text{ grains/dscf} = \frac{GPC \text{ (grams)}}{V_m \text{ (std)}} \times 15.43 \text{ (grains/grams)}$$

Filter + Probe Wash + 1<sup>st</sup> Impinger

$$PMR \text{ lb/hr} = C \text{ (grains/dscf)} \times \frac{Q_{sd} \text{ (dscf/hr)}}{7000 \text{ (grains/lb)}}$$



# SOUTHWESTERN LABORATORIES

ENVIRONMENTAL SERVICES, HOUSTON, TEXAS  
CONTROL UNIT CALIBRATION

BOX NO.             
DRY GAS METER NO. 2054K034

DATE 5/16/90  
Barometric Pressure,  $P_b$  30.05 in. Hg

Orifice Manometer setting $\Delta H$ , in. H <sub>2</sub> O	Gas Volume wet test meter $V_w$ , ft <sup>3</sup>	Gas Volume dry gas meter $V_d$ , ft <sup>3</sup>	Temperature				Time min.-sec.	Time $\theta$ min.	$\gamma$	$\Delta H\theta$
			Wet Test Meter $t_w$ , °F	Dry Gas Meter						
				Inlet $t_{di}$ , °F	Outlet $t_{do}$ , °F	Average $t_d$ , °F				
0.25	3	<del>386.215</del> 387.340	<del>73</del> 71	<del>80</del> 98	<del>80</del> 82	85	11.00	11.00	0.9810	1.8482
0.50	5	<del>390.400</del> 395.585	<del>73</del> 73	<del>98</del> 116	<del>85</del> 95	99	13.40	13.66	1.01	2.0007
1.0	5	<del>398.662</del> 403.770	<del>73</del> 73	<del>74</del> 94	<del>74</del> 90	81	9.46	9.76	0.9912	2.1107
2.0	10	<del>404.786</del> 415.102	<del>73</del> 73	<del>98</del> 122	<del>82</del> 92	99	13.45	13.75	1.0116	2.0272
Average									0.9984	1.9967

### Calculations

$\Delta H$	$\frac{\Delta H}{13.6}$	$\gamma$	$\Delta H\theta$	
			$\frac{V_w P_b (t_d + 460)}{V_d \left( P_b + \frac{\Delta H}{13.6} \right) (t_w + 460)}$	$\frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[ \frac{(t_w + 460)\theta}{V_w} \right]^2$
0.25	0.018	$\frac{3.00 \times 30.05 \times 548}{3.125 \times 30.07 \times 533}$	$\frac{0.0317 \times 0.25}{30.05 \times 545}$	$\left[ \frac{533 \times 11.00}{3.00} \right]^2$
0.50	0.037	$\frac{5.00 \times 30.05 \times 559}{5.185 \times 30.09 \times 513}$	$\frac{0.0317 \times 0.50}{30.05 \times 559}$	$\left[ \frac{533 \times 13.66}{5.00} \right]^2$
1.0	0.074	$\frac{5.00 \times 30.05 \times 541}{5.108 \times 30.12 \times 513}$	$\frac{0.0317 \times 1.00}{30.05 \times 541}$	$\left[ \frac{533 \times 9.76}{5.00} \right]^2$
2.0	0.147	$\frac{10.00 \times 30.05 \times 559}{10.316 \times 30.20 \times 513}$	$\frac{0.0317 \times 2.00}{30.05 \times 559}$	$\left[ \frac{533 \times 13.75}{10.00} \right]^2$

Is each  $\Delta H\theta$  within  $\pm 0.15$  of  $\overline{\Delta H\theta}$   
 yes, then  $\Delta H\theta$  is valid.  
 No, then repair and recalibrate.

Is each  $\gamma$  within  $\pm 0.02$  of  $\overline{\gamma}$   
 yes, then  $\overline{\gamma}$  is valid.  
 No, then repair and recalibrate

SOUTHWESTERN LABORATORIES

*Paul DeSaw*

### ENVIRONMENTAL SERVICES, HOUSTON, TEXAS GAMMA CALIBRATION SHEET

PROJECT Wood House Coop LAB NO.: \_\_\_\_\_ DATE \_\_\_\_\_

BOX NO. Unit 1

CURRENT  $\gamma$  .9985

AVERAGE  $\Delta H_2O$  0.66

MAXIMUM VACUUM 9

ACCEPTABLE  $\gamma$  LIMITS

WET TEST GAS VOLUME: 1 FT<sup>3</sup>

.9486 TO 1.048

BAROMETRIC PRESSURE: 30.42 IN. Hg

DRY GAS METER VOLUME V <sub>d</sub> FT <sup>3</sup>	WET TEST METER $e_w$	TEMPERATURE			$\gamma$
		DRY GAS METER			
		INLET $e_{d1}$ °F	OUTLET $e_{d0}$ °F	AVERAGE $e_d$ °F	
584.106	74	82	82		
585.102	74	84	82	82.5	1.0183
585.102	74	84	82		
586.100	74	86	84	84	1.0191
586.100	74	86	84		
587.110	74	88	84	85.5	1.0098
AVERAGE $\gamma$					1.0157 <del>3.1037</del>

*∴ Reading is valid*

$$\frac{V_w P_b (e_d + 460)}{V_d (P_b + \frac{H}{13.6}) (e_w + 460)} = \gamma$$

$\frac{1.00 \cdot 30.42 \cdot 542.5}{.996 \cdot 30.47 \cdot 534} = 1.0183$   
 $\frac{1.00 \cdot 30.42 \cdot 544}{.998 \cdot 30.47 \cdot 534} = 1.0191$   
 $\frac{1.00 \cdot 30.42 \cdot 545.5}{1.010 \cdot 30.47 \cdot 534} = 1.0098$

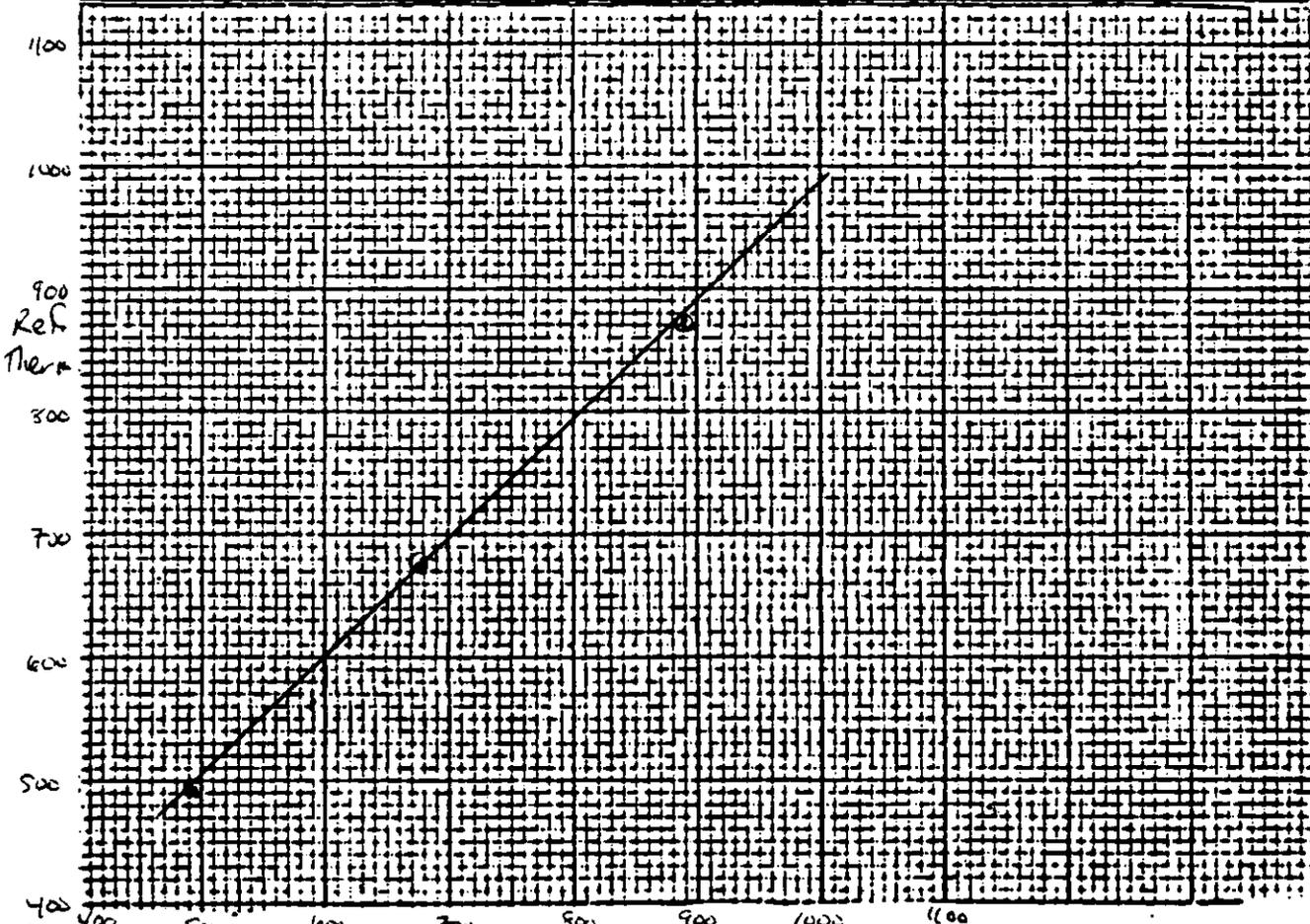
SOUTHWESTERN LABORATORIES

*Johnny Royer*

**SOUTHWESTERN LABORATORIES**  
**TEMPERATURE SENSOR CALIBRATION DATA**

DATE: 3-21-86 THERMOCOUPLE NO.: 5-1  
 AMBIENT TEMPERATURE: 72 °F BAROMETRIC PRESSURE: 30.54 In. Hg  
 CALIBRATOR: JKR REFERENCE: Mercury-in-glass HST413-C

Reference Point Source	Reference Thermometer Temperature			Thermocouple Temperature		Temperature Difference*
	°C	°F	°R	°F	°R	
Ice water slush	0	32	492	35	495	0.6 %
Boiling Water	102	215.6	675.6	218	678	0.4 %
Boiling Oil	217	422.6	822.6	430	890	0.8 %



$$\left[ \frac{(\text{ref. temp., } ^\circ\text{F} + 460) - (\text{test therm. temp., } ^\circ\text{F} + 460)}{\text{ref. temp., } ^\circ\text{F} + 460} \right] 100 \leq 1.5\% \text{ absolute value}$$

## THERMOMETER AND BAROMETER CALIBRATION

Project: Wood House Corp By: Johnny Reyes

Project No: 54-9010-419 Date: 1-21-91

<u>Thermometer</u>	<u>Thermocouple</u>	<u>Temperature °R (T<sub>t</sub>)</u>	<u>Reference °R (T<sub>r</sub>)*</u>
DORIC	5-1	72 <sup>°F</sup> 532 <sup>°R</sup>	23 <sup>°C</sup> = 73.4 <sup>°F</sup> + 460 = 533.4

### \*Mercury-in-Glass Thermometer

$$\% \text{ Difference} = \frac{T_t - T_r}{T_r} \times 100$$

$$\frac{532 - 533.4}{533.4} \times 100 = -0.003 \leq 1.5\% \therefore \text{Reading is valid}$$

### Aneroid 'Hg (P<sub>b</sub>)

Barometer A = 30.41

### Reference 'Hg (P<sub>r</sub>)\*

30.42

### \*Mercurial Barometer

$$\text{Difference} = P_b - P_r$$

$$30.42 - 30.41 = .01 \leq 0.1 \text{ 'Hg} \therefore \text{Reading is valid}$$

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

222 Cavalcade St. • PO. Box 8766, Houston, Texas 77249 • 713/892-9151

PROJECT: Pitot Tube Calibration PROJECT NO.: \_\_\_\_\_

CALCD. BY: JRO DATE: 7-2-90 CHKD BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PITOT TUBE IDENTIFICATION NUMBER: 5-B DATE: 7-2-90  
 CALIBRATED BY: JRO

"A" SIDE CALIBRATION				
RUN NO.	$\Delta P_{std}$ cm H <sub>2</sub> O (in. H <sub>2</sub> O)	$\Delta P(d)$ cm H <sub>2</sub> O (in. H <sub>2</sub> O)	$C_p(d)$	DEVIATION $C_p(d) - \bar{C}_p(A)$
1	.31	.47	.804	0
2	.31	.47	.804	0
3	.31	.47	.804	0
			$\bar{C}_p$ (SIDE A)	.804

"B" SIDE CALIBRATION				
RUN NO.	$\Delta P_{std}$ cm H <sub>2</sub> O (in. H <sub>2</sub> O)	$\Delta P(d)$ cm H <sub>2</sub> O (in. H <sub>2</sub> O)	$C_p(d)$	DEVIATION $C_p(d) - \bar{C}_p(B)$
1	.31	.48	.796	0
2	.31	.48	.796	0
3	.31	.48	.796	0
			$\bar{C}_p$ (SIDE B)	.796

$$\text{AVERAGE DEVIATION} = \sigma \text{ (A OR B)} = \frac{\sum |C_p(d) - \bar{C}_p \text{ (A OR B)}|}{3} \leftarrow \text{MUST BE } < 0.01$$

$$|\bar{C}_p \text{ (SIDE A)} - \bar{C}_p \text{ (SIDE B)}| \leftarrow \text{MUST BE } < 0.01$$

New std. pitot = .99

$$.99 \sqrt{\frac{\Delta P_{std}}{\Delta P(d)}} = C_p(d)$$



# SOUTHWESTERN LABORATORIES

MATERIALS, ENVIRONMENTAL AND GEOTECHNICAL CONSULTATION

PROJECT: Nozzle Calibration PROJECT NO.: \_\_\_\_\_ SHEET 1 OF 3

BY: \_\_\_\_\_ DATE: \_\_\_\_\_

Nozzle ID Number	Box Number	Date <u>1-22-90</u> Nozzle Diameter (in)	Date _____ Nozzle Diameter (in)			
I		.142				
II		.123				
III		.118				
IV		.134				
V		.195				
VI		.263				
VII		.136				
VIII		.148				
IX		.388				
X		.152				
XI		.185				
XII		.211				
XIII		.149				
XV		.342				

NOTE: Nozzle diameter represents average of three measurements to the nearest 0.001 inch.

Maximum allowable difference in any two measurements is 0.004 inches.

# CARL POE CO., INC.

99 REINERMAN ST. • HOUSTON, TEXAS 77007 • 713-861-3816

---

October 3, 1990

Southwestern Labs  
P.O. Box 8768  
Houston, TX 77249

Dear Sirs:

This is to certify that your 100 CFH Precision Wet Test MEter, serial no. AB-3, has been calibrated with an American five foot bell prover, serial no. 1045. It is traceable to the Bureau of Standards, reference no. 106870, PI-TAPE.

Sincerely,

CARL POE CO., INC.



Carl W. Poe  
CWP/mp

# Weight Traceability Certificate



## Precision Balance Services

hereby certifies balances belonging to

SOUTHWESTERN LABORATORIES

222 CAVALCADE

this the 10 day of May, 1990

The below tested balances were tested and adjusted for accuracy, precision, and sensitivity with weight traceable to the National Bureau of Standards.

N.B.S. Test Number: 737/228509

MODEL AE 160 S/N C38751

### PRE-TEST

LINEARITY + or - 0.1mg.

CORNERLOAD 0

CALIBRATION - 0.2mg.

OVERALL CONDITION

### POST-TEST

LINEARITY + or - 0.1mg.

CORNERLOAD 0

CALIBRATION - 0.6mg.

EXCELLENT

Technician: Dell Everett Date: 5-10-90

DELL EVERETT

# The Texas Air Control Board Certifies That

**Robbie Daughtry**  
Has completed a course conducted by The Texas Air Control Board and  
has met the requirements for evaluating visible emissions.

**October 5, 1990**



Date Certified

**April 5, 1991**

This Certificate Expires

*Phillip S. Clark* 10/5/90  
Date

Certifying Officer

**RUSSELL J. DIRAIMO, P.E.,**

Manager  
Environmental Services  
Houston

**Formal Education:**

B.S. Civil and Environmental Engineering - University of  
Rhode Island - 1977

**Additional Technical Education:**

Texas A & M University- Cause and Prevention of Grain  
Elevator Fires and Explosions - 1978

Kansas State University - International Symposium on Grain  
Dust - 1979

Houston Building Owners and Managers Association, Inc. -  
"Controlling Exposure to Asbestos in the Office  
Environment" - 1985

The National Asbestos Training Center - University of  
Kansas "Practices and Procedures for Asbestos Control"  
- 1986

Industrial Hygiene & Safety Technology, Inc. - "Hazardous  
Waste Site Operations and Emergency Response", 29 CFR  
1910.120. 40 hour training course, August, 1987.

Texas A & M Extension Course - "Asbestos Hazardous  
Emergency Response Act", 40 CFR 763 Subpart D, April,  
1988. Certified Inspector; Certified Management  
Planner.

**Professional Engineering Registration:**

Texas

**Certified Texas Air Control Board Visible Emissions Evaluator:**

1978 to present

**Awards and Honors:**

Graduated High Distinction  
Tau Beta Pi Honor Society  
Phi Kappa Phi Honor Society

**Professional Affiliations:**

National Society of Professional Engineers (NSPE)  
Texas Society of Professional Engineers (TSPE)  
Air Pollution Control Association (APCA)  
Source Evaluation Society  
Water and Wastewater Analyst Association  
Texas Hazardous Waste Management Society  
National Asbestos Council

Since joining SWL in 1978, Russell has gained engineering experience with a concentration in civil and environmental applications.

As Manager of the Environmental Services Division, Mr. DiRaimo supervises the field and laboratory personnel which provide services including air pollution testing, personnel monitoring, water and wastewater analysis, hazardous waste characterizations, site contamination studies, and gas chromatography analysis. Mr. DiRaimo's responsibilities include personnel assignments, scheduling, data interpretation, calculations and report preparation.

Mr. DiRaimo has supervised environmental testing project for numerous municipal, industrial and petrochemical facilities including the Norco, Louisiana and Deer Park Texas facilities of Shell Oil Company, the Beaumont Specialty Chemicals Plant of Mobil Chemical Company, the Texas City, Texas facility of Amoco Oil Company, and the Houston, Texas facility of Hatheway Patterson Corporation.

**PHILLIP W. YOKLEY**, Environmental Scientist  
Environmental Services  
Houston

**Formal Education:**

B.S. - Environmental Health, East Tennessee State University - 1981

**Additional Technical Education:**

Asbestos Abatement Training Program, the University of Texas, Arlington, Texas - May, 1987.

Asbestos Technique Workshop, American Industrial Hygiene Association, Houston, Texas - April, 1987.

Identification of Asbestos Utilizing Polarized Light Microscopy, McCrone Research Institute, Chicago, Illinois - 1986.

In-Stack Opacity Monitor Audit Procedures, Environmental Protection Agency Regional Office, Annapolis, Maryland  
Texas A & M Extension Course - "Asbestos Hazardous Emergency Response Act", 40 CFR 763 Subpart D, April, 1988. Certified Inspector; Certified Management Planner.

**Certified Texas Air Control Board Visual Emissions Evaluator:**  
Since 1986

**Professional Affiliations:**

Air Pollution Control Association (APCA)  
Source Evaluation Society

Since graduation, Phillip Yokley has gained an extensive background in the field of environmental monitoring, sampling and analysis. He began his career with the United States Department of Energy working in an industrial hygiene/safety capacity and subsequently held a position with coal-gasification wastewater treatment pilot facility. Most recently Mr. Yokley worked as an air pollution analyst for the Air Pollution Control Bureau in Pittsburgh, Pennsylvania.

Mr. Yokley joined SwL in 1985 as an environmental technician for the Environmental Services Division. He has subsequently been promoted to Senior Environmental Technician and Field Supervisor. His responsibilities include supervising field testing operations, equipment calibration, and the utilization of analytical instrumentation such as total organic carbon and total organic halogen analyzers necessary for the analysis of environmental samples. In addition, he is responsible for the identification and quantitation of asbestos content present in bulk samples as well as the determination of fibrous concentrations present in airborne samples.

**JESSE ROBERT DAUGHTRY,** Environmental Technician  
Environmental Services  
Houston

**Additional Technical Education:**

Texas Water Commission Wastewater Operator, Class D  
Certification, January 21, 1986.

Texas A&M University System, Wastewater Analysis, February  
6, 1986.

Robbie Daughtry is a member of SwL's air pollution team and has participated and served as Field Supervisor in source testing for parameters such as particulates, sulfur oxides, volatile organics, nitrogen oxides, hydrogen sulfide and metals, Methodology includes those published by EPA and the Texas Air Control Board. Robbie is also a certified Visible Emissions Evaluator.

Robbie has also assisted in the preparation of samples for gas chromatographic analysis, and the sampling and analysis of water and wastewater samples.