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

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

Background Report Reference

AP-42 Section Number: 10.6.1

Background Report Section: 4

Reference Number: 104

Title: Air Emissions Test Report for the Wet Scrubber and RTO Stack, Louisiana Pacific Corporation Dungannon, VA, March 9-10, 1995

ETS, Inc.

April 1995

4-104)

AIR EMISSIONS TEST REPORT
FOR THE WET SCRUBBER AND RTO STACK

CONDUCTED AT

LOUISIANA PACIFIC CORPORATION
DUNGANNON, VIRGINIA

FOR

WHEELABRATOR CLEAN AIR SYSTEMS

TEST DATES: MARCH 09-10, 1995
REPORT DATE: APRIL 05, 1995

ETS, INC.

A subsidiary of ETS International, Inc.

1401 MUNICIPAL ROAD, N.W.

ROANOKE, VA 24012

703-265-0004

ETS415

Pollution Control Consultants
Specializing In
Toxic Emission Measurement and Control

ETS CONTRACT NUMBER 95-415-T

WHEELABRATOR AIR POLLUTION CONTROL
FGC - Dry Scrubbing Systems

Inter Office Memorandum

****

To: A. DoVale

Date: April 7, 1995

From: O. Sultan

Copies to:

R. Cloud - VOC Control
WCA Inc.
Schaumburg, IL
V. Petti - WAPC
R. Crynack - WAPC

Subject Matter: Visit to Louisiana Pacific Board Plant in Dungannon - Virginia
Plant Report

****

Attached is my report on the referenced plant visit on March 29, 1995

Louisiana Pacific Board Plant - Dungannon, Virginia
Trip Report - Date March 29, 1995

Definition of the Problem:

The Louisiana Pacific Board Plant in Dungannon, Virginia has installed a Wheelabrator Clean Air (WCA) System's Regenerative Thermal Oxidizer (RTO) Unit for the destruction of VOC and organic contaminants from Plant Stack Gases. A Monsanto DynaWave Scrubber is installed upstream of the RTO to scrub particulate from the gases prior to entering the RTO. This scrubber is not meeting performance, so that, the gases to the RTO are carrying along entrained particulate. Major buildup of solids was seen in the RTO duct manifolds and inside the stoneware bed during the March 29, 1995 outage for cleaning. The buildup has adversely effected the RTO operation and performance.

DynaWave Scrubber Process Description

Flue Gases from the wood chip rotary drier are treated for the removal of particulate matter in a Monsanto DynaWave Scrubber. An ID fan draws the gases from the rotary drier through a cyclone and scrubber into the Wheelabrator Clean Air System's RTO Unit for the destruction of VOC and organic matter. The clean and treated flue gases are discharged to the atmosphere through a stack.

Dried wood chips are drawn from the rotary drier along with the drier air and directed to a cyclone separator where the wood chips are separated from the hot air stream. The wood chips exit at the bottom of the cyclone separator and are conveyed to the dry wood chips storage bin. The hot air stream along with fine entrained particulate matter leaves from the top of the cyclone separator at about 240°F.

The gases enter the particulate scrubber at the top and flow downwards. The scrubber inlet gas ductwork extends about 10 feet inside the RFP constructed scrubber vessel. The lower section of the vessel is the holding tank for the reycle water. One recirculation pump is provided, this pump sprays the recirculation water upwards, at two elevations, into the downflow gas stream to provide a countercurrent contact of water with the gas stream. The top spray is at an elevation above the actual scrubber in the 4 ft. diameter inlet duct, the lower spray is about 2 feet above the recirculation water level. The heat of the drier gas stream evaporates some water from the spray nozzles and cools the gas to its saturation temperature. The gases exit the 4 feet diameter inlet duct to the 12 feet diameter absorber vessel and turn upwards, passing through two banks of Chevron Mist Eliminators and leave the scrubber. An ID Fan provided draws the gases from the scrubber and feeds it to the RTO unit.

The solids collected in the recirculation water are removed; a 2 inch slip stream from the recircirculation pump provides feed to a Komline Sanderson Rotary Vacuum Filter but there is no liquor blowdown provided to control the liquor chemistry. Make-up water is added to

the recirculation water sump. There is no mist eliminator washing provided.

Observation

The dryer unit was down, the scrubber was open for maintenance, the scrubber was inspected in detail to observe and investigate the problem. The following observations were made:

1. The scrubber is designed for a two stage mist eliminator with no mist eliminator wash. The first stage mist eliminator had melted when gases passed through the scrubber without the sprays operatinge. The first stage mist eliminator was removed and the scrubber was operating with only the second stage installed. The second stage mist eliminator was severely plugged (see photo). The plant was installing the first stage and replacing the second stage chevrons in this downtime.

2. Plant (service) water used for make-up was added to the recirculation sump; I was advised that the water flow to recirculation pump seals exceeded the makeup water requirements which effected the water balance and constantly raised the recycle tank level. Mechanical seal requiring no water, not even for quench, was being installed.

3. There is no blowdown provided to control the recirculation liquor chemistry.

4. There is no primary dewatering (such as a hydroclone) device before the rotary vacuum filter, the dilute filter feed (<6% solids) is probably contributing to the inefficient operation of the rotary vacuum filter.

5. The superficial velocity through the mist eliminator, calculated, is approximately 11 fps

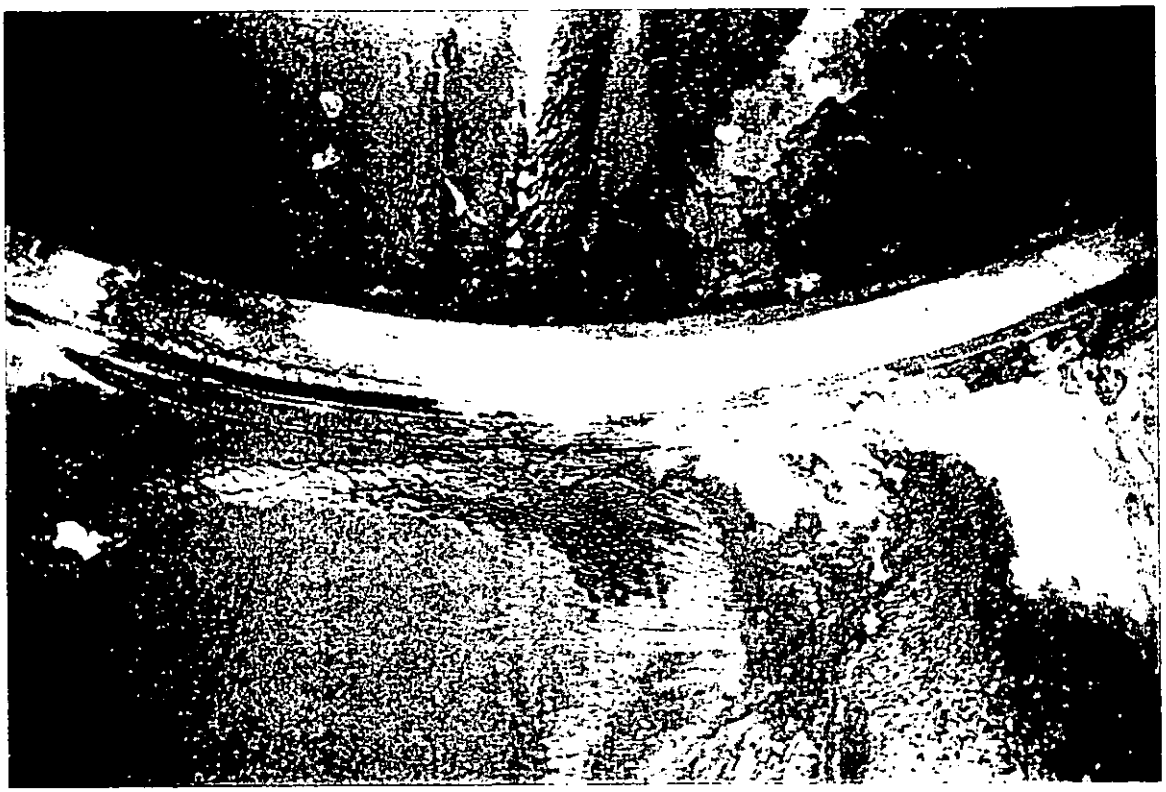
6. Particle size data indicates sub-micron size and fine particulate matter in the gas stream. The fine particles are difficult to wet, and dry fine material is difficult to de-entrain.

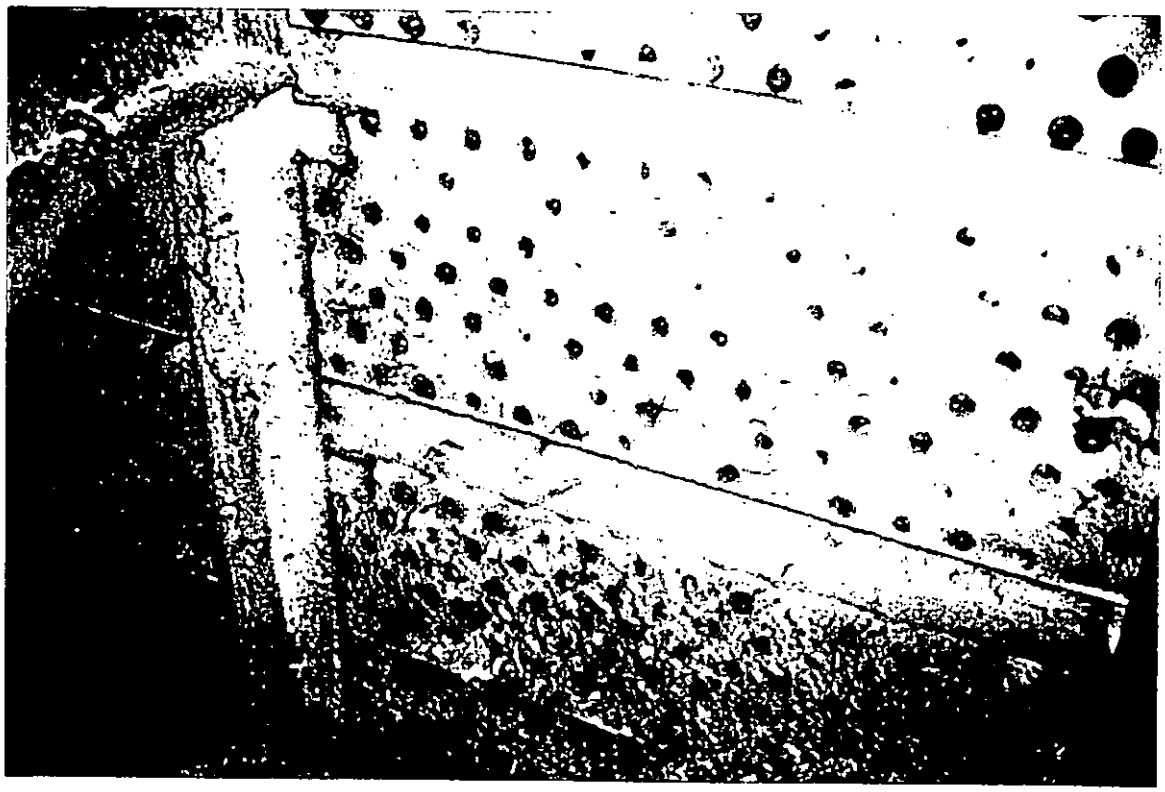
7. The spray pattern was not observed since the recirculation pump was under repair. The nozzles did not appear to be plugged. No external buildup was noted.

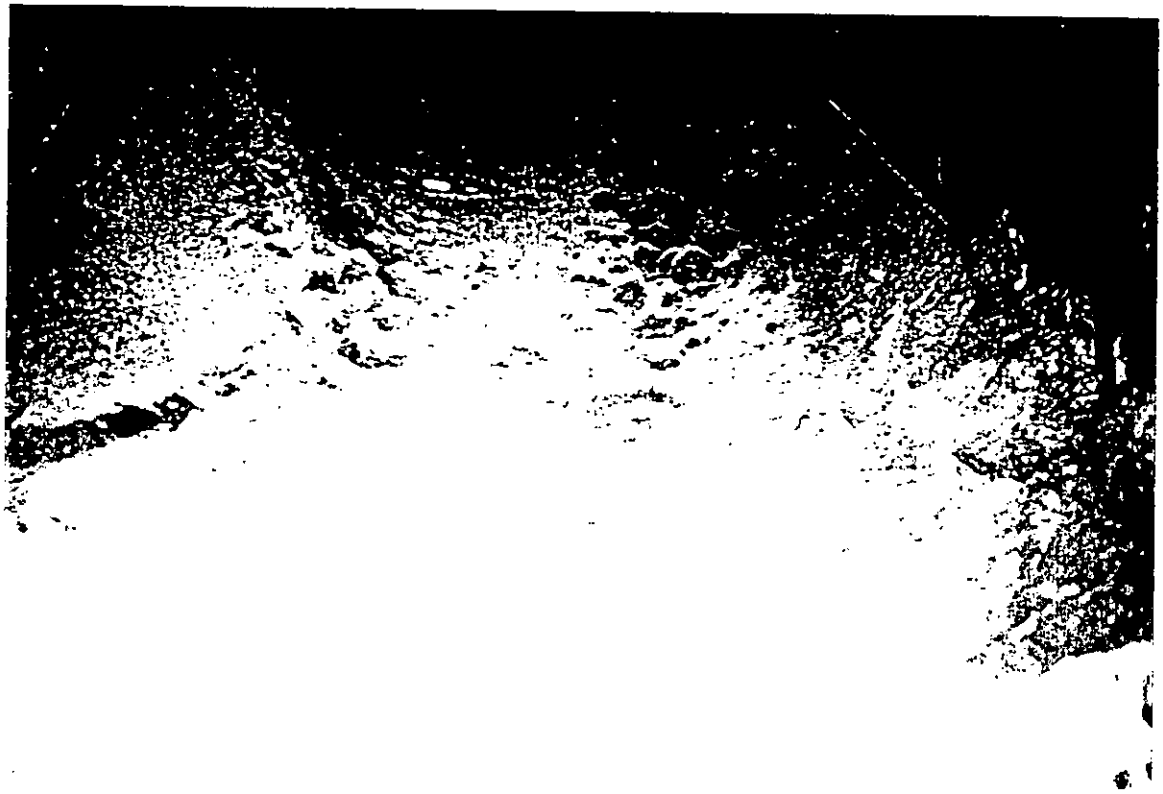
8. It was mentioned that buildup in the ID Fan has caused abnormal vibrations during operation. ID Fan is between scrubber and RTO

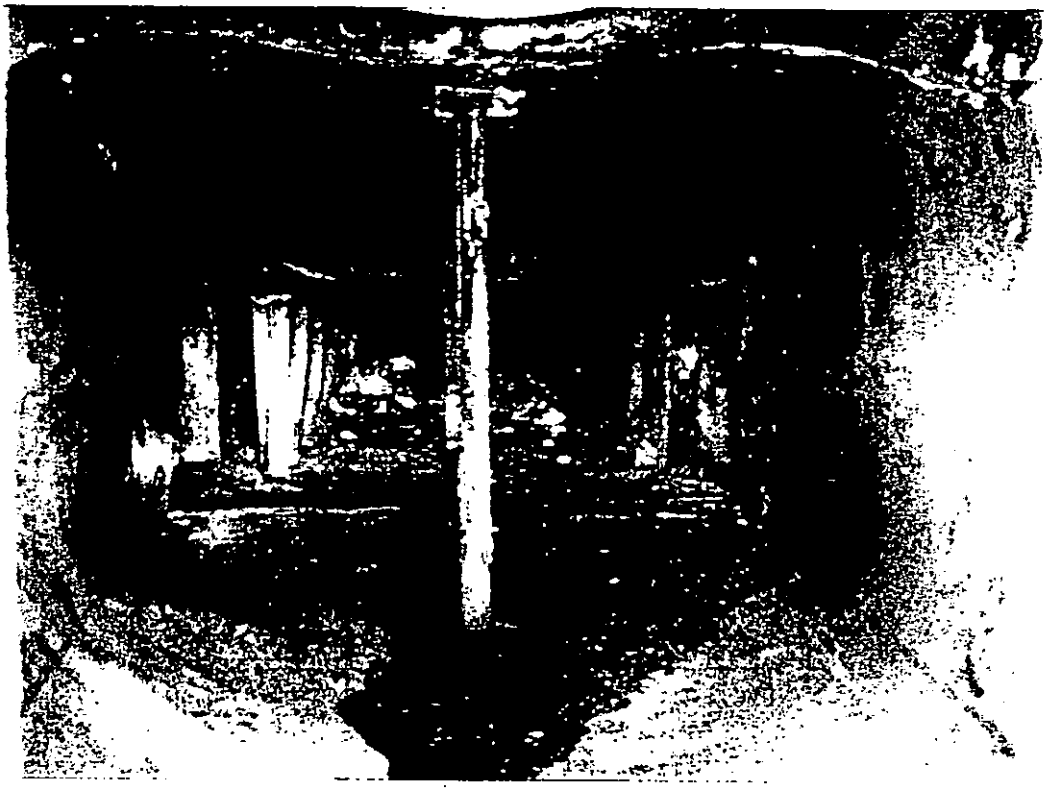
Recommendations and Conclusions:

1. Saturated Gas Velocity through the Mist Eliminator should be lower.
2. Mist eliminator washing utilizing make-up water should be provided.
3. Establish a blowdown criteria based on the chemistry of the recycle liquid. The recycle liquid should be analyzed regularly for hydrocarbons, total dissolved solids (tds) and suspended solids (ss)
4. Improve gas-liquid contact in the inlet pipe.
5. Improve gas distribution to the mist eliminator









Wheelabrator Clean Air Systems Inc.

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RECEIVED
APR 13 1995
LOUISIANA PACIFIC CORP.
HAYWARD, WISCONSIN

April 12, 1995

TO: Mr. Tony Cavadeas

FROM: Mr. Robert Cloud

SUBJECT: Louisiana-Pacific, Dungannon

Tony;

Attached please find data for the Dungannon facility. After reviewing the information the following can be determined. (Reference Table 4, P. 6 of ETS report).

- VOC destruction efficiency is low. Likely cause is the known existence of about a 1-2% inefficiency in RTO's due to valve leakage. Basically, when inlet concentrations are low (i.e., 20 ppmV), the inlet concentration plus the BTUE addition (about 1000 ppm as propane) will yield an outlet of about 20.4 ppmV (about 98% DE). When we are testing for the EPA they unfortunately don't want to count the BTUE addition. To meet a 95% DE on VOC using the same numbers as giving above, the process (i.e., press or dryer) would have to contribute 408 ppmV with BTUE contributing 612 ppmV.

- NOx is reduced.

- CO is increased. Obviously on this unit, the interference by massive particulate loadings can not be ignored. From the attached photographs, not only is the lower bed plugged but the amount of material is significant. The fact that the CO increased is extremely troubling and it is the opinion of WCAS that this unit has suffered a significant setback.

- Particulate distributions on the inlet and outlet are attached. They should be very useful in determining how efficient the scrubber is at this site. (Reference attached photo reproductions.)

- Pictures show the net effect of the OSB operation on the RTO.

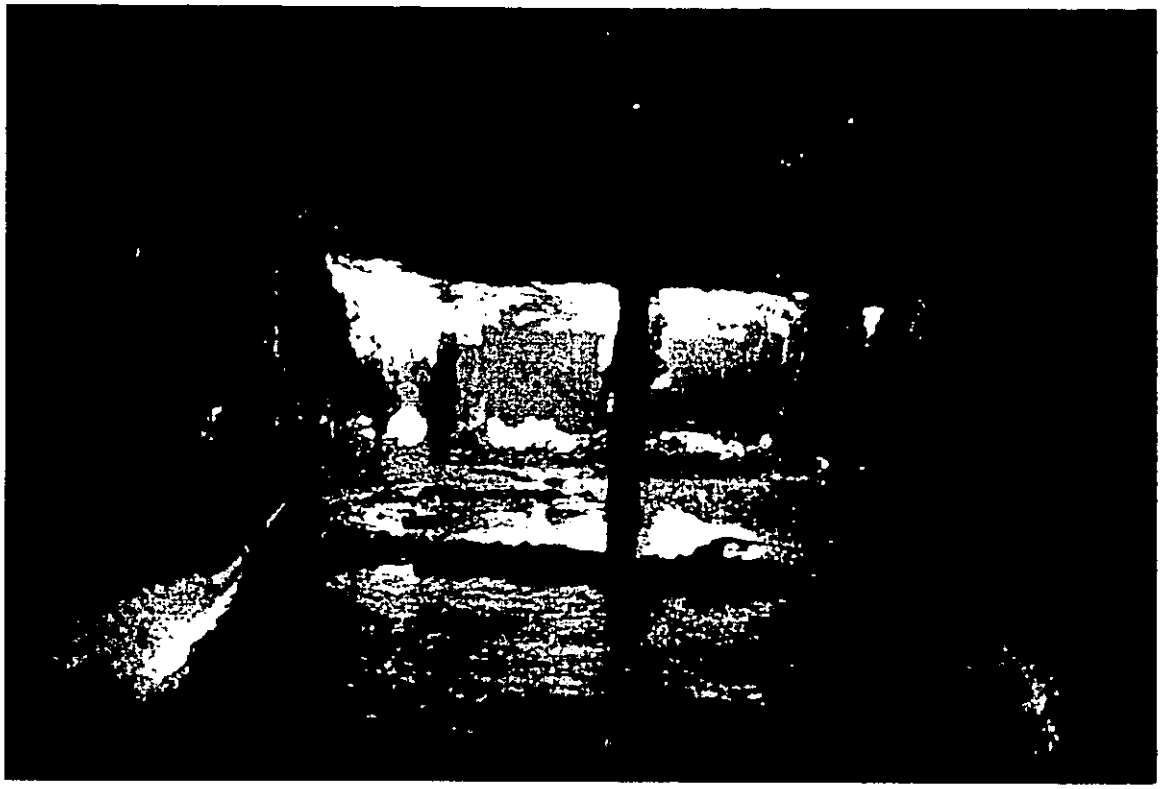
- Pictures show the excessive amount of organic material igniting under the bed during a bakeout. It should be noted by LP that this condition is dangerous due to the flame temperatures on the cold face support steel and everything should be done to prevent this condition from re-occurring. It will eventually cause the failure of the cold face support and WCAS may be unable to warrant this situation.

- Picture exhibit the plugging of the cold face support.

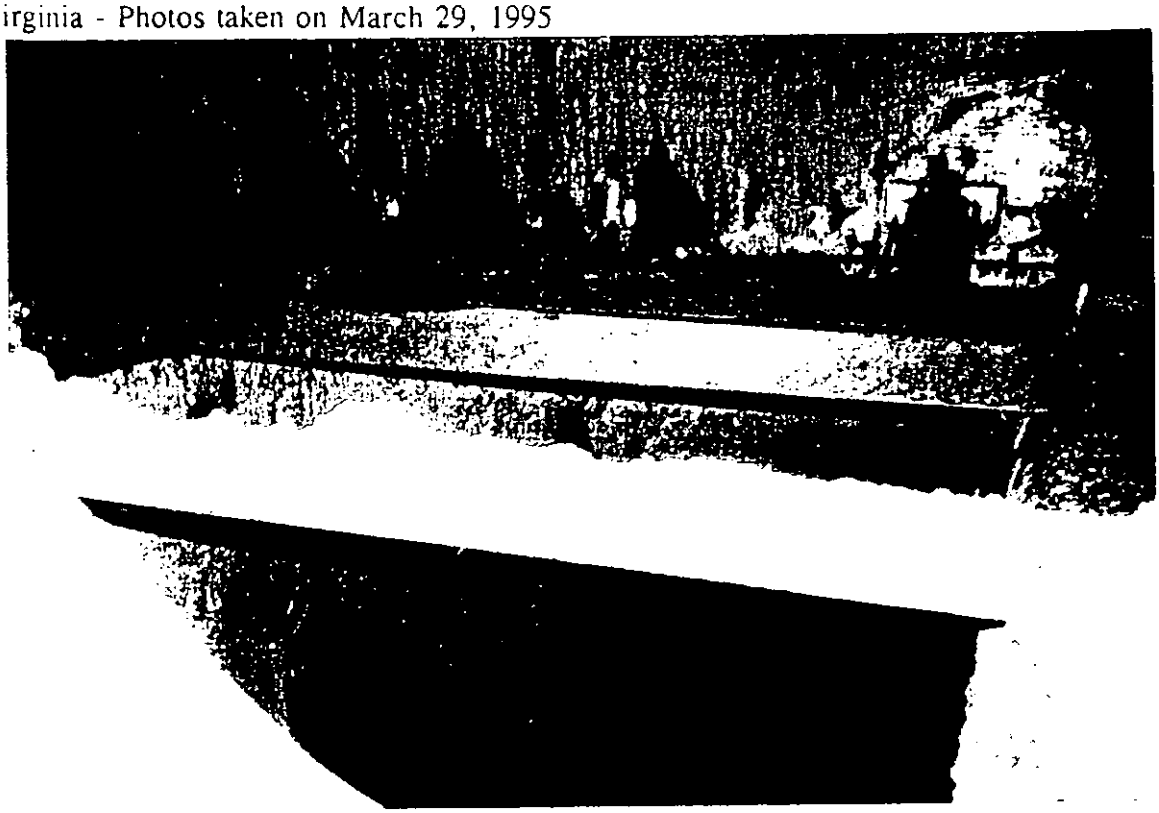
Overall, the Dungannon RTO situation is disappointing. WCAS feels that this RTO has little chance of performing in this environment unless something drastically different is done concerning particulate removal. Please keep us informed as to your efforts in correcting this situation. Also enclosed is a copy of an internal report from WAPC concerning some of their observations regarding the scrubber.

If you have any questions please contact me.

RAC:pm
Enclosures



Monsanto DynaWave Scrubber Installation At Louisiana Pacific Board Plant in Dunnagnon - Virginia - Photos taken on March 29, 1995



Buildup first stage mist eliminator supports. The chevrons are missing.

Buildup on the second stage (upper bank) chevron ME sections.

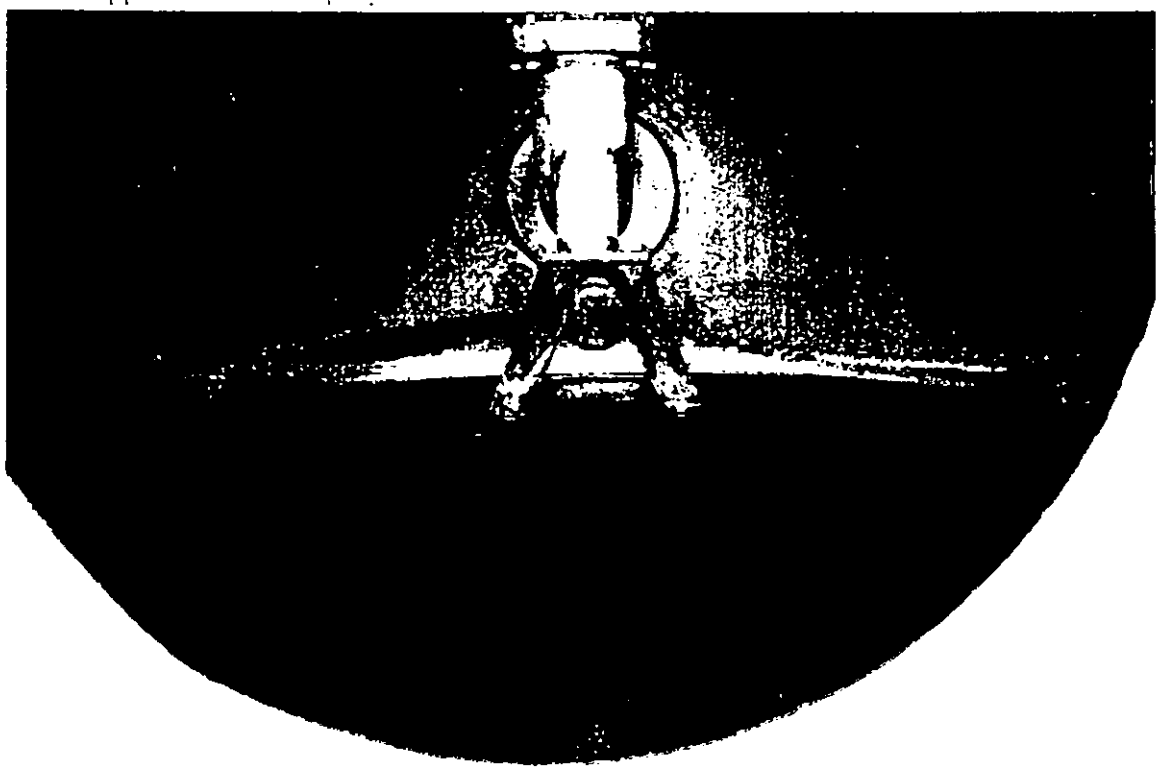
Monsanto DynaWave Scrubber Installation At Louisiana Pacific Board Plant in Dunnagnon - Virginia - Photos taken on March 29, 1995

Buildup around inlet duct between the two mist eliminator sections

Buildup throughout second stage (upper bank) mist eliminator cross-section

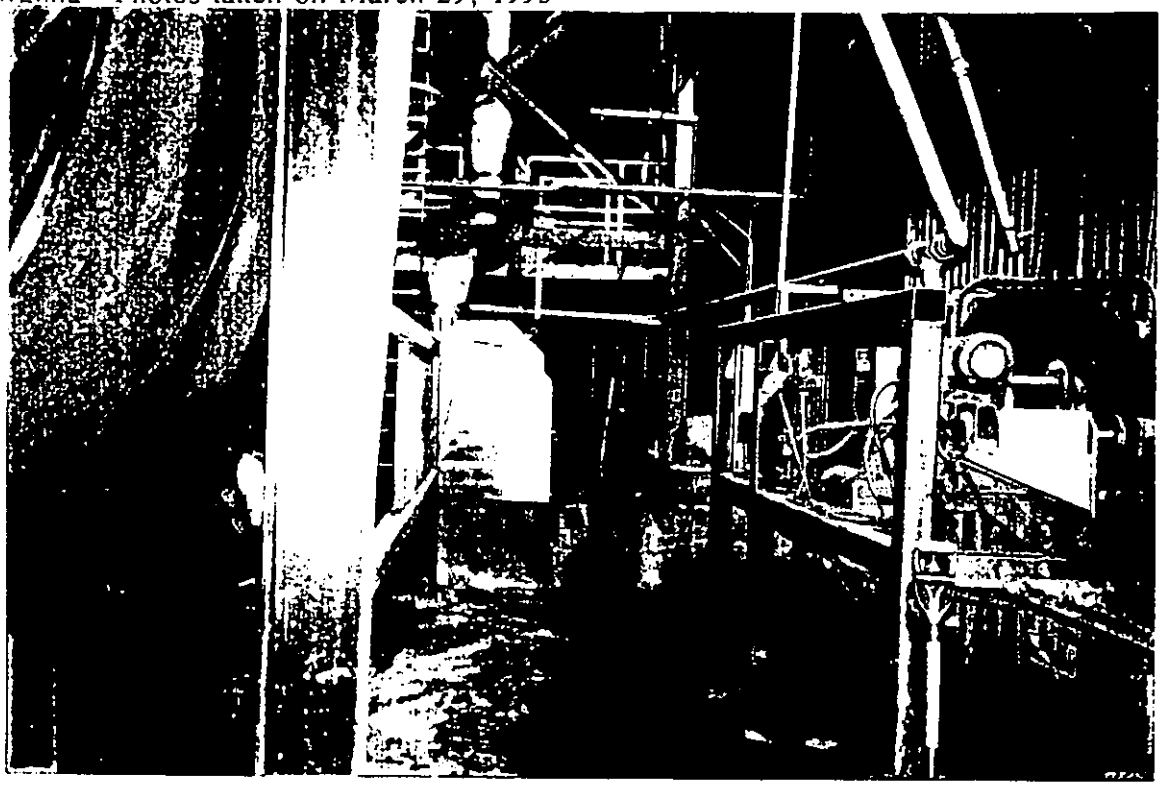
Monsanto DynaWave Scrubber Installation At Louisiana Pacific Board Plant in Dunnagnon - Virginia - Photos taken on March 29, 1995

Upper Elevation Spray Nozzle inside Gas Inlet Duct Above the Scrubber Vessel

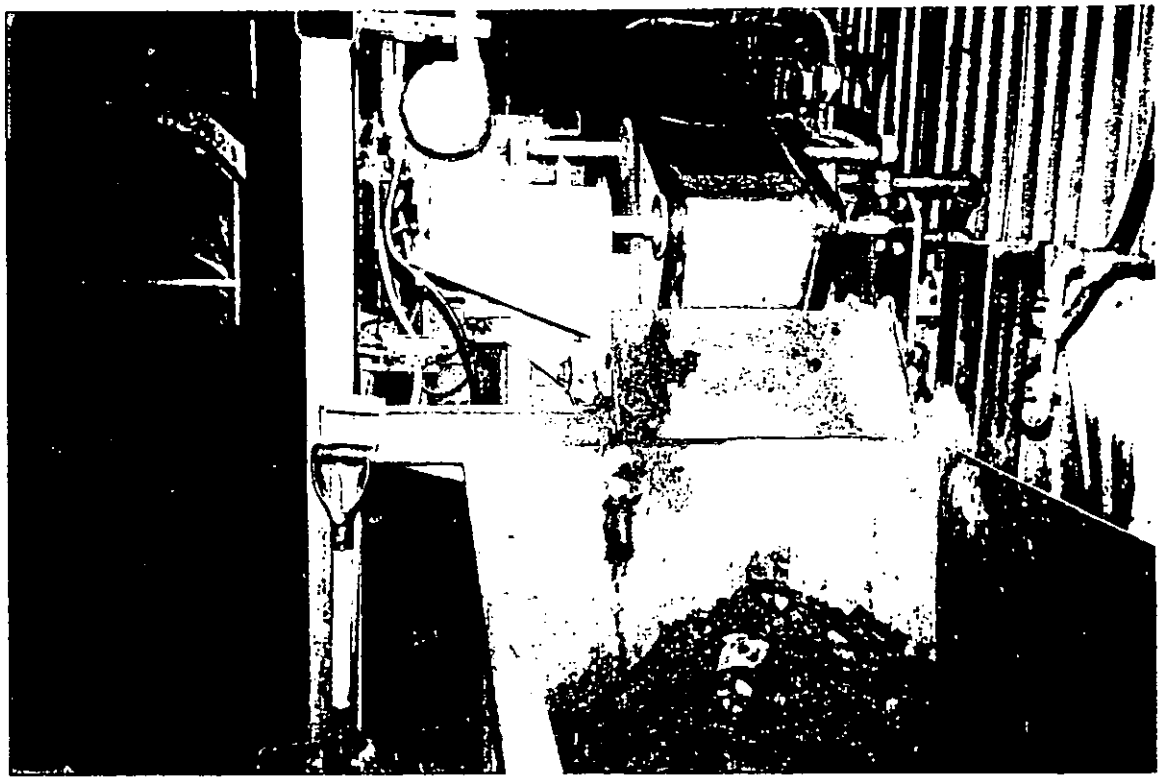


Lower Elevation Spray Nozzle Inside Scrubber. Recirc. Liquid Level in Foreground

Monsanto DynaWave Scrubber Installation At Louisiana Pacific Board Plant in Dunnagnon - Virginia - Photos taken on March 29, 1995



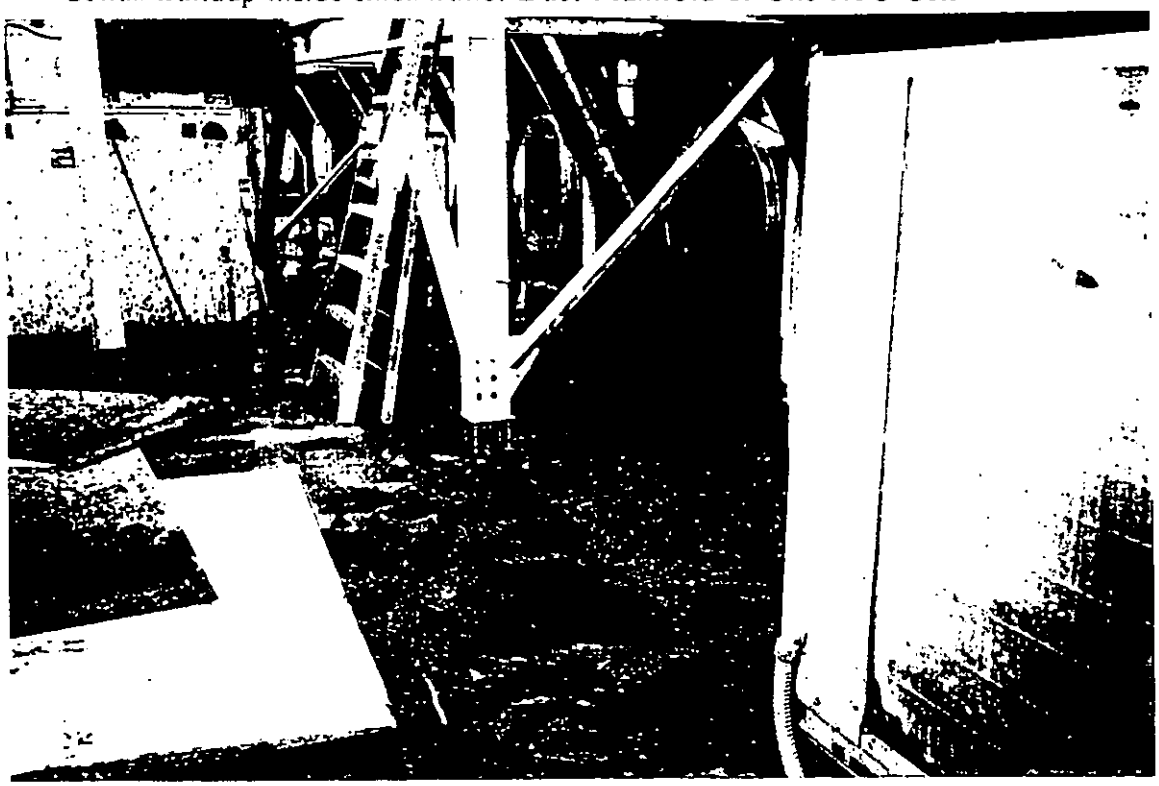
Slip Stream off Recirc. Pump to feed Rotary Vacuum Filter



Waste Solids Cake from Rotary Filter Collected in Dumpster

Monsanto DynaWave Scrubber Installation At Louisiana Pacific Board Plant in Dunnagnon - Virginia - Photos taken on March 29, 1995

Solids Buildup inside Inlet/Outlet Duct Manifold of One RTO Cell



Debris Removed from the RTO Manifolds and Ceramic Bed

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1.0 INTRODUCTION

1.1 Background: An air emissions diagnostic test program was conducted for Wheelabrator Clean Air Systems at Louisiana Pacific Corporation in Dungannon, Virginia. The test program was performed on March 09 through 10, 1995 by ETS, Incorporated (ETS) of Roanoke, Virginia. ETS personnel participating in the test program were Kevin Baird, Carl Powell, and Colgate Selden. Program coordination was provided by Rick Mueller of Wheelabrator Clean Air Systems.

1.2 Objective: The purpose of the test program was to evaluate the performance of the Regenerative Thermal Oxidizer (RTO) and to conduct particle size testing at the inlet and outlet of the wet scrubber.

1.3 Test Program: Table 1 presents a summary of the test program conducted at Louisiana Pacific. All sampling methods were conducted in general accordance with the U.S. Environmental Protection Agency (EPA) reference test methods published in the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60), Appendix A. Appendix A of this report contains a complete test log detailing the date and time of each test run.

Table 1. Summary of Test Program Conducted at Louisiana Pacific, Dungannon, Virginia - Wheelabrator Clean Air Systems

Test Location	Test Parameters	Test Method*	No. of Test Runs	Test Duration (min)
Scrubber Inlet	Flow, Moisture	EPA Methods 2, 4	1	30
	Particle Sizing	EPA Method 202; Analysis by Bahco Classifier	1	60
Scrubber Outlet	Particle Sizing	EPA Method 202; Analysis by X-Ray Sedigraphy	1	60
	Flow, Moisture	EPA Methods 2, 4	2	30
	O_2, CO_2, NO_x, CO, VOC	EPA Methods 3A, 7E, 10, 25A	1	170
RTO Inlet	O_2, CO_2, NO_x, CO, VOC	EPA Methods 3A, 7E, 10, 25A	1	248
RTO Outlet	Flow, Moisture	EPA Methods 2, 4	4	30
	O_2, CO_2, NO_x, CO, VOC	EPA Methods 3A, 7E, 10, 25A	3	1 - 170 1 - 180 1 - 248
Press Inlet	Flow, Moisture	EPA Methods 2, 4	2	30
	O_2, CO_2, NO_x, CO, VOC	EPA Methods 3A, 7E, 10, 25A	1	180

* From 40 CFR, Appendix A.

2.0 SUMMARY OF RESULTS

Tables 2 and 3 contain particle sizing results and particle distribution graphs for the scrubber inlet and outlet, respectively. Laboratory data for these analyses are contained in Appendix H.

Table 4 presents a summary of the CO, NO_x, and VOC emissions measured simultaneously at the RTO inlet and outlet. The reduction efficiencies of the RTO are also included. Mass emissions rates calculated for the inlet are based on gas flow rates taken at the outlet. These data provide cursory estimates assuming that the outlet location has no additional flow caused by air inleakage or VOC combustion across the RTO. More detailed data and results are contained in Appendices C and D.

Table 5 presents a summary of the CO, NO_x, and VOC measurements taken concurrently at the press inlet at the press inlet and the RTO outlet. More detailed data and results are presented in Appendices C and D.

A summary of the CO, NO_x, and VOC emissions from the scrubber outlet and a comparison between scrubber outlet averages and RTO outlet averages is presented in Table 6. The RTO outlet flow data utilized to calculate mass emissions rates was not collected concurrently with the continuous emissions monitoring

TABLE 2

EPA METHOD 202/BACHO PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER INLET

DATE	03/10/95
START TIME	09:10
END TIME	10:40

SIZE	WT. %	CUMULATIVE %
2.46	6.62	6.62
4.86	7.05	13.67
12.59	13.24	26.91
14.71	15.18	42.09
22.35	15.26	57.35
40.56	17.12	74.47
50.65	3.53	78
55.54	1.58	79.58
150	8.85	88.43

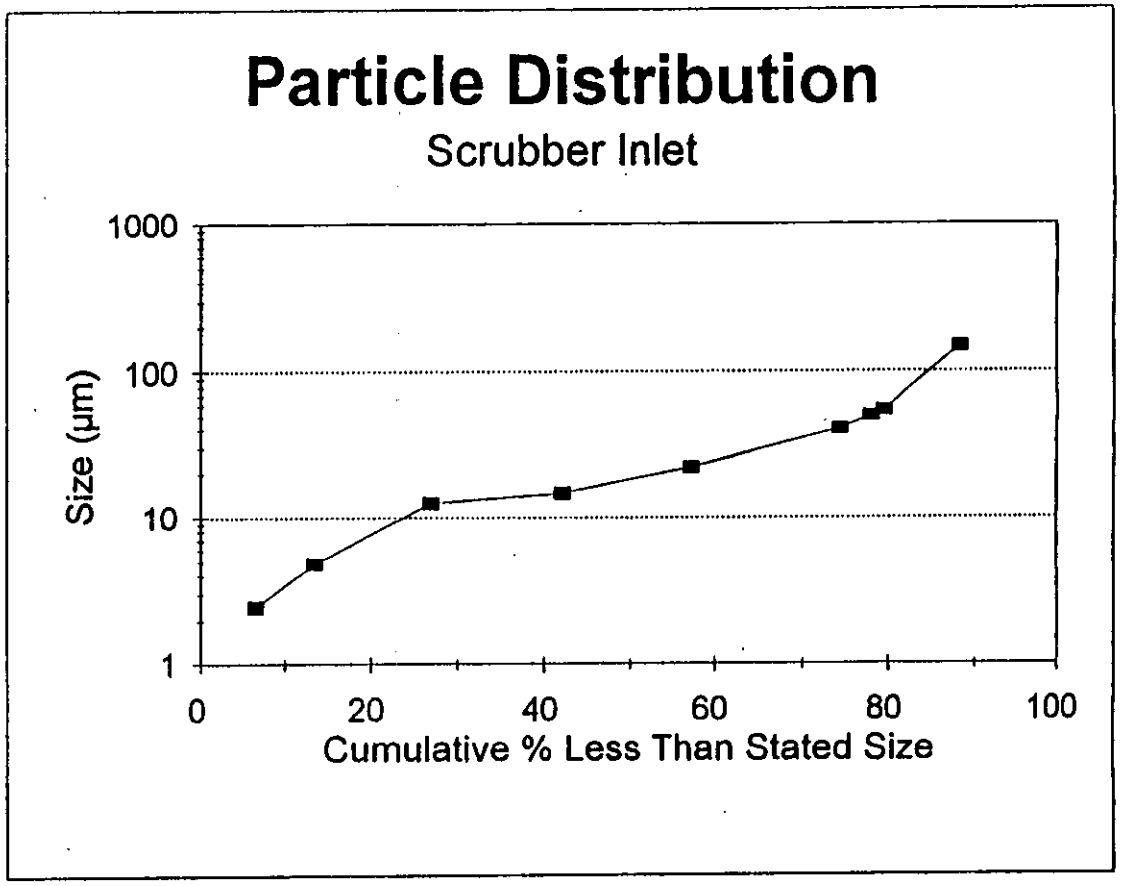


TABLE 3

EPA METHOD 202/X-RAY SEDIGRAPHY PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER OUTLET

DATE	03/09/95
START TIME	17:57
END TIME	19:00

SIZE	WT. %	CUMULATIVE %
0.00-0.10	0.9	0.9
0.10-0.20	0.7	1.6
0.20-0.30	0.6	2.2
0.30-0.40	0.5	2.7
0.40-0.50	0.4	3.1
0.50-0.60	0.1	3.2
0.60-0.70	0.4	3.6
0.70-0.80	0.3	3.9
0.80-0.90	0.3	4.2
0.90-1.00	0.4	4.6
1.00-2.00	5.7	10.3
2.00-3.00	4.1	14.4
3.00-4.00	3.7	18.1
4.00-5.00	3.1	21.2
5.00-6.00	6.4	27.6
6.00-7.00	2.3	29.9
7.00-8.00	1.7	31.6
8.00-9.00	1.1	32.7
9.00-10.00	2.4	35.1
10.00-20.00	19.3	54.4
20.00-30.00	18.3	72.7
30.00-40.00	15.8	88.5
40.00-50.00	11.5	100.0
> 50.00	0.0	100.0

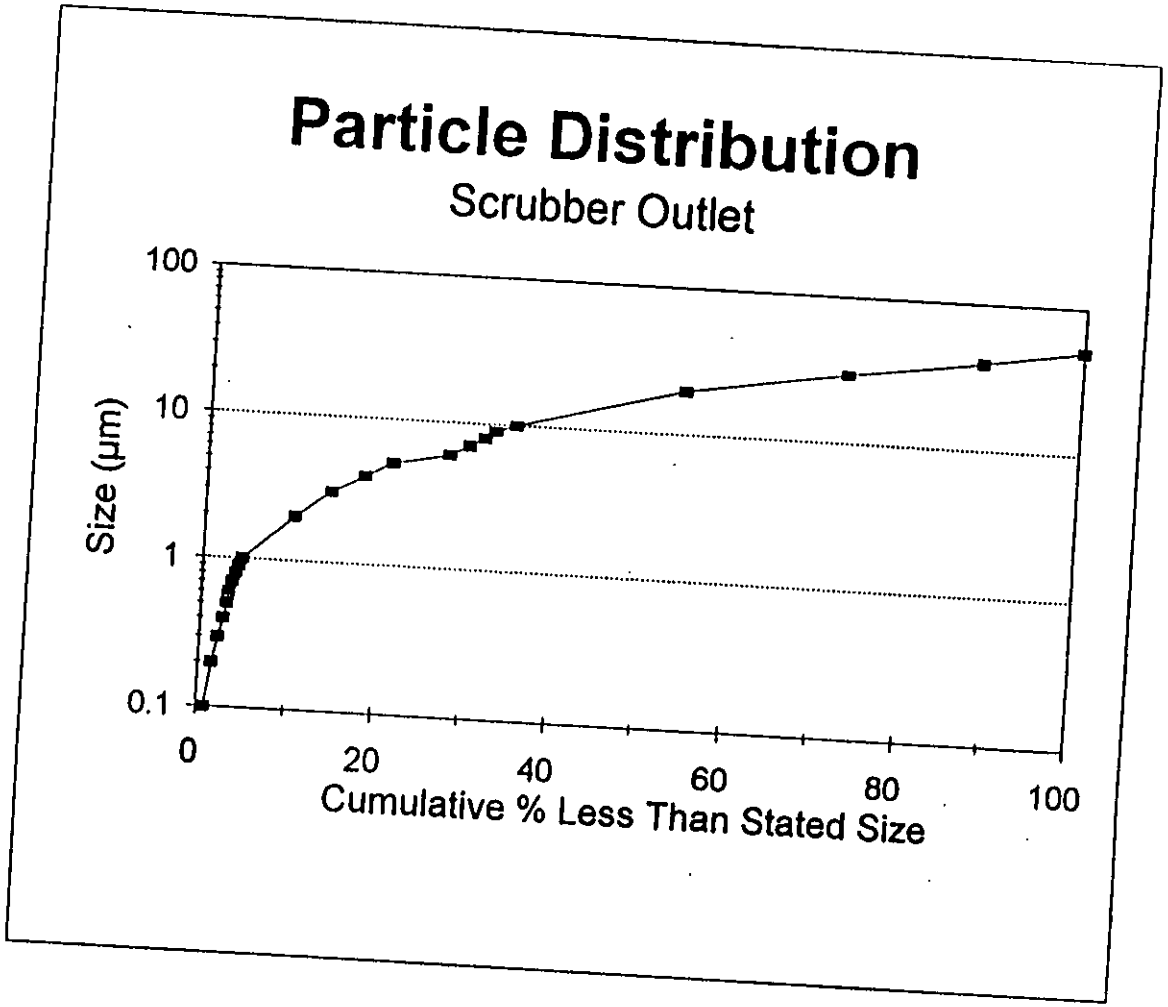


TABLE 4

SUMMARY OF CO, NOx, AND VOC EMISSIONS
WHEELABRATOR CLEAN AIR SYSTEMS
RTO INLET AND OUTLET

RUN I.D.	M1-4-R1	M1-4-R2	AVERAGE INLET*	AVERAGE OUTLET
DATE	03/09/95	03/09/95		
TIME STARTED	15:26	17:15		
TIME ENDED	15:56	17:45		
SAMPLING PARAMETERS				
Metered Volume - dcf	21.570	21.877	21.724	21.724
Corrected Volume - dscf	21.697	22.326	22.011	22.011
Total Test Time - min	30	30	30	30
GAS PARAMETERS				
Gas Temperature - ° F	153	165	159	159
Oxygen - %	18.7	18.7	18.8	18.7
Carbon Dioxide - %	1.16	1.16	1.78	1.16
Moisture - %	6.49	7.49	6.99	6.99
GAS FLOWRATE				
Velocity - ft/sec	45.94	46.24	46.04	46.09
Actual Volume - acfm	138549	139444	138868	138996
Standard Volume - dscfm	106115	103754	104838	104934
NOx EMISSIONS (as NO2)				
Concentration - ppmdv			20.06	13.31 ✓
Mass Rate - lb/hr			15.07	10.01 ok
VOC EMISSIONS (as Propane)				
Concentration - ppmwv			26.80	21.60
Concentration - ppmdv			28.81	23.22
Mass Rate - lb/hr			20.74	16.73 * 9.4 as C
				x3 →
CO EMISSIONS				
Concentration - ppmdv			99.81	139.17
Mass Rate - lb/hr			45.64	63.70 * 31.9
RTO EFFICIENCY -%				
NOx Reduction Efficiency				33.59 ✓
VOC Reduction Efficiency				19.33 ✓
CO Reduction Efficiency				-39.56

* Emissions are based on gas flow rates taken at the outlet location. These data assume no additional flow caused by air inleakage or VOC combustion.

TABLE 5

SUMMARY OF CO, NOx, AND VOC EMISSIONS
WHEELABRATOR CLEAN AIR SYSTEMS
PRESS INLET AND RTO OUTLET

LOCATION	PRESS INLET	PRESS INLET	RTO OUTLET	RTO OUTLET	PRESS INLET AVERAGE	RTO OUTLET AVERAGE
RUN I.D.	PI-M1-4-R1	PI-M1-4-R2	RTOS-M1-4-R1	RTOS-M1-4-R2		
DATE	03/10/95	03/10/95	03/10/95	03/10/95		
TIME STARTED	16:05	18:00	16:45	18:15		
TIME ENDED	16:35	18:30	17:15	18:45		
SAMPLING PARAMETERS						
Metered Volume - dcf	21.857	21.758	22.821	22.814	21.808	22.818
Corrected Volume - dscf	21.198	21.122	21.687	21.907	21.160	21.797
Total Test Time - min	30	30	30	30	30	30
GAS PARAMETERS						
Gas Temperature - ° F	81	83	142	127	82	134
Oxygen - %	20.3	20.3	19.0	19.0	20.3	19.0
Carbon Dioxide - %	0.00	0.00	1.45	1.45	0.00	1.45
Moisture - %	9.56	1.77	24.07	8.76	5.67	16.41
GAS FLOWRATE						
Velocity - ft/sec	62.31	61.38	49.17	49.18	61.84	49.18
Actual Volume - acfm	58362	57493	148302	148334	57928	148318
Standard Volume - dscfm	48815	51983	93996	115909	50399	104952
NOx EMISSIONS (as NO2)						
Concentration - ppmdv					0.88	14.86
Mass Rate - lb/hr					0.32	11.17
VOC EMISSIONS (as Propane)						
Concentration - ppmwv					3.20	17.10
Concentration - ppmdv					3.39	20.46
Mass Rate - lb/hr					1.17	14.74
CO EMISSIONS						
Concentration - ppmdv					7.50	95.27
Mass Rate - lb/hr					1.65	43.61

TABLE 6

SUMMARY OF CO, NOx AND VOC EMISSIONS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER OUTLET AND RTO OUTLET

	Scrubber	RTO OUTLET
RUN I.D.	SO-M1-4-R1	AVERAGE
DATE	03/10/95	03/10/95
TIME STARTED	11:20	MORNING*
TIME ENDED	11:50	
SAMPLING PARAMETERS		
Metered Volume - dcf	22.000	22.818
Corrected Volume - dscf	21.186	21.797
Total Test Time - min	30	30
GAS PARAMETERS		
Gas Temperature - ° F	146	134
Oxygen - %	17.7	19.0
Carbon Dioxide - %	2.75	1.45
Moisture - %	22.75	16.41
GAS FLOWRATE		
Velocity - ft/sec	67.56	49.18
Actual Volume - acfm	50941	148318
Standard Volume - dscfm	32773	104952
NOx EMISSIONS (as NO2)		
Concentration - ppmdv	30.25	16.71
Mass Rate - lb/hr	7.10	12.56
VOC EMISSIONS (as Propane)		
Concentration - ppmwv	30.90	17.60
Concentration - ppmdv	40.00	21.06
Mass Rate - lb/hr	9.00	15.17
CO EMISSIONS**		
Concentration - ppmdv	596.68	90.65
Mass Rate - lb/hr	85.29	41.50

* No flow data was taken at the RTO outlet on the morning of 3/10/95. Emissions are based on gas flow rates taken in the afternoon of 3/10/95.

**CO emissions reported are lower than actual emissions due to the fact that the CO monitoring system has a limit of 1000 ppm. CO values over 1000 ppm are recorded as 1002 ppm by the datalogger.

~ 51.3% DE excluding process condensation

data. More detailed data and results are contained in Appendices C and D.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures followed those recommended by the EPA in 40 CFR 60, Appendix A, or other methods generally accepted by the EPA and the Virginia Department of Environmental Quality (VDEQ). The following specific methods were used:

- EPA Method 1 for determination of sampling and traverse points;
- EPA Method 2 for flue gas velocity and volumetric flow rate;
- EPA Method 3 for sampling for flue gas composition and molecular weight;
- EPA Method 3A for flue gas composition and molecular weight;
- EPA Method 4 for flue gas moisture content;
- Modified EPA Method 4/Method 202 for particle size determination;
- EPA Method 7E for determination of NO_x emissions;
- EPA Method 10 for determination of CO emissions;
- EPA Method 25A for determination of total hydrocarbon emissions.

Appendices F and G contain all of the field sampling data. Laboratory data for the particle size analyses are contained in Appendix H.

3.1 Sampling Procedures

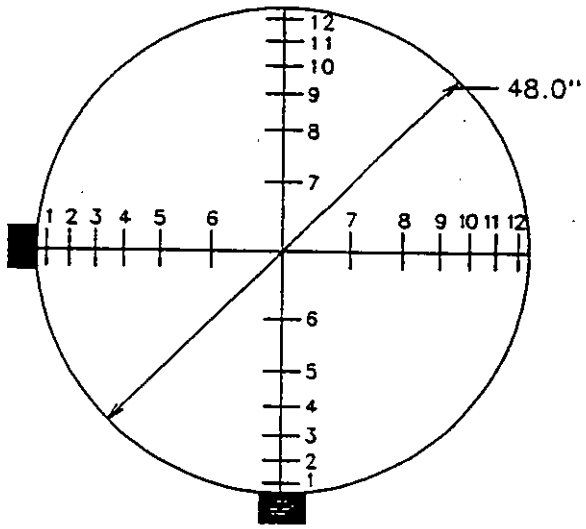
3.1.1 Sampling Point Determination - EPA Method 1:

3.1.1.1 Wet Scrubber Sampling and Traverse Points: A total of 24 sampling and traverse points (12 for each of two ports) were utilized at the wet scrubber inlet and outlet for all pollutant and gas flow rate measurements. The scrubber inlet and outlet ducts each had a diameter of 48 inches. Figure 1 shows the location of the sampling and traverse points for the wet scrubber inlet and outlet.

3.1.1.2 RTO Outlet Sampling and Traverse Points: A total of 24 sampling and traverse points (12 for each of two ports) were utilized at the RTO outlet for all pollutant and gas flow rate measurements. The RTO outlet had a diameter of 96 inches. Figure 2 shows the location of the sampling and traverse points for the RTO outlet.

3.1.1.3 Press Inlet Sampling and Traverse Points: A total of six sampling and traverse points at one port were utilized at the press inlet for all pollutant and gas flow rate measurements. The press inlet duct had a diameter of 53.5 inches. Figure 3 shows the location of the sampling and traverse points for the press inlet.

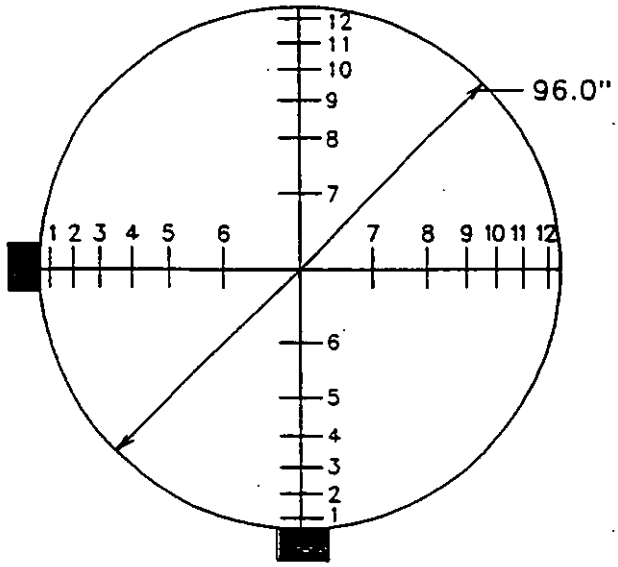
3.1.2 Volumetric Measurements - EPA Method 2: EPA Method 2 was used to determine the velocity and volumetric flow rates of the



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	2.1	1.02
2	6.7	3.22
3	11.8	5.67
4	17.7	8.51
5	25.0	12.00
6	35.6	17.07
7	64.4	30.93
8	75.0	36.00
9	82.3	39.49
10	88.2	42.33
11	93.3	44.78
12	97.9	46.98

INSIDE STACK DIAMETER	48.0 in	4.0 ft

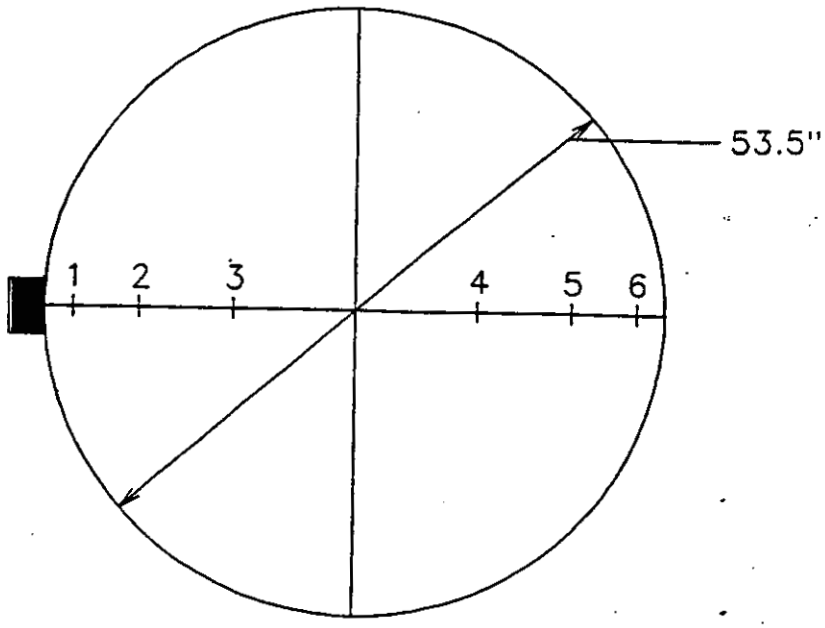
Figure 1 - Sampling and Traverse Points for Wet Scrubber Inlet and Outlet



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	2.1	2.04
2	6.7	6.43
3	11.8	11.34
4	17.7	17.02
5	25.0	24.00
6	35.6	34.14
7	64.4	61.86
8	75.0	72.00
9	82.3	78.98
10	88.2	84.66
11	93.3	89.57
12	97.9	93.96

INSIDE STACK DIAMETER	96.0 in	8.0 ft

Figure 2 - Sampling and Traverse Points for RTO Outlet



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	4.4	2.33
2	14.6	7.83
3	29.6	15.83
4	70.4	37.67
5	85.4	45.67
6	95.6	51.17

INSIDE STACK DIAMETER	53.5 in	4.5 ft

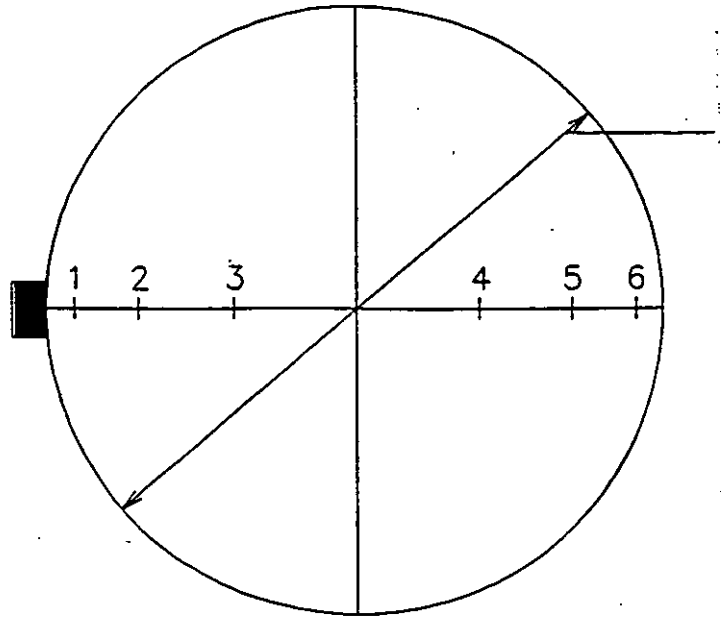
Figure 3 - Sampling and Traverse Points for Press Inlet

stack gases. Stainless steel Type-S pitot tubes were used to measure the gas velocity heads. The pitot tubes were calibrated against a NBS traceable pitot tube in accordance with Method 2. Calibrated Type-K thermocouples were used to determine gas temperatures. Velocity and temperature measurements were made at each point in the traverse as shown in Figure 1 through 3.

3.1.3 Molecular Weight Determination - EPA Method 3: Gas compositional measurements (O_2 and CO_2) for determining the average molecular weight of the stack gases were done in accordance with EPA Reference Method 3. Multi-point, integrated sampling was used to obtain a constant rate sample of flue gas concurrent with the pollutant testing. Sampling was of the same duration (except purges following port changes) as the pollutant runs.

A stainless steel probe was affixed to the pollutant sampling probe for this purpose. A peristaltic pump, delivering 500 to 750 ml/min of flue gas, was used to fill a Tedlar bag. Moisture was removed from the sample gas by means of an air-cooled condenser located prior to the pump. Figure 4 shows a schematic of the Method 3 sampling train.

3.1.4 Flue Gas Moisture Content - EPA Method 4: The flue gas moisture was measured in conjunction with each of the particulate tests according to the sampling and analytical procedures



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	4.4	2.33
2	14.6	7.83
3	29.6	15.83
4	70.4	37.67
5	85.4	45.67
6	95.6	51.17

INSIDE STACK DIAMETER	53.5 in	4.5

Figure 3 - Sampling and Traverse Points for Pr

stack steel Type-S pitot tubes were used to measure heads. The pitot tubes were calibrated against pitot tube in accordance with Method 2. Calibra couples were used to determine gas tempera and temperature measurements were made at each pose as shown in Figure 1 through 3.

3.1.3 Determination - EPA Method 3: Gas composits (O_2 and CO_2) for determining the average of the stack gases were done in accordance rence Method 3. Multi-point, integrated samplingtain a constant rate sample of flue gas concurrelutant testing. Sampling was of the same duration following port changes) as the pollutant runs.

A st probe was affixed to the pollutant sampling s purpose. A peristaltic pump, delivering 500 to 75lue gas, was used to fill a Tedlar bag. Moisture rom the sample gas by means of an air-cooled coled prior to the pump. Figure 4 shows a schematic d 3 sampling train.

3.1.4 Flure Content - EPA Method 4: The flue gas moisture in conjunction with each of the particulate tests acce sampling and analytical procedures

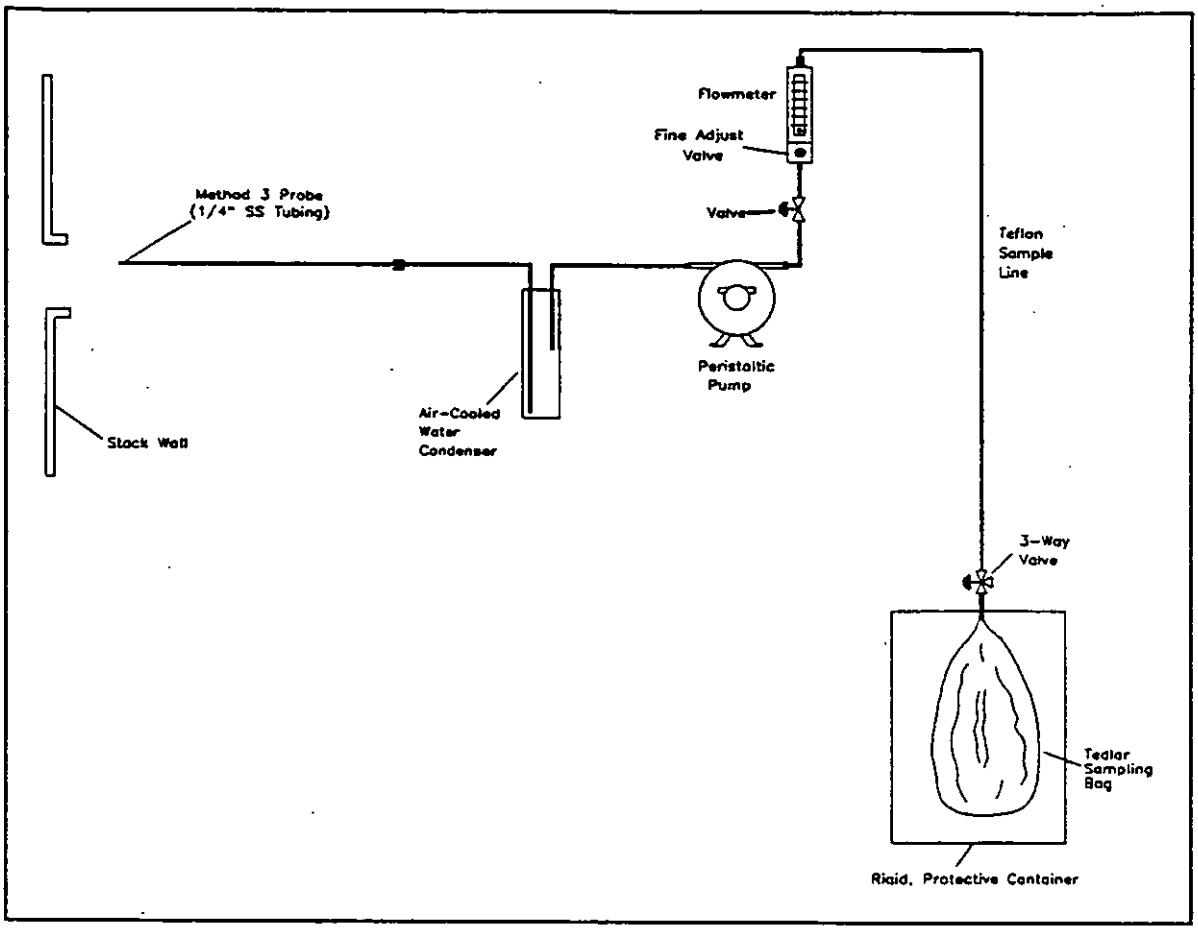


Figure 4 - EPA Method 3 Sampling Train

outlined in EPA Method 4. The flue gas moisture for each test was determined by gravimetric analyses of the water collected in the impinger condensers of the particulate sampling train. All impingers were contained in an ice bath throughout the testing in order to assure complete condensation of the moisture in the flue gas stream. Any moisture which was not condensed in the impingers was captured in the silica gel contained in the final impinger.

3.1.5 Particle Size Determination - Modified Method 4/Method 202: Samples for particle size analysis were collected in an impinger train using Modified Method 4. Analysis on these samples is described in Section 3.2.2.

3.1.6 Continuous Monitoring for NO_x, CO, THC, O_2 and CO_2 - Instrumental Methods: Instrumental monitoring of the stack gases was performed in accordance with the following procedures:

GAS	REFERENCE METHOD	INSTRUMENT TYPE
NO_x	Method 7E	TECO Model 10AR Chemiluminesence NO_x Analyzer
CO	Method 10	TECO Model 48 NDIR CO Analyzer
THC	Method 25A	J.U.M. Engineering Model VE7 FID Total Hydrocarbon Analyzer
O_2	Method 3A	Teledyne Model 320A Chemical Cell Portable O_2 Analyzer
CO_2	Method 3A	HORIBA Model PIR-2000 NDIR CO_2 Analyzer

All of the analyzers except the hydrocarbon analyzer measured gas concentrations on a dry volume basis. The hydrocarbon analyzer measured the concentrations on a wet volume basis as propane.

3.1.6.1 Sampling System Description: An integrated, remote instrumental system housing the pollutant gas analyzers as well as the diluent gas (O_2 and CO_2) monitors was used. Figure 5 outlines the general schematic of the system. The design incorporated two extractive systems - one for the dry analyzers and one for the wet hydrocarbon analyzer. All of the instruments were housed in a trailer located at ground level.

The dry sampling system consisted of a heated stainless steel probe located at the stack port location. A heated glass fiber filter was attached to the probe for rough particulate removal. A short section of heated Teflon sample line was used to deliver the sample to an ice-cooled condenser designed to remove the flue gas moisture. An unheated Teflon sample line was used to transport the dry gas sample from the stack port location down to the instrumental system. The sample gas exiting the Teflon sample line was pumped to the NO_x, CO, CO_2, and O_2 monitors.

The sampling system for the hydrocarbon analyzer incorporated a heated stainless steel probe, a heated glass fiber

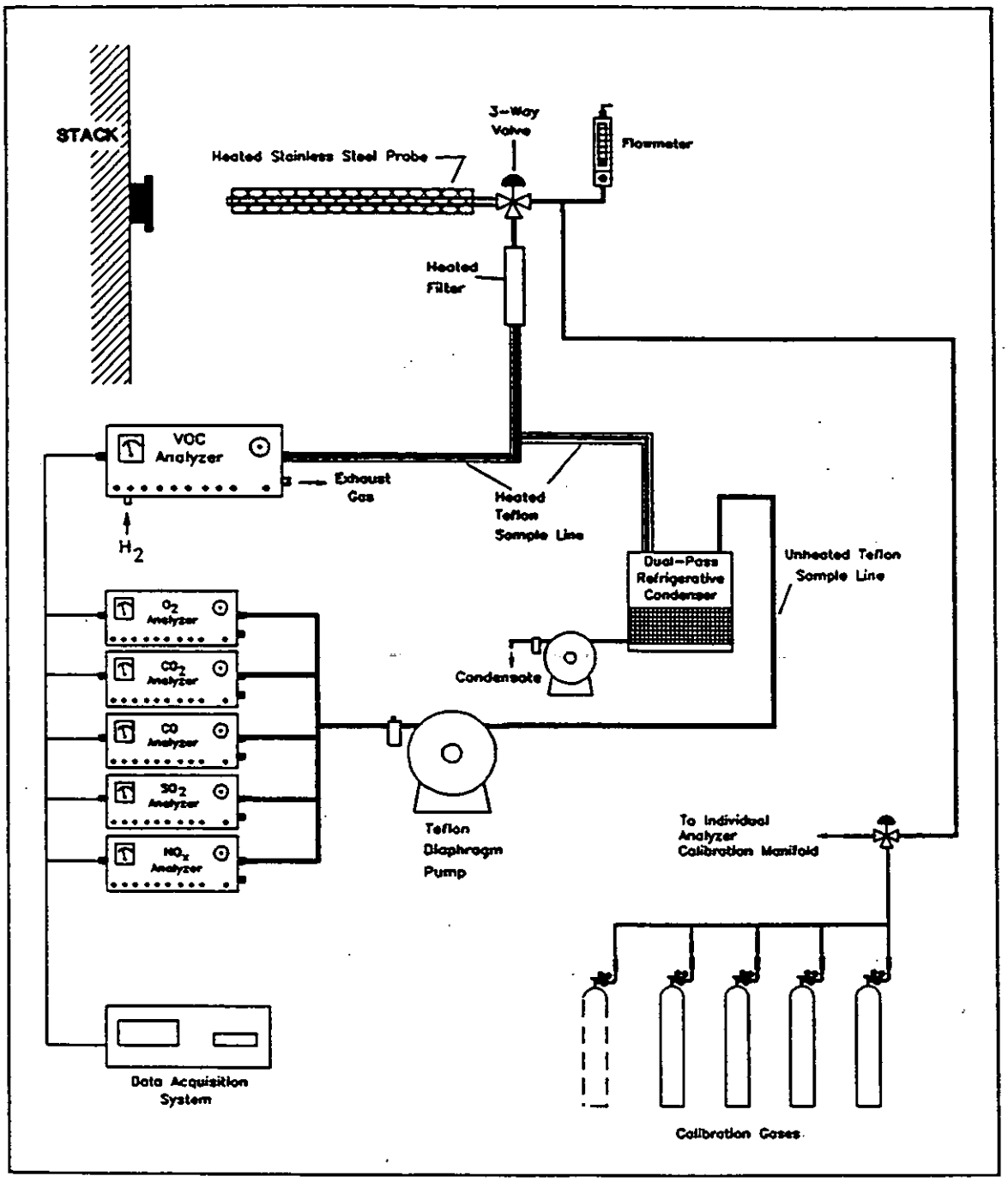


Figure 5 - Continuous Emissions Monitoring System for EPA Methods 3A, 6C, 7E, 10 and 25A

filter, and a heated Teflon sample line. The sample line was heated along its entire length from the stack sampling location to the analyzer.

3.1.6.2 Data Acquisition System: The response outputs of the monitors were recorded digitally by a Campbell Scientific Model CR10WP multi-channel data acquisition system. The system sampled at a rate of 60 Hz and stored one-minute average values.

3.1.6.3 Dry System Calibration: At the beginning of each test run, each monitor on the dry sampling system was zeroed using Zero Nitrogen and spanned using a certified calibration gas with a concentration of 80 to 100 percent of the instrument span. Following calibration a mid range gas, 40 to 60 percent of the instrument span, was introduced to each monitor. The mid range response error never exceeded two percent of the instrument span as required by EPA Reference Method 6C.

After calibrating the monitors, calibration gas was introduced remotely through the probe in order to verify the absence of sampling system bias. The bias error never exceeded five percent of the instrument span as required by EPA Reference Method 6C.

After each test run, Zero Nitrogen and either a mid or high range calibration gas were introduced remotely through the

sampling system to each monitor to check for calibration drift error. In accordance with Method 6C, the calibration drift did not exceed three percent of the instrument span for all valid test runs.

3.1.6.4 Wet System Calibration: All calibration gas standards used were EPA Protocol 1 certified. At the beginning of each test period, the VOC measurement system was zeroed, using Zero Nitrogen, and spanned, using a calibration gas with a concentration of 80 to 90 percent of the instrument span. Following calibration a mid range gas (45 to 55 percent of the instrument span) and then a low range calibration gas (25 to 35 percent of the instrument span) were introduced to the measurement system to check response linearity. The mid and low range response error did not exceed five percent of the calibration gas value as required by EPA Reference Method 25A.

After each test run, calibration gas was introduced to the VOC measurement system in order to indicate the zero and calibration drift. EPA Method 25A requires that the zero and calibration drift errors not exceed three percent of the instrument span.

3.2 Analytical Procedures

3.2.1 Moisture Content Analysis- EPA Method 4: Moisture contents were determined gravimetrically in accordance with

Method 4 by measuring either the volume or mass gains of each impinger in the pollutant sampling trains. Data for these measurements are included in the respective analytical appendices for each pollutant.

3.2.2 Particle Size Analyses - Modified Method 4/Method 202: The particle sizing samples were dried and an organic extraction was performed in accordance with EPA Method 202. A Bahco Microparticle Classifier was utilized on the inlet sample to determine the particle size distribution below 150 microns. Due to limited sample mass, the outlet sample was analyzed using X-Ray Sedigraphy. Appendix H contains the laboratory data for the analyses.

The Bacho Microparticle Classifier classifies particles aerodynamically by density and throttle size. The classifier was calibrated using a set of standard samples (Type DB-5) obtained from the American Society of Mechanical Engineers. The following terminal velocities for each throttle size was determined:

THROTTLE #	TERMINAL VELOCITY (in/min)
18	0.62
17	2.41
16	16.20
14	22.10
12	51.00
8	168.00
4	262.00
0	315.00

The classifier was inspected prior to testing for worn parts, loose bolts, or physical damage that would interfere with the operation of the instrument. Before testing, the classifier was cleaned thoroughly to remove any particulate which would contaminate the test sample. A blank run was then conducted to ensure that the unit was free of contamination particles.

Prior to particle size determination, the sample was screened to remove particles greater than 150 microns. The sample was weighed to the nearest 0.0001 grams using an analytical balance.

4.0 DATA ANALYSIS

All equations and calculations used to determine the pollutant emissions in this test program are documented in Appendix E.

5.0 FIELD EQUIPMENT CALIBRATIONS

All field equipment was calibrated in accordance with the requirements of the applicable EPA Methods and those recommended within the "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III" (EPA-600/4-77-027b, August, 1977). Equipment calibration documentation is found in Appendix I.

6.0 ANALYZER PERFORMANCE CHECKS

Analyzer quality control documentation is contained in Appendix I. Analyzer interference response checks and NO_x converter checks are included. These quality assurance checks were performed in accordance with EPA Methods 3A, 7E, and 10.

APPENDIX A

TEST LOG

TEST LOG
WHEELABRATOR CLEAN AIR SYSTEMS

LOCATION	TEST PARAMETER	TEST METHOD	RUN I.D.	DATE	START TIME	END TIME
SCRUBBER INLET	PARTICLE SIZING	MOD. METHOD 4/202	SI-M4/202-R1	03/10/95	09:10	10:40
SCRUBBER OUTLET	PARTICLE SIZING	MOD. METHOD 4/202	SO-M4/202-R1	03/09/95	17:57	19:00
RTO OUTLET	FLOW, MOISTURE	METHODS 1-4	M1-4-R1	03/09/95	15:26	15:56
RTO OUTLET	FLOW, MOISTURE	METHODS 1-4	M1-4-R2	03/09/95	17:15	17:45
RTO OUTLET	FLOW, MOISTURE	METHODS 1-4	RTOS-M1-4-R1	03/10/95	16:45	17:15
RTO OUTLET	FLOW, MOISTURE	METHODS 1-4	RTOS-M1-4-R2	03/10/95	18:15	18:45
SCRUBBER INLET	FLOW, MOISTURE	METHODS 1-4	SI-M1-4-R1	03/09/95	16:15	16:45
SCRUBBER OUTLET	FLOW, MOISTURE	METHODS 1-4	SO-M1-4-R1	03/10/95	11:20	11:50
SCRUBBER OUTLET	FLOW, MOISTURE	METHODS 1-4	SO-M1-4-R2	03/09/95	19:07	19:37
PRESS INLET	FLOW, MOISTURE	METHODS 1-4	PI-M1-4-R1	03/10/95	16:05	16:35
PRESS INLET	FLOW, MOISTURE	METHODS 1-4	PI-M1-4-R2	03/10/95	18:00	18:30
RTO INLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	RTO INLET-R1	03/09/95	15:30	19:38
RTO OUTLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	RTO OUTLET-R1	03/09/95	15:30	19:38
RTO OUTLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	RTO OUTLET-R2	03/10/95	09:00	11:50
RTO OUTLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	RTO OUTLET-R3	03/10/95	16:00	19:00
SCRUBBER OUTLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	SCRUBBER OUTLET-R1	03/10/95	09:00	11:50
PRESS INLET	O2,CO2,CO,NOx,VOC	METHODS 3A,7E,10,25A	PRESS INLET-R1	03/10/95	16:00	19:00

APPENDIX B

DATA AND RESULTS APPENDICES FOR PARTICLE SIZE TESTING

APPENDIX B.1

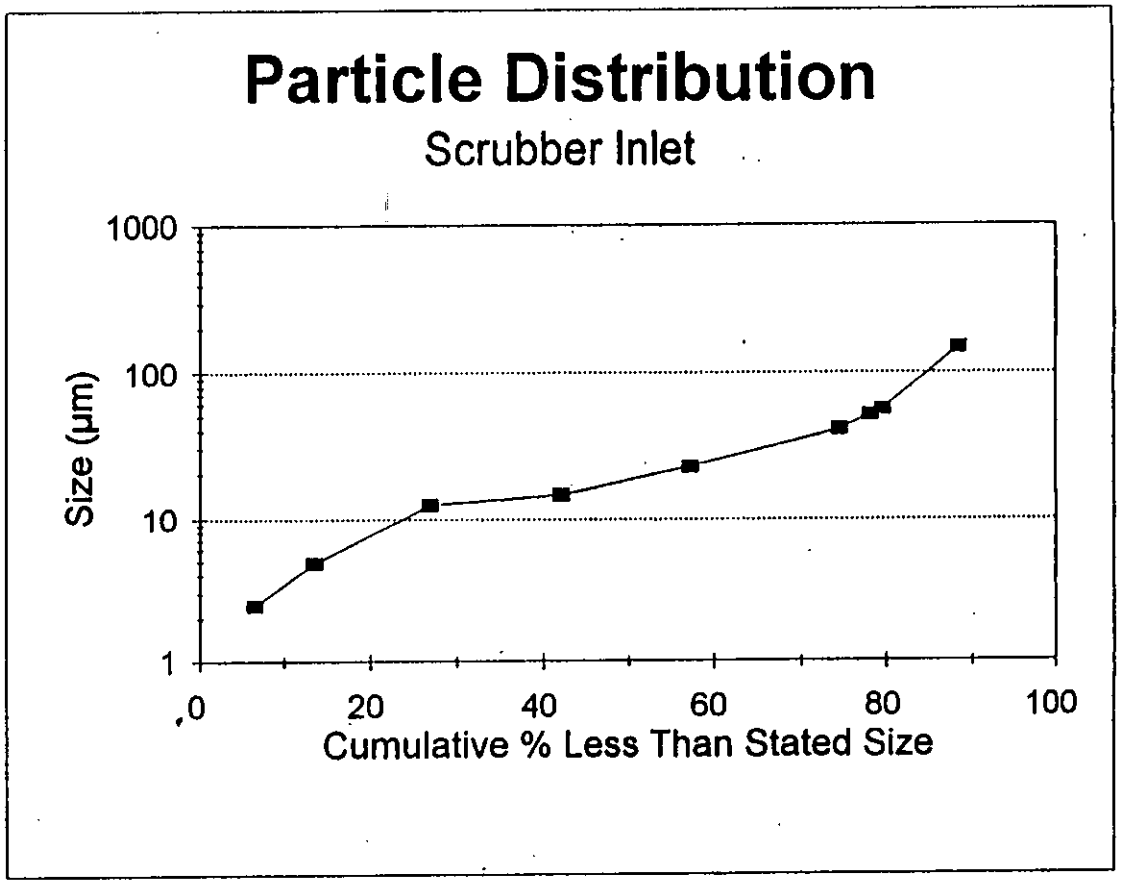
DATA AND RESULTS FOR PARTICLE SIZE TESTING

- SCRUBBER INLET -

EPA METHOD 202/BACHO PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER INLET

DATE	03/10/95
START TIME	09:10
END TIME	10:40

SIZE	WT. %	CUMULATIVE %
2.46	6.62	6.62
4.86	7.05	13.67
12.59	13.24	26.91
14.71	15.18	42.09
22.35	15.26	57.35
40.56	17.12	74.47
50.65	3.53	78
55.54	1.58	79.58
150	8.85	88.43



APPENDIX B.2

DATA AND RESULTS FOR PARTICLE SIZE TESTING

- SCRUBBER OUTLET -

RUN NUMBER SO-M4/202-R1

Date	03/09/95	
Start Time	17:57	
End Time	19:00	
Stack Diam.	48	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	60	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	644.8	846.8	202.0
IMP.2	743.1	748.7	5.6
IMP.3	593.2	598.0	4.8
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1981.1	2193.5	212.4
S.G.	775.9	789.4	13.5

METHOD 1-4 RESULTS

Metered Volume	42.077	dcf
Volume @ Std.Cond.	40.075	dscf
% Water	20.97	%
Velocity	71.35	ft/sec
Actual Flow	53798	acfm
Std. Flow	44622	scfm
Dry Std. Flow	35264	dscfm

METHOD 3 DATA

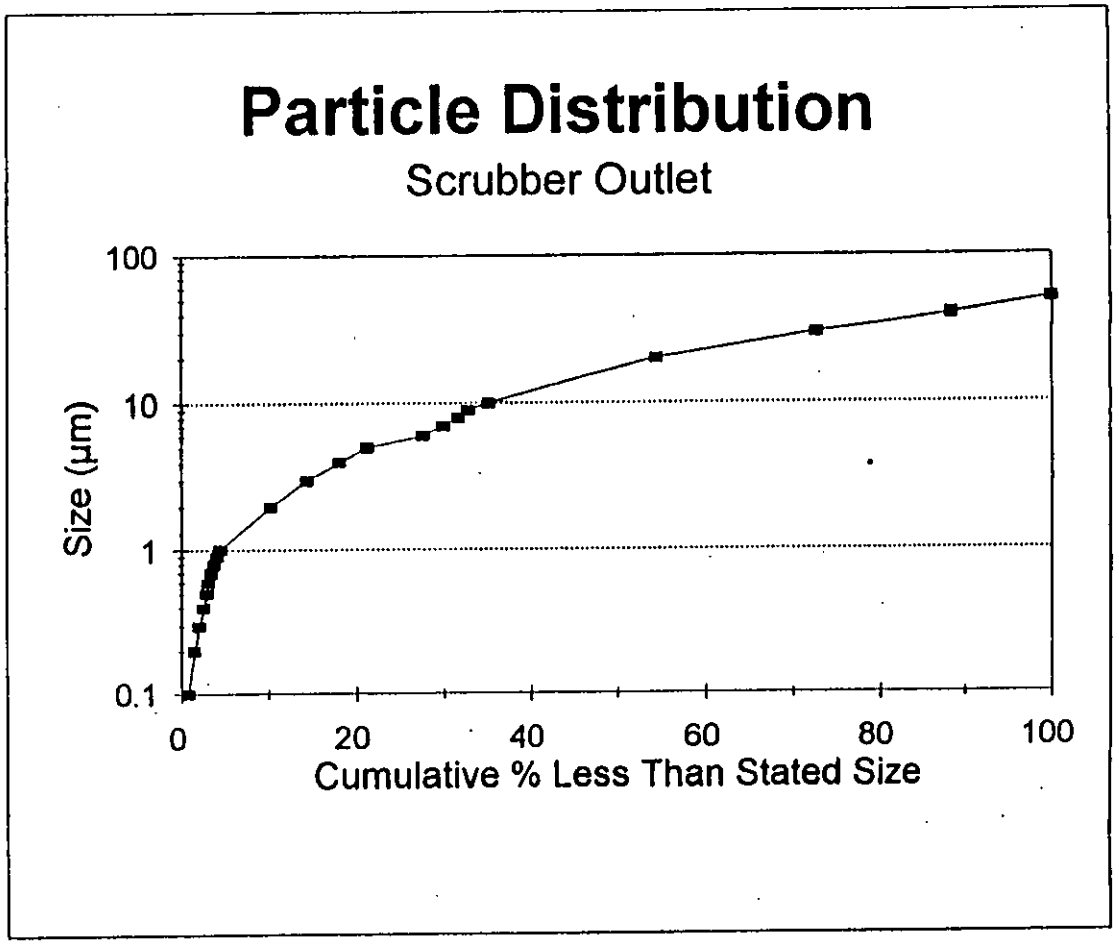
%O2	17.6	Md	29.17
%CO2	2.90	Ms	26.83
%CO	0.0	Ps	28.32
%N2	79.5	Fo	1.138
O2+CO2	20.5	%EA	519

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	137		0.65	0.78	137.513	64	64
2	141		1.50	1.80	179.590	66	65
3	141		1.60	1.92		67	65
4	141		1.60	1.92		70	65
5	143		1.70	2.04		70	66
6	143	-2.50	1.90	2.28		72	66
7	143		1.85	2.20		73	66
8	143		1.70	2.04		75	67
9	143		1.45	1.74		75	67
10	144		0.78	0.94		74	67
11	135		0.68	0.82		69	66
12	140		0.74	0.88		71	67
13	144	-2.50	0.88	1.06		72	67
14	144		0.94	1.13		73	68
15	144		1.10	1.32		74	68
16	143		1.20	1.49		74	68
17	145		1.35	1.62		76	69
18	145		1.45	1.74		76	69
19	145		1.48	1.74		76	69
20	145		1.00	1.20		77	70
					179.590		
AVG.	142	-2.50	1.28	1.53	42.077		70

EPA METHOD 202/X-RAY SEDIGRAPHY PARTICLE SIZING RESULTS
WHEELABRATOR CLEAN AIR SYSTEMS
SCRUBBER OUTLET

DATE	03/09/95
START TIME	17:57
END TIME	19:00

SIZE	WT. %	CUMULATIVE %
0.00-0.10	0.9	0.9
0.10-0.20	0.7	1.6
0.20-0.30	0.6	2.2
0.30-0.40	0.5	2.7
0.40-0.50	0.4	3.1
0.50-0.60	0.1	3.2
0.60-0.70	0.4	3.6
0.70-0.80	0.3	3.9
0.80-0.90	0.3	4.2
0.90-1.00	0.4	4.6
1.00-2.00	5.7	10.3
2.00-3.00	4.1	14.4
3.00-4.00	3.7	18.1
4.00-5.00	3.1	21.2
5.00-6.00	6.4	27.6
6.00-7.00	2.3	29.9
7.00-8.00	1.7	31.6
8.00-9.00	1.1	32.7
9.00-10.00	2.4	35.1
10.00-20.00	19.3	54.4
20.00-30.00	18.3	72.7
30.00-40.00	15.8	88.5
40.00-50.00	11.5	100.0
> 50.00	0.0	100.0



APPENDIX C

DATA AND RESULTS APPENDICES FOR EPA METHODS 2 AND 4 TESTING

APPENDIX C.1

DATA AND RESULTS FOR EPA METHODS 2 AND 4 TESTING

- RTO OUTLET (03/09/95) -

RUN NUMBER	M1-4-R1	
Date	03/09/95	
Start Time	15:26	
End Time	15:56	
Stack Diam.	96	inches
Meter Box Gamma	1.0051	
Meter Box dH@	1.8500	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	590.7	622.4	31.7
IMP.2	596.6	595.5	-1.1
IMP.3	494.2	494.2	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1681.5	1712.1	30.6
S.G.	729.5	730.9	1.4

METHOD 1-4 RESULTS

Metered Volume	21.570	dcf
Volume @ Std.Cond.	21.697	dscf
% Water	6.49	%
Velocity	45.94	ft/sec
Actual Flow	138549	acfm
Std. Flow	113482	scfm
Dry Std. Flow	106115	dscfm

METHOD 3 DATA

%O2	18.7	Md	28.93
%CO2	1.16	Ms	28.22
%CO	0.0	Ps	28.47
%N2	80.2	Fo	1.908
O2+CO2	19.8	%EA	757

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	150	-0.42	0.54	1.85	424.830	40	40
2	150		0.57	1.85	446.400	45	54
3	150		0.58				
4	145		0.57				
5	130		0.54				
6	125		0.54				
7	120		0.53				
8	130		0.53				
9	148		0.53				
10	173		0.58				
11	198		0.56				
12	200		0.54				
13	148	-0.36	0.54				
14	150		0.50				
15	142		0.53				
16	139		0.54				
17	127		0.54				
18	120		0.56				
19	135		0.53				
20	156		0.54				
21	166		0.53				
22	188		0.53				
23	194		0.53				
24	198		0.40				
					446.400		
AVG.	153	-0.39	0.54	1.85	21.570		45

RUN NUMBER	M1-4-R2	
Date	03/09/95	
Start Time	17:15	
End Time	17:45	
Stack Diam.	96	inches
Meter Box Gamma	1.0051	
Meter Box dH@	1.8500	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	622.4	656.7	34.3
IMP.2	595.5	595.6	0.1
IMP.3	494.2	494.2	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1712.1	1746.5	34.4
S.G.	730.9	734.9	4.0

METHOD 1-4 RESULTS

Metered Volume	21.877	dcf
Volume @ Std.Cond.	22.326	dscf
% Water	7.49	%
Velocity	46.24	ft/sec
Actual Flow	139444	acfm
Std. Flow	112155	scfm
Dry Std. Flow	103754	dscfm

METHOD 3 DATA

%O2	18.7	Md	28.93
%CO2	1.16	Ms	28.11
%CO	0.0	Ps	28.47
%N2	80.2	Fo	1.908
O2+CO2	19.8	%EA	757

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	155	-0.45	0.55	1.85	446.515	34	34
2	155		0.53	1.85	468.392	37	45
3	156		0.54				
4	150		0.55				
5	150		0.52				
6	130		0.53				
7	145		0.53				
8	150		0.59				
9	180		0.56				
10	190		0.55				
11	215		0.54				
12	215		0.54				
13	160		0.56				
14	165		0.52				
15	145		0.53				
16	145		0.55				
17	130		0.53				
18	133		0.53				
19	139	-0.40	0.53				
20	166		0.54				
21	166		0.52				
22	199		0.51				
23	205		0.50				
24	207		0.41				
					468.392		
AVG.	165	-0.43	0.53	1.85	21.877		38

APPENDIX C.2

DATA AND RESULTS FOR EPA METHODS 2 AND 4 TESTING

- RTO OUTLET (EVENING - 03/10/95) -

RUN NUMBER	RTOS-M1-4-R1	
Date	03/10/95	
Start Time	16:45	
End Time	17:15	
Stack Diam.	96	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 1-4 RESULTS

Metered Volume	22.821	dcf
Volume @ Std.Cond.	21.687	dscf
% Water	24.07	%
Velocity	49.17	ft/sec
Actual Flow	148302	acfm
Std. Flow	123786	scfm
Dry Std. Flow	93996	dscfm

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	614.3	729.9	115.6
IMP.2	730.5	750.1	19.6
IMP.3	593.7	593.8	0.1
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1938.5	2073.8	135.3
S.G.	785.6	796.3	10.7

METHOD 3 DATA

%O2	19.0	Md	28.99
%CO2	1.45	Ms	26.35
%CO	0.0	Ps	28.47
%N2	79.6	Fo	1.319
O2+CO2	20.4	%EA	943

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	138	-0.36	0.59	1.72	235.624	67	69
2	139	-0.35	0.59	1.72	258.445	71	77
3	142		0.59				
4	147		0.57				
5	148		0.58				
6	150		0.61				
7	150		0.59				
8	150		0.62				
9	142		0.61				
10	138		0.61				
11	133		0.60				
12	130		0.45				
13	129		0.60				
14	135		0.60				
15	135		0.60				
16	145		0.58				
17	145		0.58				
18	150		0.59				
19	150		0.62				
20	150		0.61				
21	145		0.60				
22	145		0.60				
23	140		0.57				
24	132		0.48				
					258.445		
AVG.	142	-0.36	0.59	1.72	22.821		71

RUN NUMBER **RTOS-M1-4-R2**

Date	03/10/95	
Start Time	18:15	
End Time	18:45	
Stack Diam.	96	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	729.9	771.2	41.3
IMP.2	750.1	750.2	0.1
IMP.3	593.8	593.8	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	2073.8	2115.2	41.4
S.G.	796.3	799.6	3.3

METHOD 1-4 RESULTS

Metered Volume	22.814	dcf
Volume @ Std.Cond.	21.907	dscf
% Water	8.76	%
Velocity	49.18	ft/sec
Actual Flow	148334	acfm
Std. Flow	127042	scfm
Dry Std. Flow	115909	dscfm

METHOD 3 DATA

%O2	19.0	Md	28.99
%CO2	1.45	Ms	28.03
%CO	0.0	Ps	28.47
%N2	79.6	Fo	1.319
O2+CO2	20.4	%EA	943

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	126	-0.37	0.58	1.72	261.318	64	66
2	126	-0.38	0.63	1.72	284.132	63	69
3	126		0.64				
4	126		0.61				
5	130		0.69				
6	130		0.71				
7	130		0.68				
8	130		0.70				
9	127		0.68				
10	124		0.62				
11	120		0.60				
12	118		0.55				
13	127		0.57				
14	129		0.57				
15	129		0.62				
16	129		0.61				
17	130		0.67				
18	130		0.69				
19	130		0.69				
20	130		0.69				
21	126		0.70				
22	126		0.67				
23	120		0.64				
24	121		0.53				
					284.132		
AVG.	127	-0.38	0.64	1.72	22.814		66

APPENDIX C.3

DATA AND RESULTS FOR EPA METHODS 2 AND 4 TESTING

- SCRUBBER INLET -

RUN NUMBER	SI-M1-4-R1	
Date	03/09/95	
Start Time	16:15	
End Time	16:45	
Stack Diam.	48	inches
Meter Box Gamma	0.9885	
Meter Box dH@	1.8053	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	640.2	720.1	79.9
IMP.2	721.3	749.5	28.2
IMP.3	584.9	592.6	7.7
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1946.4	2062.2	115.8
S.G.	769.7	779.5	9.8

METHOD 1-4 RESULTS

Metered Volume	22.465	dcf
Volume @ Std.Cond.	21.375	dscf
% Water	21.67	%
Velocity	78.14	ft/sec
Actual Flow	58917	acfm
Std. Flow	44492	scfm
Dry Std. Flow	34851	dscfm

METHOD 3 DATA

%O2	17.9	Md	29.16
%CO2	2.80	Ms	26.74
%CO	0.0	Ps	27.67
%N2	79.3	Fo	1.071
O2+CO2	20.7	%EA	590

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	180		1.35	1.81	427.356	64	64
2	185		1.40	1.81	449.821	66	65
3	186		1.45				
4	186		1.50				
5	187		1.50				
6	187	-11.00	1.40				
7	188		1.40				
8	190		1.30				
9	190		1.20				
10	188		1.10				
11	185		1.20				
12	186		1.20				
13	181	-11.50	1.30				
14	187		1.40				
15	190		1.30				
16	191		1.20				
17	193		1.25				
18	193		1.25				
19	193		1.50				
20	185		1.60				
21	181		1.60				
22	180		1.50				
23	183		1.30				
24	185		1.40				
					449.821		
AVG.	187	-11.25	1.36	1.81	22.465		65

APPENDIX C.4

DATA AND RESULTS FOR EPA METHODS 2 AND 4 TESTING

- SCRUBBER OUTLET -

RUN NUMBER	SO-M1-4-R1	
Date	03/10/95	
Start Time	11:20	
End Time	11:50	
Stack Diam.	48	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.80	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	623.5	733.5	110.0
IMP.2	745.9	751.0	5.1
IMP.3	592.5	593.5	1.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1961.9	2078.0	116.1
S.G.	775.0	791.4	16.4

METHOD 1-4 RESULTS

Metered Volume	22.000	dcf
Volume @ Std.Cond.	21.186	dscf
% Water	22.75	%
Velocity	67.56	ft/sec
Actual Flow	50941	acfm
Std. Flow	42423	scfm
Dry Std. Flow	32773	dscfm

METHOD 3 DATA

%O2	17.7	Md	29.15
%CO2	2.75	Ms	26.61
%CO	0.0	Ps	28.60
%N2	79.6	Fo	1.174
O2+CO2	20.4	%EA	529

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	146		0.76	1.73	213.540	66	66
2	146		0.91	1.73	235.540	77	69
3	146		0.97				
4	146		1.20				
5	146		1.25				
6	146	-2.80	0.91				
7	146		0.58				
8	146		0.46				
9	146		0.35				
10	146		0.31				
11	146		1.50				
12	146		1.80				
13	146	-2.70	1.70				
14	146		1.70				
15	146		2.00				
16	146		2.30				
17	146		1.90				
18	146		1.50				
19	146		1.00				
20	146		0.66				
					235.540		
AVG.	146	-2.75	1.19	1.73	22.000		70

RUN NUMBER	SO-M1-4-R2	
Date	03/09/95	
Start Time	19:07	
End Time	19:37	
Stack Diam.	48	inches
Meter Box Gamma	0.9993	
Meter Box dH@	1.7269	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1			0.0
IMP.2			0.0
IMP.3			0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	0.0	0.0	0.0
S.G.			0.0

METHOD 1-4 RESULTS

Metered Volume*	22.000	dcf
Volume @ Std.Cond.	20.937	dscf
% Water*	22.75	%
Velocity	66.51	ft/sec
Actual Flow	50151	acfm
Std. Flow	41232	scfm
Dry Std. Flow	31852	dscfm

METHOD 3 DATA

%O2	17.3	Md	29.19
%CO2	3.10	Ms	26.64
%CO	0.0	Ps	28.31
%N2	79.6	Fo	1.161
O2+CO2	20.4	%EA	466

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	145		0.63	1.73		67	67
2	147		0.69	1.73		78	69
3	148		0.74				
4	148		0.76				
5	148	-2.60	0.95				
6	148		1.20				
7	148		1.35				
8	148		1.40				
9	148		1.10				
10	148		0.95				
11	146		0.70				
12	148		1.40				
13	148		1.45				
14	148	-2.50	1.40				
15	148		1.50				
16	148		1.45				
17	148		1.30				
18	148		1.15				
19	148		0.93				
20	148		0.69				
					0.000		
AVG.	148	-2.55	1.09	1.73	0.000		70

* Moisture content and meter volume used are from SO-M1-4-R1.

APPENDIX C.5

DATA AND RESULTS FOR EPA METHODS 2 AND 4 TESTING

- PRESS INLET -

RUN NUMBER PI-M1-4-R1

Date	03/10/95	
Start Time	16:05	
End Time	16:35	
Stack Diam.	53.5	inches
Meter Box Gamma	1.0051	
Meter Box dH@	1.8500	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	622.4	660.0	37.6
IMP.2	595.5	596.7	1.2
IMP.3	494.2	494.6	0.4
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1712.1	1751.3	39.2
S.G.	730.9	739.3	8.4

METHOD 1-4 RESULTS

Metered Volume	21.857	dcf
Volume @ Std.Cond.	21.198	dscf
% Water	9.56	%
Velocity	62.31	ft/sec
Actual Flow	58362	acfm
Std. Flow	53976	scfm
Dry Std. Flow	48815	dscfm

METHOD 3 DATA

%O2	20.3	Md	28.81
%CO2	0.00	Ms	27.78
%CO	0.0	Ps	28.35
%N2	79.7		
O2+CO2	20.3		

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	81		1.30	1.85	543.570	63	63
2	81		1.20	1.85	565.427	67	61
3	81		1.00				
4	81	-2.00	0.90				
5	81		1.15				
6	81		1.05				
					565.427		
AVG.	81	-2.00	1.10	1.85	21.857		64

RUN NUMBER **PI-M1-4-R2**

Date	03/10/95	
Start Time	18:00	
End Time	18:30	
Stack Diam.	53.5	inches
Meter Box Gamma	1.0051	
Meter Box dH@	1.8500	
Barometric	28.50	in.Hg
Cp	0.84	
Test Duration	30	minutes

METHOD 1-4 RESULTS

Metered Volume	21.758	dcf
Volume @ Std.Cond.	21.122	dscf
% Water	1.77	%
Velocity	61.38	ft/sec
Actual Flow	57493	acfm
Std. Flow	52922	scfm
Dry Std. Flow	51983	dscfm

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	660.0	661.8	1.8
IMP.2	596.7	596.6	-0.1
IMP.3	494.6	496.9	2.3
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	1751.3	1755.3	4.0
S.G.	739.3	743.4	4.1

METHOD 3 DATA

%O2	20.3	Md	28.81
%CO2	0.00	Ms	28.62
%CO	0.0	Ps	28.32
%N2	79.7	Fo	600.000
O2+CO2	20.3	%EA	2741

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
1	83		1.35	1.85	566.509	62	61
2	83		1.25	1.85	588.267	68	61
3	83	-2.40	1.05				
4	83		0.75				
5	83		1.20				
6	83		1.00				
					588.267		
AVG.	83	-2.40	1.10	1.85	21.758		63

APPENDIX D

DATA AND RESULTS APPENDICES FOR NO_x, CO, AND VOC TESTING

APPENDIX D.1

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- RTO INLET (03/09/95) -

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
15:31	18.34	2.461	332.50	15.61	3.3X
15:32	18.38	2.457	365.30	12.95	3.4X
15:33	18.40	2.292	309.40	13.44	1.2X
15:34	18.59	2.067	191.90	14.87	0.9X
15:35	18.84	1.833	112.30	14.79	0.9X
15:36	19.08	1.484	75.10	17.94	0.8X
15:37	19.44	1.242	59.33	19.79	6.5X
15:38	19.70	1.131	62.59	19.04	21.9
15:39	19.82	1.068	55.65	17.93	19.1
15:40	19.88	1.108	52.92	17.78	19.0
15:41	19.85	1.208	53.26	17.55	19.4
15:42	19.74	1.274	53.40	17.97	19.1
15:43	19.69	1.322	53.58	17.46	19.5
15:44	19.63	1.406	57.55	17.20	22.8
15:45	19.53	1.417	53.95	17.03	20.1
15:46	19.54	1.518	53.48	16.84	18.9
15:47	19.42	1.512	53.45	14.95	18.1
15:48	19.45	0.690	47.11	5.78	17.6
15:49	20.28	0.629	34.84	5.44	18.8
15:50	20.36	0.586	33.40	5.08	62.1
15:51	20.42	0.615	32.36	5.34	67.7
15:52	20.39	0.615	32.62	5.74	62.0
15:53	20.31	0.553	32.39	4.97	58.1
15:54	20.31	0.537	32.50	3.95	53.3
15:55	20.41	1.335	37.92	14.74	60.3
15:56	19.59	1.703	58.73	18.46	59.5
15:57	19.24	1.686	56.23	18.61	56.2
15:58	19.19	1.811	57.22	19.67	51.8
15:59	19.11	1.864	56.88	20.46	50.7
16:00	19.04	1.925	60.20	21.02	50.9
16:01	18.98	1.845	61.90	19.94	47.1
16:02	19.05	1.800	64.99	19.79	45.3
16:03	19.08	1.847	66.52	20.10	46.5
16:04	19.03	1.935	66.72	19.70	45.5
16:05	18.95	1.765	64.14	20.00	41.5
16:06	19.11	1.643	70.90	19.31	39.9
16:07	19.27	1.531	72.60	18.16	38.3
16:08	19.35	1.499	76.70	18.42	35.7
16:09	19.41	1.524	72.20	18.39	34.7
16:10	19.36	1.472	69.21	17.59	33.5
16:11	19.42	1.473	73.70	17.39	34.8

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
16:12	19.41	1.506	76.50	17.53	34.2
16:13	19.33	1.532	70.00	17.63	33.7
16:14	19.37	1.513	66.77	17.17	32.0
16:15	19.41	1.543	63.79	17.39	32.5
16:16	19.35	1.537	66.32	17.67	32.1
16:17	19.37	1.527	69.08	17.60	32.0
16:18	19.37	1.531	67.94	17.71	31.2
16:19	19.39	1.553	65.36	18.07	31.3
16:20	19.34	1.663	65.76	18.48	32.4
16:21	19.20	1.732	62.06	18.32	33.7
16:22	19.12	1.809	60.89	18.56	34.8
16:23	19.07	1.825	59.23	18.26	35.8
16:24	19.06	1.903	63.02	18.06	36.9
16:25	18.97	1.878	59.77	18.42	36.1
16:26	18.99	1.880	59.81	18.09	35.9
16:27	19.00	2.024	60.76	17.29	37.9
16:28	18.81	2.048	63.30	16.78	38.0
16:29	18.76	2.152	63.74	15.59	39.2
16:30	18.70	2.112	62.51	16.52	38.5
16:31	18.73	2.247	66.53	14.37	40.8
16:32	18.59	2.264	72.90	14.29	41.0
16:33	18.58	2.285	71.90	13.26	41.1
16:34	18.56	2.368	73.10	12.59	43.2
16:35	18.48	2.323	82.30	13.47	43.8
16:36	18.52	2.292	86.80	13.95	42.8
16:37	18.54	2.297	82.00	14.02	42.2
16:38	18.54	2.390	83.20	13.00	43.6
16:39	18.44	2.454	91.80	11.17	44.6
16:40	18.38	2.424	96.00	12.04	44.7
16:41	18.38	2.425	97.70	12.41	44.4
16:42	18.40	2.133	96.50	16.70	39.0
16:43	18.70	1.860	82.30	21.43	35.0
16:44	18.98	2.006	87.50	20.30	37.0
16:45	18.83	2.104	90.80	17.99	37.4
16:46	18.70	2.181	87.20	18.85	38.3
16:47	18.63	2.283	99.80	15.65	39.1
16:48	18.54	2.230	103.20	15.94	38.2
16:49	18.60	2.233	96.90	15.38	39.4
16:50	18.58	2.366	97.10	13.33	41.0
16:51	18.43	2.369	92.30	13.75	40.8
16:52	18.44	2.409	93.40	12.73	41.7

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
16:53	18.39	2.416	100.70	12.14	41.3
16:54	18.39	2.365	100.80	12.67	40.4
16:55	18.46	2.218	97.60	15.77	38.6
16:56	18.61	2.116	96.50	18.15	36.3
16:57	18.72	2.060	90.10	19.09	35.9
16:58	18.78	2.129	98.30	17.97	37.0
16:59	18.69	2.273	103.40	15.74	37.7
17:00	18.56	2.251	101.90	16.33	36.8
17:01	18.59	2.317	98.20	15.70	37.4
17:02	18.51	2.347	103.50	13.98	37.4
17:03	18.46	2.329	105.40	14.60	36.8
17:04	18.49	2.289	100.60	15.48	35.9
17:05	18.53	2.267	96.70	16.91	35.5
17:06	18.56	2.312	100.10	15.69	34.9
17:07	18.51	2.235	104.80	16.69	34.3
17:08	18.61	2.176	107.20	17.52	33.7
17:09	18.66	2.388	97.30	15.14	36.7
17:10	18.43	2.548	113.10	10.90	37.5
17:11	18.29	2.301	112.90	15.15	34.2
17:12	18.52	2.208	109.90	17.18	33.0
17:13	18.62	2.160	106.90	19.73	31.5
17:14	18.66	2.228	110.60	17.91	31.8
17:15	18.62	2.182	111.70	19.14	31.2
17:16	18.73	2.329	110.10	16.01	34.0
17:17	18.50	2.499	113.80	13.88	36.9
17:18	18.34	2.617	126.00	11.83	38.6
17:19	18.22	2.434	119.00	15.55	36.7
17:20	18.42	2.491	104.10	14.97	38.8
17:21	18.35	2.482	122.60	14.89	36.7
17:22	18.36	2.354	105.90	17.74	34.3
17:23	18.51	2.338	99.90	18.33	33.4
17:24	18.52	2.314	102.70	18.78	32.4
17:25	18.55	2.285	94.80	19.66	31.4
17:26	18.58	2.368	103.80	19.02	31.6
17:27	18.50	2.371	103.10	19.02	31.5
17:28	18.50	2.327	101.30	20.32	30.5
17:29	18.52	2.360	106.50	19.30	30.6
17:30	18.52	2.110	106.70	21.98	27.5
17:31	18.76	1.803	107.80	22.82	24.2
17:32	19.06	1.639	112.60	23.31	22.6
17:33	19.26	1.691	117.40	22.43	22.7

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
17:34	19.20	1.654	119.20	22.08	22.5
17:35	19.24	1.669	115.70	22.04	22.1
17:36	19.23	1.513	110.40	20.34	20.5
17:37	19.41	1.392	96.60	19.55	19.6
17:38	19.54	1.401	84.50	18.78	19.5
17:39	19.51	1.381	84.50	18.80	19.1
17:40	19.54	1.492	93.00	20.02	20.0
17:41	19.41	1.415	102.10	18.91	19.0
17:42	19.49	1.387	90.30	18.39	18.8
17:43	19.52	1.372	91.20	18.66	18.5
17:44	19.52	1.501	95.60	20.07	19.5
17:45	19.41	1.462	108.60	19.30	19.2
17:46	19.44	1.505	108.60	19.51	19.0
17:47	19.40	1.486	113.00	19.75	18.5
17:48	19.43	1.431	108.10	18.67	18.2
17:49	19.47	1.532	109.00	19.90	18.7
17:50	19.36	1.523	115.30	19.72	18.2
17:51	19.38	1.498	110.70	19.52	17.7
17:52	19.40	1.450	108.50	18.84	17.5
17:53	19.44	1.432	109.40	18.42	17.4
17:54	19.49	1.339	105.70	17.68	16.7
17:55	19.55	1.353	106.60	18.30	16.8
17:56	19.53	1.375	111.60	18.26	16.8
17:57	19.50	1.439	113.40	19.09	17.3
17:58	19.44	1.517	128.30	20.05	18.0
17:59	19.37	1.590	136.60	20.67	17.7
18:00	19.29	1.520	129.20	19.81	17.0
18:01	19.34	1.505	117.10	19.29	16.9
18:02	19.39	1.482	125.60	19.42	17.8
18:03	19.38	1.438	122.80	19.00	17.0
18:04	19.45	1.083	133.50	13.29	17.4
18:05	19.86	0.192	72.80	0.22	16.7
18:06	20.78	0.189	35.10	0.37	16.2
18:07	20.80	0.222	34.40	1.21	18.5
18:08	20.76	0.439	36.74	3.79	17.1
18:09	20.48	1.515	79.50	19.20	16.8
18:10	19.38	1.655	118.50	20.67	18.5
18:11	19.22	1.742	125.00	21.93	19.1
18:12	19.13	1.790	134.00	21.83	19.1
18:13	19.07	1.775	126.50	21.44	18.8
18:14	19.11	1.636	111.40	20.03	17.6

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
18:15	19.24	1.515	123.40	19.75	16.7
18:16	19.38	1.657	124.70	21.48	18.5
18:17	19.23	1.651	122.70	20.95	18.9
18:18	19.22	1.577	118.30	20.05	16.2
18:19	19.31	1.476	122.40	19.33	16.3
18:20	19.41	1.530	117.30	19.70	17.0
18:21	19.35	1.642	121.60	20.80	18.3
18:22	19.23	1.665	121.70	21.20	17.6
18:23	19.21	1.771	117.50	22.14	18.3
18:24	19.10	1.793	122.60	21.64	18.9
18:25	19.05	1.819	116.80	22.15	18.8
18:26	19.04	1.713	118.60	21.69	18.2
18:27	19.14	1.654	127.30	20.75	18.6
18:28	19.20	1.668	128.00	21.22	17.4
18:29	19.21	1.520	137.10	19.70	17.7
18:30	19.32	1.576	153.60	20.47	17.4
18:31	19.29	1.614	148.90	21.02	17.0
18:32	19.24	1.656	142.00	21.34	17.0
18:33	19.19	1.721	140.70	21.85	17.6
18:34	19.12	1.702	147.90	21.76	17.3
18:35	19.14	1.674	152.20	21.52	16.8
18:36	19.17	1.661	145.20	21.20	17.2
18:37	19.18	1.681	164.90	21.45	17.1
18:38	19.16	1.635	152.60	20.72	16.5
18:39	19.22	1.555	143.30	20.20	16.0
18:40	19.28	1.700	147.30	21.11	16.9
18:41	19.15	1.726	147.70	21.40	17.2
18:42	19.10	1.730	129.40	20.98	16.7
18:43	19.11	1.655	134.90	20.86	16.2
18:44	19.18	1.602	142.80	20.13	15.8
18:45	19.23	1.652	131.70	20.33	15.9
18:46	19.19	1.684	127.50	20.65	16.4
18:47	19.14	1.704	126.60	20.37	16.0
18:48	19.15	1.653	117.10	19.64	15.6
18:49	19.20	1.529	113.90	18.50	15.0
18:50	19.30	1.626	124.10	19.76	15.7
18:51	19.22	1.715	139.30	19.61	16.0
18:52	19.13	1.683	123.90	19.31	16.1
18:53	19.15	1.804	111.30	19.40	16.7
18:54	19.04	1.841	100.40	19.53	17.4
18:55	18.99	1.856	97.40	19.38	17.3

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
18:56	19.00	1.781	111.80	19.13	16.8
18:57	19.06	1.797	98.20	18.90	17.0
18:58	19.06	1.819	93.70	19.26	17.3
18:59	19.03	1.767	96.00	18.60	16.6
19:00	19.10	1.662	97.60	18.42	16.1
19:01	19.22	1.865	116.90	17.59	19.0
19:02	18.99	1.970	123.60	18.65	17.3
19:03	18.88	1.889	89.80	19.79	17.0
19:04	18.99	1.857	91.10	19.99	16.9
19:05	19.03	1.957	97.90	18.40	18.4
19:06	18.91	1.954	114.50	18.23	17.0
19:07	18.91	1.834	91.50	19.52	16.4
19:08	19.03	1.823	91.70	19.44	16.2
19:09	19.05	1.849	93.50	19.54	16.6
19:10	19.01	1.972	93.70	19.21	17.2
19:11	18.91	2.006	89.40	18.16	17.6
19:12	18.86	1.906	82.80	19.15	17.1
19:13	18.97	1.872	90.90	19.33	16.9
19:14	18.99	1.937	103.60	18.80	17.3
19:15	18.93	1.881	106.30	19.35	16.8
19:16	18.98	1.977	108.80	19.63	17.6
19:17	18.90	1.995	124.40	19.34	17.4
19:18	18.87	2.022	110.10	18.58	18.0
19:19	18.85	1.938	99.80	18.84	17.1
19:20	18.92	1.866	104.30	19.69	16.9
19:21	18.99	1.882	106.50	19.78	17.1
19:22	19.01	1.903	106.70	19.04	17.1
19:23	18.95	1.984	90.60	17.89	17.9
19:24	18.87	1.988	96.00	18.60	17.5
19:25	18.87	1.988	98.30	18.54	18.0
19:26	18.86	1.993	99.90	19.49	17.4
19:27	18.90	1.952	100.50	19.18	17.8
19:28	18.91	1.895	109.40	19.77	16.9
19:29	18.94	1.879	115.40	20.48	16.7
19:30	18.97	1.945	104.60	20.57	16.9
19:31	18.91	1.947	101.80	20.16	17.4
19:32	18.88	2.080	119.60	19.43	17.4
19:33	18.79	2.063	114.20	20.32	17.7
19:34	18.78	2.110	115.20	19.73	18.4
19:35	18.74	2.148	125.00	18.91	18.4
19:36	18.71	2.109	109.60	18.36	18.5

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Starting
03-09-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
19:37	18.74	2.120	109.80	17.86	18.4
19:38	18.65	1.986	116.90	16.68	10.1
248 MinAvg	19.08	1.789	100.40	17.72	26.8

Data Corrected for Calibrations

248 MinAvg	18.82	1.779	99.81	20.06

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO INLET

Calibrations:

[THC A] Span Value = 100
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 50.00
INITIAL CALIBRATION TIME --> 1512
LOW Cal. Response = -0.70 HIGH Cal. Response = 48.73
FINAL CALIBRATION TIME ----> 2002
LOW Cal. Response = 0.00 HIGH Cal. Response = 49.49

LOW System Drift = 0.70 % HIGH System Drift = 0.76 %

[CO2 A] Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 10.03
INITIAL CALIBRATION TIME --> 1512
LOW Cal. Response = 0.06 HIGH Cal. Response = 9.87
FINAL CALIBRATION TIME ----> 2002
LOW Cal. Response = 0.01 HIGH Cal. Response = 9.97

LOW System Drift = -0.27 % HIGH System Drift = 0.52 %

[CO A] Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 300.00
INITIAL CALIBRATION TIME --> 1512
LOW Cal. Response = 0.00 HIGH Cal. Response = 300.56
FINAL CALIBRATION TIME ----> 2002
LOW Cal. Response = 1.42 HIGH Cal. Response = 300.13

LOW System Drift = 0.14 % HIGH System Drift = -0.04 %

Wheelabrator/LP/Dungannon
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95-415
CEMS DATA RTO INLET

Calibrations:

[O2 A] Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 9.98
INITIAL CALIBRATION TIME --> 1512
LOW Cal. Response = 0.13 HIGH Cal. Response = 10.15
FINAL CALIBRATION TIME ----> 2002
LOW Cal. Response = 0.04 HIGH Cal. Response = 10.17

LOW System Drift = -0.35 % HIGH System Drift = 0.08 %

[NOx A] Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 124.00
INITIAL CALIBRATION TIME --> 1512
LOW Cal. Response = -2.79 HIGH Cal. Response = 121.05
FINAL CALIBRATION TIME ----> 2002
LOW Cal. Response = -2.32 HIGH Cal. Response = 124.46

LOW System Drift = 0.19 % HIGH System Drift = 1.36 %

APPENDIX D.2

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- RTO OUTLET (03/09/95) -

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
15:31	19.14	1.451	176.00	10.22	21.9
15:32	19.19	1.487	211.40	9.40	20.3
15:33	19.13	1.373	270.50	9.70	19.5
15:34	19.24	1.310	133.40	10.80	21.9
15:35	19.32	1.189	132.90	10.41	20.1
15:36	19.48	1.027	146.90	11.36	19.8
15:37	19.58	0.917	166.80	12.27	16.0
15:38	19.69	0.884	78.30	12.52	18.6
15:39	19.72	0.853	44.32	12.25	17.0
15:40	19.74	0.852	66.25	11.74	18.3
15:41	19.70	0.917	106.40	12.60	15.8
15:42	19.65	0.980	91.00	15.95	17.0
15:43	19.59	1.026	40.28	17.16	16.1
15:44	19.54	1.021	83.00	15.67	18.2
15:45	19.54	1.056	109.60	14.06	16.4
15:46	19.49	1.063	140.40	14.26	15.1
15:47	19.47	1.136	56.21	14.98	17.4
15:48	19.38	1.057	95.00	13.84	18.4
15:49	19.52	1.034	102.40	12.36	17.3
15:50	19.50	1.021	158.60	12.10	14.4
15:51	19.55	1.065	69.65	12.52	17.4
15:52	19.47	1.014	68.91	11.96	16.0
15:53	19.52	0.990	86.80	11.43	17.0
15:54	19.52	0.992	152.40	13.72	14.9
15:55	19.57	1.073	92.20	15.23	17.3
15:56	19.45	1.076	63.91	14.57	15.4
15:57	19.47	1.031	105.00	12.14	17.0
15:58	19.45	1.057	151.20	13.41	15.8
15:59	19.46	1.086	128.90	16.00	16.2
16:00	19.40	1.108	61.04	16.44	16.0
16:01	19.40	1.015	103.00	12.52	17.4
16:02	19.50	1.050	116.10	11.87	16.0
16:03	19.45	1.056	160.20	12.73	14.4
16:04	19.41	1.124	74.00	13.05	17.0
16:05	19.35	1.037	89.90	12.79	16.5
16:06	19.50	1.004	93.70	12.59	16.1
16:07	19.48	0.951	151.20	12.97	14.0
16:08	19.56	0.947	68.16	14.20	16.7
16:09	19.62	0.938	53.93	14.53	15.0
16:10	19.60	0.890	77.10	13.01	16.2
16:11	19.63	0.895	135.80	11.11	14.5

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
16:12	19.61	0.937	95.70	12.05	16.3
16:13	19.48	0.968	46.30	14.32	14.9
16:14	19.56	0.918	72.70	13.87	16.5
16:15	19.58	0.961	106.40	12.81	14.9
16:16	19.56	0.962	118.70	12.44	14.1
16:17	19.56	0.991	50.69	13.99	16.0
16:18	19.53	0.948	80.20	14.32	16.7
16:19	19.58	0.982	92.60	14.92	15.6
16:20	19.55	1.015	142.80	13.74	13.5
16:21	19.47	1.050	59.98	12.51	16.6
16:22	19.45	1.054	78.00	13.30	15.2
16:23	19.56	1.049	95.70	13.39	16.0
16:24	19.48	1.070	179.00	12.82	14.3
16:25	19.48	1.096	99.10	12.12	18.1
16:26	19.48	1.096	77.70	12.81	15.3
16:27	19.45	1.135	115.50	12.96	16.6
16:28	19.41	1.169	186.90	13.55	15.6
16:29	19.35	1.233	147.00	12.89	17.4
16:30	19.34	1.224	76.80	13.36	16.1
16:31	19.34	1.217	116.90	12.79	16.7
16:32	19.33	1.263	167.80	13.17	15.6
16:33	19.31	1.239	185.40	11.31	15.6
16:34	19.34	1.267	92.90	9.54	17.8
16:35	19.34	1.199	146.50	8.88	16.5
16:36	19.42	1.222	181.60	9.24	17.1
16:37	19.38	1.234	221.60	11.44	15.8
16:38	19.37	1.320	118.60	13.04	19.2
16:39	19.28	1.319	130.60	11.63	15.4
16:40	19.36	1.264	168.00	9.25	17.1
16:41	19.36	1.241	218.40	10.27	15.7
16:42	19.42	1.198	137.50	13.46	18.5
16:43	19.54	1.088	86.60	14.96	15.4
16:44	19.63	1.100	117.80	11.97	16.4
16:45	19.56	1.159	189.30	11.03	15.1
16:46	19.53	1.185	150.70	13.34	16.0
16:47	19.47	1.235	73.60	13.13	16.7
16:48	19.51	1.175	135.20	11.65	16.4
16:49	19.53	1.233	172.10	9.99	15.6
16:50	19.49	1.257	200.30	10.58	14.4
16:51	19.46	1.290	100.50	12.53	17.9
16:52	19.45	1.267	144.10	11.36	15.3

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
16:53	19.50	1.278	183.30	9.28	16.6
16:54	19.45	1.241	235.70	9.51	15.7
16:55	19.51	1.233	122.80	12.75	19.2
16:56	19.50	1.187	116.30	13.69	14.6
16:57	19.61	1.138	141.50	12.33	15.6
16:58	19.59	1.175	211.60	12.02	14.5
16:59	19.55	1.280	142.50	13.64	16.1
17:00	19.48	1.268	90.60	14.60	15.2
17:01	19.50	1.267	140.00	13.27	16.0
17:02	19.45	1.292	201.60	11.50	15.2
17:03	19.48	1.277	175.30	11.93	15.7
17:04	19.50	1.270	91.00	13.16	16.8
17:05	19.53	1.178	134.60	12.33	15.5
17:06	19.62	1.202	156.90	10.39	15.3
17:07	19.62	1.158	187.70	10.29	13.4
17:08	19.60	1.206	91.90	12.64	16.6
17:09	19.57	1.234	123.20	11.70	14.2
17:10	19.57	1.290	165.30	9.64	15.1
17:11	19.50	1.221	230.70	9.82	13.8
17:12	19.61	1.224	124.90	12.19	16.7
17:13	19.59	1.188	105.80	13.93	2.5X
17:14	19.65	1.176	127.90	12.80	1.9X
17:15	19.61	1.185	201.10	11.63	1.6X
17:16	19.56	1.288	147.00	11.50	1.3X
17:17	19.50	1.322	100.90	12.45	7.8X
17:18	19.49	1.316	168.70	11.23	5.9X
17:19	19.54	1.282	222.40	11.03	3.4X
17:20	19.60	1.285	204.80	10.01	2.9X
17:21	19.48	1.324	112.00	11.68	2.6X
17:22	19.52	1.229	150.10	12.34	2.0X
17:23	19.63	1.241	169.20	12.38	1.8X
17:24	19.60	1.202	204.10	11.23	1.7X
17:25	19.63	1.206	100.10	11.15	1.7X
17:26	19.61	1.216	121.00	10.48	1.6X
17:27	19.61	1.242	157.50	11.61	1.6X
17:28	19.55	1.243	225.30	13.38	1.6X
17:29	19.58	1.263	128.40	14.06	21.7
17:30	19.55	1.171	102.10	13.46	24.0
17:31	19.70	1.023	112.50	12.23	26.1
17:32	19.80	0.967	145.40	12.33	23.0
17:33	19.82	1.011	100.60	12.45	26.8

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
17:34	19.80	0.994	58.26	12.29	23.7
17:35	19.84	0.953	94.50	11.48	27.7
17:36	19.87	0.927	126.60	11.20	25.3
17:37	19.91	0.867	119.00	11.09	28.3
17:38	19.91	0.900	44.56	11.51	25.2
17:39	19.90	0.869	79.10	10.77	27.8
17:40	19.95	0.927	102.70	10.92	25.8
17:41	19.85	0.899	158.30	10.99	26.5
17:42	19.91	0.906	67.40	11.27	27.5
17:43	19.88	0.894	75.90	11.04	28.8
17:44	19.94	0.908	83.80	10.51	26.5
17:45	19.87	0.896	150.50	10.64	23.6
17:46	19.88	0.944	85.90	11.28	27.6
17:47	19.86	0.938	62.51	11.37	26.3
17:48	19.87	0.895	87.60	10.23	26.7
17:49	19.88	0.940	149.90	10.69	24.1
17:50	19.83	0.981	126.00	11.66	29.1
17:51	19.82	0.976	60.15	11.68	24.8
17:52	19.84	0.902	98.00	10.46	26.6
17:53	19.88	0.921	140.30	10.38	24.9
17:54	19.93	0.877	163.10	10.69	29.7
17:55	19.91	0.900	65.91	11.38	24.5
17:56	19.91	0.863	88.70	10.36	26.9
17:57	19.95	0.908	107.50	11.47	24.3
17:58	19.88	0.951	171.80	13.38	24.6
17:59	19.84	1.005	103.50	14.66	30.8
18:00	19.82	0.964	109.60	12.81	30.2
18:01	19.89	0.926	134.20	11.19	28.5
18:02	19.88	0.945	212.90	13.28	27.6
18:03	19.89	0.957	141.70	14.93	31.1
18:04	19.90	0.941	89.80	14.33	26.0
18:05	19.94	0.877	116.90	11.01	26.5
18:06	19.95	0.896	159.80	11.15	23.1
18:07	19.93	0.966	143.90	13.52	28.1
18:08	19.86	0.996	73.30	14.61	23.5
18:09	19.87	0.967	123.00	12.97	25.5
18:10	19.87	1.049	162.50	12.19	24.0
18:11	19.78	1.091	197.60	14.14	29.4
18:12	19.70	1.156	103.40	16.14	24.6
18:13	19.70	1.114	133.30	15.50	27.2
18:14	19.77	1.041	155.10	12.47	25.5

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
18:15	19.84	1.008	197.70	13.32	25.5
18:16	19.86	1.092	107.00	15.72	26.5
18:17	19.80	1.078	108.00	15.50	26.9
18:18	19.82	1.002	130.40	13.02	25.4
18:19	19.90	0.986	185.20	12.88	23.2
18:20	19.91	1.047	124.80	14.72	27.5
18:21	19.86	1.079	86.80	15.35	23.8
18:22	19.86	1.044	131.50	13.63	26.6
18:23	19.88	1.105	190.40	12.96	24.5
18:24	19.81	1.151	182.70	14.65	30.2
18:25	19.76	1.184	104.10	16.46	24.0
18:26	19.76	1.108	148.30	15.70	25.8
18:27	19.84	1.106	179.40	14.56	25.0
18:28	19.86	1.094	199.30	14.34	27.9
18:29	19.87	1.032	97.30	13.28	24.7
18:30	19.93	1.001	115.10	12.22	26.0
18:31	20.01	1.026	139.20	11.91	24.2
18:32	19.96	1.058	207.00	12.54	25.1
18:33	19.93	1.119	123.20	13.34	26.2
18:34	19.89	1.090	114.30	12.89	26.0
18:35	19.97	1.050	140.60	12.18	24.9
18:36	19.95	1.081	210.00	14.80	23.5
18:37	19.93	1.113	154.60	16.47	28.4
18:38	19.93	1.089	95.90	15.94	23.5
18:39	19.97	1.032	131.40	13.42	25.7
18:40	20.00	1.120	183.60	13.95	23.4
18:41	19.92	1.140	180.10	15.87	29.9
18:42	19.91	1.132	90.80	16.17	22.9
18:43	19.97	1.065	130.50	14.12	24.7
18:44	20.06	1.045	157.80	12.29	23.5
18:45	20.04	1.059	195.50	13.43	26.1
18:46	20.02	1.118	105.50	15.57	24.4
18:47	19.99	1.082	122.30	14.52	26.2
18:48	20.08	1.042	152.20	12.25	24.5
18:49	20.08	1.025	203.90	12.81	24.9
18:50	20.09	1.103	126.70	15.29	26.0
18:51	20.03	1.127	110.20	15.60	25.1
18:52	20.03	1.088	149.40	13.42	24.9
18:53	20.03	1.126	212.80	12.83	23.9
18:54	20.00	1.204	164.40	14.80	29.1
18:55	19.93	1.186	103.40	15.40	23.1

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
18:56	20.01	1.091	151.00	13.57	25.6
18:57	20.06	1.138	193.50	12.33	23.4
18:58	20.03	1.148	192.40	13.22	29.9
18:59	19.97	1.154	101.80	15.12	22.6
19:00	20.04	1.057	138.50	14.26	25.1
19:01	20.12	1.181	172.60	12.00	23.7
19:02	19.94	1.189	234.50	12.32	28.9
19:03	19.97	1.193	122.20	14.60	26.1
19:04	19.97	1.157	131.80	14.69	26.2
19:05	20.05	1.188	163.60	12.55	24.9
19:06	19.94	1.196	240.70	12.62	25.6
19:07	19.99	1.193	142.50	14.57	27.4
19:08	19.99	1.175	112.50	14.71	24.3
19:09	20.02	1.157	152.70	13.63	24.9
19:10	20.01	1.196	216.40	12.03	23.5
19:11	19.96	1.238	180.80	12.76	29.7
19:12	19.95	1.204	106.90	14.31	22.9
19:13	20.01	1.150	154.40	14.07	25.3
19:14	20.05	1.199	197.50	12.55	23.6
19:15	20.01	1.160	201.40	12.65	29.6
19:16	20.01	1.228	105.50	14.43	22.8
19:17	19.99	1.188	145.30	13.75	25.4
19:18	20.03	1.218	173.80	12.82	23.4
19:19	19.99	1.177	226.10	11.94	26.4
19:20	20.04	1.181	130.70	13.45	25.7
19:21	20.02	1.175	127.70	14.21	25.9
19:22	20.06	1.182	156.20	13.46	24.5
19:23	19.99	1.214	227.20	12.14	24.0
19:24	19.97	1.262	157.20	13.22	27.7
19:25	19.96	1.256	103.90	14.08	22.9
19:26	19.99	1.196	158.60	13.84	25.2
19:27	20.07	1.198	202.50	12.61	23.3
19:28	20.03	1.174	184.90	12.59	29.0
19:29	20.08	1.187	95.70	14.25	22.2
19:30	20.08	1.166	146.00	14.13	24.1
19:31	20.11	1.232	182.20	13.89	23.0
19:32	20.03	1.244	214.70	12.88	27.6
19:33	20.01	1.279	117.30	14.06	23.6
19:34	19.99	1.264	145.60	13.75	25.8
19:35	20.06	1.283	175.70	13.38	24.1
19:36	20.01	1.260	231.80	12.49	25.8

Wheelabrator/LP/Dungannon
03/09/95
95-415
CEMS DATA RTO STACK

Starting
03-09-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
19:37	20.01	1.290	152.40	12.79	26.2
19:38	20.00	1.341	131.30	12.94	25.7
248 MinAvg	19.72	1.108	135.43	12.82	21.6

Data Corrected for Calibrations

248 MinAvg	18.69	1.158	139.17	13.31

APPENDIX D.3

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- RTO OUTLET (MORNING - 03/10/95) -

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
09:01	19.06	1.307	204.90	14.50	18.9
09:02	18.77	1.425	205.50	15.30	21.5
09:03	18.92	1.433	112.30	18.24	19.1
09:04	18.59	1.373	139.60	13.58	19.9
09:05	18.47	1.395	208.40	12.69	17.1
09:06	18.87	1.318	202.80	14.88	23.4
09:07	19.39	1.291	87.40	16.65	18.1
09:08	18.54	1.254	139.30	14.82	20.0
09:09	19.12	1.322	169.20	13.10	17.3
09:10	19.00	1.297	227.10	13.24	19.6
09:11	18.99	1.351	105.20	12.91	20.2
09:12	18.95	1.389	119.80	12.56	21.5
09:13	18.95	1.406	166.30	13.99	18.6
09:14	18.88	1.399	243.60	14.62	17.2
09:15	18.91	1.438	169.70	15.08	22.1
09:16	18.94	1.405	103.50	13.35	18.6
09:17	18.96	1.298	169.80	13.23	19.6
09:18	19.02	1.274	200.30	14.95	16.9
09:19	19.07	1.218	189.80	17.04	22.9
09:20	19.09	1.192	73.30	17.21	18.1
09:21	19.10	1.180	108.00	13.08	19.1
09:22	19.08	1.240	132.30	14.62	16.4
09:23	19.08	1.181	189.00	16.10	18.0
09:24	19.11	1.214	75.70	16.18	19.1
09:25	19.06	1.203	88.70	13.83	20.8
09:26	19.11	1.224	116.20	15.26	17.8
09:27	19.01	1.297	187.70	18.24	15.7
09:28	18.90	1.374	99.40	20.15	20.3
09:29	18.85	1.417	52.49	18.02	18.5
09:30	18.83	1.388	82.10	16.25	18.2
09:31	18.84	1.395	135.80	17.69	15.4
09:32	18.91	1.345	116.10	17.64	20.5
09:33	18.94	1.360	37.74	15.42	17.6
09:34	18.97	1.289	69.04	13.47	18.8
09:35	19.09	1.337	82.00	16.92	15.6
09:36	19.02	1.331	131.90	17.60	15.6
09:37	18.96	1.422	49.80	18.00	18.3
09:38	18.92	1.409	58.36	16.83	20.2
09:39	18.94	1.478	92.50	17.02	17.0
09:40	18.82	1.489	188.10	18.52	15.8
09:41	18.83	1.523	106.60	17.96	20.4

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
09:42	18.84	1.485	64.91	15.44	19.1
09:43	18.96	1.176	86.00	16.36	18.2
09:44	19.33	1.214	102.50	18.05	14.6
09:45	19.13	1.372	112.80	17.87	18.5
09:46	19.05	1.396	45.28	16.94	17.5
09:47	19.06	1.343	75.70	14.18	18.8
09:48	19.10	1.414	102.00	16.65	15.6
09:49	19.05	1.391	152.70	18.48	16.6
09:50	19.03	1.441	52.47	18.76	17.8
09:51	18.98	1.433	57.20	15.95	19.9
09:52	19.05	1.430	83.90	16.02	16.4
09:53	19.01	1.385	160.80	17.61	14.5
09:54	19.10	1.413	69.75	17.81	18.8
09:55	19.08	1.356	45.54	14.99	18.7
09:56	19.17	1.289	74.90	13.89	17.3
09:57	19.24	1.201	123.90	16.76	14.6
09:58	19.33	1.166	91.20	19.34	18.2
09:59	19.37	1.150	30.65	19.09	17.0
10:00	19.40	1.084	48.80	15.77	18.3
10:01	19.44	1.151	67.99	17.57	14.9
10:02	19.37	1.208	108.60	18.56	15.6
10:03	19.26	1.294	38.21	18.61	16.9
10:04	19.20	1.314	48.29	14.64	19.5
10:05	19.22	1.390	79.20	14.71	15.9
10:06	19.10	1.442	159.60	16.70	14.7
10:07	19.09	1.411	69.89	17.39	18.9
10:08	19.11	1.350	48.50	14.50	19.0
10:09	19.21	1.272	80.20	13.09	16.9
10:10	19.23	1.259	140.00	15.18	14.2
10:11	19.27	1.283	104.70	16.86	18.9
10:12	19.24	1.285	42.20	15.69	17.2
10:13	19.26	1.217	81.00	13.00	18.3
10:14	19.30	1.242	108.60	15.30	15.3
10:15	19.35	1.111	124.60	18.00	17.0
10:16	19.40	1.153	26.73	18.63	16.6
10:17	19.42	0.987	41.71	15.91	18.9
10:18	19.51	1.169	58.29	15.72	15.5
10:19	19.28	1.314	126.40	19.17	14.0
10:20	19.12	1.470	49.66	18.91	18.0
10:21	18.95	1.500	39.23	16.58	19.1
10:22	19.01	1.302	57.37	15.53	16.6

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
10:23	19.26	1.176	72.60	18.63	13.2
10:24	19.28	1.334	48.77	17.60	16.9
10:25	19.19	1.339	26.10	15.99	16.9
10:26	19.20	1.285	44.93	11.75	17.8
10:27	19.30	1.302	76.40	13.51	14.6
10:28	19.28	1.235	86.40	17.40	16.6
10:29	19.29	1.238	23.73	18.83	16.5
10:30	19.26	1.200	32.28	15.66	18.4
10:31	19.35	1.193	49.63	15.49	15.1
10:32	19.32	1.058	88.30	18.93	13.5
10:33	19.45	1.021	22.39	19.47	17.3
10:34	19.45	1.023	17.15	17.53	18.7
10:35	19.48	0.966	28.54	14.66	15.8
10:36	19.51	0.972	58.15	17.06	12.6
10:37	19.50	0.989	25.96	18.76	16.5
10:38	19.48	0.965	9.39	18.15	16.7
10:39	19.47	0.949	19.51	14.52	17.1
10:40	19.49	1.014	37.93	16.10	13.9
10:41	19.37	1.122	41.17	19.66	15.8
10:42	19.27	1.196	14.71	20.58	16.4
10:43	19.20	1.295	27.93	16.55	17.9
10:44	19.07	1.370	68.81	17.22	15.4
10:45	19.00	1.357	119.50	19.88	16.6
10:46	19.03	1.235	38.95	20.97	17.9
10:47	19.17	1.168	37.19	19.34	19.3
10:48	19.23	1.331	47.33	13.84	17.0
10:49	18.95	1.437	116.20	15.19	14.0
10:50	18.92	1.531	58.98	17.38	18.1
10:51	18.87	1.462	44.35	17.94	18.3
10:52	18.95	1.361	69.49	14.73	17.9
10:53	19.09	1.188	115.20	17.57	16.0
10:54	19.27	1.256	81.90	22.04	18.9
10:55	19.16	1.254	43.12	22.62	17.4
10:56	19.23	1.262	67.04	19.33	18.8
10:57	19.24	1.184	99.80	18.32	17.1
10:58	19.26	1.326	119.70	22.19	19.0
10:59	19.15	1.418	48.28	22.21	17.6
11:00	19.15	1.345	48.59	16.73	19.4
11:01	19.18	1.488	57.05	11.82	16.1
11:02	19.07	1.482	112.40	13.78	13.9
11:03	19.12	1.546	40.92	16.00	17.9

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
11:04	19.06	1.515	32.90	15.73	18.8
11:05	19.14	1.510	56.90	12.34	16.9
11:06	19.12	1.503	138.20	13.14	14.4
11:07	19.15	1.579	101.10	16.37	19.3
11:08	19.12	1.548	58.43	16.95	17.7
11:09	19.14	1.429	100.00	15.00	19.2
11:10	19.36	1.199	118.70	18.11	16.6
11:11	19.45	1.456	139.40	17.92	18.3
11:12	19.22	1.538	61.68	17.34	17.6
11:13	19.26	1.383	89.40	16.80	19.7
11:14	19.43	1.277	107.00	16.15	17.2
11:15	19.50	1.302	155.30	18.33	17.4
11:16	19.46	1.363	61.88	20.07	19.6
11:17	19.43	1.396	68.58	18.45	19.9
11:18	19.45	1.266	94.00	16.69	18.4
11:19	19.54	1.262	158.90	18.47	16.8
11:20	19.55	1.337	85.80	20.31	20.0
11:21	19.48	1.322	55.20	21.27	18.1
11:22	19.57	1.183	68.10	18.09	18.6
11:23	19.59	1.283	102.70	15.79	15.0
11:24	19.56	1.304	81.90	18.55	18.4
11:25	19.54	1.344	26.88	18.27	17.0
11:26	19.55	1.303	50.66	15.50	18.6
11:27	19.59	1.386	84.30	12.58	15.5
11:28	19.58	1.333	134.20	14.57	16.6
11:29	19.60	1.364	49.04	17.38	17.9
11:30	19.56	1.340	74.20	16.35	20.0
11:31	19.62	1.356	100.40	13.75	17.7
11:32	19.59	1.355	183.90	14.54	16.5
11:33	19.57	1.371	86.60	18.57	19.9
11:34	19.57	1.369	47.76	18.19	19.0
11:35	19.57	1.356	67.75	14.30	17.3
11:36	19.61	1.359	131.00	13.10	14.7
11:37	19.61	1.398	90.00	16.71	18.9
11:38	19.56	1.423	40.24	17.77	17.5
11:39	19.60	1.285	69.88	17.06	18.5
11:40	19.73	1.286	90.10	13.16	16.0
11:41	19.72	1.315	105.30	14.37	17.4
11:42	19.67	1.344	31.37	17.20	16.9
11:43	19.66	1.331	51.93	16.19	19.2
11:44	19.73	1.322	73.10	13.60	16.0

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
11:45	19.74	1.287	141.50	14.29	14.5
11:46	19.78	1.333	55.28	17.72	19.0
11:47	19.74	1.294	59.40	18.47	20.2
11:48	19.85	1.254	82.30	15.95	17.6
11:49	19.82	1.229	152.10	15.43	15.0
11:50	19.84	1.218	86.80	18.85	19.1
170 MinAvg	19.23	1.309	88.87	16.54	17.6

Data Corrected for Calibrations

170 MinAvg	19.75	1.322	90.65	16.71

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Calibrations:

[THC B] Span Value = 100
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 50.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -0.17 HIGH Cal. Response = 49.56
FINAL CALIBRATION TIME ----> 1228
LOW Cal. Response = 0.00 HIGH Cal. Response = 50.38

LOW System Drift = 0.17 % HIGH System Drift = 0.81 %

[CO2 B] Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 10.03

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = 0.00 HIGH Cal. Response = 9.94
FINAL CALIBRATION TIME ----> 1217
LOW Cal. Response = 0.01 HIGH Cal. Response = 9.85

LOW System Drift = 0.01 % HIGH System Drift = -0.46 %

[CO B] Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 300.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = 0.00 HIGH Cal. Response = 295.05
FINAL CALIBRATION TIME ----> 1213
LOW Cal. Response = 0.01 HIGH Cal. Response = 293.15

LOW System Drift = 0.00 % HIGH System Drift = -0.19 %

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Calibrations:

[O2 B] Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 9.98

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = 0.01 HIGH Cal. Response = 9.68
FINAL CALIBRATION TIME ----> 1217
LOW Cal. Response = 0.02 HIGH Cal. Response = 9.77

LOW System Drift = 0.04 % HIGH System Drift = 0.40 %

[NOx B] Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 124.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -0.23 HIGH Cal. Response = 123.22
FINAL CALIBRATION TIME ----> 1219
LOW Cal. Response = -0.22 HIGH Cal. Response = 125.22

LOW System Drift = 0.00 % HIGH System Drift = 0.80 %

APPENDIX D.4

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- RTO OUTLET (EVENING - 03/10/95) -

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
16:01	18.77	1.345	47.10	15.30	16.1
16:02	18.72	1.325	57.20	16.50	16.8
16:03	18.83	1.333	104.80	15.69	14.6
16:04	18.79	1.269	174.80	13.80	19.7
16:05	18.84	1.343	54.58	13.06	17.7
16:06	18.78	1.332	51.62	14.64	18.2
16:07	18.86	1.319	91.80	14.53	15.1
16:08	18.82	1.299	185.50	14.09	16.9
16:09	18.87	1.307	73.70	13.54	19.1
16:10	18.87	1.322	41.34	16.76	18.6
16:11	18.86	1.324	63.22	16.96	14.9
16:12	18.79	1.344	166.00	15.95	15.2
16:13	18.79	1.754	110.20	14.73	20.0
16:14	18.78	1.346	39.17	14.25	16.2
16:15	18.84	1.329	62.21	14.90	17.2
16:16	18.87	1.362	149.20	15.33	20.4
16:17	18.86	1.325	127.40	15.32	23.0
16:18	18.88	1.335	38.97	15.83	17.2
16:19	18.91	1.318	49.28	18.07	17.6
16:20	18.90	1.326	105.30	18.36	16.0
16:21	18.94	1.236	131.80	16.71	21.0
16:22	19.00	1.286	35.75	14.36	17.2
16:23	18.95	1.306	40.64	15.47	18.2
16:24	19.01	1.333	87.40	16.43	14.9
16:25	18.91	1.370	164.00	16.56	18.0
16:26	18.85	1.447	60.64	14.53	19.0
16:27	18.79	1.420	47.21	14.87	19.3
16:28	18.88	1.363	75.20	14.06	15.7
16:29	18.89	1.293	170.20	16.31	17.3
16:30	18.99	1.269	70.90	17.40	19.3
16:31	19.03	1.306	37.94	16.19	18.7
16:32	19.00	1.307	69.84	12.63	16.1
16:33	18.95	1.330	170.80	13.97	16.5
16:34	18.95	1.425	119.30	16.60	21.4
16:35	18.88	1.370	55.45	18.71	17.0
16:36	18.93	1.303	67.52	16.76	17.2
16:37	18.98	1.280	139.50	15.55	15.6
16:38	19.01	1.265	134.30	17.05	22.0
16:39	19.03	1.270	47.11	18.13	16.5
16:40	19.09	1.233	51.88	15.77	17.0
16:41	19.05	1.385	96.60	11.83	15.6

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
16:42	18.97	1.350	154.70	13.85	19.5
16:43	18.93	1.401	48.36	16.98	16.6
16:44	18.94	1.384	44.68	17.80	18.2
16:45	18.95	1.429	86.60	13.66	14.9
16:46	18.89	1.420	185.40	13.69	16.9
16:47	18.92	1.512	69.89	15.51	18.9
16:48	18.84	1.544	52.38	15.72	19.3
16:49	18.86	1.509	93.40	13.32	15.7
16:50	18.83	1.482	200.30	13.95	15.5
16:51	18.84	1.581	96.10	16.54	19.9
16:52	18.78	1.585	40.60	18.51	17.2
16:53	18.81	1.558	67.09	17.00	16.3
16:54	18.77	1.472	169.90	13.81	15.1
16:55	18.95	1.348	138.30	15.50	21.0
16:56	19.08	1.284	40.46	17.00	16.4
16:57	19.09	1.251	58.19	16.29	16.8
16:58	19.13	1.347	128.30	13.94	14.6
16:59	19.04	1.386	163.20	14.54	21.4
17:00	18.94	1.511	55.03	17.21	16.2
17:01	18.84	1.509	63.21	17.65	16.8
17:02	18.81	1.536	116.50	15.01	15.0
17:03	18.80	1.408	203.60	13.57	19.5
17:04	18.96	1.336	69.24	15.30	17.7
17:05	19.02	1.281	50.16	16.25	18.4
17:06	19.11	1.232	83.40	15.34	14.7
17:07	19.11	1.233	176.50	14.43	16.4
17:08	19.11	1.292	72.40	15.58	18.4
17:09	19.01	1.406	44.73	17.33	18.5
17:10	18.91	1.456	73.60	16.15	15.1
17:11	18.81	1.418	187.60	13.53	16.0
17:12	18.91	1.410	109.70	12.81	20.6
17:13	18.92	1.385	44.73	15.13	16.7
17:14	18.93	1.352	60.85	14.85	16.6
17:15	18.95	1.374	132.90	14.19	14.6
17:16	18.87	1.403	125.70	12.97	20.6
17:17	18.87	1.403	41.82	15.43	16.0
17:18	18.86	1.350	54.49	16.78	16.4
17:19	18.91	1.374	118.10	15.38	14.7
17:20	18.89	1.311	161.10	12.63	21.1
17:21	18.91	1.345	49.72	12.83	15.7
17:22	18.88	1.297	50.60	14.72	16.9

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
17:23	18.93	1.350	99.80	14.46	14.0
17:24	18.81	1.316	200.70	13.58	18.5
17:25	18.86	1.399	69.62	13.34	18.1
17:26	18.74	1.423	58.66	16.22	18.6
17:27	18.74	1.413	94.30	15.71	14.8
17:28	18.69	1.388	206.10	14.84	17.2
17:29	18.77	1.396	91.40	11.90	19.5
17:30	18.76	1.357	51.28	13.41	18.4
17:31	18.83	1.296	74.20	14.92	15.3
17:32	18.84	1.239	179.30	15.41	15.6
17:33	18.86	1.402	97.10	12.69	20.0
17:34	18.72	1.424	38.12	12.85	15.9
17:35	18.70	1.378	53.27	16.08	16.2
17:36	18.74	1.394	130.20	16.16	13.9
17:37	18.76	1.355	126.20	14.26	20.7
17:38	18.75	1.383	38.14	12.06	16.0
17:39	18.76	1.298	46.81	11.12	16.3
17:40	18.83	1.413	102.50	14.08	14.2
17:41	18.71	1.396	170.00	16.05	19.9
17:42	18.70	1.463	46.54	15.34	16.3
17:43	18.66	1.493	47.12	13.22	17.7
17:44	18.68	1.513	94.60	14.15	14.1
17:45	18.58	1.468	198.70	16.46	16.4
17:46	18.63	1.504	60.34	16.49	18.8
17:47	18.62	1.466	46.01	13.48	19.0
17:48	18.70	1.409	83.90	12.74	15.1
17:49	18.67	1.367	209.30	15.71	15.7
17:50	18.77	1.395	87.50	16.06	19.9
17:51	18.74	1.404	44.40	14.64	18.9
17:52	18.73	1.385	72.60	12.91	15.7
17:53	18.73	1.379	179.60	14.53	15.2
17:54	18.73	1.398	113.20	16.17	21.0
17:55	18.75	1.393	41.66	16.44	16.6
17:56	18.78	1.376	62.19	13.53	17.2
17:57	18.76	1.360	150.00	13.90	14.9
17:58	18.82	1.295	145.90	16.35	21.9
17:59	18.86	1.303	40.61	16.65	16.3
18:00	18.87	1.283	49.93	13.96	16.7
18:01	18.86	1.303	114.60	13.05	14.9
18:02	18.85	1.286	166.70	15.95	21.2
18:03	18.85	1.285	43.30	17.59	16.2

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
18:04	18.81	1.314	40.35	16.91	17.6
18:05	18.88	1.348	69.38	13.59	14.3
18:06	18.78	1.332	153.40	14.24	15.7
18:07	18.83	1.339	38.74	15.33	18.2
18:08	18.84	1.348	23.71	15.48	18.8
18:09	18.86	1.343	54.70	11.67	15.2
18:10	18.83	1.350	158.30	11.34	14.4
18:11	18.85	1.409	68.45	14.87	19.1
18:12	18.79	1.406	32.53	16.20	18.4
18:13	18.82	1.409	64.61	13.72	15.9
18:14	18.77	1.385	167.50	12.85	14.8
18:15	18.82	1.449	116.60	15.42	20.5
18:16	18.75	1.424	38.43	16.85	16.5
18:17	18.77	1.378	60.00	15.87	17.0
18:18	18.79	1.372	141.90	13.41	15.2
18:19	18.85	1.314	147.10	14.26	21.4
18:20	18.92	1.333	35.88	15.38	16.2
18:21	18.91	1.297	45.73	14.69	16.8
18:22	18.94	1.331	100.00	11.77	15.3
18:23	18.92	1.318	164.40	12.41	20.1
18:24	18.87	1.379	45.16	14.67	16.2
18:25	18.86	1.364	38.72	16.08	18.0
18:26	18.87	1.373	79.00	14.07	14.8
18:27	18.83	1.337	177.00	13.05	16.5
18:28	18.91	1.350	59.66	14.01	18.4
18:29	18.84	1.349	31.96	15.05	18.5
18:30	18.86	1.333	63.78	14.46	15.2
18:31	18.82	1.322	171.80	12.22	14.8
18:32	18.82	1.360	82.00	12.58	18.6
18:33	18.78	1.390	35.36	14.19	16.8
18:34	18.71	1.359	56.62	14.27	14.9
18:35	18.68	1.357	161.50	11.68	14.2
18:36	18.66	1.381	115.80	11.32	19.1
18:37	18.55	1.439	40.45	13.07	15.1
18:38	18.53	1.348	60.94	14.03	15.6
18:39	18.54	1.339	138.80	12.77	13.9
18:40	18.54	1.351	148.10	10.96	19.4
18:41	18.41	1.406	46.55	12.24	14.8
18:42	18.34	1.409	49.74	13.27	15.0
18:43	18.32	1.407	112.00	12.96	13.6
18:44	18.31	1.314	199.00	11.74	18.6

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Starting
03-10-95

Time	O2 (% dv) STACK	CO2 (% dv) STACK	CO (ppm dv) STACK	NOx (ppm dv) STACK	VOC (ppm wv) STACK
18:45	18.28	1.329	56.64	12.19	15.5
18:46	18.27	1.297	44.39	14.87	16.2
18:47	18.23	1.294	82.70	14.44	13.3
18:48	18.17	1.332	187.20	12.10	15.3
18:49	18.07	1.431	70.20	10.37	17.4
18:50	18.00	1.395	39.59	12.60	17.2
18:51	18.01	1.313	71.00	12.92	14.4
18:52	18.02	1.256	181.10	12.35	15.0
18:53	18.08	1.252	91.90	12.00	19.2
18:54	18.03	1.302	31.19	13.68	15.5
18:55	17.95	1.306	43.25	14.70	15.2
18:56	17.92	1.285	123.40	13.78	13.4
18:57	17.97	1.234	116.10	11.21	19.8
18:58	17.99	1.244	28.06	11.41	15.7
18:59	17.98	1.267	36.89	13.06	16.1
19:00	17.90	1.369	99.70	13.32	14.4
180 MinAvg	18.76	1.364	92.31	14.60	17.1

Data Corrected for Calibrations

180 MinAvg	18.99	1.448	95.27	14.86

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Calibrations:

[THC B] Span Value = 100
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 50.00

INITIAL CALIBRATION TIME --> 1228
LOW Cal. Response = 0.00 HIGH Cal. Response = 50.38
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = 0.72 HIGH Cal. Response = 44.97

LOW System Drift = 0.72 % HIGH System Drift = -5.40 %

[CO2 B] Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 10.03

INITIAL CALIBRATION TIME --> 1217
LOW Cal. Response = 0.01 HIGH Cal. Response = 9.85
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = -0.00 HIGH Cal. Response = 9.05

LOW System Drift = -0.05 % HIGH System Drift = -4.03 %

[CO B] Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 300.00

INITIAL CALIBRATION TIME --> 1213
LOW Cal. Response = 0.01 HIGH Cal. Response = 293.15
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = -0.92 HIGH Cal. Response = 290.16

LOW System Drift = -0.09 % HIGH System Drift = -0.30 %

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA RTO STACK

Calibrations:

[O2 B] Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 9.98

INITIAL CALIBRATION TIME --> 1217
LOW Cal. Response = 0.02 HIGH Cal. Response = 9.77
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = 0.04 HIGH Cal. Response = 9.98

LOW System Drift = 0.09 % HIGH System Drift = 0.81 %

[NOx B] Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 124.00

INITIAL CALIBRATION TIME --> 1219
LOW Cal. Response = -0.22 HIGH Cal. Response = 125.22
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = -0.33 HIGH Cal. Response = 122.48

LOW System Drift = -0.04 % HIGH System Drift = -1.10 %

APPENDIX D.5

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- SCRUBBER OUTLET (MORNING - 03/10/95) -

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) OUTLET	CO2 (% dv) OUTLET	CO (ppm dv) OUTLET	NOx (ppm dv) OUTLET	VOC (ppm wv) OUTLET
09:01	17.99	2.989	358.10	32.44	28.4
09:02	17.68	3.364	472.20	27.12	24.8
09:03	17.42	3.408	545.00	26.18	27.5
09:04	17.21	3.413	567.30	25.42	42.5
09:05	17.20	3.366	559.40	26.95	47.0
09:06	17.45	3.157	528.50	27.96	47.1
09:07	17.64	2.885	446.30	29.18	36.0
09:08	18.01	2.911	357.50	28.97	33.0
09:09	17.90	2.917	372.50	28.15	34.9
09:10	17.87	2.911	384.10	28.26	39.4
09:11	17.89	2.955	381.20	27.27	35.8
09:12	17.82	3.176	428.20	26.96	40.0
09:13	17.61	3.250	493.60	26.58	42.7
09:14	17.55	3.275	528.10	26.32	50.4
09:15	17.52	3.228	546.70	26.90	44.7
09:16	17.59	3.237	551.50	26.74	44.4
09:17	17.60	2.995	536.10	27.40	37.0
09:18	17.81	2.771	409.60	28.57	28.3
09:19	18.08	2.520	310.20	32.53	32.4
09:20	18.34	2.489	250.20	39.51	35.1
09:21	18.33	2.700	275.90	30.19	25.2
09:22	18.15	2.697	305.40	28.79	22.3
09:23	18.15	2.622	296.20	29.76	21.2
09:24	18.22	2.580	277.80	31.34	26.8
09:25	18.21	2.668	286.80	30.37	20.1
09:26	18.17	2.613	295.70	31.54	26.0
09:27	18.22	2.573	346.20	32.03	22.6
09:28	18.23	2.609	280.70	32.16	24.7
09:29	18.20	2.765	283.00	31.25	27.2
09:30	18.03	2.891	340.70	27.77	24.0
09:31	17.86	2.970	391.10	27.87	24.4
09:32	17.81	2.962	401.20	28.44	24.1
09:33	17.80	3.024	387.60	29.59	23.7
09:34	17.74	3.061	391.10	29.45	30.7
09:35	17.72	2.951	400.30	34.85	23.4
09:36	17.82	3.014	403.90	30.33	32.8
09:37	17.73	3.124	432.60	30.59	30.5
09:38	17.63	3.159	432.90	33.16	30.3
09:39	17.58	3.274	403.50	32.90	37.8
09:40	17.47	3.421	435.90	31.74	38.5
09:41	17.33	3.500	501.50	32.38	47.3

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) OUTLET	CO2 (% dv) OUTLET	CO (ppm dv) OUTLET	NOx (ppm dv) OUTLET	VOC (ppm wv) OUTLET
09:42	17.24	3.494	482.00	32.40	47.3
09:43	17.24	2.940	479.30	34.82	43.5
09:44	17.87	2.302	830.00	37.23	47.0
09:45	18.34	3.066	1002.00*	31.03	40.5
09:46	17.66	3.039	1002.00*	31.02	43.0
09:47	17.67	3.024	1002.00*	29.93	41.7
09:48	17.64	3.045	1002.00*	29.69	48.3
09:49	17.62	3.164	1002.00*	29.01	38.8
09:50	17.52	3.172	996.00	28.72	37.9
09:51	17.49	3.224	997.00	29.57	41.9
09:52	17.44	3.226	938.00	28.13	43.0
09:53	17.44	3.125	991.00	28.04	43.5
09:54	17.56	3.158	985.00	28.89	43.0
09:55	17.52	3.098	944.00	28.32	42.3
09:56	17.57	3.020	853.00	28.68	39.0
09:57	17.69	2.722	620.30	30.95	33.7
09:58	17.98	2.393	633.50	34.51	34.8
09:59	18.33	2.280	844.00	35.81	28.1
10:00	18.31	2.179	988.00	35.74	35.2
10:01	18.53	2.152	1002.00*	34.00	40.7
10:02	18.54	2.350	1002.00*	29.87	43.3
10:03	18.33	2.493	1002.00*	28.18	42.7
10:04	18.15	2.739	1002.00*	26.90	40.0
10:05	17.90	2.980	1002.00*	25.06	39.3
10:06	17.68	3.113	1002.00*	24.24	40.7
10:07	17.53	3.111	884.00	23.65	42.5
10:08	17.56	2.956	987.00	24.56	43.3
10:09	17.71	2.802	1002.00*	26.13	44.3
10:10	17.84	2.763	1002.00*	25.79	44.4
10:11	17.88	2.739	1002.00*	27.12	44.1
10:12	17.92	2.706	1002.00*	26.30	44.0
10:13	17.93	2.708	1002.00*	26.55	42.0
10:14	17.94	2.610	1002.00*	28.38	38.2
10:15	18.07	2.356	1002.00*	31.98	33.2
10:16	18.33	2.372	596.00	32.89	25.0
10:17	18.34	1.932	151.20	33.60	24.0
10:18	18.78	2.180	308.50	33.89	24.1
10:19	18.50	2.570	432.60	29.38	25.9
10:20	18.10	2.860	497.00	24.04	33.8
10:21	17.78	3.026	562.80	21.78	35.2
10:22	17.62	2.878	630.60	23.07	37.5

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) OUTLET	CO2 (% dv) OUTLET	CO (ppm dv) OUTLET	NOx (ppm dv) OUTLET	VOC (ppm wv) OUTLET
10:23	17.84	2.168	855.00	29.88	43.4
10:24	18.47	2.645	952.00	23.86	41.6
10:25	17.98	2.799	1002.00*	22.53	37.0
10:26	17.84	2.915	1002.00*	21.52	33.5
10:27	17.75	2.780	1002.00*	22.30	31.8
10:28	17.89	2.662	976.00	23.98	29.6
10:29	18.02	2.432	890.00	28.60	32.2
10:30	18.22	2.532	627.00	27.06	25.0
10:31	18.19	2.344	267.90	27.71	21.6
10:32	18.37	2.149	166.70	28.49	17.6
10:33	18.62	1.834	225.70	31.07	17.5
10:34	18.88	1.858	284.30	30.72	16.4
10:35	18.85	1.787	277.90	29.49	15.4
10:36	18.96	1.744	256.90	28.97	14.9
10:37	18.98	1.709	260.60	28.10	14.3
10:38	19.05	1.637	244.70	27.55	14.3
10:39	19.10	1.701	238.80	28.08	13.7
10:40	19.04	1.773	277.30	28.87	13.4
10:41	18.94	1.985	298.90	30.89	13.2
10:42	18.74	2.184	363.50	31.82	13.7
10:43	18.54	2.422	446.30	29.73	15.1
10:44	18.26	2.407	522.90	29.26	15.9
10:45	18.30	2.338	530.90	29.76	16.0
10:46	18.36	2.147	491.30	31.34	13.2
10:47	18.56	1.919	391.30	31.47	12.5
10:48	18.78	2.320	384.00	30.84	16.7
10:49	18.44	3.042	545.00	22.29	19.9
10:50	17.63	2.941	555.40	20.29	21.7
10:51	17.69	2.643	565.30	24.36	24.8
10:52	17.98	2.663	497.30	24.93	23.0
10:53	17.98	2.239	422.30	29.97	17.9
10:54	18.42	1.974	287.00	31.86	15.9
10:55	18.69	2.008	277.00	31.28	15.4
10:56	18.69	1.917	233.00	29.81	17.4
10:57	18.78	1.840	261.30	27.13	14.6
10:58	18.82	1.928	208.00	29.30	13.3
10:59	18.77	2.170	225.50	29.47	14.4
11:00	18.47	2.400	295.60	29.44	17.9
11:01	18.23	3.184	367.50	18.20	26.8
11:02	17.46	3.337	448.00	18.99	34.7
11:03	17.29	3.426	471.60	20.09	39.5

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) OUTLET	CO2 (% dv) OUTLET	CO (ppm dv) OUTLET	NOx (ppm dv) OUTLET	VOC (ppm wv) OUTLET
11:04	17.16	3.421	474.10	21.69	40.7
11:05	17.15	3.475	477.80	22.83	43.5
11:06	17.15	3.399	481.80	22.00	42.6
11:07	17.19	3.256	497.90	21.37	38.4
11:08	17.37	3.105	484.20	19.77	35.6
11:09	17.50	3.044	507.30	20.25	33.7
11:10	17.59	2.138	629.60	33.79	40.5
11:11	18.42	2.391	986.00	30.26	28.6
11:12	18.23	3.003	715.00	21.25	26.7
11:13	17.62	2.653	334.90	24.99	22.8
11:14	17.97	2.407	257.10	29.09	22.2
11:15	18.20	2.364	230.10	29.92	21.9
11:16	18.29	2.316	227.20	29.31	20.5
11:17	18.33	2.508	184.20	26.84	21.4
11:18	18.14	2.406	211.50	28.61	19.0
11:19	18.20	2.176	301.70	31.29	17.4
11:20	18.44	2.217	348.00	30.45	15.7
11:21	18.41	2.322	193.10	28.52	15.2
11:22	18.26	2.125	189.50	33.71	17.0
11:23	18.33	2.615	329.50	26.61	20.6
11:24	17.90	2.647	331.40	27.51	27.6
11:25	17.78	2.736	483.90	24.64	31.0
11:26	17.66	2.683	778.00	24.50	36.7
11:27	17.66	2.829	1002.00*	22.75	31.1
11:28	17.54	2.754	923.00	22.30	30.9
11:29	17.59	2.672	859.00	23.80	30.2
11:30	17.70	2.563	908.00	23.88	27.7
11:31	17.82	2.498	822.00	23.84	27.3
11:32	17.92	2.557	815.00	22.78	26.5
11:33	17.92	2.509	759.00	24.74	24.8
11:34	17.93	2.575	672.40	25.71	27.8
11:35	17.89	2.867	773.00	21.28	32.3
11:36	17.56	2.802	903.00	21.61	34.2
11:37	17.55	2.743	889.00	21.85	36.2
11:38	17.61	2.673	826.00	23.40	32.5
11:39	17.68	2.534	794.00	24.75	31.9
11:40	17.76	2.491	926.00	26.84	32.1
11:41	17.90	2.872	996.00	22.90	35.5
11:42	17.56	2.804	1002.00*	24.00	37.2
11:43	17.41	2.700	1002.00*	24.53	35.4
11:44	17.50	2.773	1002.00*	24.12	37.5

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) OUTLET	CO2 (% dv) OUTLET	CO (ppm dv) OUTLET	NOx (ppm dv) OUTLET	VOC (ppm wv) OUTLET
11:45	17.54	2.772	1002.00*	22.98	38.9
11:46	17.57	2.699	1002.00*	23.94	41.0
11:47	17.53	2.602	1002.00*	25.97	35.8
11:48	17.53	2.520	1002.00*	26.56	38.4
11:49	17.53	2.483	1002.00*	26.68	39.0
11:50	17.52	2.391	1002.00*	27.33	40.5
170 MinAvg	17.96	2.685	598.22	27.79	30.9

Data Corrected for Calibrations

170 MinAvg	17.67	2.752	596.68	30.25	

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Calibrations:

[THC A] Span Value = 100
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 50.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -0.57 HIGH Cal. Response = 51.88
FINAL CALIBRATION TIME ----> 1224
LOW Cal. Response = -0.44 HIGH Cal. Response = 51.12

LOW System Drift = 0.13 % HIGH System Drift = -0.75 %

[CO2 A] Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 10.03

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -0.02 HIGH Cal. Response = 9.93
FINAL CALIBRATION TIME ----> 1217
LOW Cal. Response = -0.01 HIGH Cal. Response = 9.73

LOW System Drift = 0.05 % HIGH System Drift = -1.00 %

[CO A] Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 300.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -0.29 HIGH Cal. Response = 301.08
FINAL CALIBRATION TIME ----> 1213
LOW Cal. Response = -0.12 HIGH Cal. Response = 300.27

LOW System Drift = 0.02 % HIGH System Drift = -0.08 %

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA SCRUBBER OUTLET

Calibrations:

[O2 A] Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 9.98

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = 0.03 HIGH Cal. Response = 10.20
FINAL CALIBRATION TIME ----> 1217
LOW Cal. Response = 0.05 HIGH Cal. Response = 10.11

LOW System Drift = 0.05 % HIGH System Drift = -0.36 %

[NOx A] Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 124.00

INITIAL CALIBRATION TIME --> 841
LOW Cal. Response = -2.25 HIGH Cal. Response = 121.45
FINAL CALIBRATION TIME ----> 1219
LOW Cal. Response = -2.25 HIGH Cal. Response = 120.35

LOW System Drift = -0.00 % HIGH System Drift = -0.44 %

Marker	Description	Display	Average
*	Data exceeds limit of monitor. Actual value >1000 ppm	√	√
A	Data was Absent from original raw data file.	√	
C	CALIBRATION POINT	√	
P	Port Change	√	
R	Waiting for Response Time to Elapse	√	
X	DATA NOT INCLUDED IN AVERAGE	√	
a	Port A of Stratification Check	√	
b	Port B of Stratification Check	√	
c	Port C of Stratification Check	√	
d	Port D of Stratification Check	√	
z	Zero Calibration	√	

APPENDIX D.6

DATA AND RESULTS FOR NO_x, CO, AND VOC TESTING

- PRESS INLET (EVENING - 03/10/95) -

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Starting
03-10-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
16:01	20.13	0.033	10.04	-1.90	2.5
16:02	20.12	0.044	9.11	-1.78	3.5
16:03	20.13	0.039	8.10	-2.16	5.1
16:04	20.11	0.033	7.50	-2.34	4.4
16:05	20.10	0.033	7.17	-2.16	2.8
16:06	20.12	0.041	7.34	-1.61	2.8
16:07	20.13	0.035	6.94	-2.05	4.6
16:08	20.14	0.029	6.57	-2.31	4.7
16:09	20.13	0.028	6.44	-2.31	3.2
16:10	20.15	0.035	5.94	-1.70	2.3
16:11	20.16	0.040	5.57	-1.88	4.0
16:12	20.16	0.034	6.74	-2.23	4.9
16:13	20.20	0.028	7.90	-2.37	3.8
16:14	20.21	0.034	8.34	-1.93	2.5
16:15	20.22	0.044	8.17	-1.73	3.1
16:16	20.23	0.038	7.44	-2.17	4.2
16:17	20.26	0.028	6.44	-2.38	3.3
16:18	20.25	0.030	5.84	-2.21	1.0
16:19	20.30	0.038	5.44	-1.56	0.0
16:20	20.26	0.040	5.27	-2.04	-0.5
16:21	20.26	0.027	4.59	-2.33	-0.5
16:22	20.29	0.029	4.01	-2.35	0.2
16:23	20.28	0.035	3.41	-1.64	1.3
16:24	20.33	0.042	6.45	-1.80	3.9
16:25	20.32	0.030	9.14	-2.21	5.0
16:26	20.30	0.031	10.04	-2.39	3.6
16:27	20.30	0.028	7.54	-2.42	2.0
16:28	20.32	0.022	5.71	-2.43	1.3
16:29	20.31	0.023	4.39	-1.84	1.2
16:30	20.31	0.031	4.14	-1.60	3.1
16:31	20.33	0.027	3.59	-2.13	4.9
16:32	20.31	0.025	3.43	-2.39	3.8
16:33	20.29	0.025	3.34	-2.17	2.2
16:34	20.33	0.036	3.70	-1.34	2.6
16:35	20.33	0.032	3.51	-1.88	5.1
16:36	20.32	0.025	5.70	-2.30	5.0
16:37	20.32	0.022	7.14	-2.32	3.0
16:38	20.28	0.029	8.27	-1.39	2.4
16:39	20.28	0.027	6.14	-1.61	4.8
16:40	20.33	0.028	4.20	-2.14	5.2
16:41	20.32	0.022	3.62	-2.38	3.4

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Starting
03-10-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
16:42	20.32	0.024	3.34	-1.79	2.1
16:43	20.28	0.033	2.93	-1.21	3.7
16:44	20.35	0.031	2.90	-1.90	5.6
16:45	20.34	0.027	2.43	-2.33	4.4
16:46	20.32	0.029	2.33	-2.13	2.4
16:47	20.35	0.030	2.33	-1.01	2.9
16:48	20.36	0.029	3.70	-1.66	5.8
16:49	20.34	0.027	4.93	-2.22	4.8
16:50	20.34	0.023	4.55	-2.29	2.8
16:51	20.34	0.030	5.34	-1.22	2.6
16:52	20.33	0.041	5.34	-1.40	5.6
16:53	20.35	0.034	4.47	-2.04	5.9
16:54	20.34	0.032	4.43	-2.36	3.9
16:55	20.31	0.030	5.59	-1.64	2.9
16:56	20.30	0.036	6.90	-1.00	5.2
16:57	20.28	0.035	7.67	-1.78	6.5
16:58	20.31	0.028	7.74	-2.30	4.7
16:59	20.31	0.030	7.27	-2.08	2.8
17:00	20.30	0.037	6.60	-0.93	3.6
17:01	20.29	0.036	6.10	-1.58	6.1
17:02	20.26	0.033	5.50	-2.16	5.1
17:03	20.21	0.028	4.84	-2.29	3.0
17:04	20.20	0.030	5.02	-1.11	2.9
17:05	20.20	0.030	5.27	-1.24	5.9
17:06	20.22	0.030	4.79	-1.97	5.8
17:07	20.25	0.028	4.14	-2.35	3.7
17:08	20.27	0.028	3.97	-1.70	2.6
17:09	20.28	0.038	4.29	-0.91	4.8
17:10	20.29	0.037	4.56	-1.75	6.3
17:11	20.27	0.030	4.38	-2.31	4.5
17:12	20.34	0.030	4.49	-2.16	2.7
17:13	20.32	0.038	4.39	-0.83	3.6
17:14	20.33	0.036	4.84	-1.52	6.5
17:15	20.35	0.031	4.72	-2.14	5.4
17:16	20.35	0.027	4.70	-2.33	3.1
17:17	20.35	0.032	4.72	-1.30	2.7
17:18	20.36	0.036	4.57	-1.27	5.7
17:19	20.38	0.037	3.69	-1.96	5.6
17:20	20.37	0.031	3.68	-2.36	3.5
17:21	20.38	0.031	3.68	-1.84	2.3
17:22	20.39	0.036	4.07	-0.93	4.5

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Starting
03-10-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
17:23	20.39	0.032	4.54	-1.75	6.2
17:24	20.39	0.029	4.77	-2.29	4.3
17:25	20.40	0.026	5.26	-2.22	2.4
17:26	20.42	0.036	6.34	-0.89	3.2
17:27	20.40	0.035	6.34	-1.45	6.3
17:28	20.38	0.029	6.34	-2.11	5.2
17:29	20.43	0.028	5.45	-2.34	2.7
17:30	20.42	0.028	5.24	-1.45	2.1
17:31	20.42	0.034	5.01	-1.11	5.0
17:32	20.44	0.025	4.50	-1.85	5.3
17:33	20.42	0.027	3.74	-2.29	3.3
17:34	20.46	0.024	3.51	-1.96	1.8
17:35	20.44	0.036	5.36	-0.99	3.7
17:36	20.44	0.033	8.09	-1.69	5.6
17:37	20.44	0.030	9.27	-2.17	4.2
17:38	20.43	0.027	10.95	-2.30	2.4
17:39	20.44	0.024	13.05	-2.28	1.9
17:40	20.42	0.032	14.43	-1.27	2.6
17:41	20.44	0.033	13.84	-1.47	6.0
17:42	20.43	0.033	16.89	-1.98	5.5
17:43	20.45	0.028	21.57	-2.27	3.5
17:44	20.46	0.029	22.35	-1.68	2.5
17:45	20.42	0.031	22.93	-1.03	4.9
17:46	20.43	0.029	20.36	-1.72	5.8
17:47	20.44	0.028	17.43	-2.21	4.1
17:48	20.46	0.026	18.16	-2.06	2.1
17:49	20.45	0.036	15.51	-0.99	2.9
17:50	20.43	0.030	13.44	-1.58	5.5
17:51	20.41	0.032	12.88	-2.08	4.4
17:52	20.41	0.024	12.86	-2.25	2.3
17:53	20.38	0.032	13.51	-1.50	1.7
17:54	20.38	0.038	12.36	-1.12	4.1
17:55	20.42	0.035	9.59	-1.81	4.7
17:56	20.42	0.031	8.17	-2.25	3.0
17:57	20.41	0.031	7.42	-1.96	1.5
17:58	20.42	0.032	7.50	-0.98	2.8
17:59	20.41	0.036	7.77	-1.64	5.0
18:00	20.42	0.030	7.43	-2.17	3.8
18:01	20.42	0.030	7.19	-2.19	1.8
18:02	20.43	0.033	6.75	-1.12	1.5
18:03	20.44	0.041	6.25	-1.30	4.2

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Starting
03-10-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
18:04	20.44	0.034	5.84	-1.96	4.3
18:05	20.45	0.026	5.92	-2.27	2.5
18:06	20.45	0.028	7.09	-1.61	1.4
18:07	20.45	0.038	8.09	-1.09	3.3
18:08	20.44	0.032	8.09	-1.80	4.5
18:09	20.44	0.028	7.17	-2.27	3.2
18:10	20.43	0.028	7.02	-2.05	1.5
18:11	20.43	0.031	6.92	-0.96	2.1
18:12	20.44	0.027	6.34	-1.60	4.4
18:13	20.44	0.026	5.42	-2.16	3.6
18:14	20.42	0.021	5.05	-2.23	1.8
18:15	20.39	0.025	6.09	-1.11	1.4
18:16	20.42	0.033	6.34	-1.32	3.9
18:17	20.42	0.031	6.34	-1.96	4.1
18:18	20.42	0.029	6.77	-2.30	2.5
18:19	20.42	0.029	8.76	-1.57	1.3
18:20	20.47	0.034	10.34	-1.02	2.6
18:21	20.47	0.033	10.92	-1.77	4.1
18:22	20.44	0.030	12.55	-2.29	3.2
18:23	20.47	0.026	13.67	-2.07	1.5
18:24	20.43	0.033	12.78	-0.83	1.7
18:25	20.49	0.033	13.45	-1.57	3.9
18:26	20.47	0.028	15.34	-2.16	3.5
18:27	20.48	0.024	14.01	-2.29	1.9
18:28	20.47	0.029	13.27	-1.15	1.1
18:29	20.48	0.028	12.96	-1.31	2.9
18:30	20.50	0.027	11.65	-1.99	3.6
18:31	20.50	0.027	10.54	-2.35	2.3
18:32	20.50	0.029	10.41	-1.67	1.0
18:33	20.50	0.036	9.80	-0.89	1.8
18:34	20.52	0.033	9.05	-1.74	3.2
18:35	20.52	0.026	8.47	-2.31	2.6
18:36	20.54	0.025	8.28	-2.16	1.2
18:37	20.50	0.039	8.05	-0.95	1.0
18:38	20.57	0.034	7.11	-1.64	2.6
18:39	20.56	0.032	6.35	-2.24	2.8
18:40	20.57	0.029	6.14	-2.39	1.6
18:41	20.58	0.034	6.28	-1.30	0.8
18:42	20.58	0.033	7.56	-1.30	2.1
18:43	20.57	0.031	7.84	-2.07	2.9
18:44	20.57	0.025	7.67	-2.45	2.1

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Starting
03-10-95

Time	O2 (% dv) INLET	CO2 (% dv) INLET	CO (ppm dv) INLET	NOx (ppm dv) INLET	VOC (ppm wv) INLET
18:45	20.62	0.028	7.92	-1.87	1.0
18:46	20.59	0.042	8.67	-1.07	1.4
18:47	20.62	0.034	7.92	-1.95	2.6
18:48	20.66	0.027	7.07	-2.46	2.5
18:49	20.65	0.028	6.48	-2.35	1.3
18:50	20.66	0.035	6.77	-1.04	0.9
18:51	20.67	0.036	6.44	-1.68	2.0
18:52	20.68	0.030	6.06	-2.31	2.4
18:53	20.68	0.024	6.64	-2.50	1.6
18:54	20.67	0.031	7.99	-1.41	0.8
18:55	20.67	0.033	9.00	-1.43	1.6
18:56	20.71	0.030	8.84	-2.18	2.3
18:57	20.67	0.026	8.42	-2.57	1.8
18:58	20.72	0.023	7.84	-2.02	0.9
18:59	20.77	0.030	7.14	-0.98	1.1
19:00	20.70	0.033	6.22	-1.94	2.0
180 MinAvg	20.39	0.031	7.51	-1.83	3.2

Data Corrected for Calibrations

180 MinAvg	20.31	0.001	7.50	0.88

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Calibrations:

[THC A] Span Value = 100
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 50.00

INITIAL CALIBRATION TIME --> 1447
LOW Cal. Response = 0.00 HIGH Cal. Response = 50.46
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = -2.69 HIGH Cal. Response = 47.95

LOW System Drift = -2.69 % HIGH System Drift = -2.51 %

[CO2 A] Span Value = 20
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 10.03

INITIAL CALIBRATION TIME --> 1447
LOW Cal. Response = 0.01 HIGH Cal. Response = 9.88
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = 0.05 HIGH Cal. Response = 9.85

LOW System Drift = 0.19 % HIGH System Drift = -0.13 %

[CO A] Span Value = 1000
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 300.00

INITIAL CALIBRATION TIME --> 1447
LOW Cal. Response = 0.00 HIGH Cal. Response = 301.14
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = 0.00 HIGH Cal. Response = 299.40

LOW System Drift = 0.00 % HIGH System Drift = -0.17 %

Wheelabrator/LP/Dungannon
03/10/95
95-415
CEMS DATA PRESS INLET

Calibrations:

[O2 A] Span Value = 25
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 9.98

INITIAL CALIBRATION TIME --> 1447
LOW Cal. Response = 0.05 HIGH Cal. Response = 9.97
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = 0.05 HIGH Cal. Response = 10.12

LOW System Drift = -0.02 % HIGH System Drift = 0.59 %

[NOx A] Span Value = 250
LOW Calibration Gas = 0.00 HIGH Calibration Gas = 124.00

INITIAL CALIBRATION TIME --> 1447
LOW Cal. Response = -2.64 HIGH Cal. Response = 122.90
FINAL CALIBRATION TIME ----> 1928
LOW Cal. Response = -2.82 HIGH Cal. Response = 125.49

LOW System Drift = -0.07 % HIGH System Drift = 1.04 %

APPENDIX E

CALCULATIONS

EPA METHODS 2-4 CALCULATIONS

1. Metered Gas Sample Volume at Standard Conditions

$$V_{m(std)} = V_m \times \gamma \times \frac{528}{29.92} \times \left[\frac{P_B + \frac{\Delta H}{13.6}}{T_m + 460} \right]$$

2. Gas Volume of Water Vapor Collected in Impinger Liquid

$$V_{WC(std)} = (v_f - v_i) \times 0.04707$$

3. Gas Volume of Water Vapor Collected in Silica Gel

$$V_{wsg(std)} = (w_f - w_i) \times 0.04715$$

4. Moisture Volume Fraction in Flue Gas

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

5. Moisture Volume Percentage in Flue Gas

$$\%H_2O = B_{ws} \times 100$$

6. Absolute Pressure of Flue Gas

$$P_s = P_B + \frac{P_{static}}{13.6}$$

7. Nitrogen Content of Flue Gas

$$\%N_2 = 100 - (\%CO_2 + \%O_2 + \%CO)$$

8. Dry Molecular Weight of Flue Gas

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

9. Wet Molecular Weight of Flue Gas

$$M_s = M_d \times (1 - B_{ws}) + 18 \times B_{ws}$$

10. Fuel Factor Based on Flue Gas Composition

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

11. Excess Air of Flue Gas

$$\%EA = \frac{\%O_2 - 0.5\%CO}{0.264\%N_2 - (\%O_2 - 0.5\%CO)} \times 100$$

12. Average Gas Velocity, ft/sec

$$v_s = 85.49 \times C_p \times (\Delta P)^{1/2}{}_{avg} \times \frac{(T_s + 460)^{1/2}}{(P_s \times M_s)^{1/2}}$$

13. Area of Round Duct or Stack

$$A_s = \frac{\pi \times D^2}{4 \times 144} \quad (round\ ducts)$$

14. Area of Rectangular Duct

$$A_s = \frac{L \times W}{144} \quad (rectangular\ ducts)$$

15. Actual Volumetric Flow Rate of Flue Gas

$$Q_a = v_s \times A_s \times 60$$

16. Flow Rate of Flue Gas at Standard Temperature and Pressure

$$Q_s = Q_a \times \left[\frac{P_s \times 528}{(T_s + 460) \times 29.92}\right]$$

17. Dry Flow Rate of Flue Gas at Std. Temperature and Pressure

$$Q_{sd} = Q_s \times (1 - B_{ws})$$

NOMENCLATURE FOR EPA METHODS 2-4

A_s	=	Stack area, ft^2
B_{ws}	=	Moisture volume fraction
C_p	=	Pitot tube coefficient (≈0.84)
D_s	=	Stack diameter, inches
ΔH	=	Average meter orifice pressure, in.W.C.
ΔP	=	Pitot tube differential pressure, in.W.C.
F_o	=	Combustion factor
γ	=	Meter calibration factor, gamma
L	=	Length of rectangular stack or duct, inches
M_D	=	Dry molecular weight, lb/lb-mole
M_s	=	Wet molecular weight, lb/lb-mole
P_B	=	Barometric pressure, in.Hg
P_s	=	Absolute stack pressure, in.Hg
P_{static}	=	Average static pressure, in.W.C.
Q_a	=	Actual gas flow rate, acfm
Q_s	=	Standard gas flow rate, scfm
Q_{sd}	=	Dry standard gas flow rate, dscfm
T_m	=	Average meter temperature, °F
T_s	=	Average stack temperature, °F
v_f	=	Final impinger volume, ml
v_i	=	Initial impinger volume, ml
V_m	=	Uncorrected metered gas volume, dcf
$V_{m(std)}$	=	Corrected gas volume, dscf
v_s	=	Average gas velocity, ft/sec
$V_{wc(std)}$	=	Gas volume of water caught in impingers, scf
$V_{wsg(std)}$	=	Gas volume of water caught in silica gel, scf
W	=	Width of rectangular stack or duct, inches
w_f	=	Final silica gel mass, grams
w_i	=	Initial silica gel mass, grams
$\%O_2$	=	Dry volumetric concentration of O_2, %dv
$\%CO_2$	=	Dry volumetric concentration of CO_2, %dv
%CO	=	Dry volumetric concentration of CO, %dv
$\%N_2$	=	Dry volumetric concentration of N_2, %dv
%EA	=	Percent excess air

GASEOUS EMISSIONS MONITORING CALCULATIONS

1. HOURLY EMISSIONS RATE - M_i

$$M_i = \frac{C_i \times Q_{sd} \times 60 \times MW_i}{10^6 \times 0.84948 \times 453.593}$$

NOMENCLATURE

i	= NO_x, SO_2, CO, or total hydrocarbons (as propane)
M_i	= Mass emissions rate of i, lb/hr
C_i	= Concentration of i in stack gas, ppmdv
MW_i	= Molecular weight of i
	= 46.01 for NO_2
	= 28.01 for CO
	= 64.06 for SO_2
	= 44.10 for propane
Q_{sd}	= Average flue gas flow rate, dscfm
0.84948	= Molar volume of ideal gas, ft^3/mole
453.593	= grams per pound
10^6	= parts per million
60	= minutes per hour

METHOD 25A EMISSIONS CALCULATIONS

1. Dry VOC Concentration

$$C_c = \frac{C_w}{(1 - B_{ws})}$$

2. Hourly emissions rate

$$M = \frac{C_c \times Q_{sd} \times 60 \times MW_i}{10^6 \times 0.84948 \times 453.593}$$

3. Removal Efficiency Across Pollution Control Device

$$Eff = \frac{M_i - M_o}{M_i} \times 100$$

EPA METHOD 25A EMISSIONS NOMENCLATURE

C_w	=	Wet concentration of total gaseous VOC's in stack gas, ppmwv
B_{ws}	=	stack gas moisture fraction
M	=	Emissions rate of VOC's, lb/hr
C_c	=	Dry concentration of total gaseous VOC's in stack gas, ppmdv
Q_{sd}	=	Total gas flow rate, dscfm
MW_i	=	Molecular weight of reporting standard for VOC's, grams/mole
	=	44.097 for propane
	=	12.011 for carbon
60	=	Minutes per hour
0.84948	=	Molar volume of ideal gas, ft^3/mole
453.593	=	grams per pound
10^6	=	parts per million
Eff	=	Removal efficiency, percent
M_i	=	VOC mass loading at inlet to control device, lb/hr
M_o	=	VOC emissions rate at inlet to control device, lb/hr
100	=	Correction for percentage calculation

INSTRUMENT ANALYZER CALCULATIONS

1. Analyzer Calibration Error is determined by:

$$E_c = \frac{A_c - C_g}{V_s} \times 100$$

2. System Bias is determined by:

$$B_s = \frac{C_s - A_c}{V_s} \times 100$$

3. Calibration Drift is determined by:

$$D_c = \frac{F_c - I_c}{V_s} \times 100$$

4. The Adjusted Data Value is determined by:

$$C_{gas} = (\overline{C} - C_0) \times \frac{C_{ma}}{C_m - C_0}$$

Nomenclature:

A_c	=	the analyzer response for calibration gas standard
B_s	=	Sampling system bias, % analyzer span
$\overline{C}$	=	the average gas concentration of the analyte indicated by the gas analyzer
C_g	=	the actual gas cylinder concentration value
C_{ges}	=	the adjusted gas concentration of the analyte
C_m	=	the average of initial and final system calibration responses for the upscale calibration gas
C_{ma}	=	the actual concentration of the upscale calibration gas used for system calibration
C_o	=	the average of initial and final system calibration responses for the zero gas
C_s	=	the system response for calibration gas introduced remotely at the sample probe (zero or upscale)
D_c	=	Calibration drift, % analyzer span
E_c	=	Analyzer calibration error, % analyzer span
F_c	=	Final system calibration response value
I_c	=	Initial system calibration response value
V_s	=	Span value of analyzer

APPENDIX F

RAW FIELD DATA APPENDICES FOR PARTICLE SIZE TESTING

APPENDIX F.1

RAW FIELD DATA FOR PARTICLE SIZE TESTING

- SCRUBBER INLET -

FACILITY LA Pacific TEST LOCATION Scrubber Inlet DATE 3/10/95

START TIME 9:10 POLLUTANT Particulate/Sizing RUN I.D. SI-M4-01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
A1	0	0910		166	1.2	.88	471.804	72	72	—	34	9
2	7.5			168	1.3	.96	473.4	74	74	—	34	9
3	5			168	1.3	.96	474.9	74	74	—	34	9
4	7.5			149	1.2	.88	476.8	73	73	—	34	7
5	10			143	1.5	1.1	478.3	76	76	—	34	8
6	12.5			145	1.5	1.1	479.4	76	76	—	34	12
7	15		-9.5	147	1.6	1.1	481.6	74	74	—	35	8
8	17.5			147	1.4	1.0	482.3	74	75	—	35	7
9	20			149	1.4	1.0	484.3	74	76	—	35	7
10	22.5			150	1.3	.96	485.6	74	76	—	35	7
11	25			150	1.3	.96	486.8	74	76	—	35	7
12	27.5	09		150	1.0	.74	488.6	74	76	—	35	5.5
	30	0940		~~7~~	—	—	489.2	—	—	—	—	-
B1	32.5	0942		155	1.4	1.0	490.8	76	78	—	35	15
2	35	1015		155	1.3	.96	492.4	78	78	—	35	3
3	37.5			154	1.3	.96	493.7	76	78	—	35	3
4	40			154	1.5	1.1	495.1	80	82	—	35	3
5	42.5			154	1.5	1.1	496.6	80	82	—	35	3
6	45		-9.5	160	1.4	1.0	498.2	80	82	—	36	3
7	47.5			166	1.5	1.1	499.6	82	84	—	36	3
8	50			164	1.4	1.0	501.0	82	84	—	36	3
9	52.5			156	1.3	.96	502.4	82	84	—	36	3
10	55			156	1.3	.96	503.9	82	85	—	36	3
11	57.5			156	1.0	.74	505.1	83	85	—	36	3
12	60	1040		152	1.0	.74	506.445	83	85	—	36	3

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
F2	433	Acetone F4
F3	434	Dmp 1-3
F7	438	5G

LEAK CHECK

Vacuum	15	~~15~~	15	
Rate	.004	~~.014~~	.018	

IMPINGER VOLUMES

	Initial	Final
#1	614.3	745.0
#2	730.5	738.3
#3	593.7	594.6
#4	785.6	792.5
#5		
#6		

NOZZLE SIZE	0.188
METER BOX I.D.	9
GAMMA	1.0051
DELTA H@	1.580
BAR. PRESS.	29.5
FILTER I.D.	—
OPERATOR	CH

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: LA-Pacific		LOCATION: Scrubber Inlet	
RUN I.D.: SF-M2-R1		ETS CONT. NO.: 95-415	
PROCESS/FUEL TYPE: Wood		TECHNICIAN: KBB	
%O2	17.9	%CO2	2.8
%O2	17.8	%CO2	2.8
%O2	17.9	%CO2	2.9
AVERAGE	17.9	AVERAGE	2.8
		Fo FACTOR:	1.071

Part.

RUN I.D.: SF-M2-R2		TECHNICIAN:	
%O2	17.5	%CO2	3.0
%O2	17.5	%CO2	3.1
%O2	17.5	%CO2	3.1
AVERAGE	17.5	AVERAGE	3.1
		Fo FACTOR:	1.0968

RUN I.D.:		TECHNICIAN:	
%O2		%CO2	
%O2		%CO2	
%O2		%CO2	
AVERAGE		AVERAGE	
		Fo FACTOR:	

Fo = (20.9 - %O2)/%CO2

COMMON Fo FACTORS:

Gas, Natural	(1.600-1.836)
Gas, Propane	(1.434-1.586)
Wood	(1.000-1.120)
Coal, Bituminous	(1.083-1.230)
Coal, Anthracite	(1.016-1.130)
Oil, Distillate	(1.260-1.413)
Oil, Residual	(1.210-1.370)

APPENDIX F.2

RAW FIELD DATA FOR PARTICLE SIZE TESTING

- SCRUBBER OUTLET -

FACILITY L.A. Pacific TEST LOCATION Scrubber outlet DATE 3/9/95

START TIME 17:57 POLLUTANT Condensibles RUN I.D. S.O. ~~Pr~~ -M 4 -R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Meter dH	Meter Volume cu.ft.	Meter Temp Inlet	Meter Temp Outlet	Filter Temp.	Imp. Temp.	Meter Vac.
1	17:57	0		137	.65	.78	137.513	64	64		53	4"
2		3		141	1.5	1.8	139.7	66	65		44	5"
3		6		141	1.6	1.92	141.8	67	65		44	5.5"
4		9		141	1.6	1.92	144.4	70	65		45	5.5"
5		12		143	1.7	2.04	146.1	70	66		45	2"
6		15	-2.5	143	1.9	2.28	148.3	72	66		46	2"
7		18		143	1.85	2.2	150.7	73	66		47	2"
8		21		143	1.7	2.04	153.3	75	67		47	2.5"
9		24		143	1.45	1.74	155.8	75	67		48	2"
10		27		144	.78	.936	158.81	74	67		48	1.5"
B1	18:27 / 18:30	30		135	.68	.816	159.929	69	66		52	1"
2		3		140	.74	.88	161.5	71	67		50	1"
3		6		144	.88	1.056	163.2	72	67		51	1.5"
4		9		144	.94	1.128	164.9	73	68		52	1.5"
5		12		144	1.1	1.32	166.8	74	68		52	1.5"
6		15	-2.5	143	1.2	1.44	168.8	74	68		53	1.5"
7		18		145	1.35	1.62	170.9	76	69		55	1.5"
8		21		145	1.45	1.74	173.2	76	69		56	2"
9		24		145	1.45	1.74	175.3	76	69		58	2"
10		27		145	1.0	1.2	177.6	77	70		59	1"
end	19:00	30					179.590					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
F1		Imp. K3
F2		Acetone Probe Rinse
F3		Acetone Imp. Rinse
F4		Silica Gel
F2	425	F.H. Acetone R.
F3	426	Imp. Contents
F7	430	Silica Gel

LEAK CHECK

Vacuum	15"	15"			
Rate	.001	.001			

IMPINGER VOLUMES

	Initial	Final
#1	644.8	846.8
#2	743.1	748.7
#3	593.2	594.0
#4	275.9	289.4
#5		
#6		

NOZZLE SIZE	.22
METER BOX I.D.	6
GAMMA	.9993
DELTA H@	1.7629
BAR. PRESS.	
FILTER I.D.	—
OPERATOR	CS KP.

INTEGRATED BAG ANALYSIS FOR %O2 AND %CO2
INSTRUMENT ANALYZER METHOD 3A

SOURCE: LA-Pacific		LOCATION: Scrubber outlet	
RUN I.D.: 50-M2-R1		ETS CONT. NO.: 95-415	
PROCESS/FUEL TYPE: wood		TECHNICIAN: KBB	
%O2	17.6	%CO2	2.9
%O2	17.6	%CO2	2.9
%O2	17.6	%CO2	2.9
AVERAGE	17.6	AVERAGE	2.9
		Fo FACTOR:	1.138

RUN I.D.: 50-M2-R2		TECHNICIAN: KBB	
%O2	17.3	%CO2	3.1
%O2	17.3	%CO2	3.1
%O2	17.3	%CO2	3.1
AVERAGE	17.3	AVERAGE	3.1
		Fo FACTOR:	1.161

RUN I.D.:		TECHNICIAN:	
%O2		%CO2	
%O2		%CO2	
%O2		%CO2	
AVERAGE		AVERAGE	
		Fo FACTOR:	

Fo = (20.9 - %O2)/%CO2

COMMON Fo FACTORS:

Gas, Natural	(1.600-1.836)
Gas, Propane	(1.434-1.586)
Wood	(1.000-1.120)
Coal, Bituminous	(1.083-1.230)
Coal, Anthracite	(1.016-1.130)
Oil, Distillate	(1.260-1.413)
Oil, Residual	(1.210-1.370)

APPENDIX G

RAW FIELD DATA APPENDICES FOR EPA METHODS 2 AND 4 TESTING

APPENDIX G.1

RAW FIELD DATA FOR EPA METHODS 2 AND 4 TESTING

- RTO OUTLET (03/09/95) -

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA - Pacific
LOCATION NAME	RTO - Stack
RUN NUMBER	RTO-S-M2/4-R1
TECHNICIAN	CHP/GS
DATE	3-9-95
START TIME	1526
END TIME	1556
BAROMETRIC	
Cp	—
METER BOX #	9
Gamma (Y)	1.0051
delta H@	1.8500
PITOT #	
Cp	
TEST TIME	30 min

METHOD 4 DATA

	INITIAL (g)	FINAL (g)	NET (g)
IMP.1	590.7	622.4	
IMP.2	596.6	595.5	
IMP.3	494.2	494.2	
IMP.4	~~494.2~~		
IMP.5			
IMP.6			
IMP.7			
S.G.	729.5	730.9	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.85	424.83	40°	40°
FINAL		446.40	45°	54°
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A 12	1526	150	.54	
11		150	.57	
10		150	.58	
9		145	.57	-.42
8		130	.54	
7		125	.54	
6		120	.53	
5		130	.53	
4		148	.53	
3		173	.58	
2		198	.56	
1		200	.54	
B 12		148	.54	
11		150	50	
10		142	.53	
9		139	.54	
8		127	.54	
7		120	.56	-.36
6		135	.53	
5		156	.54	
4		166	.53	
3		188	.53	
2		194	.53	
1	1541	198	.40	

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA Pacific
LOCATION NAME	RTO - Stack
RUN NUMBER	RTO-S-M2/4-R2
TECHNICIAN	CS, CP
DATE	3-9-95
START TIME	0815
END TIME	~~1830~~ 1745
BAROMETRIC	29.5
Cp	—
METER BOX #	9
Gamma (Y)	1.0051
delta H@	1.85
PITOT #	
Cp	
TEST TIME	30

METHOD 4 DATA

	INITIAL (g)	FINAL (g)	NET (g)
IMP.1	622.4	656.7	
IMP.2	595.5	595.6	
IMP.3	494.2	494.2	
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.	730.9	734.9	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.85	446.515	34	34
FINAL	1.85	468.372	37	45
AVG.	1.85			

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A-12	1915	155	0.55	
11		155	0.53	
10		156	.0.54	
9		150	.55	
8		156	.52	
7		130	.53	
6		145	.53	-.45
5		156	.59	
4		180	.56	
3		190	.55	
2		215	.54	
1		215	.54	
B 12		166	.56	
11		165	.52	
10		145	.53	
9		145	.55	
8		130	.53	-.40
7		133	.53	
6		139	.53	
5		166	.54	
4		166	.52	
3		199	.51	
2		205	.50	
1	~~1730~~ 1745	207	.41	

PITOT LEAK CHECK

pre-test	—
post-test	—

M4 LEAK CHECK

pre-test	—
post-test	—

CYCLONIC FLOW CHECK
40 CFR 60, APPENDIX A, METHOD 1, SECTION 2.4

Location: RTO - STACK
Date: 3/10/95

Load Condition: _____
Start Time: 1720
End Time: 1750

Point No.	α
A 1	+1
2	+3
3	+1
4	+2
5	+6
6	+2
7	-1
8	-2
9	+1
10	+1
11	+3
12	-1

Point No.	α
B 1 ~~13~~	+2
2 ~~14~~	+1
3 ~~15~~	+3
4 ~~16~~	+3
5 ~~17~~	+2
6 ~~18~~	+1
7 ~~19~~	+8
8 ~~20~~	-1
9 ~~21~~	-1
10 ~~22~~	-1
11 ~~23~~	+2
12 ~~24~~	+1

Sum of the Absolute Value of the Rotation Angles ($\Sigma|\alpha|_{i=1,n}$): _____
where: α = rotation angle for point i, and
n = number of sampling points.

Average Rotation Angle ($\frac{\Sigma|\alpha|_{i=1,n}}{n}$): _____
where: α = rotation angle for point i, and
n = number of sampling points.

Note: the flow is determined to be cyclonic if the Average Rotation Angle is greater than 20°.

Flow Check Done by: CHP / CS

APPENDIX G.2

RAW FIELD DATA FOR EPA METHODS 2 AND 4 TESTING

- RTO OUTLET (EVENING - 03/10/95) -

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA Pacific
LOCATION NAME	DUNGANNON, VA
RUN NUMBER	RTO-5-M2/4-R1
TECHNICIAN	CHP
DATE	3/10/95
START TIME	16:45
END TIME	17:15
BAROMETRIC	28.5
Cp	—
METER BOX #	6
Gamma (Y)	0.9993
delta H@	1.7269
PITOT #	50529
Cp	
TEST TIME	30 min

METHOD 4 DATA

	INITIAL (g)	FINAL (g)	NET (g)
IMP.1	614.3	729.9	
IMP.2	730.5	750.1	
IMP.3	593.7	593.8	
IMP.4	~~795.6~~		
IMP.5			
IMP.6			
IMP.7			
S.G.	785.6	796.3	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.72	235.624	67	69
FINAL	1.72	259.445	71	77
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A 1	16:45	130	.59	
2		139	.59	
3		142	.59	
4		147	.57	
5		148	.58	-.36
6		150	.61	
7		150	.59	
8		150	.62	
9		142	.61	
10		139	.61	
11		133	.60	
12		130	.45	
B 1		129	.60	
2		135	.60	
3		135	.60	
4		145	.58	
5		145	.58	-.35
6		150	.59	
7		150	.62	
8		150	.61	
9		145	.60	
10		145	.60	
11		140	.57	
12	17:00	132	.48	

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA Pacific
LOCATION NAME	DUNGANNON, VA
RUN NUMBER	RTO-M2/4-~~[illegible]~~ R2 4P
TECHNICIAN	CHP
DATE	3/10/95
START TIME	1815
END TIME	1845
BAROMETRIC	28.5
Cp	—
METER BOX #	6
Gamma (Y)	.9993
delta H@	1.7269
* PITOT #	50524 *
Cp	
TEST TIME	30 min

METHOD 4 DATA

	INITIAL (a)	FINAL (a)	NET (a)
IMP.1	729.9	~~768.4~~	771.2
IMP.2	750.1	750.2	
IMP.3	593.8	593.8	
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.	796.3	799.6	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.72	261.319	64	66
FINAL	1.72	294.132	63	69
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A 1	1815	126	.58	
2		126	.63	
3		126	.64	
4		126	.61	
5		130	.69	
6		130	.71	-.37
7		130	.68	
8		130	.70	
9		127	.68	
10		124	.62	
11		120	.60	
12		119	.55	
B 1		127	.57	
2		129	.57	
3		129	.62	
4		129	.61	
5		130	.67	
6		130	.69	
7		130	.69	-.38
8		130	.69	
9		126	.70	
10		126	.67	
11		120	.64	
12	1830	121	.53	

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

APPENDIX G.3

RAW FIELD DATA FOR EPA METHODS 2 AND 4 TESTING

- SCRUBBER INLET -

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA-Pacific
LOCATION NAME	~~[illegible]~~-scrubber Inlet
RUN NUMBER	SI-M2/4-R1
TECHNICIAN	CS, CP
DATE	3-9-95
START TIME	1615
END TIME	1645
BAROMETRIC	28.50
Cp	—
METER BOX #	12
Gamma (Y)	0.9885
delta H@	1.8053
PITOT #	
Cp	0.
TEST TIME	30

METHOD 4 DATA

	INITIAL (a)	FINAL (a)	NET (a)
IMP.1	690.2	720.1	
IMP.2	721.3	749.5	
IMP.3	584.9	592.6	
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.	769.7	729.5	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.81	427.381	64	64
FINAL	1.81	449.84	66	65
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A-1	1615	180	1.35	-11.6
2		185	1.4	
3		186	1.45	
4		186	1.5	
5		187	1.5	
6		187	1.4	
7		188	1.4	
8		190	1.3	
9		190	1.2	
10		188	1.1	
11		185	1.2	
12		186	1.2	
B-1		181	1.3	-11.5
2		187	1.4	
3		190	1.3	
4		191	1.2	
5		193	1.25	
6		193	1.25	
7		193	1.5	
8		185	1.6	
9		181	1.6	
10		180	1.5	
11		183	1.3	
12	1645	185	1.4	

PITOT LEAK CHECK

pre-test	✓
post-test	—

M4 LEAK CHECK

pre-test	✓
post-test	✓

APPENDIX G.4

RAW FIELD DATA FOR EPA METHODS 2 AND 4 TESTING

- SCRUBBER OUTLET -

+ lows from 45

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION SOMZ-B template R1

PLANT NAME	L.A. Pacific
LOCATION NAME	Scrubber Inlet
RUN NUMBER	S.O.-M2/4-R2
TECHNICIAN	C.S. / C.J.
DATE	3/10/95
START TIME	11:20
END TIME	11:50
BAROMETRIC	28.8
Cp	
METER BOX #	6
Gamma (Y)	.9993
delta H@	1.7269
PITOT #	103
Cp	
TEST TIME	30

METHOD 4 DATA

	INITIAL (a)	FINAL (a)	NET (a)
IMP.1	623.5	733.5	
IMP.2	745.9	756.0	
IMP.3	552.5	593.5	
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.	775.0	791.4	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.7269	213.540	66	66
FINAL	1.7269	235.540	77	69
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
C1	11:20	146	.76	
2		146	.91	
3		146	.97	
4		146	1.2	-2.8
5		146	1.25	
6		146	0.91	
7		146	.58	
8		146	.46	
9		146	.35	
10	11:27	146	.31	
11				
12				
D1	11:29	146	1.5	
2		146	1.6	
3		146	1.7	
4		146	1.7	
5		146	2.0	
6		146	2.3	-2.7
7		146	1.9	
8		146	1.5	
9		146	1.0	
10	11:35	146	.66	
11				
12				

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	LA Pacific
LOCATION NAME	scrubber outlet
RUN NUMBER	~~[illegible]~~ outlet/M4-R2
TECHNICIAN	C.S./C.P.
DATE	3/5/98
START TIME	19:07
END TIME	19:37
BAROMETRIC	28.5
Cp ~~[illegible]~~	
METER BOX #	6
Gamma (Y)	.9993
delta H@	1.7269
PITOT #	103
Cp	
TEST TIME	30

METHOD 4 DATA

	INITIAL (g)	FINAL (g)	NET (g)
IMP.1			
IMP.2			
IMP.3			
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.			
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.7269		67	67
FINAL	1.7269		78	69
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
B 1	19:07	145	.63	
2		147	.89	
3		148	.74	
4		148	1.16	-2.6
5		148	.95	
6		148	1.2	
7		148	1.35	
8		148	1.4	
9		148	1.1	
10	19:13	148	.98	
A 1	19:15	146	.7	
2		148	1.4	
3		148	1.45	-2.5
4		148	1.4	
5		148	1.5	
6		148	1.45	
7		148	1.3	
8		148	1.15	
9		148	.93	
10	19:37	148	.69	

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

APPENDIX G.5

RAW FIELD DATA FOR EPA METHODS 2 AND 4 TESTING

- PRESS INLET -

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	L.A. Pacific
LOCATION NAME	Press Inlet
RUN NUMBER	P.2.-M2/4-R1
TECHNICIAN	L.S./C.P.
DATE	3/10/94
START TIME	16:05
END TIME	16:35
BAROMETRIC	28.5
Cp	—
METER BOX #	9
Gamma (Y)	1.0051
delta H@	1.8500
PITOT #	103
Cp	
TEST TIME	30

METHOD 4 DATA

		INITIAL (g)	FINAL (g)	NET (g)
622.4	IMP.1	622.4	660.0	
595.5	IMP.2	595.5	596.7	
494.2	IMP.3	494.2	494.6	
	IMP.4			
	IMP.5			
	IMP.6			
	IMP.7			
739.9	S.G.	739.9	739.3	
			TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.8500	543.570	63	63
FINAL	1.8500	565.727	67	61
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A 1	16:05	81	1.3	
2		81	1.20	
3		81	1.0	
4		81	.9	
5		81	1.45	-2.0
6	16:09	81	1.05	
7				
8				
9				
10				
11				
12				
B				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

ETS Inc.
METHOD 2/4 DATA SHEET

GENERAL INFORMATION

PLANT NAME	L.A. Pacific
LOCATION NAME	Press Inlet
RUN NUMBER	P.T. 1u4-R2
TECHNICIAN	C.S. / C.P.
DATE	3/10/95
START TIME	18:00
END TIME	18:30
BAROMETRIC	28.5
Cp	—
METER BOX #	6
Gamma (Y)	1.0251
delta H@	1.8500
PITOT #	103
Cp	
TEST TIME	30

METHOD 4 DATA

	INITIAL (g)	FINAL (g)	NET (g)
IMP.1	660.0	661.8	
IMP.2	596.7	586.6	
IMP.3	494.6	496.9	
IMP.4			
IMP.5			
IMP.6			
IMP.7			
S.G.	739.3	743.4	
		TOTAL	

VOLUME METERED	delta H (in. WC)	METER VOLUME (dcf)	DGM INLET (DegF)	DGM OUTLET (DegF)
INITIAL	1.8500	566.509	62	61
FINAL	1.8500	568.267	68	61
AVG.				

METHOD 2

PORT/POINT	TIME	STACK TEMP. (Deg F)	delta P (in. WC)	STATIC (in. WC)
A 1	18:00	83	1.35	
2		83	1.25	
3		83	1.05	-2.4
4		81	.75	
5		83	1.2	
6	18:06	83	1.0	

PITOT LEAK CHECK

pre-test	✓
post-test	✓

M4 LEAK CHECK

pre-test	✓
post-test	✓

CYCLONIC FLOW CHECK
40 CFR 60, APPENDIX A, METHOD 1, SECTION 2.4

Location: Press Inlet
Date: 3/12/95

Load Condition: _____
Start Time: 12:40
End Time: 12:48

Point No.	α
1	+1
2	+3
3	-2
4	-5
5	+8
6	+4
7	
8	
9	
10	
11	
12	

Point No.	α
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Sum of the Absolute Value of the Rotation Angles ($\Sigma|\alpha|_{i=1,n}$): _____
where: α = rotation angle for point i, and
n = number of sampling points.

Average Rotation Angle ($\frac{\Sigma|\alpha|_{i=1,n}}{n}$): _____
where: α = rotation angle for point i, and
n = number of sampling points.

Note: the flow is determined to be cyclonic if the Average Rotation Angle is greater than 20°.

Flow Check Done by: _____

APPENDIX H

PARTICLE SIZING LABORATORY DATA

BAHCO DATA AND RESULTS

ETS CONTRACT : 95-403-T

ETS I.D. : SI-M4-R1

CLIENT : LOUISIANA PACIFIC

NOTE: All sample dust weights include pan weight.

CENTRIFUGE DATA

PAN WEIGHT (grams):	2.6506
AS-IS SAMPLE WT(gms):	2.8261
-100 MESH SAMPLE (gms):	2.8058
BAHCO SAMPLE(gms):	2.7735
PERCENT LESS THAN 100 MESH (150 microns)	88.43

DENSITY DATA

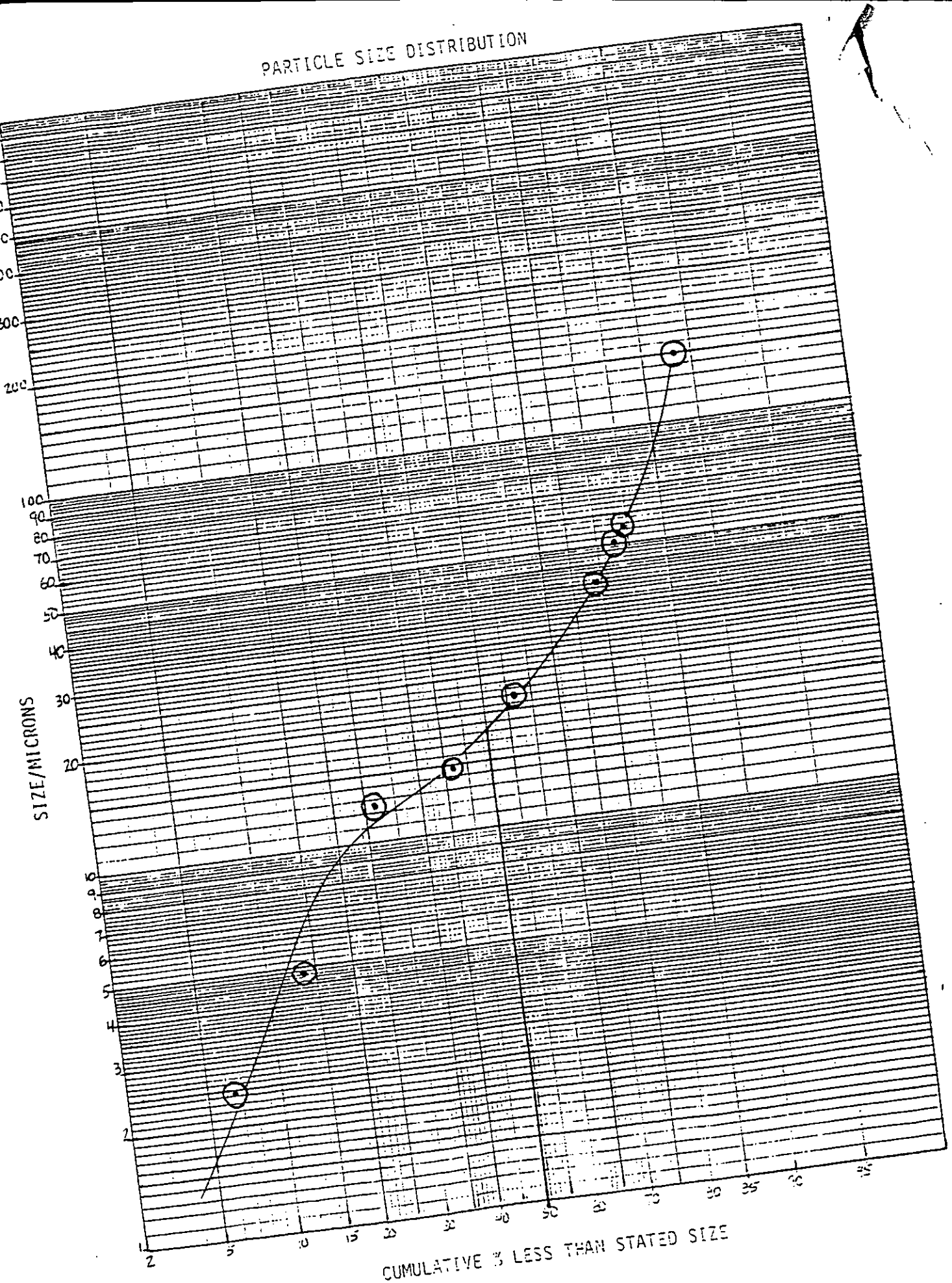
FLASK VOLUME (ml) :	5
FLASK WEIGHT (gms) :	40.680
SAMPLE + FLASK (grams) :	40.712
LIQUID DENSITY (gm/cc) :	0.785
FLSK+LIQU.+SAMP.(grams) :	79.969
CALCULATED DUST DENSITY =	1.41

THROTTLE	RESIDUE (grams)	TERMINAL VELOCITY (in/min)	CUMULATIVE PERCENT LESS THAN SIZE	PARTICLE DIAMETER (microns)
18	2.7643	0.62	6.62	2.46
17	2.7545	2.41	13.67	4.86
16	2.7361	16.2	26.91	12.59
14	2.7150	22.1	42.09	14.71
12	2.6938	51.0	57.35	22.35
8	2.6700	168	74.47	40.56
4	2.6651	262	78.00	50.65
0	2.6629	315	79.58	55.54

CALCULATIONS

$$\text{CUM.\% LESS THAN SIZE} = \frac{(\text{BAHCO SAMPLE} - \text{RESIDUE})}{\text{BAHCO SAMPLE}} \times (\text{\% LESS THAN 100 MESH})$$

$$\log(\text{Diameter}) = 0.5705 - 1/2 \times (\log(\text{Density}) - \log(\text{Term.Vel.}))$$


PARTICLE SIZE DISTRIBUTION
SIZE/MICRONS
CUMULATIVE % LESS THAN STATED SIZE

TELEDYNE
WAH CHANG ALBANY
Analytical Services
1600 Old Salem Rd NE
Albany, OR 97321
(503) 967-6939
Expeditor (503) 967-6913
FAX (503) 967-6986

REPORT OF ANALYSIS

March 17, 1995

Terry Williamson
ETS, INC.
1401 Municipal Rd NW
Roanoke, VA 24012-1309

Re: Particle Sizing

ETS: PURCHASE ORDER 5425
ETS: Contract #95-403-T

TWCA S.O. : B-9802-1	
TWCA Sample ID:	J-54603
MEDIAN: 18 μm	Under a microscope, particles up to 120μm were observed.

Distribution table attached.

Bill Beasley
Analytical Laboratory Expeditor

de

FAXED

Analytical results are subject to terms listed on the back

HORIBA CAPA-700 PARTICLE ANALYZER

DATE 3-16-95

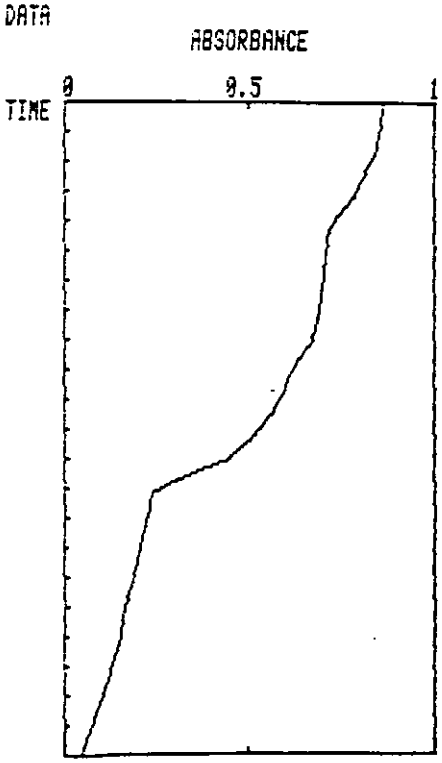
SAMP. J 54603

DISP. A-11

* CONDITIONS

DISP. VISC.	1.54	[cP]
DISP. DENS.	0.76	[g/cc]
SAMP. DENS.	1.41	[g/cc]
D (MAX)	50.00	[μm]
D (MIN)	0.10	[μm]
SPEED	480	[rpm/min]
TIME	0 H 21 M 55 S	
ΔX	10	[mm]
MEASURE MODE	GRADIENT	

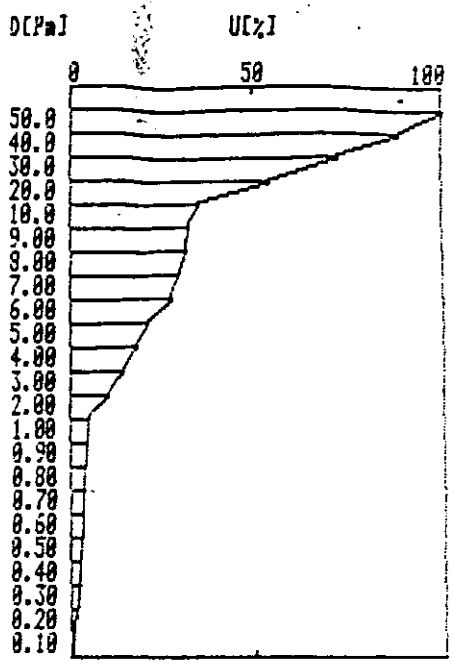
* DATA



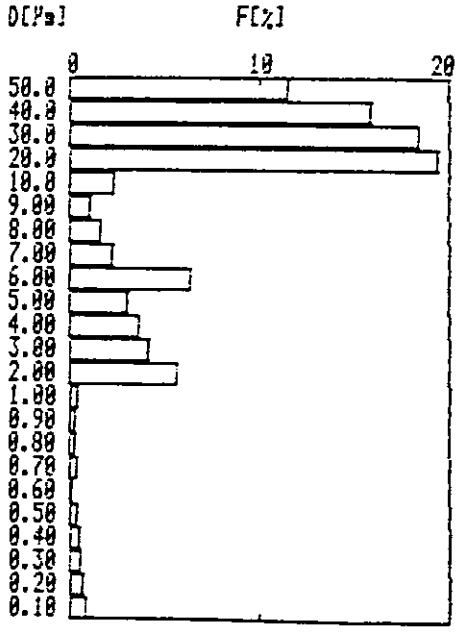
* DISTRIBUTION TABLE (BY VOL.)
(K[D]=OPTIONAL)

D[μm]	F[%]	U[%]
50.0<	0.0	100.0
50.0-40.0	11.5	100.0
40.0-30.0	15.8	88.5
30.0-20.0	18.3	72.7
20.0-10.0	19.3	54.4
10.0-9.00	2.4	35.1
9.00-8.00	1.1	32.7
8.00-7.00	1.7	31.6
7.00-6.00	2.3	29.9
6.00-5.00	6.4	27.6
5.00-4.00	3.1	21.2
4.00-3.00	3.7	18.1
3.00-2.00	4.1	14.4
2.00-1.00	5.7	10.3
1.00-0.90	0.4	4.6
0.90-0.80	0.3	4.2
0.80-0.70	0.3	3.9
0.70-0.60	0.4	3.6
0.60-0.50	0.1	3.2
0.50-0.40	0.4	3.1
0.40-0.30	0.5	2.7
0.30-0.20	0.6	2.2
0.20-0.10	0.7	1.6
0.10-0.00	0.9	0.9

D (MEDIAN)	17.72	[μm]
SD	14.56	[μm]
Sw	1.664	[m²/g]



* DISTRIBUTION GRAPH (BY VOL.)
(k[D]=OPTIONAL)



Carbon?

J 54603

Median 18μm

Note: Under a microscope, particles up to 120μm were observed.

B Ball

H-1538

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 7 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	32	0.000
3	100	100	0.000
4	200	198	0.303
5	300	300	0.000
6	400	400	0.000
7	500	499	0.104
8	600	600	0.000
9	700	699	0.086
10	800	798	0.159
11	900	899	0.074
			0.066 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

Wheelabrator/Louisianna Pacific
95-415
03/09/95
LOCAL CALIBRATION OUTLET

Starting
03-09-95

Time	O2 (% dv) Outlet	CO (ppm dv) Outlet	NOx (ppm dv) Outlet	CO2 (% dv) Outlet	VOC (ppm wv) Outlet
09:54	-0.03z	-0.13z	-0.48z	0.002z	1.2
09:55	0.02	0.00	-0.47	-0.001	1.1
09:56	-0.01	-0.08	-0.43	8.610	1.1
09:57	11.19	-1.00	-0.44	17.730	1.1
09:58	21.52	-1.00	-0.45	17.250	1.1
09:59	22.24c	-1.00	-0.44	17.260c	1.1
10:00	22.11	6.25	-0.43	12.460	1.1
10:01	7.48	700.00	-0.46	0.012	1.1
10:02	0.20	903.00	-0.44	0.010	1.1
10:03	0.26	897.00	-0.43	0.019	1.1
10:04	0.14	900.00	0.01	1.621	1.1
10:05	0.11	880.00	-0.21	0.670	1.1
10:06	0.14	830.00	-0.25	0.079	1.1
10:07	1.49	518.90	-0.42	8.490	1.1
10:08	8.89	14.81	-0.44	9.960	1.0
10:09	10.15c	-1.00	-0.44	9.970c	1.0
10:10	10.10	-1.00	-0.44	9.990	1.0
10:11	9.51	103.20	-0.44	2.833	1.0
10:12	1.69	546.60	-0.44	0.003	1.0
10:13	-0.01	589.80	-0.43	0.002	1.1
10:14	-0.00	587.70	-0.44	0.016	1.1
10:15	0.16	571.90	-0.31	0.025	1.1
10:16	0.18	511.80	-0.28	0.021	1.1
10:17	0.01	444.90	-0.29	0.014	1.1
10:18	-0.01	331.60	-0.34	-0.001	1.1
10:19	-0.00	847.00	-0.44	-0.005	1.1
10:20	-0.02	897.00	-0.43	-0.002	1.1
10:21	-0.03	894.00c	-0.44	-0.004	1.1
10:22	-0.01	823.00	-0.43	-0.003	1.1
10:23	-0.02	588.80	-0.43	-0.004	1.1
10:24	-0.03	582.50c	-0.43	-0.003	1.1
10:25	-0.02	507.00	-0.32	-0.002	1.1
10:26	-0.03	300.80	-0.29	-0.003	1.0
10:27	-0.03	294.80c	-0.29	-0.002	1.0
10:28	-0.03	291.00	168.30	0.000	1.0
10:29	-0.02	220.70	236.00	-0.002	1.0
10:30	0.01	113.50	226.50	-0.003	1.0
10:31	0.03	34.88	225.00c	-0.007	1.0
10:32	-0.01	4.91	121.00	-0.002	1.0
10:33	-0.01	0.00	124.70c	-0.001	1.0
10:34	-0.02	0.00	124.80	-0.005	1.0z

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 5 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	100	0.000
4	200	198	0.303
5	300	299	0.132
6	400	398	0.233
7	500	498	0.208
8	600	598	0.189
9	700	697	0.259
10	800	798	0.159
11	900	899	0.074
			0.160 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	100	0.000
4	200	200	0.000
5	300	300	0.000
6	400	399	0.116
7	500	500	0.000
8	600	599	0.094
9	700	699	0.086
10	800	799	0.079
11	900	898	0.147
			0.066 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 3 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	85	85	0.000
2	100	99	0.179
3	200	198	0.303
4	300	299	0.132
5	400	398	0.233
6	500	499	0.104
7	600	598	0.189
8	700	698	0.172
9	800	798	0.159
10	900	898	0.147
11	0	0	0.000
			0.147 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 4 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	298	0.263
6	400	398	0.233
7	500	499	0.104
8	600	598	0.189
9	700	697	0.259
10	800	798	0.159
11	900	898	0.147
			0.158 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 1 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	30	0.407
3	100	98	0.357
4	200	199	0.152
5	300	300	0.000
6	400	399	0.116
7	500	498	0.208
8	600	599	0.094
9	700	699	0.086
10	800	798	0.159
11	900	900	0.000
			0.144 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 12 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 2 Date 20-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	77	75	0.372
2	100	99	0.179
3	200	198	0.303
4	300	298	0.263
5	400	398	0.233
6	500	498	0.208
7	600	600	0.000
8	700	698	0.172
9	800	799	0.079
10	900	899	0.074
11	0	0	0.000
			0.171 AVERAGE DIFF

Calibration Performed By ..... CARL POWELL

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

METER BOX AUDIT

Plant Name WERI. Job No. 94-372

City/State Delaware Cty. Penn. Auditor J. P.

Test Location Unit 5 Stack outlet Date 3-1-95

Isokinetic Meter Box I.D. 94-12 Gamma (Y) vs ~~1.01122~~ 0.9928 dH@ vs ~~1.87955~~ 1.7906

Zero/Level Manometer? yes Barometric Pressure (Pbar) 29.99

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (F)	Lower and Upper Limits for Audit Gamma	
Final 324.425	Final 62 60	0.96 * Y = vs ~~0.9708~~ 0.9531	
317.100 Initial ~~315.785~~	Initial 60/60	1.04 * Y = vs ~~1.0517~~ 1.0325	
Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temperature (F)	Audit Test Time	
Vm = 7.325	Tm = 60.5	(Minutes) 10	(Seconds) 0

$$Yc = \frac{[Min.\ 10 + (Sec.\ 0 / 60)]}{Vm\ 7.325} * \sqrt{\frac{0.0319\ (Tm\ 60.5 + 460}{BP\ 29.99}}$$

Yc = 1.0158 / Audit Gamma Audit Gamma within 4% limits? Y (Y/N)

Positive Pressure/Back half leak check OK? Y (Y/N)

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 94-336
Job I.D.

Print Date 01/18/95

Meter Box No.: 12
Delta H: 1.7906
Gamma: 0.9928

Analyst: _____
Calibration Date: 01/18/95
Test Meter No. 9548
Barometric Pressure 28.98

QA/QC Check: Lynne Sexton 1/19/95
Previous Calibration Date: 08/04/94
Previous Gamma: 1.0112

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	121.992	136.574	14.582	76.0	76.0	76.00	421.486	436.168	14.682	76.0	76.0	81.0	78.0	77.75	36.0	1.78095	0.99517
2	1.0	136.809	146.980	10.171	75.0	76.0	75.50	436.490	446.721	10.231	78.0	80.0	82.0	79.0	79.75	17.5	1.72043	0.99949
3	1.5	147.153	165.682	18.529	76.0	76.0	76.00	446.895	465.747	18.852	79.0	81.0	84.0	80.0	81.00	26.5	1.78226	0.98827
4	2.0	165.836	179.441	13.605	76.0	75.0	75.50	465.926	479.778	13.852	80.0	84.0	86.0	81.0	82.75	17.0	1.80472	0.99044
5	2.5	179.753	190.385	10.632	77.0	75.0	76.00	480.088	490.928	10.840	81.0	82.0	85.0	81.0	82.25	12.0	1.84571	0.98599
6	3.0	190.655	203.851	13.196	75.0	75.0	75.00	491.296	504.625	13.329	81.0	85.0	86.0	81.0	83.25	13.5	1.80956	0.99769

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 7 Date 10-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	2	2	0.000
2	32	31	0.203
3	100	99	0.179
4	204	204	0.000
5	303	303	0.000
6	400	400	0.000
7	502	501	0.104
8	608	609	-0.094
9	707	707	0.000
10	803	802	0.079
11	898	897	0.074
			0.050 AVERAGE DIFF

Calibration Performed By ..... W.C.Hayes

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

Differerence % = ((Referance temperature - Thermocouple temperature)/Referance temperature) * 100

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. reset
Job I.D.

Print Date 03/06/95

Meter Box No.: 12
Delta H: 1.8053
Gamma: 0.9885

Analyst:
Calibration Date: 03/06/95
Test Meter No. 9548
Barometric Pressure 28.91

QA/QC Check: 3/7/95
Previous Calibration Date: 01/18/95
Previous Gamma: 0.9928

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	136.912	147.189	10.277	72.0	72.0	72.00	637.065	647.542	10.477	74.0	74.0	74.0	76.0	74.50	25.0	1.71792	0.98427
2	1.0	147.391	159.786	12.395	72.0	71.0	71.50	647.742	660.362	12.620	76.0	74.0	75.0	79.0	76.00	21.5	1.73875	0.98797
3	1.5	159.998	174.202	14.204	71.0	71.0	71.00	660.575	675.056	14.481	78.0	75.0	77.0	80.0	77.50	20.5	1.79721	0.98910
4	2.0	174.558	194.942	20.384	71.0	71.0	71.00	675.418	696.206	20.788	80.0	76.0	77.0	81.0	78.50	26.0	1.86815	0.98938
5	2.5	195.122	205.235	10.113	71.0	71.0	71.00	696.409	706.712	10.303	81.0	77.0	77.0	82.0	79.25	11.5	1.85347	0.99051
6	3.0	205.421	216.009	10.588	71.0	71.0	71.00	706.902	717.684	10.782	81.0	77.0	77.0	82.0	79.25	11.0	1.85647	0.98971

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 5 *Date 09-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	500	0.000
8	600	601	-0.094
9	700	700	0.000
10	800	800	0.000
11	900	901	-0.074
			0.007 AVERAGE DIFF

Calibration Performed By ..... W.R.GRAHAM

Post Test Calibration-Contract #\- _____

•e-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 10-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	34	33	0.202
3	102	101	0.178
4	201	201	0.000
5	303	304	-0.131
6	401	401	0.000
7	498	497	0.104
8	600	602	-0.189
9	702	702	0.000
10	802	802	0.000
11	903	903	0.000
			0.015 AVERAGE DIFF

Calibration Performed By ..... W.C.Hayes

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.

METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K

THERMOCOUPLE NUMBER 3 *Date 09-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	30	0.407
3	100	98	0.357
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	800	0.000
11	900	900	0.000
			0.078 AVERAGE DIFF

Calibration Performed By ..... W.R.GRAHAM

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 4 *Date 09-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	98	0.357
4	200	200	0.000
5	300	302	-0.263
6	400	400	0.000
7	500	500	0.000
8	600	601	-0.094
9	700	701	-0.086
10	800	801	-0.079
11	900	901	-0.074
			-0.003 AVERAGE DIFF

Calibration Performed By ..... W.R.GRAHAM

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.

METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K

THERMOCOUPLE NUMBER 1 *Date 09-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	98	0.357
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	899	0.074
			0.064 AVERAGE DIFF

Calibration Performed By ..... W.R.GRAHAM

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 9 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 2 *Date 09-Nov-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	30	0.407
3	100	98	0.357
4	200	200	0.000
5	300	300	0.000
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	899	0.074
			0.095 AVERAGE DIFF

Calibration Performed By ..... W.R.GRAHAM

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Print Date 03/03/95

Contract No. reset
Job I.D.

Meter Box No.: 9
Delta H: 1.8500
Gamma: 1.0051

Analyst: [signature]
Calibration Date: 03/03/95
Test Meter No. 9548
Barometric Pressure 29.16

QA/QC Check: [signature] 3/6/95
Previous Calibration Date: 02/15/95
Previous Gamma: 0.9820

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	48.658	59.115	10.457	68.0	68.0	68.00	315.464	325.976	10.512	71.0	70.0	72.0	75.0	72.00	26.5	1.82926	1.00104
2	1.0	59.312	69.572	10.260	68.0	67.0	67.50	326.152	336.519	10.367	75.0	72.0	74.0	79.0	75.00	18.5	1.83828	1.00123
3	1.5	69.730	80.086	10.356	67.0	67.0	67.00	336.674	347.158	10.484	79.0	74.0	75.0	83.0	77.75	15.5	1.88661	1.00414
4	2.0	80.257	91.937	11.680	67.0	66.0	66.50	347.332	359.156	11.824	82.0	76.0	77.0	85.0	80.00	15.0	1.84078	1.00807
5	2.5	92.121	106.847	14.726	66.0	66.0	66.00	359.362	374.290	14.928	84.0	77.0	77.0	87.0	81.25	17.0	1.85146	1.00871
6	3.0	107.060	119.849	12.789	66.0	66.0	66.00	374.508	387.501	12.993	86.0	78.0	78.0	88.0	82.50	13.5	1.85336	1.00755

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. reset
Job I.D.

Print Date 08/26/94

Meter Box No.: 9
Delta H: 1.9016
Gamma: 0.9938

Analyst: [signature]
Calibration Date: 08/26/94
Test Meter No. 9548
Barometric Pressure 29.00

QA/QC Check: [signature] 8/30/94
Previous Calibration Date: 05/27/94
Previous Gamma: 0.9935

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	100.710	110.957	10.247	80.0	82.0	81.00	918.571	928.933	10.362	79.0	79.0	83.0	87.0	82.00	26.0	1.90011	0.98948
2	1.0	111.191	121.792	10.601	81.0	80.0	80.50	929.159	939.899	10.740	86.0	83.0	85.0	89.0	85.75	19.0	1.87963	0.99412
3	1.5	122.024	137.871	15.847	80.0	80.0	80.00	940.135	956.255	16.120	88.0	85.0	86.0	92.0	87.75	23.5	1.91955	0.99340
4	2.0	138.044	149.295	11.251	80.0	81.0	80.50	956.417	967.872	11.455	90.0	86.0	87.0	94.0	89.25	14.5	1.93137	0.99306
5	2.5	149.568	160.530	10.962	80.0	81.0	80.50	968.146	979.281	11.135	92.0	87.0	87.0	95.0	90.25	12.5	1.88657	0.99591
6	3.0	160.739	172.710	11.971	80.0	80.0	80.00	979.509	991.671	12.162	93.0	87.0	88.0	96.0	91.00	12.5	1.89225	0.99676

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	1	-0.217
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	899	0.074
			0.037 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 7 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.031 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 4 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.050 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 5 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.031 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 2 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	201	-0.152
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	800	0.000
11	900	900	0.000
			0.020 AVERAGE DIFF

alibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 3 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	200	0.000
5	300	301	-0.132
6	400	400	0.000
7	500	499	0.104
8	600	600	0.000
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.039 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 94-344
Job I.D.

Print Date 12/02/94

Meter Box No.: 6
Delta H: 1.7269
Gamma: 0.9993

Analyst: [signature]
Calibration Date: 12/02/94
Test Meter No. 9548
Barometric Pressure 29.19

QA/QC Check: Lynne Sexton 12/2/94
Previous Calibration Date: 09/12/94
Previous Gamma: 1.0134

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	958.049	968.418	10.369	73.0	74.0	73.50	975.830	986.292	10.462	76.0	74.0	77.0	81.0	77.00	25.0	1.67300	0.99636
2	1.0	968.809	980.199	11.390	74.0	74.0	74.00	986.689	998.217	11.528	81.0	72.0	78.0	85.0	79.00	19.5	1.68399	0.99477
3	1.5	980.388	990.461	10.073	74.0	74.0	74.00	998.389	1008.59	10.204	84.0	78.0	79.0	87.0	82.00	14.5	1.77590	0.99818
4	2.0	990.704	1001.65	10.946	74.0	74.0	74.00	1008.84	1019.89	11.045	85.0	79.0	79.0	88.0	82.75	13.5	1.73578	1.00223
5	2.5	1001.85	1013.14	11.293	73.0	74.0	73.50	1020.11	1031.51	11.399	86.0	79.0	80.0	89.0	83.50	12.5	1.74195	1.00295
6	3.0	1013.35	1023.70	10.353	73.0	73.0	73.00	1031.74	1042.21	10.469	87.0	80.0	80.0	88.0	83.75	10.5	1.75085	1.00130

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 1 Date 21-Sep-94

	Reference Temperature	Thermocouple Temperature	Difference %
1	0	0	0.000
2	32	31	0.203
3	100	99	0.179
4	200	201	-0.152
5	300	301	-0.132
6	400	399	0.116
7	500	499	0.104
8	600	601	-0.094
9	700	700	0.000
10	800	799	0.079
11	900	900	0.000
			0.028 AVERAGE DIFF

Calibration Performed By ..... MICK BERKHEAD

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

APPENDIX I

FIELD EQUIPMENT CALIBRATION DATA

Wheelabrator/Louisianna Pacific
95-415
03/09/95
LOCAL CALIBRATION

Starting
03-09-95

Time	O2 (% dv) Inlet	CO (ppm dv) Inlet	NOx (ppm dv) Inlet	CO2 (% dv) Inlet	VOC (ppm wv) Inlet
10:35	0.00	-0.03	122.90	-0.026	0.1
10:36	-0.03	-0.04	122.80	-0.025	59.8
10:37	0.14	-0.06	64.74	-0.028	78.4
10:38	0.25	-0.05	33.42	-0.027	78.9
10:39	0.17	-0.01	31.75	-0.026	79.5
10:40	0.19	0.09	30.72	-0.021	80.0
10:41	0.20	-0.00	30.53	-0.021	81.6
10:42	0.23	0.24	28.52	-0.018	83.9c
10:43	0.24	0.31	27.89	-0.014	67.6
10:44	0.27	0.43	27.50	-0.013	18.6
10:45	0.26	0.43	24.03	-0.008	8.6
10:46	0.31	0.52	17.41	-0.004	50.3c
10:47	0.41	0.54	13.06	-0.005	41.1
10:48	0.62	0.51	10.92	-0.002	28.3
10:49	0.13	0.48	9.34	-0.005	6.9
10:50	0.89	0.52	8.32	0.000	14.2
10:51	1.14	0.53	7.89	0.006	30.9c
10:52	1.40	0.49	7.74	0.012	29.2
10:53	1.54	0.51	7.53	0.019	6.3
10:54	2.46	0.50	8.51	0.019	1.8
10:55	4.27	0.57	8.88	0.024	1.7

Marker	Description	Display	Average
A	Data was Absent from original raw data file.	√	
C	CALIBRATION POINT	√	
P	Port Change	√	
R	Waiting for Response Time to Elapse	√	
a	Port A of Stratification Check	√	
b	Port B of Stratification Check	√	
c	Port C of Stratification Check	√	
d	Port D of Stratification Check	√	
z	Zero Calibration	√	
*	Data was not used in calculated parameter averages.		

Wheelabrator/Louisianna Pacific
95-415
03/09/95
LOCAL CALIBRATION OUTLET

Starting
03-09-95

Time	O2 (% dv) Outlet	CO (ppm dv) Outlet	NOx (ppm dv) Outlet	CO2 (% dv) Outlet	VOC (ppm wv) Outlet
10:35	-0.01	0.00	124.90	-0.004	1.0
10:36	-0.02	0.00	119.50	-0.005	1.0
10:37	0.08	0.00	4.26	-0.006	1.0
10:38	0.07	0.00	1.06	0.002	0.9
10:39	0.05	0.00	0.42	0.003	1.3
10:40	5.08	0.00	0.24	0.004	1.1
10:41	14.15	0.00	0.14	0.007	0.2
10:42	17.90	0.00	0.08	0.003	-0.0z
10:43	19.53	0.00	0.03	0.005	0.1
10:44	20.25	0.00	-0.01	0.004	22.3
10:45	20.55	0.00	-0.03	0.002	81.5
10:46	20.71	0.00	-0.05	0.002	83.6c
10:47	20.79	0.00	-0.08	0.003	83.1
10:48	20.76	0.00	-0.08	0.005	40.2
10:49	20.75	0.00	-0.08	0.000	49.3
10:50	20.77	0.00	-0.08	0.006	50.4
10:51	20.77	0.00	-0.09	0.006	50.6c
10:52	20.76	0.00	-0.09	0.002	50.6
10:53	20.74	0.00	-0.10	0.004	37.5
10:54	11.83	88.10	15.90	0.984	30.7c
10:55	19.51	194.30	12.03	1.502	30.5

Wheelabrator/Louisianna Pacific
95-415
03/09/95
LOCAL CALIBRATION

Starting
03-09-95

Time	O2 (% dv) Inlet	CO (ppm dv) Inlet	NOx (ppm dv) Inlet	CO2 (% dv) Inlet	VOC (ppm wv) Inlet
09:54	0.01z	-0.33z	-2.81z	-0.027z	4.4
09:55	0.01	0.10	-2.80	-0.022	4.4
09:56	0.05	0.00	-2.77	9.400	4.5
09:57	13.25	-0.50	-2.76	17.490	4.5
09:58	22.07	-0.33	-2.75	17.340	4.6
09:59	22.25c	-0.83	-2.75	17.340c	4.6
10:00	22.19	8.03	-2.72	12.460	4.6
10:01	11.25	634.60	-2.75	-0.014	4.7
10:02	1.84	995.00	-2.62	-0.015	4.7
10:03	1.87	993.00	-2.56	-0.005	4.6
10:04	1.16	985.00	-2.50	0.466	4.6
10:05	0.76	992.00	-2.52	0.053	4.6
10:06	0.62	960.00	-2.51	0.008	4.6
10:07	1.00	650.70	-2.70	8.530	4.6
10:08	8.70	40.41	-2.71	10.080	4.5
10:09	10.29c	-0.58	-2.71	10.080c	4.5
10:10	10.23	-0.67	-2.71	10.070	4.5
10:11	10.06	90.90	-2.70	2.614	4.4
10:12	3.31	544.80	-2.69	-0.018	4.3
10:13	0.05	647.40	-2.70	-0.018	4.3
10:14	0.00	642.50	-2.69	-0.015	4.3
10:15	-0.01	637.10	-2.53	-0.008	4.2
10:16	0.05	588.50	-2.51	-0.011	4.2
10:17	0.01	539.90	-2.51	-0.016	4.2
10:18	-0.00	401.00	-2.55	-0.024	4.2
10:19	-0.01	861.00	-2.70	-0.022	4.2
10:20	-0.02	885.00	-2.70	-0.024	4.1
10:21	-0.03	910.00c	-2.70	-0.023	4.1
10:22	-0.03	844.00	-2.69	-0.026	4.1
10:23	-0.02	606.20	-2.69	-0.029	4.1
10:24	-0.03	589.30c	-2.68	-0.032	4.1
10:25	-0.02	514.30	-2.54	-0.030	4.0
10:26	-0.02	310.10	-2.48	-0.029	4.0
10:27	-0.02	302.60c	-2.47	-0.029	4.0
10:28	0.01	299.60	232.60	-0.025	4.0
10:29	-0.01	255.70	249.30	-0.026	4.0
10:30	0.00	183.70	223.50	-0.023	4.0
10:31	-0.01	110.90	223.80c	-0.025	4.0
10:32	0.02	45.80	119.90	-0.023	2.7
10:33	0.00	7.07	123.00c	-0.027	1.9
10:34	-0.01	0.64	123.00	-0.026	0.0z

Wheelabrator/Louisianna Pacific
95-415
03/10/95
LOCAL CALIBRATION SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) Inlet	CO (ppm dv) Inlet	NOx (ppm dv) Inlet	CO2 (% dv) Inlet	VOC (ppm wv) Inlet
07:31	-0.01	-0.25	-2.88	-0.027	4.8
07:32	0.00	-0.20	-2.88	-0.024	4.6
07:33	0.01z	-0.19z	-2.90z	-0.028z	4.2
07:34	-0.01	-0.20	-2.89	10.800	3.9
07:35	2.44	-0.61	-2.90	17.790	3.7
07:36	10.75	-0.92	-2.90	17.300	3.4
07:37	20.22	-0.93	-2.90	17.050	3.3
07:38	22.22	-0.78	-2.89	17.340	3.2
07:39	22.18	-0.94	-2.90	15.700	3.1
07:40	21.99	-0.83	-2.90	10.100	3.0
07:41	19.09	-0.83	-2.90	10.080	2.9
07:42	14.05	-1.00	-2.89	10.000	2.6
07:43	10.05	-0.95	-2.90	9.790	0.6
07:44	10.00	-0.81	-2.89	9.800	0.5
07:45	10.00	-1.13	-2.89	9.810	1.4
07:46	10.03	-0.86	-2.89	12.640	1.1
07:47	15.28	-0.93	-2.89	16.960	0.2
07:48	21.63C	-0.85	-2.89	17.250C	0.2
07:49	22.02	-1.10	-2.88	12.650	0.1
07:50	14.07	-1.13	-2.88	10.070	0.0z
07:51	10.27	-1.14	-2.88	10.070	25.3
07:52	10.26C	-1.15	-2.88	10.040C	82.4
07:53	10.26	19.12	-2.82	6.292	82.8
07:54	4.73	643.80	-2.86	-0.025	82.8
07:55	0.06	894.00	-2.86	-0.027	82.7
07:56	0.01	881.00	-2.86	-0.031	82.7
07:57	0.00	903.00	-2.86	-0.032	82.6
07:58	-0.03	911.00	-2.85	-0.035	82.6
07:59	-0.03	922.00	-2.85	-0.037	82.5
08:00	-0.02	898.00C	-2.85	-0.040	82.5
08:01	-0.00	884.00	-2.76	-0.011	82.5
08:02	0.04	468.90	-2.66	-0.039	82.5
08:03	0.00	303.60C	-2.66	-0.039	82.9
08:04	0.02	387.50	-2.79	-0.041	84.3
08:05	0.01	573.20	-2.83	-0.043	62.9
08:06	-0.02	598.80C	-2.82	-0.041	52.2
08:07	-0.01	585.20	152.60	-0.012	52.0C
08:08	-0.02	504.20	246.90	-0.034	52.0
08:09	-0.00	269.10	228.90	-0.031	52.0
08:10	-0.01	70.40	220.80C	-0.033	46.0
08:11	-0.04	7.55	168.60	-0.034	33.6

Wheelabrator/Louisianna Pacific
95-415
03/10/95
LOCAL CALIBRATION SCRUBBER OUTLET

Starting
03-10-95

Time	O2 (% dv) Inlet	CO (ppm dv) Inlet	NOx (ppm dv) Inlet	CO2 (% dv) Inlet	VOC (ppm wv) Inlet
08:12	-0.01	-0.11	121.30	-0.039	32.5
08:13	-0.02	-0.30	121.90C	-0.035	31.1C
08:14	0.18	-0.28	118.70	-0.019	31.7
08:15	3.89	2.04	2.74	0.066	31.7

Wheelabrator/Louisianna Pacific
95-415
03/10/95
LOCAL CALIBRATION RTO STACK

Starting
03-10-95

Time	O2 (% dv) Outlet	CO (ppm dv) Outlet	NOx (ppm dv) Outlet	CO2 (% dv) Outlet	VOC (ppm wv) Outlet
07:31	-0.02	0.00	-0.46	-0.002	1.7
07:32	-0.01	0.00	-0.46	0.000	1.8
07:33	0.01z	0.00z	-0.47z	0.000z	1.8
07:34	1.45	-0.38	-0.47	11.060	1.8
07:35	19.40	-1.00	-0.47	17.450	1.8
07:36	22.90	-1.00	-0.47	17.340	1.8
07:37	22.89	-1.00	-0.47	17.230	1.8
07:38	22.35	-1.00	-0.48	17.200	1.8
07:39	22.11	-1.00	-0.47	15.400	1.9
07:40	15.28	-0.83	-0.47	9.980	1.8
07:41	10.14	-1.00	-0.48	9.990	1.8
07:42	10.10	-1.00	-0.47	9.970	1.8
07:43	10.12	-1.00	-0.48	9.960	1.8
07:44	10.09	-1.00	-0.47	9.950	1.8
07:45	10.09	-1.00	-0.47	9.950	1.8
07:46	10.08	-1.00	-0.47	13.100	1.8
07:47	17.60	-1.00	-0.47	17.160	1.8
07:48	22.00C	-1.00	-0.47	17.280C	1.7
07:49	21.27	-0.83	-0.47	12.440	1.7
07:50	11.39	-1.00	-0.47	9.990	1.7
07:51	10.09	-1.00	-0.47	9.990	1.7
07:52	10.10C	-1.00	-0.46	10.000C	1.7
07:53	9.91	35.89	-0.41	6.142	1.7
07:54	1.78	811.00	-0.46	-0.004	1.7
07:55	-0.02	893.00	-0.46	-0.004	1.7
07:56	-0.03	896.00	-0.46	-0.002	1.7
07:57	-0.01	896.00	-0.46	0.001	1.8
07:58	-0.04	898.00	-0.46	-0.003	1.8
07:59	-0.04	902.00	-0.46	-0.004	1.7
08:00	-0.02	900.00c	-0.46	-0.004	1.7
08:01	-0.04	876.00	-0.34	0.000	1.7
08:02	-0.03	406.70	-0.36	-0.002	1.7
08:03	-0.03	294.10C	-0.35	-0.001	1.7
08:04	0.00	417.20	-0.45	-0.001	1.7
08:05	-0.02	579.80	-0.46	-0.005	1.7
08:06	-0.04	580.10C	-0.46	-0.003	1.6
08:07	-0.02	579.30	134.80	0.005	1.6
08:08	-0.02	521.80	220.30	-0.002	1.6
08:09	-0.01	318.60	224.10	-0.004	1.6
08:10	0.00	121.10	223.80C	-0.010	1.6
08:11	-0.03	21.46	171.20	-0.007	1.6

Wheelabrator/Louisianna Pacific
95-415
03/10/95
LOCAL CALIBRATION RTO STACK

Starting
03-10-95

Time	O2 (% dv) Outlet	CO (ppm dv) Outlet	NOx (ppm dv) Outlet	CO2 (% dv) Outlet	VOC (ppm wv) Outlet
08:12	-0.03	0.08	124.40	-0.007	1.7
08:13	-0.05	0.00	124.30C	-0.005	1.7
08:14	-.70E+04	0.00	120.70	0.066	1.7
08:15	0.03	2.18	75.30	0.019	1.7
08:16	0.85	1.24	123.70	0.000	1.7
08:17	-0.02	0.00	123.10	0.002	1.7
08:18	-0.02	0.00	123.10	0.001	1.7
08:19	-0.01	0.00	123.30	0.000	1.7
08:20	1.59	-0.38	23.97	7.990	1.6
08:21	9.16	-1.00	-0.16	9.940	1.6
08:22	9.61	-0.83	-0.24	9.950	1.6
08:23	9.66	-1.00	-0.27	9.930	1.6
08:24	8.10	84.50	-0.10	1.905	1.6
08:25	0.53	288.20	-0.17	0.008	1.5
08:26	0.01	294.20	-0.19	0.006	1.5
08:27	0.01	294.70	-0.20	0.005	1.5
08:28	0.00	294.30	-0.20	0.006	1.5
08:29	-0.01	292.60	-0.12	0.005	1.5
08:30	0.02	290.40	-0.01	0.006	1.5
08:31	0.03	290.20	-0.04	0.009	1.4
08:32	0.05	290.50	-0.05	0.010	1.4
08:33	0.08	290.20	-0.05	0.015	1.4
08:34	0.08	289.00	-0.09	0.017	1.4
08:35	0.10	289.40	-0.09	0.018	1.4
08:36	0.12	288.70	-0.09	0.022	1.4
08:37	0.13	288.60	-0.15	0.026	0.1
08:38	0.13	288.60	-0.18	0.032	-0.4
08:39	0.15	289.20	-0.14	0.040	-0.2z
08:40	3.72	249.60	9.46	1.196	24.1
08:41	18.19	141.20	12.71	1.531	82.6C
08:42	18.81	187.30	11.69	1.454	83.5
08:43	18.93	215.10	12.07	1.524	83.4
08:44	18.82	277.90	12.04	1.470	58.5
08:45	18.89	160.30	12.41	1.499	49.1C
08:46	18.93	154.40	13.41	1.471	41.2
08:47	19.01	197.20	14.57	1.453	29.2C
08:48	18.98	270.40	15.08	1.435	29.1

EPA METHOD 20
INTERFERENCE RESPONSE TABLE

Date: 04/15/93
Analyzer Type: Oxygen
Serial Number: 111917
Span Value: 25 %

Test Gas Type	Concentration (ppmdv)	Analyzer Output	% of Span
CO	488	0.009	0.0004
CO2	9.98	0.015	0.0006
SO2	231	-0.022	0.0009
NOx	232	-0.014	0.0006
Total			0.0024

% of Span = (Analyzer output response / Instrument span) x 100
The sum of the (% of Span) values should not exceed 2%.

EPA METHOD 20
INTERFERENCE RESPONSE TABLE

Date: 04/19/93
Analyzer Type: Carbon Dioxide
Serial Number: 91-20-15
Span Value: 20 %

Test Gas Type	Concentration (ppmdv)	Analyzer Output	% of Span
CO	488	0.101	0.0051
O2	21.9	0.203	0.0102
SO2	231	-0.021	0.0011
NOx	232	-0.007	0.0004
Total			0.0166

% of Span = (Analyzer output response / Instrument span) x 100
The sum of the (% of Span) values should not exceed 2%.

EPA METHOD 20
INTERFERENCE RESPONSE TABLE

Date: 01/17/94
Analyzer Type: Carbon Monoxide
Serial Number: 48-28884-233
Span Value: 5 ppm

Test Gas Type	Concentration (ppmdv)	Analyzer Output	% of Span
O2	19.24	0.18	0.0360
CO2	12.13	0.002	0.0004
SO2	74.2	0	0.0000
NOx	1000	1.081	0.2162
Total			0.2526

% of Span = (Analyzer output response / Instrument span) x 100
The sum of the (% of Span) values should not exceed 2%.

EPA METHOD 20
INTERFERENCE RESPONSE TABLE

Date: 04/15/93
Analyzer Type: Nitrogen Oxides
Serial Number: 28304-231
Span Value: 250 ppm

Test Gas Type	Concentration (ppmdv)	Analyzer Output	% of Span
O2	21.9	0.137	0.0005
CO	488	0.168	0.0007
CO2	9.98	0.202	0.0008
SO2	231	-0.004	0.0000
Total			0.0020

% of Span = (Analyzer output response / Instrument span) x 100
The sum of the (% of Span) values should not exceed 2%.

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-2308

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ETS, INC.
Attn: Bill Hayes
1401 Municipal Road NW
Roanoke, VA 24012

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5102
Scott Project # 12-08618

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-015448	**Certification Date**	09-23-94	**Expiration Date**	09-23-97
Cylinder Pressure	1915 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Oxygen	9.98 %	+/- 1% NIST Traceable
Carbon Dioxide	10.03 %	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	12/95	K-000279	20.98% Balance in Nitrogen
NTRM# 1675	09/95	ALM-032766	14.01% Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/16804	09-14-94	Gas Chromatography
Varian /3400/0160	09-14-94	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Oxygen	Date: 09-23-94 Response Units: Area STD=406449 SPL=193736 SPL=193177 SPL=192246 STD=405891 STD=405651	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 09-14-94
Carbon Dioxide	Date: 09-23-94 Response Units: Area STD=591541 SPL=423129 SPL=423602 SPL=423323 STD=591991 STD=590840	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 09-14-94
	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	

A. Barber

Analyst A. Barber

Scott Specialty Gases, Inc.
1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

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Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5129
Scott Project # 12-08743

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-045643	Certification Date	10-05-94	Expiration Date	10-05-97
Cylinder Pressure	1915 PSIG	Previous Certification	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Dioxide	17.27 %	+/- 1% NIST Directly Traceable
Oxygen	22.1 %	+/- 1% NIST Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 1675	09/95	ALM-032766	14.01 % Balance in Nitrogen
GMIS	12/95	KLM-000274	20.98 % Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/0160	09-14-94	Gas Chromatography
Varian /3400/16804	09-14-94	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Carbon Dioxide	Date: 10-05-94 Response Units: Area STD=577284 SPL=709847 SPL=712032 SPL=712611 STD=577061 STD=577619	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 09-14-94
Oxygen	Date: 10-05-94 Response Units: Area STD=776252 SPL=819271 SPL=818061 SPL=820611 STD=778119 STD=777602	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 09-14-94
	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	

A. Barber
Analyst A. Barber

ETS, Inc

NOx ANALYZER CONVERTER CHECK

TEST INFORMATION

Analyzer Manufacturer:	TECO
Model No.:	10 A/R
Serial No:	28304 - 231 #3
Span Setting (ppm):	1000
NO Gas Value:	901
NO2 Gas Value:	448
Date:	2/6/95
Technician:	R. Graham

ANALYZER RESPONSE

Prepared Sample

time (min)	response (ppm)	time (min)	response (ppm)
1	448	16	444
2	448	17	444
3	448	18	444
4	448	19	444
5	448	20	444
6	448	21	444
7	448	22	444
8	448	23	444
9	446	24	444
10	446	25	442
11	446	26	442
12	446	27	442
13	446	28	442
14	446	29	442
15	444	30	442

Highest Response (ppm)
448

Final Response (ppm)
442

Reduction (%)
1.34

NO2 Gas

NO2 Gas (ppm):	448
Stable Response (ppm):	444
Conversion Eff. (%):	98.7

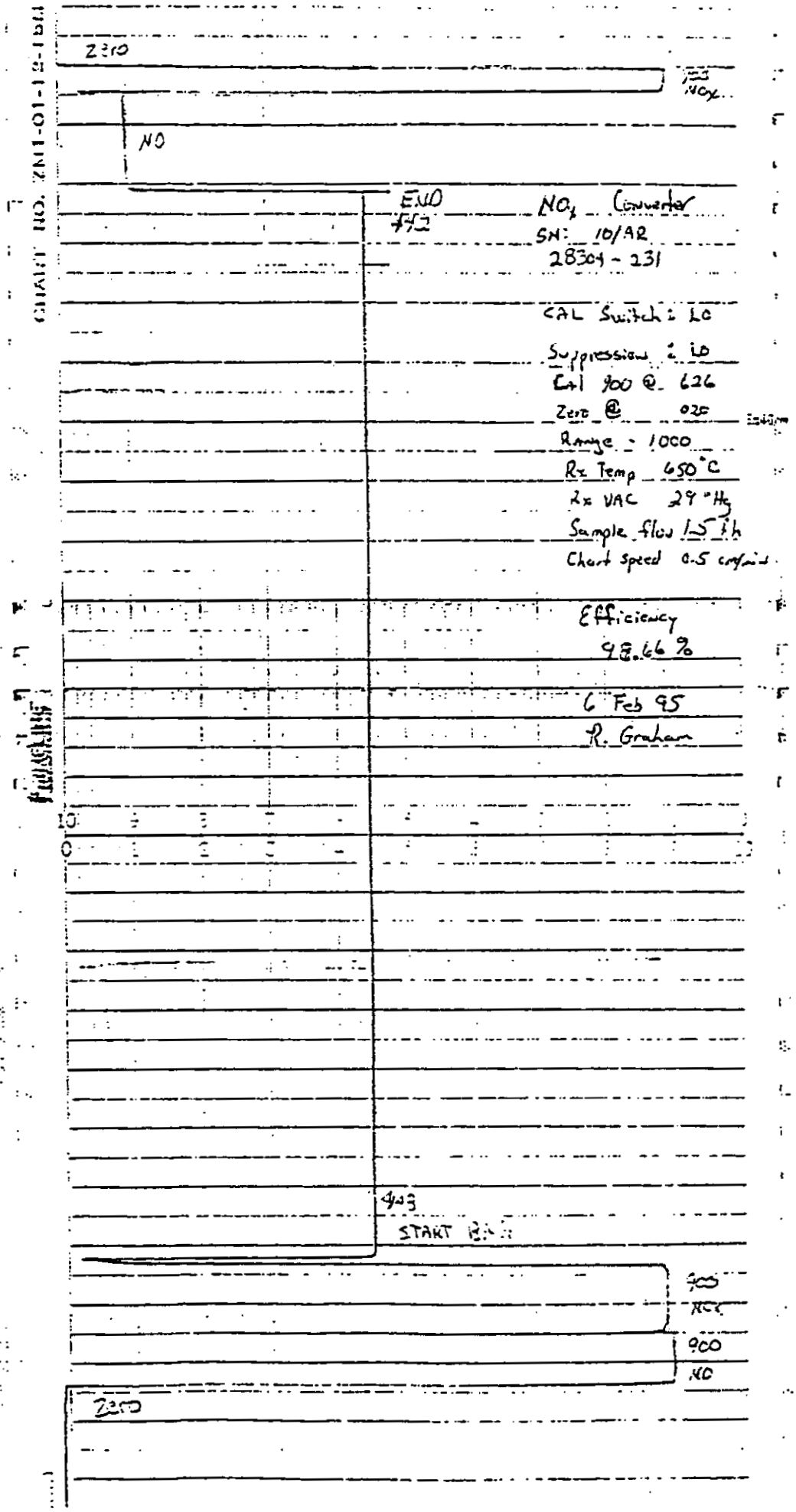
CHART NO. ZN1-01-12-1BH
Zero
NOx
NO
END
NOx Converter
SN: 10/AR
28304 - 231
CAL Switch : LO
Suppression : LO
Cal 900 @ 626
Zero @ 020
Range - 1000
Rx Temp 650°C
Rx VAC 29 "Hg
Sample flow 1.5 lb
Chart speed 0.5 cm/min
Efficiency
98.66 %
6 Feb 95
R. Graham
START
900
NOx
900
NO
Zero

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

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1750 East Club Boulevard
Durham, NC 27704

Purchase Order 4886
Scott Project # 12-07484

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-21323	**Certification Date**	06-27-94	**Expiration Date**	06-27-97
Cylinder Pressure	1915 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	300 PPM	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 2636	12/94	ALM-024902	243.2 PPM Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/16804	06-03-94	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Carbon Monoxide	Date: 06-17-94 Response Units: Area STD=11685 SPL=14545 SPL=14404 SPL=14502 STD=11585 STD=11791	Date: 06-27-94 Response Units: Area STD=12132 SPL=14910 SPL=14831 SPL=14908 STD=11963 STD=12192	Date: 06-03-94
	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date:
	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	

Analyst T. Richards

213-585-2154
FAX# 213-585-0582

LIQUID CARBONIC

CYLINDER GAS PRODUCTS

5700 SOUTH ALAMEDA STREET • LOS ANGELES, CALIFORNIA 90058

44

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER ENV. & INDUST. DIST. P.O NUMBER 011894-2

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs 1681b	CC 43665	950 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-729

ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 12/06/93

FIRST ANALYSIS DATE 01/31/94 SECOND ANALYSIS DATE 02/07/94

Z 0	R 950	C 897	CONC. 897 ppm	Z 0	R 950	C 896	CONC. 896 ppm
R 950	Z 0	C 897	CONC. 897 ppm	R 950	Z 0	C 896	CONC. 896 ppm
Z 0	C 897	R 950	CONC. 897 ppm	Z 0	C 896	R 950	CONC. 896 pp
U/M ppm		MEAN TEST ASSAY	897 ppm	U/M ppm		MEAN TEST ASSAY	896 ppm

THIS CYLINDER NO. SA 10333
HAS BEEN CERTIFIED ACCORDING TO SECTION 0.4
OF TRACEABILITY PROTOCOL NO. 1
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 1650 PSIG
CERTIFICATION DATE 02/07/94
EXPIRATION DATE 02/07/97 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	897 ppm
NITROGEN	BALANCE

ANALYZED BY [illegible] CERTIFIED BY KHAN T. YOUNG

RECEIVED AUG 3 1 1994

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

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1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5000
Scott Project # 12-08091

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-17068	**Certification Date**	08-25-94	**Expiration Date**	08-25-96
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	124.0 PPM	+/- 1% NIST Traceable
NOX	125.0 PPM	Reference Value Only
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	06/96	AAL-21031	139.6 PPM Balance in Nitrogen
*NTRM# 1685	08/96	ALM-036516	245.4 PPM Balance in Nitrogen

*SECOND ANALYSIS

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO: Horiba/CLA53A/850658093	08-08-94	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis

Date: 08-17-94 Response Units: PPM
Z1=0.0 R2=139.2 Z3=0.0
R1=139.1 Z2=0.0 T3=124.1
T1=123.8 T2=123.9 R3=139.2

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Second Triad Analysis

Date: 08-25-94 Response Units: PPM
Z1=0.3 R2=245.5 Z3=0.6
R1=245.6 Z2=0.6 T3=124.5
T1=124.6 T2=124.5 R3=245.7

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Calibration Curve

Date: 08-08-94

Date:

Date:

Analyst K. Cooke

Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
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Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5129
Scott Project # 12-08743

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-3884	**Certification Date**	10-11-94	**Expiration Date**	10-11-96
Cylinder Pressure	1950 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	224 PPM	+/- 1% NIST Directly Traceable
NOX	226 PPM	Reference Value Only
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1685	08/96	ALM-036516	245.4 PPM Balance in Nitrogen
NTRM# 1686	07/95	ALM-022384	492 PPM Balance in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NICOLET / 8220 / AAB9400252	09-24-94	FTIR
NO: Horiba/CLA53A/850658093	10-10-94	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Nitric Oxide	Date: 10-04-94 Response Units: PPM Z1=0.1 R2=245.8 Z3=0.5 R1=245.4 Z2=0.3 T3=223.8 T1=224.5 T2=224.6 R3=244.8	Date: 10-11-94 Response Units: PPM Z1=0.5 R2=492.2 Z3=0.7 R1=492.1 Z2=0.8 T3=224.6 T1=224.4 T2=224.6 R3=491.6	Date: 10-10-94
	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date: Response Units: Z1= R2= Z3= R1= Z2= T3= T1= T2= R3=	Date:
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Analyst K. Cooke

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Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ETS Inc.
Attn: Bill Hayes
1401 Municipal Road NW
Roanoke, VA 24012

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5374
Scott Project # 12-10493

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-028534	**Certification Date**	02-22-95	**Expiration Date**	02-22-98
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	50.0 PPM	+/- 1% NIST Directly Traceable
Air		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 1668	06-96	ALM-032005	95.5 PPM Balance in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/16804	02-22-95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Propane	Date: 02-22-95 Response Units: Area STD=1510857 SPL=795630 SPL=785989 SPL=791368 STD=1510930 STD=1512359	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 02-22-95
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Analyst S. Vaughan

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Scott Specialty Gases, Inc.

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ETS Inc.
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1401 Municipal Road NW
Roanoke, VA 24012

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5374
Scott Project # 12-10493

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-031477	**Certification Date**	02-22-95	**Expiration Date**	02-22-98
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	29.8 PPM	+/- 1% NIST Directly Traceable
Air		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 1668	06-96	ALM-032005	95.5 PPM Balance in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/16804	02-22-95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Propane	Date: 02-22-95 Response Units: Area STD=1510857 SPL=472435 SPL=470239 SPL=470610 STD=1510930 STD=1512359	Date: Response Units: STD= SPL= SPL= SPL= STD= STD=	Date: 02-22-95
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Analyst S. Vaughan