EVALUATOR Dean C. EVALUATION DATE 8-7-92

METHOD 5: SECONDARY EMISSIONS TEST REPORT EVALUATION

STATE: GA FACILITY: Time Products TEST DATE: 11-29-88

PROCESS(ES) TESTED: Powdered Soap Production
Spray Dryer Scrubber

SAMPLING DURATION ✓ ✓ 3
must have at least 3 runs, each ≥ 1 hour duration, with sampling ± 2 minutes at each traverse point, and total sampling volume ≥ 30 dscf

2.5 minutes per point

PRODUCTION RATE 3
is process or production rate during testing representative of normal rates

1.69 tons/hr.
Max: 5 t/hr.

CONTROL DEVICE(S) 3
are devices described, and their efficiencies given

Scrubber FLOW: 130 GPM

METHOD 1 3
are calculations accurate, and is figure provided

24 pts.

METHODS 2,3 3
are data and calculations included for gas velocity, cyclonic flow, and molecular weight determination, and is source of barometric pressure noted = 29.35/
Bar. Press. = 29.50 in Hg.

METHOD 4 2
are data and calculations included for moisture content determination, and is moisture content realistic (< saturation)

In Appd. "Test Calcs"

FIELD DATA is field data on standard forms, and does raw data correspond with printout 3

BOILER TESTS
calculation of ~~F factor~~ orsat accurate ? —

SAMPLING TEMPERATURE 1
both probe and filter must be maintained at 248 ± 25°F or other temperature specified in NSPS

??

BACK-HALF 2
if any, what method was used to catch and recover condensible matter

moisture catch from impingers was measured with graduated cyl.

EQUIPMENT were a borosilicate glass probe liner and a glass fiber filter used 2

glass?

CALIBRATION were both pre- and post-test calibrations performed for
meter box 3

pitot tube 3

temperature sensor 2

nozzle (3 #) 3
3/8 .378

LEAK CHECKS both pre- and post-test 3

BLANKS were filter and reagent blanks analyzed, and were any problems addressed 3

SAMPLE PREP 3
filter desiccation and tare weights documented

ISOKINETICS within 100±10% for all runs 3
92, 96, 100

Georgia Department of Natural Resources
205 Butler Street, S.E., East Floyd Tower, Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Harold F. Reheis, Director
Environmental Protection Division

February 14, 1992

Mr. John Hamilton
Pacific Environmental Services
3325 Chapel Hill Boulevard
Cedar Terrace
Suite 250
Durham, N.C. 27707

Dear Mr. Hamilton:

As per your request attached is a copy of the test report for the detergent spray dryer at Procter & Gamble, Augusta. four cyclones are used for product recovery followed by two packed bed scrubbers with tubular wet electrostatic precipitators.

Also attached is a test report from a much smaller detergent spray dryer at Time Products in Atlanta. Emissions from this spray dryer are controlled by a spray chamber with a mist eliminator.

Note that the operating capacities are in tons per hour of detergent slurry on a dry basis.

Should you have any questions or comments, please contact me at 404/656-4867.

Sincerely,

James P. Johnston
Environmental Engineer
Air Pollution Compliance Program

enclosures

ENTROPY
ENVIRONMENTALISTS INC.

POST OFFICE BOX 12291
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27709-2291
919-781-3550

STATIONARY SOURCE SAMPLING REPORT

EEI REF. NO. 5949B

THE PROCTER & GAMBLE MANUFACTURING COMPANY

AUGUSTA, GEORGIA

PARTICULATE EMISSIONS TESTING

MSG TOWER STACK

July 18, 1988

Compliance Particulate Emission Testing

on

Spray Dryer Scrubber

at

Time Products

Atlanta, Georgia

Test Date: November 29, 1988

Submitted by:

Air Techniques, Inc.
1724 Nekoma Street
Marietta, GA 30067

Joe Barefoot,
Testing Manager

Russell Barton,
Laboratory Manager

M E M O R A N D U M

Georgia Department of Natural Resources
205 Butler Street, S.E., Floyd Towers East, Atlanta, Georgia 30334
J. Leonard Ledbetter, Commissioner
Harold F. Reheis, Assistant Director
Environmental Protection Division
(404) 656-4713

STORAGE

TO: Mr. Marvin M. Lowry
THROUGH: Michael E. Fogle
FROM: L. Webber
SUBJECT: Source Test Report Review
DATE: _____

The following tests have been reviewed and were conducted in an acceptable fashion for the purpose intended.

COMPANY & LOCATION: TIME PRODUCTS, ATLANTA, GA.
SOURCE TESTED: SPRAY DRYER
POLLUTANT DETERMINED: PARTICULATE
REPORT REVIEWED BY: L. Webber
TEST WITNESSED BY: NO WITNESS
DATE(S) OF TESTS: 11/29/88
DATE REC'D BY APB: 1/12/89

TEST RUN:	1	2	3	AVG
MAXIMUM EXPECTED OPERATING CAPACITY:	5 TONS/HR			
OPERATING CAPACITY:	1.69 TONS/HR			
ALLOWABLE EMISSION RATE:	5.7 lbs/HR			
APPLICABLE REGULATION:	391-3-1-.02(2)(e)			
CONTROL EQUIPMENT & OPERATIONAL DATA:	Scrubber Flow = 130 GPM			
OPACITY (Unofficial data--not for compliance determination):	NO DATA			
GAS TEMPERATURE (°F):	108	110	114	
GAS MOISTURE (%):	9.2	9.8	11.3	
GAS FLOW RATE (ACFM):	12,879	14,613	13,488	
GAS FLOW RATE (DSCFM):	10,721	11,983	10,794	
POLLUTANT CONCENTRATION (GRAINS/DSCF):	0.0081	0.0056	0.0074	
EMISSION RATE: LB/HR	0.74	0.58	0.68	0.67
PERCENT OF ALLOWABLE:	11.8			

OTHER INFORMATION: _____

cc: Mr. John W. Mitchell
Mr. Michael E. Fogle

SM-23
Rev. (9) 8/86

EMISSION DATA SUMMARY

SM-67 (1)
Rev. (3) 8/80

COMPANY: TIME PRODUCTS

DATE OF TEST: 11/29/88

SAMPLING FIRM: AIR TECHNIQUES, INC.

SOURCE TESTED: SPRAY DRYER

Run Number	"TPSD 1"	"TPSD 2"	"TPSD 3"
Stack Temperature (°F)	107.8	110.4	114.3
Stack Moisture (%)	9.2	9.7	11.3
Stack Gas Flow Rate (ACFM)	12,861.9	14,621.5	13,495.2
Stack Gas Flow Rate (DSCFM)	10,711.2	11,981.7	10,795.3
Pollutant Concentration (gr/DSCF)	0.0081	0.0056	0.0074
Emission Rate (LBS/HR)	0.741	0.575	0.681
Capacity (TONS/HR)	1.65	1.65	1.65
Meter Temperature (°F)	66.83	61.65	59.60
Meter Pressure (in. H_2O)	1.295	1.742	1.531
$(\sqrt{\Delta p})$avg	0.288	0.325	0.298
Sample Volume @ Meter (ft^3)	38.457	44.499	41.744
Sample Volume (DSCF)	36.904	42.956	40.433
Stack Gas Velocity (ft./sec.)	17.06	19.39	17.90
Molecular Weight (lb./lb-mole)	28.25	28.18	28.01
Isokinetics (%)	92.2	95.9	100.3

COMMENTS:

INITIAL: RPC

EMISSION DATA SUMMARY

SM-67 (2)
Rev. (3) 8/80

COMPANY: TIME PRODUCTS

SAMPLING FIRM: AIR TECHNIQUES, INC.

DATE OF TEST: 11/29/88

SOURCE TESTED: SPRAY DRYER

Run Number	"TPSD 1"	"TPSD 2"	"TPSD 3"
Particulate Mass (gms.)	0.01930	0.01560	0.01930
Initial Meter Volume (ft^3)	0.000	0.000	0.000
Final Meter Volume (ft^3)	38.457	44.499	41.744
H_2O Collected (mls.)	79.0	98.5	109.3
% CO_2	4.0	4.0	4.0
% O_2	16.0	16.0	16.0
Barometric Pressure (in. Hg)	29.50	29.35	29.35
Stack Pressure (in. H_2O)	-0.10	-0.04	-0.04
Time of Test (min.)	60.00	60.00	60.00
Pitot CP	0.840	0.840	0.840
Meter Correction Factor	0.968	0.968	0.968
Nozzle Diameter (in.)	0.378	0.378	0.378
Stack Dimension (in.)	48.0	48.0	48.0
Stack Dimension (in.)	0.0	0.0	0.0
F-Factor	0.0	0.0	0.0

COMMENTS:

INITIAL: REC

J. D. 1/30/89

Georgia Department of Natural Resources
205 Butler Street, S.E., Floyd Towers East, Atlanta, Georgia 30334
J. Leonard Ledbetter, Commissioner
Harold F. Reheis, Assistant Director
Environmental Protection Division
(404) 656-4713

DATE: 1/26/89

MEMORANDUM

TO: Michael E. Fogle, Program Manager
Source Test Unit

FROM: Jimmy Johnston
Environmental Engineer
Air Pollution Compliance Program

SOURCE IDENTITY AND EMISSION POINT:
Time Products
Spray Dryer

DATE(S) TEST PERFORMED: 11/29/88

I have reviewed the attached emission test report and found that the contents comply with State and Federal statutory requirements and all applicable permit conditions. Any differences are indicated below:

☐ No fuel analysis included ☐ No description of control device

☐ Description of process not included

☐ Process input weight rate or BTU input not documented properly

☐ No control device operational parameters

☐ Other - explain

☐ These noted differences should not significantly change the reported emissions to the atmosphere and should not be a basis for report rejection. The source will be notified of them in the test report acceptability letter.

Complete the following:

Applicable Rule or Regulation:
391-3-1-.02(2)(e)

Maximum expected operating capacity:
5 tons/hr

Operating capacity:
1.65 tons/hr

Reported emissions to atmosphere:
0.67 #/hr

Computed allowable:
5.7 #/hr

TIME PRODUCTS, INC.
3780 Browns Mill Road S.E.
Atlanta, Georgia 30354
(404) 767-7526

Jan. 11, 1989

Mr. James P. Johnston
Air Quality Standards
Ga. Dept. of Natural Resources
205 Butler Street, S. E.
Room 1162
Atlanta, GA. 30334

Dear Mr. Johnston,

Enclosed please find Air Techniques report on the retesting request required under Air Quality Permit No. 2841-060-9652.

If you have any questions, please do not hesitate to contact either myself or the personnel at Air Techniques.

Sincerely,

TIME PRODUCTS, INC.

Earl V. Blough
President

EVB:pac

Enclosure

Compliance Particulate Emission Testing

on

Spray Dryer Scrubber

at

Time Products

Atlanta, Georgia

Test Date: November 29, 1988

Submitted by:

Air Techniques, Inc.
1724 Nekoma Street
Marietta, GA 30067

Joe Barefoot,
Testing Manager

Russell Barton,
Laboratory Manager

TABLE OF CONTENTS

Appendix

I. Introduction

Compliance particulate emission testing was performed on the Spray Dryer Scrubber at Time Products, located in Atlanta, Georgia. The purpose of the testing was to determine if particulate emissions comply with standards set forth by the Georgia Environmental Protection Division. Three, one hour test repetitions were performed.

The testing was performed on November 29, 1988 by John Soulsby and Scott Copeland, of Air Techniques, Inc., Marietta, Georgia.

Air Techniques would like to extend its appreciation to Time Products personnel for their assistance throughout the test program.

II. Summary of Results

The summary of test results is shown in tabular form in Table I in the Appendix. Below is shown the emission rate and allowable emission rate, both expressed in pounds per hour, and the process feed rate, expressed in tons per hour; for each repetition:

Test No.	Particulate EmissionRate (#/HR)	Allowable Emission Rate (#/HR)	Process Rate (TPH)
1	Ø.74	5.8	1.69
2	Ø.58	5.8	1.69
3	Ø.68	5.8	1.69
Average	Ø.67	5.8	1.69

Note: Allowable emission rate based on the formula:

$E = (4.1)(P)$

E = Allowable emission rate in pounds per hour

P = Process rate in tons per hour

III. Test Methods and Sampling Procedures

The sampling train used for execution of the testing was manufactured by GII Enterprises, a division of Andersen Samplers, Atlanta, Georgia. The train meets all specifications as outlined by the U.S. Environmental Protection Agency.

As specified in the various test methods, all necessary calibrations on the dry gas meter, orifice, thermocouples, digital thermometer, sampling tip, pitot tubes, aneroid barometer, and analytical balance were performed. Included in the Appendix are the results of the calibrations.

The number of sample points and the sampling location were determined according to EPA Method 1. The test location and nearest disturbances (upstream and downstream) from the test site can be found in detail on the preliminary sample traverse data sheet in the Appendix.

EPA Method 2 was used to determine stack gas velocity and volumetric flow rate. An S- type pitot tube was used in conjunction with an inclined oil gauge manometer. After each test repetition , a leak check was performed on the pitot manometer assembly and indicated no leak for 15 seconds.

Dry molecular weight was determined according to EPA method 3 during each repetition by fyrite analysis of grab gas samples. The results of these analyses are reported on the field data sheets in the Appendix.

Georgia EPD Method 5T, Determination of Particulate Emissions from Stationary Sources, was used to determine particulate concentrations. The sampling train consisted of a calibrated nozzle, probe with heated liner, glass fiber filter and filter holder, four impingers, 50' umbilical cord, pump, dry gas meter, and orifice. A detailed schematic of the train can be found in the Appendix.

Before each test, the probe and filter holder assembly were secured in the filter box. In each of first two impingers was placed 100 milliliters of distilled water. The third impinger was left empty, and the fourth impinger was loaded with 200.0 g. of silica gel. Before each repetition, an optional leak check was performed to insure all connections were secure.

After the probe and filter heaters warmed up to the specified operating temperature, the probe was inserted into the stack at the first sample traverse point. The stack gas parameters were recorded on the field data sheet, the pump turned on, and the sampling rate set at the isokinetic rate. At the end of the sampling period for the first point, the probe was moved to the next traverse point, and the sampling rate adjusted to maintain the isokinetic rate for the measured gas parameters at that point. This procedure was followed until all of the traverse points had been sampled. At each point, the following information was measured and recorded on the field data sheet: dry gas meter volume, stack gas velocity pressure

differential, orifice meter pressure differential, stack gas temperature, sample train filtration temperature, impinger train exit temperature, dry gas meter inlet and outlet temperature, and sample train system vacuum. After all of the points had been sampled, the pump was turned off and the probe removed from the stack.

Immediately following each repetition, a leak check was performed on the sample train and indicated less than the allowable Ø.Ø2 CFM. The train was then disassembled. The filter holder was first removed and immediately sealed to ensure no particulate matter was lost. Both ends of the probe assembly were sealed to ensure no particulate matter was lost from that component. Next, the moisture catch from impingers one, two, and three was measured with a graduated cylinder, then placed in a container labeled impinger catch. Impingers one and two and the connecting glassware were then rinsed with acetone and this rinse placed in a container labeled acetone rinse. The silica gel from the fourth impinger was returned to its container and sealed.

The probe and nozzle were removed from the test site for cleaning. The nozzle, union, and probe liner were brushed and rinsed with reagent grade acetone until all particulate matter was removed. The acetone wash was placed in a labeled polyethylene container.

After the test was completed, the sealed filter holder assembly was returned to the laboratory. The filter was

removed from the holder assembly in a controlled environment to ensure that no particulate matter was lost during the recovery process. The filter was placed in a labeled container and desiccated for a minimum of 24 hours, then weighed to a constant weight. The front half of the filter holder assembly was rinsed with acetone and the wash was added to the labeled probe wash container of the same repetition. If any filter fibers remained on the holder gasket, they were carefully removed and also added to the probe wash container.

A sample of the acetone used for cleanup was saved as a blank in a separate container labeled "Acetone Blank". A distilled water blank was also saved and labeled "Water Blank". After the test, the probe wash containers from each test repetition, along with the blanks, were returned to the laboratory. The contents of each sample bottle were transferred to tared beakers. The containers were then rinsed with acetone to ensure that all of the particulate matter was recovered. The volume of the acetone was recorded and then evaporated by placing the beakers on a low temperature steam bath. The evaporation was closely supervised to prevent "bumping" and subsequent loss of the sample. Each beaker, with residue, was desiccated and weighed to the nearest Ø.1 milligram.

The organics in the impinger catch were extracted with three, 25 milliliter portions of chloroform followed by three, 25 milliliter portions of ether. The extraction was placed in a tared beaker, evaporated, and reweighed to a constant weight.

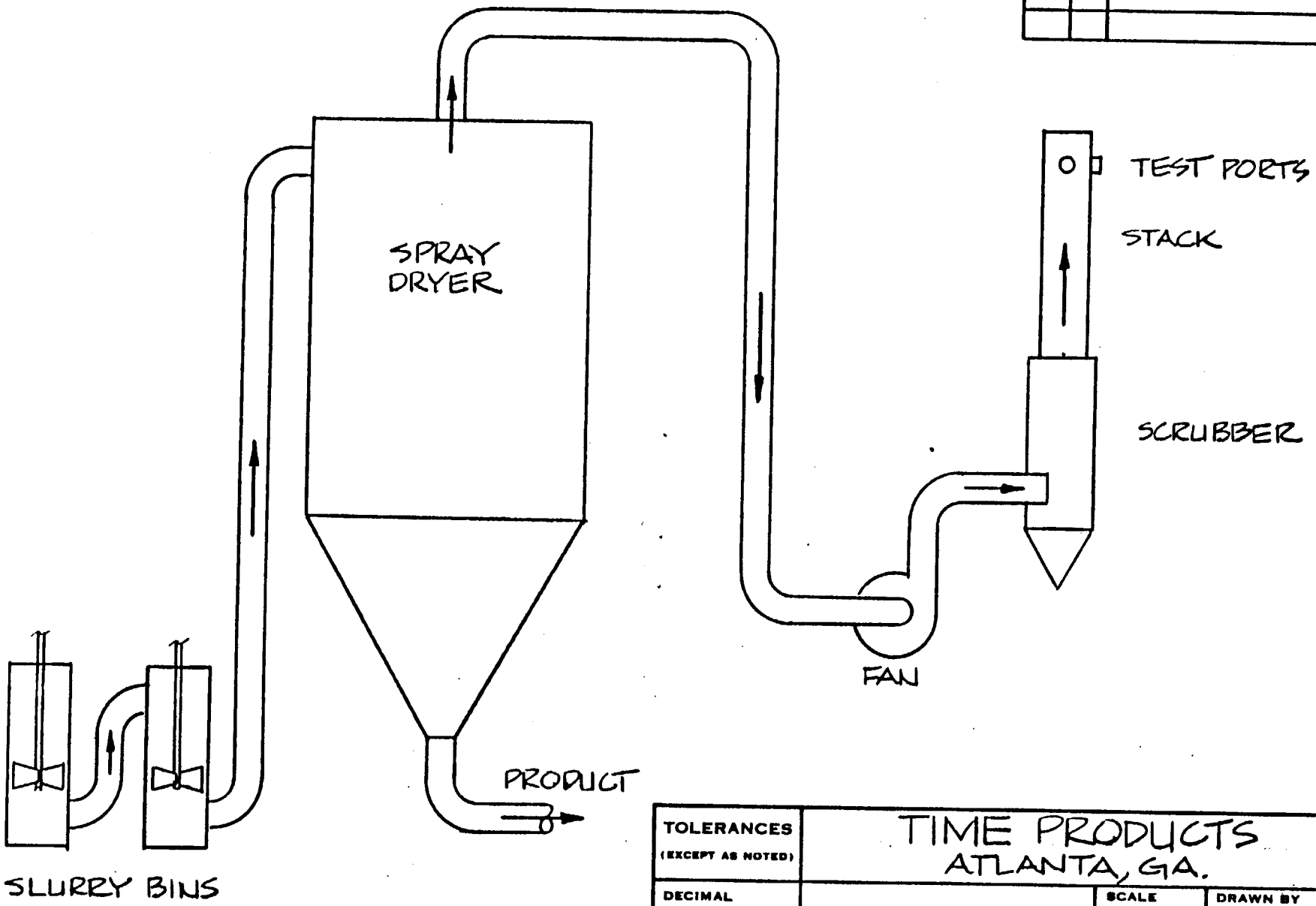
The remaining impinger water was placed in a separate beaker, evaporated, and reweighed to a constant weight. The impinger rinses were also transfered to tared beakers and evaporated.

The pre-weighed silica gel samples were returned to the laboratory in their original containers. The samples were weighed to the nearest Ø.5 gram.

IV. Process Description

Initial ingredients for the powdered soap product are mixed in two slurry bins which are connected in series. This soap like slurry is then conveyed to a spray dryer where excess moisture in the product is driven off. The final product, a soap powder, is then conveyed out the bottom of the spray dryer, while the unwanted emissions are exhausted out the top. Emissions exhausted from the top of the spray dryer are drawn out by a fan before being run through a scrubber to reduce the condensable and non-condensable emissions.

DATE	SYM	REVISION REC'	DR.	CK



TOLERANCES (EXCEPT AS NOTED)	TIME PRODUCTS ATLANTA, GA.		
DECIMAL ±		SCALE NONE	DRAWN BY JM Moore APPROVED BY
FRACTIONAL ±	TITLE SPRAY DRYER SCHEMATIC		
ANGULAR ±	DATE	DRAWING NUMBER	

AIR TECHNIQUES INC 1724 Nekoma Street, NE • Marietta, Georgia

APPENDIX

SUMMARY OF TEST RESULTS
Time Products
Scrubber Stack
November 29, 1988

	Test # 1	Test # 2	Test # 3
Sample Volume (Vm):	38.457	44.499	41.744
Sqrt Delta P:	0.283	0.325	0.298
Sampling Time (min):	60	60	60
Barometric Pressure (Pb):	29.50	29.35	29.35
Delta H (H):	1.30	1.74	1.53
Volume in Impingers (mls):	79.0	98.5	109.3
Static Pressure (in. wc.):	-0.1	.0	.0
Stack Pressure (Ps):	29.49	29.35	29.35
Stack Temperature (Ts):	568	570	574
Meter Coefficient (Y):	0.968	0.968	0.968
Pitot Coefficient (Cp):	0.840	0.840	0.840
Meter Temperature (Tm):	527	522	520
Area Stack (As):	12.57	12.57	12.57
Area Nozzle (An):	0.000779	0.000779	0.000779
Percent CO2 (%):	4.0	4.0	4.0
Percent O2 (%):	16.0	16.0	16.0
Percent N2 (%):	80.0	80.0	80.0
Milligrams:	19.3	15.6	19.3
Molecular Weight Dry (Md):	29.28	29.28	29.28
Volume Water (Vwstd):	3.72	4.64	5.14
Volume Gas Sampled (Vmstd):	36.878	42.909	40.386
Wet Fraction (Bws):	0.092	0.098	0.113
Molecular Weight Wet (Ms):	28.25	28.18	28.01
Volume Gas Sampled (Vma):	44.302	52.330	50.464
Stack Gas Velocity, (Vs):	17.08	19.38	17.83
Volumetric Flowrate (Qs):	10,721	11,983	10,794
Volumetric Flowrate (Qa):	12,879	14,613	13,488
Grainloading, gr/dscf (cs):	0.0081	0.0056	0.0074
Grainloading, gr/ACF (csi):	0.0067	0.0046	0.0059
Emission Rate, #/Hour:	0.74	0.58	0.68
Percent Isokinetic Sampling:	92.57	96.37	100.69

TOTAL PARTICULATE MATTER COLLECTED

CLIENT: Time Products DATE: 11-29-87

SOURCE: Spray Dryer Scrubber RUN #: 1-3

Acetone Blank Concentration (Equal to or less than 0.01 mg/g): 132.7211 − 132.7204 = 0.7

Ma = 0.7 mg Va = 325 Pa = .786

Ca = Ma / (Va * Pa) Ca = 0.0027

	Test # 1	Test # 2	Test # 3
Acetone Wash Blank:			
Vaw =	240 ml	200 ml	275 ml
Wa = Ca * Vaw * Pa			
Wa =	0.5 mg	0.4 mg	0.6 mg
Particulate Matter Collected in Acetone Wash:			
WF =	135.9926 g	99.4098 g	130.6258 g
Wi =	135.9759 g	99.4014 g	130.6172 g
Maw = 1000 (WF − Wi) − Wa			
Maw =	16.2 mg	8.0 mg	8.0 mg
Particulate Matter Collected on the Filter:			
WF =	0.3365 g	0.3384 g	0.3485 g
Wi =	0.3393 g	0.3393 g	0.3446 g
MF = 1000 (WF − Wi)			
MF =	−2.8 mg	−0.9 mg	3.9 mg
Total Particulate Matter Collected (Mn = Maw + MF):			
Mn =	13.4 mg	7.1 mg	11.9 mg

TOTAL WET CATCH PARTICULATE MATTER COLLECTED

CLIENT: Time Products DATE: 11-29-XX

SOURCE: Spray Dryer Scrubber RUN #: 1-3

	Test # 1	Test # 2	Test # 3
Organic particulate matter extracted from impinger catch:			
Wf =	125.9615 g	110.5640 g	124.0021 g
Wi =	125.9595 g	110.5614 g (R5)	124.0011 ~~124.4565~~ g
Mx = 1000 * (Wf - Wi)			
Mx =	2.0 mg	2.6 mg	1.0 mg
Total Particulate matter in impinger water after extraction:			
Wf =	129.4552 g	126.7469 g	127.0227 g
Wi =	129.4525 g	126.7434 g	127.0190 g
Mix = 1000 * (Wf - Wi)			
Mix =	2.7 mg	3.5 mg	3.7 mg
Total particulate matter collected in impinger acetone wash:			
Wf =	126.6769 g	100.4378 g	131.6696 g
Wi =	126.6757 ~~126.6727~~ g (R5)	100.4354 g	131.6669 g
Mac = 1000 * (Wf - Wi)			
Mac =	1.2 mg	2.4 mg	2.7 mg
Total particulate matter collected in wet catch (Mx + Mix+ Mac)			
Mn =	5.9 mg	8.5 mg	7.4 mg

AIR TECHNIQUES INC. 1724 Nakoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

CHAIN OF CUSTODY FORM

Plant: TIMF PRODUCTS Source: ~~11-29-88~~ SCRUBBER STACK

Date Sampled: 11-29-88 Run Number: 1 2 + 3

SAMPLE RECOVERY

Container Identification	Sample Description
TEST 1 IMPINGER CATCH	DEIONIZED WATER
TEST 1 PROBE WASH	ACETONE RINSE
TEST 1 FILTER	GLASS FIBER FILTER
TEST 2 IMPINGER CATCH	DEIONIZED WATER
TEST 2 PROBE WASH	ACETONE RINSE
TEST 2 FILTER	GLASS FIBER FILTER
TEST 3 IMPINGER CATCH	DEIONIZED WATER
TEST 3 PROBE WASH	ACETONE RINSE
TEST 3 FILTER	GLASS FIBER MAT

Sample Recovery Person:

Signature and Title: [signature]

Recovery Location Wash: ON SITE

Filter: ~~LABORATORY~~ ON SITE

Date and Time of Recovery Wash: TEST DATE

Filter: 11-30-88 AM

Laboratory Person Receiving Sample:

Signature: [signature]

Date and Time of Receipt: 11-30-88 PM

Sample Storage: ATI LAB

AIR TECHNIQUES INC 1724 Nekoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

CHAIN OF CUSTODY FORM

Plant: TIME PRODUCTS Source: ~~#5 KY~~ SCRUBBER STACK

Date Sampled: 11-29-84 Run Number: 1, 2 & 3

SAMPLE RECOVERY

Container Identification	Sample Description
TEST 1 IMPINGER RINSE	ACETONE WASH
TEST 2 IMPINGER RINSE	ACETONE WASH
TEST 3 IMPINGER RINSE	ACETONE WASH
ACETONE BLANK	

Sample Recovery Person:

Signature and Title: [signature]

Recovery Location Wash: ON SITE

Filter: ON SITE

Date and Time of Recovery Wash: TEST DATE

Filter: 11-30-84 AM

Laboratory Person Receiving Sample:

Signature: Russell Burton

Date and Time of Receipt: 11-30-84 PM

Sample Storage: AT I LAB

SAMPLE ANALYSIS

Company: Time Products

Source: Spray Dryer Scrubber

Test Date: 11-29-84

Beaker No.	Test No.	Analysis	Date Tare	Date Final
167	Probe wash 1	Gravimetric	12/2	12/2
3	Probe wash 2	"	|	12/3
156	Probe wash 3	"	|	12/9
179	Ether Ext. 1	"	|	12/9
37	Ether Ext 2	"	|	12/15
195	Eth. Ext. 3	"	↓	12/9

FILTERS

Filter No.	Test No.	Analysis	Tare	Final
2032	1	Gravimetric	10/25	12/15
2033	2	"	"	"
2031	3	"	"	"

SAMPLE ANALYSIS

Company: Time Products

Source: Spray Dryer Scrubber

Test Date: 11-29-88

Beaker No.	Test No.	Analysis	Date Tare	Date Final
103	Imp. Catch 1	Gravimetric	12/6	12/15
176	Imp. Catch 2	"		12/15
183	Imp. Catch 3	"		12/15
164	Imp. Rinse 1	"		12/9
2	Imp. Rinse 2	"		12/9
152	Imp. Rinse 3	"		12/9
173	Acet. Blank	"	12/8	12/16

FILTERS

Filter No.	Test No.	Analysis	Tare	Final

TEST CALCULATIONS

I. Determination of Moisture in Stack Gases

a. Volume of Water Vapor Collected (Cubic Feet):

$$Vwstd = 0.04707 * (Vlc)$$

b. Dry Gas Volume Through Meter (Cubic Feet):

$$Vmstd = 17.64 * Vm * Y * [(Pbar + (\hat{}H/13.6)) / Tm]$$

c. Moisture Content: (Bws)

$$Bws = Vwstd / [Vwstd + Vmstd]$$

d. Wet Molecular Weight: (Ms)

$$Ms = [Md * (1-Bws)] + [18.0 * Bws]$$

II. Actual Stack Gas Volume Sampled (Cubic Feet):

$$Vma = [Vmstd * Ts * Pstd] / [(1-Bws) * Tstd * Ps$$

III. Determination of Stack Gas Velocity & Volumetric Flow Rate

a. Stack Gas Velocity (Feet per Second):

$$Vs = Kp * Cp * (SQR \hat{}P) * [SQR (Ts / (Ps * Ms)]$$

b. Stack Volumetric Flow Rate (Cubic Feet per Minute):

1. Dry Standard Conditions (Qs)

$$Qs = 60 * (1-Bws) * Vs * As * (Tstd/Ts) * (Ps/Pstd)$$

2. Actual Conditions (Qa)

$$Qa = Vs * As * 60$$

IV. Determination of Particulate Concentration (Grainloading)

a. Dry Standard Conditions: (cs)

cs = Ø.Ø1543 * (Mn / Vmstd)

b. Actual Conditions: (csl)

csl = Ø.Ø1543 * (Mn / Vma)

V. Emission Rate (Pounds per Hour)

E = 6Ø * Qs * cs / 7ØØØ

VI. Pollutant Emission Rate (Pounds per Million BTU's):

E = F * (cs / 7ØØØ) * [2Ø.9 / (2Ø.9 - %O2)]

VII. Heat Input (MMBTU per Hour):

Qh = 6Ø * Qs / F * [(2Ø.9 - %O2) / 2Ø.9]

VIII. Determination of Acceptability of Sampling Results: (I)

$$I = \frac{Ts * ((Ø.ØØ267 * Vlc) + ((Vm*Y/Tm)*(Pbar+(\hat{}H/13.6))))}{Ø.599 * Ø * Vs * Ps * An}$$

AIR TECHNIQUES

Use Regulation E of Georgia E.P.D rules and regulations for air quality control, to determine allowable emission rate.

$E = (4.1)(P)^{.67}$ if below 30 tons per hour.

where E = emission rate in pounds per hour

P = process input wt. in pounds per hour

* Notes: 8.5 hrs total time
10 total batches
4,000 pounds per batch
slurry is 30% water w/ 28% evaporation

$4{,}000 \text{ lbs} \times 10 = 40{,}000 \text{ lbs}$

$40{,}000 \text{ lbs} \times \frac{1.0 \text{ Ton}}{2000 \text{ lbs}} = 20 \text{ Tons} \times .72 = 14.4 \text{ Tons dry}$

$\frac{14.4 \text{ Tons}}{8.5 \text{ hrs}} = 1.69 \text{ Tons/Hr} = P$

so $\Rightarrow$ $E = (4.1)(1.69)^{.67} = 5.8 \text{ lbs/hr}$

Project: Time Products Work Order: By: Russell Buster Date: 1-5-88 Sheet:

AIR TECHNIQUES

TIME PRODUCTS
11-29-88
SCRUBBER STACK

	TIME	FLOW RATE	TOTAL
TEST 1	12:35 pm	129	3151
	12:50	122	3345
	1:05	114	3535
	1:20	124	3724
	1:35	122	3916
TEST 2	2:45 pm	123	4926
	3:00	135	5067
	3:15	122	5259
	3:30	114	5448
	3:45	~~149~~ 142	5692
TEST 3	4:46 pm	145	5924
	5:01	143	6149
	5:16	146	6410
	5:31	138	6613
	5:46	139	6803

Project: Work Order: By: Date: Sheet:

SHIFT REPORT

DATE 11-29-88 SHIFT 1st SUPERVISOR [illegible]

FINISHED PRODUCTS	NET WEIGHT		NO. RUN		NO. PACKED
Item: 106	25	x	348	=	8700
106	50	x	603	=	30,150
		x		=	
		x		=	
		x		=	

Total No. Packed 38,850 A

Product on Hold	Net Weight		No. On Hold		
Item:		x		=	Ø
		x		=	Ø

Total No. On Hold Ø B

Total Tails (A+B+C=D) 1000 C

Total Yield 39,850 D

No. of Batches Made 10 x Batch Weight 4,000# = E Total Solids 40,000 E

Running Time
Total Shift Hours 10 F

Down Time — Report to nearest ½ hour.

Time	Reason
1.5	Wash Down

Total Down Time 1.5 G

Running Time _____ (F-G=H) 8.5 H

Actual #/Hr. (A ÷ F = I) 3885 I

Actual #/Running Hr. (A ÷ H = J) 4571 J

Labor: Regular 72 hr.
O.T. _____ hr.
Outside _____ hr.
Total _____ hr.

72 K

(A ÷ K) #/M.H. 540 L

COMMENTS ON BACK:

AIR TECHNIQUES, INC.
Field Data Summary

Number of Points: 24
Minutes per Point: 2.5
Location: Time Products, Hapeville, GA
Test Date: November 29, 1988
Test No.: 1

Point	Volume Meter	Del P	SQRT Del P	Del H	Stack Temp	Meter Inlet	Temp Outlet
1	147.802	Ø.Ø4	Ø.2ØØ	Ø.62	1Ø9	68	64
2		Ø.Ø5	Ø.224	Ø.77	11Ø	68	65
3		Ø.Ø5	Ø.224	Ø.77	111	69	65
4		Ø.Ø7	Ø.265	1.1Ø	11Ø	7Ø	65
5		Ø.Ø8	Ø.283	1.2Ø	11Ø	7Ø	65
6		Ø.Ø9	Ø.3ØØ	1.4Ø	11Ø	7Ø	65
7		Ø.11	Ø.332	1.7Ø	1Ø8	71	65
8		Ø.Ø9	Ø.3ØØ	1.4Ø	1Ø8	7Ø	65
9		Ø.Ø9	Ø.3ØØ	1.4Ø	1Ø6	7Ø	65
1Ø		Ø.Ø8	Ø.283	1.2Ø	1Ø4	68	63
11		Ø.Ø7	Ø.265	1.1Ø	1Ø4	7Ø	63
12		Ø.Ø4	Ø.2ØØ	Ø.62	1ØØ	71	64
13		Ø.Ø7	Ø.265	1.1Ø	1Ø9	67	63
14		Ø.Ø8	Ø.283	1.2Ø	1Ø9	68	64
15		Ø.Ø9	Ø.3ØØ	1.4Ø	1Ø8	69	64
16		Ø.1Ø	Ø.316	1.5Ø	1Ø9	71	65
17		Ø.12	Ø.346	1.8Ø	1Ø9	7Ø	64
18		Ø.13	Ø.361	2.ØØ	1Ø7	68	64
19		Ø.12	Ø.346	1.8Ø	1Ø8	68	64
2Ø		Ø.1Ø	Ø.316	1.5Ø	1Ø9	7Ø	64
21		Ø.1Ø	Ø.316	1.5Ø	1Ø9	7Ø	64
22		Ø.Ø9	Ø.3ØØ	1.4Ø	1Ø9	7Ø	65
23		Ø.Ø9	Ø.3ØØ	1.4Ø	1Ø7	7Ø	65
24		Ø.Ø8	Ø.283	1.2Ø	1Ø3	69	63
FINAL	186.259						
			AVERAGES				
	38.457		Ø.288	1.3Ø	568		527

AIR TECHNIQUES, INC.
Field Data Summary

Number of Points: 24
Minutes per Point: 2.5
Location: Time Products, Hapeville, GA
Test Date: November 29, 1988
Test No.: 2

Point	Volume Meter	Del P	SQRT Del P	Del H	Stack Temp	Meter Inlet	Temp Outlet
1	186.599	Ø.Ø9	Ø.3ØØ	1.4Ø	111	59	59
2		Ø.Ø9	Ø.3ØØ	1.4Ø	112	6Ø	6Ø
3		Ø.Ø9	Ø.3ØØ	1.4Ø	11Ø	61	59
4		Ø.1Ø	Ø.316	1.6Ø	111	62	6Ø
5		Ø.11	Ø.332	1.7Ø	111	62	6Ø
6		Ø.13	Ø.361	2.1Ø	112	63	6Ø
7		Ø.16	Ø.4ØØ	2.5Ø	111	65	6Ø
8		Ø.15	Ø.387	2.4Ø	111	66	6Ø
9		Ø.13	Ø.361	2.1Ø	11Ø	66	6Ø
1Ø		Ø.13	Ø.361	2.1Ø	1Ø9	65	6Ø
11		Ø.11	Ø.332	1.7Ø	1Ø6	65	6Ø
12		Ø.11	Ø.332	1.7Ø	1Ø5	67	6Ø
13		Ø.Ø8	Ø.283	1.3Ø	11Ø	6Ø	58
14		Ø.1Ø	Ø.316	1.7Ø	11Ø	61	59
15		Ø.1Ø	Ø.316	1.7Ø	112	62	58
16		Ø.1Ø	Ø.316	1.7Ø	113	63	59
17		Ø.12	Ø.346	2.ØØ	113	63	59
18		Ø.14	Ø.374	2.4Ø	113	65	59
19		Ø.13	Ø.361	2.2Ø	113	66	59
2Ø		Ø.1Ø	Ø.316	1.7Ø	113	65	59
21		Ø.Ø8	Ø.283	1.3Ø	113	66	6Ø
22		Ø.Ø7	Ø.265	1.2Ø	113	66	6Ø
23		Ø.Ø7	Ø.265	1.2Ø	1Ø6	67	59
24		Ø.Ø8	Ø.283	1.3Ø	1Ø2	67	6Ø
FINAL	231.Ø98						
			AVERAGES				
	44.499		Ø.325	1.74	57Ø		522

AIR TECHNIQUES, INC.
Field Data Summary

Number of Points: 24
Minutes per Point: 2.5
Location: Time Products, Hapeville, GA
Test Date: November 29, 1988
Test No.: 3

Point	Volume Meter	Del P	SQRT Del P	Del H	Stack Temp	Meter Inlet	Temp Outlet
1	231.309	Ø.Ø9	Ø.3ØØ	1.5Ø	116	55	55
2		Ø.1Ø	Ø.316	1.7Ø	116	56	56
3		Ø.1Ø	Ø.316	1.7Ø	114	57	55
4		Ø.1Ø	Ø.316	1.7Ø	116	59	56
5		Ø.11	Ø.332	1.8Ø	115	61	56
6		Ø.14	Ø.374	2.4Ø	115	62	56
7		Ø.12	Ø.346	2.ØØ	116	63	56
8		Ø.1Ø	Ø.316	1.7Ø	116	63	56
9		Ø.Ø9	Ø.3ØØ	1.5Ø	115	64	57
1Ø		Ø.Ø8	Ø.283	1.3Ø	114	65	57
11		Ø.Ø8	Ø.283	1.3Ø	1Ø9	65	57
12		Ø.Ø6	Ø.245	1.1Ø	1Ø8	65	57
13		Ø.Ø5	Ø.224	Ø.84	116	57	56
14		Ø.Ø6	Ø.245	1.1Ø	116	59	56
15		Ø.Ø6	Ø.245	1.1Ø	115	62	56
16		Ø.Ø6	Ø.245	1.1Ø	116	63	57
17		Ø.Ø8	Ø.283	1.3Ø	117	65	57
18		Ø.1Ø	Ø.316	1.7Ø	116	65	57
19		Ø.13	Ø.361	2.2Ø	117	66	57
2Ø		Ø.12	Ø.346	2.ØØ	116	66	57
21		Ø.1Ø	Ø.316	1.7Ø	114	66	58
22		Ø.Ø9	Ø.3ØØ	1.5Ø	114	66	58
23		Ø.Ø8	Ø.283	1.3Ø	1Ø9	66	58
24		Ø.Ø7	Ø.265	1.2Ø	1Ø8	66	58
FINAL	273.Ø53						
			AVERAGES				
	41.744		Ø.298	1.53	574		52Ø

Velocity Data Sheet

Run # · Date: 11/19/98

Plant TIME PRODUCTS City HAPEVILLE State GA.
Sampling Location SCRUBBER STACK Start ____ am / pm Stop ____ am / pm
Operator(s) SONNY, COPELAND

Identification: Pitot # G-84 Digital Thermometer # ____ Barometer # C
Ambient Data: Temperature (°F) ____ Barometric Pressure (in. Hg) 29.50
Stack Data: Length (in.) — Width (in.) — Equiv. Diameter (in.) —
Diameter (in.) 48 Port Extension (in.) 3.0 Area (ft^2) 12.57
Disturbances: Upstream (L/D) 3.5 Downstream (L/D) 1
Conditions: Pitot Cp .84 Pressure (in. H_2O) -.08 Pressure (in. Hg) ____
Temperature: Dry Bulb (°F) 123 Wet Bulb (°F) 120
Moisture Fraction (=%) ~~11%~~ 9%
Fyrite Analysis: $\%CO_2$ 4 / ____ / ____ $\%O_2$ 16 / ____ / ____

Number of Points 24

Point #	Diameter Fraction of Traverse Points				Distance		Test Data					
					From Wall	From Wall + Ext.	Velocity Pressure A	B	Additional Data			
-	6 Pts.	8 Pts.	10 Pts.	12 Pts.	in.	in.	in. H20	in. H20				
1	0.044	0.032	0.026	0.021	1.0	4.0	.04					
2	0.146	0.105	0.082	0.067	3.2	6.2	.05					
3	0.296	0.194	0.146	0.118	5.7	8.7	.06					
4	0.704	0.323	0.226	0.177	8.5	11.5	.06					
5	0.854	0.677	0.342	0.250	12.0	15.0	.07					
6	0.956	0.806	0.658	0.356	17.1	20.1	.09					
7		0.895	0.744	0.644	30.9	33.9	.11					
8		0.968	0.854	0.750	36.0	39.0	.10					
9			0.918	0.823	39.5	42.5	.09					
10			0.974	0.882	42.3	45.3	.08					
11				0.933	44.8	47.8	.09					
12				0.979	47.0	50.0	.07					
Traverse Point Layout							.075					

Comments ____

Field Data Sheet

Run # 1 Method # 5T

Plant TIME PRODUCTS Source SCRUBBER
Date 11/29/88 Start 12:35 am/pm Stop 1:42 am/pm City HAPEVILLE State GA
Operators Soulsby / Copeland / /
Console # 6 EPA Box # 2 Nozzle # 3/8 C Diameter .378 Probe # 1 Length 5 ft
Console Km (-) .71 K-factor (-) 15.4 Barometer # C
Ambient Conditions: Temp. (°F) Pressure (in. Hg) 29.50
Stack Conditions: Pressure (in. H_2O) -.08 Pressure (in. Hg) Moisture(%)= 14% assumed

Leak Checks:	Pre-Test	Post-Test
Sample Train:	.006 CFM @ 13 in. Hg	.007 CFM @ 8 in. Hg
Pitot Dynamic:	7.4 in. H_2O for 15 sec.	3.4 in. H_2O for 15 sec.
Pitot Static:	3.7 in. H_2O for 15 sec.	6.3 in. H_2O for 15 sec.
Method #3 Train:	N/A in. Hg for 30 sec.	- in. Hg for 30 sec.

Fyrite Analysis: $\%CO_2$ 4 / / / $\%O_2$ 16 / / /
Water Collected (ml.): Tare 200 Gross 270 Net 70
Moisture Collected in Silica Gel (g.): Tare 200 Gross 209 Net 09
Minutes per Point: 2.5

POINT #	VOLUME GAS METER	PRESSURE PITOT DEL P	ORIFICE DESIRE	ORIFICE ACTUAL	TEMPERATURE STACK	FILTER	SILICA GEL	GAS METER IN	GAS METER OUT	PUMP VACUUM
-	CUBIC FEET	IN. H20	IN. H20	IN. H20	°F.	°F.	°F.	°F.	°F.	IN. HG
1	147.802	.04	.62	.62	109	275	40	68	64	2.5
2	148.78	.05	.77	.77	110	275	42	68	65	3.0
3	150.01	.05	.77	.77	111	274	44	69	65	3.0
4	151.27	.07	1.1	1.1	110	262	44	70	65	3.5
5	152.72	.08	1.2	1.2	110	244	47	70	65	4.0
6	154.21	.09	1.4	1.4	110	242	47	70	65	4.0
7	155.85	.11	1.7	1.7	108	238	35	71	65	5.0
8	—	.09	1.4	1.4	108	240	38	70	65	5.0
9	159.41	.09	1.4	1.4	106	228	37	70	65	5.0
10	161.13	.08	1.2	1.2	104	250	38	68	63	4.5
11	162.75	.07	1.1	1.1	104	250	43	70	63	4.0
12	164.31	.04	.62	.62	100	254	48	71	64	3.5
1	165.532	.07	1.1	1.1	109	270	39	67	63	4.0
2	166.97	.08	1.2	1.2	109	273	40	68	64	4.0
3	168.55	.09	1.4	1.4	108	275	39	69	64	4.5
4	170.20	.10	1.5	1.5	109	275	42	71	65	4.5
5	171.91	.12	1.8	1.8	109	274	43	70	64	5.5
6	173.74	.13	2.0	2.0	107	261	44	68	64	5.5
7	175.67	.12	1.8	1.8	108	250	45	68	64	5.5
8	177.—	.10	1.5	1.5	109	247	44	70	64	5.0
9	179.43	.10	1.5	1.5	109	244	44	70	64	5.0
10	181.17	.09	1.4	1.4	109	244	45	70	65	4.5
11	182.90	.09	1.4	1.4	107	245	45	70	65	4.5
12	184.61	.08	1.2	1.2	103	249	44	69	63	4.5
	186.259									
	38.457 cu ft	.089								

Comments:

Field Data Sheet

Run # 2 Method # 5I

Plant [illegible] PRODUCTS Source SPLITTER STACK

Date 11/29/88 Start 2:44 am/pm Stop 3:41 am/pm City HAMMOND State IN

Operators [illegible] / [illegible] / / /

Console # 6 EPA Box # 2 Nozzle # .340 Diameter .375 Probe # 1 Length 6

Console Km (-) .71 K-factor (-) 15.4 15.8 16.2 Barometer # 6

Ambient Conditions: Temp. (°F) Pressure (in. Hg) 29.35

Stack Conditions: Pressure (in. H_2O) -.07 Pressure (in. Hg) Moisture(%)= ~~10~~ 9%

Leak Checks:	Pre-Test	Post-Test
Sample Train:	.023 CFM @ 24 in. Hg	.003 CFM @ 8 in. Hg
Pitot Dynamic:	4.7 in. H_2O for 15 sec.	4.2 in. H_2O for 15 sec.
Pitot Static:	5.2 in. H_2O for 15 sec.	5.9 in. H_2O for 15 sec.
Method #3 Train:	in. Hg for 30 sec.	N/A in. Hg for 30 sec.

Fyrite Analysis: $\%CO_2$ 4 / / / $\%O_2$ 16 / / /

Water Collected (ml.): Tare 200 Gross 290 Net 90

Moisture Collected in Silica Gel (g.): Tare 200 Gross 208.5 Net 8.5

Minutes per Point: 2.5

POINT #	VOLUME	PRESSURE			TEMPERATURE					PUMP VACUUM
	GAS METER	PITOT DEL P	ORIFICE		STACK	FILTER	SILICA GEL	GAS METER		
			DESIRE	ACTUAL				IN	OUT	
-	CUBIC FEET	IN. H2O	IN. H2O	IN. H2O	°F.	°F.	°F.	°F.	°F.	IN. HG
1	186.599	.09	1.4	1.4	111	246	37	54	54	4.0
2	188.29	.09	1.4	1.4	112	263	36	60	60	4.0
3	189.98	.09	1.4	1.4	110	248	36	61	59	4.0
4	191.—	.10	1.6	1.6	111	230	39	62	60	4.0
5	193.42	.11	1.7	1.7	111	231	41	62	60	4.0
6	195.23	.13	2.1	2.1	112	229	40	63	60	4.5
7	197.17	.16	2.5	2.5	111	231	42	65	60	5.5
8	—	.15	2.4	2.4	111	241	43	66	60	6.0
9	201.49	.13	2.1	2.1	110	234	43	66	60	6.0
10	203.55	.13	2.1	2.1	109	242	43	66	60	5.5
11	—	.11	1.7	1.7	106	243	43	65	60	5.5
12	207.44	.11	1.7	1.7	105	254	43	67	60	5.0
1	209.402	.08	1.3	1.3	110	266	37	66	58	4.0
2	211.01	.10	1.7	1.7	110	267	39	67	59	4.5
3	212.74	.10	1.7	1.7	112	270	41	62	58	4.5
4	214.42	.10	1.7	1.7	112	270	42	63	59	5.0
5	216.46	.12	2.0	2.0	113	268	42	63	59	5.0
6	218.41	.14	2.4	2.4	113	241	42	65	59	5.5
7	220.44	.13	2.2	2.2	112	268	44	66	59	6.0
8	222.18	.10	1.7	1.7	113	251	42	66	59	6.0
9	224.51	.08	1.3	1.3	113	245	43	66	60	5.0
10	226.22	.07	1.2	1.2	112	245	43	66	60	4.0
11	227.84	.07	1.2	1.2	106	242	42	67	59	4.0
12	229.46	.08	1.3	1.3	102	246	42	67	60	4.0
	231.094									
	44.444 = 47									

Comments:

Field Data Sheet

Run # 2 Method # 5F

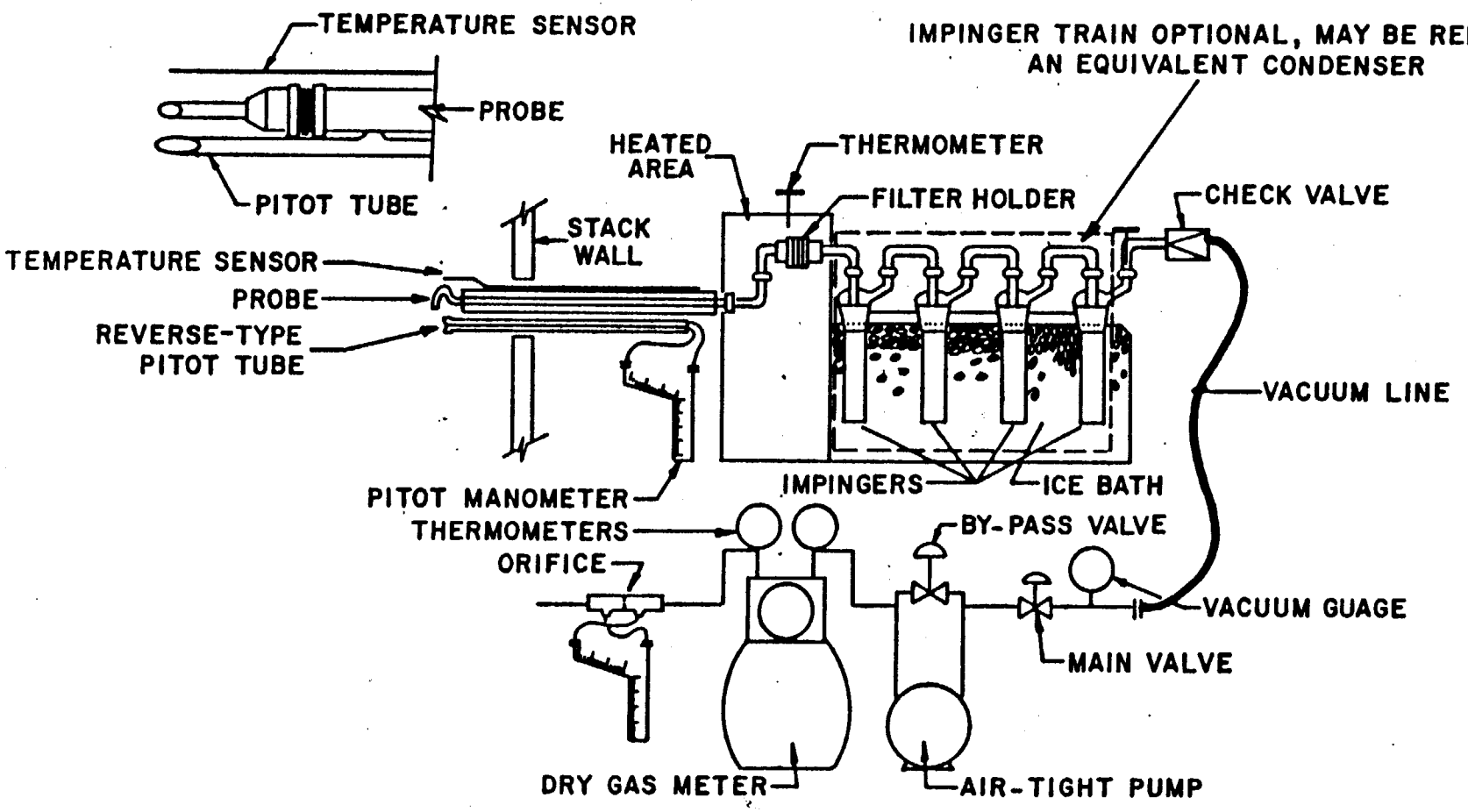
Plant TIMET PRODUCTS Source FURNACE STACK
Date 11/29/- Start 9:46 am/pm Stop 3:51 am/pm City HAVELAND State KA
Operators SCHAER / CLEVELAND / / /
Console # 6 EPA Box # 2 Nozzle # 5/16 Diameter .318 Probe # 1 Length 6
Console Km (-) .71 K-factor (-) 16.8 Barometer # 6
Ambient Conditions: Temp. (°F) _____ Pressure (in. Hg) 29.35
Stack Conditions: Pressure (in. H_2O) -.04 Pressure (in. Hg) _____ Moisture(%) = 10%

Leak Checks:	Pre-Test	Post-Test
Sample Train:	.004 CFM @ 10 in. Hg	.004 CFM @ 7 in. Hg
Pitot Dynamic:	5.4 in. H_2O for 15 sec.	7.1 in. H_2O for 15 sec.
Pitot Static:	5.7 in. H_2O for 15 sec.	6.0 in. H_2O for 15 sec.
Method #3 Train:	_____ in. Hg for 30 sec.	N/A in. Hg for 30 sec.

Fyrite Analysis: %CO_2 4 / / %O_2 16 / /
Water Collected (ml.): Tare 200 Gross 300 Net 100
Moisture Collected in Silica Gel (g.): Tare 200 Gross 209.3 Net 9.3
Minutes per Point: 2.5

POINT #	VOLUME	PRESSURE			TEMPERATURE					PUMP VACUUM
	GAS METER	PITOT DEL P	ORIFICE		STACK	FILTER	SILICA GEL	GAS METER		
			DESIRE	ACTUAL				IN	OUT	
-	CUBIC FEET	IN. H2O	IN. H2O	IN. H2O	°F.	°F.	°F.	°F.	°F.	IN. HG
1	231.309	.09	1.5	1.5	116	258	32	55	55	7.0
2	233.00	.10	1.7	1.7	116	264	36	56	56	5.0
3	234.78	.10	1.7	1.7	114	270	37	57	56	5.0
4	236.61	.10	1.7	1.7	116	247	42	59	56	5.0
5	238.43	.11	1.8	1.8	115	264	43	61	56	5.0
6	240.20	.14	2.4	2.4	115	260	44	62	56	6.5
7	242.40	.12	2.0	2.0	116	253	46	63	56	6.0
8	244.45	.10	1.7	1.7	116	250	45	63	56	5.0
9	246.24	.09	1.5	1.5	115	248	46	64	57	4.5
10	248.12	.08	1.3	1.3	114	245	47	65	57	4.5
11	249.79	.08	1.3	1.3	109	247	46	65	57	4.5
12	251.—	.06	1.1	1.1	108	247	46	64	57	4.0
1	253.048	.05	.87	.87	116	246	25	57	56	3.0
2	254.36	.06	1.1	1.1	116	245	58	59	56	3.0
3	255.77	.06	1.1	1.1	115	241	46	62	56	3.5
4	257.25	.06	1.1	1.1	116	244	41	63	57	3.5
5	258.73	.08	1.3	1.3	117	245	43	65	57	4.0
6	260.30	.10	1.7	1.7	116	248	44	65	57	5.0
7	262.04	.13	2.2	2.2	117	246	46	66	57	6.5
8	264.05	.12	2.0	2.0	116	236	48	66	57	6.0
9	266.06	.10	1.7	1.7	114	237	46	66	58	5.5
10	267.94	.09	1.5	1.5	114	248	47	66	56	5.0
11	269.—	.08	1.3	1.3	109	242	46	66	59	4.5
12	271.42	.07	1.2	1.2	108	247	47	66	59	4.5
	273.062									

Comments: _____


TEMPERATURE SENSOR
PROBE
PITOT TUBE
IMPINGER TRAIN OPTIONAL, MAY BE REPLACED BY AN EQUIVALENT CONDENSER
HEATED AREA
THERMOMETER
FILTER HOLDER
CHECK VALVE
STACK WALL
TEMPERATURE SENSOR
PROBE
REVERSE-TYPE PITOT TUBE
VACUUM LINE
PITOT MANOMETER
IMPINGERS
ICE BATH
THERMOMETERS
BY-PASS VALVE
ORIFICE
VACUUM GUAGE
MAIN VALVE
DRY GAS METER
AIR-TIGHT PUMP

METHOD 5

AIR TECHNIQUES, INC.
Meter Calibration Form

Date 12-6-88 Console #6 Pb= 29.15

^H ("H2O)	^cm ("H2O)	V1cm (CF)	V2cm (CF)	V1dgm (CF)	V2dgm (CF)	tcm (oF)	t1 (oF)	t2 (oF)
1.5	.10	0.000	005.645	284.968	290.978	56°	78/88	62/67
1.5	.10	5.665	10.710	290.978	296.362	56	84/98	67/70
1.5	.10	10.710	15.801	296.362	301.841	56°	92/100	70/73

^H = Orifice pressure differential, inches of water
^cm = Calibration meter pressure differential, inches of water
V1cm = Initial calibration meter volume, cubic feet
V2cm = Final calibration meter volume, cubic feet
V1dgm = Initial dry gas meter volume, cubic feet
V2dgm = Final dry gas meter volume, cubic feet
tcm = Temperature of calibration meter, degrees F
t1 = Inlet temperature of dry gas meter, degrees F
t2 = Outlet temperature of dry gas meter, degrees F
Tcm = Average temperature of calibration meter, degrees R
Tdgm = Average temperature of dry gas meter, degrees R
Pcm = Absolute pressure in calibration meter, "Hg.
Pdgm = Absolute pressure in dry gas meter, "Hg.

Calculations

1. Pcm = Pb + (^cm/13.6)

2. Pdgm = Pb + (^H/13.6)

3. Meter Correction Factor (MCF)

MCF =((V2cm-V1cm)*(Tdgm)*(Pcm))/((V2dgm-V1dgm)*(Tcm)*(Pdgm))

MCF @ H= = .971

MCF @ H= = .976

MCF @ H= = .976

4. AVERAGE MCF = .975

Person performing calibration [signature]

AIR TECHNIQUES, INC.
Meter Calibration Form

Date 3-3-88 Console #6 Pb= 28.86

^H ("H20)	^cm ("H20)	V1cm (CF)	V2cm (CF)	V1dgm (CF)	V2dgm (CF)	tcm (oF)	t1 (oF)	t2 (oF)	
0.5	.10	000.000	006.300	235.090	241.699	61°	80/81	66/67	15 M 52 S
1.0	.10	006.300	011.940	241.699	247.634	61°	81/87	68/70	10 MI 20 SE
1.5	.10	011.940	022.289	247.634	258.568	61°	81/84	69/72	15 M 39 SE
2.0	.10	022.289	032.456	258.568	269.347	61.5°	91/87	73/74	13 MI 22 SEC
2.5	.10	032.456	043.128	269.347	280.673	61.5°	90/94	74/75	12 MI 34 SEC
3.0	.10	043.128	053.296	280.673	291.492	62°	91/89	75/76	11 MI 03 SE

^H = Orifice pressure differential, inches of water
^cm = Calibration meter pressure differential, inches of water
V1cm = Initial calibration meter volume, cubic feet
V2cm = Final calibration meter volume, cubic feet
V1dgm = Initial dry gas meter volume, cubic feet
V2dgm = Final dry gas meter volume, cubic feet
tcm = Temperature of calibration meter, degrees F
t1 = Inlet temperature of dry gas meter, degrees F
t2 = Outlet temperature of dry gas meter, degrees F
Tcm = Average temperature of calibration meter, degrees R
Tdgm = Average temperature of dry gas meter, degrees R
Pcm = Absolute pressure in calibration meter, "Hg.
Pdgm = Absolute pressure in dry gas meter, "Hg.

Calculations

1. Pcm = Pb + (^cm/13.6)
2. Pdgm = Pb + (^H/13.6)
3. Meter Correction Factor (MCF)

MCF =((V2cm-V1cm)*(Tdgm)*(Pcm))/((V2dgm-V1dgm)*(Tcm)*(Pdgm))

MCF @ H=0.5 = .975 MCF @ H=1.0 = .976

MCF @ H=1.5 = .971 MCF @ H=2.0 = .974

MCF @ H=2.5 = .975 MCF @ H=3.0 = .937

4. AVERAGE MCF = .968 Signed

AIR TECHNIQUES, INC.
Orifice Calibration Form

Date: 3-3-88 Console: #6

ΔH ("H20)	V1 (CF)	V2 (CF)	θ (Min)	T1 (oR)	T2 (oR)	V2 - V1 (CF)	Qm (CFM)	Km
0.5	235.090	241.699	15.87	540.5	526.5	6.609	.411	.732
1.0	241.699	247.634	10.33	544	529	5.935	.567	.713
1.5	247.634	258.568	15.65	542.5	530.5	10.934	.691	.709
2.0	258.568	269.347	13.37	549	533.5	10.779	.745	.706
2.5	269.347	280.673	12.57	552	534.5	11.326	.887	.704
3.0	280.673	291.492	11.05	550	535.5	10.819	.966	.700

V1 = Dry gas meter at start of each calibration run

V2 = Dry gas meter at end of each calibration run

T1 = Dry gas meter inlet temperature

T2 = Dry gas meter outlet temperature

Pm = Atmospheric pressure (in. Hg.) + (ΔH/13.6)

Mm = 28.97 #/# mole

Tm = T2 average

Calculations

1. Qm = [(V1 - V2) / θ] * [(Avg T2) / (Avg T1+T2)

2. Km = [square root (Pm * Mm / Tm / ΔH)] * Qm

Average orifice meter calibration: .711

Calibrated by: John A. Sinclair

AIR TECHNIQUES, INC.
DIGITAL THERMOMETER CALIBRATION

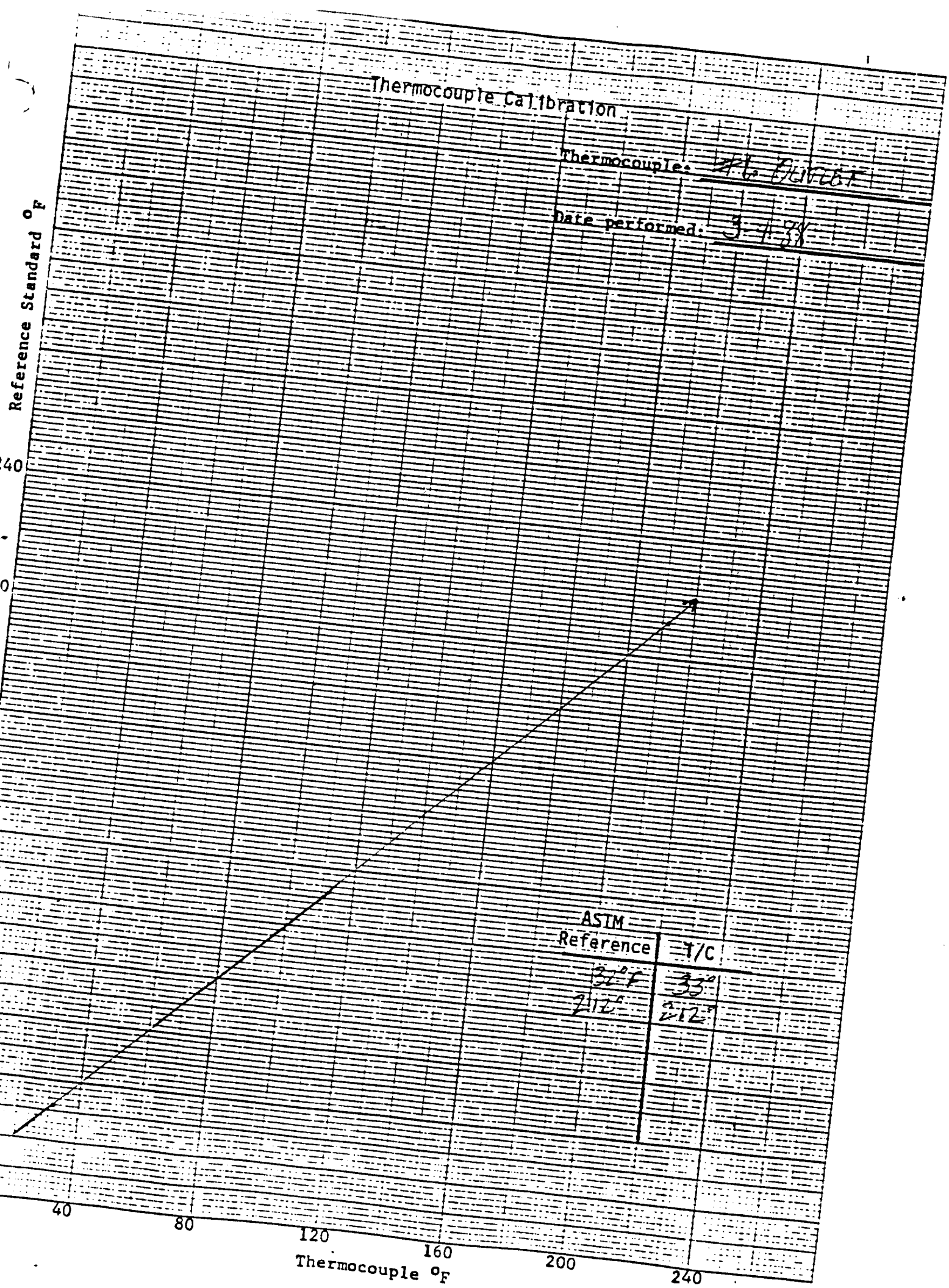
Date: 5-31-88 Digital Thermometer: Console #6

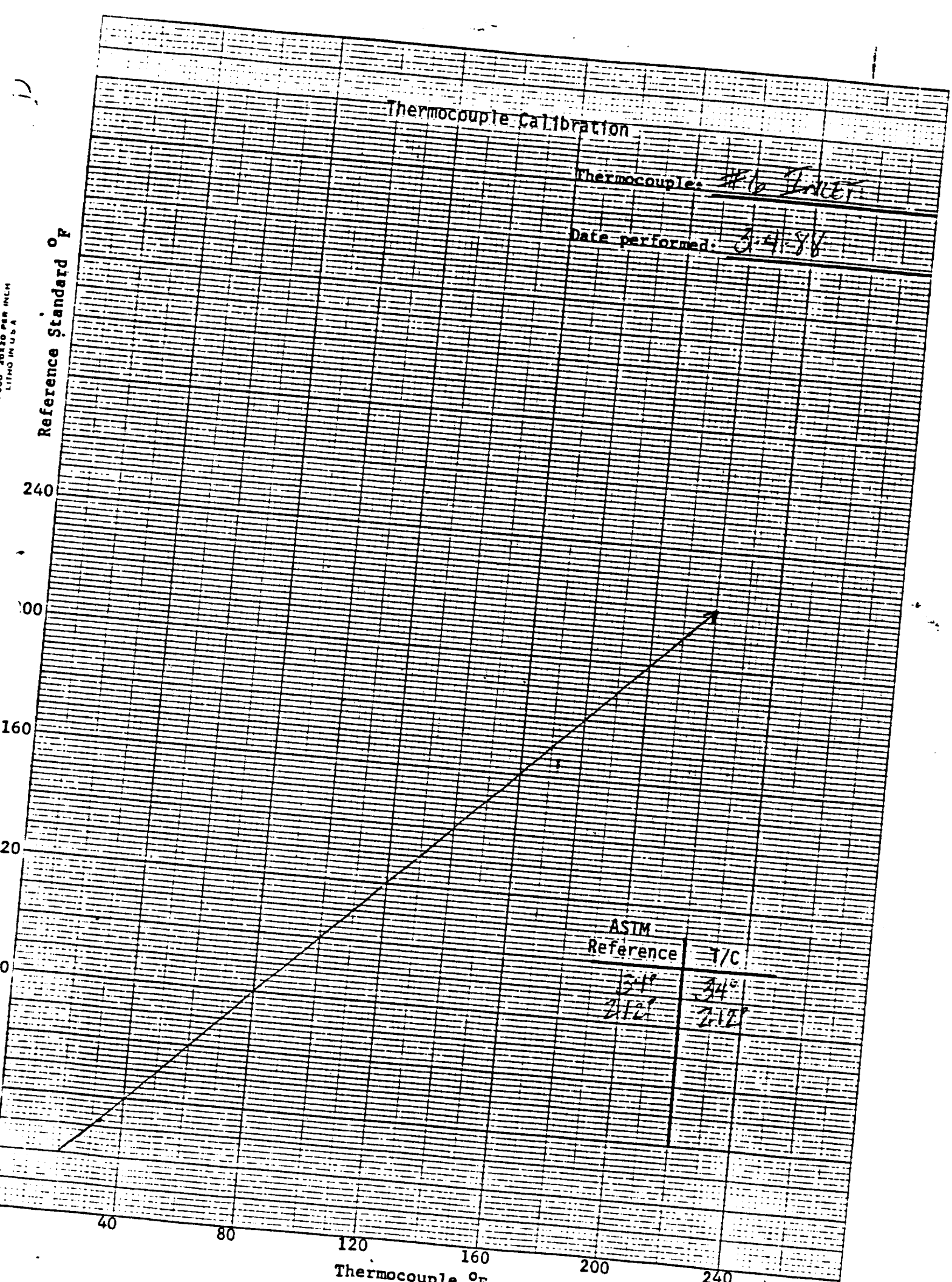
Sending MV - degrees F	Reading MV - degrees F	Accuracy
68° Ambient	67°	✓
150°	150°	✓
300°	301°	✓
450°	449	✓
700°	701°	✓
1000°	1002°	✓
1250°	1252°	✓
1500°	1500°	✓
1750°	1747°	✓
1900°	1898°	✓
		✓

Used as standard:

Thermo-Electric Micromite, calibration tracible to NBS standards.

Calibrated by: Jerry D Freeman

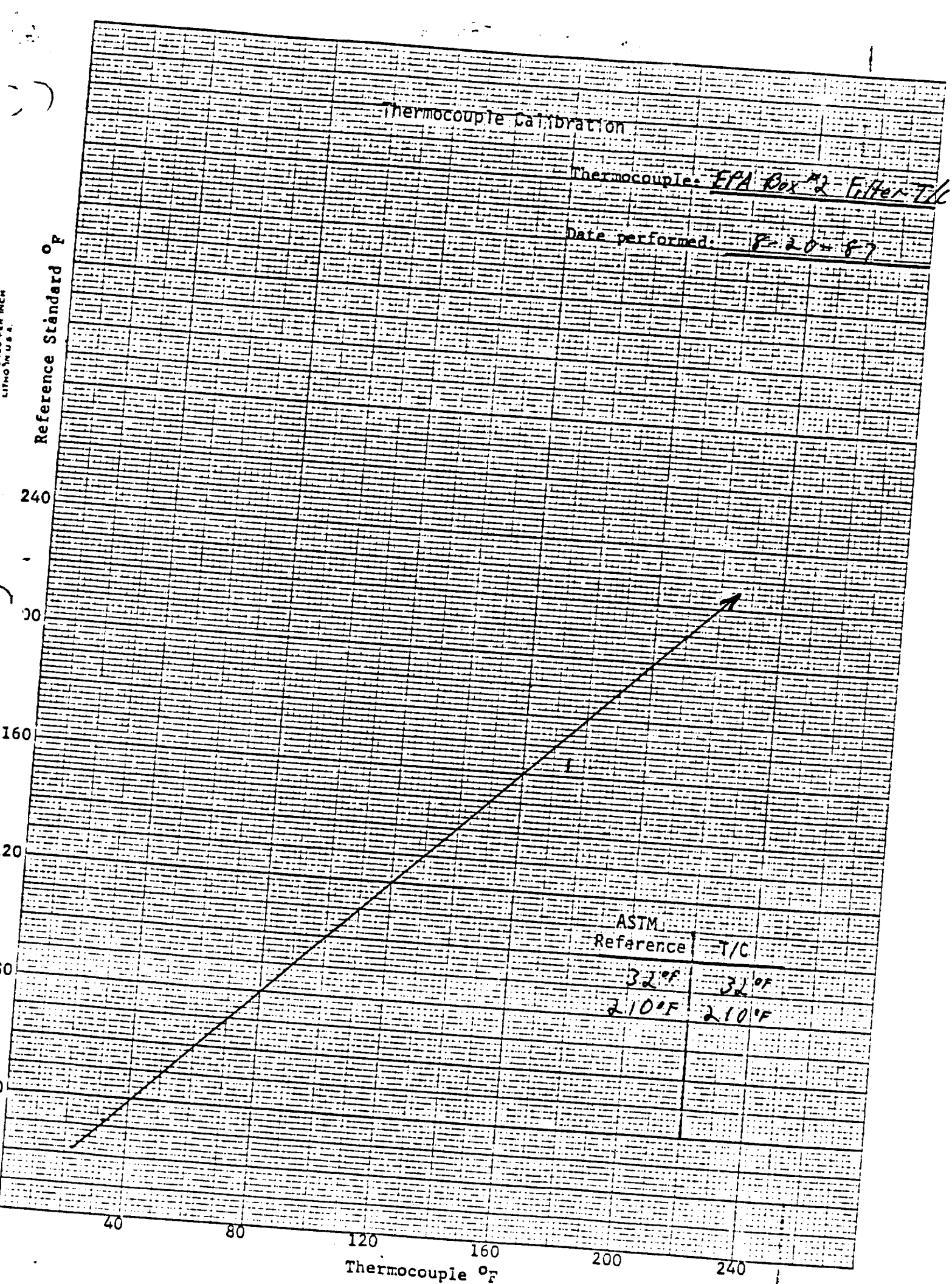

Thermocouple Calibration
Thermocouple: #6 Direct
Date performed: 3-4-94
Reference Standard °F
240
0
40
80
120
160
200
240
Thermocouple °F
ASTM Reference
T/C
32°F
33°
212°
212°


Thermocouple Calibration
Thermocouple: #1 Inlet
Date performed: 3-4-96
Reference Standard °F
240
160
120
0
40
80
120
160
200
240
Thermocouple °F
ASTM Reference
T/C
34°
212°
212°

Thermocouple Calibration

Thermocouple: EPA Box #2 Filter T/C

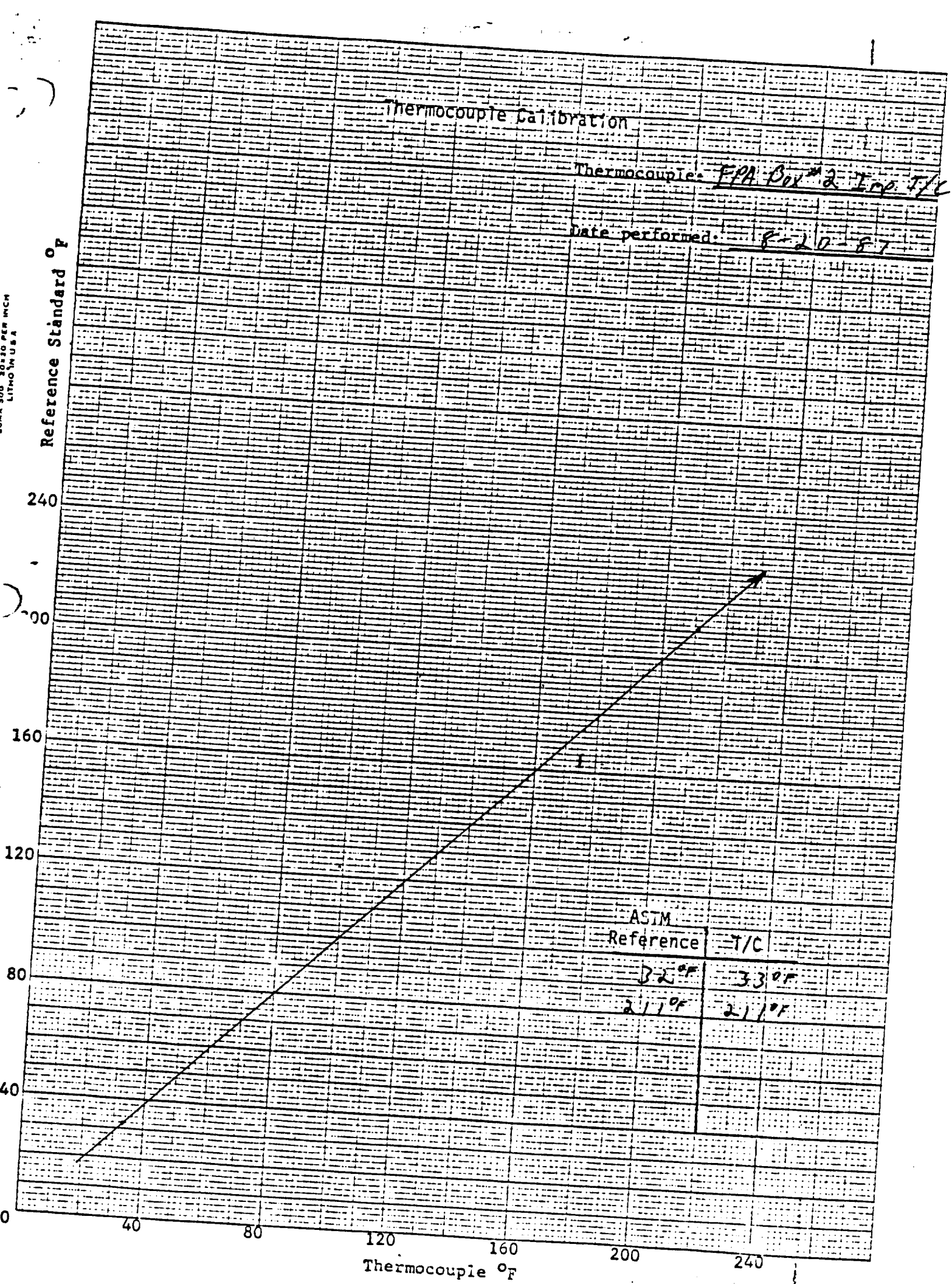
Date performed: 8-20-87



Thermocouple Calibration

Thermocouple: EPA Box #2 Inp T/C

Date performed: 8-20-87

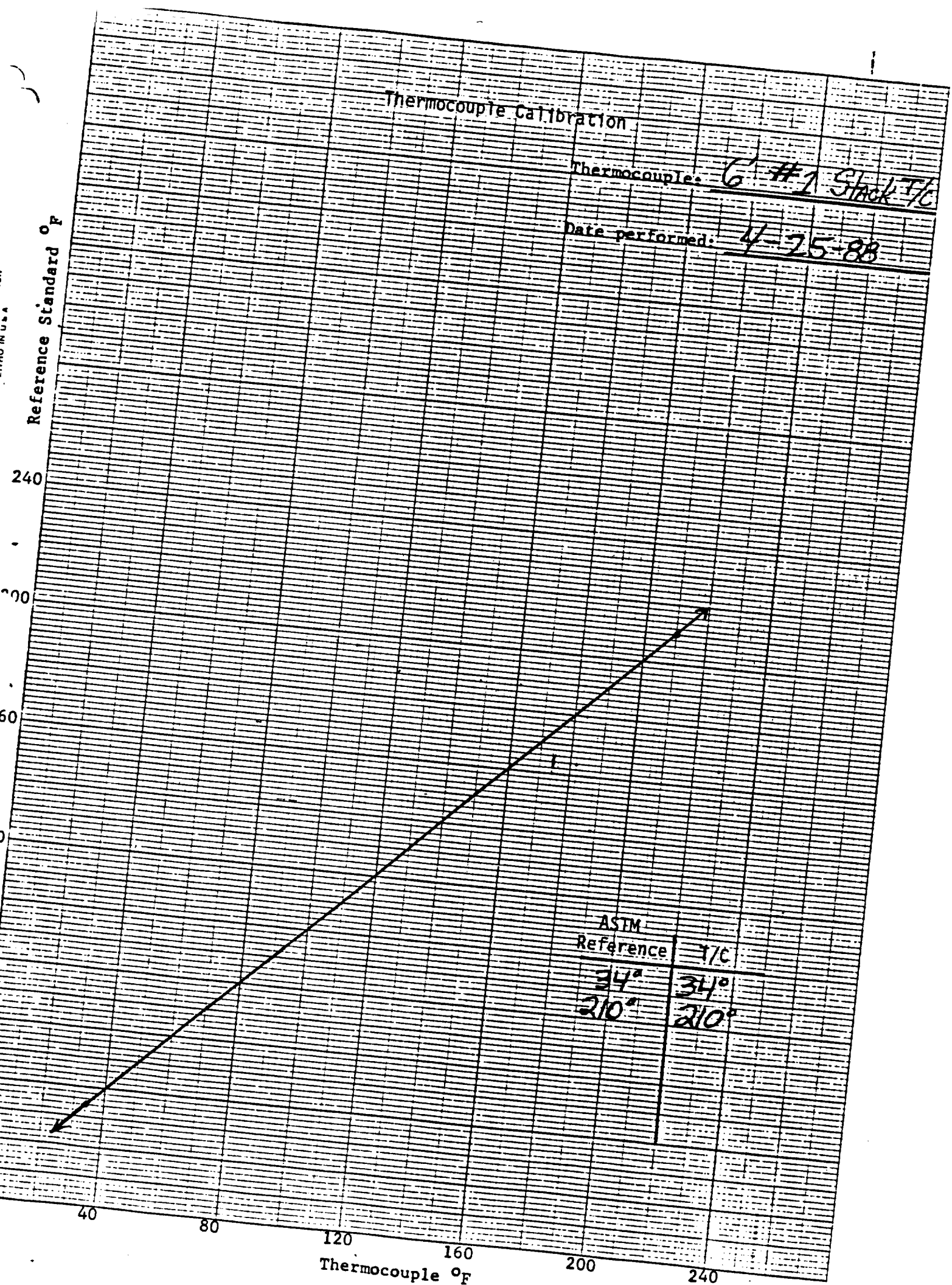


ASTM Reference	T/C
32°F	33°F
211°F	211°F

Thermocouple Calibration

Thermocouple: G #1 Stack T/C

Date performed: 4-25-88



ASTM Reference	T/C
34°	34°
210°	210°

AIR TECHNIQUES, INC.

ANALYTICAL BALANCE CALIBRATION FORM

Balance Name Mettler H80

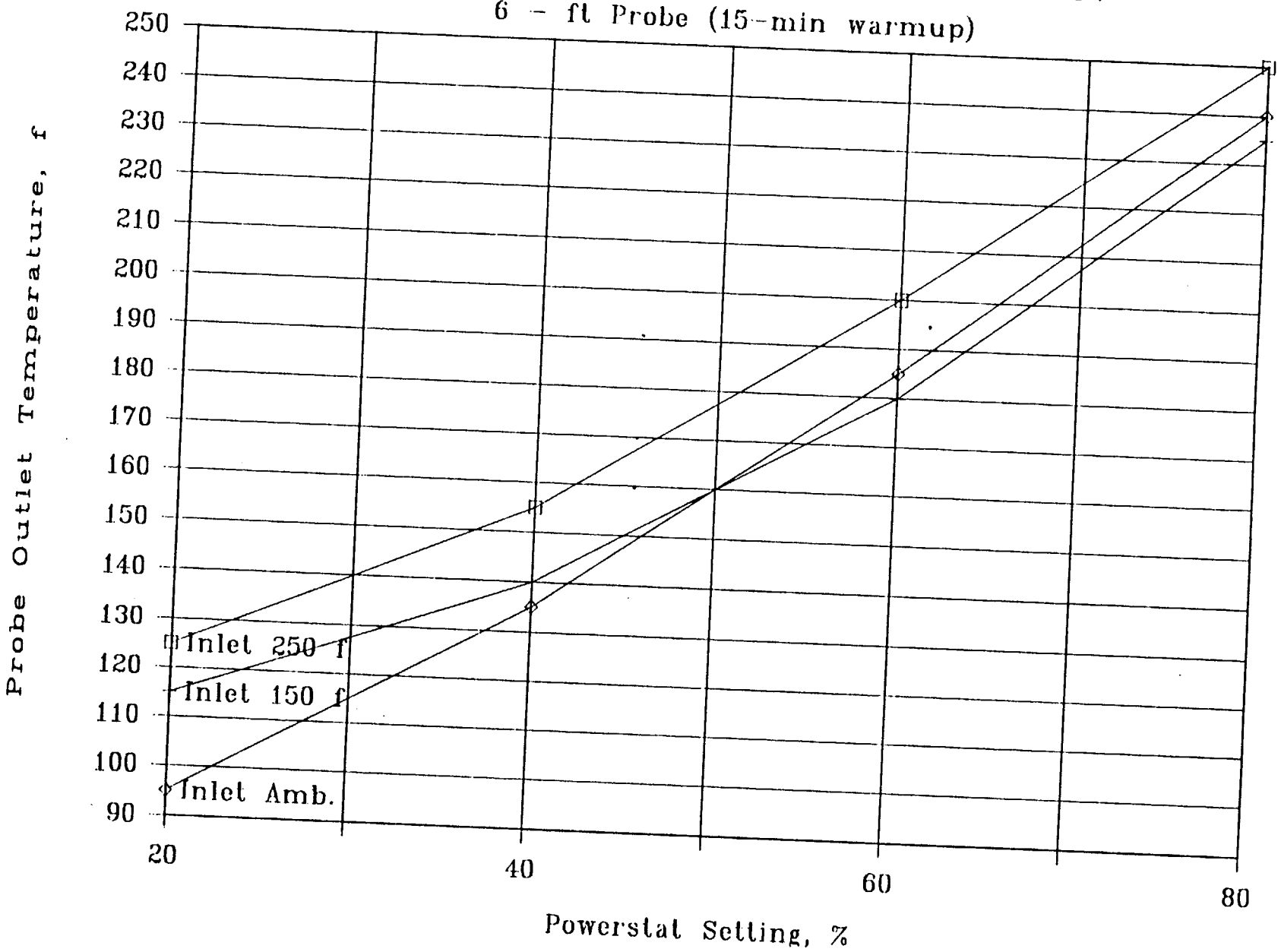
Serial Number G0403E009

Calibration Date 8-27-87

Class S Weight	Balance Reading
50.0 mg	50.0 mg
500.0 mg	500.4 mg
1.0000 g	1.0000 g
20.0000 g	20.0000 g
100.0000 g	100.0002 g

Calibrated by Russell Burton

PROBE HEAT CALIBRATION



AIR TECHNIQUES INC 1724 Nekoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

PITOT PROBE CALIBRATION FORM

Plant: TIME PRODUCTS
Source: SCRUBBER STACK
Test Date: 11-29-88
Calibrated By: J. Seiker
Pre-test Calibration Date: 11-29-88
Post-test Calibration Date: 11-30-88
Probe No: 6 #1
Pitot Assembly Coefficient: .84
Nozzle Size: 3/8"

ITEM	Pre-Test Value	Post-Test Value
Pitot Opening to Center Line, Pa	.50	.50
Pitot Opening to Center Line, Pb	.50	.50
Tubing Diameter, Dt	.375	.375
Pitot Opening to Thermocouple, Z	3.0	3.0
Pitot to Nozzle, X	1.0	1.0
Pitot to Probe, Y	4.0	4.0
Pitot Face Opening to Nozzle Opening, W	.60	.60

Pa=Pb; 1.05 Dt less than or equal to P less than or equal to 1.50 Dt
Z-greater than or equal to 2 in.; X-greater than or equal to 3/4 in.
Y-greater than or equal to 3 in.; W-greater than 0 in.
Acceptable Limit of Error: .01-Pitot

NOZZLE CALIBRATION

.378	.378	.378	.378

Average Diameter

Acceptable Limit of Error: .004-Nozzle

NOMENCLATURE

As	Cross-sectional area of stack, square feet
An	Cross-sectional area of nozzle, square feet
ACF	Actual cubic feet of gas at stack conditions
ACFM	Actual cubic feet of gas per minute at stack conditions
Bws	Proportion by volume of water vapor in gas stream
cs	Particulate concentration in stack gas, gr/dscf
csl	Particulate concentration in stack gas, gr/ACF
Ca	Distilled water blank residue concentration, mg/g
Cp	Pitot tube coefficient
delta H	Pressure drop across orifice meter, inches water
dp	Nozzle diameter, inches
delta P	Velocity head of stack gas, inches water
dscf	Cubic feet of dry gas corrected to standard conditions
E	Particulate emission rate, pounds/hour
Kp	Constant (85.49)
Ma	Mass of residue of distilled water after evaporation, mg
Maw	Mass of residue of distilled water blank, mg
Mf	Particulate matter collected on filter, mg
Mn	Total particulate matter collected, mg
I	Percent of isokinetic sampling
Pa	Density of water mg/ml
Pbar	Barometric pressure, inches mercury
Pm	Barometric pressure of dry gas meter, in. mercury
Ps	Absolute stack gas pressure, inches mercury
Pstd	Barometric pressure, standard conditions, 29.92 "Hg

Qa	Volumetric flow rate, actual conditions, ACF/min
Qs	Volumetric flow rate, dry standard conditions, dscf/min
Tm	Absolute average dry gas meter temperature, degree R
Ts	Absolute average stack gas temperature, degree R
Tstd	Absolute temperature at standard conditions, 528 R
θ	Total sampling time, minutes
Va	Volume of distilled water blank, ml
Vaw	Volume of distilled water used in wash, ml
Vf	Final volume of impinger contents, ml
Vi	Initial volume of impinger contents, ml
Vlc	Total volume collected in impingers and silica gel, ml
Vm	Volume of gas sampled through gas meter, cubic feet
Vma	Stack gas volume sampled, ACF
Vmstd	Volume of gas sampled through gas meter, cubic feet
Vs	Average stack gas velocity, feet/sec
Vwstd	Volume of water vapor in gas sampled, standard cubic feet
Wa	Weight of residue in distilled water wash, mg
Wf	Final weight of filter or probe wash beaker, g
Wi	Initial weight of filter or probe wash beaker, g
Y	Dry gas meter calibration factor