9.5.3 Meat Rendering Plants

Total VOC emissions for the Supercooker

TRC Environmental Corporation for IBP, Inc.

August 1998

1998 (post section publication) source test data.

October 13, 1998

Mr. Dave Meierhenry
Air Quality Compliance Section
Nebraska Department of Environmental Quality
P. O. Box 98922
Lincoln, NE 68509-8922

RE: IBP, inc., Lexington, Nebraska
Updates to the Lexington VOC Final Report

Dear Mr. Meierhenry:

Please find enclosed a copy of the updates for the final VOC report submitted August 26, 1998. The updates reflect the changes discussed with myself and TRC.

If you have any questions concerning the testing results or procedures used, please contact me a 402-241-3647 or you may contact Mr. Scott Miller, TRC Project Manager, at 630-810-1122.

Sincerely,

Rechelle Kruse

Rechelle Kruse
Air Pollution Control Engineer

Enclosure

c: Leo Lang
Ryan Post
Dallas Safriet

RK98-598/LE-Stack Tests

SECTION 2

SUMMARY OF RESULTS

On July 21,1998, testing was conducted to determine emission rates of the Supercooker exhaust at the IBP plant in Lexington, Nebraska. All testing was completed in accordance with approved test methodologies.

Table 2-1 summarizes the data for the Supercooker on July 21,1998 at the IBP plant located in Lexington, Nebraska.

Raw field data sheets are located in Appendix A. Process data recorded by IBP is located in Appendix B. Laboratory results are located in Appendix C. Equipment calibration data sheets are located in Appendix D. Calculation formulas can be found in Appendix E. All test procedures were conducted as stated in Section 3 except:

On Run #2&3 the moisture content was above saturation therefore moisture was determined by using stack temperature and the saturation table. On Run #1,2&3 RM 25, lab receipt data was used to calculate VOC emission rates. Lab receipt data was used because line loss was not taken into account when final tank measurements were taken. TRC feels that the lab receipt data is the accurate data to be used and is also considered worst case scenario.

Table 2-1 VOC Emission Rates for the Supercooker

WET COOKER EXHAUST EMISSION RATE RESULTS			
	TEST #1	TEST #2	TEST #3
TGNMO as Carbon, ppmc	358.0	273.0	296.0

AVG = 1.008 lbs/hr TGNMO as carbon

Table 4-1. Test Results - Supercooker Exhaust

IBP Lexington Supercooker

Run No.	1	2	3	
Date	7-21-98	7-21-98	7-21-98	
Start Time	11:57	13:25	14:55	
Stop Time	12:57	14:25	15:55	AVERAGES
Barometric Pressure, in. Hg	28.80	28.80	28.80	28.80
Net Sampling Time, minutes	30.0	30.0	30.0	30.0
Volume Metered, cf	26.508	26.291	26.582	26.460
Avg. DGM Temp, F	93.4	99.00	102.80	98.4
AVG Delta H, in of H2O	2.00	2.00	2.00	2.00
AVG Delta H, in of Hg	0.1471	0.1471	0.1471	0.1471
DGM Calibration Factor	0.9951	0.9951	0.9951	0.9951
Volume of Gas Collected, dscf	24.349	23.908	24.009	24.089
Total Water Collected, mL	32.0	78.0	163.0	91.0
Volume of Water Vapor, scf	1.509	3.678	7.685	4.291
Moisture, % @ Saturation	5.8	7.2	8.6	7.2
Dry Mole Fraction, 100-%M	0.9417	0.9279	0.9143	0.9280
CO2 at Stack, % dry	0.0	0.0	0.0	0.0
O2 at Stack, % dry	20.9	20.9	20.9	20.9
CO + N2, % dry	79.1	79.1	79.1	79.1
Dry Molecular Weight, lb/lb mole	28.84	28.84	28.84	28.84
Wet Molecular Weight, lb/lb mole	28.20	28.05	27.91	28.06
Stack Diameter, in	10	10	10	10.00
Stack Area, sq. in. (@ pitot meas. location)	78.5	78.5	78.5	78.5
Static Pressure, in. of H2O	-0.62	-0.65	-0.61	-0.63
Stack Pressure, in. of Hg	28.75	28.75	28.76	28.75
Avg. Stack Temp., F	103.3	103.5	109.7	105.5
Avg. Sqroot of Delta P	1.0659	1.064	1.0663	1.0654
SDE Average	25.298	25.257	25.451	25.335
Pitot Coefficient	0.84	0.84	0.84	0.84
Stack Gas Velocity, afpm	3828.0	3832.2	3871.5	3843.9
Stack Flowrate, wet acfm	2,088	2,090	2,112	2,097
Stack Flowrate, dry scfm	1,771	1,746	1,720	1,746
Stack Flowrate, dry scf/hr	106,263	104,779	103,179	104,741
Stack Flowrate, wet scf/hr	1.1285E+05	1.1292E+05	1.1285E+05	112,873
TGNMO ppmc	358.00	273.00	296.00	309.00
TGNMO Lb/Hr as Carbon	1.184	0.890	0.950	1.008

Triangle Environmental Services, Inc.

METHOD 25 TABLE OF RESULTS

Client: TRC Environmental Corporation ID#98156R Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)
(Post-test PT data replaced by laboratory receipt data)

	Sample Description	Concentrations (ppmC) CO	CH4	CO2	Noncon-densibles	Conden-sibles	TGNMO	Mass Conc. (mgC/cu.m)
1	Super Cooker	2	17	6207	5	353	358	179
2	Super Cooker	4	18	5476	19	254	273	136
3	Super Cooker	< 3	21	3479	7	289	296	148

< # = Concentration Below Practical Quantitation Limit

* Please refer to the "Comments on the Analyses" page of the report for additional information.

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156R Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)
(Post-test PT data replaced by laboratory receipt data)

Sample # 1 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	3.5	305.37	0.011
Postsampling	556.0	297.15	1.871
Lab Receipt	556.0	297.15	1.871
Tank Final	1218.0	297.15	4.099
CV Final	1493.0	298.65	4.999

Tank N283A:
Tank Volume = 0.004542 cu.m
Volume Sampled = 0.003258 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.000$

Trap GGI →
Collection Vessel 33:
CV Volume = 0.008361 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	2	376	358	0
CH4	259.6	2	2,024	2,072	1,977
CO2	256.4	2	723,098	722,715	722,456
Noncondensibles	253.5	5	576	490	589
Condensibles	256.4	4	19,003	19,132	19,107

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.6%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	2	±	2	86.7
CH4	17	±	0	2.3
CO2*	6207	±	3	0.0
Noncondensibles	5	±	0	9.8
Condensibles*	353	±	1	0.4
TGNMO	358			

Mass Concentration 179 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156R Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)
(Post-test PT data replaced by laboratory receipt data)

Sample # 2 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	1.5	308.71	0.005
Postsampling	523.0	297.15	1.760
Lab Receipt	523.0	297.15	1.760
Tank Final	1512.0	297.15	5.088
CV Final	1500.0	299.65	5.006

Tank 6209T:
Tank Volume = 0.006126 cu.m
Volume Sampled = 0.004147 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.000$

Trap DDZ →
Collection Vessel 12:
CV Volume = 0.008343 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	3	347	330	368
CH4	259.6	3	1,635	1,597	1,581
CO2	256.4	3	485,063	485,058	485,253
Noncondensibles	253.5	6	1,703	1,679	1,669
Condensibles	256.4	4	17,479	17,554	17,528

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.5%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	4	±	0	5.5
CH4	18	±	0	1.7
CO2*	5476	±	1	0.0
Noncondensibles	19	±	0	1.0
Condensibles*	254	±	1	0.2
TGNMO	273			

Mass Concentration 136 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156R Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)
(Post-test PT data replaced by laboratory receipt data)

Sample # 3 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	4.2	308.71	0.014
Postsampling	555.0	298.15	1.861
Lab Receipt	555.0	298.15	1.861
Tank Final	1395.0	298.15	4.679
CV Final	1496.0	300.65	4.976

Tank 6208T:
Tank Volume = 0.006109 cu.m
Volume Sampled = 0.004354 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.000$

Trap GGE →
Collection Vessel 40:
CV Volume = 0.008388 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	3	0	34	308
CH4	259.6	3	2,194	2,209	2,191
CO2	256.4	3	353,186	352,875	353,081
Noncondensibles	253.5	6	645	699	638
Condensibles	256.4	3	20,779	20,939	20,728

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.4%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	< 3			
CH4	21	±	0	0.4
CO2*	3479	±	2	0.0
Noncondensibles	7	±	0	5.1
Condensibles*	289	±	2	0.5
TGNMO	296			

Mass Concentration 148 mgC/cu.m

< # = Concentration Below Practical Quantitation Limit

August 26, 1998

Mr. Dave Meirhenry
Air Quality Compliance Section
Nebraska Department of Environmental Quality
P. O. Box 98922
Lincoln, NE 68509-8922

RE: IBP, inc., Lexington, Nebraska
Inedible Cooking System VOC Test Report

Dear Mr. Meirhenry:

Please find enclosed a copy of the VOC Test Report for the IBP, Lexington, Nebraska, facility. The testing was conducted on July 21, 1998, by TRC Environmental Corporation. Volatile organic carbon testing was completed per the Nebraska Compliance Sampling Methods and was approved through protocol submittals. As shown in the detailed testing report on page 3, the average VOC (Total Hydrocarbons as Methane) emission rate from the steam heated Dupps Supercooker is 1.00 lbs/hr as carbon.

If you have any questions concerning the testing results or procedures used, please contact me a 402-241-3647 or you may contact Mr. Scott Miller, TRC Project Manager, at 630-810-1122.

Sincerely,

Rechelle Kruse
Air Pollution Control Engineer

Enclosures

c: Leo Lang (without test report)
Ryan Post (with test report)
Mr. Dallas Seifert, Federal EPA- AP-42 (with Test Report)

RK98-563/LE-Stack Testing

Project Summary:

IBP created a project to quantify VOC emissions from their rendering processes including blood dryers, edible dryers, and inedible cookers for both beef and pork. The testing was conducted on all three systems under various heating conditions. The intent was to quantify VOC emissions for natural gas system as well as steam systems and to prove or disprove the difference in VOCs from products developed in fuel fired vs. steam heated processes.

A VOC test was conducted on the exhaust outlet of the Lexington steam Dupps Supercooker after the condenser per method 25 TGNMO.

Emission Data:

Inedible Steam Cooker:

Test Data:

Test #1	1.184 lbs/hr
Test #2	0.890 lbs/hr
Test #3	0.928 lbs/hr
Average	1.00 lbs/hr

Process Information During Test:

Head Kill	4,665 hd/day
Inedible Yield	39.6 lbs/hd finished crax
Inedible Operation	20 hrs.

Total Inedible Crax Processed:
[(4,645 hd/day) x (39.6 lbs/hd)]/20 hrs/day = 9,236.7 lbs/hr finished crax
(9,236.7 lbs/hr) x (1 ton/2,000 lbs) = 4.62 tons/hr finished crax

Inedible Crax Emission Factor:

Crax Processed	4.62 tons/hr
VOC Emissions from Blood Drying	1.00 lbs/hr

1.00 lbs/hr/4.62 tons/hr = 0.23 lbs/ton finished crax

TRC

FINAL REPORT

TOTAL VOC EMISSIONS OF THE SUPERCOOKER

Prepared for

IBP, Inc.
Lexington, Nebraska

Prepared By

TRC ENVIRONMENTAL CORPORATION
DOWNERS GROVE, ILLINOIS 60515

August 21, 1998

TRC

FINAL REPORT

TOTAL VOC EMISSIONS OF THE SUPERCOOKER

Prepared for

IBP, Inc.
Lexington, Nebraska

Prepared by

TRC ENVIRONMENTAL CORPORATION
1307 Butterfield Road, Suite 412
Downers Grove, IL 60515
(630) 810-1122

August 21, 1998

TRC Project No. 22214-11

[redacted]

DISCLAIMER

This report is intended for use solely by IBP, Inc. the specific purposes described in the contractual documents between TRC Environmental Corporation (TRC) and IBP. All professional services and reports generated by TRC have been prepared for IBP's purposes as described in the contract. The information, statements, and conclusions contained in the report have been prepared in accordance with the work statement, contract terms, and conditions. The report may be subject to differing interpretations and/or may be misinterpreted by third persons or entities who were not involved in the investigative or consultation process. TRC Environmental Corporation therefore expressly disclaims any liability to persons, other than IBP, who may use or rely upon this report in any way or for any purpose.

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LIST OF ACRONYMS AND ABBREVIATIONS

acfm	actual cubic feet per minute
afmp	actual feet per minute
CEM	continuous emission monitor
CEMS	continuous emission monitoring system
cf	cubic feet
CO_2	carbon dioxide
dscf	dry standard cubic feet
EPA	Environmental Protection Agency
°F	degrees Fahrenheit
ft	feet
in H_2O	inches of water
in Hg	inches of mercury
lb/hr	pounds per hour
O_2	oxygen
ppm (v)	parts per million volume
QA/QC	Quality Assurance/Quality Control
scfm	standard cubic feet per minute
TGNMO	total gaseous non-methane organics
THC	total hydrocarbons
TRC	TRC Environmental Corporation
VOC	volatile organic compound

PROGRAM SUMMARY

The IBP, Inc. facility located in Lexington, Nebraska has a Supercooker in their rendering operations. TRC Environmental Corporation (TRC) was contracted by IBP, Inc. to conduct emission testing on the Supercooker. The major objectives of the test program was to collect representative flue gas samples and determine the emission rates of volatile organic compounds (VOC's) at the Supercooker exhaust.

TRC accomplished this objective through the use of acceptable test methods performed by trained and experienced staff. IBP, Inc. personnel were responsible for maintaining the proper operations during the emission test series. The emission test program was conducted on July 21,1998. The emission tests included sampling for total gaseous non-methane organics (TGNMO), total hydrocarbons (THC), volumetric flow rates, and moisture content of the Supercooker flue gas following USEPA Methods 1 (Sampling Location Selection), 2 (Flow Rate), 3 (CO_2 and O_2 for Molecular Weight), 4 (Moisture), and 25 (TGNMO).

SECTION I

INTRODUCTION

1.1 Project Scope

The IBP, Inc. facility operates a Supercooker at its Lexington, Nebraska facility. TRC was contracted by IBP, to conduct TGNMO emission testing for determination of volatile organic compound (VOC) emission rates of the Supercooker exhaust.

The major objective of the test program was to collect representative flue gas samples and determine emission rates of VOC at the Supercooker exhaust. Three 1-hour tests were conducted at the Supercooker exhaust, simultaneously with flow rates, CO_2 and O_2 for molecular weight, and moisture.

1.2 Sampling Locations

Sampling for TGNMO was conducted on the Supercooker exhaust. The inside stack dimension was measured to be 10 inches in diameter; therefore, the stack area equals 78.5 square inches. Stack gas velocity, moisture, and volumetric flow rates were measured simultaneously with the TGNMO sampling. The required number of sample points and the sample point locations for the velocity traverses of each source were calculated according to 40 CFR Part 60, Appendix A, Method 1. A copy of the field data sheet can be found in Appendix A.

SECTION 2

SUMMARY OF RESULTS

On July 21,1998, testing was conducted to determine emission rates of the Supercooker exhaust at the IBP plant in Lexington, Nebraska. All testing was completed in accordance with approved test methodologies.

Table 2-1 summarizes the data for the Supercooker on July 21,1998 at the IBP plant located in Lexington, Nebraska.

Raw field data sheets are located in Appendix A. Process data recorded by IBP is located in Appendix B. Laboratory results are located in Appendix C. Equipment calibration data sheets are located in Appendix D. Calculation formulas can be found in Appendix E. All test procedures were conducted as stated in Section 3. No anomalous data is reported.

Table 2-1 VOC Emission Rates for the Supercooker

WET COOKER EXHAUST EMISSION RATE RESULTS			
	TEST #1	TEST #2	TEST #3
TGNMO as Carbon, ppmc	358.0	273.0	289.0

AVG = 1.000 lbs/hr TGNMO as carbon

SECTION 3

FIELD SAMPLING PROCEDURES

3.1 Field Sampling Summary

After consideration of the program requirements, TRC provided a experienced professional to conduct the field effort. Mr. Thomas Lundin of the Chicago Measurements office performed the testing.

3.1.1 Pre-Sampling Preparation

Equipment was inspected for proper operation and durability prior to calibration. All calibrations were performed prior to and at the conclusion of the emissions test program as shown below:

- Pitot tubes (QA Handbook Section 3.12, pp. 1-13 and USEPA Reference Method 2) - measured for appropriate spacing and dimensions or calibrated in a wind tunnel. Rejection criteria given on the calibration sheet. Post-test check to inspect for damage.

- Thermocouples (QA Handbook Section 3.4,2,pp. 15-18) - verified against a mercury-in-glass thermometer at three points including the anticipated measurement range. Acceptance limits - impinger $\pm 2°F$; DGM $\pm 5.4°F$; stack ± 1.5 percent of stack temperature.

- Field barometer (QA Handbook Section 3.4.2, pp. 18-19) - compared against a mercury-in-glass barometer or use the airport station's barometric pressure and correct for elevation. Acceptance criteria - $\pm$ 0.02 in. Hg; post-test check - same.

- Method 25 rotometers - (QA Handbook Section 3.17.2, pp. 4-8) - calibrated against a standard bubble meter. Acceptance criteria - pretest $Y_i = 0.05Y$; post-test check -average 3 run theoretical volume $\pm$ 10% of average 3 run actual volume.

3.2 Sampling Methods

3.2.1 Flow Rate Measurements

Velocity measurements at the sampling locations were made following EPA Reference Methods 1 and 2 simultaneously with the TGNMO and (THC) sampling. A Type-S pitot tube with an attached water manometer was used to measure the exhaust velocities at the sampling ports. An attached Type-K thermocouple with remote digimite was used to determine gas temperature.

3.2.2 CO_2 and O_2 Measurement

Tedlar^R bag flue gas samples were taken concurrently with the TGNMO sampling. A Fyrite was used to determine percent by volume of CO_2 and O_2.

3.2.3 Moisture Measurement

Moisture was measured simultaneously using USEPA Method 4 for each test run. The moisture train was operated for 30 minutes acquiring a minimum of 21 dry standard cubic feet of gas during the TGNMO sampling run.

3.2.4 Total Hydrocarbons

TRC conducted (TGNMO) testing at the Supercooker exhaust following USEPA RM25.

3.2.4.1 USEPA Method 25 Train for Total Gaseous Non-Methane Organics

TGNMO sampling as conducted following the criteria of USEPA Reference Test Method 25. Flue gas was sampled from the Supercooker exhaust at a constant rate through a heated probe and filter and a chilled condensate trap by means of an evacuated sample tank. The heated probe and oven were kept at a temperature of $\geq 265°F$ and $250 \pm 5°F$ respectively

during the sampling. After completion of each test run, the trap and tank were sealed, labeled and documented on the chain-of-custody record. All traps were kept under dry ice until the moment of analysis. Three one-hour tests were conducted. A schematic representation of the sampling train is included as Figure 3-1.

Leak checks on the Method 25 train were performed before each sampling run. All leak checks and leakage rates are documented on the relevant field test data sheet. Copies of the field data sheets and summary calculations are included in Appendix A.

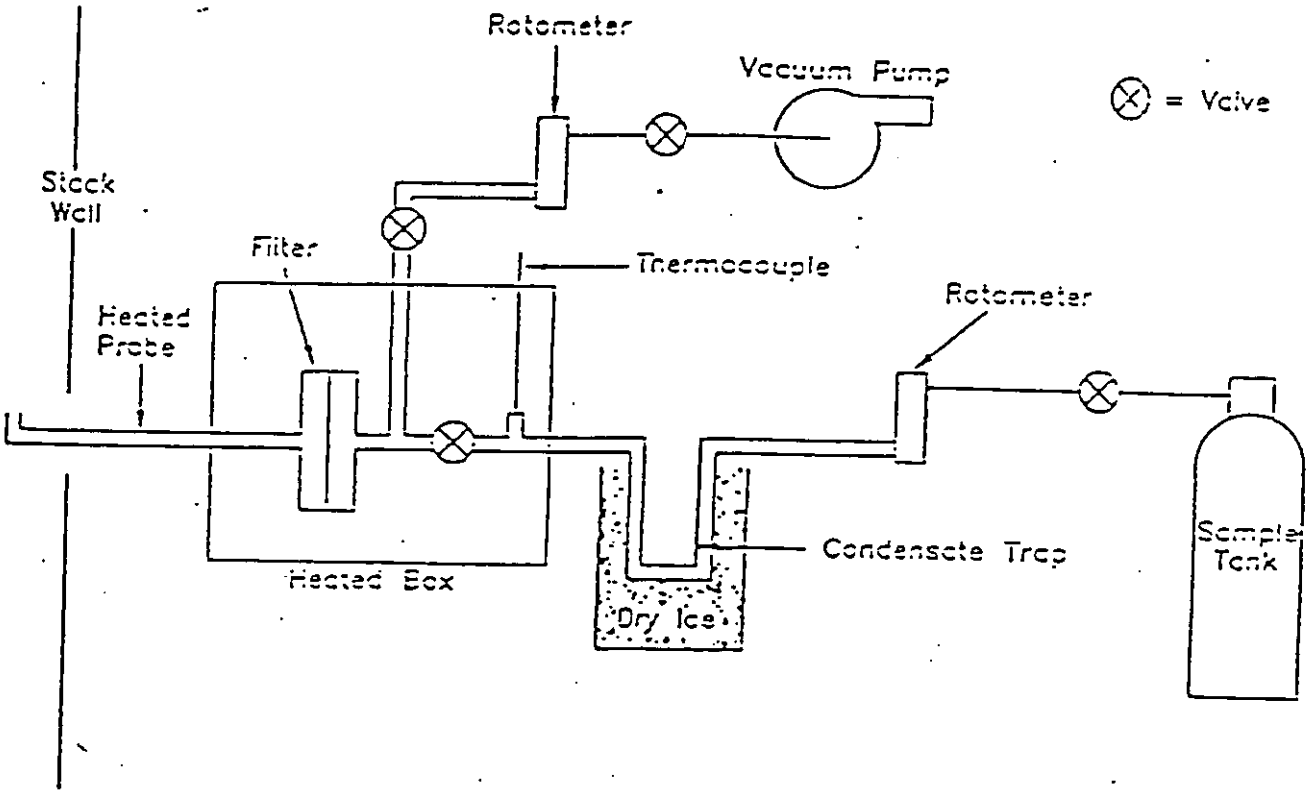

Figure 3-1 Method 25 Sampling Train

SECTION 4
DATA REPORTING

4.1 Data Reporting

A flow chart depicting the measurement data reporting scheme is shown in Figure 4-1. Figure 4-2 presents the analytical data validation and reporting scheme routinely used at TRC.

All data was reported in standard units depending on the measurement and the ultimate use of the data. The bulk of the data was computer processed and reported as follows:

- Gas Properties:
  a. Moisture %
  b. Flow rate, dscfm and acfm
  c. Pressure, in. Hg
  d. Temperature, °F

- Total Gaseous non-methane Organics as ppmc & lb/hr

Results of the testing conducted at the IBP plant on the Supercooker exhaust are contained in Table 4-1.

Table 4-1. Test Results - Supercooker Exhaust

IBP Lexington Supercooker

Run No.	1	2	3	
Date	7-21-98	7-21-98	7-21-98	
Start Time	11:57	13:25	14:55	
Stop Time	12:57	14:25	15:55	AVERAGES
Barometric Pressure, in. Hg	28.80	28.80	28.80	28.80
Net Sampling Time, minutes	30.0	30.0	30.0	30.0
Volume Metered, cf	26.508	26.291	26.582	26.460
Avg. DGM Temp, F	93.4	99.00	102.80	98.4
AVG Delta H, in of H2O	2.00	2.00	2.00	2.00
AVG Delta H, in of Hg	0.1471	0.1471	0.1471	0.1471
DGM Calibration Factor	0.9951	0.9951	0.9951	0.9951
Volume of Gas Collected, dscf	24.349	23.908	24.009	24.089
Total Water Collected, mL	32.0	78.0	163.0	91.0
Volume of Water Vapor, scf	1.509	3.678	7.685	4.291
Moisture, % @ Saturation	5.8	7.2	8.6	7.2
Dry Mole Fraction, 100-%M	0.9417	0.9279	0.9143	0.9280
CO2 at Stack, % dry	0.0	0.0	0.0	0.0
O2 at Stack, % dry	20.9	20.9	20.9	20.9
CO + N2, % dry	79.1	79.1	79.1	79.1
Dry Molecular Weight, lb/lb mole	28.84	28.84	28.84	28.84
Wet Molecular Weight, lb/lb mole	28.20	28.05	27.91	28.06
Stack Diameter, in	10	10	10	10.00
Stack Area, sq. in. (@ pitot meas. location)	78.5	78.5	78.5	78.5
Static Pressure, in. of H2O	-0.62	-0.65	-0.61	-0.63
Stack Pressure, in. of Hg	28.75	28.75	28.76	28.75
Avg. Stack Temp., F	103.3	103.5	109.7	105.5
Avg. Sqroot of Delta P	1.0659	1.064	1.0663	1.0654
SDE Average	25.298	25.257	25.451	25.335
Pitot Coefficient	0.84	0.84	0.84	0.84
Stack Gas Velocity, afpm	3828.0	3832.2	3871.5	3843.9
Stack Flowrate, wet acfm	2,088	2,090	2,112	2,097
Stack Flowrate, dry scfm	1,771	1,746	1,720	1,746
Stack Flowrate, dry scf/hr	106,263	104,779	103,179	104,741
Stack Flowrate, wet scf/hr	1.1285E+05	1.1292E+05	1.1285E+05	112,873
TGNMO ppmc	358.00	273.00	289.00	306.67
TGNMO Lb/Hr as Carbon	1.184	0.890	0.928	1.000

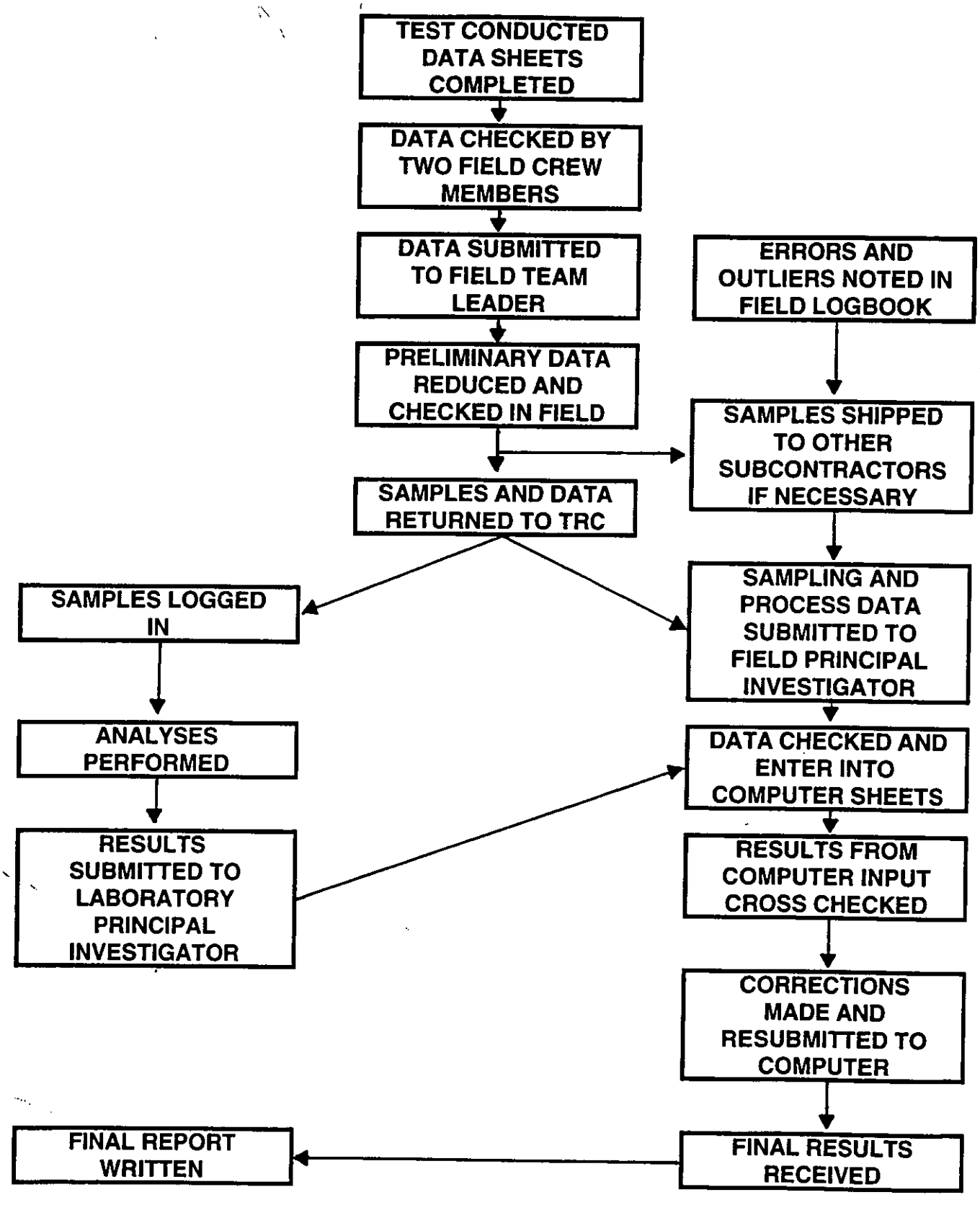

Figure 4-1. Measurement Data Flow Scheme

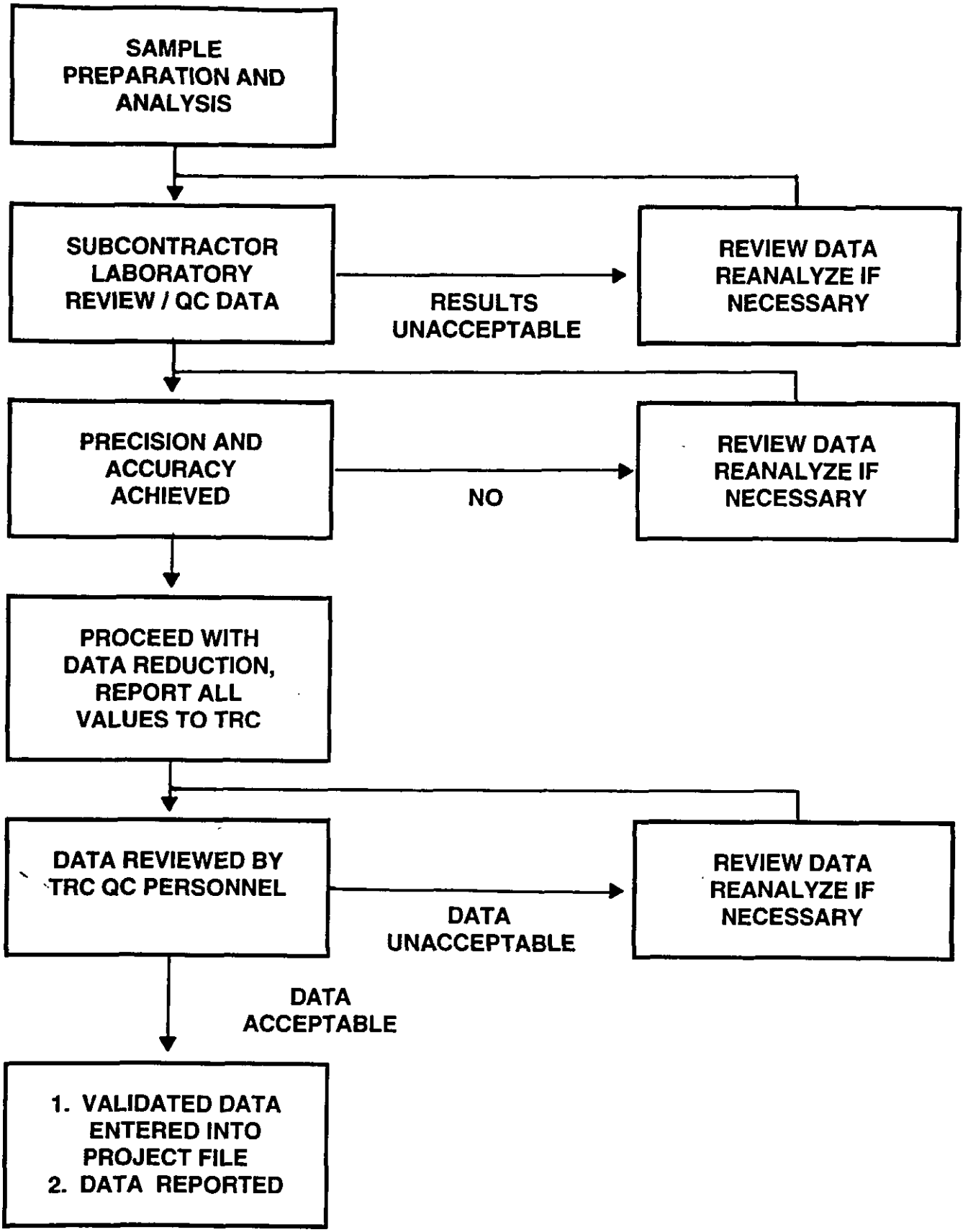

Figure 4-2. Analytical Data Report Scheme

APPENDIX A

RAW FIELD DATA SHEETS

Traverse Point Location for Circular and Rectangular Ducts

Project Number: _____

Client: IBP / Lexington NB

Date: 7-21-98

Sampling Location: INED. SUPER COOKER

Internal Stack Diameter: 10

Nipple Length: 1.5

Total Stack Diameter: 11.5

Nearest Upstream Disturbance (C): 15'

Nearest Downstream Disturbance (D): 8.5'

Calculator: T. Lumpkin

Traverse Point Number	Fraction of Stack ID (1 / 100)	Stack ID	Traverse Point (1 x 2 = Point)	Nipple Length	Traverse Point Location includes nipple
1		10'	.044	1.5	1.94
2			.146		2.96
3			.296		4.46
4			.704		8.54
5			.854		10.0
6			.956		11.06
7					
8					
9					
10					
11					
12					
13					
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15					
16					
17					
18					
19					
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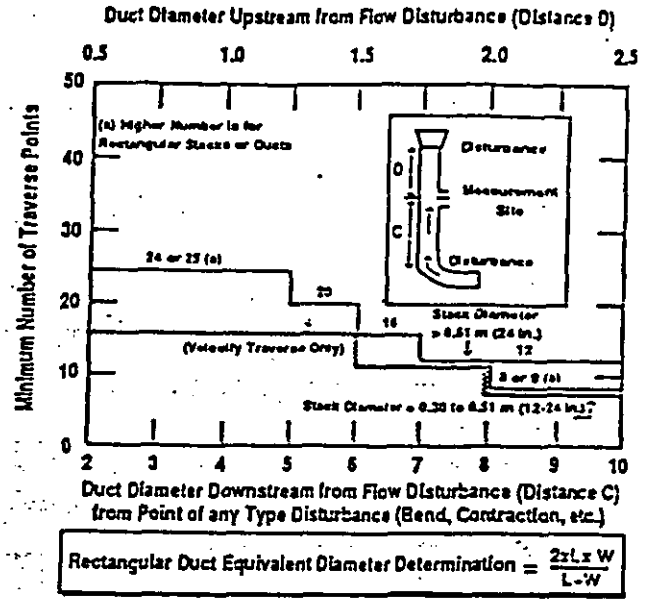
21					
22					
23					
24					



Rectangular Duct Equivalent Diameter Determination = $\frac{2 \times L \times W}{L + W}$

Location of Traverse Points in Circular Stacks

	4	6	8	10	12	14	16	18	20	22	24
1	5.7	4.4	3.2	2.6	2.1	1.3	1.6	1.4	1.3	1.1	1.1
2	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	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	15.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	5.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	85.4	79.2
11										95.5	87.5
12											95.8

Method 25 Field Data

Client: IBP
Location: INEO. Sugar Cooker
Date: 7-21-98

Project Number:
Sample Location: STACK
Run Number: 1
Operator: T. Lupoin

Tank Number: 283 Trap Number: GG1 Sample ID: R/1

	Tank Vacuum		Barometric Pressure	Ambient Temperature
	Manometer mm/cm Hg	Gauge mm/cm Hg/in Hg	mm/cm Hg/in. Hg	C /(F)
Pretest	728	23.5	29.80	90°
Post Term	156	5.0	" "	96°

Pretest Leak Rate (mm/cm Hg/in Hg/5 min): 0.0 @ 5mm

Clock Time	Sample Time	Gauge Vacuum mm/cm Hg	Flowmeter Setting ml / (cm)	Temperature Probe (C)/ F	Temperature Box (C)/ F	Comments
1157	0	23.5	40	130	120	
[illegible]	5	27.0	40	131	119	Normal
[illegible]	10	25.0	40	129	120	Probe
[illegible]	15	23.0	40	129	121	heat set
[illegible]	20	21.0	40	130	121	to 135 C
[illegible]	25	19.0	40	128	121	
[illegible]	30	17.0	40	129	121	Box heat
[illegible]	35	15.0	40	129	120	set to
[illegible]	40	13.0	40	128	121	120 C
[illegible]	45	11.0	40	129	122	
[illegible]	50	9.0	40	129	121	
[illegible]	55	7.0	40	128	122	
1257	60	5.0	40	129	121	

TRC
ENVIRONMENTAL

Method 25 Field Data

Client: IBP
Location: LEXINGTON, NB
Date: 7-21-99

Project Number:
Sample Location: INTED. SUPER CAVERN
Run Number: 2
Operator: T. LINDSAY

Tank Number: 6209 Trap Number: DD2 Sample ID: R/2

	Tank Vacuum		Barometric Pressure	Ambient Temperature
	Manometer mm/cm Hg	Gauge mm/cm Hg/in Hg	mm/cm Hg/in. Hg	C (F)
Pretest	~~29~~ 730	28.5	28.7	96
Post Term	154	5.5	" "	96

Pretest Leak Rate (mm/cm Hg/in Hg/5 min): 0.0 @ 5MIN

Clock Time	Sample Time	Gauge Vacuum mm/cm Hg	Flowmeter Setting ml / cm	Temperature Probe (C) F	Temperature Box (C) F	Comments
1325	0	28.5	40	130	121	
	5	28.5	40	129	120	Normal
	10	25.0	50	131	122	Probe
	15	23.0	50	130	122	heat set
	20	21.0	60	129	121	to 135 C
	25	19.0	60	131	120	
	30	17.0	60	130	122	Box heat
	35	15.0	60	130	123	set to
	40	13.0	60	131	121	120 C
	45	11.0	60	131	122	
	50	9.0	60	130	120	
	55	7.0	60	130	121	
1425	60	5.5	60	131	121	

TRC
ENVIRONMENTAL

Method 25 Field Data

Client: IBP
Location: Lexington, NB
Date: 7-21-98

Project Number:
Sample Location: INED. SUPER COOKER
Run Number: 3
Operator: T. Lundin

Tank Number: 6208 Trap Number: GGE Sample ID: R/3

	Tank Vacuum		Barometric Pressure	Ambient Temperature
	Manometer mm/cm Hg	Gauge mm/cm Hg/in Hg	mm/cm Hg/in. Hg	(C) (F)
Pretest	7~~8~~6	29.0	28.8	96°F
Post Term	115	4.5	" "	96°

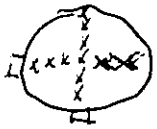
Pretest Leak Rate (mm/cm Hg/in Hg/5 min): OD @ 5mm

Clock Time	Sample Time	Gauge Vacuum mm/cm Hg	Flowmeter Setting ml / cm	Temperature Probe (C) / F	Temperature Box (C) / F	Comments
1455	0	28.5	60	131	120	
	5	26.5	60	131	122	Normal
	10	24.5	60	130	122	Probe
	15	22.5	60	131	121	heat set
	20	20.5	60	132	122	to 135 C
	25	18.5	60	131	120	
	30	16.5	60	131	120	Box heat
	35	14.5	60	132	121	set to
	40	12.5	60	133	121	120 C
	45	10.5	60	131	121	
	50	8.5	60	130	122	
	55	6.5	60	130	121	
1555	60	4.5	60	132	121	

TRC
ENVIRONMENTAL

VELOCITY TRAVERSE

Plant: IBP	Date: 7-21-98
Unit Number: 7NED. Super Cooler	Stack Diameter (in.): 10"
Load Condition:	Stack Gauge Pressure ("H_2O): ⊖ .62
Run No.: 1	Operators: T. Lundin
Project No.:	
Barometric Pressure at Ground Level ("Hg): 28.10	
Pitot Tube ID:	
Pitot Tube Coefficient: .84	Port Change Pitot Leak Check — Pass / Fail
Estimated Stack CO_2%: 00 O_2%: 19 H_2O%:	Port #1: ✓ / —
Platform Elevation (feet): 40'	Port #2: ✓ / —
Schematic of Stack Cross Section:	Port #3: — / —
	Port #4: — / —
	$\sqrt{\Delta P}$ = 1.0659
	T_s = 103.3



Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.10	102
2	1.30	102
3	1.12	103
4	1.05	104
5	1.22	103
6	1.06	103
Average:		

Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.12	103
2	1.25	102
3	1.10	104
4	1.08	104
5	1.2	105
6	1.05	104
Average:		

Reference: 40 CFR 60, Appendix A, Method 2

TRC

VELOCITY TRAVERSE

Plant: IBP	Date: 7-21.98
Unit Number: INED. Sugar Cooler	Stack Diameter (in.): 10"
Load Condition:	Stack Gauge Pressure ("H_2O): ⊖ .15
Run No.: 2	Operators: T. Lucas
Project No.:	
Barometric Pressure at Ground Level ("Hg): 28.8	
Pitot Tube ID:	
Pitot Tube Coefficient: .84	Port Change Pitot Leak Check — Pass / Fail
Estimated Stack CO_2%: 0.0 O_2%: 20.9 H_2O%:	Port #1 — —
Platform Elevation (feet):	Port #2 — —
Schematic of Stack Cross Section:	Port #3 — —
Sugar Run #1	Port #4 — —
	$\sqrt{\Delta P}$ = 1.0640
	T_s = 103.5

Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.12	102
2	1.27	102
3	1.10	103
4	1.06	105
5	1.20	104
6	1.0	104
Average:		

Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.15	102
2	1.2	103
3	1.12	103
4	1.10	105
5	1.23	105
6	1.05	104
Average:		

Reference: 40 CFR 60, Appendix A, Method 2

TRC

VELOCITY TRAVERSE

Plant: IBP / LEXINGTON, NB	Date: 7-21-98
Unit Number: INED SUPER COOKER	Stack Diameter (in.): 10"
Load Condition:	Stack Gauge Pressure ("H_2O): (-).61
Run No.: 3	Operators: T. LUNDIN
Project No.:	
Barometric Pressure at Ground Level ("Hg): 28.8	
Pitot Tube ID:	
Pitot Tube Coefficient: .84	Port Change Pitot Leak Check — Pass / Fail
Estimated Stack CO_2%: 0.0 O_2%: 20.9 H_2O%:	Port #1: ✓ /
Platform Elevation (feet): 40'	Port #2: ✓ /
Schematic of Stack Cross Section: See Run #1	Port #3: /
	Port #4: /
	$\sqrt{\Delta P}$ = 1.0663
	Ts = 109.7

Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.15	109
2	1.25	109
3	1.10	110
4	1.07	111
5	1.2	110
6	1.03	109
Average:		

Traverse Point Number	Velocity Head (In H_2O)	Stack Temp. (F)
1	1.14	109
2	1.23	110
3	1.14	110
4	1.10	111
5	1.25	110
6	1.0	108
Average:		

Reference: 40 CFR 60, Appendix A, Method 2

TRC

FGI 75-6

MOISTURE DETERMINATION

Plant Name: JSP/LEXINGTON Unit: INED. SUPER COOLER	Ambient Temperature: 90°
Date: 7-21-98	Barometric Pressure: (BP): 28.80 Elevation: @ grnd
Sampling Location: INED. SUPER STACK Elevation: 40'	Probe Length & Type: 3' STR.
Run Number: 1	Meter Box Number: 3 Gamma: (Y): .9951
Operator: T. LUNDIN Reviewer:	Leak Check: Pre-test: 0.001 @ 12" Post-test: 0.00 @ 10"

Traverse Point Number	Elapsed Time	Clock Time	Gas Meter Reading (Ft^3)	DELTA H (in H_2O)	Impinger Temperature (F°)	Gas Meter Temperature		Pump Vacuum ($Hg^"$)
						INLET °F	OUTLET °F	
1	0	11:58	397.405	2.0	67	92	91	5.0
	5		401.8		62	92	91	5.0
	10		406.2		60	94	92	5.0
	15		410.7		57	96	92	5.0
	20		415.1		58	97	93	5.0
	25		419.5		61	98	93	5.0
	30	12:38	423.913					
			Vm = 26.508	ΔH = 2.0		Avg.:	Avg.: 93.4	

T_m = 93.4

Analytical Data

	Impinger #1 Weight g	Impinger #2 Weight g	Impinger #3 Weight g	Silica Gel Weight g
Final	118	104	2	208
Initial	105	100	—	200
Net Gain	18 +	+ 4 +	2 +	8 =

32

V_L (grams) Total

Moisture Calculation:

Net volume of gas through dry gas meter at meter conditions = V_m = 26.508 cu. ft.

Average absolute meter temperature (T_m + 460) = 553.4 °R

$$\text{Percent moisture} = M = \frac{4.715\,(VL)}{.04715(VL) + \frac{17.64\,(Y)(Vm)(BP)}{Tm + 460}}$$

REF: CFR 60, App. A, Method 4

FOI 75-6

MOISTURE DETERMINATION

Plant Name: IBI / LEXINGTON Unit: INED. SURGE CONTR	Ambient Temperature: 90°
Date: 7-21-93	Barometric Pressure: (BP): 28.8 Elevation: @ grad
Sampling Location: STACK Elevation: 40'	Probe Length & Type: 3' ST
Run Number: 2	Meter Box Number: 3 Gamma: (Y): .9951
Operator: T. LUNDIN Reviewer:	Leak Check: Pre-test: 0.002 @ 14" Post-test: 0.001 @ 11"

Traverse Point Number	Elapsed Time	Clock Time	Gas Meter Reading (Ft^3)	DELTA H (in H_2O)	Impinger Temperature (F°)	Gas Meter Temperature INLET °F	Gas Meter Temperature OUTLET °F	Pump Vacuum ($Hg^"$)
	0	1326	424.157	20	67	95	94	8.0
	5		428.2		63	97	95	8.0
	10		432.9		60	101	96	8.0
	15		437.3		58	103	98	8.0
	20		441.7		59	105	99	8.0
	25		446.1		62	106	99	8.0
	30	1355	450.449					
			Vm = 26.291	ΔH = 20		Avg.:	Avg.:	

T_m = 99.0

Analytical Data

	Impinger #1 Weight g	Impinger #2 Weight g	Impinger #3 Weight g	Silica Gel Weight g	
Final	166	102	1	209	78
Initial	100	100	—	200	
Net Gain	66 +	+ 2 +	1 +	9 =	V_L (grams) Total

Moisture Calculation:

Net volume of gas through dry gas meter at meter conditions = V_m = 26.291 cu. ft.

Average absolute meter temperature (T_m + 460) = 559.0 °R

$$\text{Percent moisture} = M = \frac{4.715\,(VL)}{.04715(VL) + \frac{17.64\,(Y)(Vm)(BP)}{Tm + 460}}$$

REF: CFR 60, App. A, Method 4

TRC

FC. 17[illegible]

MOISTURE DETERMINATION

Plant Name: TBP / LEXINGTON Unit: INED. SUPER HEATER	Ambient Temperature: 95°
Date: 7-21-98	Barometric Pressure: (BP): 28.8 Elevation:
Sampling Location: STACK Elevation:	Probe Length & Type: 3' SS
Run Number: 3	Meter Box Number: 3 Gamma: (Y): .9951
Operator: T. LUNDIN Reviewer:	Leak Check: Pre-test: 0.000 @ 10" Post-test: 0.001 @ 12"

Traverse Point Number	Elapsed Time	Clock Time	Gas Meter Reading (Ft^3)	DELTA H (in H_2O)	Impinger Temperature (F°)	Gas Meter Temperature INLET °F	Gas Meter Temperature OUTLET °F	Pump Vacuum ($Hg^"$)
	0	14[55]	457.605	2.0	66	101	100	5
	5		462.0		64	102	101	5
	10		466.4		60	103	101	5
	15		470.9		61	105	102	5
	20		475.3		62	106	102	5
	25		479.7		64	108	102	5
	30	15[25]	484.187			~~108~~		
			Vm = 26.582	ΔH =		Avg.:	Avg.:	

T_m = 102.8

Analytical Data

	Impinger #1 Weight g	Impinger #2 Weight g	Impinger #3 Weight g	Silica Gel Weight g	
Final	236	104	2	219	163
Initial	100	100	—	200	
Net Gain	(136) +	+ 6 +	2 +	19 =	V_L (grams) Total

Moisture Calculation:

Net volume of gas through dry gas meter at meter conditions = V_m = 26.582 cu. ft.

Average absolute meter temperature (T_m + 460) = 562.8 °R

$$\text{Percent moisture} = M = \frac{4.715\,(VL)}{.04715(VL) + \frac{17.64\,(Y)(Vm)(BP)}{Tm + 460}}$$

REF: CFR 60, App. A, Method 4

APPENDIX B

PROCESS DATA

Attn: Rachel

LEXINGTON PLANT **W/E 07/25/98** **DAILY STATISTICS** *REVISED*

SLAUGHTER	*MON*	*TUE*	*WED*	*THU*	*FRI*	*SAT*	*TOTAL*
A SHIFT KILL							
GROSS HOURS	8	8	8	8	8	4	44
NET HOURS	7.75	7.75	7.75	7.5	7.75	3.75	42.25
ACT SUNSHINE MIN	0	6	0	8	0	0	14
PD SUNSHINE MIN	0	6	0	8	0	0	14
HEAD KILLED	2,365	2,365	2,214	2,365	2,230	1,101	12,640
LIVE WT	3,013,537	2,876,047	2,837,450	2,962,056	2,863,579	1,438,911	15,991,580
DRESS WT	1,923,966	1,846,132	1,815,978	1,877,733	1,816,021	911,511	10,191,341
B SHIFT KILL							
GROSS HOURS	7.5	8	8	7.25	8	7.25	46
NET HOURS	7.25	7.75	7.75	7	7.5	7	44.25
ACT SUNSHINE MIN	0	0	0	0	10	0	10
PD SUNSHINE MIN	0	0	0	0	10	0	10
HEAD KILLED	2,064	2,300	2,285	2,070	2,369	2,127	13,215
LIVE WT	2,557,531	2,844,342	2,872,447	2,557,631	2,908,257	2,622,023	16,362,231
DRESS WT	1,622,899	1,802,018	1,828,516	1,640,912	1,858,149	1,683,083	10,435,577
TOTAL KILL #'S							
GROSS HOURS	15.5	16	16	15.25	16	11.25	90
NET HOURS	15	15.5	15.5	14.5	15.25	10.75	86.5
ACT SUNSHINE MIN	0	6	0	8	10	0	24
PD SUNSHINE MIN	0	6	0	8	10	0	24
HEAD KILLED	4,429	4,665	4,499	4,435	4,599	3,228	25,855
LIVE WT	5,571,068	5,720,389	5,709,897	5,519,687	5,771,836	4,060,934	32,353,811
DRESS WT	3,546,865	3,648,150	3,644,494	3,518,645	3,674,170	2,594,594	20,626,918
CONDEMNS	1	1	3	4	4	4	17
SLUNKS	2	21	3	0	0	0	26
PERFECT KILL	4,576	4,730	4,730	4,500	4,734	3,279	26,549
PLANNED KILL	4,831	4,960	4,992	4,707	4,938	3,462	27,889
HD FROM PERFECT	(147)	(65)	(231)	(65)	(135)	(51)	(694)
HD FROM PLANNED	(402)	(295)	(493)	(272)	(339)	(234)	(2,034)
TARGETED HD A	2,365	2,365	2,365	2,365	2,365	1,144	12,969
TARGETED HD B	2,211	2,365	2,365	2,135	2,365	2,135	13,576
TARGET % A	100.00%	100.00%	93.62%	100.00%	94.29%	96.26%	97.47%
TARGET % B	93.34%	97.25%	96.62%	96.96%	100.17%	99.63%	97.34%
PROCESSING	*MON*	*TUE*	*WED*	*THU*	*FRI*	*SAT*	*TOTAL*
A SHIFT CUT							
HEAD CUT	2,086.0	2,013.5	2,206.0	2,167.5	2,209.5	1,576.5	12,259.0
GROSS HOURS	8	8	8	8	8	5.5	45.5
NET HOURS	7.75	7.75	7.75	7.75	7.75	5.25	44
B SHIFT CUT							
HEAD CUT	1,981.5	1,942.0	2,008.5	1,956.5	2,099.5	1,574.0	11,560.0
GROSS HOURS	8	8	8	8	8	6	46
NET HOURS	7.75	7.75	7.75	7.75	7.75	5.75	44.5
TOTAL CUT #'S							
HEAD CUT	4,067.5	3,955.5	4,212.5	4,124.0	4,309.0	3,150.5	23,819.0
GROSS HOURS	16	16	16	16	16	11.5	91.5
NET HOURS	15.5	15.5	15.5	15.5	15.5	11	88.5

1. COOKOR DISCHARGE TEMP
2. COOKOR CENTER TEMP
3. DISCHARGE ROTARY VALVE % SPD
4. STEAM VALVE POSITION
5. COOKOR LEVEL
6. COOKOR VACUUM PRESSURE
7. CONTROL WHEEL % SPD - Not incl.
8. FEED VALVE - Not incl.
9.
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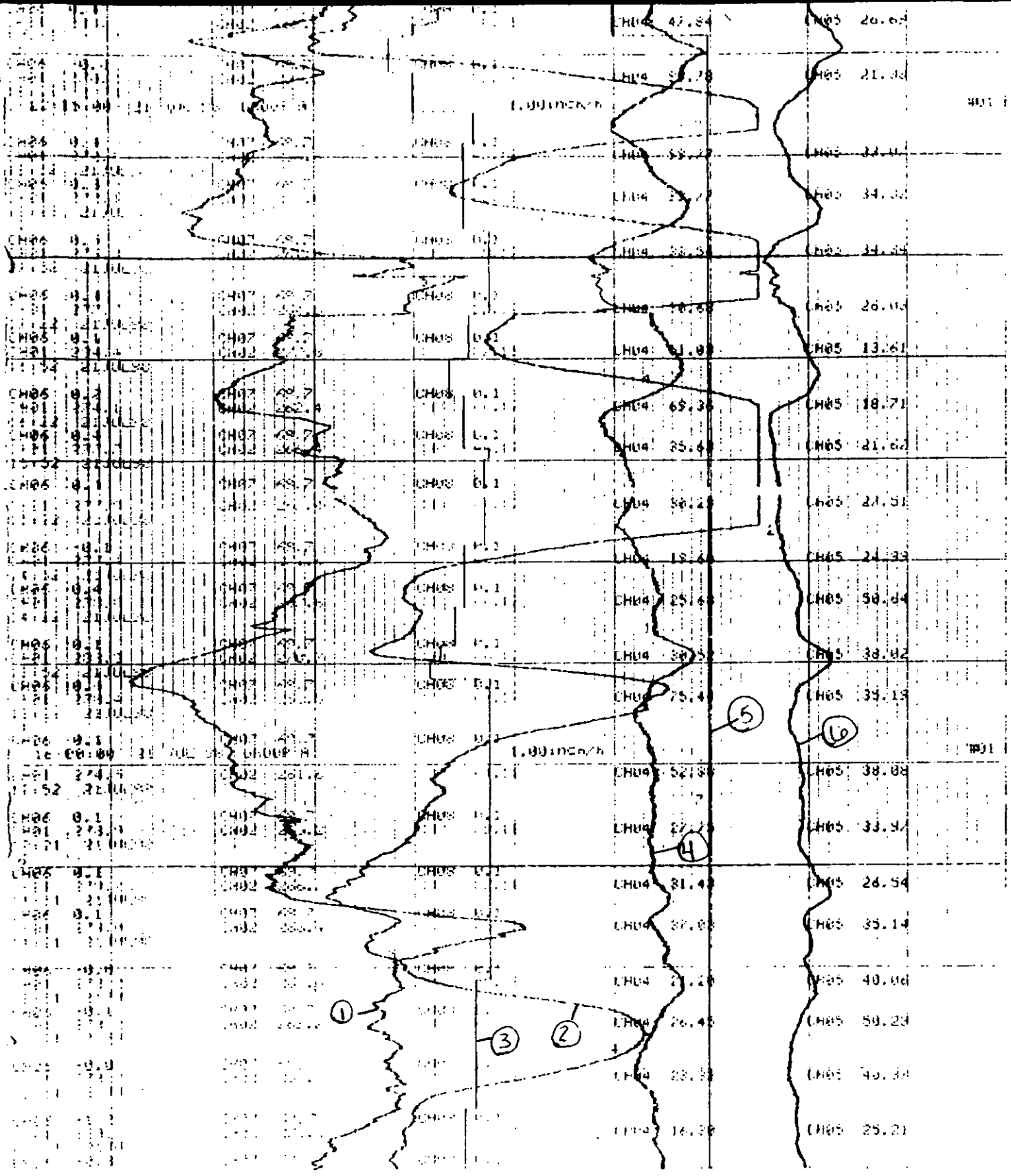
3317 ATTN: Rochelle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APPENDIX C

LABORATORY DATA

Method 25
Analytical Results

prepared for

TRC ENVIRONMENTAL CORPORATION
1307 Butterfield Road, Suite 420
Downers Grove, IL 60515

by

Triangle Environmental Services, Inc.

Reviewed by:

Donna Nolen-Weathington
Laboratory Analyst

Approved by:

Larry W. Taylor
Laboratory Supervisor

Approved by:

John Y. Morimoto, Ph.D.
QA Officer

Report
98156

August 6, 1998

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

Triangle Environmental Services, Inc.

METHOD 25 TABLE OF RESULTS

Client: TRC Environmental Corporation ID#98156R Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)
(Post-test PT data replaced by laboratory receipt data)

	Sample Description	Concentrations (ppmC)						Mass Conc. (mgC/cu.m)
		CO	CH4	CO2	Noncon-densibles	Conden-sibles	TGNMO	
1	Super Cooker	2	17	6207	5	353	358	179
2	Super Cooker	4	18	5476	19	254	273	136
3	Super Cooker	< 3	21	3479	7	289	296	148

< # = Concentration Below Practical Quantitation Limit

* Please refer to the "Comments on the Analyses" page of the report for additional information.

Triangle Environmental Services, Inc.
METHOD 25 PROCEDURES

CALIBRATION

Initial calibrations and operational checks of the recovery and analytical systems are conducted at a frequency of no greater than one year between sets. The calibrations satisfy the requirements for Methods 25, 25-C, and 10-B.

Triplicate injections of a calibration gas mixture consisting of 200.0 ppm carbon monoxide, 50.0 ppm methane, 10000 ppm carbon dioxide, and 20.00 ppm propane are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppmC) and must agree within 10% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 2% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

CONDENSATE RECOVERY

To flush the trap of CO_2, hydrocarbon-free air is flushed through the trap maintained at -78 °C into the sample tank until less than 10 ppm CO_2 is detected in the flow stream (the concentration of CO_2 is monitored with an NDIR CO_2 detector and measured using a CO_2 analyzer). The sample tank is pressurized to about 1200 mm Hg for analysis and is replaced with an intermediate collection vessel (ICV).

To oxidize the organic material in the trap, hydrocarbon-free air is then passed through the trap heated to 250 °C and the recovery oxidation catalyst into the ICV until less than 10 ppm CO_2 is detected in the flow stream. The ICV is pressurized to about 1200 mm Hg for analysis.

ANALYSIS

All samples, which include the daily calibration gas mixture, sample tanks, and ICVs, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a flame ionization detector (FID). CO, CH_4, and CO_2 are eluted from the Unibead 1S-Carbosieve G column and pass through the analytical oxidation and reduction catalyst to the FID. The column is then backflushed to elute the nonmethane organic (NMO) fraction, which passes through the analytical oxidation and reduction catalysts to the FID.

CALCULATIONS

Calculations are done in accord with USEPA Method 25 procedures. A sample calculation for one of the samples is provided in the report. CO and CO_2 blanks are used to compensate for a background concentration of (1) "CO" due to the interference of O_2 resulting from the coelution of O_2 and CO and (2) CO_2 due to CO_2 and organic compounds in the recovery carrier gas. A concentration of noncondensibles or condensibles of less than the PQL is considered to be zero in computing the TGNMO.

EQUIPMENT

Tanks and ICVs are twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppmC NMO, and stored for later use.

Traps are flushed at 300 °C for at least 30 minutes with compressed air. Each trap is then flushed at 300 °C for thirty minutes with hydrocarbon-free air. The effluent is then routed through an oxidation catalyst and a reduction catalyst for analysis by FID-GC to confirm less than 10 ppmC total C.

Sampling units are reconditioned by replacing filters and checking that all sections operate properly. The unit is heated (with a PTFE line used in place of a trap) and is flushed with zero air for at least thirty minutes before an aliquot of this flow is injected into the analyzer. If the total carbon concentration is below 10 ppm, the unit is made ready for use and stored for shipment.

Triangle Environmental Services, Inc.

METHOD 25 SAMPLE CALCULATION

Client: TRC Environmental Corporation ID#98156 Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)

Sample # 1 Super Cooker

D A T A

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)
Presampling	3.5	305.37
Postsampling	575.5	305.37
Lab Receipt	556.0	297.15
Tank Final	1218.0	297.15
CV Final	1493.0	298.65

Tank N283A:
Tank Volume = 0.004542 cu.m

Trap GGI →
Collection Vessel 33:
CV Volume = 0.008361 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	2	376	358	0
CH4	259.6	2	2,024	2,072	1,977
CO2	256.4	2	723,098	722,715	722,456
Noncondensibles	253.5	5	576	490	589
Condensibles	256.4	4	19,003	19,132	19,107

CO Blank = 0 area counts CO2 Blank = 3 ppm

C A L C U L A T I O N S

Measured Concentrations, corrected for blank (ppmC):

Cm(CO) = [Area(CO) - CO Blank] / RF(CO)
= [376 - 0] / 246.7 = 1.5
= [358 - 0] / 246.7 = 1.5
= [0 - 0] / 246.7 = 0.0

Cm(CH4) = Area(CH4)/RF(CH4)
= 2024 / 259.6 = 7.8
= 2072 / 259.6 = 8.0
= 1977 / 259.6 = 7.6

Cm(CO2) = Area(CO2)/RF(CO2) - CO2 Blank
= 723098 / 256.4 - 3 = 2817.2
= 722715 / 256.4 - 3 = 2815.7
= 722456 / 256.4 - 3 = 2814.7

Cm(Noncondensibles) = Area(Noncondensibles)/RF(Noncondensibles)
= 576 / 253.5 = 2.3
= 490 / 253.5 = 1.9
= 589 / 253.5 = 2.3

Cm(Condensibles) = Area(Condensibles)/RF(Condensibles) - CO2 Blank
= 19003 / 256.4 - 3 = 71.1
= 19132 / 256.4 - 3 = 71.6
= 19107 / 256.4 - 3 = 71.5

Pressure-Temperature Ratio, Q(i) = P(i)/T(i) (mm Hg/K):

Tank Presampling: Q(2) = 3.5 / 305.37 = 0.011
Tank Postsampling: Q(1) = 575.5 / 305.37 = 1.885
Tank Lab Receipt: Q(5) = 556.0 / 297.15 = 1.871
Tank Final: Q(3) = 1218.0 / 297.15 = 4.099
CV Final: Q(4) = 1493.0 / 298.65 = 4.999

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x 0.004542 x [1.885 - 0.011]
= 0.003281

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C=%RSD of Cm)

Calculated Concentrations (ppmC):

C(CO) = Q(3)/[Q(1)-Q(2)] x Cm(CO)
= 4.099/(1.885 - 0.011) x 1.0 = 2.2

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)
= 4.099/(1.885 - 0.011) x 7.8 = 17.1

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)
= 4.099/(1.885 - 0.011) x 2815.9 = 6161.9

C(Noncondensibles) = Q(3)/[Q(1)-Q(2)] x Cm(Noncondensibles)
= 4.099/(1.885 - 0.011) x 2.2 = 4.8

C(Condensibles)
= Volume(CV)/Volume(Tank) x Q(4)/[Q(1)-Q(2)] x Cm(Condensibles)
= 0.008361/0.004542 x 4.999/(1.885 - 0.011) x 71.4 = 350.9

Total Gaseous Non-Methane Organics(TGNMO)=C(Noncondensibles)+C(Condensibles)
= 4.8 +350.9
= 355.6

Mass Concentration (mgC/cu.m)
= 0.4993 x TGNMO
= 0.4993 x 355.6 = 177.6

Triangle Environmental Services, Inc.
METHOD 25 SAMPLE QA/QC DATA

DAILY RECOVERY SYSTEM CHECKS

4.3.1.1* **Condensate Recovery System Leak Check**

Evacuate system to ≤10 mm Hg absolute pressure, isolate system, and monitor for ten minutes.
Requirement: Pressure Change ≤3 mm Hg

4.3.1.2* **Condensate Recovery System Background Test**

Analyze recovery system effluent for CO_2 concentrations.
Requirement: CO_2 ≤ 10 ppm

4.3.1.3* **Condensate Oxidation Catalyst Efficiency Check**

Analyze 1% methane standard through oxidation catalyst.
Requirement: CO_2 = CH_4 concentration ± 2%

DAILY ANALYZER CHECKS

5.3* **Daily Calibration**

Response Factor Checks
Requirement: Daily RF = Initial RF ± 10%
See the individual sample data sheet for the daily response factor

	Initial RF for Analyzer A 4/8/98	Initial RF for Analyzer B 4/21/98
CO	219.06	247.37
CH_4	227.99	250.07
CO_2	225.44	250.03
NMO	228.34	250.52

Triplicate injections of a mixture of CO, CH_4, CO_2, and C_3H_8 are made before and after each batch of samples.

* USEPA Method 25 Protocol Reference Number

INITIAL CONDENSATE RECOVERY SYSTEM TESTS

5.1.1* **Carrier and Auxiliary Gas Blank**

Requirement: $CO + CH_4 + CO_2 + NMO \leq 5$ ppm

5.1.3* **System Performance Check**

Volume Injected	Compound	Average % Recovery				% RSD			
50 uL	Hexane	101	102	98.8	104.6	0.058	0.101	1.68	0.229
50 uL	Decane	97	100	93.7	103.3	0.120	0.047	1.7	0.359
10 uL	Hexane	104	107	92	90.0	0.118	0.145	1.206	0.135
10 uL	Decane	98	97	99.6	93.3	0.119	0.232	1.36	0.254
Requirement:		100 ± 10%				≤5			

INITIAL NMO ANALYZER PERFORMANCE CHECKS

5.2.1* **Oxidation Catalyst Efficiency Check** Analyzer A,4/8/98; Analyzer B,4/21/98

FID response with reduction catalyst in bypass mode = 0, 0
Requirement: ≤1%

5.2.2* **Reduction Catalyst Efficiency Check** Analyzer A,4/8/98; Analyzer B,4/21/98

Response of CH_4 with oxidation and reduction catalysts in series mode compared to response with both catalysts in bypass mode.
100.0%, 100.0% Requirement: > 95%

5.2.3* **Analyzer Linearity Check+NMO Calibration** Analyzer A,4/8/98;Analyzer B,4/21/98

$100x(1-RF/RF_{average})$		Requirement:
max. dev. CO:	+1.70%, +1.28%	± 2.5%
max. dev. CH_4:	-2.00%, -1.77%	± 2.5%
max. dev. CO_2:	+1.71%, +2.10%	± 2.5%
max. dev. NMO:	-1.42%, -1.12%	± 2.5%
max. %RSD:	1.50%, 0.54%	≤ 2%
$\frac{RF\ (NMO)}{RF\ (CO_2)}$ =	0.98, 1.00	1.0 ± 0.1

* USEPA Method 25 Protocol Reference Number

5.2.4* **System Performance Check** Analyzer A,4/8/98; Analyzer B,4/21/98, 5/1/98

	Measured Value, Expected Value		Requirement
	Analyzer A	Analyzer B	
Propane in Mix	19.6, 20.0	20.22, 20.0	± 5%
Hexane	50.6, 51.6	51.6, 51.6	± 5%
Toluene	20.3, 20.0	19.34, 20.0	± 5%
Methanol	104.5, 109.1	109.55, 109.0	± 5%

EQUIPMENT CHECKS

4.1.1* **Clean Sampling Equipment Check**

Sample Unit	<10	ppmC total C	@ 100%
Trap	<10	ppmC total C	@ 100%
Tank	< 2	ppmC NMO	@ 100%

4.1.2* **Sample Tank Evacuation and Leak Check**

Tank evacuated to ≤10 mm Hg absolute pressure, monitored for ≥1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

5.4* **Sample Tank and ICV Volumes**

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

* USEPA Method 25 Protocol Reference Number

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156 Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)

Sample # 1 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	3.5	305.37	0.011
Postsampling	575.5	305.37	1.885
Lab Receipt	556.0	297.15	1.871
Tank Final	1218.0	297.15	4.099
CV Final	1493.0	298.65	4.999

Tank N283A:
Tank Volume = 0.004542 cu.m
Volume Sampled = 0.003281 dscm

Lab Receipt P/T / Postsampling P/T = 0.993

Trap GGI →
Collection Vessel 33:
CV Volume = 0.008361 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	2	376	358	0
CH4	259.6	2	2,024	2,072	1,977
CO2	256.4	2	723,098	722,715	722,456
Noncondensibles	253.5	5	576	490	589
Condensibles	256.4	4	19,003	19,132	19,107

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.6%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	2	±	2	86.7
CH4	17	±	0	2.3
CO2*	6162	±	3	0.0
Noncondensibles	5	±	0	9.8
Condensibles*	351	±	1	0.4
TGNMO	356			

Mass Concentration 178 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156 Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)

Sample # 2 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	1.5	308.71	0.005
Postsampling	577.5	308.71	1.871
Lab Receipt	523.0	297.15	1.760
Tank Final	1512.0	297.15	5.088
CV Final	1500.0	299.65	5.006

Tank 6209T:
Tank Volume = 0.006126 cu.m
Volume Sampled = 0.004409 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 0.941$

Trap DDZ →
Collection Vessel 12:
CV Volume = 0.008343 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	3	347	330	368
CH4	259.6	3	1,635	1,597	1,581
CO2	256.4	3	485,063	485,058	485,253
Noncondensibles	253.5	6	1,703	1,679	1,669
Condensibles	256.4	3	17,479	17,554	17,528

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.5%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	4	±	0	5.5
CH4	17	±	0	1.7
CO2*	5152	±	1	0.0
Noncondensibles	18	±	0	1.0
Condensibles*	239	±	1	0.2
TGNMO	257			

Mass Concentration 128 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: TRC Environmental Corporation ID#98156 Analyzed: 8/4/98

Project ID: 22214-0000-00011 (IBP/Lexington, Neb.)

Sample # 3 Super Cooker

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	4.2	308.71	0.014
Postsampling	615.2	308.71	1.993
Lab Receipt	555.0	298.15	1.861
Tank Final	1395.0	298.15	4.679
CV Final	1496.0	300.65	4.976

Tank 6208T:
Tank Volume = 0.006109 cu.m
Volume Sampled = 0.004663 dscm

Lab Receipt P/T / Postsampling P/T = 0.934

Trap GGE →
Collection Vessel 40:
CV Volume = 0.008388 cu.m

Response Factors (RF), Practical Quantitation Limits (PQL), and Area Counts:

	RF (area/ppmC)	PQL (ppmC)	Area 1	Area 2	Area 3
CO	246.7	2	0	34	308
CH4	259.6	2	2,194	2,209	2,191
CO2	256.4	2	353,186	352,875	353,081
Noncondensibles	253.5	5	645	699	638
Condensibles	256.4	3	20,779	20,939	20,728

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 100.4%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	< 2			
CH4	20	±	0	0.4
CO2*	3248	±	1	0.0
Noncondensibles	6	±	0	5.1
Condensibles*	270	±	1	0.5
TGNMO	276			

Mass Concentration 138 mgC/cu.m

< # = Concentration Below Practical Quantitation Limit

Chain of Custody

TPC Environmental Consultants — Downers Grove, IL (630) 810-1122

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
22214-0510-00011	IBP / LEXINGTON, NB

SAMPLERS: (Signature) Tom Lundin (Printed) Tom Lundin

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: RM 25	REMARKS
283 (TANK)	7/21/98	1157	✓		SUPER COOKER EXHAUST	1	✓	ANALYSES FOR RM 25
GG1 (TRAP)	7/21/98	1157	✓		" "	1	✓	
6209 (TANK)	7/21/98	1325	✓		" "	1	✓	
DD2 (TRAP)	7/21/98	1325	✓		" "	1	✓	
6208 (TANK)	7/21/98	1455	✓		" "	1	✓	
GGE (TRAP)	7/21/98	1455	✓		" "	1	✓	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Tom Lundin	7/21/98 6:00 P.M.				
(Printed) Tom Lundin	7/24/98 12:00 P.M.	(Printed)	(Printed)		(Printed)
Relinquished by: (Signature)	**Date / Time**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Remarks**	
		John Y. Marint	7/24/98 12:3	Tenko traps	
(Printed)		(Printed) John Y. Marint			

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

METHOD 25 SAMPLE DATA
Triangle Environmental Services, Inc.

Company Name: IBP / LEXINGTON, NB			Date: 7-21-98
Units of Measure:	Pressure: ☒ mm Hg ☐ in.Hg		Temperature: ☒ °F ☐ °C

Run # 1	Tank ID # 283		Trap ID # GG1	
Description (20 character limit)	SUPER COOKER			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	28.8	28.5	728	90°F
Post-Test Data	28.8	5.0	156	96°F

Run # 2	Tank ID # 6209		Trap ID # DD2	
Description (20 character limit)	SUPER COOKER			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	28.8	28.5	730	96°F
Post-Test Data	28.8	5.5	154	96°F

Run # 3	Tank ID # 6208		Trap ID # GGE	
Description (20 character limit)	SUPER COOKER			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	28.75	~~728~~ 28.5	726	96°F
Post-Test Data	28.75	~~115~~ 4.5	115	96°F

Run #	Tank ID #		Trap ID #	
Description (20 character limit)				
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data				
Post-Test Data				

Run #	Tank ID #		Trap ID #	
Description (20 character limit)				
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data				
Post-Test Data				

Run #	Tank ID #		Trap ID #	
Description (20 character limit)				
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data				
Post-Test Data				

APPENDIX D

EQUIPMENT CALIBRATION

PRETEST DRY GAS METER CALIBRATION DATA FORM (ENGLISH UNITS)

METER BOX NUMBER: 3

DRY GAS METER NUMBER: 1197469

DATE: 2/2/98

REFERENCE TEST METER NUMBER: 27865

DELTA-H		0.5	1	1.5	2	2.5	3	3.5	4
Vwr	521.055	527.050	533.777	539.676	546.597	552.364	558.432	564.039	569.999
Vdr	37.435	43.636	50.553	56.606	63.691	69.599	75.930	81.677	87.795
Tw		68	70	70	70	70	70	70	70
Tdi		75	81	87	91	95	97	98	100
Tdo		77	77	79	80	81	83	84	85
Td(AVE)		75.8	79.0	82.8	85.3	87.8	89.8	91.0	92.3
THETA		14.0	11.0	8.0	8.1	6.0	6.0	5.0	5.0
VAC.		1	1	1	1	1	1	1	1
Yi		0.9797	0.9866	0.9943	1.0000	1.0026	0.9868	1.0055	1.0050
DELTA-H@i		1.5263	1.4989	1.5358	1.5181	1.4928	1.6121	1.5263	1.5403
Vw		5.995	6.727	5.899	6.921	5.767	6.068	5.607	5.96
Vd		6.201	6.917	6.053	7.085	5.908	6.331	5.747	6.118
Vd/Min.		0.4429	0.6288	0.7566	0.8747	0.9847	1.0552	1.1494	1.2236

Y(AVE)	0.9951
DELTA-H@(AVE)	1.5313
Pbar	29.47

CALIBRATED BY D.W.

Vwr=REFERENCE TEST METER READING
Vdr=DRY GAS METER READING
Vw=GAS VOLUME PASSING THROUGH THE REFERENCE TEST METER, CUBIC FEET
Vd=GAS VOLUME PASSING THROUGH THE DRY GAS METER, CUBIC FEET
Tw=TEMPERATURE OF THE GAS IN THE REFERENCE TEST METER, DEGREES F
Tdi=TEMPERATURE OF THE INLET GAS OF THE DRY GAS METER, DEGREES F
Tdo=TEMPERATURE OF THE OUTLET GAS OF THE DRY GAS METER, DEGREES F
Td=AVERAGE TEMPERATURE OF THE GAS IN THE DRY GAS METER, DEGREES F
DELTA-H=PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. WATER
Yi=RATIO OF ACCURACY OF REFERENCE TEST METER TO DRY GAS METER FOR EACH RUN
Y=AVERAGE RATIO OF ACCURACY OF REFERENCE TEST METER TO DRY GAS METER
DELTA-H@i=ORIFICE PRESSURE DIFFERENTIAL THAT EQUATES TO 0.75 cfm OF AIR
AT 68 DEGREES F AND 29.92 INCHES OF Hg., INCHES OF WATER
DELTA-H@=AVERAGE ORIFICE PRESSURE DIFFERENTIAL THAT EQUATES TO 0.75 cfm OF AIR
AT 68 DEGREES F AND 29.92 INCHES OF Hg.,INCHES OF WATER
TOLERENCE OF Yi=PLUS OR MINUS 0.020 FROM Y
TOLERENCE OF DELTA-H@i=PLUS OR MINUS 0.20 FROM DELTA-H@
Pbar=BAROMETRIC PRESSURE,in. Hg.
THETA=TIME OF CALIBRATION RUN, Min.

Thermocouple Calibration Form

Meter Box #3

Thermocouple Number	Temperature Reading #1	Reference Temp #1	Temperature Reading #2	Reference Temp #2	Temperature Reading #3	Reference Temp #3
1 Stack	71	72	188	186	288	286
2 Probe	71	72	188	186	288	286
3 Filter	72	72	187	186	287	286
4 Impingers	71	72	187	186	288	286
5 Spare	71	72	187	186	287	286
6 DGM In	39	38	71	72	109	108
7 DGM Out	38	38	71	72	109	108

Calibrated By: SRM
Date: 4-8-96

Criteria: Impinger temperature must be with 2 °F of reference temperature
Criteria: DGM temperature must be with ±5.4 °F of reference temperature
Criteria: Stack temperature must be with 1.5% of reference temperature

ROTOMETER CALIBRATION SHEET

Date: 4/28/97
Initials: DW
Part #: RIG #1

Rotometer Scale: 0-120 ccm
Rotometer Use: RM25 SAMPLE RIG
Calibrated Against: BIOS DC-1

Setting on Rotometer (cc/min)	Volume (mL)	Time (sec)	Actual Sampling Rate (cc/min)
40			38.66
60			61.12
80			80.39
100			98.52

TRC Environmental Corporation

SHEET NO. _____ OF _____

PROJECT NO. _____

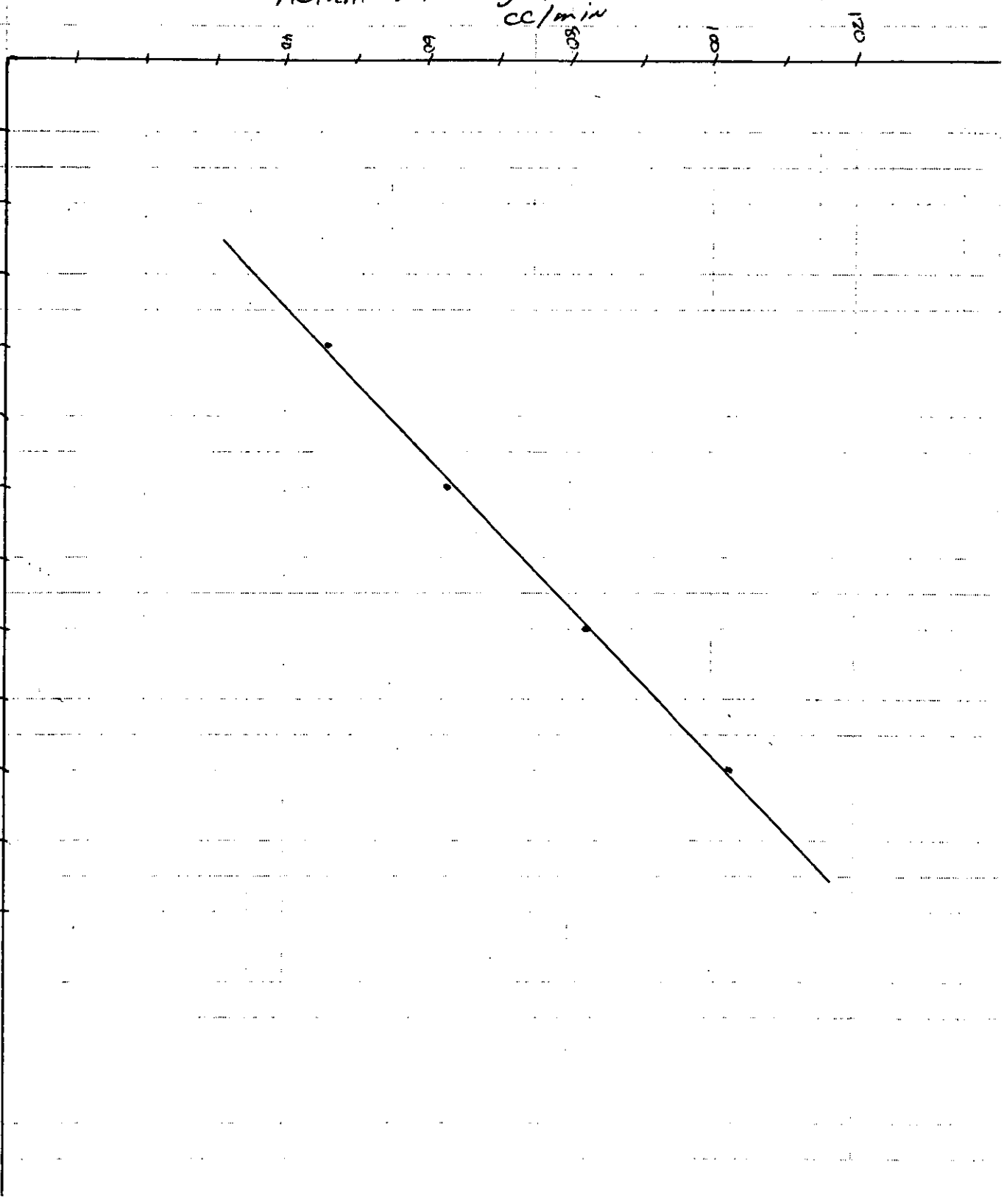
DATE _____

BY _____

CHK'D _____

SUBJECT _____

ACTUAL SAMPLING RATE
cc/min



RM25 RIG #3

ROTOMETER CALIBRATION SHEET

Date: 4/28/97
Initials: DW
Part #: RIG #2

Rotometer Scale: 0/120 cm
Rotometer Use: R/S SAMPLE RIG
Calibrated Against: GOS DC-1

Setting on Rotometer (cc/min)	Volume (mL)	Time (sec)	Actual Sampling Rate (cc/min)
40			95
60			10
80			31
100			.3

TRC Environmental Corporation

SHEET NO. _____ OF _____

PROJECT NO. _____

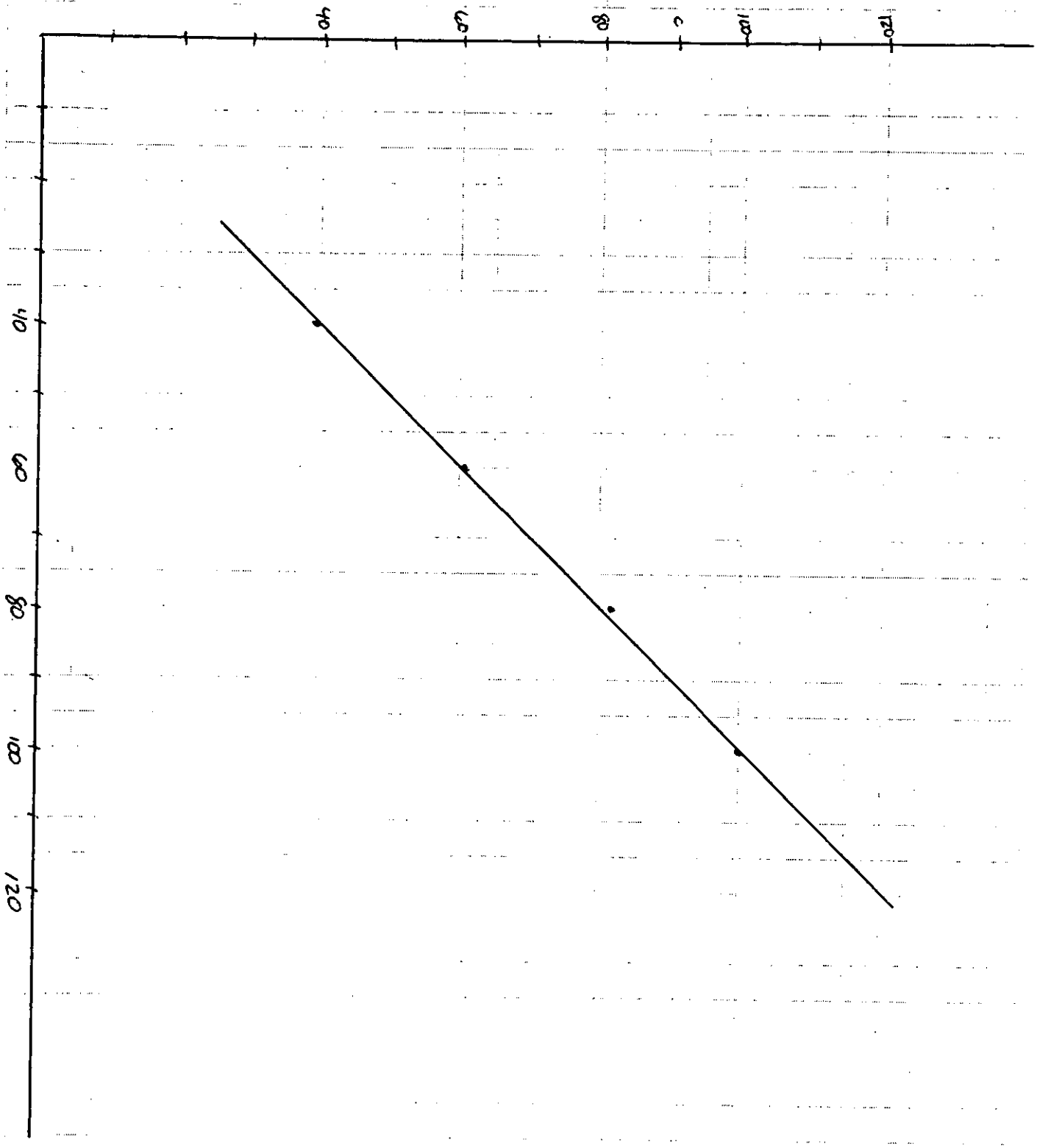
DATE _____

BY _____

CHK'D _____

SUBJECT _____

ACTUAL SAMPLING RATE cc/min



RM25 RIG #2

ROTOMETER CALIBRATION SHEET

Date: 4/28/97
Initials: DW
Part #: RIG #3

Rotometer Scale: 0-120 ccm
Rotometer Use: RM25 SAMPLE RIS
Calibrated Against: BIOS DC-1

Setting on Rotometer (cc/min)	Volume (mL)	Time (sec)	Actual Sampling Rate (cc/min)
40			46.27
60			63.03
80			82.97
100			102.40

TRC Environmental Corporation

SHEET NO. _____ OF _____

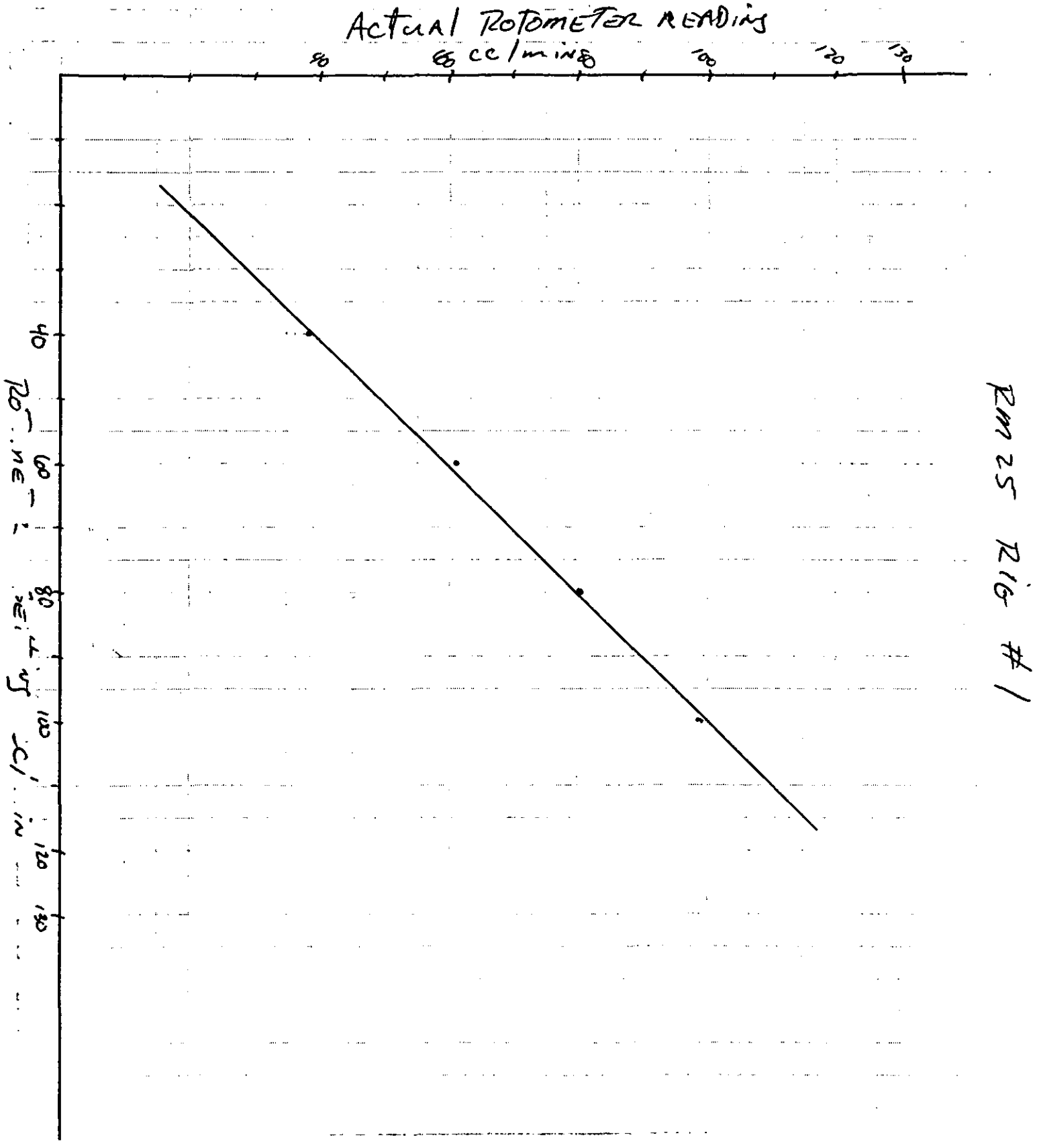
PROJECT NO. _____

DATE _____

BY _____

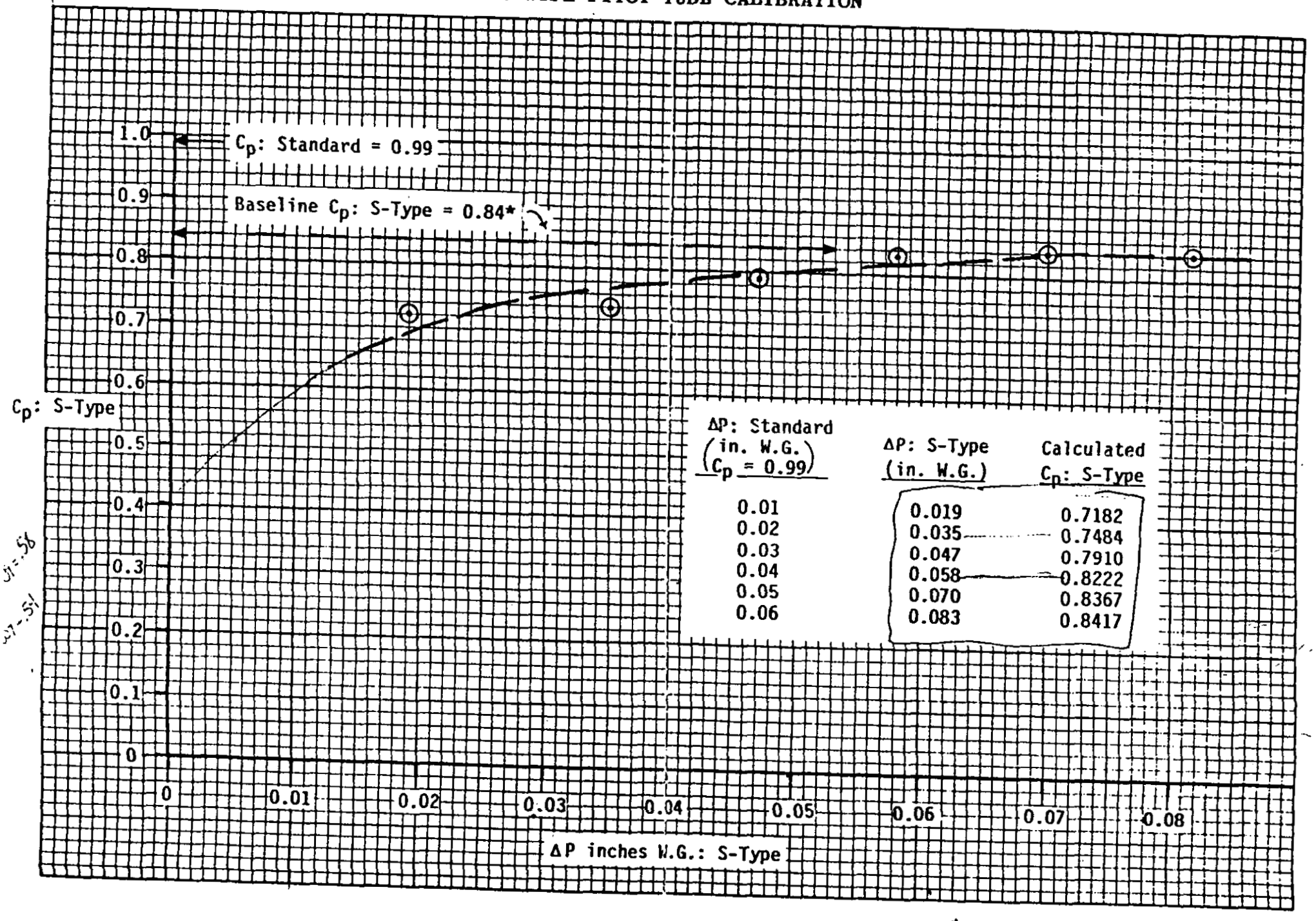
CHK'D _____

SUBJECT _____



RM 25 RIG #1

S-TYPE PITOT TUBE CALIBRATION



ΔP: Standard (in. W.G.) C_p = 0.99	ΔP: S-Type (in. W.G.)	Calculated C_p: S-Type
0.01	0.019	0.7182
0.02	0.035	0.7484
0.03	0.047	0.7910
0.04	0.058	0.8222
0.05	0.070	0.8367
0.06	0.083	0.8417

*as per 40: CFR

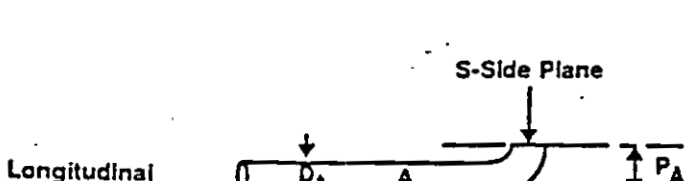
Type S Pitot Inspection Form

Pitot Tube No. 324

Tubing Diameter, D_t 3/8 in. $\left(\frac{3}{16} < D_t < \frac{3}{16}\right)$

Pitot Tube Assembly Level? (Yes) No

Pitot Tube Opening Damaged? (Yes) No

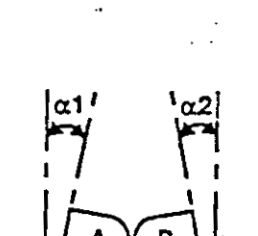


Note: $1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

P_A = 7/16 in.

P_B = 7/16 in.



α 1 = 2 °

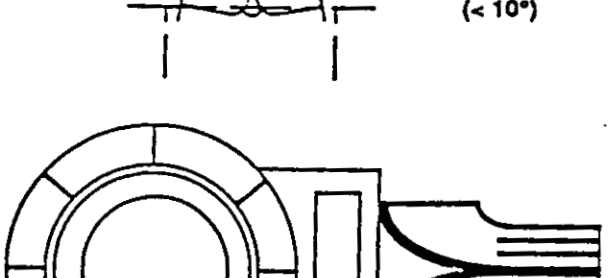
α 2 = 0 °

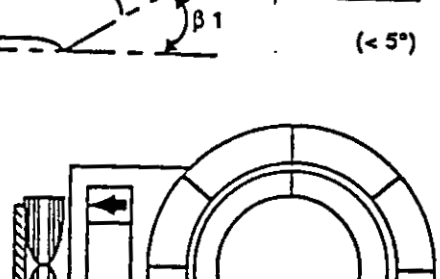
(< 10°)

β 1 = 0 °

β 2 = 1 °

(< 5°)





Level Position to find γ = 1°

Z = A' sin γ .017 in. (< 1/8 in.)

Level Position to find θ = .5°

W = A' sin θ .009 in. (< 1/32 in.)

Comments: _____

Checked by: SM

Date: 8-29-97

Calibration Required? NO

D_t = External Tube Diameter

A' = Distance Between Tips (P_A + P_B) inches

TRC

APPENDIX E

CALCULATION FORMULAS

CALCULATION FORMULAS

Linearity Percent Difference = $\frac{\text{Analyzer Response - Cylinder Value}}{\text{Span}} \times 100$

Bias System Bias = $\frac{\text{System Response - Analyzer Respor}}{\text{Span}} \times 100$

Drift System Drift = $\frac{\text{System Response - Previous System Response}}{\text{Span}} \times 100$

Moisture Moisture = $\frac{100 \times \text{Volume water vapor (scf)}}{\text{(Volume Gas (dscf) + Volume water vapor)}}$

Stack Area Area = 3.14 x Radius^2

AFPM Actual Feet per Minute = 5130 x .84 x SDE Avg x (1 / (stack pres. Hg x wet MW)) ^.5

ACFM Actual Cubic Feet/Min = AFPM x Stack Area (sqaure feet)

DSCFM Dry Std. Cubic Feet/Min = SCFH / 60 min

DSCF/HR Dry Std. Cubic Feet/Hr = MMBTU/HR x F-Factor x (~~20.9~~ 20.9 / (20.9-{RUN# O2%}))

MMBTU / HR Million BTU's per Hour = Fuel Flow (scfm gas) x Heat Content (BTU/scf) x 60 min/hr

Humidity Humidity (gal H2O/gal. air Taken From Chart (Wet bulb / Dry bulb temps)

EFFLUENT GAS CONC CALCULATION

GAS CONC. = (Avg Stk Conc - Avg Zero Cal) x (Span Conc/(Avg Span Cal - Avg Zero Cal))

PPM NOx NOx PPM @15% O2 = PPM NOx x ((20.9% O2 - 15% O2) / (20.9% O2 - Actual O2%))

PPM CO CO PPM @15% O2 = PPM CO x ((20.9% O2 - 15% O2) / (20.9% O2 - Actual O2%))

ISO NOx ISO NOx = PPM NOx @15% O2 x { (760/Barometric mm Hg)^.5 x 2.178^(19 x (gH2O/gAir - .00633)) } x (288/Ambient temperature in degrees (K))^1.53

LBS/HR NOx Pounds per hour NOx = PPM ISO NOx x 1.554E-7 x 46 (MW) x DSCFM

LBS/HR VOC's Pounds per hour VOC's = PPM (C3H8 - CH4) x 1.554E-7 x 16.01 (MW) x DSCFM

LBS/HR CO Pounds per hour CO = PPM CO x 1.554E-7 x 28 (MW) x DSCFM

F-Factor F-Factor, dscf / MMBTU = [1,000,000 x (3.64x%H)+(1.53x%C)+(.57x%S)+(.14x%N)-.46x%O)] / GCV, (I