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Title: Louisiana-Pacific Corporation Regenerative Thermal Oxidizer CO and Flow CEMS, Chilco, Idaho August 1, 1995

Am Test-Air Quality, Inc.

August 1995

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AIR QUALITY, INC.

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4-80)

RELATIVE ACCURACY TEST AUDIT (RATA)

August 31, 1995

Prepared For:

LOUISIANA-PACIFIC CORPORATION
REGENERATIVE THERMAL OXIDIZER
CO AND FLOW CEMS
CHILCO, IDAHO
AUGUST 1, 1995

Submitted by:

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We certify that the information contained herein is accurate and complete to the best of our knowledge.

AM 895

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08/29/94
R. Schultz

Louisiana-Pacific Corporation
Chilco, ID

CEMS Computer program to calculate CO LB/HR (dry)

CO LB/HR = RD!*lbcf!*MW!*FF!*1000*Temp!*Pcmp!*Mcmp!*60
(dry)

Where:

Pb! = 13.52 psia, Local Barometric pressure based on altitude of 2311' ASL (27.51 "Hg.)
lbcf! = 2.6E-9, Conversion factor for ppm to lbcf without CO molecular weight
Temp! = (460 + 68)/(460 + FT!)
Pcmp! = Pb! / 14.696 psia
Mcmp! = (100 - Moisture!) / 100
MW! = 28.01, Molecular weight for CO
Moisture! = 7%
RD! = CO reading
FF! = Flow reading
FT! = Temperature reading

Therefore; to calculate CO LB/HR (dry) from the 15 minute averages of CO ppm; flow & temperature, substitute those values into this equation:

$$\text{CO LB/HR (dry)} = \frac{\text{CO ppm} \times \text{Flow}}{(460 + \text{Temperature})} \times 1.97406^{*}$$

* Constant based on 7% moisture content.

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1.0

INTRODUCTION

The purpose of this relative accuracy test audit (RATA) was to verify acceptable performance of a Graseby STI continuous emission monitoring system (CEMS) and continuous emission rate monitoring system (CERMS) installed at the Regenerative Thermal Oxidizer (RTO) exhaust stack at Louisiana-Pacific Corporation's oriented strandboard manufacturing plant in Chilco, Idaho. The CEMS measures the concentration of carbon monoxide (CO) from the RTO exhaust stack. The CERMS incorporates a flow rate monitor to measure the exhaust gas flow rate.

Louisiana-Pacific contracted Am Test-Air Quality, Inc. based in Preston, Washington, to conduct the RATA's using Environmental Protection Agency (EPA) reference methods. The concentration of CO in the gas stream and flow rate of the stack gas were measured concurrently by the CEMS and by Am Test using EPA reference methods. The CEMS values were compared to the reference method values to calculate the relative accuracy of the CEMS using procedures described in the July 1, 1994 edition of the Environmental Protection Agency (EPA) document, Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix B, Performance Specification 4 and 4A, 'Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources," and Performance Specification 6, 'Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources." The RATA is required on a yearly basis by 40 CFR 60 Appendix F, 'Procedure 1. Quality Assurance Requirements for Gas Continuous Emission Monitoring Systems used for Compliance Determination."

Am Test measured the concentration of carbon monoxide at the RTO stack using EPA sampling and analysis methods described in 40 CFR 60, Appendix A, Method 10. Method 10 uses a gas filter correlation non-dispersive infrared (NDIR) analyzer to measure the carbon monoxide (CO) concentration in the stack gas. Methods 1, 2, 3A, and 4 were also performed to calculate the stack gas airflow in units of actual cubic feet per minute (acf/min) to compare to the continuous flow rate monitor. Methods 1 and 2 were performed to measure the gas velocity and temperature for calculating the volumetric flow rate. Method 3A was used to calculate the molecular weight of the stack gas. Method 4 was performed to measure the moisture content of the stack gas. Six (6) Method 4 tests and twelve (12) Method 1, 2, 3A, and 10 tests were performed on August 1, 1995.

Mr. Douglas M. Albertson and Mr. Paul J. Clark of Am Test-Air Quality, Inc. performed the field sampling. Data reduction, quality assurance review, and final report preparation were performed by Mr. Kris A. Hansen, Ms. Angela F. Blaisdell, Ms. Amy M. Brotherton, and Ms. Annika M. Woehr of Am Test-Air Quality, Inc. Mr. Matt Holmquist of Louisiana-Pacific coordinated this project and provided the CEMS data.

2.0

SUMMARY OF RESULTS

The following section of this report presents relative accuracy comparisons for each component of the continuous emission monitoring system. Refer to the Table of Contents to locate specific information. Computer printouts of results for the individual moisture and airflow tests are included in Appendix A of this report in printouts titled "Methods 1, 2, 3A, and 4." Computer printouts of the average emission concentrations during the Method 3A (O_2) and 10 (CO) reference method tests performed at each site are included in Appendix A of this report in printouts titled "Calibration Summary - Gaseous Emission Monitors." The average reference method (RM) data were corrected for the calibration drift of each analyzer during each test period. Appendix B of this report contains the CEMS data provided by Louisiana-Pacific. Example calculations of the relative accuracy test audit results are included in Appendix C of this report, along with reference method field data sheets and copies of raw 1-minute RM data. Supporting information is included in Appendix D of this report.

The relative accuracy test audit was performed on August 1, 1995. Data from the CEMS were continuously recorded, and 15-minute averages were calculated using a computerized data acquisition system (DAS). The DAS records CO values on a dry parts per million (ppm) basis and the volumetric flow rate in units of thousand actual cubic feet per minute (kacfm). Louisiana-Pacific provided the CEMS CO and flow 15-minute averages, and Am Test personnel calculated the average CEMS values during each reference method (RM) test period.

Am Test conducted a series of six (6) Method 4 and twelve (12) Method 1, 2, 3A, and 10 RM tests at the incinerator stack on June 29, 1995. Gaseous RM data were logged once per minute, with a calibration check after each run. The CO and flow rate RM measurements were compared to the corresponding CEMS measurements, and the 'best" 9 of 12 runs were used to calculate the accuracy. The relative accuracy test audit (RATA) results for each component of the CEMS are summarized on the following computer printouts titled "Relative Accuracy Test Audit."

Performance Specification 4, Section 2.3, states that the relative accuracy of carbon monoxide CEMS must be no greater than 10% of the reference method mean, or 5% of the applicable standard, whichever is greater. Performance Specification 4A, Section 2.5 states that the relative accuracy of carbon monoxide CEMS must be no greater than 10% of the reference method mean, or 5 ppm difference, whichever is greater. There is no specified ppm CO emissions standard for this source. Performance Specification 6, Section 3.3, states that the relative accuracy of the CERMS must be no greater than 20% of the reference method mean, or 10% of the emission standard, whichever is greater. The CERMS emissions standard for this source is 11.65 lb/hr CO. An overall summary table with the RATA results and applicable performance specifications for each analyzer is included on the following computer printout titled 'Summary of Relative Accuracy Test Audit (RATA) Results."

AMTEST
AIR QUALITY, INC.

Summary of Relative Accuracy Test Audit (RATA) Results

Louisiana-Pacific Corporation
RTO Exhaust Stack
Chilco, Idaho
August 1, 1995

	RTO Exhaust Stack	*40 CFR 60 Specification*
Carbon Monoxide (CO) (parts per million)		
Relative Accuracy (%)	4.6	*10%*
Relative Accuracy (ppm difference)	0.4	*5% of standard or 5 ppm CO*
Flow Rate (thousand actual cubic feet per minute)		
Relative Accuracy (%)	5.1	*20%*
Relative Accuracy (kacf/min difference)	7.6	*10% of standard*

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AMTEST AIR QUALITY, INC.

RELATIVE ACCURACY TEST AUDIT
AM TEST - AIR QUALITY, INC.

FILE NAME:	R329\LPCHILCO.XLS
CLIENT:	Louisiana-Pacific Corporation
LOCATION:	Chilco, Idaho
MONITOR LOCATION:	RTO Exhaust Stack
MONITOR DESCRIPTION:	Thermo Environmental Model 48 Carbon Monoxide (CO) Analyzer
DATE OF TESTS:	August 1, 1995

TEST #	CLOCK TIME	REFERENCE METHOD CO ppm dry	CEMS READINGS CO ppm dry	DIFFERENCES Xi	Xi^2
1	0945-1015	9.2	9.1	-0.1	0.01
2	1030-1100	5.6	6.1	0.5	0.25
3	1115-1145	9.5	8.9	-0.6	0.36
4	1200-1230	26.4	26.2	-0.2	0.04
6	1330-1400	10.1	9.7	-0.4	0.16
7	1415-1445	4.1	3.9	-0.2	0.04
9	1545-1615	3.6	3.2	-0.4	0.16
10	1630-1700	2.7	3.3	0.6	0.36
11	1715-1745	3.7	4.3	0.6	0.36
MEAN:		8.32	8.30	-0.02	
SUM OF THE SQUARED DIFFERENCES:					1.74
SUM OF THE DIFFERENCES SQUARED:				0.04	

CONFIDENCE COEFFICIENT:	0.4 ppm CO
RELATIVE ACCURACY:	4.6 % of reference method mean
RELATIVE ACCURACY:	0.4 ppm CO
SPECIFICATION:	< or = 10% of reference method mean or 5% of the emission standard or 5 ppm difference

Runs 5, 8, and 12 were rejected.

AMTEST AIR QUALITY, INC.

RELATIVE ACCURACY TEST AUDIT
AM TEST - AIR QUALITY, INC.

FILE NAME:	R329\LPFLOW.XLS
CLIENT:	Louisiana-Pacific Corporation
LOCATION:	Chilco, Idaho
MONITOR LOCATION:	RTO Exhaust Stack
MONITOR DESCRIPTION:	United Sciences Model 100 Flow Rate Monitor
DATE OF TESTS:	August 1, 1995

TEST #	CLOCK TIME	REFERENCE METHOD kacf/min	CEMS READINGS kacf/min	DIFFERENCES Xi	Xi^2
1	1000-1010	149.6	142.7	-6.9	47.61
2	1035-1045	148.1	143.2	-4.9	24.01
3	1125-1135	145.5	141.1	-4.4	19.36
4	1206-1216	146.6	138.5	-8.1	65.61
5	1250-1300	150.6	141.4	-9.2	84.64
6	1337-1347	151.4	146.6	-4.8	23.04
7	1425-1435	149.9	142.9	-7.0	49.00
10	1635-1645	151.9	147.9	-4.0	16.00
12	1805-1815	150.4	143.8	-6.6	43.56
MEAN:		149.33	143.12	-6.21	
SUM OF THE SQUARED DIFFERENCES:					372.83
SUM OF THE DIFFERENCES SQUARED:				3124.81	

CONFIDENCE COEFFICIENT:	1.4 kacf/min
RELATIVE ACCURACY:	5.1 % of reference method mean
RELATIVE ACCURACY:	7.6 kacf/min
SPECIFICATION:	< or = 20% of reference method mean or 10% of the emission standard

Runs 8, 9, and 11 were rejected.

3.0
PROJECT OVERVIEW/EXCEPTIONS

An acceptable leak check of less than 0.02 cfm at the highest vacuum rate (or greater) used during the test preceded and followed each Method 4 run. Acceptable bias checks were obtained for each gaseous emission test period. There were no notable exceptions.

The CEMS mass emissions of carbon monoxide on a lb/hr basis are shown on a daily summary report computer printout located in Appendix B of this report. Louisiana Pacific Corporation's carbon monoxide mass emissions results are provided hourly which makes a direct comparison with Am Test's reference method data difficult. Since both the CO concentration-basis relative accuracy and airflow relative accuracy were well within the performance specification criteria, it could be assumed that the CEMS would pass a mass emission rate criteria.

4.0

SOURCE AND CEMS DESCRIPTION

Louisiana-Pacific Corporation operates an oriented strandboard manufacturing plant in Chilco, Idaho. The plant is equipped with a natural gas-fired Regenerative Thermal Oxidizer (RTO) to control emissions from the press and dryer.

The CO analyzer used in the Graseby STI CEMS is a Thermo Environmental Instruments, Inc. Model 48 gas filter correlation non-dispersive infrared (NDIR) analyzer. The range of the analyzer is 0-50 parts per million (ppm). The analyzer is spanned with 45 ppm CO calibration gas.

The flow rate monitor used in the CERMS is a United Sciences, Inc. Model 100 ultrasonic gas flow and temperature monitor. Flow values are calculated in units of thousand actual cubic feet per minute (kacfm).

5.0

SAMPLING AND ANALYSIS PROCEDURES

5.1 EPA Methods 1 and 2 - Velocity, Temperature and Airflow

EPA Method 1 procedures were used to assure that representative measurements of volumetric flow rate were obtained by dividing the cross-section of the stack or duct into a number of equal areas, and then locating a traverse point within each of the equal areas. Refer to the 'Stack Schematic and Location of Sample Points" data sheet and/or the figure titled, 'Location of Sampling Ports and Traverse Points," located in the appendices of this report, for a schematic of the stack and the point locations selected for testing. Method 2 was performed to measure the stack gas velocity using a type S or a standard pitot tube, and the gas temperature using a calibrated thermocouple probe connected to a digital thermocouple indicator. The type S pitot tubes were connected with tubing to an oil-filled inclined manometer, a Shortridge® Instruments, Inc. Air Data Multimeter ADM-850, which is a special low-flow pressure measurement device, or magnehelic gauges to obtain velocity measurements. The pitot tube lines were leak-checked and the pressure measurement device was leveled and zeroed prior to use. A check for cyclonic flow was performed in each stack prior to beginning a series of test. Calibration information for each pressure and temperature measurement device used are included in the appendices of this report.

5.2 EPA Method 3A -Molecular Weight

The stack gas composition was determined using EPA Method 3A procedures, which allow the use of instrumental analyzers. A paramagnetic analyzer was used to measure the percent (%) oxygen (O_2), and a non-dispersive infrared (NDIR) analyzer was used to measure the % carbon dioxide (CO_2). The manufacturer and model number for the specific analyzers used are detailed on the 'Continuous Analyzer Checklist" in the appendices of this report. Certified O_2 and CO_2 gases were utilized to check the calibration of the instruments after each test. The O_2 and CO_2 data were used to calculate the molecular weight of the stack gas.

The Method 3A sample system is illustrated in the figure titled 'EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. Reference method samples were collected at three (3) measurement points in one (1) of the sample ports. The gaseous emission probe was moved to three (3) points across the stack during each test, which were 16.7, 50.0, and 83.3 percent of the measurement line across the stack. An effluent gas sample was drawn through a heated stainless steel sampling probe and an out-of-stack filter. A calibration valve was connected to the outlet of the probe for the purpose of introducing calibration gas. The gas sample passed through a moisture removal system to continuously remove condensate from the sample gas. A Teflon® sample line was used to transport the gas sample to the RM continuous monitoring system. A Teflon® coated leak-free pump was utilized to pull the sample gas through the system at a flow rate sufficient to minimize the response time of the measurement system. A sample flow rate control valve and rotameter were used to maintain a constant sampling rate within 10 percent of the desired flow rate.

The O_2 measurement system was assembled on-site, and calibration gases were introduced and adjustments were made to calibrate the instrument. The sampling system components were adjusted to achieve appropriate sampling rates. Prior to sampling, a sampling system bias check was performed by introducing calibration gases to the system at the calibration valve at the outlet of the sample probe. Following the initial calibrations, testing commenced following a period of at least twice the system response time. The response time was determined by observing the times required to achieve a stable response when both the zero and upscale gases were introduced. The longer of the two times was used as the response time of the analyzer.

Immediately following every test period, a calibration check was performed using zero and span gases. Computer printouts of the raw 1-minute and drift-corrected data are included in the appendices of this report.

5.3 EPA Method 4 - Moisture

The sample train used for moisture sampling was an EPA Method 4 design as illustrated in the figure titled 'Method 4 Sample Train" in the appendices of this report. The gas was pulled through a heated probe liner using a pump into an impinger train which was immersed in an ice water bath. The first impinger was a modified Greenburg-Smith type containing 100 milliliters of deionized water. The second Greenburg-Smith impinger also contained 100 ml of water. The third impinger was empty, and the fourth bubbler contained indicating silica gel desiccant to absorb any moisture from the stack gas before it entered the control box. The impinger section was maintained at a temperature below 68° F by keeping ice on the impingers. The temperature at the outlet of the silica gel bubbler was monitored to verify that it did not exceed 68° F during a test. Prior to each run, the sample train was leak-checked following the procedures in Method 5. Upon completion of each test, the probe was removed from the stack and a post-test leak check was performed.

The sample train was connected to a control box by means of an umbilical cord which contains a vacuum hose, pitot lines, thermocouple wires, and a 4-wire electrical cord. The control box (meter box) is used to monitor stack conditions. The control box consists of a leak-free pump used to pull the gas through the sample train, fine and coarse metering valves to control the sampling rate, a vacuum gauge which measures the pressure drop from the sampling nozzle to the metering valves, and a calibrated dry gas meter readable to 0.001 cubic feet. The dry gas meter inlet and outlet temperatures were monitored by thermocouples which are connected to the multichannel thermocouple indicator. The dry gas meter calibration factor, Y, is determined by calibrating the meter against a standard laboratory dry gas meter.

Before and after each run, the impingers in the sample train were removed and weighed with a readability of 0.1 grams using an electronic top loading balance. The difference between the initial and final weights of the condenser section constitute the amount of moisture gained during the run.

5.4 EPA Method 10 - Carbon Monoxide Reference Method

Carbon monoxide (CO) reference method data were collected using Method 10, which is an instrumental method. A gas filter correlation non-dispersive infrared analyzer was used to measure the parts per million (ppm) CO on a dry basis. The manufacturer and model number for the specific analyzer used is detailed on the "Continuous Analyzer Checklist" included in the appendices of this report. Measurements from the instrument were recorded once per minute.

The Method 10 sample train is illustrated in the figure titled "EPA Method 3A, 6C, 7E and 10 Sample Train" in the appendices of this report. An effluent gas sample was drawn through the same sample conditioning system described for Method 3A testing. A linearity check was performed prior to sampling using zero, mid-range, and high-range span gas. Sampling was continuous, with a calibration check using zero and span gas after each run.

6.0

QUALITY ASSURANCE PLAN

The purpose of the quality assurance plan is to provide guidelines for achieving quality control in air pollution measurements. The detailed procedures which are utilized are included in the Environmental Protection Agency's (EPA's) reference manual titled Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 3, EPA-600/4-77-027b. These procedures are followed throughout equipment preparation, field sampling, sample recovery, analysis, and data reduction. Am Test-Air Quality, Inc.'s quality assurance procedures are discussed below.

6.1 Calibration Procedures and Frequency

Field equipment utilized for on-site measurements is calibrated at a frequency recommended by the equipment manufacturer or industry practice. Prior to field use, each instrument is calibrated and the calibration value is recorded. If any measuring or test device requiring calibration cannot immediately be removed from service, the Project Manager may extend the calibration cycle providing a review of the equipment's history warrants the issuance of an extension. No equipment will be extended more than twice a calibration cycle, nor will the extension exceed one-half the prescribed calibration cycle. Test equipment consistently found to be out of calibration will be repaired or replaced.

The dry gas meters used to accurately measure sample volumes are calibrated using a standard laboratory dry gas meter. The type S pitot tubes utilized for velocity determination are calibrated using Method 2, Section 4.1, and are inspected regularly for wear. The magnehelic gauges used for pressure measurements are checked against an oil-filled manometer. The digital thermocouple indicator used for temperature measurement has a readability of 1 degree Fahrenheit and is periodically re-certified by the manufacturer. Each thermocouple probe used to monitor temperature is checked periodically at three (3) temperature settings. Copies of calibration information for each measurement device used are included in the appendices of this report. A barometer readable to 0.01 inches of mercury is used in the field to obtain barometric pressure readings.

The gaseous measurement systems are capable of meeting the system performance specifications detailed in 40 CFR 60, Appendix A, Method 6C, Section 4. For meeting these specifications, the analyzer's calibration error must be less than ± 2 percent of the span for the zero, mid-range, and high-range calibration gases. The sampling system bias must be less than $\pm 5\%$ of the span for the zero, and mid- or high-range calibration gases. The zero drift must be less than $\pm 3\%$ of the span over the period of each run. The calibration drift must be less than $\pm 3\%$ of the span over the period of each run. Copies of the certificates of analysis for each tank of calibration gas used are included in the appendices of this report. The calibration gases were analyzed following the EPA Traceability Protocol Number 1, or next best available. Purified nitrogen was utilized for the zero gas.

Support equipment is defined as all equipment, not previously discussed, that is required for completing an environmental monitoring or measurement task. This equipment may include storage and transportation containers, sample recovery glassware, and communications gear. Support equipment is periodically inspected to maintain the performance standards necessary for proper and efficient execution of all tasks and responsibilities.

During a project, a systems audit is performed, consisting of an on-site qualitative inspection and review of the total measurement system. This inspection is conducted on a daily basis by the Project Leader. During the systems audit, the auditor observes the procedures and techniques of the field team in the following general areas:

- Setting up and leak testing the sample train
- Isokinetic sampling check (if applicable)
- Final leak check of the sample train
- Sample recovery

Visual inspections of pitot tubes, glassware, and other equipment are also made. The main purpose of a systems audit is to ensure that the measurement system will generate valid data, if operated properly.

6.2 Sample Recovery and Field Documentation

Data collected during each test, are immediately inspected for completeness and placed under the custody of the Project Leader until custody is transferred when the samples are returned to the Air Quality laboratory. Sample recovery is carried out in a suitable area free from particulate matter contamination. Each sample is assigned an identifying lab number to assist the chemists in tracking the sample.

6.3 Data Reduction, Validation, and Reporting

Raw data are handled according to strict guidelines when being transposed into computer files or to other logs. The guidelines include document receipt control procedures, file review, and sign-off by a project assistant. Raw data are entered into the appropriate computer spreadsheet by a "processor," then the entered figures are checked for accuracy by a "checker," different from the "processor." Any mistakes are corrected, and figures are rechecked and signed off by the "checker." In addition, a by-hand calculation check of each spreadsheet is made using a hand-held calculator to validate the computer output.

All data generated by each phase of a laboratory or field sampling program are reviewed by the senior reviewer. The data package is signed off by the senior reviewer prior to releasing the data for report preparation.

The test results are calculated according to EPA 40 CFR 60 criteria. Copies of the pertinent equations used to derive these results are included in the appendices of this report. Standard conditions are 68° F and 29.92 inches of mercury. The average values from instrumental analyzer readings were computed and bias corrected for each test period. The average gas effluent concentration was determined from the average gas concentration displayed by the analyzer, adjusted for the zero and upscale sampling system bias checks. Calculations are on a dry basis using the following equation:

$$C_{gas} = (C - C_o) * (C_{ma}/(C_m - C_o)$$

where:

C_{gas} = Effluent gas concentration, dry basis

C = Average gas concentration indicated by analyzer, dry basis

C_o = Average of initial and final system calibration bias check responses for the zero gas

C_{ma} = Actual concentration of the upscale calibration gas

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas

7.0
METHODOLOGY REFERENCES

EPA. Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Reference Methods 1, 2, 3A, 4, and 10; Appendix B, Performance Specifications 4, 4A, and 6; and Appendix F. July 1, 1994.

EPA. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 3, EPA-60/4-77-027b.

APPENDIX A
Computer Printouts of Reference Method Data

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, AND 10
AM TEST - AIR QUALITY, INC.

FILE NAME: R329\LPSUM
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho

RTO EXHAUST STACK

	RUN #1	RUN #2	RUN #3	RUN #4	RUN #5	RUN #6	RUN #7	RUN #8	RUN #9	RUN #10	RUN #11	RUN #12
LAB #:	8840a	8840b	8841a	8841b	8842a	8842b	8843a	8843b	8844a	8844b	8845a	8845b
DATE:	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95	8/1/95
METHOD 4 START TIME:	0951	0951	1115	1115	1245	1245	1420	1420	1545	1545	1715	1715
METHOD 4 STOP TIME:	1051	1051	1215	1215	1345	1345	1520	1520	1645	1645	1815	1815
SAMPLE LENGTH (minutes):	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
METHOD 2 START TIME:	1000	1035	1125	1206	1250	1337	1425	1506	1550	1635	1720	1805
METHOD 2 STOP TIME:	1010	1045	1135	1216	1300	1347	1435	1516	1600	1645	1730	1815
SAMPLE LENGTH (minutes):	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
VOLUME SAMPLED (cubic feet):	33.057	33.057	31.842	31.842	31.066	31.066	30.975	30.975	30.747	30.747	30.784	30.784
VOLUME SAMPLED (dry std. cubic feet):	29.031	29.031	27.625	27.625	27.270	27.270	27.215	27.215	26.757	26.757	26.572	26.669
VOLUME SAMPLED (dry std. cubic meters):	0.822	0.822	0.782	0.782	0.772	0.772	0.771	0.771	0.758	0.758	0.753	0.755
STACK GAS MOISTURE (percent):	11.47	11.47	11.74	11.74	12.10	12.10	9.42	9.42	8.04	8.04	9.77	9.73
BAROMETRIC PRESURE (inches of Hg):	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.40	27.50
STATIC PRESSURE (inches of H2O):	-0.52	-0.55	-0.55	-0.52	-0.50	-0.54	-0.60	-0.60	-0.53	-0.57	-0.52	-0.55
STACK PRESSURE (inches of Hg):	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.46	27.36	27.46
STACK TEMPERATURE (degrees F.):	217.2	211.1	212.2	218.0	215.6	217.9	214.9	218.0	217.8	217.3	218.4	214.5
STACK TEMPERATURE (degrees R.):	677.2	671.1	672.2	678.0	675.6	677.9	674.9	678.0	677.8	677.3	678.4	674.5
CARBON DIOXIDE (percent):	1.5	1.4	1.4	1.7	1.3	1.3	1.0	1.1	0.9	1.0	1.2	1.2
OXYGEN (percent):	19.3	19.4	18.6	18.0	15.7	18.8	19.3	18.2	19.4	19.6	19.4	19.4
MOLECULAR WEIGHT (dry, lb/lb-mole):	29.01	29.00	28.97	28.99	28.84	28.96	28.93	28.90	28.92	28.94	28.97	28.97
MOLECULAR WEIGHT (wet, lb/lb-mole):	27.75	27.74	27.68	27.70	27.53	27.63	27.90	27.88	28.04	28.06	27.90	27.90
AVERAGE VELOCITY HEAD (inches of H2O):	0.545	0.539	0.519	0.522	0.550	0.555	0.552	0.569	0.556	0.568	0.571	0.556
PITOT TUBE Cp:	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
STACK GAS VELOCITY (feet/second):	50.0	49.5	48.6	49.0	50.3	50.6	50.1	51.0	50.2	50.7	51.2	50.3
STACK DIAMETER (inches):	95.63	95.63	95.63	95.63	95.63	95.63	95.63	95.63	95.63	95.63	95.63	95.63
STACK AREA (square feet):	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9
AIRFLOW (dry std. cubic feet per min.):	94767	94634	92603	92460	94978	95113	97467	98778	98820	99927	98335	97534
AIRFLOW (actual cubic feet per min.):	149587	148050	145534	146554	150614	151360	149872	152592	150299	151873	153108	150402
AIRFLOW (thousand actual cubic feet per min.):	149.6	148.1	145.5	146.6	150.6	151.4	149.9	152.6	150.3	151.9	153.1	150.4
METHOD 10 - CARBON MONOXIDE (CO)												
CARBON MONOXIDE EMISSION CONCENTRATION (ppm):	9.2	5.6	9.5	26.4	20.1	10.1	4.1	7.0	3.6	2.7	3.7	4.7
CO EMISSION RATE (lb/hr):	3.80	2.31	3.84	10.6	8.33	4.19	1.74	3.02	1.55	1.18	1.59	2.00
CO EMISSION RATE (tons/yr):	16.7	10.1	16.8	46.6	36.5	18.4	7.63	13.2	6.80	5.15	6.95	8.76

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R1	LAB #:	8840a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	0951 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1051 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1000 hours
RUN #:	1 - Method 4	METHOD 2 STOP TIME:	1010 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

FINAL	INITIAL	NET		
-----	-------	-----		
704.5	646.0	58.5	PITOT TUBE Cp:	0.84
654.1	644.1	10.0	STACK DIAMETER	95.63 inches
555.9	552.2	3.7	STACK AREA:	49.9 sq. feet
830.3	822.7	7.6	METER TEMPERATURE:	89.9 degrees F
TOTAL H2O GAIN:		79.8	BAROMETRIC PRES.:	27.50 inches Hg
TOTAL VOLUME (scf):		3.76	STATIC PRESSURE:	-0.52 inches H2O
PERCENT MOISTURE:		11.47	STACK PRESSURE:	27.46 inches Hg
Bws:		0.1147	ORIFICE PRESSURE:	0.80 inches H2O
			METER PRESSURE:	27.56 inches Hg

INIT. METER VOLUME:	309.100	AVERAGE CONC. CO2:	1.5 percent
FINAL METER VOLUME:	342.157	AVERAGE CONC. O2:	19.3 percent
VOLUME SAMPLED:	33.057	AVERAGE CONC. CO:	9.2 ppm
STD VOLUME (dscf):	29.031	MOLECULAR WEIGHT:	29.01 g/g-mole-dry
STD VOLUME (dscm):	0.822	MOLECULAR WEIGHT:	27.75 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.45	221	S 1	0.45	220
2	0.63	220	2	0.64	222
3	0.68	219	3	0.80	215
4	0.57	219	4	0.74	212
5	0.50	218	5	0.52	212
6	0.54	216	6	0.48	214
7	0.52	219	7	0.42	214
8	0.45	218	8	0.42	216

STACK GAS TEMPERATURE:	217.2 degrees F	677.2 degrees R
AVERAGE VELOCITY HEAD:	0.545 inches H2O	
STACK GAS VELOCITY:		50.0 ft/sec
STACK GAS AIR FLOW:	149587 acf/min	94767 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R2	LAB #:	8840b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	0951 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1051 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1035 hours
RUN #:	2 - Method 4	METHOD 2 STOP TIME:	1045 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

FINAL	INITIAL	NET
704.5	646.0	58.5
654.1	644.1	10.0
555.9	552.2	3.7
830.3	822.7	7.6

TOTAL H2O GAIN:	79.8
TOTAL VOLUME (scf):	3.76
PERCENT MOISTURE:	11.47
Bws:	0.1147
INIT. METER VOLUME:	309.100
FINAL METER VOLUME:	342.157
VOLUME SAMPLED:	33.057
STD VOLUME (dscf):	29.031
STD VOLUME (dscm):	0.822
Y FACTOR:	0.993

PITOT TUBE Cp:	0.84
STACK DIAMETER	95.63 inches
STACK AREA:	49.9 sq. feet
METER TEMPERATURE:	89.9 degrees F
BAROMETRIC PRES.:	27.50 inches Hg
STATIC PRESSURE:	-0.55 inches H2O
STACK PRESSURE:	27.46 inches Hg
ORIFICE PRESSURE:	0.80 inches H2O
METER PRESSURE:	27.56 inches Hg
AVERAGE CONC. CO2:	1.4 percent
AVERAGE CONC. O2:	19.4 percent
AVERAGE CONC. CO:	5.6 ppm
MOLECULAR WEIGHT:	29.00 g/g-mole-dry
MOLECULAR WEIGHT:	27.74 g/g-mole-wet

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.48	208	S 1	0.43	206
2	0.63	208	2	0.72	206
3	0.60	207	3	0.58	209
4	0.54	208	4	0.62	212
5	0.50	211	5	0.50	216
6	0.49	213	6	0.60	216
7	0.53	214	7	0.54	215
8	0.47	214	8	0.43	215

STACK GAS TEMPERATURE:	211.1 degrees F	671.1 degrees R
AVERAGE VELOCITY HEAD:	0.539 inches H2O	
STACK GAS VELOCITY:		49.5 ft/sec
STACK GAS AIR FLOW:	148050 acf/min	94634 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R3	LAB #:	8841a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1115 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1215 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1125 hours
RUN #:	3 - Method 4	METHOD 2 STOP TIME:	1135 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

FINAL	INITIAL	NET		
-----	-------	-----	PITOT TUBE Cp:	0.84
			STACK DIAMETER	95.63 inches
704.8	640.7	64.1	STACK AREA:	49.9 sq. feet
650.1	642.7	7.4	METER TEMPERATURE:	96.5 degrees F
537.7	536.7	1.0	BAROMETRIC PRES.:	27.50 inches Hg
840.0	834.6	5.4	STATIC PRESSURE:	-0.55 inches H2O
TOTAL H2O GAIN:		77.9	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):		3.67	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:		11.74	METER PRESSURE:	27.55 inches Hg
Bws:		0.1174		

INIT. METER VOLUME:	342.376	AVERAGE CONC. CO2:	1.4 percent
FINAL METER VOLUME:	374.218	AVERAGE CONC. O2:	18.6 percent
VOLUME SAMPLED:	31.842	AVERAGE CONC. CO:	9.5 ppm
STD VOLUME (dscf):	27.625	MOLECULAR WEIGHT:	28.97 g/g-mole-dry
STD VOLUME (dscm):	0.782	MOLECULAR WEIGHT:	27.68 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.40	208	S 1	0.48	209
2	0.63	208	2	0.67	209
3	0.69	209	3	0.63	212
4	0.48	211	4	0.54	215
5	0.46	212	5	0.46	216
6	0.52	213	6	0.53	216
7	0.50	213	7	0.48	215
8	0.43	214	8	0.45	215

STACK GAS TEMPERATURE:	212.2 degrees F	672.2 degrees R
AVERAGE VELOCITY HEAD:	0.519 inches H20	
STACK GAS VELOCITY:		48.6 ft/sec
STACK GAS AIR FLOW:	145534 acf/min	92603 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R4	LAB #:	8841b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1115 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1215 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1206 hours
RUN #:	4 - Method 4	METHOD 2 STOP TIME:	1216 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	704.8	640.7	64.1	STACK AREA:	49.9 sq. feet
	650.1	642.7	7.4	METER TEMPERATURE:	96.5 degrees F
	537.7	536.7	1.0	BAROMETRIC PRES.:	27.50 inches Hg
	840.0	834.6	5.4	STATIC PRESSURE:	-0.52 inches H2O
TOTAL H2O GAIN:			77.9	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			3.67	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			11.74	METER PRESSURE:	27.55 inches Hg
Bws:			0.1174		

INIT. METER VOLUME:	342.376	AVERAGE CONC. CO2:	1.7 percent
FINAL METER VOLUME:	374.218	AVERAGE CONC. O2:	18.0 percent
VOLUME SAMPLED:	31.842	AVERAGE CONC. CO:	26.4 ppm
STD VOLUME (dscf):	27.625	MOLECULAR WEIGHT:	28.99 g/g-mole-dry
STD VOLUME (dscm):	0.782	MOLECULAR WEIGHT:	27.70 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.45	211	S 1	0.49	215
2	0.54	215	2	0.53	218
3	0.62	216	3	0.61	219
4	0.60	218	4	0.65	219
5	0.56	221	5	0.50	220
6	0.50	220	6	0.46	220
7	0.50	220	7	0.49	219
8	0.44	219	8	0.44	218

STACK GAS TEMPERATURE:	218.0 degrees F	678.0 degrees R
AVERAGE VELOCITY HEAD:	0.522 inches H2O	
STACK GAS VELOCITY:		49.0 ft/sec
STACK GAS AIR FLOW:	146554 acf/min	92460 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R5	LAB #:	8842a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1245 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1345 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1250 hours
RUN #:	5 - Method 4	METHOD 2 STOP TIME:	1300 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----		
				PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	772.4	704.5	67.9	STACK AREA:	49.9 sq. feet
	660.7	654.1	6.6	METER TEMPERATURE:	90.0 degrees F
	556.6	555.9	0.7	BAROMETRIC PRES.:	27.50 inches Hg
	834.7	830.3	4.4	STATIC PRESSURE:	-0.50 inches H2O
TOTAL H2O GAIN:			79.6	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			3.75	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			12.10	METER PRESSURE:	27.55 inches Hg
Bws:			0.1210		

INIT. METER VOLUME:	374.419	AVERAGE CONC. CO2:	1.3 percent
FINAL METER VOLUME:	405.485	AVERAGE CONC. O2:	15.7 percent
VOLUME SAMPLED:	31.066	AVERAGE CONC. CO:	20.1 ppm
STD VOLUME (dscf):	27.270	MOLECULAR WEIGHT:	28.84 g/g-mole-dry
STD VOLUME (dscm):	0.772	MOLECULAR WEIGHT:	27.53 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.54	217	S 1	0.41	209
2	0.60	219	2	0.72	210
3	0.66	220	3	0.73	212
4	0.60	221	4	0.70	212
5	0.57	218	5	0.55	212
6	0.53	218	6	0.43	214
7	0.50	218	7	0.45	215
8	0.44	220	8	0.44	214

STACK GAS TEMPERATURE:	215.6 degrees F	675.6 degrees R
AVERAGE VELOCITY HEAD:	0.550 inches H2O	
STACK GAS VELOCITY:		50.3 ft/sec
STACK GAS AIR FLOW:	150614 acf/min	94978 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R6	LAB #:	8842b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1245 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1345 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1337 hours
RUN #:	6 - Method 4	METHOD 2 STOP TIME:	1347 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	772.4	704.5	67.9	STACK AREA:	49.9 sq. feet
	660.7	654.1	6.6	METER TEMPERATURE:	90.0 degrees F
	556.6	555.9	0.7	BAROMETRIC PRES.:	27.50 inches Hg
	834.7	830.3	4.4	STATIC PRESSURE:	-0.54 inches H2O
TOTAL H2O GAIN:			79.6	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			3.75	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			12.10	METER PRESSURE:	27.55 inches Hg
Bws:			0.1210		

INIT. METER VOLUME:	374.419	AVERAGE CONC. CO2:	1.3 percent
FINAL METER VOLUME:	405.485	AVERAGE CONC. O2:	18.8 percent
VOLUME SAMPLED:	31.066	AVERAGE CONC. CO:	10.1 ppm
STD VOLUME (dscf):	27.270	MOLECULAR WEIGHT:	28.96 g/g-mole-dry
STD VOLUME (dscm):	0.772	MOLECULAR WEIGHT:	27.63 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.47	218	S 1	0.44	215
2	0.65	216	2	0.72	218
3	0.60	216	3	0.75	218
4	0.60	215	4	0.67	217
5	0.46	215	5	0.52	219
6	0.57	219	6	0.63	220
7	0.55	220	7	0.50	220
8	0.42	220	8	0.41	220

STACK GAS TEMPERATURE:	217.9 degrees F	677.9 degrees R
AVERAGE VELOCITY HEAD:	0.555 inches H2O	
STACK GAS VELOCITY:		50.6 ft/sec
STACK GAS AIR FLOW:	151360 acf/min	95113 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R7	LAB #:	8843a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1420 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1520 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1425 hours
RUN #:	7 - Method 4	METHOD 2 STOP TIME:	1435 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	754.1	704.8	49.3	STACK AREA:	49.9 sq. feet
	655.0	650.1	4.9	METER TEMPERATURE:	89.5 degrees F
	538.7	537.7	1.0	BAROMETRIC PRES.:	27.50 inches Hg
	844.8	840.0	4.8	STATIC PRESSURE:	-0.60 inches H2O
TOTAL H2O GAIN:			60.0	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			2.83	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			9.42	METER PRESSURE:	27.55 inches Hg
Bws:			0.0942		

INIT. METER VOLUME:	405.800	AVERAGE CONC. CO2:	1.0 percent
FINAL METER VOLUME:	436.775	AVERAGE CONC. O2:	19.3 percent
VOLUME SAMPLED:	30.975	AVERAGE CONC. CO:	4.1 ppm
STD VOLUME (dscf):	27.215	MOLECULAR WEIGHT:	28.93 g/g-mole-dry
STD VOLUME (dscm):	0.771	MOLECULAR WEIGHT:	27.90 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.40	217	S 1	0.40	209
2	0.64	216	2	0.63	212
3	0.58	217	3	0.62	212
4	0.57	218	4	0.67	211
5	0.55	218	5	0.50	211
6	0.59	217	6	0.63	214
7	0.52	216	7	0.58	218
8	0.47	215	8	0.53	217

STACK GAS TEMPERATURE:	214.9 degrees F	674.9 degrees R
AVERAGE VELOCITY HEAD:	0.552 inches H2O	
STACK GAS VELOCITY:		50.1 ft/sec
STACK GAS AIR FLOW:	149872 acf/min	97467 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R8	LAB #:	8843b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1420 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1520 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1506 hours
RUN #:	8 - Method 4	METHOD 2 STOP TIME:	1516 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	754.1	704.8	49.3	STACK AREA:	49.9 sq. feet
	655.0	650.1	4.9	METER TEMPERATURE:	89.5 degrees F
	538.7	537.7	1.0	BAROMETRIC PRES.:	27.50 inches Hg
	844.8	840.0	4.8	STATIC PRESSURE:	-0.60 inches H2O
TOTAL H2O GAIN:			60.0	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			2.83	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			9.42	METER PRESSURE:	27.55 inches Hg
Bws:			0.0942		

INIT. METER VOLUME:	405.800	AVERAGE CONC. CO2:	1.1 percent
FINAL METER VOLUME:	436.775	AVERAGE CONC. O2:	18.2 percent
VOLUME SAMPLED:	30.975	AVERAGE CONC. CO:	7.0 ppm
STD VOLUME (dscf):	27.215	MOLECULAR WEIGHT:	28.90 g/g-mole-dry
STD VOLUME (dscm):	0.771	MOLECULAR WEIGHT:	27.88 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.45	216	S 1	0.50	213
2	0.58	220	2	0.64	216
3	0.63	220	3	0.80	219
4	0.60	208	4	0.72	220
5	0.60	221	5	0.55	219
6	0.58	220	6	0.54	220
7	0.51	219	7	0.50	220
8	0.48	218	8	0.48	219

STACK GAS TEMPERATURE:	218.0 degrees F	678.0 degrees R
AVERAGE VELOCITY HEAD:	0.569 inches H2O	
STACK GAS VELOCITY:		51.0 ft/sec
STACK GAS AIR FLOW:	152592 acf/min	98778 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R9	LAB #:	8844a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1545 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1645 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1550 hours
RUN #:	9 - Method 4	METHOD 2 STOP TIME:	1600 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

FINAL	INITIAL	NET
812.7	772.4	40.3
664.3	660.7	3.6
557.0	556.6	0.4
840.0	834.7	5.3

TOTAL H2O GAIN:	49.6
TOTAL VOLUME (scf):	2.34
PERCENT MOISTURE:	8.04
Bws:	0.0804

PITOT TUBE Cp:	0.84
STACK DIAMETER	95.63 inches
STACK AREA:	49.9 sq. feet
METER TEMPERATURE:	94.8 degrees F
BAROMETRIC PRES.:	27.50 inches Hg
STATIC PRESSURE:	-0.53 inches H2O
STACK PRESSURE:	27.46 inches Hg
ORIFICE PRESSURE:	0.70 inches H2O
METER PRESSURE:	27.55 inches Hg

INIT. METER VOLUME:	437.080	AVERAGE CONC. CO2:	0.9 percent
FINAL METER VOLUME:	467.827	AVERAGE CONC. O2:	19.4 percent
VOLUME SAMPLED:	30.747	AVERAGE CONC. CO:	3.6 ppm
STD VOLUME (dscf):	26.757	MOLECULAR WEIGHT:	28.92 g/g-mole-dry
STD VOLUME (dscm):	0.758	MOLECULAR WEIGHT:	28.04 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.49	215	S 1	0.46	217
2	0.58	215	2	0.65	217
3	0.66	217	3	0.71	216
4	0.60	217	4	0.54	218
5	0.57	218	5	0.56	220
6	0.49	218	6	0.62	220
7	0.52	219	7	0.55	220
8	0.50	220	8	0.43	218

STACK GAS TEMPERATURE:	217.8 degrees F	677.8 degrees R
AVERAGE VELOCITY HEAD:	0.556 inches H2O	
STACK GAS VELOCITY:		50.2 ft/sec
STACK GAS AIR FLOW:	150299 acf/min	98820 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R10	LAB #:	8844b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1545 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1645 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1635 hours
RUN #:	10 - Method 4	METHOD 2 STOP TIME:	1645 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	812.7	772.4	40.3	STACK AREA:	49.9 sq. feet
	664.3	660.7	3.6	METER TEMPERATURE:	94.8 degrees F
	557.0	556.6	0.4	BAROMETRIC PRES.:	27.50 inches Hg
	840.0	834.7	5.3	STATIC PRESSURE:	-0.57 inches H2O
TOTAL H2O GAIN:			49.6	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):			2.34	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:			8.04	METER PRESSURE:	27.55 inches Hg
Bws:			0.0804		

INIT. METER VOLUME:	437.080	AVERAGE CONC. CO2:	1.0 percent
FINAL METER VOLUME:	467.827	AVERAGE CONC. O2:	19.6 percent
VOLUME SAMPLED:	30.747	AVERAGE CONC. CO:	2.7 ppm
STD VOLUME (dscf):	26.757	MOLECULAR WEIGHT:	28.94 g/g-mole-dry
STD VOLUME (dscm):	0.758	MOLECULAR WEIGHT:	28.06 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.45	217	S 1	0.49	218
2	0.58	217	2	0.66	220
3	0.62	217	3	0.79	220
4	0.60	217	4	0.70	219
5	0.55	215	5	0.52	219
6	0.56	215	6	0.53	218
7	0.53	214	7	0.55	218
8	0.46	214	8	0.55	218

STACK GAS TEMPERATURE:	217.3 degrees F	677.3 degrees R
AVERAGE VELOCITY HEAD:	0.568 inches H2O	
STACK GAS VELOCITY:		50.7 ft/sec
STACK GAS AIR FLOW:	151873 acf/min	99927 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R11	LAB #:	8845a
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1715 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1815 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1720 hours
RUN #:	11 - Method 4	METHOD 2 STOP TIME:	1730 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

	FINAL	INITIAL	NET		
	-----	-------	-----	PITOT TUBE Cp:	0.84
				STACK DIAMETER	95.63 inches
	803.1	754.1	49.0	STACK AREA:	49.9 sq. feet
	661.1	655.0	6.1	METER TEMPERATURE:	97.3 degrees F
	539.5	538.7	0.8	BAROMETRIC PRES.:	27.40 inches Hg
	849.9	844.8	5.1	STATIC PRESSURE:	-0.52 inches H20
TOTAL H20 GAIN:			61.0	STACK PRESSURE:	27.36 inches Hg
TOTAL VOLUME (scf):			2.88	ORIFICE PRESSURE:	0.70 inches H20
PERCENT MOISTURE:			9.77	METER PRESSURE:	27.45 inches Hg
Bws:			0.0977		

INIT. METER VOLUME:	469.796	AVERAGE CONC. CO2:	1.2 percent
FINAL METER VOLUME:	500.580	AVERAGE CONC. O2:	19.4 percent
VOLUME SAMPLED:	30.784	AVERAGE CONC. CO:	3.7 ppm
STD VOLUME (dscf):	26.572	MOLECULAR WEIGHT:	28.97 g/g-mole-dry
STD VOLUME (dscm):	0.753	MOLECULAR WEIGHT:	27.90 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.50	216	S 1	0.53	219
2	0.62	216	2	0.57	219
3	0.62	217	3	0.67	220
4	0.65	217	4	0.72	220
5	0.55	217	5	0.53	220
6	0.59	218	6	0.59	221
7	0.52	218	7	0.57	220
8	0.48	217	8	0.46	219

STACK GAS TEMPERATURE:	218.4 degrees F	678.4 degrees R
AVERAGE VELOCITY HEAD:	0.571 inches H20	
STACK GAS VELOCITY:		51.2 ft/sec
STACK GAS AIR FLOW:	153108 acf/min	98335 dscf/min

METHODS 1, 2, 3A AND 4
AM TEST-AIR QUALITY, INC.

FILE NAME:	R329\LPM4R12	LAB #:	8845b
CLIENT:	Louisiana-Pacific Corp.	METHOD 4 START TIME:	1715 hours
LOCATION:	Chilco, Idaho	METHOD 4 STOP TIME:	1815 hours
SAMPLE SITE:	RTO Exhaust Stack	SAMPLE LENGTH:	60.0 minutes
SAMPLE DATE:	August 1, 1995	METHOD 2 START TIME:	1805 hours
RUN #:	12 - Method 4	METHOD 2 STOP TIME:	1815 hours
OPERATORS:	Albertson/Clark	SAMPLE LENGTH:	10.0 minutes

IMPINGER WEIGHTS

FINAL	INITIAL	NET		
-----	-------	-----	PITOT TUBE Cp:	0.84
			STACK DIAMETER	95.63 inches
803.1	754.1	49.0	STACK AREA:	49.9 sq. feet
661.1	655.0	6.1	METER TEMPERATURE:	97.3 degrees F
539.5	538.7	0.8	BAROMETRIC PRES.:	27.50 inches Hg
849.9	844.8	5.1	STATIC PRESSURE:	-0.55 inches H2O
TOTAL H2O GAIN:		61.0	STACK PRESSURE:	27.46 inches Hg
TOTAL VOLUME (scf):		2.88	ORIFICE PRESSURE:	0.70 inches H2O
PERCENT MOISTURE:		9.73	METER PRESSURE:	27.55 inches Hg
Bws:		0.0973		

INIT. METER VOLUME:	469.796	AVERAGE CONC. CO2:	1.2 percent
FINAL METER VOLUME:	500.580	AVERAGE CONC. O2:	19.4 percent
VOLUME SAMPLED:	30.784	AVERAGE CONC. CO:	4.7 ppm
STD VOLUME (dscf):	26.669	MOLECULAR WEIGHT:	28.97 g/g-mole-dry
STD VOLUME (dscm):	0.755	MOLECULAR WEIGHT:	27.90 g/g-mole-wet
Y FACTOR:	0.993		

SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F	SAMPLE POINT	VELOCITY " H2O	TEMPERATURE °F
W 1	0.42	210	S 1	0.50	214
2	0.61	210	2	0.80	216
3	0.66	212	3	0.68	216
4	0.52	213	4	0.68	217
5	0.50	215	5	0.54	216
6	0.54	215	6	0.59	216
7	0.56	216	7	0.48	216
8	0.45	215	8	0.44	215

STACK GAS TEMPERATURE:	214.5 degrees F	674.5 degrees R
AVERAGE VELOCITY HEAD:	0.556 inches H2O	
STACK GAS VELOCITY:		50.3 ft/sec
STACK GAS AIR FLOW:	150402 acf/min	97534 dscf/min

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-1
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 1 - Methods 3A and 10
SAMPLE TIMES: 0945-1015

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.1	5.98	0.0	6.1	1.5
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	19.3
Carbon Monoxide (CO)	ppm	0.0	0.0	30.2	30.2	30.1	0.0	30.2	9.2

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.5 %
Oxygen (O2)	19.3 %
Carbon Monoxide (CO)	9.2 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-2
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 2 - Methods 3A and 10
SAMPLE TIMES: 1030-1100

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.4
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	19.4
Carbon Monoxide (CO)	ppm	0.0	0.0	30.2	29.9	30.1	0.0	30.1	5.6

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.4 %
Oxygen (O2)	19.4 %
Carbon Monoxide (CO)	5.6 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-3
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 3 - Methods 3A and 10
SAMPLE TIMES: 1115-1145

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.4
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	18.6
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	29.5	30.1	0.0	29.8	9.4

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.4 %
Oxygen (O2)	18.6 %
Carbon Monoxide (CO)	9.5 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-4
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 4 - Methods 3A and 10
SAMPLE TIMES: 1200-1230

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO_2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.7
Oxygen (O_2)	%	0.0	0.0	15.0	14.9	15.01	0.0	15.0	17.9
Carbon Monoxide (CO)	ppm	0.0	0.0	29.9	29.8	30.1	0.0	29.9	26.2

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO_2)	1.7 %
Oxygen (O_2)	18.0 %
Carbon Monoxide (CO)	26.4 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-5
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 5 - Methods 3A and 10
SAMPLE TIMES: 1245-1315

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.3
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	15.7
Carbon Monoxide (CO)	ppm	0.0	0.0	29.8	30.1	30.1	0.0	30.0	20.0

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.3 %
Oxygen (O2)	15.7 %
Carbon Monoxide (CO)	20.1 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-6
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 6 - Methods 3A and 10
SAMPLE TIMES: 1330-1400

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.3
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	18.8
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	30.1	30.1	0.0	30.1	10.1

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.3 %
Oxygen (O2)	18.8 %
Carbon Monoxide (CO)	10.1 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-7
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 7 - Methods 3A and 10
SAMPLE TIMES: 1415-1445

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO_2)	%	0.0	0.0	6.0	5.9	5.98	0.0	6.0	1.0
Oxygen (O_2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	19.3
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	30.0	30.1	0.0	30.1	4.1

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO_2)	1.0 %
Oxygen (O_2)	19.3 %
Carbon Monoxide (CO)	4.1 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-8
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 8 - Methods 3A and 10
SAMPLE TIMES: 1500-1530

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	5.9	5.98	0.0	6.0	1.1
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	18.2
Carbon Monoxide (CO)	ppm	0.0	0.0	30.0	29.8	30.1	0.0	29.9	7.0

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.1 %
Oxygen (O2)	18.2 %
Carbon Monoxide (CO)	7.0 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL-9
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 9 - Methods 3A and 10
SAMPLE TIMES: 1545-1615

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	5.9	5.9	5.98	0.0	5.9	0.9
Oxygen (O2)	%	0.0	0.0	15.0	14.9	15.01	0.0	15.0	19.3
Carbon Monoxide (CO)	ppm	0.0	0.0	29.8	30.0	30.1	0.0	29.9	3.6

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	0.9 %
Oxygen (O2)	19.4 %
Carbon Monoxide (CO)	3.6 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL10
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 10 - Methods 3A and 10
SAMPLE TIMES: 1630-1700

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.0
Oxygen (O2)	%	0.0	0.0	15.0	15.3	15.01	0.0	15.2	19.8
Carbon Monoxide (CO)	ppm	0.0	0.0	30.0	30.2	30.1	0.0	30.1	2.7

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.0 %
Oxygen (O2)	19.6 %
Carbon Monoxide (CO)	2.7 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME: R328\LPCHIL11
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
SAMPLE DATE: August 1, 1995
RUN #: 11 - Methods 3A and 10
SAMPLE TIMES: 1715-1745

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.2
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	19.4
Carbon Monoxide (CO)	ppm	0.0	-0.1	30.2	30.0	30.1	-0.1	30.1	3.7

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.2 %
Oxygen (O2)	19.4 %
Carbon Monoxide (CO)	3.7 ppm

CALIBRATION SUMMARY - GASEOUS EMISSION MONITORS

FILE NAME:	R328\LPCHIL12
CLIENT:	Louisiana-Pacific Corporation
LOCATION:	Chilco, Idaho
SITE LOCATION:	RTO Exhaust Stack
SAMPLE DATE:	August 1, 1995
RUN #:	12 - Methods 3A and 10
SAMPLE TIMES:	1800-1830

PARAMETER	MEASUREMENT UNIT	INITIAL ZERO CHECK	FINAL ZERO CHECK	INITIAL SPAN CHECK	FINAL SPAN CHECK	UPSCALE CAL. GAS VALUE Cma	AVERAGE ZERO BIAS Co	AVERAGE SPAN BIAS Cm	AVERAGE MEASURED CONC. C
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0.0	6.0	1.2
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0.0	15.0	19.4
Carbon Monoxide (CO)	ppm	-0.1	0.0	30.0	29.9	30.1	-0.1	30.0	4.6

PARAMETER	EFFLUENT GAS CONCENTRATION Cgas
Carbon Dioxide (CO2)	1.2 %
Oxygen (O2)	19.4 %
Carbon Monoxide (CO)	4.7 ppm

STACK GAS TEMPERATURE COMPARISON
AM TEST - AIR QUALITY, INC.

FILE NAME: R329\LPTEMP
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SAMPLE SITE: RTO Exhaust Stack

RUN#	RUN TIME	AM TEST TEMPERATURE °F	LOUISIANA PACIFIC TEMPERATURE °F	DIFFERENCE
1	1000-1010	217.2	216.0	-1.2
2	1035-1045	211.1	214.8	3.7
3	1125-1135	212.2	217.6	5.4
4	1206-1216	218.0	216.2	-1.8
5	1250-1300	215.6	228.0	12.4
6	1337-1347	217.9	222.4	4.5
7	1425-1435	214.9	220.0	5.1
8	1506-1516	218.0	219.7	1.7
9	1550-1600	217.8	222.5	4.7
10	1635-1645	217.3	214.1	-3.2
11	1720-1730	218.4	217.2	-1.2
12	1805-1815	214.5	222.7	8.2

APPENDIX B

STI CEMS Data

DAILY SUMMARY REPORT
RTO Stack HOURLY AVERAGES
LOUISIANA PACIFIC
Chilco, ID

REPORTING PERIOD August 1

Period	CO ppm	FLOW kcfm	TEMP Deg-F	CO £/HR
0:00 to 1:00	12.6	137.3	202.8	5.352
1:00 to 2:00	10.5	139.0	201.3	4.542
2:00 to 3:00	12.4	134.6	201.4	5.190
3:00 to 4:00	15.8	139.4	203.2	6.831
4:00 to 5:00	6.7	137.4	202.8	2.877
5:00 to 6:00	6.7	137.8	200.7	2.877
6:00 to 7:00	8.7	139.3	204.3	3.740
7:00 to 8:00	15.9	141.7	208.6	6.921
8:00 to 9:00	18.3	140.9	214.5	7.839
9:00 to 10:00	20.9	138.9	218.0	8.817
10:00 to 11:00	6.5	142.0	215.7	2.810
11:00 to 12:00	9.0	140.1	217.1	3.810
12:00 to 13:00	24.1	140.5	222.8	x10.207
13:00 to 14:00	11.1	144.6	223.8	4.817
14:00 to 15:00	3.9	144.3	220.2	1.704
15:00 to 16:00	4.8	140.0	219.6	2.029
16:00 to 17:00	3.1	145.6	216.2	1.380
17:00 to 18:00	4.5	146.0	217.9	1.991
18:00 to 19:00	0.0*	0.0*	0.0*	0.000*
19:00 to 20:00	0.0*	0.0*	0.0*	0.000*
20:00 to 21:00	0.0*	0.0*	0.0*	0.000*
21:00 to 22:00	0.0*	0.0*	0.0*	0.000*
22:00 to 23:00	0.0*	0.0*	0.0*	0.000*
23:00 to 24:00	0.0*	0.0*	0.0*	0.000*

Averages

0:00 to 12:00	12.0	139.0	207.5	5.1
12:00 to 24:00	8.6	143.5	220.1	3.7
0:00 to 24:00	10.9	140.5	211.7	4.7

* Bad data not used for averages.

DAILY CO SUMMARY REPORT

RTO Stack CO ppm FIFTEEN MINUTE AVERAGES
LOUISIANA PACIFIC
Chilco, ID

TODAY'S DATE: 08-01-1995
TIME: 18:30:26

REPORTING PERIOD
DAY: August 1

Period	15 Read.	15 Stat.	30 Read.	30 Stat.	45 Read.	45 Stat.	60 Read.	60 Stat.	Hr. AVG. Read.	Hr. AVG. Stat
Hour 0	10.7	0	12.0	0	13.1	0	14.5	0	12.6	0
Hour 1	11.9	0	10.3	0	10.1	0	9.7	0	10.5	0
Hour 2	10.9	0	10.5	0	14.2	0	14.0	0	12.4	0
Hour 3	15.7	0	15.8	0	20.7	0	11.1	0	15.8	0
Hour 4	9.5	0	6.0	0	4.8	0	6.7	0	6.7	0
Hour 5	3.9	0	5.1	0	9.5	0	8.4	0	6.7	0
Hour 6	9.0	0	7.8	0	8.6	0	9.3	0	8.7	0
Hour 7	13.6	0	13.1	0	14.5	0	22.3	0	15.9	0
Hour 8	19.6	0	16.7	0	14.1	0	22.5	0	18.3	0
Hour 9	19.4	0	33.7	0	19.6	0	$\boxed{11.1}$	0	20.9	0
Hour 10	$\boxed{7.0}$ 9.1	0	6.9	0	$\boxed{6.2}$	0	$\boxed{5.9}$ 6.1	0	6.5	0
Hour 11	6.0	0	$\boxed{7.9}$	0	$\boxed{9.9}$ 8.9	0	12.0	0	9.0	0
Hour 12	$\boxed{29.3}$	0	$\boxed{23.1}$ 26.2	0	20.3	0	$\boxed{24.0}$	0	24.1	0
Hour 13	$\boxed{13.1}$ 16.6	0	11.7	0	$\boxed{11.6}$	0	$\boxed{7.8}$ 9.7	0	11.1	0
Hour 14	4.3	0	$\boxed{4.0}$	0	$\boxed{3.8}$ 3.9	0	3.5	0	3.9	0
Hour 15	$\boxed{4.5}$	0	$\boxed{7.8}$ 6.2	0	3.5	0	$\boxed{3.3}$	0	4.8	0
Hour 16	$\boxed{3.0}$ 3.2	0	3.0	0	$\boxed{3.2}$	0	$\boxed{3.3}$ 3.3	0	3.1	0
Hour 17	3.4	0	$\boxed{3.9}$	0	$\boxed{4.7}$ 4.3	0	6.0	0	4.5	0
Hour 18	$\boxed{7.5}$	0	$\boxed{6.6}$ 7.1	0	-1.0	-1	-1.0	-1	-1.0	-1
Hour 19	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 20	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 21	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 22	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 23	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1

Run 1 = 9.1 ppm CO
Run 2 = 6.1 ppm CO
Run 3 = 8.9 ppm CO
Run 4 = 26.2 ppm CO
Run 5 = 18.6 ppm CO
Run 6 = 9.7 ppm CO
Run 7 = 3.9 ppm CO
Run 8 = 6.2 ppm CO
Run 9 = 3.2 ppm CO
Run 10 = 3.3 ppm CO
Run 11 = 4.3 ppm CO
Run 12 = 7.1 ppm CO

AMW

DAILY FLOW SUMMARY REPORT

RTO Stack FLOW kcfm FIFTEEN MINUTE AVERAGES
LOUISIANA PACIFIC
Chilco, ID

TODAY'S DATE: 08-01-1995
TIME: 18:31:07

REPORTING PERIOD
DAY: August 1

Period	15 Read.	15 Stat.	30 Read.	30 Stat.	45 Read.	45 Stat.	60 Read.	60 Stat.	Hr. AVG. Read.	Hr. AVG. Stat
Hour 0	139.0	0	136.6	0	136.4	0	137.3	0	137.3	0
Hour 1	141.1	0	141.1	0	133.8	0	139.8	0	139.0	0
Hour 2	136.1	0	132.2	0	134.1	0	136.1	0	134.6	0
Hour 3	139.6	0	142.1	0	138.0	0	137.6	0	139.4	0
Hour 4	136.9	0	134.2	0	140.7	0	137.9	0	137.4	0
Hour 5	130.6	0	138.5	0	140.3	0	141.7	0	137.8	0
Hour 6	138.3	0	138.0	0	139.7	0	141.1	0	139.3	0
Hour 7	140.5	0	141.3	0	143.2	0	141.9	0	141.7	0
Hour 8	139.9	0	141.5	0	141.9	0	140.3	0	140.9	0
Hour 9	141.4	0	137.3	0	135.8	0	140.9	0	138.9	0
Hour 10	142.7	0	145.5	0	143.2	0	136.8	0	142.0	0
Hour 11	135.2	0	138.8	0	143.3	0	143.1	0	140.1	0
Hour 12	138.5	0	140.6	0	141.4	0	141.4	0	140.5	0
Hour 13	142.9	0	144.1	0	146.6	0	144.9	0	144.6	0
Hour 14	144.8	0	143.6	0	142.2	0	146.8	0	144.3	0
Hour 15	138.9	0	139.0	0	142.6	0	139.6	0	140.0	0
Hour 16	146.0	0	141.9	0	147.9	0	146.6	0	145.6	0
Hour 17	147.0	0	142.9	0	146.8	0	147.3	0	146.0	0
Hour 18	143.8	0	136.7	0	-1.0	-1	-1.0	-1	-1.0	-1
Hour 19	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 20	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 21	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 22	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 23	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1

Run 1 = 142.7 Kcfm
Run 2 = 143.2 Kcfm
Run 3 = 141.1 Kcfm
Run 4 = 138.5 Kcfm
Run 5 = 141.4 Kcfm
Run 6 = 146.6 Kcfm
Run 7 = 142.9 Kcfm
Run 8 = 138.9 Kcfm
Run 9 = 139.6 Kcfm
Run 10 = 147.9 Kcfm
Run 11 = 142.9 Kcfm
Run 12 = 143.8 Kcfm

DAILY TEMP SUMMARY REPORT

RTO Stack TEMP Deg-F FIFTEEN MINUTE AVERAGES
LOUISIANA PACIFIC
Chilco, ID

TODAY'S DATE: 08-01-1995
TIME: 18:31:37

REPORTING PERIOD
DAY: August 1

Period	15 Read.	15 Stat.	30 Read.	30 Stat.	45 Read.	45 Stat.	60 Read.	60 Stat.	Hr. AVG. Read.	Hr. AVG. Stal
Hour 0	200.8	0	202.7	0	202.7	0	204.8	0	202.8	0
Hour 1	203.0	0	201.6	0	200.5	0	200.2	0	201.3	0
Hour 2	200.4	0	201.1	0	201.6	0	202.4	0	201.4	0
Hour 3	202.4	0	202.4	0	202.7	0	205.3	0	203.2	0
Hour 4	205.0	0	204.1	0	201.4	0	200.6	0	202.8	0
Hour 5	202.4	0	200.8	0	199.3	0	200.4	0	200.7	0
Hour 6	204.0	0	205.1	0	204.3	0	203.9	0	204.3	0
Hour 7	206.9	0	207.3	0	208.5	0	211.5	0	208.6	0
Hour 8	213.2	0	215.9	0	214.1	0	214.7	0	214.5	0
Hour 9	216.3	0	219.1	0	219.2	0	217.2	0	218.0	0
Hour 10	216.0	0	215.1	0	214.8	0	217.0	0	215.7	0
Hour 11	217.0	0	217.7	0	217.5	0	216.2	0	217.1	0
Hour 12	216.2	0	219.2	0	227.9	0	228.0	0	222.8	0
Hour 13	224.7	0	225.4	0	222.4	0	222.6	0	223.8	0
Hour 14	220.9	0	220.0	0	220.0	0	220.0	0	220.2	0
Hour 15	219.7	0	217.5	0	218.6	0	222.5	0	219.6	0
Hour 16	217.3	0	215.3	0	214.1	0	217.9	0	216.2	0
Hour 17	218.3	0	217.2	0	215.8	0	220.5	0	217.9	0
Hour 18	222.7	0	225.0	0	-1.0	-1	-1.0	-1	-1.0	-1
Hour 19	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 20	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 21	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 22	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1
Hour 23	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1	-1.0	-1

Run 1 = 216.0°F
Run 2 = 214.8°F
Run 3 = 217.6°F
Run 4 = 216.2°F
Run 5 = 228.0°F
Run 6 = 222.4°F
Run 7 = 220.0°F
Run 8 = 219.7°F
Run 9 = 222.5°F
Run 10 = 214.1°F
Run 11 = 217.2°F
Run 12 = 222.7°F

APPENDIX C
Example Calculations and Field Data Sheets

AMTEST AIR QUALITY, INC

Example Calculation of Bias Correction

Client: Louisiana-Pacific Corporation **Location:** Chilco, Idaho

Site Location: RTO Exhaust Stack

Run #: 5

Date: 8/1/95

$$C_{gas} = (C - C_o) * (C_{ma}/(C_m - C_o)$$

where:

C_{gas} = Effluent gas concentration, dry basis, ppm

C = Average gas concentration indicated by analyzer, dry basis, ppm

C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm

C_{ma} = Actual concentration of the upscale calibration gas, ppm

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm

= [20.0 ppm - 0.0] * [30.1/(30.0 - 0.0]

= 20.1 ppm CO (bias corrected)

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AMTEST AIR QUALITY, INC.

Example Calculation of Gaseous Carbon Monoxide (CO) Emissions

Client: Louisiana-Pacific Corporation

Location: Chilco, Idaho

Site Location: RTO Exhaust Stack

Run #: 5

Date: 8/1/95

Emission Concentration Results

instrument averaged 20.1 ppm carbon monoxide (CO) during the run

$$\_\_\_\_ \text{ ppm} * \frac{(20.9 - \_\_\_\_ \%\ O_2)}{(20.9 - \_\_\_\_ \%\ O_2)} = n/a \text{ ppm CO @ } \_\_\_ \%\ O_2$$

$$20.1 \text{ ppm} * \frac{28.01 \text{ g/g-mole}}{22.414 \text{ L/g-mole}} * \frac{273.15\ ^{\circ}K}{293.15\ ^{\circ}K} * \frac{1000 \text{ l}}{1 \text{ m}^3} \bullet \frac{1}{10^6 \text{ ppm}} = 0.023 \text{ g/m}^3 \text{ CO}$$

Emission Rate Results

$$0.023 \text{ g/m}^3 * \frac{1 \text{ m}^3}{35.31 \text{ ft}^3} * 94978 \frac{\text{dscf}}{\text{min}} \bullet 60 \frac{\text{min}}{\text{hr}} * \frac{1 \text{ lb}}{453.6 \text{ g}} = 8.3 \text{ lb/hr CO}$$

$$8.3 \frac{\text{lb}}{\text{hr}} * 24 \frac{\text{hrs}}{\text{day}} \bullet 365 \frac{\text{days}}{\text{yr}} * \frac{1 \text{ ton}}{2000 \text{ lbs}} = 36.5 \text{ tons/yr CO}$$

/AMW

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)
AM TEST - AIR QUALITY, INC.

Client Louisiana-Pacific Corporation Location RTO Exhaust Stack Chilco, Idaho

Monitor Manufacturer Thermo Environmental Model No. 48

Type of Monitor (O2, SO2, NOx, CO etc.) carbon monoxide

Unit of Measurement (%, ppm, wet or dry basis) ppm dry

CEMS Emission Standard (provide units) 11.65 lb/hr CO

Measurement Principle (NDIR, ultraviolet, etc.) NDIR

Monitor System Type (extractive or in-situ)

Range of Instrument 0-50 ppm Span Gas Concentration 45 ppm

RELATIVE ACCURACY TEST						
Run No.	Date	Time	Reference Method Value	CEMS Value	Difference Xi	Difference (Xi)2
1	8/1/95	0945 1015	9.2	9.1	-0.1	0.01
2		1030 1100	5.6	6.1	0.5	0.25
3		1115 1145	9.5	8.9	-0.6	0.36
4		1200 1230	26.4	26.2	-0.2	0.04
~~5~~		~~1245 1315~~	~~20.1~~	~~18.6~~	~~-1.5~~	~~2.25~~
6		1330 1400	10.1	9.7	-0.4	0.16
7		1415 1445	4.1	3.9	-0.2	0.04
~~8~~		~~1500 1530~~	~~7.0~~	~~6.2~~	~~-0.8~~	~~0.64~~
9		1545 1615	3.6	3.2	-0.4	0.16
10		1630 1700	2.7	3.3	0.6	0.36
11		1715 1745	3.7	4.3	0.6	0.36
~~12~~		~~1800 1830~~	~~4.7~~	~~7.1~~	~~2.4~~	~~5.76~~
Mean			a 8.32	8.30	b -0.02	
Sum of the Differences						c 1.74
(Sum of the Differences)2					d 0.04	

Runs 5,8, and 12 were rejected.

EXAMPLE CALCULATION
CONFIDENCE COEFFICIENT AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
AM TEST - AIR QUALITY, INC.

Client Louisiana - Pacific Corporation

Location RTO Exhaust Stack Chilco, Idaho

Date 8/1/95

Monitor ID Thermo Environmental 48

Confidence Coefficient = CC

$t_{.975} = 2.306$

n = 9

Xi = difference

$$\text{Confidence Coefficient} = \frac{t_{.975}}{n\sqrt{n-1}} \sqrt{n \bullet (\underset{c}{Xi^2}) - (\underset{d}{Xi})^2}$$

$$= \frac{2.306}{9\sqrt{9-1}} \bullet \sqrt{9 * \underline{1.74} - \underline{0.04}} = \underline{0.4 \text{ ppm CO}}$$

$$\% \text{ Accuracy} = \frac{\left|\overset{b}{\text{Mean of the Differences}}\right| + CC}{\underset{a}{\text{Mean of Reference Method Values}}} \bullet 100\%$$

$$= \frac{|\ -0.02\ | + 0.4}{8.32} * 100\% = \underline{4.6}\ \%$$

$$\text{Accuracy (conc. basis)} = \left|\overset{b}{\text{Mean of the Differences}}\right| + CC$$

$$= |\ -0.02\ | + \underline{0.4} = \underline{0.4 \text{ ppm CO}}$$

O2 RATA Only:

Maximum Difference during RATA =

EXAMPLE CALCULATION SHEET
EPA METHODS 1, 2, 3A AND 4

FOR METHOD ______

CLIENT: Louisiana-Pacific Corporation LOCATION: Chilco, Idaho DATE: 8/1/95

RUN #: 6 LAB #: 8842b SITE LOCATION: RTO Exhaust Stack

Dry Gas Volume - Equation 5-1

Vm_{std} = 17.647°R/"Hg(constant)*volume sampled*Yfactor*(P_B + ΔH/13.6)/(460 + T_m)

= 17.647°R/"Hg* 31.066 ft³* 0.993*(27.50"Hg + (0.7 "H_2O/13.6))/(460 + 90.0° F)

= 27.270 dscf

dscm = 27.270 dscf/35.31 ft³/m³ = 0.772 dscm

Moisture - Equation 5-2 and 5-3

Vw_{std} = 0.04715 ft³/g * 79.6 grams of H_2O collected in impingers = 3.75 scf

B_{ws} = (3.75 scf)/(3.75 scf + 27.270 dscf) = 0.1210

% Moisture = 12.10 % = B_{ws} * 100

Molecular weight - Equation 3-2

M_d = 0.440*(1.3 %CO_2) + 0.320*(18.8 %O_2) + 0.280*(100%- 1.3 %CO_2- 18.8 %O_2(%CO + %N_2))

= 28.96 g/g-mole (dry)

M_s = M_d * (1-B_{ws}) + 18.0 * B_{ws} = 28.96 g/g-mole • (1 - 0.1210) + 18.0 g/g-mole * 0.1210

= 27.63 g/g-mole (wet) F_o = (20.9-______)%O_2/______%CO_2= n/a

Stack gas velocity and volumetric flow rate - Equation 2-9 and 2-10

V_s = 85.49 * C_p* $\sqrt{\Delta P * T_s / (M_s * P_s)}$

V_s = 85.49 * 0.84 *$\sqrt{}$ 0.555 * 677.9° R /(27.63 g/g-mole * 27.46"Hg)

(217.9° F + 460)° R (27.50P_B + -.54P_s/13.6)

V_s = 50.6 ft/sec (std)

Q_{sd} = 3600 • (1 - B_{ws}) * V_s * A_s * (T_{std}/T_s) * (P_s / P_{std}) / 60 min/hr

Q_{sd} = 3600 • (1 - 0.1210) * 50.6 ft/sec * 49.9 ft² • (528° R/ 677.9° R) * (27.46"Hg / 29.92"Hg) / 60

π*95.63²/4/144

= 95113 dscf/min (dry standard cubic feet per minute)

acfm = 50.6 ft/sec * 49.9 ft²* 60 sec/min

= 151360 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * Vm_{std} * T_s ÷ [P_s * V_s * sample time * A_n *(1 -B_{ws})]

0.09450 * ________dscf * _____° R/[_____"Hg * _____ft/sec * _____min * _______ft² *(1 - _____)]

(_____N_{dia}/12/2)²•Pi

I = n/a %

All of the above numbered equations are from the 40 CFR 60 and assume English units.

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Amw

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)
AM TEST - AIR QUALITY, INC.

Client Louisiana-Pacific Corporation Location RTO Exhaust Stack Chilco, Idaho

Monitor Manufacturer United Sciences Model No. 100

Type of Monitor (O2, SO2, NOx, CO etc.) flow

Unit of Measurement (%, ppm, wet or dry basis) Kacfm

CEMS Emission Standard (provide units) ______

Measurement Principle (NDIR, ultraviolet, etc.) ultrasonic

Monitor System Type (extractive or in-situ) ______

Range of Instrument ______ Span Gas Concentration ______

RELATIVE ACCURACY TEST						
Run No.	Date	Time	Reference Method Value	CEMS Value	Difference Xi	Difference (Xi)2
1	8/1/95	1000 1010	149.6	142.7	-6.9	47.61
2		1035 1045	148.1	143.2	-4.9	24.01
3		1125 1135	145.5	141.1	-4.4	19.36
4		1206 1216	146.6	138.5	-8.1	65.61
5		1250 1300	150.6	141.4	-9.2	84.64
6		1337 1347	151.4	146.6	-4.8	23.04
7		1425 1435	149.9	142.9	-7.0	49.00
~~8~~		~~1506 1516~~	~~152.6~~	~~138.9~~	~~-13.7~~	~~187.69~~
~~9~~		~~1550 1600~~	~~150.3~~	~~139.6~~	~~-10.7~~	~~114.49~~
10		1635 1645	151.9	147.9	-4.0	16.00
~~11~~		~~1720 1730~~	~~153.1~~	~~142.9~~	~~-10.2~~	~~104.04~~
12		1805 1815	150.4	143.8	-6.6	43.56
Mean			a 149.33	143.12	b -6.21	
Sum of the Differences						c 372.83
(Sum of the Differences)2					d 3124.81	

Runs 8, 9, and 11 were rejected.

EXAMPLE CALCULATION
CONFIDENCE COEFFICIENT AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
AM TEST - AIR QUALITY, INC.

Client Louisiana-Pacific Corporation   Location RTO Exhaust Stack Chilco, Idaho

Date 8/1/95   Monitor ID United Sciences 100

Confidence Coefficient = CC

$t_{.975} = 2.306$

n = 9

Xi = difference

Confidence Coefficient $= \frac{t_{.975}}{n\sqrt{n-1}} \sqrt{n * (\underset{c}{\sum Xi^2}) - (\underset{d}{\sum Xi})^2}$

$= \frac{2.306}{9\sqrt{9-1}} \cdot \sqrt{9 * 372.83 - 3124.81}$ = 1.4 Kacf/min

% Accuracy $= \frac{|\text{Mean of the Differences}|^{b} + \text{CC}}{\text{Mean of Reference Method Values}^{a}} \cdot 100\%$

$= \frac{|-6.21| + 1.4}{149.33} * 100\% =$ 5.1 %

Accuracy (conc. basis) $= |\text{Mean of the Differences}|^{b} + \text{CC}$

$= |-6.21| + 1.4 =$ 7.6 Kacf/min

O2 RATA Only:

Maximum Difference during RATA =

STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

Client Louisiana Pacific - Chilco

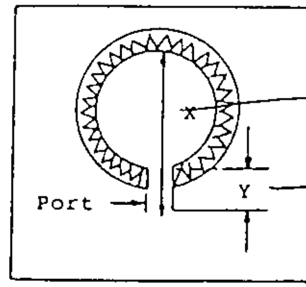
Location ~~RTO~~ Chilco, ID

Sampling Location RTO - Exhaust

Inside of far wall to outside of port (distance, X) 101 3/4 - N port; 102 - south port; 101.88 avg.

Inside of near wall to outside of port (distance, Y) 6.25

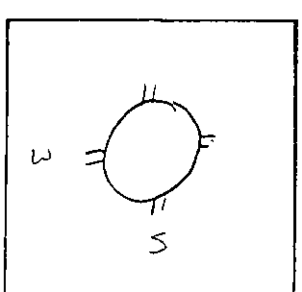
Stack I.D. (distance X - distance Y) 95.63

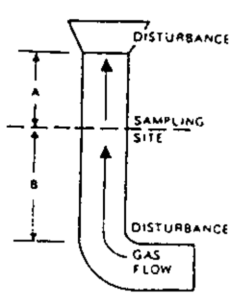


Schematic of Sampling Location

1 Traverse Point #	2 Fractional Percent of Stack I.D.	3 Stack I.D. inches	4 Column 2 x 3	5 Distance Y	6 Traverse Point Location from Outside of Port columns 4 + 5
1	.032	95.63	3.1	6.25	9.3
2	.105		10		16.3
3	.194		18.6		24.8
4	.323		30.9		37.1
5	.677		64.7		71.
6	.806		77.1		83.3
7	.895		85.6		91.8
8	.968		92.6		98.8
9					
10					
11					
12					

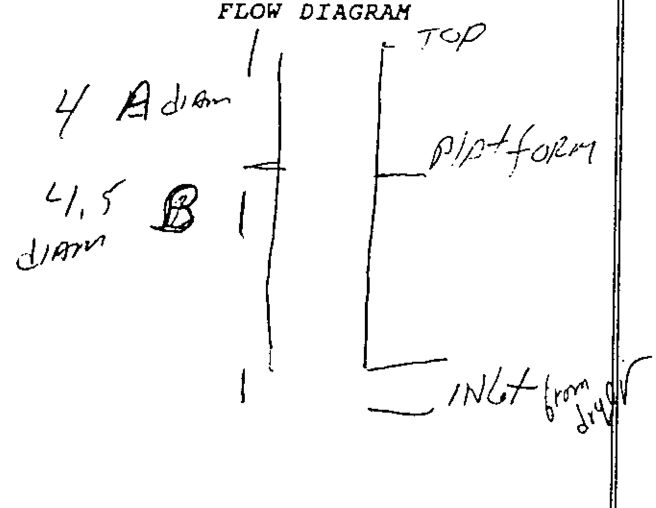
CROSS SECTION





Distance A = 4 diameters *downstream*
Distance B = 4.5 diameters *upstream*

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM



8840

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client LP Corp
Location Chico TD
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators DR
Run I.D. 1-M4

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time 0951
Stop Time 1051
Barometric Pressure "Hg 27.50
Static Pres "H_2O -.52
Production Rate ___

Filter # ___ Box # B-1

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm .001 / .002
Leak Test Vacuum 10" / 10"
___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	704.5	646.0	58.5
#2 Imp.	654.1	644.1	10.0
#3 Imp.	555.9	552.2	3.7
#4 Imp.			
#5 Imp.			
#6 S.G.	830.3	822.7	7.6

Total H_2O Volume 79.8 g

SAMPLING PARAMETERS

% Moisture 11.5%
Meter Temp. ___
Stack Temp. ___
△ H@ 1.65 Y 1.993
Meter Box ID Red M.
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (△H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading △ P " H_2O	Stack Temp °F	
North	0	309.100	.80	82	81	ø	67				
	10	314.850		85	83	ø	67				
	20	320.400		90	87	ø	59				
	30	325.855		92	90	ø	59				
	40	331.270		94	92	ø	59				
	50	336.715		96	94	ø	60				
	60	342.157		98	95	ø	62				
		33.057	△H	89.9 T_m					$(\triangle p)^2$	T_s	

8841

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client Louisiana Pacific Corp
Location Chilco ID
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators DK
Run I.D. 2-M4

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time 1115
Stop Time 1215
Barometric Pressure "Hg 27.50
Static Pres "H_2O -.55
Production Rate ___

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.002 / .005
Leak Test Vacuum	10" / 10"

___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

Filter # ___ Box # B2

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	704.8	640.7	64.1
#2 Imp.	650.1	642.7	7.4
#3 Imp.	537.7	536.7	1
#4 Imp.			
#5 Imp.			
#6 S.G.	840.0	834.6	5.4

Total H_2O Volume 77.9✓ g

SAMPLING PARAMETERS

% Moisture 11.7
Meter Temp. ___
Stack Temp. ___
△ H@ 1.651 Y .553
Meter Box ID Red Box
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
North	0	342.376	.7	98	97	ø	66				
	10	347.770		97	98	ø	65				
	20	353.185		97	98	ø	62				
	30	358.467		97	97	ø	63				
	40	363.730		96	96	ø	58				
	50	368.995		96	95	1	57				
	60	374.218		95	94	1	56				
		31.842✓	△H	Tm 96.3✓					$(\triangle p)^2$	Ts	

8842

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client Louisiana Pacific
Location Chilco Id
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators PC
Run I.D. 3 M-4

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time 1245
Stop Time 1345
Barometric Pressure "Hg 27.50
Static Pres "H_2O -.52
Production Rate ___

Filter # ___ Box # ___

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm .005 / .04
Leak Test Vacuum 10" / 10"
___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	772.4	704.5	67.9
#2 Imp.	660.7	654.1	6.6
#3 Imp.	556.6	555.9	0.7
#4 Imp.			
#5 Imp.			
#6 S.G.	834.7	830.3	4.4

Total H_2O Volume 79.6✓ g

SAMPLING PARAMETERS

% Moisture 12.1
Meter Temp. ___
Stack Temp. ___
△ H@ 1.651 Y .993
Meter Box ID Red Mn
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (^H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading ^ P " H_2O	Stack Temp °F	
North Port	0	374.419	0.7	91	91	Ø	52				
	10	379.360		90	90	Ø	52				
	20	384.600		89	89	Ø	53				
	30	389.845		90	89	Ø	53				
	40	395.075		91	89	Ø	54				
	50	400.280		92	89	Ø	54				
	60	405.485		91	86	Ø	57				
		31.066✓	△H	90.0✓ Tm					$(\Delta P)^{2}$	Ts	

8843

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Client Louisiana Pacific
Location Clw, ID
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators DL
Run I.D M4 Run #4

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.002 / .003
Leak Test Vacuum	10" / 10"

___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

QA FORMS COMPLETED

Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Filter # ___ Box # ___

	Final Wt. gram	Initial Wt. gram		Net Wt. gram
#1 Imp.	754.1	704.8	=	49.3
#2 Imp.	655.0	650.1	=	4.9
#3 Imp.	538.7	537.7	=	1.0
#4 Imp.			=	
#5 Imp.			=	
#6 S.G.	844.8	840.0	=	4.8

Total H_2O Volume 60.0 ✓ g

Start Time 1420
Stop Time 1520
Barometric Pressure "Hg 27.50
Static Pres "H_2O -.60
Production Rate ___

SAMPLING PARAMETERS

% Moisture 9.4
Meter Temp. ___
Stack Temp. ___
$\Delta H@$ 1.651 Y .993
Meter Box ID ___
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
1 Pt	0	405.800	0.7	89	88	∅	66				
	10	410.065		89	87	∅	64				
	20	416.020		90	87	∅	63				
	30	421.230		91	88	∅	63				
	40	426.420		92	88	∅	58				
	50	431.700		93	89	∅	56				
	60	436.775		93	89	∅	53				
		30.975 ✓	Δ H	89.5 ✓ T_m							

8844

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page ___ of 64

Client Louisiana Pac. L.L.C.
Location Chilco ID
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators DC
Run I.D. M-4 Run # 5

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time 1545
Stop Time 1645
Barometric Pressure "Hg 27.50
Static Pres "H_2O -.53
Production Rate ___

Filter # ___ Box # ___

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm .005 / .005
Leak Test Vacuum 10" / 10"
___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	812.7	772.4	40.3
#2 Imp.	664.3	660.7	3.6
#3 Imp.	557.0	556.6	0.4
#4 Imp.			
#5 Imp.			
#6 S.G.	840.0	834.7	5.3

Total H_2O Volume 49.6✓ g

SAMPLING PARAMETERS

% Moisture 8.0
Meter Temp. ___
Stack Temp. ___
△ H@ 1.651 Y .993
Meter Box ID Red Min
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (△H) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading △ P " H_2O	Stack Temp °F	
4 Port	0	437.080	.7	93	92	Ø	65				
	10	442.363		94	92	Ø	59				
	20	447.555		95	92	Ø	60				
	30	452.480		97	93	Ø	62				
	40	457.606		98	94	Ø	61				
	50	462.780		98	95	Ø	63				
	60	467.827		99	95	Ø	64				
Anw		30.747✓	△H	94.785✓ Tm							

8845

METHOD 4 AND AIRFLOW SAMPLING DATA SHEET

Page ___ of 65

Client Louisiana Pacific
Location Chile TD
Sample Site RTO Exhaust Stack
Stack Diameter 95.63"
Date 8-1-95
Operators AL
Run I.D. M-4 R-6

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ___
Pitot Tube Insp. ___
Magnehelic Cal. ___
Temp. Probe Cal. ___
Gas Meter Calib. ___

Start Time 1715
Stop Time 1815
Barometric Pressure "Hg 27.40
Static Pres "H_2O -.52
Production Rate ___

Filter # ___ Box # ___

EQUIPMENT CHECKS

Initial/Final
Leak Rate cfm .002 / .001
Leak Test Vacuum 10" / 10"
___ Pitots, Pre Leak Ck
___ Pitots, Post Leak Ck
___ Gas Sampling System
___ Integrated Bag
___ Thermocouples @ ___ °F

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	803.1	754.1	49.0
#2 Imp.	661.1	655.0	6.1
#3 Imp.	539.5	538.7	0.8
#4 Imp.			
#5 Imp.			
#6 S.G.	849.9	844.8	5.1

Total H_2O Volume 61.0 ✓ g

SAMPLING PARAMETERS

% Moisture 7.8
Meter Temp. ___
Stack Temp. ___
Δ H@ 1.651 Y .993
Meter Box ID Red Mw.
Pitot # ___ Side # ___
Thermocouple ID ___
Flow Meas. Device ___
Cp ___
K Factor ___

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Orifice Setting (ΔH) "H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump. Vac. Gauge " Hg	Imp. Exit Temp °F	Sample Point	Pitot Reading Δ P " H_2O	Stack Temp °F	
Ah Port	0	469.896	.7	98	96	0	60	6			
	10	474.975		98	95	1	56				
	20	480.166		99	95	1	60				
	30	485.250		99	95	1	61				
	40	490.373		100	95	1	62				
	50	495.490		100	95	1	62				
	60	500.580		101	96	1	64				

AMW 30.784 ✓ ___ Δ H 97.3 ✓ T.

66

AMTEST
AIR QUALITY, INC.

SAMPLE TRAIN INFORMATION

Fill out one sheet per site and per test type.

CLIENT: Louisiana Pacific Corp

LOCATION: Chilco, ID

SITE: RTO Exhaust Stack

TEST TEAM: PJC + DMA DATE(S): 8-1-95

RUN #'S: 1 thru 6 TYPE: M4

Probe/Filter Temperature: ✓ 248+25 F ____ 320 F ____ Other

Impinger Temperature: ✓ <68 F ____ Other

THIMBLE: ____ yes ✓ no NOZZLE TYPE: ____ quartz ____ steel ✓ none

PROBE LINER: ____ quartz ____ glass ✓ steel ____ teflon

PROBE TYPE: ✓ regular ____ water-cooled

FRONT-HALF FILTER: ____ yes X no SIZE (mm): ____ 90 ____ 110 ____ 125 ____ other ____

FRONT-HALF FILTER MEDIA: ____ quartz fiber ____ glass fiber ____ teflon

SUPPORT: ____ steel ____ glass frit ____ teflon GASKET: ____ silicon ____ teflon

BACK-HALF FILTER: ____ yes X no

BACK-HALF FILTER MEDIA: ____ quartz fiber ____ glass fiber ____ telfon ____ tared ____ untared

NOTE: Show the back-half filter location with an arrow on the table below.

CONTENTS	Initial Volume (mL)	Clean-up Solution Used	Bottle Type	Comments
Nozzle/Probe Rinse				
Filter				
#1 DI	100	Weigh + Discard		
#2 DI	100	↓		
#3 MT	–	↓		
#4 SG	–	↓		
#5				
#6				
#7				

IF THIS INFORMATION IS NOT ACCURATE FOR ALL RUNS, NOTE ALL EXCEPTIONS.

LOUISIANA-PACIFIC CORP.
CHILCO, ID
AUGUST 1, 1995
VELOCITY TRAVERSE
RTO EXHAUST STACK

by PJC AND DMA

RUN#1

DATE :	8-1-95	TE: T80-994	
TIME:	1000hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"WG	-0.52	P duct	27.46
Stack ID"	95.63	vol%MC	11.5
O2	19.3	%	
N2	79.2	%	
CO2	1.5	%	
MW(dry)	29.01	MW(wet)	27.75
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.45	221	45.5
2	0.63	220	53.8
3	0.68	219	55.9
4	0.57	219	51.2
5	0.5	218	47.9
6	0.54	216	49.7
7	0.52	219	48.9
8	0.45	218	45.4
S 1	0.45	220	45.5
2	0.64	222	54.4
3	0.8	215	60.5
4	0.74	212	58.0
5	0.52	212	48.6
6	0.48	214	46.8
7	0.42	214	43.8
8	0.42	216	43.8
AVG		217.2	50.0
AREA		49.88	ft^2
FLOW		149,592	ACFM
		107,053	SCFM
		94,742	SDCFM

RUN#2

DATE :	8-1-95	TE: T80-994	
TIME :	1035hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"WG	-0.550	P duct	27.46
Stack ID"	95.63	vol%MC	11.5
O2	19.4	%	
N2	79.2	%	
CO2	1.4	%	
MW(dry)	29.00	MW(wet)	27.74
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.48	208	46.6
2	0.63	208	53.4
3	0.6	207	52.1
4	0.54	208	49.4
5	0.5	211	47.7
6	0.49	213	47.3
7	0.53	214	49.2
8	0.47	214	46.3
S 1	0.43	206	44.0
2	0.72	206	57.0
3	0.58	209	51.3
4	0.62	212	53.1
5	0.5	216	47.8
6	0.6	216	52.4
7	0.54	215	49.7
8	0.43	215	44.3
AVG		211.1	49.5
AREA		49.88	ft^2
FLOW		148,050	ACFM
		106,898	SCFM
		94,605	SDCFM

RUN#3

DATE :	8-1-95	TE: T80-944	
TIME :	1125hrs	Mag Box #3	
		Pitot : P80-994	
P(bar)"Hg	27.5	Cp	0.84
Static P"WG	-0.55	P duct	27.46
Stack ID"	95.63	vol%MC	11.7
O2	18.6	%	
N2	79.9	%	
CO2	1.4	%	
MW(dry)	28.94	MW(wet)	27.66
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.4	208	42.6
2	0.63	208	53.5
3	0.69	209	56.0
4	0.48	211	46.8
5	0.46	212	45.8
6	0.52	213	48.7
7	0.5	213	47.8
8	0.43	214	44.4
S 1	0.48	209	46.7
2	0.67	209	55.2
3	0.63	212	53.6
4	0.54	215	49.7
5	0.46	216	45.9
6	0.53	216	49.3
7	0.48	215	46.9
8	0.45	215	45.4
AVG		212.2	48.6
AREA		49.88	ft^2
FLOW		145,580	ACFM
		104,949	SCFM
		92,670	SDCFM

LOUISIANA- PACIFIC CORP
CHILCO, ID
AUGUST 1,1995
VELOCITY TRAVERSE
RTO EXHAUST STACK

by PJC AND DMA

RUN#4

DATE :	8-1-95	TE: T80-994	
TIME:	1206HRS	Mag Box #3	
		Pitot : P80-994	
P(bar)"Hg	27.5	Cp	0.84
Static P"WG	-0.52	P duct	27.46
Stack ID"	95.63	vol%MC	11.7
O2	17.9	%	
N2	80.4	%	
CO2	1.7	%	
MW(dry)	28.99	MW(wet)	27.70
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W#1	0.45	211	45.2
2	0.54	215	49.7
3	0.62	216	53.3
4	0.6	218	52.5
5	0.56	221	50.8
6	0.5	220	48.0
7	0.5	220	48.0
8	0.44	219	45.0
S1	0.49	215	47.4
2	0.53	218	49.4
3	0.61	219	53.0
4	0.65	219	54.7
5	0.5	220	48.0
6	0.46	220	46.0
7	0.49	219	47.5
8	0.44	218	45.0
AVG		218.0	49.0
AREA		49.88	ft^2
FLOW		146,555	ACFM
		104,754	SCFM
		92,498	SDCFM

RUN#5

DATE :	8-1-95	TE: T80-994	
	1250hrs	Mag Box #3	
TIME :		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"WG	-0.500	P duct	27.46
Stack ID"	95.63	vol%MC	12.1
O2	15.7	%	
N2	83	%	
CO2	1.3	%	
MW(dry)	28.84	MW(wet)	27.52
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.54	217	49.9
2	0.6	219	52.7
3	0.66	220	55.3
4	0.6	221	52.8
5	0.57	218	51.3
6	0.53	218	49.5
7	0.5	218	48.1
8	0.44	220	45.2
S 1	0.41	209	43.3
2	0.72	210	57.4
3	0.73	212	57.8
4	0.7	212	56.6
5	0.55	212	50.2
6	0.43	214	44.5
7	0.45	215	45.5
8	0.44	214	45.0
AVG		215.6	50.3
AREA		49.88	ft^2
FLOW		150,612	ACFM
		108,048	SCFM
		94,975	SDCFM

RUN#6

DATE :	8-1-95	TE: T80-944	
TIME :	1337hrs	Mag Box #3	
		Pitot : P80-994	
P(bar)"Hg	27.5	Cp	0.84
Static P"V	-0.54	P duct	27.46
Stack ID"	95.63	vol%MC	12.1
O2	18.8	%	
N2	79.9	%	
CO2	1.3	%	
MW(dry)	28.96	MW(wet)	27.63
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.47	218	46.5
2	0.65	216	54.6
3	0.6	216	52.5
4	0.6	215	52.5
5	0.46	215	45.9
6	0.57	219	51.3
7	0.55	220	50.4
8	0.42	220	44.1
S 1	0.44	215	44.9
2	0.72	218	57.6
3	0.75	218	58.8
4	0.67	217	55.5
5	0.52	219	49.0
6	0.63	220	54.0
7	0.5	220	48.1
8	0.41	220	43.5
AVG		217.9	50.6
AREA		49.88	ft^2
FLOW		151,358	ACFM
		108,201	SCFM
		95,109	SDCFM

LOUISIANA-PACIFIC CORP.
CHILCO, ID
AUGUST 1, 1995
VELOCITY TRAVERSE
RTO EXHAUST STACK

by PJC AND DMA

RUN#7

DATE :	8-1-95	TE: T80-994	
TIME:	1425hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"WG	-0.6	P duct	27.46
Stack ID"	95.63	vol%MC	9.4
O2	19.3	%	
N2	79.7	%	
CO2	1	%	
MW(dry)	28.93	MW(wet)	27.90
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.4	217	42.7
2	0.64	216	54.0
3	0.58	217	51.4
4	0.57	218	51.0
5	0.55	218	50.1
6	0.59	217	51.9
7	0.52	216	48.6
8	0.47	215	46.2
S 1	0.4	209	42.4
2	0.63	212	53.4
3	0.62	212	53.0
4	0.67	211	55.0
5	0.5	211	47.5
6	0.63	214	53.5
7	0.58	218	51.4
8	0.53	217	49.1
AVG		214.9	50.1
AREA		49.88	ft^2
FLOW		149,868	ACFM
		107,595	SCFM
		97,481	SDCFM

✓

RUN#8

DATE :	8-1-95	TE: T80-994	
TIME :	1506hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"WG	-0.600	P duct	27.46
Stack ID"	95.63	vol%MC	9.4
O2	18.2	%	
N2	80.7	%	
CO2	1.1	%	
MW(dry)	28.90	MW(wet)	27.88
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.45	216	45.3
2	0.58	220	51.5
3	0.63	220	53.7
4	0.6	208	52.0
5	0.6	221	52.5
6	0.58	220	51.5
7	0.51	219	48.3
8	0.48	218	46.8
S 1	0.5	213	47.6
2	0.64	216	54.0
3	0.8	219	60.5
4	0.72	220	57.4
5	0.55	219	50.2
6	0.54	220	49.7
7	0.5	220	47.9
8	0.48	219	46.9
AVG		218.0	51.0
AREA		49.88	ft^2
FLOW		152,590	ACFM
		109,045	SCFM
		98,795	SDCFM

✓

RUN#9

DATE :	8-1-95	TE: T80-944	
TIME :	1550hrs	Mag Box #3	
		Pitot : P80-994	
P(bar)"Hg	27.5	Cp	0.84
Static P"V	-0.53	P duct	27.46
Stack ID"	95.63	vol%MC	8.0
O2	19.3	%	
N2	79.9	%	
CO2	0.9	%	
MW(dry)	28.94	MW(wet)	28.07
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.49	215	47.0
2	0.58	215	51.2
3	0.66	217	54.7
4	0.6	217	52.1
5	0.57	218	50.8
6	0.49	218	47.1
7	0.52	219	48.6
8	0.5	220	47.7
S 1	0.46	217	45.6
2	0.65	217	54.3
3	0.71	216	56.7
4	0.54	218	49.5
5	0.56	220	50.5
6	0.62	220	53.1
7	0.55	220	50.0
8	0.43	218	44.2
AVG		217.8	50.2
AREA		49.88	ft^2
FLOW		150,226	ACFM
		107,405	SCFM
		98,813	SDCFM

✓

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LOUISIANA-PACIFIC CORP.
CHILCO, ID
AUGUST 1, 1995
VELOCITY TRAVERSE
RTO EXHAUST STACK

by PJC AND DMA

RUN#10

DATE :	8-1-95	TE: T80-994	
TIME:	1635hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.50	Cp	0.84
Static P"V	-0.57	P duct	27.46
Stack ID"	95.63	vol%MC	8.0
O2	19.8	%	
N2	79.2	%	
CO2	1	%	
MW(dry)	28.95	MW(wet)	28.08
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.45	217	45.1
2	0.58	217	51.3
3	0.62	217	53.0
4	0.6	217	52.1
5	0.55	215	49.8
6	0.56	215	50.3
7	0.53	214	48.9
8	0.46	214	45.5
S 1	0.49	218	47.1
2	0.66	220	54.8
3	0.79	220	59.9
4	0.7	219	56.4
5	0.52	219	48.6
6	0.53	218	49.0
7	0.55	218	49.9
8	0.55	218	49.9
AVG		217.3	50.7
AREA		49.88	ft^2
FLOW		151,850	ACFM
		108,645	SCFM
		99,953	SDCFM

RUN#11

DATE :	8-1-95	TE: T80-994	
TIME :	1720hrs	MAG BOX #3	
		Pitot : P80-994	
P(bar)"Hg	27.40	Cp	0.84
Static P"V	-0.520	P duct	27.36
Stack ID"	95.63	vol%MC	9.8
O2	19.4	%	
N2	79.4	%	
CO2	1.2	%	
MW(dry)	28.97	MW(wet)	27.89
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.5	216	47.8
2	0.62	216	53.2
3	0.62	217	53.3
4	0.65	217	54.5
5	0.55	217	50.2
6	0.59	218	52.0
7	0.52	218	48.8
8	0.48	217	46.9
S 1	0.53	219	49.3
2	0.57	219	51.1
3	0.67	220	55.5
4	0.72	220	57.5
5	0.53	220	49.3
6	0.59	221	52.1
7	0.57	220	51.2
8	0.46	219	45.9
AVG		218.4	51.2
AREA		49.88	ft^2
FLOW		153,120	ACFM
		108,988	SCFM
		98,307	SDCFM

RUN#12

DATE :	8-1-95	TE: T80-944	
TIME :	1805hrs	Mag Box #3	
		Pitot : P80-994	
P(bar)"Hg	27.5	Cp	0.84
Static P"V	-0.55	P duct	27.46
Stack ID"	95.63	vol%MC	9.8
O2	19.4	%	
N2	79.9	%	
CO2	1.2	%	
MW(dry)	29.11	MW(wet)	28.02
PORT, #	Delta P ("H2O)	Temp (F)	Velocity (ft/s)
W 1	0.42	210	43.4
2	0.61	210	52.3
3	0.66	212	54.5
4	0.52	213	48.4
5	0.5	215	47.6
6	0.54	215	49.4
7	0.56	216	50.4
8	0.45	215	45.1
S 1	0.5	214	47.5
2	0.8	216	60.2
3	0.68	216	55.5
4	0.68	217	55.5
5	0.54	216	49.5
6	0.59	216	51.7
7	0.48	216	46.6
8	0.44	215	44.6
AVG		214.5	50.2
AREA		49.88	ft^2
FLOW		150,087	ACFM
		107,827	SCFM
		97,260	SDCFM

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STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

Client Louisiana Pacific

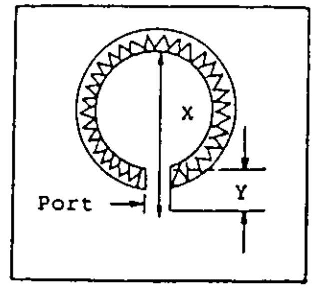
Location Chilco, Idaho

Sampling Location RTO Exhaust Stack

Inside of far wall to outside of port (distance, X) 101.88

Inside of near wall to outside of port (distance, Y) 6.25

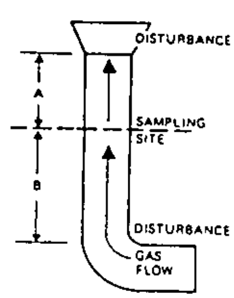
Stack I.D. (distance X - distance Y) 95.63



Schematic of Sampling Location

1 Traverse Point #	2 Fractional Percent of Stack I.D.	3 Stack I.D. inches	4 Column 2 x 3	5 Distance Y	6 Traverse Point Location from Outside of Port columns 4 + 5
1	16.7	95.63	15.97		
2	50.0	↓	47.82		
3	83.3	↓	79.66		
4					
5					
6					
7					
8					
9					
10					
11					
12					

CROSS SECTION



Distance A = 4 diameters downstream
Distance B = 4.5 diameters upstream

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM

GAS LOG MEASUREMENT DATA

FILE NAME: AMB\EXCEL\ONEMIN\LPCHILCO
CLIENT: Louisiana-Pacific Corporation
LOCATION: Chilco, Idaho
SITE LOCATION: RTO Exhaust Stack
DATE: August 1, 1995

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 1 - 0945-1015			
945	1.6	19.2	11.8
946	1.6	19.2	13.2
947	1.6	19.3	13.9
948	1.6	19.2	12.1
949	1.7	19.1	14.9
950	1.7	19.1	15.1
951	1.7	19.1	14.7
952	1.6	19.2	15.7
953	1.4	19.4	10.7
954	1.5	19.3	9.3
955	1.4	19.4	9.2
956	1.4	19.4	7.0
957	1.4	19.3	8.4
958	1.3	19.4	7.3
959	1.4	19.4	6.1
1000	1.5	19.3	8.9
1001	1.4	19.4	8.0
1002	1.4	19.3	7.6
1003	1.4	19.4	8.1
1004	1.3	19.5	5.7
1005	1.3	19.5	6.0
1006	1.3	19.5	6.3
1007	1.4	19.4	5.2
1008	1.4	19.4	7.4
1009	1.2	19.5	6.3
1010	1.4	19.4	5.0
1011	1.4	19.3	7.7
1012	1.4	19.4	6.5
1013	1.6	19.2	8.3
1014	1.5	19.3	10.4
1015	1.5	19.3	8.7
Average Run 1	1.5	19.3	9.2
	(%)	(%)	(ppm)
	CARBON DIOXIDE	OXYGEN	CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 2 - 1030-1100			
1030	1.4	19.2	6.7
1031	1.3	19.4	5.6
1032	1.3	19.4	5.5
1033	1.4	19.3	6.3
1034	1.4	19.3	5.9
1035	1.4	19.4	6.2
1036	1.3	19.4	5.6
1037	1.3	19.4	4.3
1038	1.3	19.4	5.8
1039	1.3	19.5	5.0
1040	1.4	19.4	4.6
1041	1.5	19.3	6.6
1042	1.4	19.4	5.7
1043	1.4	19.4	5.6
1044	1.4	19.4	6.9
1045	1.3	19.5	4.9
1046	1.5	19.3	5.6
1047	1.4	19.4	6.3
1048	1.4	19.4	5.0
1049	1.4	19.4	5.9
1050	1.3	19.4	5.3
1051	1.4	19.4	4.4
1052	1.4	19.4	5.7
1053	1.4	19.4	4.9
1054	1.4	19.4	5.4
1055	1.4	19.4	6.5
1056	1.3	19.4	5.5
1057	1.3	19.4	5.4
1058	1.3	19.5	5.3
1059	1.3	19.4	4.3
1100	1.4	19.4	5.7
Average Run 2	1.4	19.4	5.6
	(%)	(%)	(ppm)
	CARBON DIOXIDE	OXYGEN	CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 3 - 1115-1145			
1115	1.3	18.5	6.3
1116	1.3	18.5	7.0
1117	1.3	18.5	8.0
1118	1.3	18.6	6.8
1119	1.3	18.6	7.7
1120	1.3	18.7	7.2
1121	1.4	18.5	7.2
1122	1.4	18.5	9.1
1123	1.4	18.6	8.8
1124	1.4	18.5	8.4
1125	1.4	18.5	10.1
1126	1.4	18.6	7.8
1127	1.5	18.5	9.2
1128	1.4	18.5	10.0
1129	1.5	18.5	9.4
1130	1.6	18.4	13.1
1131	1.5	18.5	12.4
1132	1.5	18.5	11.6
1133	1.5	18.4	12.7
1134	1.4	18.6	14.0
1135	1.4	18.5	10.6
1136	1.4	18.6	11.0
1137	1.5	18.5	9.6
1138	1.4	18.6	10.8
1139	1.4	18.6	9.2
1140	1.4	18.6	8.1
1141	1.4	18.6	10.0
1142	1.4	18.6	8.6
1143	1.4	18.6	8.1
1144	1.4	18.6	10.0
1145	1.4	18.6	8.8
Average Run 3	1.4	18.6	9.4
	(%)	(%)	(ppm)
	CARBON DIOXIDE	OXYGEN	CARBON MONOXIDE

AMTEST AIR QUALITY, INC.

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

CLIENT: L.P. Corp.
LOCATION: Chilco, ID
SITE LOCATION: RTO Exhaust Stack
DATE: 8-1-95

RUN # 1 CONDITION:

START: 0945
STOP: 1015

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One: Wet	Check One: Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.1	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.2	30.2	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

✓AM

RUN # 2 CONDITION:

START: 1030
STOP: 1100

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One: Wet	Check One: Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.2	~~30.0~~ AM	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm				29.9				
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

✓AM

RUN # 3 CONDITION:

START: 1115
STOP: 1145

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One: Wet	Check One: Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	29.5	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

✓AM

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 4 - 1200-1230			
1200	1.7	17.8	21.9
1201	1.7	17.8	26.3
1202	1.7	17.8	23.4
1203	1.7	17.8	28.7
1204	1.7	17.9	25.5
1205	1.7	17.8	24.4
1206	1.8	17.8	29.1
1207	1.8	17.8	27.8
1208	1.7	17.9	27.0
1209	1.7	17.9	28.5
1210	1.8	17.8	28.8
1211	1.9	17.7	36.4
1212	1.8	17.8	34.1
1213	1.9	17.7	33.7
1214	1.8	17.8	42.4
1215	1.7	17.9	31.3
1216	1.6	18.0	26.4
1217	1.6	18.0	24.2
1218	1.7	17.9	22.5
1219	1.7	17.9	25.6
1220	1.7	17.9	27.7
1221	1.6	18.0	23.3
1222	1.7	18.0	19.7
1223	1.6	18.0	22.2
1224	1.6	18.0	21.2
1225	1.6	18.0	24.3
1226	1.6	18.0	22.6
1227	1.7	18.0	24.7
1228	1.5	18.1	23.0
1229	1.5	18.1	16.1
1230	1.6	18.0	19.2
Average Run 4	1.7	17.9	26.2
	(%)	(%)	(ppm)
	CARBON DIOXIDE	OXYGEN	CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 5 - 1245-1315			
1245	1.3	15.2	18.3
1246	1.3	15.1	21.4
1247	1.2	15.3	24.0
1248	1.3	15.3	20.2
1249	1.3	15.2	22.9
1250	1.3	15.3	20.9
1251	1.3	15.3	19.7
1252	1.3	15.3	23.0
1253	1.3	15.3	21.4
1254	1.4	15.2	24.0
1255	1.4	15.2	29.2
1256	1.5	15.1	30.1
1257	1.2	15.2	34.6
1258	1.4	15.3	31.3
1259	1.3	15.3	26.6
1300	1.2	15.5	22.3
1301	1.2	15.5	17.1
1302	1.3	15.4	18.2
1303	1.2	15.4	19.7
1304	1.2	15.4	17.1
1305	1.2	15.5	17.5
1306	1.1	15.9	16.1
1307	1.3	16.7	13.8
1308	1.3	16.7	15.5
1309	1.3	16.8	13.1
1310	1.3	16.8	14.0
1311	1.3	16.7	15.6
1312	1.3	16.8	13.4
1313	1.3	16.8	14.0
1314	1.2	16.9	12.2
1315	1.2	16.8	11.6
Average Run 5	1.3	15.7	20.0
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 6 - 1330-1400			
1330	1.6	18.6	21.2
1331	1.6	18.5	17.5
1332	1.5	18.6	15.9
1333	1.4	18.7	13.0
1334	1.5	18.7	11.6
1335	1.5	18.6	14.2
1336	1.6	18.6	13.1
1337	1.5	18.6	14.0
1338	1.5	18.7	14.7
1339	1.4	18.7	12.0
1340	1.4	18.7	12.8
1341	1.3	18.9	10.9
1342	1.3	18.8	8.5
1343	1.3	18.8	9.7
1344	1.2	18.9	8.1
1345	1.3	18.8	7.5
1346	1.3	18.9	9.1
1347	1.3	18.9	7.3
1348	1.3	18.8	8.7
1349	1.1	19.0	7.8
1350	1.1	19.0	14.6
1351	1.2	19.0	6.7
1352	1.2	19.0	6.1
1353	1.3	18.9	7.0
1354	1.3	18.9	7.9
1355	1.2	19.0	6.0
1356	1.1	19.0	5.9
1357	1.1	19.1	5.2
1358	1.2	19.0	4.9
1359	1.2	18.9	6.6
1400	1.1	19.1	5.3
Average Run 6	1.3 (%) CARBON DIOXIDE	18.8 (%) OXYGEN	10.1 (ppm) CARBON MONOXIDE

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

AMTEST AIR QUALITY, INC.

CLIENT: Louisiana Pacific Corp.
LOCATION: Chilco, ID
SITE LOCATION: RTO Exhaust Stack
DATE: 8-1-95

RUN # 4 CONDITION:

START: 1200
STOP: 1230

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	14.9	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	29.9	29.8	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 5 CONDITION:

START: 1245
STOP: 1315

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	29.8	30.1	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 6 CONDITION:

START: 1330
STOP: 1400

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	30.1	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

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TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 7 - 1415-1445			
1415	1.1	19.1	5.2
1416	1.0	19.3	4.4
1417	1.0	19.3	3.5
1418	1.1	19.2	4.6
1419	1.0	19.4	3.7
1420	1.1	19.3	3.9
1421	1.2	19.2	4.9
1422	1.0	19.3	4.2
1423	1.0	19.4	4.4
1424	1.0	19.4	4.0
1425	1.1	19.3	3.9
1426	1.1	19.3	5.0
1427	1.0	19.4	4.0
1428	1.1	19.3	3.7
1429	1.1	19.3	4.5
1430	1.1	19.3	3.7
1431	1.2	19.2	4.6
1432	1.1	19.3	4.5
1433	1.1	19.3	3.7
1434	1.1	19.3	4.6
1435	1.0	19.4	4.0
1436	1.1	19.3	3.9
1437	1.0	19.4	4.6
1438	1.0	19.4	3.6
1439	1.0	19.4	3.8
1440	0.9	19.5	3.9
1441	0.9	19.5	3.2
1442	1.0	19.4	3.9
1443	1.0	19.4	4.1
1444	0.9	19.5	3.7
1445	1.0	19.4	4.3
Average Run 7	1.0	19.3	4.1
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 8 - 1500-1530			
1500	0.9	18.4	4.6
1501	0.8	18.5	5.5
1502	0.8	18.6	4.7
1503	0.8	18.5	4.5
1504	0.9	18.4	5.0
1505	1.0	18.4	4.6
1506	1.0	18.3	5.1
1507	1.0	18.3	5.3
1508	1.1	18.2	4.8
1509	1.2	18.1	15.2
1510	1.2	18.1	7.3
1511	1.3	18.1	7.1
1512	1.2	18.1	7.8
1513	1.2	18.1	7.2
1514	1.4	18.0	8.4
1515	1.4	18.0	10.6
1516	1.4	18.0	9.4
1517	1.4	18.0	11.4
1518	1.3	18.1	10.8
1519	1.2	18.2	7.4
1520	1.2	18.1	8.4
1521	1.2	18.2	7.1
1522	1.2	18.1	6.7
1523	1.2	18.2	7.5
1524	1.2	18.2	5.9
1525	1.2	18.2	6.5
1526	1.1	18.3	6.3
1527	1.1	18.3	5.5
1528	1.1	18.3	6.8
1529	1.0	18.4	5.6
1530	1.0	18.4	5.0
Average Run 8	1.1	18.2	7.0
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 9 - 1545-1615			
1545	1.0	19.0	5.4
1546	0.8	19.3	3.5
1547	0.9	19.2	4.0
1548	0.9	19.3	3.2
1549	0.9	19.2	3.4
1550	0.9	19.3	4.1
1551	1.0	19.2	3.6
1552	0.9	19.2	4.0
1553	0.8	19.3	3.8
1554	0.9	19.2	3.2
1555	0.9	19.3	4.2
1556	0.9	19.3	3.6
1557	1.0	19.2	3.6
1558	1.0	19.2	4.0
1559	0.8	19.4	3.2
1600	0.9	19.2	3.5
1601	0.9	19.2	3.7
1602	0.9	19.3	3.3
1603	0.9	19.3	3.9
1604	0.8	19.4	3.3
1605	0.8	19.4	3.1
1606	0.8	19.3	3.5
1607	0.9	19.3	3.2
1608	0.8	19.4	3.5
1609	0.8	19.4	3.7
1610	0.8	19.4	3.2
1611	0.7	19.5	3.5
1612	0.7	19.6	3.3
1613	0.7	19.5	3.0
1614	0.8	19.4	3.7
1615	0.8	19.5	3.1
Average Run 9	0.9	19.3	3.6
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

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SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

AMTEST AIR QUALITY, INC.

CLIENT: Louisiana Pacific Corp
LOCATION: Chilco ID
SITE LOCATION: RTO Exhaust Stack
DATE: 8-1-95

RUN # 7 CONDITION:

START: 1415
STOP: 1445

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	5.9	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.1	30.0	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 8 CONDITION:

START: 1500
STOP: 1530

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	5.9	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.0	29.8	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

RUN # 9 CONDITION:

START: 1545
STOP: 1615

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	5.9	5.9	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	14.9	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	29.8	30.0	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

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TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 10 - 1630-1700			
1630	1.0	19.7	3.1
1631	1.0	19.8	2.3
1632	1.1	19.7	2.3
1633	1.0	19.8	2.9
1634	1.0	19.8	2.1
1635	1.1	19.8	2.6
1636	1.1	19.7	3.1
1637	1.0	19.8	2.4
1638	1.0	19.8	2.9
1639	1.0	19.9	2.3
1640	1.0	19.8	2.2
1641	1.0	19.8	3.0
1642	1.0	19.9	2.4
1643	1.1	19.7	3.0
1644	1.0	19.9	3.2
1645	1.0	19.9	2.2
1646	1.0	19.8	2.9
1647	1.0	19.8	2.5
1648	1.1	19.8	2.5
1649	1.0	19.8	3.8
1650	1.0	19.8	2.7
1651	1.0	19.9	2.7
1652	1.1	19.8	2.9
1653	1.0	19.9	2.4
1654	1.0	19.8	2.9
1655	0.9	19.9	2.5
1656	1.1	19.8	2.4
1657	1.2	19.7	3.4
1658	1.0	19.9	2.6
1659	1.2	19.7	2.9
1700	1.0	19.9	3.9
Average Run 10	1.0	19.8	2.7
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 11 - 1715-1745			
1715	1.1	19.5	2.6
1716	1.0	19.5	3.2
1717	1.1	19.5	2.3
1718	1.0	19.5	2.8
1719	1.1	19.4	3.1
1720	1.1	19.5	2.8
1721	1.0	19.5	3.6
1722	1.1	19.4	3.0
1723	1.2	19.4	3.4
1724	1.1	19.4	3.9
1725	1.2	19.4	2.9
1726	1.2	19.3	3.9
1727	1.2	19.4	4.4
1728	1.1	19.5	3.1
1729	1.2	19.4	3.6
1730	1.2	19.4	3.5
1731	1.2	19.4	3.4
1732	1.2	19.4	4.3
1733	1.2	19.4	4.0
1734	1.2	19.3	4.2
1735	1.2	19.3	4.5
1736	1.2	19.4	3.9
1737	1.3	19.3	4.4
1738	1.1	19.4	4.1
1739	1.1	19.5	3.3
1740	1.2	19.3	4.9
1741	1.1	19.5	4.0
1742	1.2	19.4	3.7
1743	1.2	19.3	4.8
1744	1.2	19.4	3.5
1745	1.3	19.3	4.1
Average Run 11	1.2	19.4	3.7
	(%) CARBON DIOXIDE	(%) OXYGEN	(ppm) CARBON MONOXIDE

TIME	CARBON DIOXIDE (%)	OXYGEN (%)	CARBON MONOXIDE (ppm)
RUN 12 - 1800-1830			
1800	1.4	19.3	6.5
1801	1.4	19.2	5.9
1802	1.4	19.1	6.9
1803	1.3	19.3	5.4
1804	1.4	19.2	6.3
1805	1.3	19.2	7.6
1806	1.2	19.3	6.4
1807	1.2	19.3	5.5
1808	1.1	19.4	4.4
1809	1.2	19.4	4.3
1810	1.1	19.4	4.3
1811	1.1	19.5	3.6
1812	1.2	19.4	4.1
1813	1.0	19.5	4.4
1814	1.0	19.5	3.3
1815	1.2	19.4	4.3
1816	1.0	19.5	3.8
1817	1.1	19.4	3.8
1818	1.1	19.5	3.9
1819	1.0	19.5	3.2
1820	1.2	19.4	4.1
1821	1.1	19.4	4.4
1822	1.1	19.5	3.9
1823	1.1	19.4	4.9
1824	1.0	19.5	4.3
1825	1.1	19.4	4.2
1826	1.2	19.4	4.5
1827	1.0	19.5	3.5
1828	1.2	19.4	4.4
1829	1.1	19.4	5.0
1830	1.1	19.5	2.8
Average Run 12	1.2	19.4	4.6
	(%)	(%)	(ppm)
	CARBON DIOXIDE	OXYGEN	CARBON MONOXIDE

AMTEST AIR QUALITY, INC.

SAMPLING SYSTEM BIAS CHECK

Am Test-Air Quality, Inc.

CLIENT: Louisiana Pacific Corp
LOCATION: Chilco, ID
SITE LOCATION: RTO Exhaust Stack
DATE: 8-1-95

RUN # 10 CONDITION:

START: 1630
STOP: 1700

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.3	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	0.0	30.0	30.2	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

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RUN # 11 CONDITION:

START: 1715
STOP: 1745

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	0.0	-0.1	30.2	30.0	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

Jmw

RUN # 12 CONDITION:

START: 1800
STOP: 1830

Parameter	Unit	Initial Zero Check	Final Zero Check	Initial Span Check	Final Span Check	Upscale Cal Gas Value	Analyzer Range	Check One Wet	Check One Dry
Carbon Dioxide (CO2)	%	0.0	0.0	6.0	6.0	5.98	0-25		✓
Oxygen (O2)	%	0.0	0.0	15.0	15.0	15.01	0-25		✓
Carbon Monoxide (CO)	ppm	-0.1	0.0	30.0	29.9	30.1	0-50		✓
Sulfur Dioxide (SO2)	ppm								
Nitrogen Oxides (NOx)	ppm								
Total Reduced Sulfur (TRS as SO2)	ppm								
Non-Methane Hydrocarbons (NMHC)	ppm								
Total Hydrocarbons (THC)	ppm								

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AMTEST
AIR QUALITY, INC.

ANALYZER LINEARITY CHECKS

Am Test-Air Quality, Inc.

CLIENT: Louisiana-Pacific Corp

LOCATION: Chilco, ID

SITE LOCATION: RTO exhaust stack

DATE: 8-1-95

Type of Analyzer Gas: O_2

Range: 0-25 | (check one) %: ✓ ppm: | TIME (hours): 822

Make: Servomex

Model #: 1420 B

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High			1.5		
Mid-High	14.2	14.1			
Mid	9.28	9.3			
Mid Low					
Low	Zero	0.0			

Type of Analyzer Gas: CO

Range: 0-50 | (check one) %: ppm: ✓ | TIME (hours): 0822

Make: TECO

Model #: 48

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High	30.1	30.1	2.0		
Mid-High					
Mid	11.8	11.2			
Mid Low					
Low	Zero	0.0			

Type of Analyzer Gas: ______

Range: 0- | (check one) %: ppm: | TIME (hours):

Make: ______

Model #: ______

	Calibration Gas	Analyzer Response	Time (minutes)	Absolute Difference	Percent of Span
High					
Mid-High					
Mid					
Mid Low					
Low					

Louisiana Pacific Corp
Chilco, ID
8-1-95

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Rev 5/19/95

GAS CYLINDER CHECKLIST

TEST #	CYLINDER #	GAS CONCENTRATIONS	EXP. DATE
		Carbon Dioxide, Oxygen	
	CC-19319	6.03% O_2	2/97
		Carbon Dioxide, Oxygen	
	CC-12424	4.01% CO_2, 13.92% O_2	
	CC-19669	9.03% CO_2, 13.99% O_2	1/98
	LL-10577	11.8% CO_2, 9.95% O_2	---
		Carbon Dioxide, Oxygen, Carbon Monoxide	
614993	CC-6973	59.3 ppm CO, 8.17% CO_2, 15.20% O_2	3/97
	CC-18534	150.2 ppm CO, 15.00% CO_2, 5.03% O_2	---
	CC-125	296 ppm CO, 6.05% CO_2, 15.02% O_2	---
	CC-66323	297 ppm CO, 5.98% CO_2, 15.01% O_2	---
	CC-48487	297 ppm CO, 5.99% CO_2, 15.07% O_2	---
	CC-66215	299.8 ppm CO, 6.00% CO_2, 15.00% O_2	---
	CC-82571	299.9 ppm CO, 6.00% CO_2, 15.00% O_2	---
	CC-89217	301.5 ppm CO, 5.98% CO_2, 14.98% O_2	---
✓	CC-2895	556 ppm CO, 11.06% CO_2, 9.28% O_2	---
	CC-74240	593 ppm CO, 11.90% CO_2, 9.94% O_2	---
	CC-20649	594 ppm CO, 11.97% CO_2, 10.00% O_2	---
	CC-7284	597 ppm CO, 11.99% CO_2, 10.00% O_2	---
	CC-14485	597 ppm CO, 12.00% CO_2, 9.99% O_2	---
✓	CC-4302	296 ppm CO, 5.98% CO_2, 15.01% O_2	
		Sulfur Dioxide, Oxygen	
	CC-5966	148 ppm SO_2, 5.04% O_2	8/95
	CC-14717	992.9 ppm SO_2	6/95
	CC-27286	321.8 ppm SO_2, 10.05% O_2	8/96

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 Rev 5/19/95

GAS CYLINDER CHECKLIST

	TEST #	CYLINDER #	GAS CONCENTRATIONS	EXP. DATE
			Sulfur Dioxide, Nitrogen Oxides	
______	53206	XC-1580B	49.6 ppm SO_2, 50.0 ppm NO_x	5/97
______	53206	XC-1576B	49.8 ppm SO_2, 49.5 ppm NO_x	4/97
______		CC-26785	50.4 ppm SO_2, 52.0 ppm NO_x	7/96
______	53208	XC-1596B	89.1 ppm SO_2, 89.6 ppm NO_x	4/97
______	53208	XC-1590B	88.9 ppm SO_2, 89.5 ppm NO_x	4/97
______		CC-72894	89.5 ppm SO_2, 89.8ppm NO_x	12/96
______		CC-61958	89.7 ppm SO_2, 89.8 ppm NO_x	12/96
______		CC-18144	191.3 ppm SO_2, 193.9 ppm NO_x	11/96
______		CC-59262	196.1 ppm SO_2, 200.1 ppm NO_x	12/96
______		CC-4623	212 ppm SO_2, 236 ppm NO_x	10/95
______	684023	CC-94523	478 ppm SO2, 484 ppm NOx	3/97
______	684023	CC-18044	479 ppm SO2, 482 ppm NOx	3/97
______		CC-3735	932.1 ppm SO_2, 912.7 ppm NO_x	12/94
			Nitrogen Oxides	
______		CC-14913	4.86 ppm NO_x	3/96
______		CC-82961	10.6 ppm NO_x	3/96
______		CC-94990	25.4 ppm NO_x	1/97
______		CC-18322	114.9 ppm NO_x	3/96
			Carbon Monoxide	
______		CC-26883	30.1 ppm CO	12/97
______		CC-16544	30.3 ppm CO	7/96
______		CC-4239	30.5 ppm CO	12/97
______		CC-97420	60.8 ppm CO	12/97
______		CC-39011	61.6 ppm CO	12/97
______		CC-64521	905 ppm CO	---
______		CC-90717	912 ppm CO	6/96
______		CC-3738	2992 ppm CO	---
______		CC-25720	6000 ppm CO	---
			Carbon Monoxide, Oxygen	
______		CC-87523	121 ppm CO, 10.1% O_2	---
______		CC-17765	11.8 ppm CO, 14.2% O_2	---

Louisiana-Pacific Corp.
Chilco, ID

AMTEST AIR QUALITY, INC.

CONTINUOUS ANALYZERS CHECKLIST

Oxygen (O_2)

Infrared Industries Model 2200 O_2 Analyzer ____

Servomex Model 1420B O_2 Analyzer ✓

Western Research Model 721ATM Analyzer with Servomex 1155 O_2 Transducer ____

Carbon Dioxide (CO_2)

Infrared Industries Model 702D CO_2 Analyzer ____

Automated Custom Systems Model 3300 CO_2 Analyzer ____

Servomex Model 1410B Infrared CO_2 Analyzer ✓

Carbon Monoxide (CO)

Automated Custom Systems Model 3300 CO Analyzer ____

Thermo Environmental Instruments Model 48 CO Analyzer ✓

Sulfur Dioxide (SO_2)

Monitor Labs Model 8850 SO_2 Analyzer ____

Sampling Technologies, Inc./Am Test SO_2 Dilution Module ____

Western Research Model 721AT SO_2 Analyzer ____

Western Research Model 721ATM SO_2 Analyzer ____

Nitrogen Oxides (NO_x)

Monitor Labs Model 8840 NO_x Analyzer ____

Monitor Labs Model 8730 NO_x Dilution Module ____

Thermo Environmental Instruments Model 10S NO_x Analyzer ____

Thermo Environmental Instruments Model 42H NO_x Analyzer ____

Hydrocarbons (HC)

Byron Model 301 HC Analyzer ____

Infrared Industries Model 702D HC Analyzer ____

Infrared Industries Model 703 HC Analyzer ____

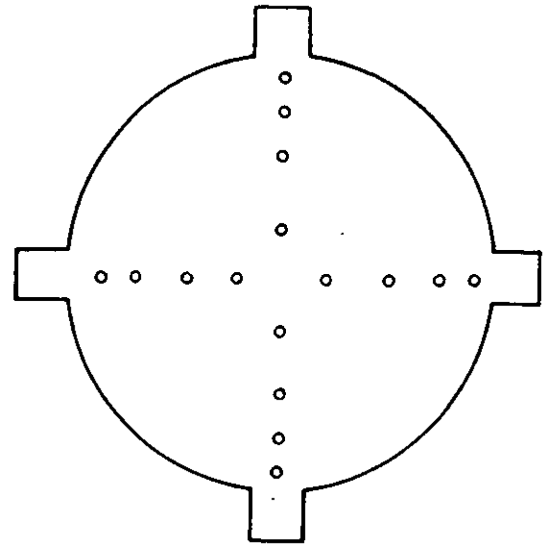
Compur Flame Ionization Detector (FID) THC Analyzer ____

Thermo Environmental Instruments Model 51 THC Analyzer ____

APPENDIX D
Miscellaneous Supporting Information

CROSS SECTIONAL AREA

Traverse Point	Distance (inches)
1	3.1
2	10.0
3	18.6
4	30.9
5	64.7
6	77.1
7	85.6
8	92.6



STACK DIMENSIONS

95.63-inch diameter circular stack

4 ports at 90 degrees

A = 4 diameters downstream

B = 4.5 diameters upstream

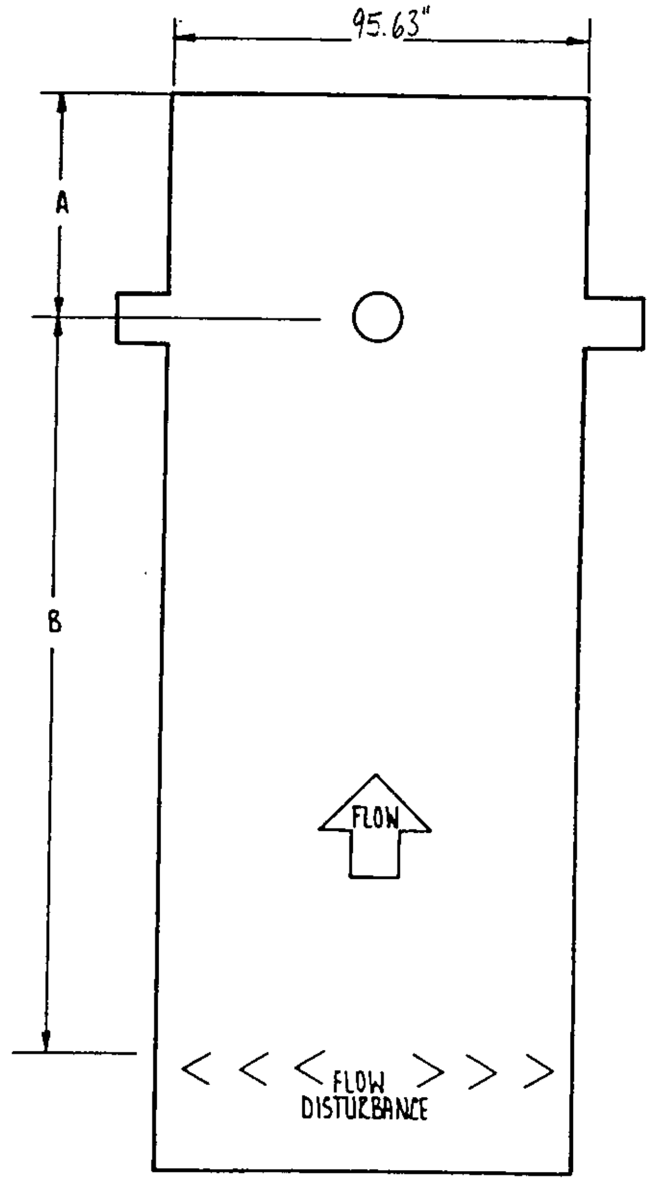


Figure 1. Location of sampling ports and traverse points

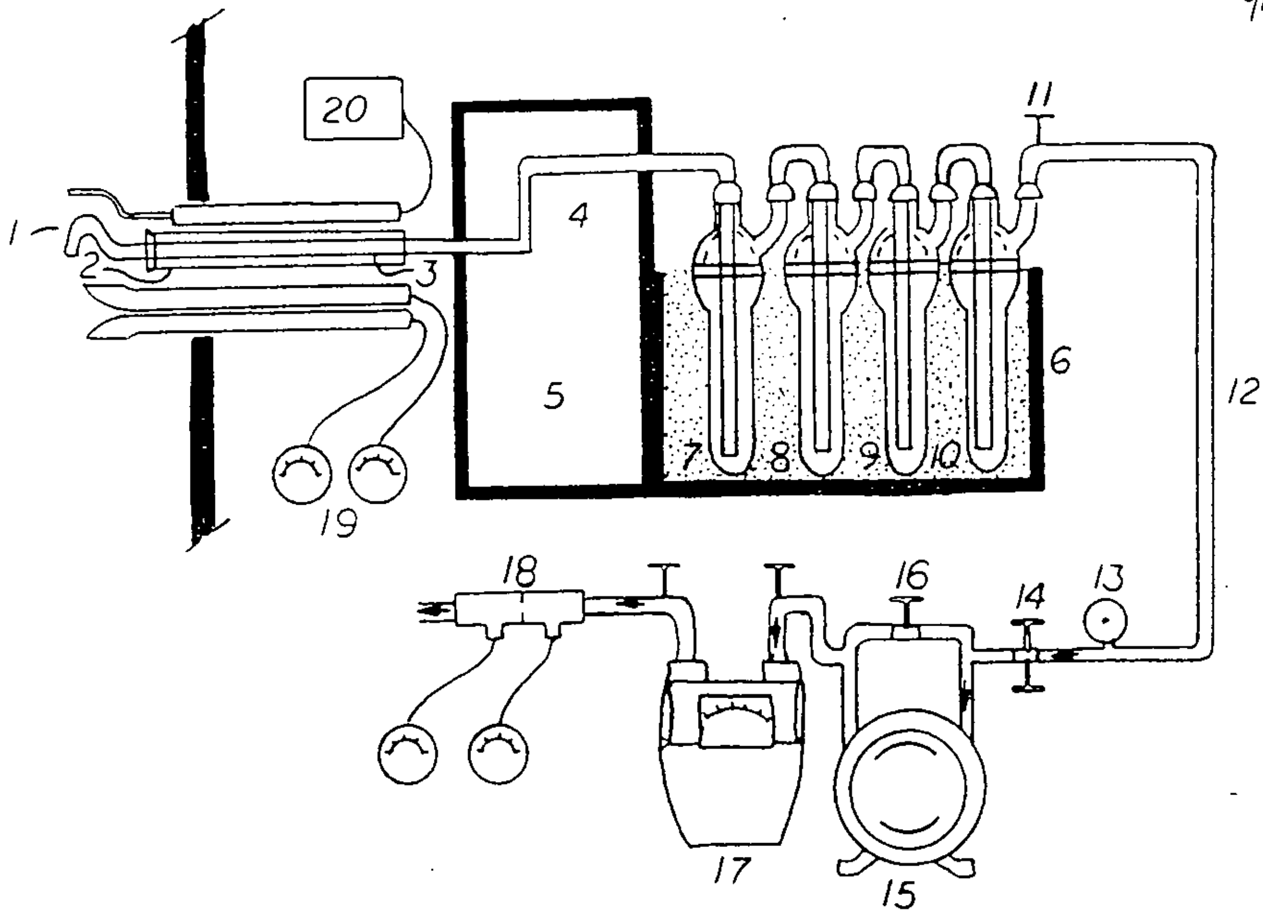


Figure 2 . EPA Method 4 Moisture Sample Train.

1. Sampling nozzle
2. Sampling probe sheath
3. Heated sample probe liner
4. Connective glassware
5. Heated compartment
6. Impinger case - contains ice during sampling
7. First impinger containing 100 ml H_2O
8. Modified Greenburg-Smith impinger containing 100 ml H_2O
9. Third impinger - empty
10. Fourth impinger containing indicating silica gel desiccant
11. Impinger exit gas temperature sensor
12. Umbilical cord - vacuum line
13. Vacuum gauge
14. Fine and coarse adjustment valves
15. Leak free pump
16. By-pass valve
17. Dry gas meter with inlet and outlet temperature sensors
18. Orifice meter with magnehelic gauges
19. S-type pitot tube with magnehelic gauges
20. Fluke multi-channel digital thermocouple indicator

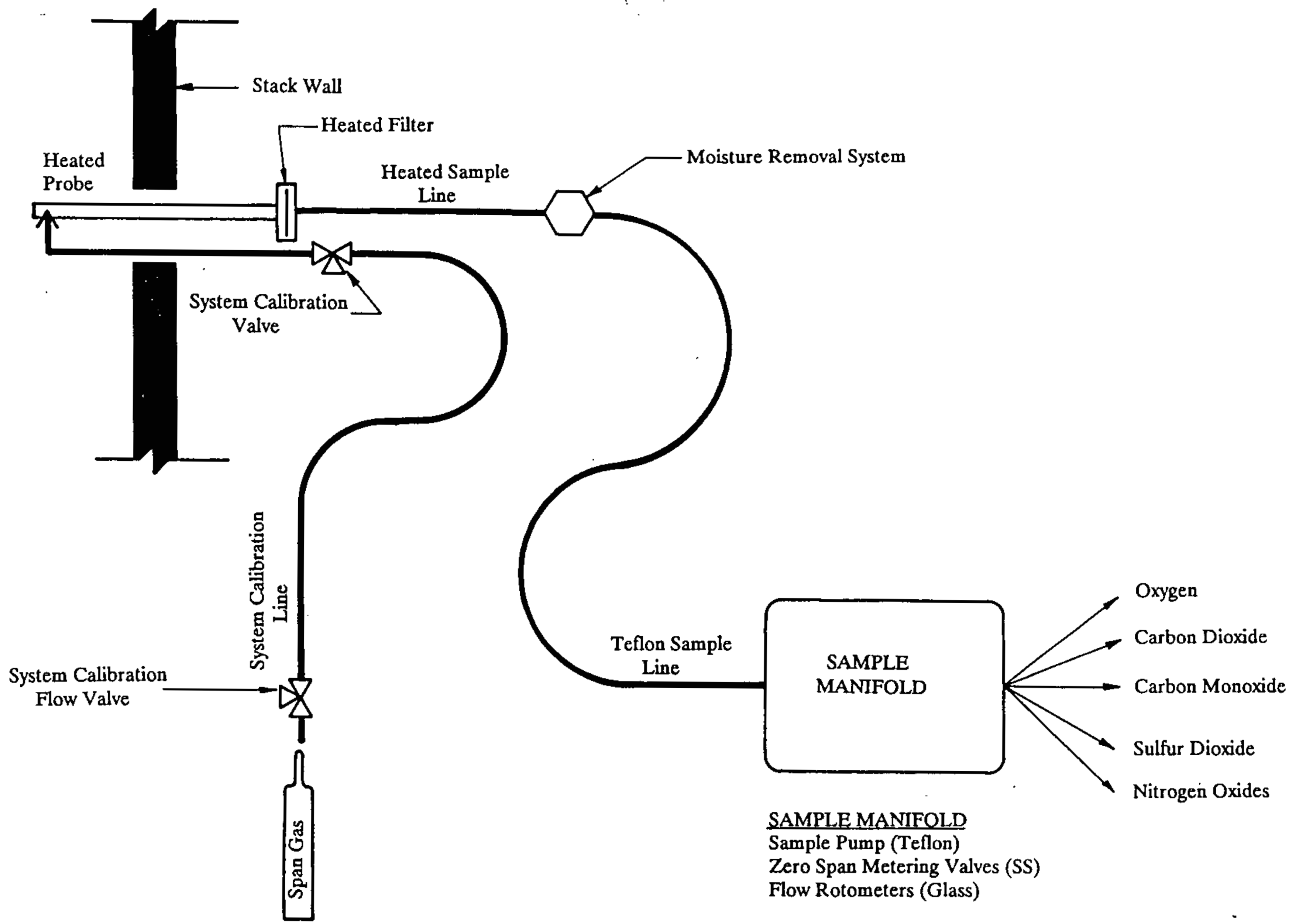


Figure 3 . EPA Method 3A, 6C, 7E and 10 Sample Train

METHOD 1 - LOCATION OF TRAVERSE POINTS

Circular Stacks

TRAVERSE POINT	DISTANCE, % of diameter
1	4.4
2	14.7
3	29.5
4	70.5
5	85.3
6	95.6

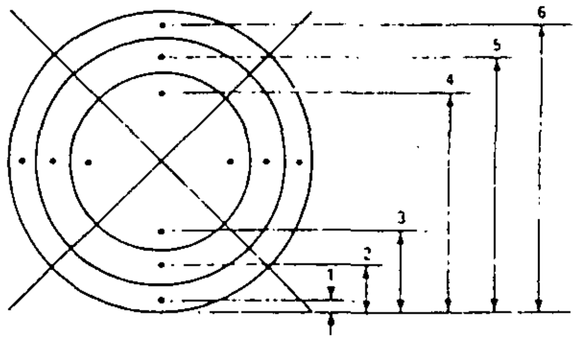


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

(Percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	65.4	80.6
18									98.6	93.3	88.4	83.9

Rectangular Stacks

For a rectangular cross section, an equivalent diameter (D_e) shall be calculated from the following equation, to determine the upstream and downstream distances:

$$D_e = \frac{2LW}{(L+W)}$$

where L=length and W=width.

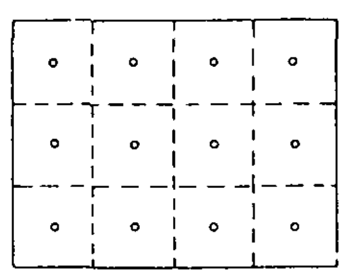


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

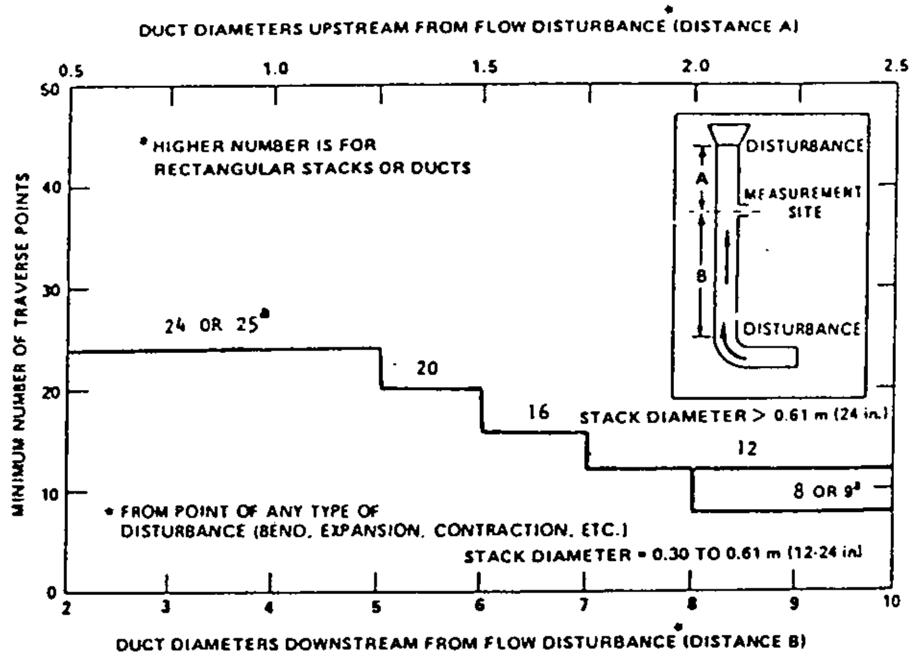


Figure 1-1. Minimum number of traverse points for particulate traverses.

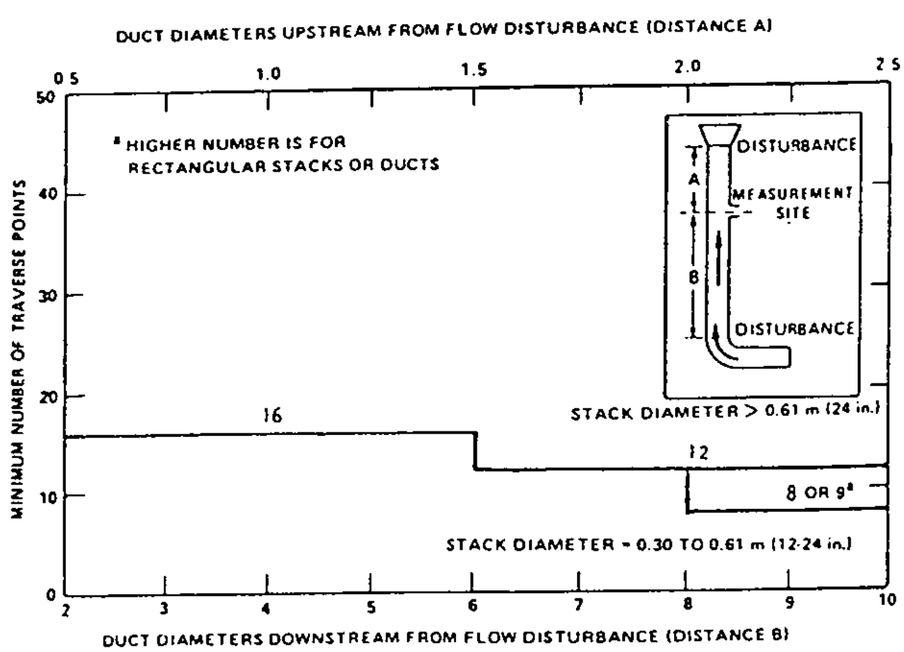


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

METHOD 2 - STACK GAS VELOCITY AND VOLUMETRIC FLOW CALCULATIONS

5.1 Nomenclature.

A = Cross-sectional area of stack, m^2 (ft^2).
B_{ws} = Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.
C_p = Pitot tube coefficient, dimensionless.
K_p = Pitot tube constant,

$$34.97 \frac{m}{sec} \left[\frac{(g/g\text{-mole})(mm\ Hg)}{(°K)(mm\ H_2O)} \right]^{1/2}$$

for the metric system and

$$85.49 \frac{ft}{sec} \left[\frac{(lb/lb\text{-mole})(in.\ Hg)}{(°R)(in.\ H_2O)} \right]^{1/2}$$

for the English system.
M_d = Molecular weight of stack gas, dry basis (see Section 3.6) g/g-mole (lb/lb-mole).
M_s = Molecular weight of stack gas, wet basis, g/g-mole (lb/lb-mole).
$= M_d (1 - B_{ws}) + 18.0\ B_{ws}$

Eq. 2-5

P_{bar} = Barometric pressure at measurement site, mm Hg (in. Hg).
P_g = Stack static pressure, mm Hg (in. Hg).
P_s = Absolute stack gas pressure, mm Hg (in. Hg).
$= P_{bar} + P_g$ Eq. 2-6

Eq. 2-6

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr).
t_s = Stack temperature, °C (°F).
T_s = Absolute stack temperature, °K, (°R).
$= 273 + t_s$ for metric.

Eq. 2-7

$= 460 + t_s$ for English.

Eq. 2-8

T_{std} = Standard absolute temperature, 293 °K (528° R).
v_s = Average stack gas velocity, m/sec (ft/sec).
Δ_p = Velocity head of stack gas, mm H_2O (in. H_2O).
3,600 = Conversion factor, sec/hr.
18.0 = Molecular weight of water, g/g-mole (lb/lb-mole).

5.2 Average Stack Gas Velocity.

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$$

Equation 2-9

5.3 Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{sd} = 3{,}600(1 - B_{ws}) v_s A \left(\frac{T_{std}}{T_{s\ (avg)}} \right) \left(\frac{P_s}{P_{std}} \right)$$

Eq. 2-10

METHOD 3 - MOLECULAR WEIGHT AND EXCESS AIR CALCULATIONS

6.1 Nomenclature.

M_d = Dry molecular weight, g/g-mole (lb/lb-mole).
%EA = Percent excess air.
$\%CO_2$ = Percent CO_2 by volume (dry basis).
$\%O_2$ = Percent O_2 by volume (dry basis).
%CO = Percent CO by volume (dry basis).
$\%N_2$ = Percent N_2 by volume (dry basis).
0.264 = Ratio of O_2 to N_2 in air, v/v.
0.280 = Molecular weight of N_2 or CO, divided by 100.
0.320 = Molecular weight of O_2 divided by 100.
0.440 = Molecular weight of CO_2 divided by 100.

6.2 Percent Excess Air. Calculate the percent excess air (if applicable), by substituting the appropriate values of percent O_2, CO, and N_2 (obtained from Section 4.1.3 or 4.2.4) into Equation 3-1.

% EA =

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

Eq. 3-1

NOTE: The equation above assumes that ambient air is used as the source of O_2 and that the fuel does not contain appreciable amounts of N_2 (as do coke oven or blast furnace gases). For those cases when appreciable amounts of N_2 are present (coal, oil, and natural gas do not contain appreciable amounts of N_2) or when oxygen enrichment is used, alternate methods, subject to approval of the Administrator, are required.

6.3 Dry Molecular Weight. Use Equation 3-2 to calculate the dry molecular weight of the stack gas

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

Eq. 3-2

METHOD 4 - STACK GAS MOISTURE CALCULATIONS

2.3.1 Nomenclature.

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

M_w = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

P_m = Absolute pressure (for this method, same as barometric pressure) at the dry gas meter, mm Hg (in. Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

R = Ideal gas constant, 0.06236 (mm Hg) (m³)/(g-mole) (°K) for metric units and 21.85 (in. Hg) (ft³)/(lb-mole) (°R) for English units.

T_m = Absolute temperature at meter, °K (°R).

T_{std} = Standard absolute temperature, 293° K (528°R).

V_m = Dry gas volume measured by dry gas meter, dcm (dcf).

ΔV_m = Incremental dry gas volume measured by dry gas meter at each traverse point, dcm (dcf).

$V_{m(std)}$ = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

$V_{wc(std)}$ = Volume of water vapor condensed corrected to standard conditions, scm (scf).

$V_{wsg(std)}$ = Volume of water vapor collected in silica gel corrected to standard conditions, scm (scf).

V_f = Final volume of condenser water, ml.

V_i = Initial volume, if any, of condenser water, ml.

W_f = Final weight of silica gel or silica gel plus impinger, g.

W_i = Initial weight of silica gel or silica gel plus impinger, g.

Y = Dry gas meter calibration factor.

ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).

2.3.2 Volume of Water Vapor Condensed.

$$V_{wc(std)} = \frac{(V_f - V_i)\rho_w R T_{std}}{P_{std} M_w}$$

$$= K_1 (V_f - V_i)$$

Eq. 4-1

K_1 = 0.001333 m³/ml for metric units
= 0.04707 ft³/ml for English units

2.3.3 Volume of Water Vapor Collected in Silica Gel.

$$V_{wsg(std)} = \frac{(W_f - W_i) R T_{std}}{P_{std} M_w}$$

$$= K_2 (W_f - W_i)$$

Eq. 4-2

Where:
K_2 = 0.001335 m³/g for metric units
= 0.04715 ft³/g for English units

2.3.4 Sample Gas Volume.

$$V_{m(std)} = V_m Y \frac{(P_m)(T_{std})}{(P_{std})(T_m)}$$

$$= K_3 Y \frac{V_m P_m}{T_m}$$

Eq. 4-3

Where:
K_3 = 0.3858 °K/mm Hg for metric units
= 17.64 °R/in. Hg for English units

NOTE: If the post-test leak rate (Section 2.2.6) exceeds the allowable rate, correct the value of V_m in Equation 4-3, as described in Section 6.3 of Method 5.

2.3.5 Moisture Content.

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

Eq. 4-4

NOTE: In saturated or moisture droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one using a value based upon the saturated conditions (see Section 1.2), and another based upon the results of the impinger analysis. The lower of these two values of B_{ws} shall be considered correct.

NOMENCLATURE
METHOD 5 CALCULATIONS

Vm_{std} = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

Y = Dry gas meter calibration factor

P_b = Barometric pressure at the sampling site, mm Hg (in. Hg)

H = Average pressure differential across the orifice meter, mm H_2O (in. H_2O)

T_m = Absolute average dry gas meter temperature, $^\circ$ K ($^\circ$ R)

dscm = Dry standard cubic meters

dscf = Dry standard cubic feet

W_a = Weight of residue in acetone wash

M_a = Mass of residue of acetone after evaporation, mg

C_a = Acetone blank residue concentration, mg/g

V_a = Volume of acetone blank

V_{aw} = Volume of acetone used in wash, ml

M_n = Total amount of particulate matter collected, mg

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, mg/dscm (gr/dscf)

gr/dscf = grains per dry standard cubic foot

Vw_{std} = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf)

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

M_d = Molecular weight of stack gas, g/g-mole on dry basis

M_s = Molecular weight of stack gas, g/g-mole on wet basis

V_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec)

C_p = Pitot tube coefficient, dimensionless

Δp = Velocity head of stack gas, mm H_2O (in. H_2O)

P_s = Absolute stack gas pressure, mm Hg (in. Hg)

NOMENCLATURE (continued)
METHOD 5 CALCULATIONS

Q_{std} = Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr)

dscf/min = dry standard cubic feet per minute (also identified as dcfm or scfm)

acfm = actual cubic feet per minute

I = Percent of isokinetic sampling

A_n = Cross-sectional area of nozzle, m^2 (ft^2)

AMTEST
AIR QUALITY, INC.

DRY GAS METER CALIBRATION
AM TEST - AIR QUALITY, INC.

FILE NAME: REMAN595.WK1
METER BOX #: Red Manometer
CALIBRATION DATE: 5-30-95
METHOD OF CALIB.: STANDARD DRY GAS METER (Method 5 Section 7.1)

TOTAL TIME min	DELTA H "H2O	METER VOL V1 cf	METER VOL V2 cf	TEMP IN deg F	TEMP OUT deg F	BARO. PRES. "Hg	STD DGM V1	STD DGM V2	ST.DGM TEMP IN deg F	ST.DGM TEMP OUT deg F	ST.DGM Yds FACTOR	Y FACTOR	DELTA H@
17.0	0.5	152.540	159.779	73.0	71.0	29.66	591.850	598.934	68.0	68.0	1.001	0.9858	1.613
10.0	1.0	160.000	165.985	75.0	71.0	29.66	599.160	605.050	69.0	69.0	1.001	0.9901	1.620
10.0	1.5	166.263	173.405	77.0	72.0	29.66	605.325	612.369	70.0	69.0	1.001	0.9929	1.699
10.0	2.0	173.605	181.880	79.0	73.0	29.66	612.568	620.745	71.0	70.0	1.001	0.9945	1.685
10.0	2.5	182.211	191.529	82.0	74.0	29.66	621.071	630.287	71.0	70.0	1.001	0.9979	1.655
10.0	3.0	191.785	202.046	84.0	76.0	29.66	630.542	640.695	71.0	71.0	1.001	0.9998	1.633
AVERAGE												0.993	1.651

[redacted] TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 6-21-93 Thermocouple Indicator # Red Man

Ambient Temperature 65 °F Barometric Pressure 29.4 in Hg

THERMOCOUPLE # OR REFERENCE	REFERENCE THERMOMETER TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE	
			°F	%
Red Marometer				
Meter in	33.	34	1	0.2%
	211	213	2	0.3%
Meter out	33	33	0	0.0%
	211	214	3	0.5%

$$\frac{(\text{ref temp, °F} + 460) - (\text{test therm. temp, °F} + 460)}{(\text{ref temp, °F} + 460)} * 100 \leq 1.5\%$$

AMTEST
AIR QUALITY, INC.

#1

STANDARD DRY GAS METER CALIBRATION DATA SUMMARY
AMTEST AIR QUALITY, INC.

PERFROMED BY HOMER R. DULIN CO.

Cal. DGM Ind, SCFH	Primary Standard SCFH	Yds
13.5	13.8	1.022
25.7	25.8	1.004
35.9	35.7	0.994
46.5	46.2	0.994
55.9	55.9	1.000
66.8	66.6	0.997
85.5	84.8	0.992
88.8	88.5	0.997
99.9	100.1	1.002
108.6	108.9	1.003
113.3	113.5	1.002
	AVG. Yds =	1.001

105

HOMER R. DULIN CO.

729 EAST WILLOW STREET
LONG BEACH, CALIFORNIA 90806
(310) 424-8533 (213) 636-4096 FAX (310) 426-7707

CERT. NO. 4-304-4

CALIBRATION CERTIFICATION

SUBMITTED BY: KRIS A. HANSEN CO.

FLOWMETER SERIAL No. 0302

MANUFACTURER EQUIMETER MFG. SERIAL No. 27688

TUBE No. FLOAT No.
MODEL NO.: T-110

REMARKS: CALIBRATED IN CFH AIR @ 14.7 PSIA & 70 DEG F.

ACCURACY: SEE DATA

INDICATED		ACTUAL	
CFH		CFH	
113.3		113.5	
108.6		108.9	
99.9		100.1	
88.8		88.5	
85.5		84.8	
66.8		66.6	
55.9		55.9	
46.5		46.2	
35.9		35.7	
25.7		25.8	
13.5		13.8	

Flowmeter Certified with HOMER R. DULIN CO.

Equipment No. 12400 Accuracy 0.2% Calib. Due 5-28-94
Procedure No. 101G
NIST Cert. No. 821/249576-92

Our standards are certified by or are traceable to the National Institute of Standards and Technology and comply with MIL-STD-45662A.

P.O. No. 06330 Shipper No.

4-18-94 — CALIBRATION DATE

4-18-95 — RECALIBRATION DATE

B. Richardson — CALIBRATION TECHNICIAN
B. RICHARDSON

TYPE S PITOT TUBE INSPECTION DATA FORM

Date 5-18-95 Pitot Tube # P8.0-994

Client Louisiana-Pacific

Location Chilco, Idaho

Site(s) RTO Exhaust Stack

Test Date(s) August 1, 1995

Pitot tube assembly level? ✓ yes ____ no

Pitot tube openings damaged? ____ yes (explain below) ✓ no

α_1 = 1 ° (<10°), α_2 = 1 ° (<10°), β_1 = 0 ° (<5°),

β_2 = 0 ° (<5°)

γ = ____ °, θ = ____ °, A = ____ cm (in.)

$z = A \sin \gamma$ = 0.010" cm (in.); <0.32 cm (<1/8 in.),

$w = A \sin \theta$ = 0.005" cm (in.); <.08 cm (<1/32 in.)

P_A 0.547 cm (in.) P_b 0.543 cm (in.)

D_t = 1.090" cm (in.)

Comments:

Calibration required? ____ yes* ____ no

*If yes, tag and take out of service until repaired.

SECTION 1. DESCRIPTION

1.1 General

The Servomex 1400B series of gas analysers comprises two base units, the 1410B analyser using dual wavelength, single beam infrared technique and the 1420B/1421B oxygen analysers using paramagnetic technology. This manual describes the 1420B oxygen analyser.

The 1400B series may be fitted into a twin unit 19" rack mounted case, a bench top case or a single unit case for flush panel mounting.

The 1420B has voltage and current outputs, multiple ranges, oxygen level alarms, flow alarm and remote range indication.

A version of the analyser is available for oxygen purity measurements.

Included with the analyser are the following accessories:

Fuses	2531-0526
Filters	2377-3608
'D' connectors	2535-7127 (plug)
	2535-7374 (socket)
'D' connector hoods	2535-7088
Manual	01420001B
IEC Power connector	2533-1437

A 3 1/2 digit green LED indicates the oxygen content to 0.1% resolution.

WARNING

This analyser is not suitable for use in hazardous areas or for measuring flammable sample gases.

1.2 Principles of Operation

The 1420B oxygen analyser measures the paramagnetic susceptibility of the sample gas by means of a magneto-dynamic type measuring cell.

Oxygen is virtually unique in being a paramagnetic gas, this means that it is attracted into a magnetic field. In the Servomex measuring cell the oxygen concentration is detected by means of a dumb-bell mounted on a torque suspension in a strong, non-linear magnetic field. The higher the concentration of oxygen the greater this dumb-bell is deflected from its rest position. This deflection is detected by an optical system and twin photo-cells connected to an amplifier. Around the dumb-bell is a coil of wire. A current is passed through this coil to return the dumb-bell to its original position. The current is measured and is proportional to the oxygen concentration.

1.3 Sampling System

The sampling system of the analyser includes a combination filter/automatic flow control device, designed to keep a constant flow of sample gas through the measuring cell for varying input pressures and to prevent the entrance of particulate matter into the measuring cell. Excess flow is vented to the by-pass.

An optional back pressure regulator is available for high oxygen concentrations to reduce the errors which would occur due to changes in barometric pressure.

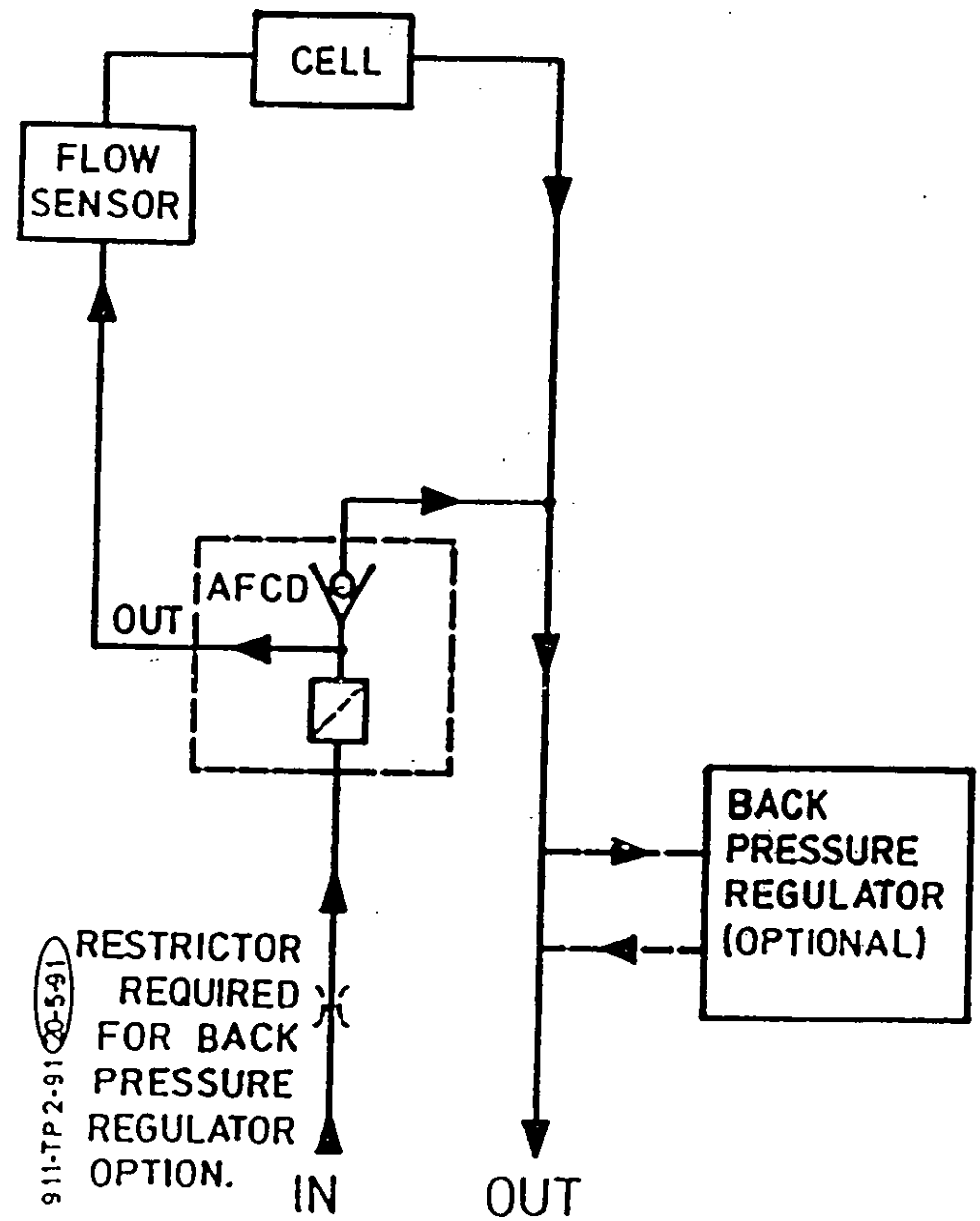


Figure 1.1 Schematic of Sampling System

1.4 Use With Toxic or Flammable Gases

1.4.1 Toxic Gases

If the analyser is used with sample gases which may be toxic, asphyxiant or otherwise harmful to health then adequate precautions should be taken to ensure safe installation and operation.

These precautions could, for example, include ensuring good quality sample piping to reduce the possibility of leaks, regular leak checking of the analyser and sample piping, minimum sample pressure, adequate ventilation of enclosed spaces and the possibility of monitoring for toxic levels.

The analyser vent should be piped to a well ventilated area.

1.4.2 Flammable Gases

WARNING

This analyser is not suitable for use in hazardous areas or for measuring flammable sample gases.

Consult Servomex for details of analysers which may be more suitable for measuring sample gases which can be toxic or flammable.

1.5 Specification

Performance Specification (typical)

Repeatability:	Better than ±0.1% O_2 under constant conditions (measured at the IV electrical output).
Temperature coefficient:	±0.005% O_2 ±0.04% of reading(on display) per °C change from calibration temperature.
Response Time:	Less than 15 seconds to 90%. At point when flow alarm is triggered the response time will be approximately 50 seconds

Outputs

Display:	3 1/2 digit LED reading 0.0 to 100.0% oxygen with overrange capability.
Output:	4-20mA (isolated), maximum load 600 ohms. Isolation 110V ac. 0-1V (unisolated), minimum load 1000 ohms for range selected.

Alarm outputs:

Oxygen level:	2 oxygen level alarms, SPCO relay contacts rated at 1A/110V AC or 1A/28V DC, non-inductive. Can be configured to high or low. Independent of range.
Flow fail:	SPCO relay contacts rated at 1A/110V AC or 1A 28V DC, non-inductive.
Local alarm:	Red LED lamps flash when alarm active.

Sample requirements

Condition:	Clean, dry gas with dew point 5°C below ambient temperature.
Inlet pressure: (Standard)	3.5 to 70kPa (0.5 to 10psig). Inlet pressure changes within this range will change the reading by less than 0.1% O_2.
(With back-pressure regulator)	17kPa to 35kPa (2.5 to 5 psig). Pressure values will be increased by 1 psig for every 2000ft(10Pa per 1000m) altitude above sea level.
Flowrate:	1 to 6 litres/minute approximately depending on sample pressure. Version with back pressure regulator: 1 - 2 litres/min
Filtering:	0.6 micron replaceable filter integral to the automatic flow control device.
Materials exposed to the sample:	Stainless steel, Pyrex glass, brass, platinum, epoxy resin, Viton, nylon, neoprene, polypropylene and glass fibre filter.
Gas connection:	6.4mm (1/4") OD tube.

Physical Characteristics

Case:	Steel and aluminium finished in epoxy powder paint.
Case classification:	IP 20 (IEC 529) when fitted into the Servomex 1400 series 19 inch case.

Dimensions:	See Figure 2.1.
Weight:	5Kg (11lb) approximately.
<u>Electrical</u>	
AC Supply:	88 to 264V, 47 to 440Hz.
Power required:	50VA.
<u>Environmental Limits</u>	
Operating ambient temperature:	0 to +45°C (32 to 113°F) 0 to 40°C (32 to 104°F), when fitted in bench top case.
Storage temperature range:	-20 to +70°C (-4 to 158°F)
Relative humidity:	0-85%, non-condensing.
Sunlight:	Protect from direct sunlight which may cause the interior of the analyser to overheat.
Vibration:	Protect the analyser from excessive vibration.
EMC:	Complies with EN 50022(1987) CLASS A for conducted interference and radiated electric field.

1.6 Product Identification

A label is fitted to the rear panel giving the model and serial numbers. It is of the form 1420/B701/NNNN where NNNN is the serial number

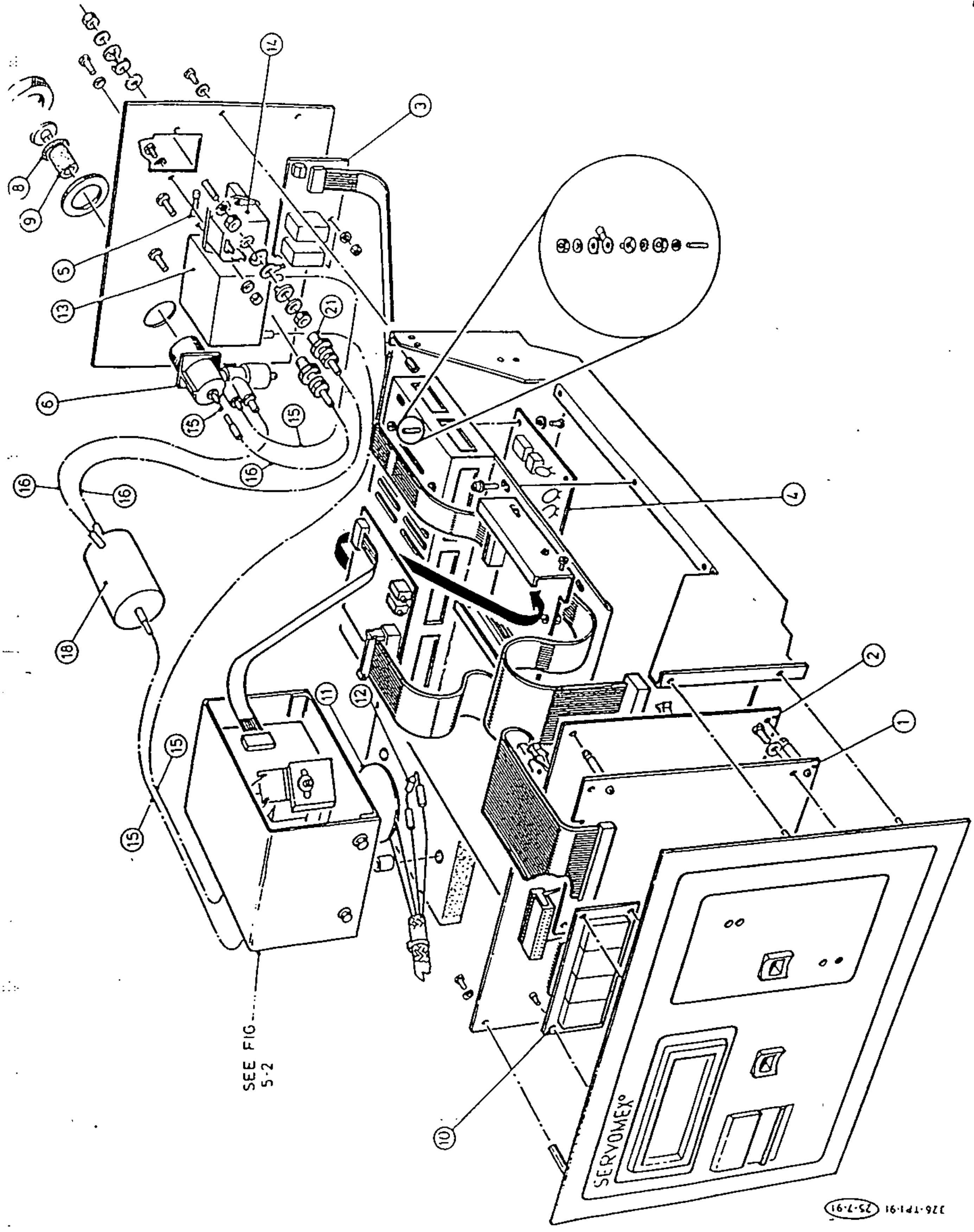


Figure 5.1 Exploded View 1420B Oxygen Analyser

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Servomex

1410B
Infrared Analyser
Instruction Manual

Ref : 01410/001B/0
Order as part No. 01410001B

Certificate No.________Q5166
ISO 9001 (1987)
EN 29001 (1987)
BS 5750 Part 1 (1987)

CUSTOMISED CIRCUIT VARIABLES

The 1400 display pcb (01410902/0) on this instrument is fitted with ~~standard~~/special resistor values and switch settings, as follows :-

Resistors		Special Switch 1 Settings	
R8	~~8K0/~~	1/1	ON
R9	9K0	1/2	ON
R10	~~1K0/~~	1/3	OFF
R11	500R	1/4	ON
R12	500R	1/5	ON
R13	500R	1/6	ON
R14	500R	1/7	ON
R15	500R	1/8	ON

Standard Switch 1 settings are listed on Page 18 of the manual.

Section 1. Description and Specification.

1.1 General

This manual describes the Servomex 1410 infra-red gas analyser.

The 1410 is supplied for packaging into a 19 inch rack , 4U high, case. A suitable case is available from Servomex, part number 00022905.

If the 1410 is not fitted into a suitable protective case by Servomex (eg. when the 1410 is supplied as an OEM chassis) it is then the responsibility of the user to ensure that suitable precautions are taken so that the level of protection is adequate for the intended environment.

A 3 1/2 digit LED display indicates the gas concentration

The analyser has built-in alarms for flow failure, instrument fault and high concentration level. These alarms have indicating LED's on the front panel. An alarm relay is fitted inside the unit and can be selected by the user to operate on any one of these alarm conditions.

A switch on the analyser's front panel selects the measurement range. Pins on the rear of the analyser allow connection of a remote range change switch which, if connected, overrides the front panel switch.

WARNING

This analyser is not suitable for use in hazardous areas or for measuring hazardous gas mixtures

1.2 Specification

Principle:	Infra-red. Single beam dual wavelength.
Accuracy:	Subject to available standards or gas mixtures. Typically better than +/- 2% FSD.
Linearity:	Better than +/- 1% FSD.
Repeatability:	Better than +/- 1% FSD
Zero drift:	Less than 2% FSD per week
Effect of sample cell contamination:	Less than 1% FSD for 50% cell window obscuration, due to broad band contamination.
Temperature coefficient:	Zero - less than 0.2% FSD per deg C Span - less than 0.4% of reading per deg C (includes gas law effect).

Sample pressure coefficient:	Less than 0.15% of reading per mbar
Response time:	Typically 30 seconds to 90%.
Electrical output:	0 to 1V, isolated, min load 1K and 4 to 20mA, isolated, max load impedance 500R. Note that the current and voltage outputs are not isolated from each other.
Operating ambient temperature:	0 to 40 deg C (32 to 104 deg F).
Relative humidity:	5 to 85% non-condensing.
Storage temperature:	-20 to +70 deg C (-4 to 158 deg F).
Storage relative humidity:	80% RH maximum.
AC supply;	120 or 240V AC, +/-10%, 45/65Hz. Max load 30VA.

Alarms

Instrument/level/ flow alarm: This alarm can be configured to operate in different ways:-

1. As a concentration alarm only
2. As an instrument fault alarm only
3. As a flow alarm

4 sets of changeover relay contacts rated at 3A/120V, 1A/240V AC or 1A/28V DC.
Relay de-energises on alarm or power failure.
See section 2.3.1 for details of how to configure these alarms.

Additional Gas Concentration Alarm: Change over relay contacts rated at 1A/28V AC or DC . Relay de-energises on high concentration or power fail.

Sample Requirements

Pressure:	0.9 to 1.1 bar absolute.
Flowrate:	Typically 100ml/min to 1 litre/min.
Materials in contact with the sample:	Stainless steel, Viton, sapphire/CaF2, UPVC, as standard.
Gas connection:	6.4mm (1/4in) OD tube, suitable for push-on tubing or 1/4 inch compression fittings.

Section 4. Principles Of Operation And Product Description

4.1 Description Of The 1410

The 1410 analyser comprises two major assemblies:-

1. 12X1 infrared bench (see appendices A-D)
2. Front panel assembly (see figure 4.1)

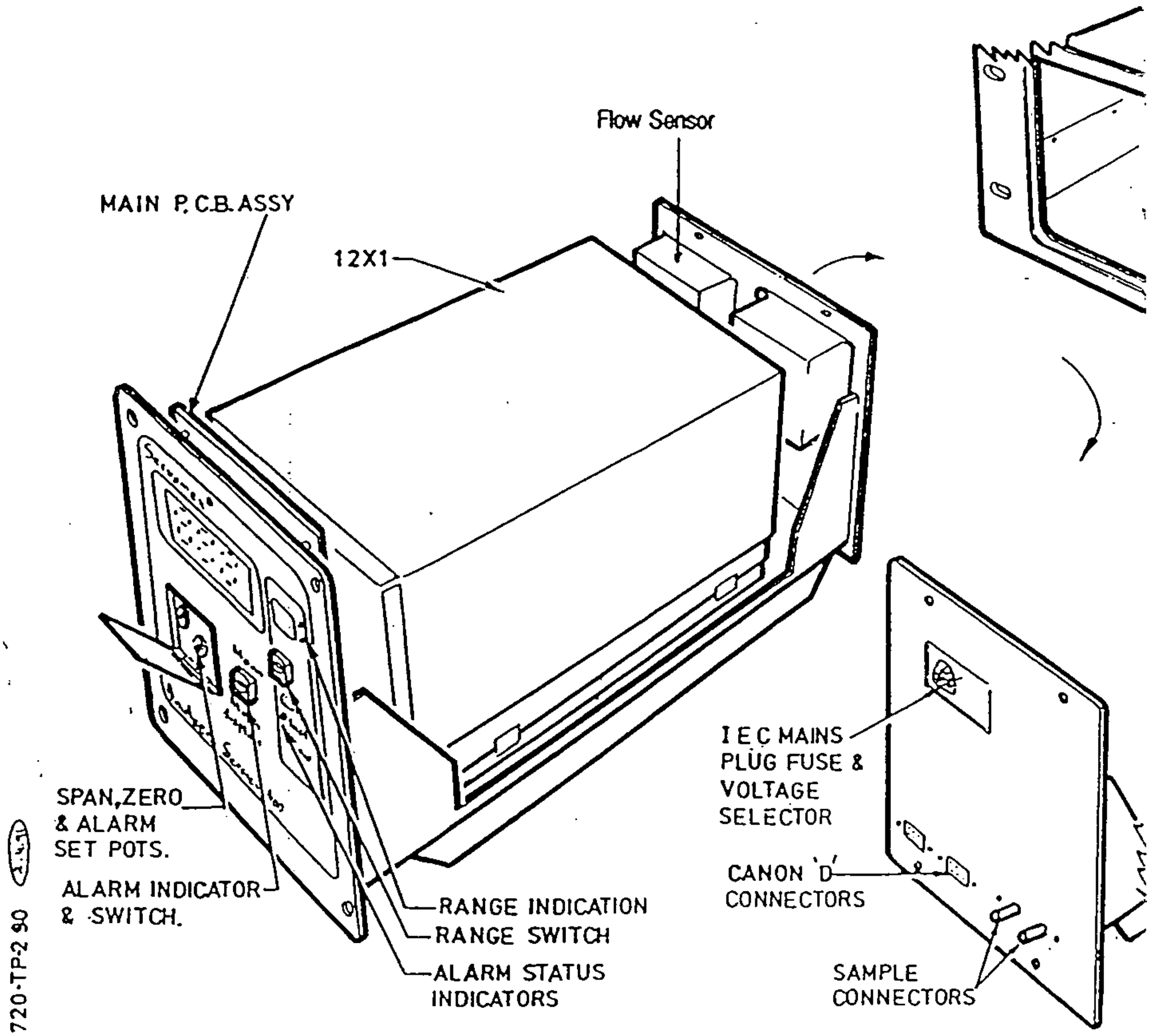


Figure 4.1 General Construction

Thermo Environmental Instruments Inc.

Gas Filter Correlation CO Analyzer 118

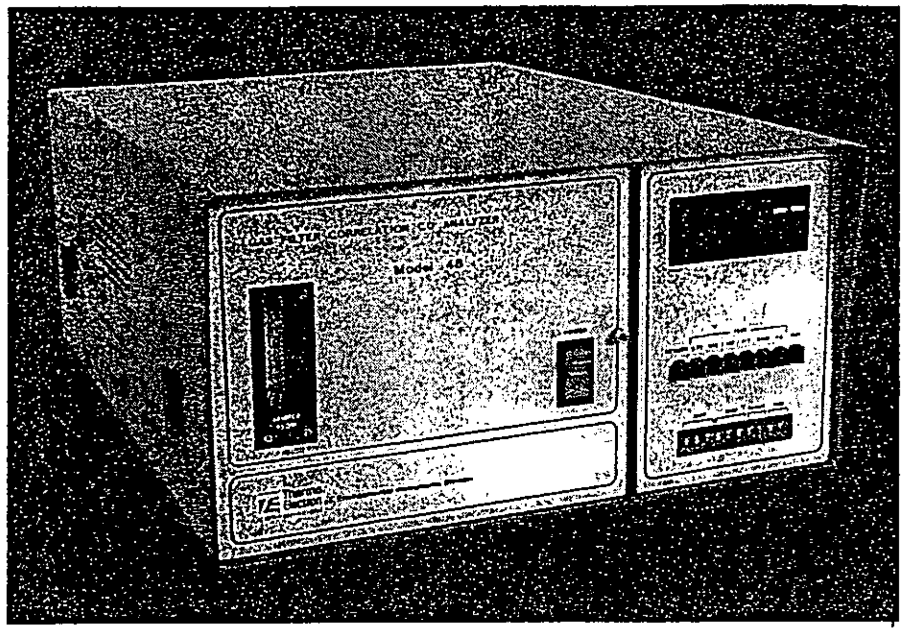
Model 48

For Continuous Ambient Air Monitoring

Thermo Electron's Microprocessor Based Model 48 Ambient CO Analyzer provides unequaled ease of operation, reliability, precision and specificity. The unique Gas Filter Correlation principle of operation offers the significant advantages of unequaled specificity and sensitivity and increased resistance to shock and vibration.

Key Features

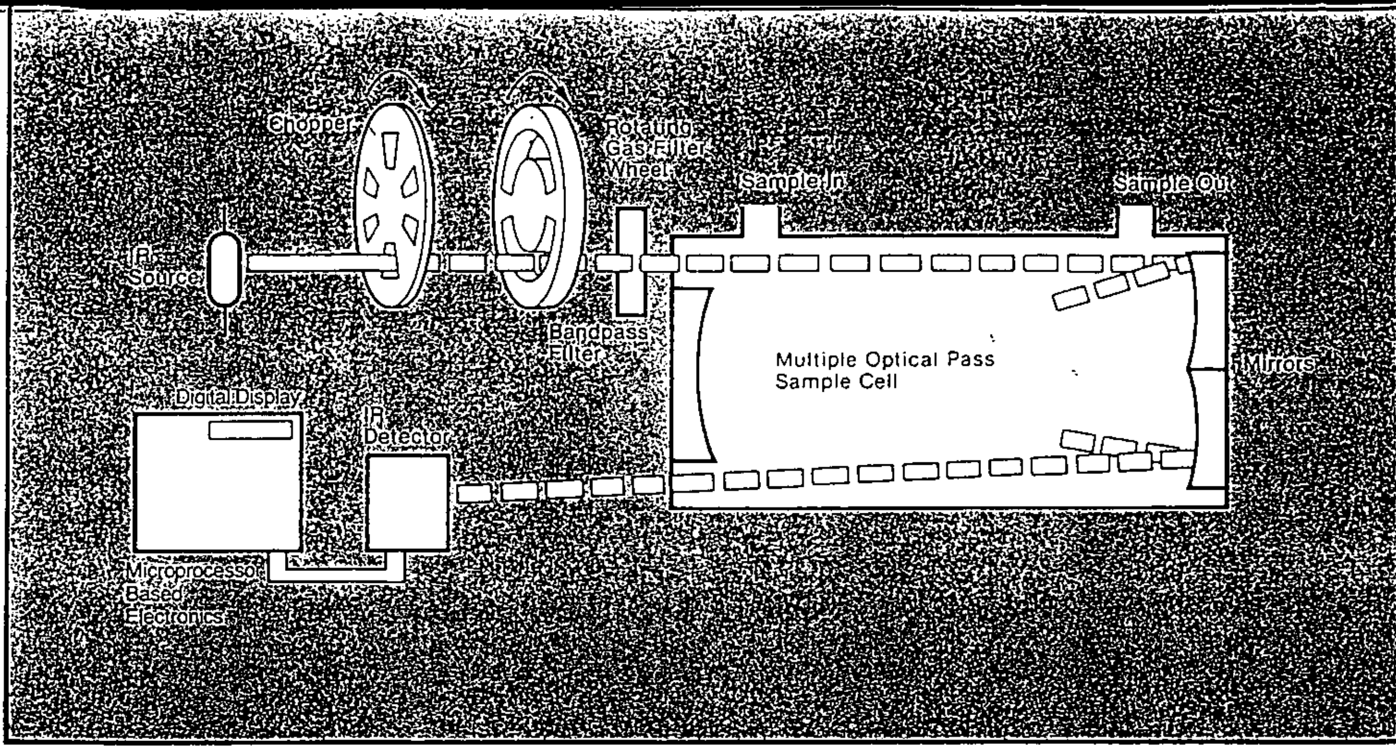
- Microprocessor Based
- Automatic pressure and temperature correction
- Dual fully independent outputs standard
- Hourly average output standard
- Lower ranges, wide dynamic range (suitable for both ambient and source)
- Highly specific to CO
- Long term zero and span stability
- Vibration and shock resistant
- Powerful diagnostics made possible by microprocessor
- Linear through all ranges
- Unaffected by changes in flow
- Self-aligning optics
- U.S.A.—EPA reference method RFCA-0981-054, range 0-50ppm time constant — 30 seconds



Model 48 Specifications

Ranges	0-1, 0-2, 0-5, 0-10, 0-20, 0-50*, 0-100, 0-200, 0-500, 0-1000 ppm
Zero Noise	0.05 ppm RMS — With time constant = 30 seconds
Minimum Detectable Limit	0.10 ppm
Zero Drift, 24 Hours	± 0.2 ppm
Span Drift, 24 hours	± 1% Full Scale
Rise/Fall Times (0-95%) (at 1 ~~ppm~~ flow, 30 second integration time)	1 minute
Precision	± 0.1 ppm
Linearity	± 1%
Flow Rate	1 lpm standard
Rejection Ratio	Negligible interference from water and CO_2
Operating Temperature	Performance specifications maintained over the range 15–35° C (may be operated safely over the range 5–45° C)
Power Requirements	100 Watts; 105–125 VAC, 60Hz; 220-240VAC 50Hz
Physical Dimensions	17" wide × 8¾" high × 23" deep
Weight	45 lbs.
Dual Outputs (standard)	Selectable to 0-10mV, 0-100mV 0-1V, 0-5V, 0-10V; digital display; 1 hour integrated value. Other outputs available upon request (4-20ma, IEEE488)

* See Federal Register, Tuesday, February 18, 1975, Volume 40, Number 33, Part II for definitions and Federal specifications. Performance specifications over 15-35°C range.



Principle of Operation

The basic components of a Gas Correlation System are illustrated in the above diagram. Radiation from an infrared source is chopped and then passed through a gas filter which alternates between CO and N_2 due to Rotation of the filter wheel. The radiation then passes through a narrow bandpass filter and a multiple optical pass sample cell where absorption by the sample gas occurs. The IR radiation exits the sample cell and falls on a solid state IR detector.

The CO gas filter acts to produce a reference beam which cannot be further affected by CO in the sample chamber. The N_2 side of the filter wheel is transparent to IR radiation and therefore produces a measure beam which *can* be absorbed by CO. The chopped detector signal is modulated by the alternation between the two gas filters with an amplitude proportional to the concentration of CO in the sample chamber. Other gases do not cause modulation of the detector signal since they absorb the reference and measure beams equally. Thus, the Gas Filter Correlation System responds solely to CO.

Options

48-001 — Particulate Filter

48-002 — Rack Mounts

48-003 — Remote activation of zero and span solenoids.

Thermo Environmental Instruments Inc.
8 West Forge Parkway
Franklin, MA 02038
(508) 520-0430
Telex: 200205 THEMO UR
FAX: (508) 520-1460

Printed in U.S.A 10/89 5M

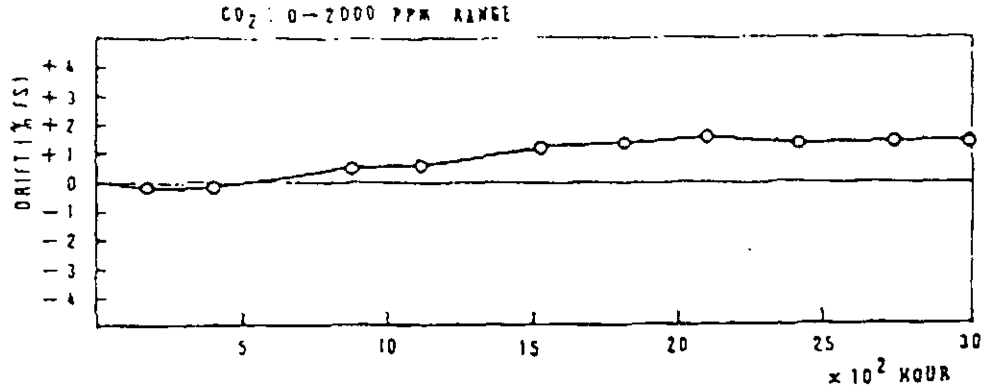


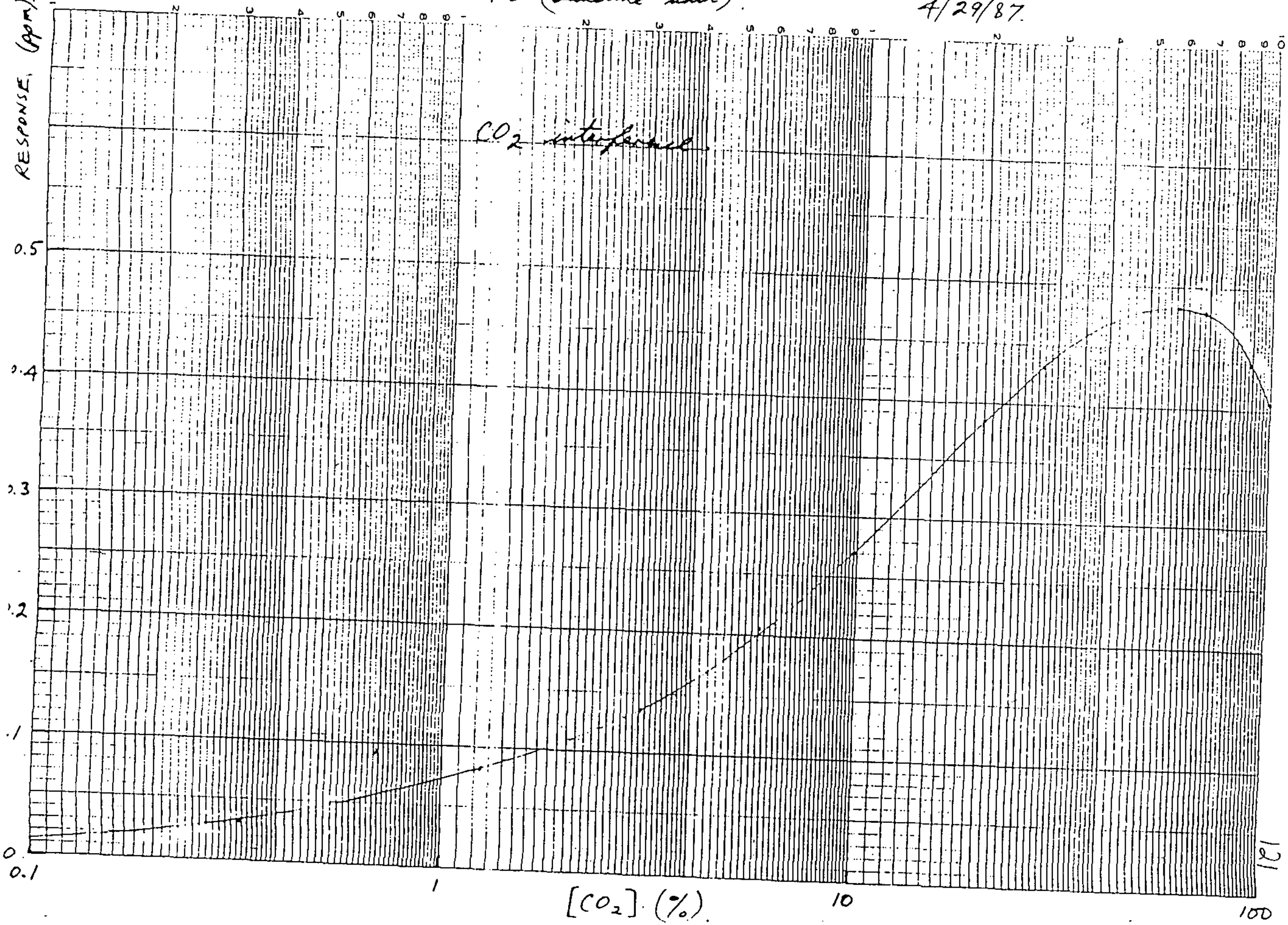
FIGURE 9 ZERO DRIFT

INTERFERENT COMP. / RANGE	CO 1000 PPM	CO_2 20%	SO_2 1000 PPM	H_2O 25°C SAT.
CO : 0—1000 PPM	———	0.02 %FS	≃ 0	−0.5 %FS
CO_2 : 0—400 PPM	0.12 %FS	———	≃ 0	−0.5 %FS

TABLE 1 . INTERFERENCE

3 CYCLES X 10 DIVISIONS PER INCH

MODEL A8 (Baseline unit) 4/29/87



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663680

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BOC GASES

An operating unit of The BOC Group, Inc

Union Landing & River Roads
P.O. Drawer No. 272
Riverton
New Jersey 08077
Telephone: Marketing; 609-829-7878
Prod. & Admin.; 609-829-7914
International; 609-829-7917

ANALYTICAL REPORT

To: General Welding Supply
3623 E. Marginal Way So.
Seattle, WA 98134

Date Reported: 12-12-94
Test Number: 4C889
Fill Date: 11-23-94

Material Submitted: 600ppm CO,10%O2,12%CO2/N2

Specification Number: Primary Standard

Method of Analysis: Non-Dispersive Infrared Analyzer, Percent Oxygen Analyzer

Result of Investigation: Cylinder No. CC-2895

Component	Specification	Concentration
* Carbon Monoxide	600 ppm	556 ppm
** Oxygen	10%	9.28%
** Carbon Dioxide	12%	11.06%
Nitrogen	Balance	Balance

* Primary Standard Analytical Accuracy +/- 2.0% Relative
** Primary Standard Analytical Accuracy +/- 0.02% Absolute

By J. Loney
Authorized Signature

ORM NO. 037-002

BOC GASES
An operating unit of The BOC Group, Inc
Union Landing & River Roads
P.O. Drawer No. 272
Riverton
New Jersey 08077
Telephone: Marketing; 609-829-7878
Prod. & Admin.; 609-829-7914
International; 609-829-7917

698206

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ANALYTICAL REPORT

To: General Welding Supply
3623 E. Marginal Way So.
Seattle, WA 98124

Date Reported: 05-22-95
Test Number: 54184
Fill Date: 05-10-95

Material Submitted: 300ppm CO,6%CO2,15%O2/N2

Specification Number: N/A

Method of Analysis: Non-Dispersive Infrared Analyzer, Percent Oxygen Analyzer

Analyzed: Cylinder No. CC-4302 Size 152, CGA 590 2000 psi

Component	Specification	Concentration
* Carbon Monoxide	300 ppm	296 ppm
** Carbon Dioxide	6%	5.98%
** Oxygen	15%	15.01%
Nitrogen	Balance	Balance

* Primary Standard Analytical Accuracy +/- 2% Relative

** Primary Standard Analytical Accuracy +/- 0.02% Absolute

By [signature]
Authorized Signature

FORM NO. 037-002

AIRCO

To: General Welding Supply

Expiration Date: 12/17/97
Customer P.O.: 397390
Balance Gas: Nitrogen
CAS 7727-37-9

Certification of Analysis - EPA Protocol Gas
Performed According to Section 3.0.4

Certified Per Traceablity Procedure # G1
Certified Accuracy 1% NIST Protocol # 1

Test Number: 40318
Cylinder Number: CC-26883
Fill Date: 12/06/94
Cylinder Pressure: 2000 PSIG
Certification Date: 12/17/94
Location: Riverton, N.J.

Component	Certified Concentration	GMIS No.	GMIS Conc.	Cylinder Number	Serial Number	Analytical Procedure	Make	Model	Calibration Date
Carbon Monoxide	30.1 ppm	GMIS	50.3 ppm	CC-93519	48-46045-275	Non-dispersive Infrared	Thermo Envir	48	11/23/94

CAS 630-08-0

First Analysis — Analyst: M. McAveety — Date: 12/10/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	4956	2970	30.1 ppm
0000	4949	2962	30.1 ppm
0000	4947	2966	30.2 ppm
		Average-	30.1 ppm

Second Analysis — Analyst: M. McAveety — Date: 12/17/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	4970	2972	30.1 ppm
0000	4960	2972	30.1 ppm
0000	4962	2970	30.1 ppm
		Average-	30.1 ppm

This Calibration Standard has been Certified versus EPA Traceability Protocol # 1, Procedure G1, and Analysis performed per section 3.0.4
Certified Concentration: Balance = Nitrogen, Carbon Monoxide=30.1 ppm

APPROVED BY [signature]
Laboratory Manager

EPA PROTOCOL

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AIRCO

To: General Welding-Hansen

Expiration Date: 03/07/97
Customer P.O.: 244165/K.Hansen
Balance Gas: Nitrogen
CAS 7727-37-9

Certification of Analysis - EPA Protocol Gas Performed According to Section 3.0.4

Certified Per Traceablity Procedure # G1
Certified Accuracy 1% NIST Protocol # 1

Test Number: 41242
Cylinder Number: CC-17765
Fill Date: 02/19/94
Cylinder Pressure: 1650 PSIG
Certification Date: 03/07/94
Location: Riverton, N.J.

Component	Certified Concentration	GMIS No.	GMIS Conc.	Cylinder Number	Serial Number	Analytical Procedure	Make	Model	CAS 630-08-0 Calibration Date
Carbon Monoxide	11.8 ppm	GMIS	24.7 ppm	CC-62780	48-46045-275	Non-dispersive Infrared	Thermo Envir	48	02/01/94

First Analysis Analyst: A. Lattanze Date: 02/28/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2512	1194	11.7 ppm
0000	2506	1193	11.8 ppm
0000	2507	1197	11.8 ppm
		Average-	11.8 ppm

Second Analysis Analyst: A. Lattanze Date: 03/07/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2544	1220	11.8 ppm
0000	2538	1218	11.9 ppm
0000	2548	1222	11.8 ppm
		Average-	11.8 ppm

Component	Certified Concentration	GMIS No.	GMIS Conc.	Cylinder Number	Serial Number	Analytical Procedure	Make	Model	CAS 7782-44-7 Calibration Date
Oxygen	14.2 %	GMIS	20.1 %	CC-13707	BW-805	Paramagnetic	Siemens	5E	02/01/94

First Analysis Analyst: A. Lattanze Date: 02/28/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2066	1456	14.2 %
0000	2066	1456	14.2 %
0000	2068	1456	14.2 %
		Average-	14.2 %

Second Analysis Analyst: A. Lattanze Date: 02/28/94

Zero Gas	Reference Gas	Sample Gas	-- Concentration
0000	2066	1456	14.2 %
0000	2066	1456	14.2 %
0000	2068	1456	14.2 %
		Average-	14.2 %

This Calibration Standard has been Certified versus EPA Traceability Protocol # 1, Procedure G1, and Analysis performed per section 3.0.4
Certified Concentration: Balance = Nitrogen, Carbon Monoxide=11.8 ppm, Oxygen=14.2 %

APPROVED BY J. Long
Laboratory Manager

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AMTEST AIR QUALITY, INC.

RESUME OF KRIS A. HANSEN, QEP

PRESIDENT
AM TEST-AIR QUALITY, INC.
AM TEST ALASKA

EDUCATION

- B.S., Chemistry, Central Washington University, 1973
- Coursework and 2.5 years research completed towards M.S., Chemistry, Central Washington University
- Several workshops, courses and conferences annually on the subjects of continuous emission monitoring systems (CEMS), Title III MACT, Title V operating permits, enhanced monitoring, and advanced emission measurement.

PROFESSIONAL MEMBERSHIPS/CERTIFICATIONS

- Institute of Professional Environmental Practice (IPEP), Qualified Environmental Professional (QEP), July 1995
- Air and Waste Management Association (A&WMA), Fellow Member (since 1978)
- Pacific Northwest International Section of A&WMA (PNWIS)
- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Am Test-Air Quality, Inc. was formed under the direction of Mr. Hansen in 1982. This company conducts full-service source testing activities. Mr. Hansen follows developments in EPA testing methodology and has developed sampling and analysis techniques for many sources for which EPA guidelines are not available. He has worked at numerous types of industrial facilities, including refineries, power plants, nuclear plants, aluminum plants, wood products facilities, smelters, incinerators, and other industrial sources throughout the United States and internationally. Mr. Hansen manages an experienced field testing and laboratory analysis staff. He manages all phases of project development, including cost estimation, scheduling, sample collection, analysis and report preparation. He also manages all other aspects of the business, including business development and personnel issues.

Prior to joining Am Test, Inc., Mr. Hansen's professional experience included 4.5 years with an environmental consulting firm, and 2 years as a laboratory instructor and research fellow while attending graduate school at Central Washington University, where his research emphasis was in gas chemistry. Mr. Hansen has 18 years of professional experience.

Mr. Hansen has assisted in the instruction of EPA Air Pollution Training Institute (APTI) courses offered by the EPA in cooperation with the University of Washington. Mr. Hansen was the recipient of the 1987 PNWIS/APCA "Hardhat Award" which was presented in recognition of his contributions to the advancement of source sampling technology in the Pacific Northwest. He is a current board member of the Puget Sound Chapter of PNWIS/A&WMA. Mr. Hansen recently received his QEP certification from the IPEP.

AMTEST AIR QUALITY, INC.

RESUME OF ANGELA F. BLAISDELL

VICE PRESIDENT/SR. TECHNICAL WRITER

EDUCATION

- B.S., Marine Resources, Western Washington University, Bellingham, Washington, 1980
- Minors in Chemistry and Biology
- Several workshops, courses and conferences annually, including a Continuous Emission Monitoring System (CEMS) Workshop, taught by Dr. James Jahnke in October 1992 and April 1993, a Title V Operating Permits Workshop in May 1993, an Advanced Emission Measurement Workshop in July 1993, a Title III MACT Workshop in 1994 and Enhanced Monitoring Workshops in 1993 and 1994.

PROFESSIONAL MEMBERSHIPS

- Air and Waste Management Association (A&WMA)
- Pacific Northwest International Section of A&WMA (PNWIS)
- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Ms. Blaisdell has worked with Am Test-Air Quality, Inc. for the past 10 years and has had 14 years of professional experience in the field of air quality. She helps manage all aspects of source test projects, including initial client contact, scope of work preparation, scheduling, pre-test coordination, implementation of quality assurance programs for field sampling, analysis, data reduction, final data review and report preparation and review. She reviews current literature for each test method and incorporates the methodology into our testing and reporting protocol. Ms. Blaisdell recently assisted in the instruction of the EPA-APTI 464L "Continuous Emission Monitoring" course, the EPA 450 "Source Sampling for Particulate Pollutants" course and the EPA 502 Course "Hazardous Waste Incineration" offered by the EPA's Air Pollution Training Institute in cooperation with the University of Washington. She was the General Chair of the 1994 PNWIS Spring Specialty Conference on Enhanced Monitoring, and was a speaker at the 1990 and 1991 PNWIS annual meetings on the subject of continuous emission monitoring systems (CEMS). Angela is the current Treasurer and past secretary/treasurer for the Pacific Northwest International Section (PNWIS) of the Air and Waste Management Association (A&WMA) and is the past Chair for the Puget Sound Chapter of PNWIS. Ms. Blaisdell was the recipient of the 1991 PNWIS/A&WMA "Labcoat Award" which is presented each year to an individual to recognize his contribution to the advancement of source sampling methodology in the Pacific Northwest.

Prior to joining Am Test, Ms. Blaisdell acted as a Project Leader and Office Manager for an environmental engineering consulting firm in the Seattle area for 2 years. Experience with that firm involved sample collection, analysis and report preparation for source and ambient air, water and industrial hygiene studies. Ms. Blaisdell also worked on various research projects in the Chemistry department while attending Western Washington University.

AMTEST AIR QUALITY, INC.

RESUME OF DOUGLAS M. ALBERTSON

SENIOR AIR QUALITY SPECIALIST

EDUCATION

- B.A., Bioscience, California State University at Stanislaus, 1971
- Professional training courses and specialty conferences

PROFESSIONAL MEMBERSHIPS

- Air and Waste Management Association (AWMA)
- Pacific Northwest International Section of AWMA (PNWIS)

PROFESSIONAL EXPERIENCE

Mr. Albertson has worked with Am Test-Air Quality Inc. for the past year. He has over 20 years experience in environmental research, including process modification, equipment design, permitting, analytical testing, and plant start-up. Mr. Albertson manages Am Test-Air Quality's Coeur d'Alene, Idaho office. He has had extensive experience in all aspects of source testing, project management and technical review of emission reports.

From 1972 to 1982, Mr. Albertson was the co-founder of Chemecology Corporation, an analytical laboratory which specialized in all facets of environmental testing. He was responsible for the identification and solution of environmental problems on combustion sources fired with coal, crude oil, natural gas and a wide variety of biomass. Mr. Albertson organized research projects and managed data collection teams throughout the United States, Europe and Japan.

From 1983 to 1993, Mr. Albertson was employed by Energy Products, Inc. of Coeur d'Alene, Idaho, as an Environmental and Special Projects Manager. His responsibilities included development of equipment and procedures to analyze and minimize emissions from full scale combustors and gasifiers fired with conventional and experimental fuels. In this position, Mr. Albertson derived full scale operating conditions and process flow for full scale facilities based on mass/energy balance from pilot research, developed emissions factors and projections to be used for environmental permit operations, and provided technical support for marketing, sales and engineering staff. He designed, built and operated a continuous emission monitoring system (CEMS) for monitoring process emissions. Mr. Albertson authored over 30 research reports in fluid bed combustion and gasification. In the 10 years Mr. Albertson was employed at EPI, several of his reports were published in national publications. A sample of Mr. Albertson's technical papers follows:

"Emissions From Fluid Bed Combustion of High Ash Cotton Stalks", IGT Conference, New Orleans, Louisiana, February 1988.

"Design Characteristics of a 12 MW AFB Power Station Firing Agricultural Wastes", American Society of Mechanical Engineers, San Francisco, California, April 1989.

"Modifications to Fluid Bed Boiler Design Based on NO_x Reduction Experience", American Society of Mechanical Engineers, Dallas, Texas, October 1989

AMTEST AIR QUALITY, INC.

RESUME OF PAUL J. CLARK

AIR QUALITY SPECIALIST

EDUCATION

- Naval Nuclear Power School, 1982
- Various Naval Engineering Courses
- Numerous Safety and Hazard Communication Courses
- OSHA 80-Hour Hazardous Waste Training, 1993

PROFESSIONAL EXPERIENCE

Mr. Clark began his employment with Am Test-Air Quality, Inc. in January, 1995. He conducts source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, test planning and preparation, and data reduction and evaluation. In the laboratory and office, he performs test equipment trouble-shooting, maintenance, fabrication, and calibration. He helps keep the Air Quality shop and mobile laboratories organized and stocked with the necessary sampling supplies and parts.

Mr. Clark is experienced at performing the following test methods: EPA Methods 1, 2, 3A, 4, 5, 6, 6C, 7E, 8, 10, 11, 12, 13B, 16A, 17, 20, 23, 25A, 25B, 26, 26A, 29 (multiple metals sampling), 101A, 201A, 202, semi-volatile organic compound sampling (including dioxins and furans), volatile organic compound testing by TO-14, particle size distribution, continuous emission monitoring systems certifications, and other miscellaneous EPA methodology.

Prior to joining Am Test-Air Quality, Inc., Mr. Clark was an Environmental Technician for several Seattle based companies, including Chempro, Airco Services, Inc. and Penberthy Electromelt International, Inc. Mr. Clark also worked as a Shift Supervisor at Penberthy Electromelt, a hazardous waste thermal treatment unit and as a Field Supervisor at Airco Services, Inc. His responsibilities have included the organization and demobilization of 2-12 person crews for emergency spill response, site remediation and industrial cleaning as well as the development and implementation of safety training programs. In 1987, Mr. Clark was honorably discharged by the U.S. Navy after 6 years of active duty with a rank of E-6 and the position of Leading Petty Officer for the Reactor Laboratory Division aboard a Nuclear Powered Submarine.

AMTEST
AIR QUALITY, INC.

RESUME OF AMY M. BROTHERTON

TECHNICAL WRITER

EDUCATION

- B.A., English, University of California, Santa Barbara, California, 1991

PROFESSIONAL EXPERIENCE

Ms. Brotherton began her employment with Am Test-Air Quality, Inc. in April 1992. She performs technical writing of reports and word processing of proposals, test plans, and reports for the Senior Technical Writers to review. She performs data processing of field and laboratory analysis data using computerized data reduction programs, and performs by-hand calculations to verify computer program integrity. She also develops new computerized data reduction programs for field and laboratory analysis data and reviews other staff members data for accuracy.

Prior to her employment at Am Test, Ms. Brotherton worked for a medical claims processing company as an assistant to the medical-legal staff. In this position, she determined payment for worker's compensation claims, performed quality assurance review, and provided medical-legal training to company officers.

AMTEST
AIR QUALITY, INC.

RESUME OF ANNIKA M. WOEHR

PROJECT ASSISTANT/TECHNICAL WRITER

EDUCATION

- B.S., Biology, Florida Atlantic University, Boca Raton, Florida, 1992, emphasis in Marine Biology

PROFESSIONAL EXPERIENCE

Ms. Woehr began her employment with Am Test-Air Quality, Inc. in June 1994. She has been responsible for pre-field preparation for air quality projects and preparation of sample trains, glassware, labware and sampling hardware to be used on each specific project. In the field, Ms. Woehr has acted as a Project Assistant, assisting the Project Manager, Project Engineer, or Project Leader in setting up the equipment at each sample site, performing tests and recording data, recovering the samples after each test, performing any in-field analysis, and in demobilizing. When working in the field, she is responsible for properly labeling and identifying each sample, and initiating chain-of-custody procedures.

In the laboratory, Ms. Woehr is experienced in gravimetric analysis of particulate matter samples and particle size distribution samples. She assists in preparation and analysis of samples for quantifying sulfur oxides, reduced sulfur compounds, toxic metals (including hexavalent chromium), semi-volatile compounds (including dioxins and furans), and volatile organic compounds.

In the office, Ms. Woehr reduces the field data and inputs values into data reduction programs and performs by-hand calculations to verify computer program integrity.

Prior to joining Am Test, Annika worked through an employment agency for a coastal management firm restoring and building up sand dunes on beaches in Florida using native and endangered plants. She worked as a teacher assistant, office assistant, research assistant while attending Florida Atlantic University. One project involved maintaining sea turtle tanks in a laboratory. She also spent a summer working as a secretary in Geneva, Switzerland.

AMTEST
AIR QUALITY, INC.

AmTest-Air Quality, Inc.
30545 S.E. 84th St., #5
Preston, WA 98050
Office: (206) 222-7746
FAX: (206) 222-7849

AM TEST-AIR QUALITY, INC.
CAPABILITIES

Am Test-Air Quality, Inc. is an independent company providing comprehensive air pollution testing services to industry and government. Am Test, Inc.'s Air Quality Division was developed in 1982 by Mr. Kris A. Hansen. On January 1, 1991, the Air Quality Division incorporated as a separate company named Am Test-Air Quality, Inc. Am Test-Air Quality's main office and laboratory facility is located in Preston, Washington. The Preston office employs a staff of 20 qualified, experienced engineers, chemists and scientists. In January 1993, Am Test-Air Quality, Inc. opened a branch office, Am Test Alaska in Anchorage, Alaska in order to better serve our many Alaskan clients. One aspect of the testing services provided by Am Test-Air Quality, Inc., which we feel is unsurpassed by other testing firms, is the quality and experience of our personnel. We utilize highly experienced, motivated personnel on all projects. We believe that the success of a project is dependent on the use of state-of-the-art equipment and experienced, knowledgeable personnel. We have performed source testing projects of all different sizes and difficulty levels. Typically, we dispatch test teams of one to ten individuals. On all projects, our attention to detail remains extremely high.

Am Test-Air Quality, Inc. performs source testing projects at all types of facilities throughout the United States and Canada. Some of the types of facilities tested include:

- Oil and Gas Refineries
- Pulp and Paper Mills
- Gas, Oil, Wood, Coal and Nuclear-Fired Power Plants
- Chemical Plants
- Aluminum Reduction Facilities
- Wood Products Industries
- Smelters
- Cement Kilns
- Hazardous Waste Incinerators
- Municipal and Medical Waste Combustors
- Landfill Gas Flares
- Wastewater and Sewage Treatment Facilities
- Coating and Finishing Facilities
- Manufacturers
- Superfund Clean-Up Sites
- Asphalt Plants

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Examples of the types of projects Am Test-Air Quality, Inc. becomes involved in include:

- Regulatory compliance with NSPS, MACT, BIF requirements
- Continuous emission monitoring system (CEMS) certifications
- Enhanced monitor certifications (CEMS, CRMS, CPMS)
- Emission inventories for MACT, NESHAP, SARA Title III and SIP determinations
- Air pollution control equipment warranty/guarantee/design testing
- Combustion or control device optimization
- Air toxics studies for hazardous air pollutants (HAPs)
- Particle size distribution studies (PM_{10})
- Soil remediation unit evaluations
- Vapor recovery system efficiency evaluations
- Destruction/capture efficiency studies
- Ammonia slip evaluations
- Pilot plant or engineering-scale trial burns
- Hands-on stack sampling training workshops
- Industry-agency liaison

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MANUAL EMISSIONS TESTING SERVICES

Am Test-Air Quality, Inc. performs all recognized EPA source test methods for many types of industries. We also perform NIOSH methods, BIF Regulation methods, SW-846 methods, toxic organic (TO) methods and are experienced at developing test methods for specialized applications where published methods do not exist. Am Test personnel keep current on new method development by attending training courses and utilizing the EMTIC bulletin board system (BBS). A partial list of pollutants measured using manual test methods follows:

- Particulate Matter
- Particle Size Distribution
- Sulfur Oxides
- Nitrogen Oxides
- Opacity Measurement
- Carbon Monoxide and Fixed Gases
- Hydrogen Sulfide
- Multi-Metals
    - Hexavalent Chromium
    - ICP Metals
    - Low-Level Mercury
- Particulate and Gaseous Fluoride
- Total Reduced Sulfur Compounds
- Volatile Organic Compounds
    - 8240 list of VOCs
    - Alcohols and Acetates
    - BTEX
    - Formaldehyde/Aldehydes
- Semi-Volatile Organic Compounds
    - Dioxin and Furan Isomers
    - PAHs
    - BNAs
    - PCBs
    - Pesticides and Herbicides
- Acid Gases
    - Hydrochloric Acid
    - Hydrofluoric Acid
    - Nitric Acid
    - Sulfuric Acid
- Chlorine, Chlorine Dioxide and Chloroform
- Ammonia and Urea
- Radionucleides
- Hazardous Air Pollutants (HAPs)

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CONTINUOUS EMISSION MONITORING SYSTEMS AND INSTRUMENTAL TESTING SERVICES

Am Test-Air Quality, Inc. has two (2) complete continuous emission monitor (CEM) instrument vans and a separate set of instruments which can be shipped to remote locations. We maintain an inventory of approximately 80 EPA Protocol 1 (or best available grade) certified calibration gas mixtures to tailor calibrations gases to each source. Each mobile laboratory is equipped with:

- O_2, CO_2, SO_2, NO_x, and CO analyzers
- Total hydrocarbon (THC) and non-methane hydrocarbon (NMHC) analyzers
- PC-based data acquisition systems for collecting and reducing data to provide on-site results
- Cylinder racks for calibration gases
- Heated or unheated Teflon sample transport lines
- Sample extraction systems, including sample probes, fine particulate filters, moisture removal systems, and Teflon lined sample pumps
- Laboratory bench space which can be equipped with analytical balances, wet chemical analysis equipment and instrumental methods, including gas chromatography

Am Test-Air Quality, Inc.'s mobile laboratories are used to perform New Source Performance Standards (NSPS) testing and to conduct continuous emission monitoring system (CEMS) performance specification testing and audits. We provide a variety of CEMS services, including:

- Performance Specification Tests (PST)
- Relative Accuracy Test Audits (RATA)
- Relative Accuracy Audits (RAA)
- Cylinder Gas Audits (CGA)
- Quality Assurance Plans (QAP)

In addition, Am Test-Air Quality, Inc.'s senior level staff are extremely knowledgeable in the field of CEMS and can assist in monitor selection, calibration gas selection, stratification testing to locate CEMS probes, sampling system troubleshooting, and act as a liaison with the regulatory agency.

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AM TEST LABORATORY

AmTest, Inc. is a full service analytical testing laboratory located in Redmond, Washington. It was organized to provide the highest caliber laboratory testing of environmental and industrial samples. Experienced environmental chemists and microbiologists have the best available equipment at their disposal. Experienced personnel, top-notch instrumentation, and a personal interest in your testing requirements assures:

- **Quick turnaround time for sample analysis**
- **Maximum quality control on projects**
- **Direct dialogue with the analytical staff**
- **Reasonable rates**

AmTest's laboratory is departmentalized into the following disciplines:

AIR QUALITY	**Source and Ambient Testing**
ENVIRONMENTAL	**Water, Wastes, Tissue, Vegetation**
INDUSTRIAL	**Food, Materials Testing, Industrial Hygiene, Special Projects**
OIL AND FUELS	**Lubricating Oil, Fuel Analysis, Hydraulics, Contamination Analysis**
TRACE ORGANICS	**PCB's, Pesticides, Hazardous Wastes, Priority Pollutants**
MICROBIOLOGY	**Water, Wells, Food, Product Evaluation**

AmTest's laboratory utilizes the following instrumentation:

Finnigan Incos 50 GC/MS	Atomic Absorption Spectrometer-Flame
Jarrell Ash ICP Plasma Emission Spectrometer	Atomic Absorption Spectrometer-Graphite Furnace
Gas Chromatographs: FID, EC, TC, N_2, P	Atomic Absorption Spectrometer-Hydride Generation
Jarrell Ash Arc, Spark Emission Spectrometer	UV/Visible Spectrometer
Xertex TOX Analyzer	Infrared Spectrometer
Source Test Equipment-EPA Approved	High Performance Liquid Chromatograph

AmTest is one laboratory in a group of laboratories serving the West. Other facilities include:

AmTest, Inc., Portland, Oregon
AmTest of Arizona, Phoenix, Arizona
Can Test Ltd., Vancouver, B.C.
Loring Laboratories, Calgary, Alberta
Metropolitan Clinical Laboratories, Ltd., Vancouver, B.C.

Phone Mr. Shawn Moore, General Manager or Mr. Mark Fugiel, Technical Director, at (206)885-1664 for more details or a price quotation.