AP32 Section:	12.5.1
Background Chapter	3
Reference:	34
Title:	Particulate Matter Emissions Evaluation, Melt Line Furnace Baghouse, Green River Steel, Owensboro, KY. Prepared for Green River Steel, Owensboro, KY. Prepared by FBT Testing & Environmental Services, West Chester, OH. August, 1999.

MEMORANDUM

TO: Edd Frazier

Thru: Dan Gray
Larry Garrison

FROM: Gerald Slucher

DATE: September 22, 1999

SUBJECT: Green River Steel Tests

On August 10 through 12, 1999, FBT Testing and Environmental Services performed particulate emission tests on the Melt Line Furnace baghouse at Green River Steel in Owensboro. Steve Sanders and I from the Division observed the tests. Proper procedures were followed. The test report was checked for completeness and accuracy and was acceptable.

The reported emission rate during these tests was 0.007 gr/dscf, compared to the allowable from 40 CFR 60.272 of 0.0052 gr/dscf. I am attaching the plant data so you can determine the production rate during the tests. If you have any questions, please contact me.

GHS

cc: Owensboro Regional Office
William A. Clements
File: 077-0920-0008

Facility: Green River Steel
Source Tested: EAF Baghouse
Test Date 8/10-12/99
Testing Company FBT Environmental

	RUN 1	RUN 2	RUN 3
Vm(ACF)	187.67	177.744	186.48
Pbar(in Hg)	30.08	29.7	30.07
Ts(F)	129	132	130
(SRQT(dP))AVG	0.6851	0.6348	0.6699
dH(in H2O)	1.93	1.71	1.87
Tm(F)	77	86	81
Vw(ml H2O)	79	103	108
P's(in H2O)	-0.13	-0.24	-0.27
Ps(in Hg)	30.07044	29.68235	30.05015
Cp	0.84	0.84	0.84
%O2	21	21	21
%CO2	0	0	0
%CO	0	0	0
%N2	79	79	79
As(ft^2)	121.09	121.09	121.09
Dn(in)	0.26	0.26	0.26
Dn^2	0.0676	0 0.0676	0.0676
Time(min)	240	240	240
Probe & Filter			
Catch(grams)	0.0878	0.08877	0.07292
GAMMA(Y)	0.987	0.987	0.987
Vm(SCF)	183.9607	169.1099	181.3549
Vw(gas)	3.72485	4.85645	5.0922
%Moisture	1.984623	2.791603	2.731178
1-Bw	0.980154	0.972084	0.972688
Md			
MWdry	28.84	28.84	28.84
MWstack	28.62487	28.53739	28.54394
Vstack(ft/min)	2440.775	2285.6	2392.841
Qa(ACFM)	295553.4	276763.3	289749.1
Qs(SCFM)	260965.8	238021.3	253290.3
%Isokinetic	96.51087	97.27164	98.02681
Part Emissions			
C(grains/dscf)	0.007364	0.0081	0.006204
A(lb/hr)	16.47298	16.52464	13.46961

Facility: Green River Steel
Source Tested: EAF Baghouse
Test Date 8/10-12/99
Testing Company FBT Environmental

	RUN 1	RUN 2	RUN 3
Vm(ACF)	187.67	177.744	186.48
Pbar(in Hg)	30.08	29.7	30.07
Ts(F)	129	132	130
(SRQT(dP))AVG	0.6851	0.6348	0.6699
dH(in H2O)	1.93	1.71	1.87
Tm(F)	77	86	81
Vw(ml H2O)	79	103	108
P's(in H2O)	-0.13	-0.24	-0.27
Ps(in Hg)	30.07044	29.68235	30.05015
Cp	0.84	0.84	0.84
%O2	21	21	21
%CO2	0	0	0
%CO	0	0	0
%N2	79	79	79
As(ft^2)	121.09	121.09	121.09
Dn(in)	0.26	0.26	0.26
Dn^2	0.0676	0 0.0676	0.0676
Time(min)	240	240	240
Probe & Filter			
Catch(grams)	0.0878	0.08877	0.07292
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Particulate Matter Emissions Evaluation
Melt Line Furnace Baghouse
Green River Steel
Owensboro, Kentucky

Prepared for

Green River Steel
4701 US 60 East
Owensboro, Kentucky 42303

Prepared by

FBT Testing & Environmental Services
7419 Kingsgate Way
West Chester, OH 45069

Drafted by

Peter Hilty
Environmental Scientist

Reviewed by

David Wetmore
Director, Environmental Services

August, 1999

FBT

Table of Contents

1.0 EXECUTIVE SUMMARY

FBT testing & Environmental services (FBT) performed an emissions evaluation of the Melt Line Furnace baghouse at Green River Steel's Owensboro, Kentucky foundry. Three measurement runs were performed from August 10th-12th, 1999. The testing was performed to demonstrate compliance with Kentucky DEP regulations. The results of the testing are summarized below:

Run #	Date/Time	gr/dscf[a]
1	8/10/1999 0047-0500	0.007
2	8/11/1999 0048-0504	0.008
3	8/12/1999 0036-0451	0.006
Average		**0.007**

[a] grains per dry standard cubic foot

2.0 INTRODUCTION

FBT was retained by Green River Steel to perform an emissions evaluation of the melt line furnace baghouse at their Owensboro, Kentucky facility. Three measurement runs were performed from August 10th-12th, 1999. The FBT team of Messrs. Peter Hilty and Brian Murphy conducted the testing. Mr. William O'Bryan, of Green River Steel, coordinated testing and process operations. Mr. Gerald Slucher and Mr. Steve Sanders, of the Kentucky Department for Environmental Protection, observed the testing.

3.0 PROCESS DESCRIPTION/STACK DESCRIPTION

3.1 Process Description

Green River Steel operates an electric arc furnace (EAF) in the production of steel alloys. This is a batch process that involves smelting of scrap steel in the EAF, transfer of the molten steel, followed by pouring of ingots. Emissions from the EAF are exhausted to a fabric filter baghouse for particulate matter control. Fugitive, charging, tapping and ingot pouring emissions from within the melt shop are captured through a multi-point roof pickup system and are also exhausted to the baghouse. Maximum operating capacity is 80,000 pounds per hour.

WLB. 4-17-99

3.2 Stack Description

The sampling ports are located in a round 150" I.D. stack, 300" from the closest upstream disturbance (2 diameters) and 90" (0.6 diameters) from the closest downstream disturbance (atmosphere). 12 sampling points per traverse were used. Figure 3.1 depicts the stack and sampling location.

4.0 TEST RESULTS

Table 4.1 summarizes stack gas conditions.

Table 4.2 summarizes emissions.

5.0 SAMPLING PROCEDURES

The sampling and analytical procedures used conform to the most recent revisions of USEPA Reference Methods for stationary sources. Specifically, USEPA Reference Methods 1, 2, 3, 4, and 5 were used. A brief description of each procedure is included below:

5.1 Measurement Sites

The location of measurement sites and the number of traverse points were determined as specified in **USEPA Method 1**, "Sample and Velocity Traverses for Stationary Sources." Figure 3.1 shows the sample port locations.

5.2 Velocity and Volumetric Flow Rates

The stack gas velocities and volumetric flow rates were determined using **USEPA Method 2**, "Determination of Stack Gas Velocity and Volumetric Flow Rate." Velocities were measured with S-type pitot tubes, and stack gas temperatures were measured with calibrated Type "K" thermocouples.

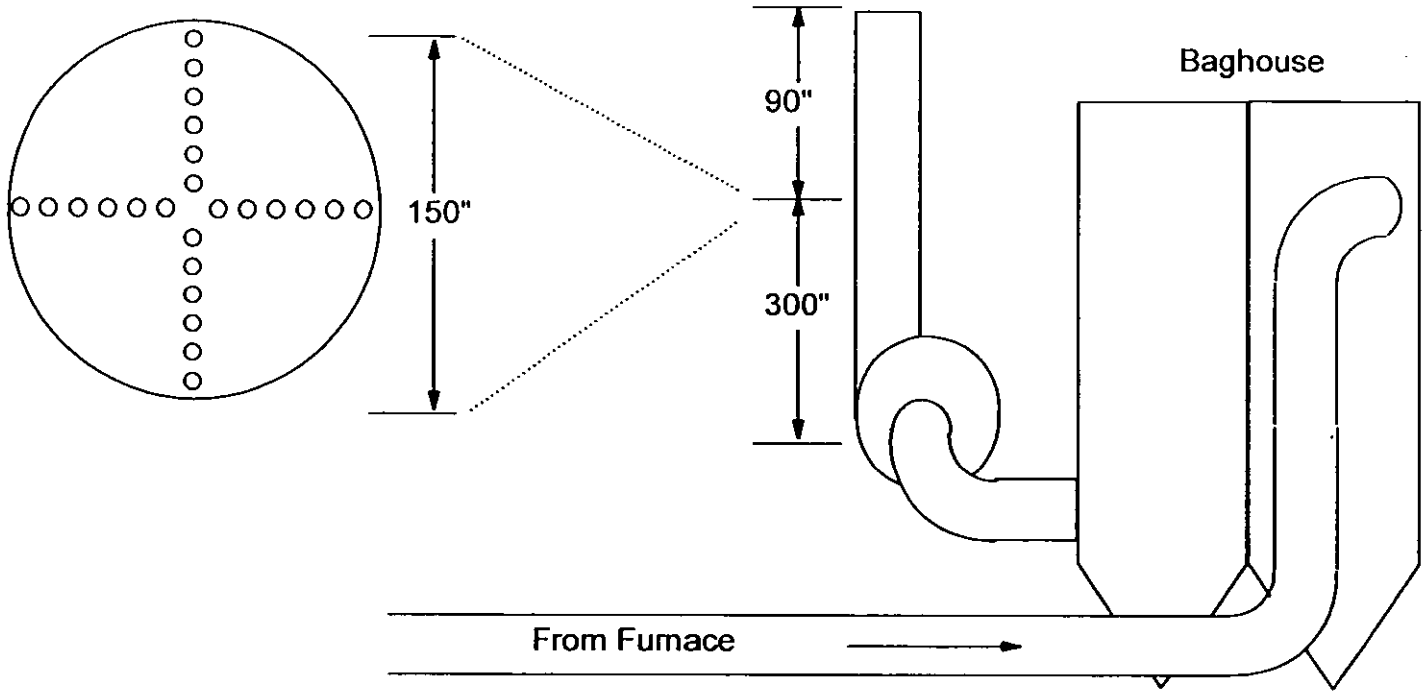

Figure 3.1 Process schematic

FBT

Table 4.1 Summary of Stack Gas Conditions

Run #	Date/Time	Vs (fps)[a]	Flow Rate (acfm)[b]	Flow Rate (dscfm)[c]	T_S °F	H_2O %	O_2 %	CO_2 %
1	8/10/99 0047-0500	40.7	295,933	261,335	129	2.0	21.0	0.0
2	8/11/99 1248-0504	38.1	276,875	238,153	132	2.8	21.0	0.0
3	8/12/99 0036-0451	39.9	289,866	253,430	130	2.7	21.0	0.0
Average		**39.6**	**287,558**	**250,972**	**130**	**2.5**	**21.0**	**0.0**

[a] Velocity in feet per second

[b] Actual cubic feet per minute

[c] Dry standard cubic feet per minute

Table 4.2 Summary of Particulate Emissions

Run #	Date/Time	Concentration (gr/dscf)[a]	Concentration (lb/dscf)[b]	Emission Rate (lb/hr)[c]
1	8/10/99 0047-0500	7.35E-03	1.09E-06	17.138
2	8/11/99 1248-0504	8.08E-03	1.20E-06	17.176
3	8/12/99 0036-0451	6.19E-03	9.21E-07	14.001
Average		**7.21E-03**	**1.07E-06**	**16.105**

[a] Concentration in grains per dry standard cubic foot

[b] Concentration in pounds per dry standard cubic foot

[c] Emission rate in pounds per hour

5.3 *Dry Molecular Weight*

The dry molecular weight was determined using **USEPA Method 3**, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight." Grab samples were collected during each test and analyzed with fyrite gas analyzers for concentrations of O_2 and CO_2.

5.4 *Moisture*

Moisture content was determined using **USEPA Method 4**, "Determination of Moisture Content in Stack Gases", simultaneously with the particulate procedures.

5.5 *Particulate Matter*

The filterable particulate matter emissions were determined using **USEPA Method 5**, "Determination of Particulate Emissions from Stationary Sources." Stack gas samples were withdrawn through a heated stainless-steel probe, a heated (248°+/-25°), tared glass fiber filter, and a moisture condensing system. Filterable particulate was ascertained by gravimetric analysis of the filter and the probe wash residue. Figure 5.1 depicts the Method 5 sampling train.

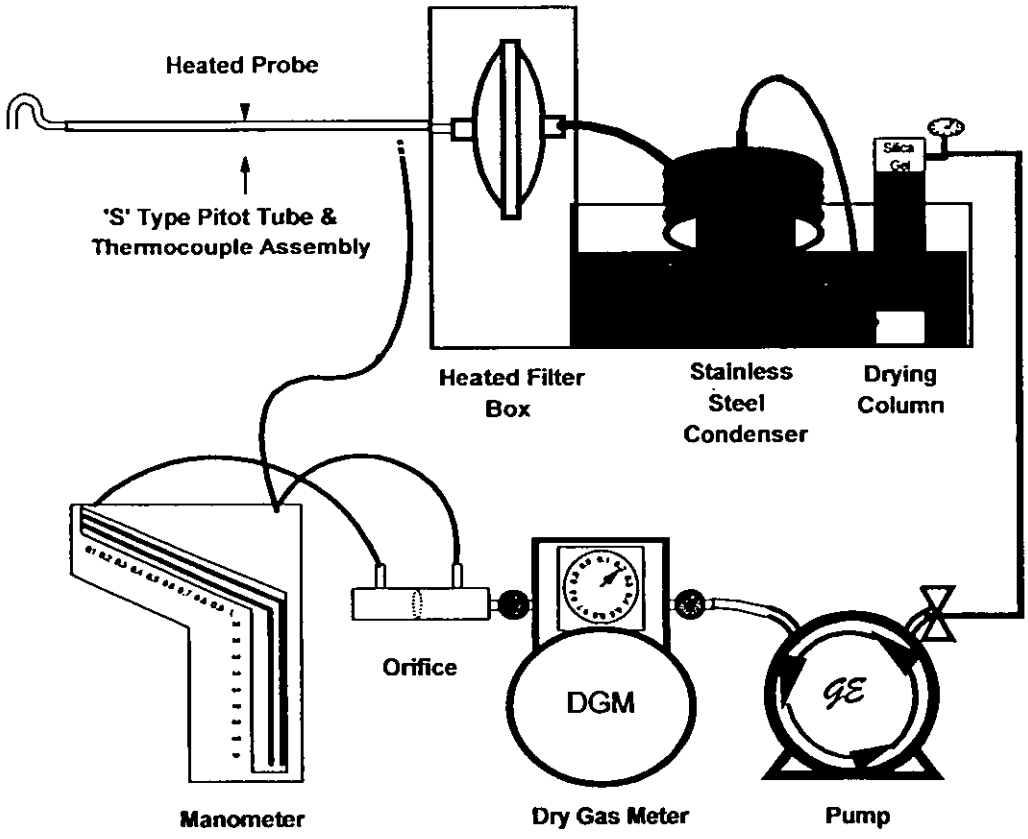

Figure 5.1 Method 5 particulate matter sampling train

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APPENDIX A

CALCULATIONS

CALCULATIONS NOMENCLATURE

Symbol	*Units*	*Description*
An	ft^2	Nozzle area
As	ft^2	Stack area
AFHI	MM Btu/hr	Auxiliary fuel heat input
Bws	dimensionless	Proportion of water vapor in stack gas
CO_2	per cent	Carbon dioxide content by volume
CO	per cent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
Cs(gr/dscf)	grains/dscf	Concentration
Cs(lb/dscf)	pounds/dscf	Concentration
Cs@'x'%	gr/dscf	Concentration corrected for $\%O_2$ or $\%CO_2$
Cs(ppm)	parts per million	Concentration
Dn	inches	Nozzle diameter
ΔH	in. H_2O	Pressure drop across meter orifice
ΔP	in. H_2O	Stack velocity pressure head
Er	lb/hr	Mass emission rate
F	dscf	Volume of flue gas per 10^6 BTU
I	per cent	Per cent isokinetic sampling
Kp	constant	Conversion constant for ΔP to fps = 85.49
Mn	milligrams	Particulate sample weight
Md	lb/lb mole	Dry molecular weight of stack gas
Ms	lb/lb mole	Wet molecular weight of stack gas
N_2	per cent	Nitrogen content by volume
O_2	per cent	Oxygen content by volume
Pbar	in. Hg	Barometric pressure
Ps	in. H_2O	Static pressure
Pm	in. Hg	Meter pressure = Pbar + (ΔH+13.6)
Ps	in. Hg	Stack pressure = Pbar + (Ps+13.6)
Pstd	in. Hg	Standard pressure = 29.92
Qa	acfm	Actual volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at dry, standard conditions
θ	minutes	Sampling time per run
Tm	^oF or ^oR	Meter temperature
Ts	^oF or ^oR	Stack temperature
Tstd	^oF or ^oR	Standard temperature = 68°F or 528°R
Vlc	ml	Volume of water collected
Vm	ft^3	Volume of dry gas sampled
Vmstd	dscf	Sample volume at standard conditions
Vs	ft/sec	Stack gas velocity
Vwstd	scf	Sample volume of water vapor
γ	dimensionless	Meter correction factor
Xsair	per cent	Excess Air

BLANK ANALYTICAL DATA

CLIENT/PROJECT #: Green River Steel
DATE: Baghouse Exhaust
BLANK #:

ACETONE BLANK CALCULATIONS

ACETONE DENSITY(Pa):	0.788	g/ml	
BLANK VOLUME(Va):	50.0	ml	
FINAL WEIGHT(Wf):	1,562.40	mg	
TARE WEIGHT(Wi):	1,561.60	mg	2.03046E-05
CONCENTRATION(Ca):	0.010	mg/g =	(Wf-Wi)/(Va*Pa)

NOTE: In no case should a blank residue of >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

SAMPLE CORRECTIONS(Wa) = Ca*Vaw*Pa

RUN #:	1	2	3		
FBT #:	1	2	3		
RINSE VOLUME(Vaw):	210.0	200.0	200.0		
FINAL WEIGHT(mg):	97,455.7	95,508.1	97,118.4		
TARE WEIGHT(mg):	97,423.4	95,479.1	97,101.6		
GROSS RINSE WEIGHT(mg):	32.25	28.95	16.75	0	0
Wa(mg):	1.6548	1.576	1.576	0	0
NET RINSE WEIGHT(mg):	30.60	27.37	15.17	0	0

FBT

EXAMPLE CALCULATION

CLIENT/PROJECT NUMBER:	Green River Steel
SAMPLE LOCATION:	Baghouse Exhaust
DATE/TIME:	8/10/99 0047-0500
RUN #:	1

1.METER CORRECTIONS:

Vmc = Vm-(Lp-La)*Time = Vm-(Lp-0.02)*Time =	187.670
Vm(std) = 17.647*Vmc*Y*(Pbar+ΔH÷13.6)÷Tm(°R) =	183.963

2.MOISTURE FRACTION:

Vw(scf) = Vwc x 0.04707 =	3.71853
Bws = Vw(std)÷(Vw(std)+Vm(std))=	0.020
%H2O = Bws x 100 =	1.98

3.MOLECULAR WEIGHT:

Md = 0.44*(%CO2)+0.32*(%O2)+0.28(%N2+%CO) =	28.84
Ms = Md*(1-Bws)+(18.0*Bws) =	28.63

4.VOLUMETRIC FLOW RATE(Q):

Vs = 85.49*Cp*Avg(√ΔP)*[Ts(°R)÷(Ps"Hg*Ms)]$^{0.5}$ =	40.7
Qa = Vs*60*As(ft²) =	295932.9
Qstd = Qa*17.647*(1-%H2O)*Ps÷Ts(°R) =	261335.0

5.ISOKINETIC:

%I = 0.0945*Ts(°R)*Vm(std)÷[Ps*Vs*An*Time*(1-Bws)] =	96.38

6.CONCENTRATION(Cs):

Cs(gr/dscf) = 0.0154*Wt(mg)÷Vm(std) =	7.35E-03
Cs(lb/dscf) = 1.429E-04*Cs(gr/dscf) =	1.09E-06

7.EMISSION RATE(Er):

Er(lb/hr) = Cs(lb/dscf)*Qstd*60 =	17.138

FBT

CLIENT/PROJECT #:	Green River Steel		
SAMPLE LOCATION:	Baghouse Exhaust		
DATE/TIME:	8/10/99 0047-0500		
RUN #:	1		

STATIC PRESSURE("H_2O):	-0.13	"Hg	30.07
BAROMETRIC("Hg):	30.08		
SAMPLE TIME(min):	240	Vm(corr)	187.670
ACTUAL METER VOLUME:	187.670	dscf	183.963
Average $\sqrt{\Delta P}$:	0.686		
AVG ORIFICE ΔH:	1.93		
AVG STACK TEMP °F:	129.0	°R	589.0
AVG METER TEMP °F:	77.0	°R	537.0
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.260	An(ft^2)	3.69E-04
METER Υ:	0.987		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	121.09
DIA OR DIM (inches):	149.00	Md	28.84
% O_2 :	21.00	Ms	28.63
% CO_2 :	0.00	% H_2O	1.98
VOL CONDENSATE(ml):	79	aturated %	14.63
PARTICULATE FILTER GAIN(mg):	57.2		
PARTICULATE RINSE GAIN(mg):	30.6	NET GAIN:	87.8

**********CALCULATED RESULTS**********

STACK GAS CONDITIONS

VELOCITY (Vs):	40.7	ft/sec
VOLUMETRIC FLOW RATE (Qa):	295,933	acfm
(Qstd):	261,335	dscfm
STACK GAS TEMP :	129	Deg F
MOISTURE (%H_2O):	1.98	%
%O_2:	21.0	
%CO_2:	0.0	
ISOKINETIC SAMPLING RATE:	96.38	%

FILTERABLE PARTICULATE EMISSIONS

CONCENTRATION (Cs):	7.35E-03	gr/dscf
	1.09E-06	lb/dscf
EMISSION RATE (Er):	17.138	lb/hr

COMMENTS: blank corrected

FBT

CLIENT/PROJECT #:	Green River Steel		
SAMPLE LOCATION:	Baghouse Exhaust		
DATE/TIME:	8/11/99 0048-0504		
RUN #:	2		

STATIC PRESSURE("H_2O):	-0.24	"Hg	29.68
BAROMETRIC("Hg):	29.70		
SAMPLE TIME(min):	240	Vm(corr)	177.744
ACTUAL METER VOLUME:	177.744	dscf	169.115
Average $\sqrt{\Delta P}$:	0.635		
AVG ORIFICE ΔH:	1.71		
AVG STACK TEMP °F:	132.0	°R	592.0
AVG METER TEMP °F:	86.0	°R	546.0
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.260	An(ft^2)	3.69E-04
METER Υ:	0.987		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	121.09
DIA OR DIM (inches):	149.00	Md	28.84
% O_2 :	21.00	Ms	28.54
% CO_2 :	0.00	% H_2O	2.79
VOL CONDENSATE(ml):	103	aturated %	16.05
PARTICULATE FILTER GAIN(mg):	61.4		
PARTICULATE RINSE GAIN(mg):	27.37	NET GAIN:	88.77

**********CALCULATED RESULTS**********

STACK GAS CONDITIONS

VELOCITY (Vs):	38.1	ft/sec
VOLUMETRIC FLOW RATE (Qa):	276,875	acfm
(Qstd):	238,153	dscfm
STACK GAS TEMP :	132	Deg F
MOISTURE (%H_2O):	2.79	%
%O_2:	21.0	
%CO_2:	0.0	
ISOKINETIC SAMPLING RATE:	97.23	%

FILTERABLE PARTICULATE EMISSIONS

CONCENTRATION (Cs):	8.08E-03	gr/dscf
	1.20E-06	lb/dscf
EMISSION RATE (Er):	17.176	lb/hr

COMMENTS: blank corrected

FBT

CLIENT/PROJECT #:	Green River Steel
SAMPLE LOCATION:	Baghouse Exhaust
DATE/TIME:	8/12/99 0036-0451
RUN #:	3

STATIC PRESSURE("H_2O):	-0.27	"Hg	30.05
BAROMETRIC("Hg):	30.07		
SAMPLE TIME(min):	240	Vm(corr)	186.480
ACTUAL METER VOLUME:	186.480	dscf	181.358
Average $\sqrt{\Delta P}$:	0.670		
AVG ORIFICE ΔH:	1.87		
AVG STACK TEMP °F:	130.0	°R	590.0
AVG METER TEMP °F:	81.0	°R	541.0
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.260	An(ft^2)	3.69E-04
METER Υ:	0.987		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	121.09
DIA OR DIM (inches):	149.00	Md	28.84
% O_2 :	21.00	Ms	28.54
% CO_2 :	0.00	% H_20	2.73
VOL CONDENSATE(ml):	108	aturated %	15.03
PARTICULATE FILTER GAIN(mg):	57.75		
PARTICULATE RINSE GAIN(mg):	15.17	NET GAIN:	72.92

***********CALCULATED RESULTS**********************

STACK GAS CONDITIONS

VELOCITY (Vs):	39.9	ft/sec
VOLUMETRIC FLOW RATE (Qa):	289,866	acfm
(Qstd):	253,430	dscfm
STACK GAS TEMP :	130	Deg F
MOISTURE (%H_2O):	2.73	%
%O_2:	21.0	
%CO_2:	0.0	
ISOKINETIC SAMPLING RATE:	97.98	%

FILTERABLE PARTICULATE EMISSIONS

CONCENTRATION (Cs):	6.19E-03	gr/dscf
	9.21E-07	lb/dscf
EMISSION RATE (Er):	14.001	lb/hr

COMMENTS: blank corrected

FBT

APPENDIX B

ANALYTICAL DATA

PROJECT ANALYTICAL SHEET FOR PARTICULATE MATTER

PROJECT NAME: [illegible]

PROJECT DATE: 8/9 - 8/12

PROJECT MANAGER: D. Wetmore

NUMBER OF SITES: 1

ID NO.	RUN NO.	DESCRIPTION	TARE MASS	FINAL MASS	NET MASS	VOLUME
	1	Filter 3530	325.9 mg	383.1 mg	57.2 mg	ml
	1	Front 1/2 148	97,423.4 mg	97,455.65 mg	32.25 mg	210 ml
	2	Filter 3531	327.3 mg	388.7 mg	61.4 mg	ml
	2	Front 1/2 149	95,479.1 mg	95,508.05 mg	28.95 mg	200 ml
	3	Filter 3532	328.95 mg	386.7 mg	57.75 mg	ml
	3	Front 1/2 150	97,101.6 mg	97,118.35 mg	16.75 mg	200 ml
	4	Blank Acetone 124	1561.6 mg	1562.4 mg	0.8 mg	50 ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml
			mg	mg	mg	ml

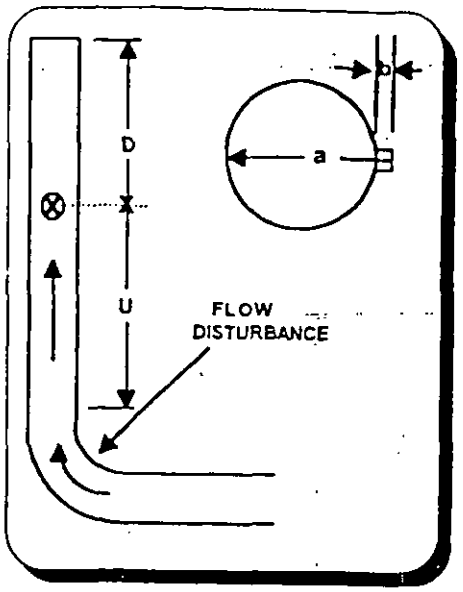
ANALYZED BY: P. Hatz   REVEIWED BY: ____________

ERT

APPENDIX C

RAW FIELD DATA

Traverse Point Locator Data



Client : [illegible]

Calculator : Will Date : 5/9/99

Location : Baghouse Exhaust

Distance from *upstream* disturbance (u) : 300" (2 dd)

Distance from *downstream* disturbance (d) : 90" (.6 dd)

Outside of port to *far side* of stack (a) : 153.4"

Outside of port to *near side* of stack (b) : 3.5"

Inside Stack Diameter (a-b) : 12.5 (149.9")

Point #	% from wall to point	" from wall to point (c)	Port length (b)	" from probe tip to point (b+c)
1	2.1	3.15	3.5"	3.7
2	6.7	10.0		13.5
3	11.8	17.7		21.2
4	17.7	26.5		30
5	25	37.5		41
6	35.6	53.4		56.9
7	64.4	96.5		100
8	75	112.4		115.9
9	82.3	123.4		126.9
10	88.2	132.2		135.7
11	93.3	140		143.5
12	97.9	146.75		150.25

FIELD DATA SHEET

Client / City: Green River Steel | Probe Length / Type: 13' SS

Date: 8/10/99 | Run #: 1 | Nozzle Size: ____, ____, ____ = 0.260

Location: Baghouse Exhaust | Meter Box #: ~~Nutech~~ ES-1 ΔH@: 1.819 Y: 0.987

Sample Type: MS | Operator: Hilty | Assumed H_2O: 5 % | T_s: ____

P_{BAR}: 30.06 | Ambient Temperature: ____ °F | P_s: -.13 | Reference ΔP: ____ | K-factor: ____

Pretest Leak Rate: 0.006 ft³ @ 10 "hg | Filter #: ____

Postest Leak Rate: 0.006 ft³ @ 5 "hg

Pitot Leak Check: ✓ | Orsat Leak Check: ____

Comments: cp=.84

Fyrite Data:	Moisture Data Total: 79	
O_2: 21	ml H_2O	g Sil. Gel
CO_2: 0	45	34

Traverse Schematic:

Page 1 of 1 Record data every 10 minutes

Trav. #	Sample Time	Clock Time	Meter Reading	Pitot #: PT-1 ΔP	Pitot #: PT-1 ΔH(calc)	TC #'s: ΔH(act)	T-119 Probe	T-65 Stack	ES-1 Tm In	ES-1 Tm Out	HB Filter	DL Exit	Pump Vac.
	—	—	—										
1	0	0047	246.414	0.49	2.02	2.0	225	119	68	69	235	36	3
2	10		254.321	0.54	2.23	2.2	225	117	70	69	237	38	3
3	20		262.561	0.52	2.13	2.1	227	122	70	69	232	39	3
4	30		270.468	0.52	2.13	2.1	227	123	76	71	238	40	3
5	40		278.613	0.50	2.05	2.1	229	127	79	72	235	40	3
6	50		286.546	0.51	2.10	2.1	226	129	79	73	233	40	3
7	60		294.551	0.47	1.94	1.9	225	132	65	75	245	41	3
8	70		303.041	0.49	2.01	2.0	228	132	62	75	240	42	3
9	80		311.361	0.51	2.10	2.1	225	132	63	76	241	43	3
10	90		318.741	0.44	2.01	2.0	229	134	64	76	249	43	3
11	100		327.031	0.47	1.93	1.9	225	134	63	77	241	44	3
12	110		335.100	0.50	2.05	2.1	226	126	62	77	243	44	3
1	120	0300	342.705	0.54	2.24	2.2	226	122	75	75	255	45	3
2	130		350.641	0.46	1.99	2.0	229	121	79	74	261	45	3
3	140		358.801	0.54	2.24	2.2	231	121	79	79	266	46	3
4	150		367.058	0.50	2.06	2.1	229	124	80	74	261	47	3
5	160		375.421	0.48	1.97	2.0	229	130	80	74	266	47	3
6	170		383.681	0.45	1.85	1.9	231	133	62	75	261	47	3
7	180		391.499	0.45	1.84	1.8	233	134	63	76	265	47	3
8	190		398.917	0.40	1.64	1.6	232	131	84	77	231	40	3
9	200		406.615	0.35	1.43	1.4	226	143	64	76	235	40	3
10	210		413.071	0.39	1.56	1.6	230	137	84	76	231	40	3
11	220		420.013	0.37	1.52	1.5	229	134	65	79	245	40	3
12	230		427.571	0.35	1.43	1.4	232	132	65	79	234	41	3
	240/End		434.084	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

θ: 240 V_m: 187.670 avg $\sqrt{\Delta P}$: 0.6857 avg ΔH: 1.93 T_M: 89 T_a: 77 Calculated By: BM Checked By: ____

FBT

FIELD DATA SHEET

Client / City: Green River Steel | Probe Length / Type: 13 / SS

Date: 8-11-99 Run #: 2 | Nozzle Size: ____, ____, ____ = 0.260

Location: Baghouse Exhaust | Meter Box #: C5-1 ΔH@: 1.819 Y: 0.987

Sample Type: M5 Operator: BM | Assumed H_2O: 5 % T_s: 130

P_{BAR}: 29.70 Ambient Temperature: 79 °F P_s: -.24 | Reference ΔP: .5 K-factor: ____

Pretest Leak Rate: .013 ft^3 @ 13 "hg | Filter #: ____

Postest Leak Rate: .005 ft^3 @ 6 "hg

Pitot Leak Check: ✓ Orsat Leak Check: N/A

Comments: 4 = .84

Fyrite Data: O_2: 21 CO_2: 0

Moisture Data Total: 103

ml H_2O	g Sil. Gel
60	43

Traverse Schematic:

Page 1 of 1 Record data every 10 minutes

Trav. #	Sample Time	Clock Time	Meter Reading	Pitot #: PT-1 ΔP	Pitot #: PT-1 ΔH(calc)	TC #'s: ΔH(act)	T-115 Probe	T-65 Stack	Tm In	Tm Out	Filter	Exit	Pump Vac.
A1	0	1248	434.552	.58	2.45	2.5	230	117	79	79	314	64	5
2	10		443.4	.35	1.46	1.5	235	127	82	79	310	59	5
3	20		450.3	.41	1.71	1.7	233	128	84	80	298	54	3
4	30		457.4	.43	1.79	1.8	238	129	87	81	299	53	4
5	40		465.2	.47	1.95	2.0	228	134	88	82	296	54	4
6	50		474.7	.48	1.98	2.0	229	136	91	83	298	55	4
7	60		482.4	.45	1.85	1.9	228	138	91	84	298	56	4
8	70		491.3	.41	1.67	1.7	229	144	92	85	297	58	4
9	80		496.6	.40	1.64	1.6	231	142	92	85	297	59	3
10	90		503.8	.34	1.39	1.4	229	142	91	85	297	63	4
11	100		510.6	.36	1.48	1.5	230	139	90	85	293	64	3
12	110		517.3	.31	1.29	1.3	228	134	91	85	298	65	3
B1	120	0304	524.080	.39	1.67	1.7	230	123	86	85	311	39	4
2	130		530.9	.38	1.63	1.6	227	121	88	85	305	34	4
3	140		538.3	.41	1.75	1.8	229	127	90	85	257	39	4
4	150		545.7	.38	1.60	1.6	231	134	90	84	268	41	4
5	160		552.9	.37	1.55	1.6	229	137	90	84	267	46	4
6	170		560.2	.42	1.78	1.8	228	133	90	84	289	48	4
7	180		567.9	.38	1.61	1.6	230	132	91	85	266	51	4
8	190		575.4	.39	1.66	1.7	229	130	90	85	284	53	4
9	200		584.1	.41	1.74	1.7	232	132	89	84	264	59	4
10	210		590.1	.39	1.65	1.7	228	133	90	84	264	60	4
11	220		597.2	.37	1.56	1.6	230	134	89	84	265	61	4
12	230		604.3	.43	1.83	1.8	228	130	90	84	264	63	4
	240		612.296										

θ: 240 V_m: 177.744 avg $\sqrt{\Delta P}$: 0.6346 avg ΔH: 1.71 T_s: 132 T_m: 61 Calculated By: ____ Checked By: ____

FBT

FIELD DATA SHEET

Client / City: Green River Steel
Date: 6/12/99 Run #: 3
Location: Baghouse Exhaust
Sample Type: M5 Operator: Hilty
P_{BAR}: 30.07 Ambient Temperature: 76 °F P_s: -0.27
Pretest Leak Rate: 0.012 ft³ @ 10 "hg
Postest Leak Rate: 0.004 ft³ @ 5 "hg
Pitot Leak Check: ✓ Orsat Leak Check:

Probe Length / Type: 13' SS
Nozzle Size: ____, ____, ____ = 0.260
Meter Box #: ES-1 ΔH@: 1.819 Y: .987
Assumed H_2O: 5 % T_s: ____
Reference ΔP: ____ K-factor: 4.517

Filter #: ____

Comments: 40 b

Fyrite Data:	Moisture Data Total: 168	
O_2: 21, 21, ,	ml H_2O	g Sil. Gel
CO_2: 0, 0, ,	55	53

Traverse Schematic: 57, 46, 3

Page 1 of 1 Record data every 10 minutes

Trav. #	Sample Time	Clock Time	Meter Reading	Pitot #: PT-1 ΔP	Pitot #: PT-1 ΔH(calc)	TC #'s: ΔH(act)	T-114 Probe	T-65 Stack	Tm In	Tm Out	Filter	Exit	Pump Vac.
	—	—	—										
1	0	0036	614.389	0.49	2.04	2.0	231	116	75	74	231	41	3
2	10		622.431	0.48	1.98	2.0	229	123	77	74	245	40	3
3	20		630.410	0.51	2.11	2.1	232	125	80	75	280	40	3
4	30		638.721	0.46	1.96	2.0	230	129	80	76	253	40	3
5	40		646.358	0.45	1.84	1.8	233	137	84	77	245	41	2
6	50		654.103	0.45	1.84	1.8	235	134	85	76	246	42	2
7	60		661.426	0.46	1.89	1.9	231	134	86	76	245	43	2
8	70		669.216	0.48	1.99	2.0	235	132	87	80	237	43	2
9	80		677.413	0.48	1.84	1.9	233	133	87	80	241	43	2
10	90		685.291	0.46	1.92	1.9	231	129	86	80	240	44	2
11	100		693.548	0.44	1.83	1.8	230	131	87	80	248	44	3
12	110		701.348	0.45	1.90	1.9	235	121	87	80	253	40	3
1	120	0251	709.297	0.51	2.17	2.2	237	116	82	80	241	38	3
2	130		717.674	0.53	2.23	2.2	233	123	85	80	253	39	3
3	140		725.821	0.53	2.24	2.2	231	129	86	80	257	39	3
4	150		734.478	0.55	2.29	2.3	237	130	86	79	255	42	3
5	160		743.241	0.46	1.89	1.9	230	135	86	80	236	43	3
6	170		751.136	0.40	1.64	1.6	231	141	86	80	240	43	3
7	180		758.481	0.39	1.59	1.6	237	141	86	80	245	44	3
8	190		765.683	0.38	1.56	1.6	246	140	85	80	263	44	3
9	200		773.116	0.35	1.43	1.4	243	134	84	79	259	44	3
10	210		780.261	0.41	1.67	1.7	241	127	83	79	255	44	3
11	220		787.266	0.36	1.47	1.5	250	130	84	78	257	45	3
12	230		794.411	0.32	1.32	1.3	243	130	84	76	251	47	3
	240/End		801.869	—	—	—	—	—	—	—	—	—	—

θ: 240 V_m: 166.46 avg $\sqrt{\Delta P}$: 0.6695 avg ΔH: 1.67 T_s: 130 T_m: 61 Calculated By: ____ Checked By: ____

FRT

APPENDIX D

QA/QC DATA

QUALITY ASSURANCE/QUALITY CONTROL

This section describes the specific QA/QC procedures employed by FBT in performing this series of tests. The goal of the QA/QC activities for this project are intended to ensure, to the highest degree possible, the accuracy of the data collected. The procedures contained in the "Quality Assurance Handbook for Air Pollution Measurement Systems," "Volume III, Stationary Source Specific Methods," EPA-600/77-027B serve as the basis for performance for all testing and related work activities.

CALIBRATION OF APPARATUS:

The preparation and calibration of source sampling equipment is essential in maintaining data quality. Brief descriptions of the calibration procedures used by FBT follow:

Barometers

FBT uses aneroid barometers which are calibrated against a National Weather Service-Type mercurial barometer.

Temperature Sensors

Bimetallic dial thermometers and Type "K" thermocouples are calibrated using the procedure described in Section 3.4.2 of the Quality Assurance Handbook. Each temperature sensor is calibrated over the expected range of use against an ASTM 3C or 3F thermometer.

Pitot Tubes

FBT uses Type "S" pitot tubes which are constructed according to EPA Method 2 specifications. Pitot tubes meeting these criteria are assigned a baseline coefficient of 0.84 and need not be calibrated.

Differential Pressure Gauges

FBT uses Dwyer inclined/vertical manometers to measure differential pressures. These include velocity pressure, static pressure, and meter orifice pressure. Manometers are selected with sufficient sensitivity to accurately measure pressures over the entire range of expected values. Manometers are primary standards and require no calibration.

Dry Gas Meters and Orifices

Dry gas meters and orifices are calibrated in accordance with Section 3.3.2 of the Quality Assurance Handbook. This procedure involves direct comparison of the dry gas meter to a reference wet test meter. The reference wet test meter is routinely calibrated against a bell prover. Before its initial use in the field, the metering system is calibrated over the entire range of operation. After each field use, the metering system is calibrated at a single intermediate setting based on the previous field test. Acceptable tolerances for the initial and final dry gas meter factors and orifice calibration factious are $\pm$ 0.02 and $\pm$ 0.20 from average, respectively.

QA/QC (cont.)

THE ON-SITE QA/QC ACTIVITIES INCLUDED:

Measurement Sites

Prior to sampling, all measurements were checked dimensionally to determine measurement site locations, location of test ports, and stack inside dimensions. Inside dimensions were checked through all available test ports to ensure uniformity of the stack cross-sectional area.

Velocity Measurements

All velocity measurement apparatus was assembled, leveled, zeroed, and leak checked prior to each test run. The static pressure was determined at a single point near the center of the stack .

Flue Gas Component Sampling

During sampling, Fyrite combustion gas analyzers were used to determine percent concentrations of carbon dioxide and oxygen.

Moisture

Stack gas moisture was determined simultaneously with particulate matter. During sampling, the exit gas of the last impinger was maintained below 68°F to ensure complete condensation of the stack gas water vapor. The total moisture was determined gravimetrically.

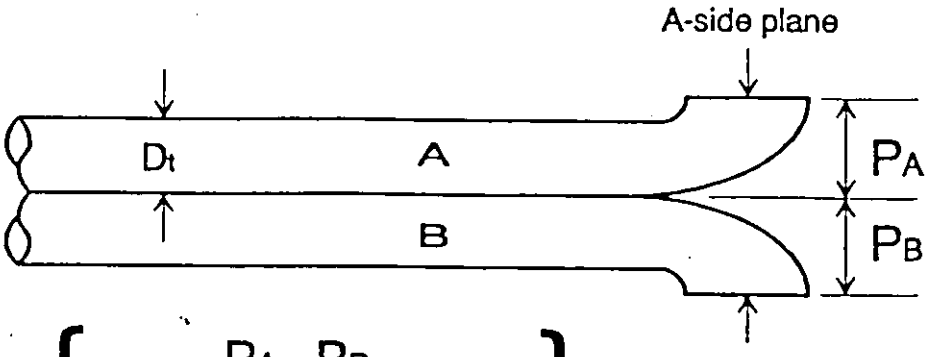
Sample Trains

The sample trains were assembled, equilibrated to required temperatures and leak checked prior to testing. The nozzle size was determined in the field by making triplicate measurements along three different diameters using a dial caliper. The three measurements must vary no more than 0.004 inches between the high and low numbers.

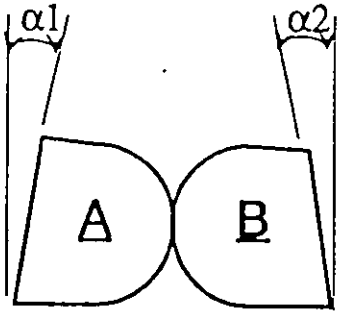
At the conclusion of each test run, the sample trains were leak checked at the highest vacuum attained during the test run. Acceptable leakage rates are 0.02 cfm or 4 percent of the average sampling rate (whichever is less).

S-type Pitot Tube Calibration

Identification: PT-1
Performed by: BH
Date: 11/11/98

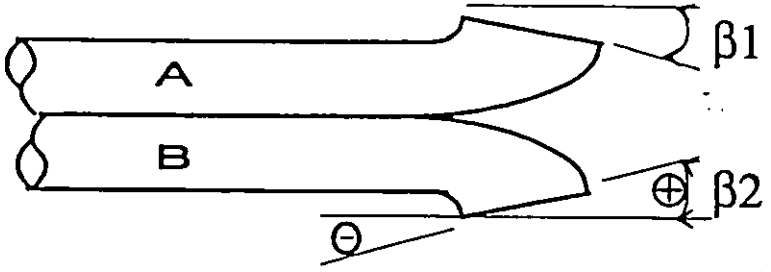


$$\left\{ \begin{array}{c} P_A = P_B \\ 1.05Dt \le P \le 1.50Dt \end{array} \right\}$$



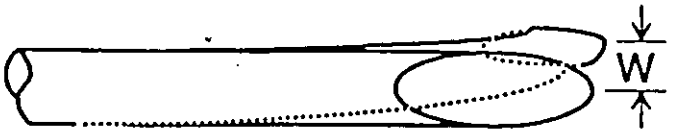
α1 = 0 °

α2 = 0 °



β 1= 0 °

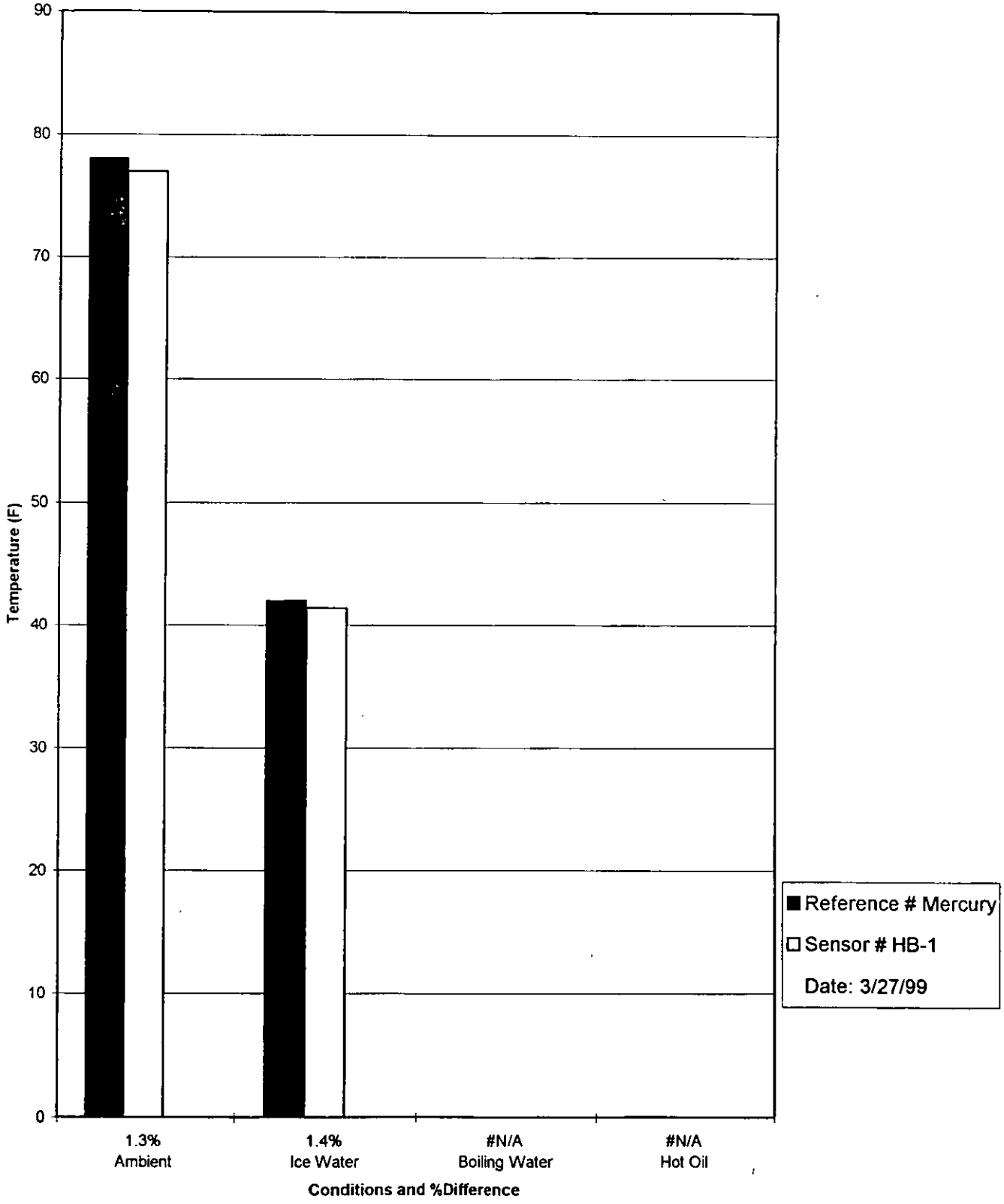
β 2= 0 °



W = 0 in.

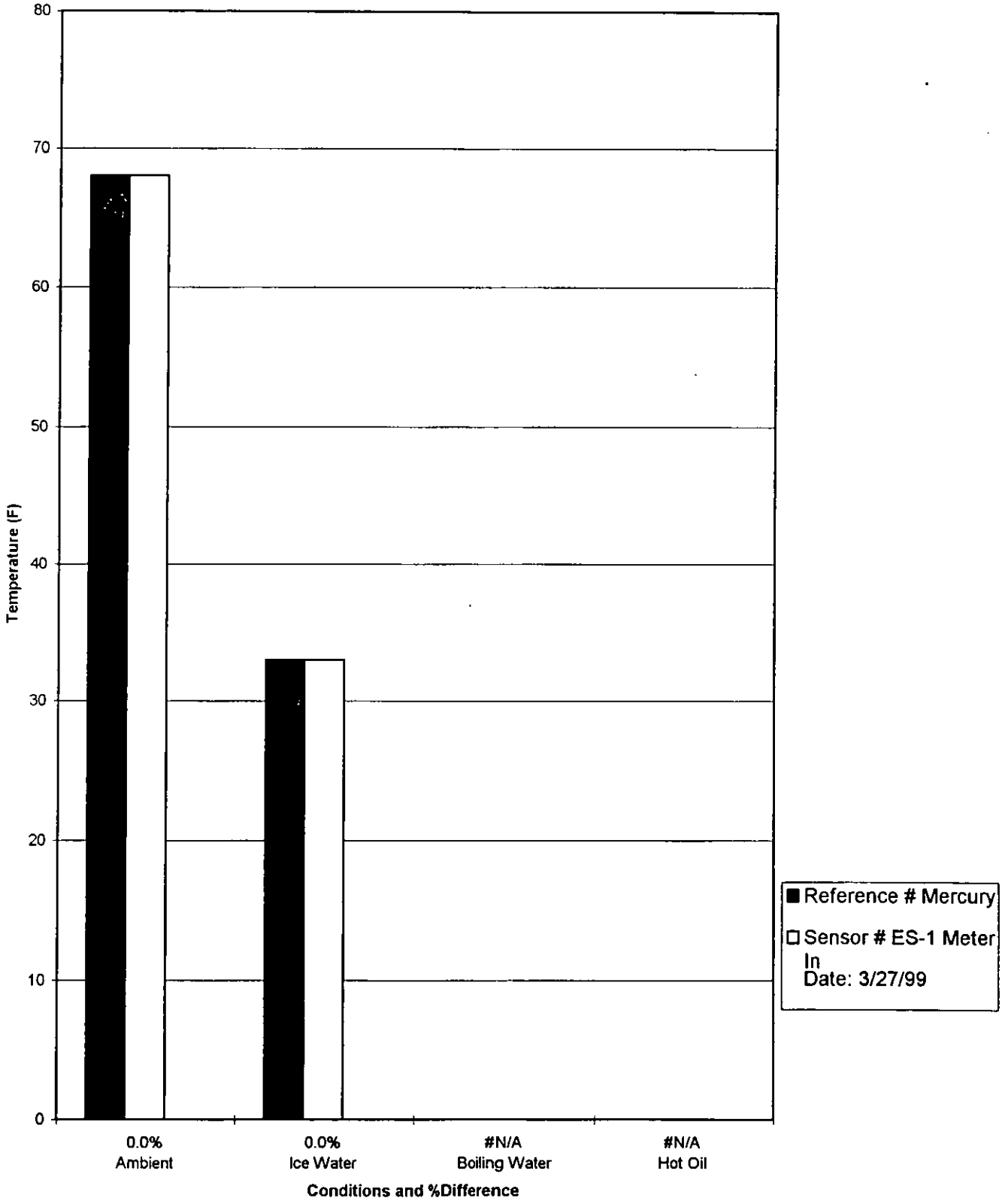
ERT

TEMPERATURE SENSOR CALIBRATION



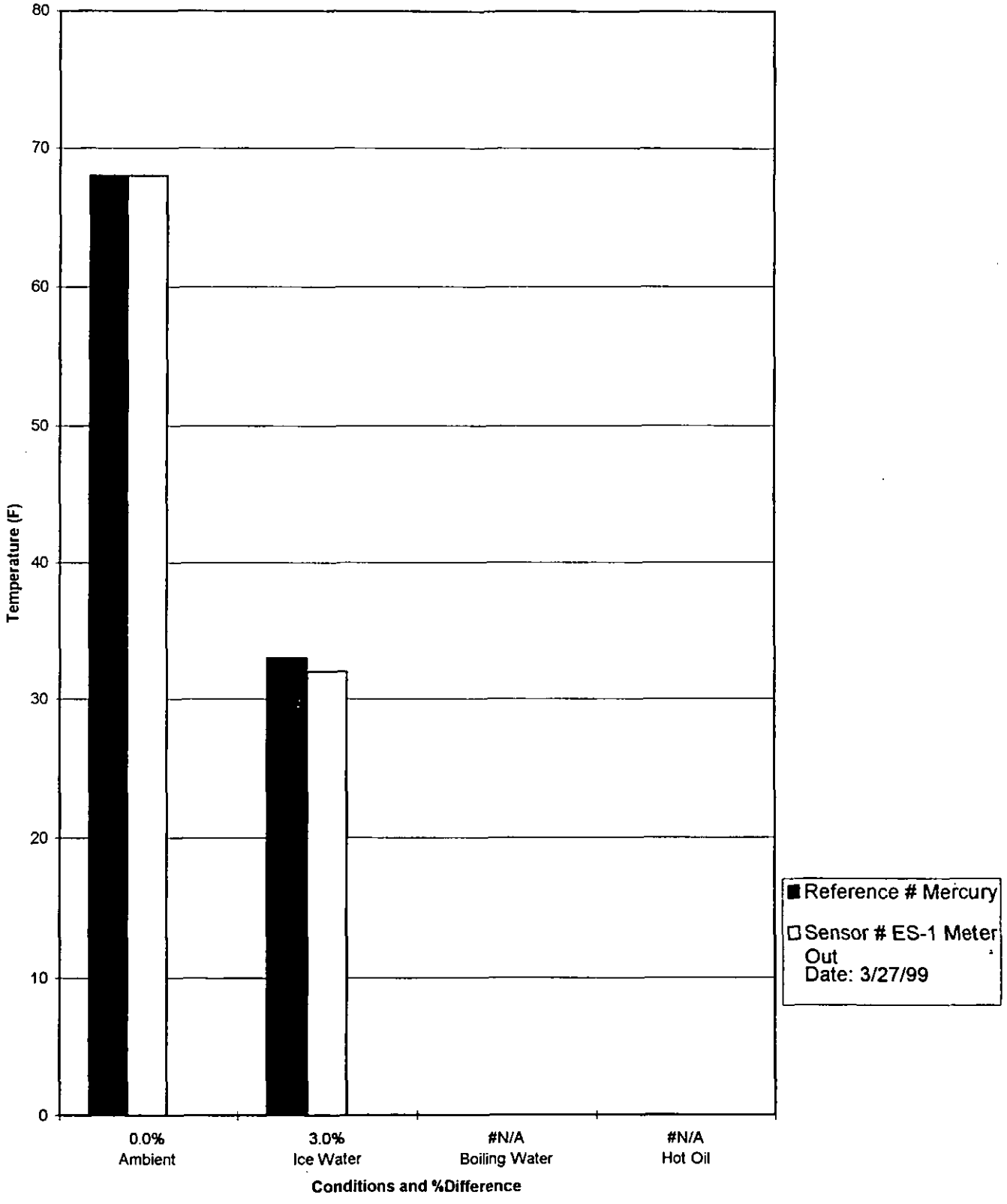
FBT

TEMPERATURE SENSOR CALIBRATION



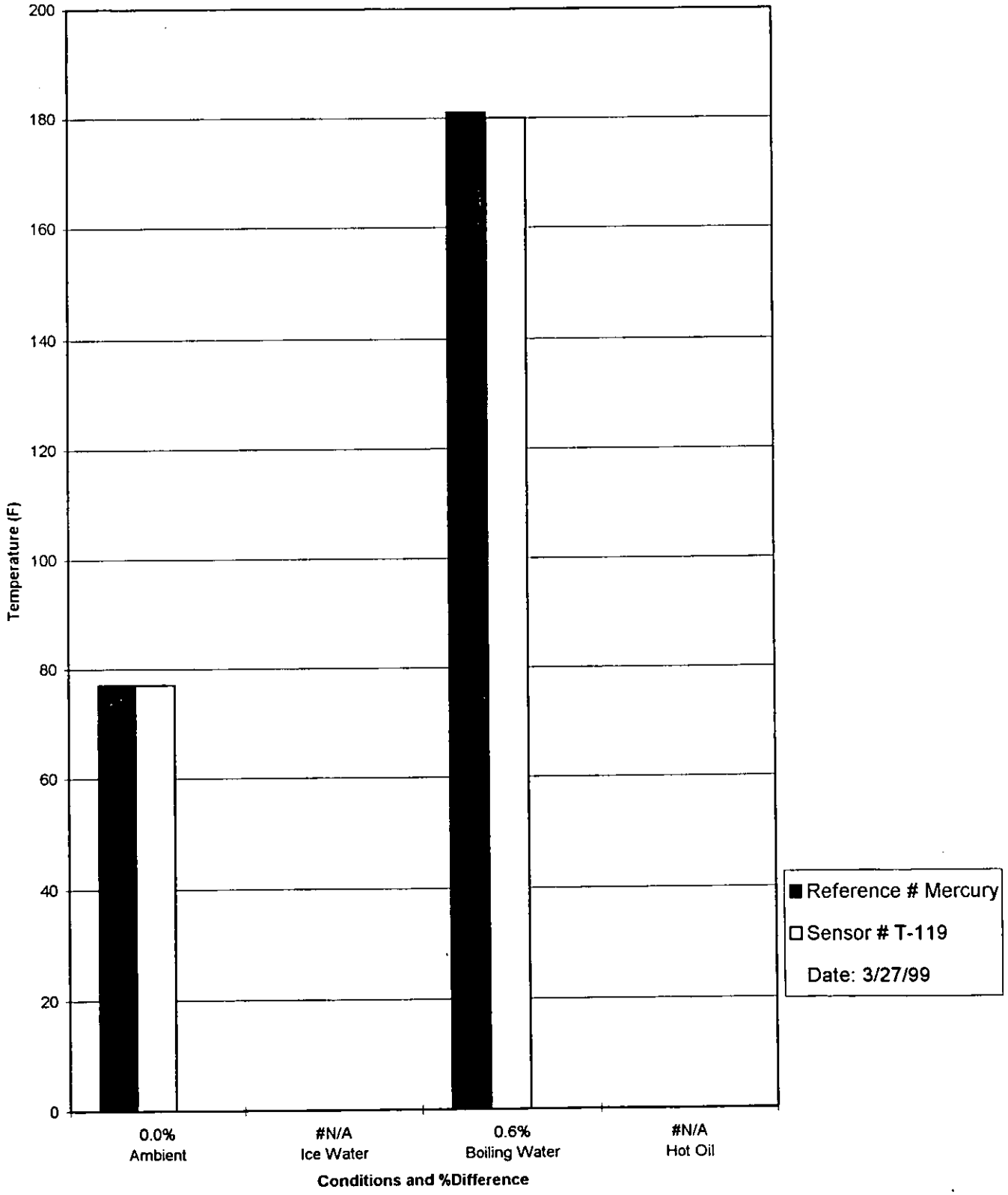
FBT

TEMPERATURE SENSOR CALIBRATION



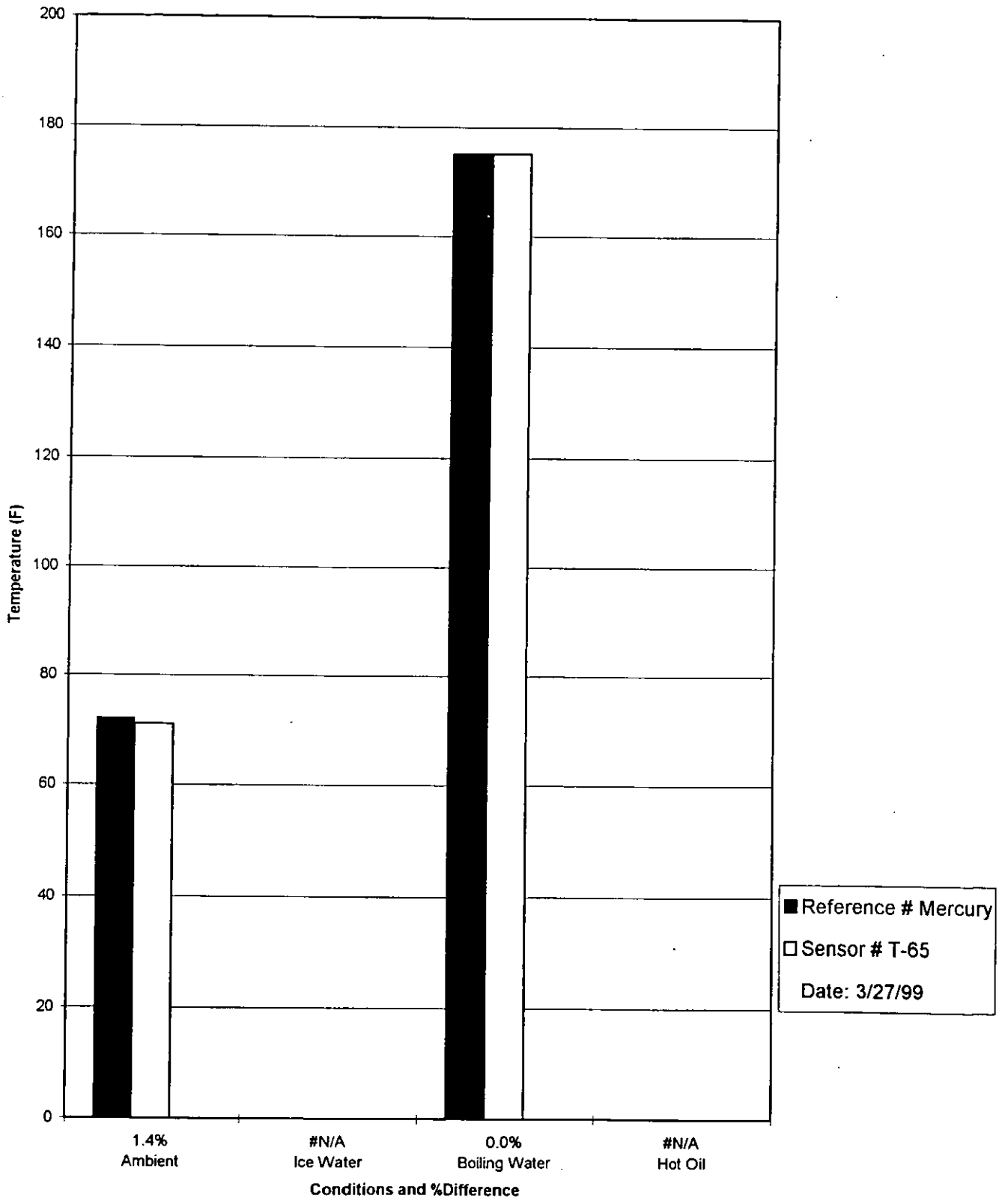
FBT

TEMPERATURE SENSOR CALIBRATION



FBT

TEMPERATURE SENSOR CALIBRATION



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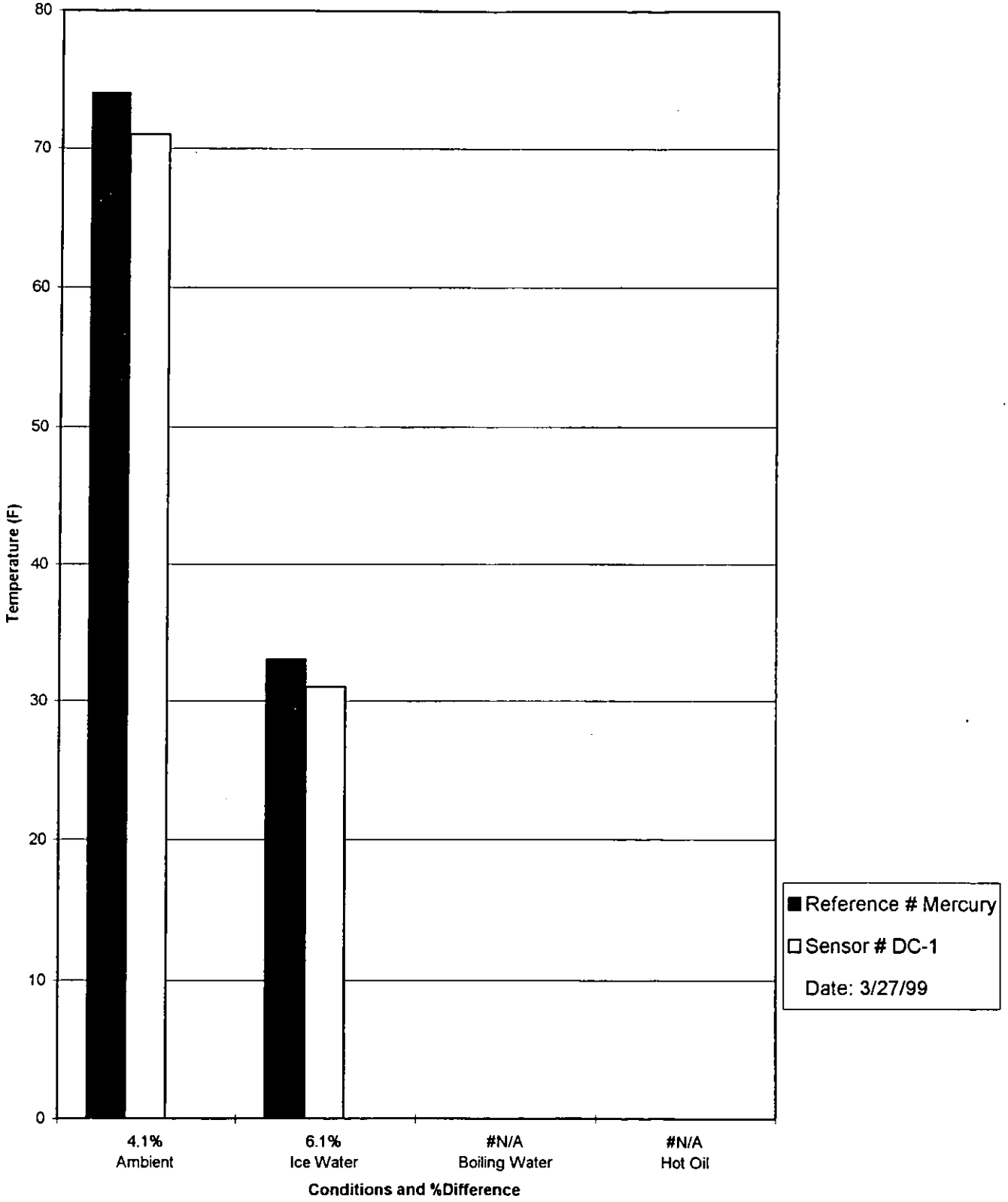
TEMPERATURE SENSOR CALIBRATION



FBT

FBT Testing & Environmental Services

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.

CLIENT: Green River Steel

CRITICAL ORIFICE SET SERIAL #: 1355

DATE: 8/20/99

METER BOX #: ES-1

PERSON: M.H.

INITIAL Y: 0.967

BAROMETRIC PRESSURE (in Hg): 25.71

INITIAL ΔH@: 1.619

K FACTORS			ΔH
#30	=	0.829	3.7
#24	=	0.6396	2.2
#19	=	0.5082	1.4
#17	=	0.4565	1.1
#12	=	0.3156	0.5

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (In Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)
24	1	0.6396	13.5	954.549	965.091	66	65	66	65	65	12.5	2.2
	2	0.6396	13.5	965.491	977.763	66	66	67	65	66	7.7	2.2
30	1	0.429	13.5	971.763	977.821	66	66	66	67	66	5.6	3.8
	2	0.429	13.5	977.621	983.297	66	66	67	66	66	5.0	3.8
19	1	.5062	19	983.297	987.361	65	66	65	67	66	8.4	1.45
	2	.5062	19	988.361	995.441	66	66	66	67	66	8.9	1.45

FBT Testing & Environmental Services

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.

CLIENT: Green River Steel

CRITICAL ORIFICE SET SERIAL #: 1355

DATE: 8/20/99

METER BOX #: ES-1

PERSON: Hilty

INITIAL Y: 0.987

INITIAL ΔH@: 1.819

BAROMETRIC PRESSURE (in Hg): 29.71

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
24	1	0.6396	13.5	954.549	965.491	10.942	66	65	66	65	65	65.25	12.50	2.2	10.9836	10.3599	0.9432		1.8084
24	2	0.6396	13.5	965.491	971.763	6.272	66	66	67	65	66	66	7.70	2.2	6.2869	6.3817	1.0151		1.8059
																AVG =	0.9791	-0.80	
30	1	0.829	13.5	971.763	977.821	6.058	66	66	66	67	68	66.75	5.60	3.8	6.0876	6.0156	0.9882		1.8614
30	2	0.829	13.5	977.821	983.287	5.466	66	66	67	68	68	67.25	5.00	3.8	5.4875	5.3711	0.9788		1.8596
																AVG =	0.9835	-0.36	
19	1	0.5082	19	983.287	989.361	6.074	65	68	65	67	68	67	9.00	1.45	6.0656	5.9324	0.9780		1.8747
19	2	0.5082	19	989.631	995.441	5.810	66	68	68	67	69	68	9.00	1.45	5.7910	5.9267	1.0234		1.8747
																AVG =	1.0007	1.39	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9878

PRE-TEST/POST-TEST MUST BE ≤ 5.00%= 0.08%

AVERAGE $\Delta H_@$ = 1.8474

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \frac{V_m(std)}{V_m}$

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

644 Linn Street, Suite 501
Cincinnati, Ohio 45203
513 651 3440 Tel
513 651 3452 Fax

June 24, 1999

Kentucky Division of Air Quality
803 Schenkel Lane
Frankfort, KY 40601

Attention: Mr. Dan Gray

RE: Compliance Test Protocol
Green River Steel
4701 U.S. 60 East
Owensboro, KY 42303
ID #: 077-0920-0008

Gentlemen:

Enclosed is the Compliance Test Protocol for Green River Steel, located at 4701 U.S. 60 East, in Owensboro, Kentucky. The stack testing is required to meet the testing requirements outlined in Permit Number V-97-054 for Emission Point 01 (Electric Arc Furnaces).

If you have any questions concerning this protocol, please contact the undersigned. We will be contacting KDAQ to schedule the testing date.

Sincerely,
DAMES & MOORE

Maria Eichelberger
Project Manager

G. Trivedi, P.E.
for Associate

Attachment

cc: Jerry Slucher, KDAQ
Bill O'Bryan, Green River Steel

Commonwealth of Kentucky
Natural Resources and Environmental Protection Cabinet
Department for Environmental Protection
Division of Air Pollution Control
Frankfort, Kentucky 40601

COMPLIANCE TEST PROTOCOL

I. SOURCE INFORMATION

A. GENERAL INFORMATION

PLANT NAME Green River Steel ID NO: 077-0920-0008

ADDRESS 4701 U.S. 60 East OWENSBORO, KY 42303

PLANT CONTACT William O'Bryan TELEPHONE NO: (502)926-4400

AFFECTED FACILITIES TO BE TESTED EP-01-2 Electric Arc Furnaces (EAF), Baghouse, and Dust Handling equipment

B. PROCESS INFORMATION

MAXIMUM RATED CAPACITY 40 Tons / hr. (combined capacity of 2 EAFs)

RATE TO BE RUN DURING TEST 40 Tons/hour

(Permitted rate will be no more than 110% of average test rate.)

METHOD OF DETERMINING RATE Heat sheets maintained by furnace room.

NORMAL OPERATING CYCLES *(e.g., 8 hrs/day, soot blowing, etc.)* Each furnace has it's own operating cycle such that normal downstream operations can be sequenced over the operating day.

DATA NORMALLY MONITORED TO ENSURE A PROPER OPERATION Duration of each charge and tap; voltage and current of each fan, quantity of steel produced.

OPERATING CONDITIONS THAT TEND TO CAUSE "WORST CASE" POLLUTION EMISSIONS N.A.

NORMAL MAINTENANCE SCHEDULE FOR EQUIPMENT AFFECTING EMISSIONS Baghouses go through cleaning cycle prior to shut down after the days run.

INCLUDE A SIMPLIFIED PROCESS FLOW DIAGRAM

C. CONTROL EQUIPMENT DATA

TYPE AND MANUFACTURER OF ALL CONTROL EQUIPMENT Side draft and canopy hoods controlled by 340,000 acfm, baghouse manufactured by Micropul

DATA TO BE MONITORED AND RECORDED TO ENSURE REPRESENTATIVE OPERATION DURING TEST, AND THEIR OPTIMUM VALUES.

Fan voltage and current, pressure drop across compartments.

OPERATIONAL CYCLES Cleaning of bags as needed based on pressure drop, isolating one compartment at a time with dampers provided.

CONTINUOUS MONITORS None

NORMAL MAINTENANCE SCHEDULE ON CONTROL EQUIPMENT, AND LAST TIME THIS MAINTENANCE WAS PERFORMED.

The baghouse is maintained according to manufacturer's specifications. Bags will be checked and replaced if needed before test. Baghouse monometers will be checked also and all hoppers emptied.

COMPLIANCE TEST PROTOCOL CONTINUED

II. SAMPLING DATA

TESTING FIRM NAME FBT Testing & Environmental Services

ADDRESS 7419 Kingsgate Way, Suite D, West Chester, OH. 45069

PERSON TO CONTACT David Wetmore TELEPHONE NO: (513)755-1717

LIST ALL AFFECTED FACILITIES TO BE SAMPLED AND GIVE THE INFORMATION REQUIRED BELOW:

Affected Facility	Pollutants	Total Time Per Test	No. of Tests (minimum of 3)	Test Methods to be Used
01 (01)	Particulate	4 hours	3	Reference Method 5 Methods 1-4 (velocities, volumetric flow rates, dry molecular weights, moisture) Method 9 (visible emissions)

INCLUDE A DIAGRAM OF THE SAMPLING LOCATION WITH DIMENSIONS, PORT LOCATIONS, NUMBER AND LOCATION OF TRAVERSE POINTS.

A. SAMPLING TRAIN INFORMATION

GIVE A DETAILED DESCRIPTION OF ANY SAMPLING OR SAMPLE RECOVERY AND TRANSPORT PROCEDURES WHICH DO NOT COMPLY WITH THE SPECIFIED PROCEDURES AND JUSTIFICATION FOR DEVIATION.

LENGTH OF SAMPLING PROBE As Necessary

PROBE LINER MATERIAL OF CONSTRUCTION Stainless Steel

MANUFACTURER OF SAMPLING EQUIPMENT APEX

AMOUNT OF CLEAN-UP OR ANALYSIS TO BE DONE ON-SITE Probe & filter recovery

STACK TEMPERATURE 200 ° F STACK % MOISTURE Not Available

STACK GAS VELOCITY 43 ft/sec.

STACK GAS COMPOSITION, INCLUDING ORGANICS Particulate

B. LABORATORY ANALYSIS

GIVE A DETAILED DESCRIPTION OF ANY ANALYTICAL PROCEDURE AND/OR EQUIPMENT WHICH DOES NOT COMPLY WITH THE SPECIFIED PROCEDURES AND JUSTIFICATION FOR DEVIATION.

HAVE YOU PARTICIPATED IN ANY EPA INTER-LAB SOURCE AUDITS IN THE LAST YEAR? NO

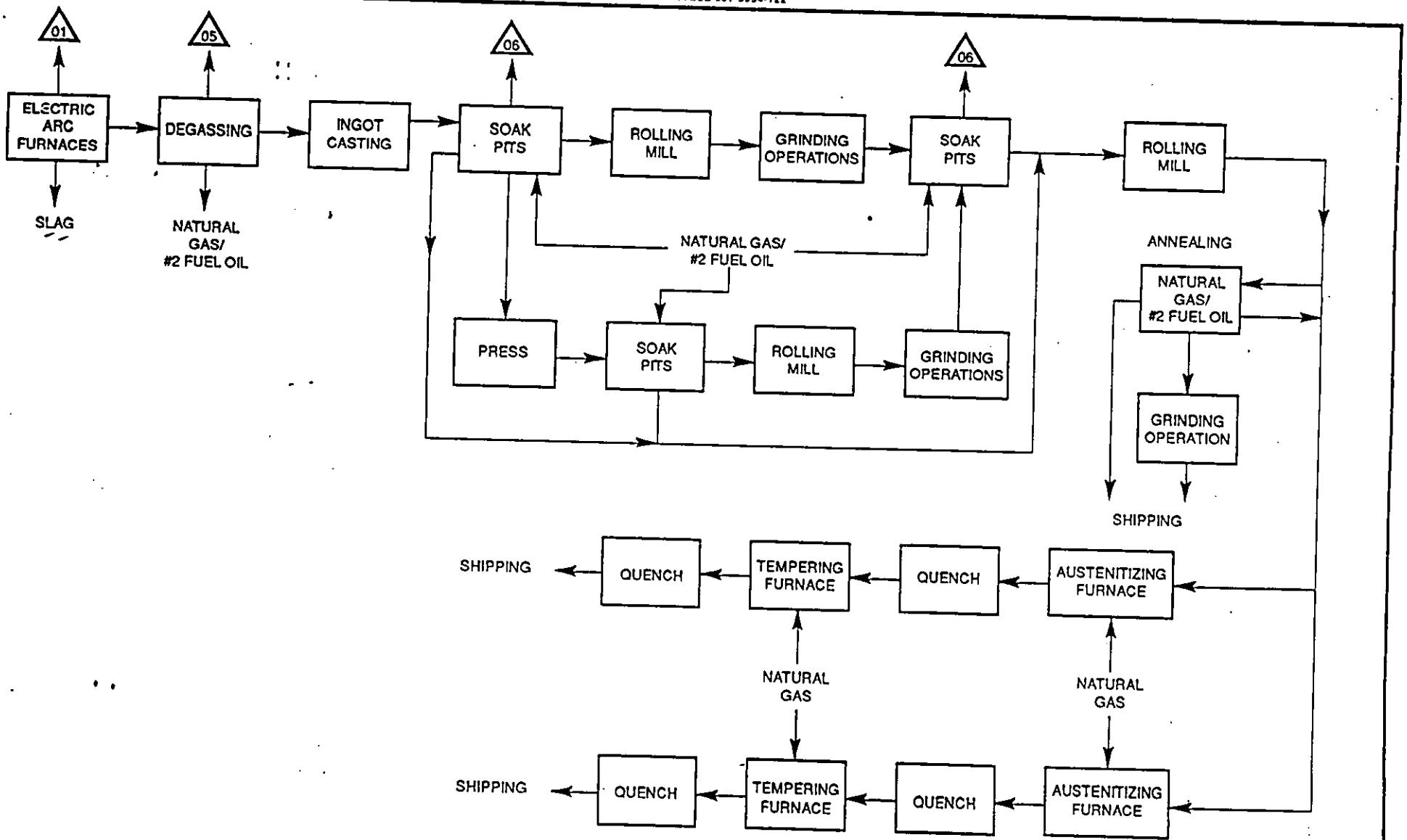
IF SO, LIST THE TYPE OF AUDIT, THE DATE, AND THE RESULT

WHAT ARE YOUR CHAIN OF CUSTODY PROCEDURES AND METHOD OF DOCUMENTATION?

Samples are sealed and logged following the sampling event. The samples are forwarded to the laboratory where they are logged for quality control purposes.

C. DATA SHEETS

SUBMIT EXAMPLES OF ALL DATA SHEETS TO BE USED.



LEGEND:

01 EMMISSION POINT

GREEN RIVER STEEL CORPORATION
OWENSBORO, KENTUCKY

FIGURE 1
PROCESS FLOW DIAGRAM

FIELD DATA SHEET

Client/City: _____ Probe Length/Type: _____

Date: _____ Run #: _____ Nozzle Size: ____, ____, ____ = ____

Location: _____ Meter Box#: _____ ΔH@: _____ Y: _____

Sample Type: _____ Operator: _____ Assumed H_2O: ____% Reference ΔP: _____

INITIAL LEAK CHECK:	MB: ____ ft³ @ ____ "hg	P_{BAR}: _____ P_s: _____ Filter No.: _____
	Pitot - ____ / Orsat - ____	Comments:
FINAL LEAK CHECK:	MB: ____ ft³ @ ____ "hg	
	Pitot - ____ / Orsat - ____	
Fyrite Data:	Moisture Data:	Traverse Schematic:
O_2: ____, ____, ____, ____	ml H_2O / g Sil. Gel	
CO_2: ____, ____, ____, ____		

Page ___ of ___ Record data every _____ minutes

Trav. #	Sample Time	Clock Time	Meter Reading	Pitot #: ____ ΔP	ΔH(calc)	TC #: ____ ΔH(act)	____ Probe	____ Stack	Tm In	Hotbox #: ____ Tm Out	Filter	SH #: ____ Exit	Pump Vac.

Θ: ____ V_m: _____ avg ΔP: _____ avg ΔH: _____ T_s: ____ T_m: ____ Calculated By: _____ Checked By: _____

Operator's Signature: _____ Administrator's Signature: _____

FBT

Traverse Point Locator Data

Client : _____

Calculator : _____ Date : _____

Location : _____

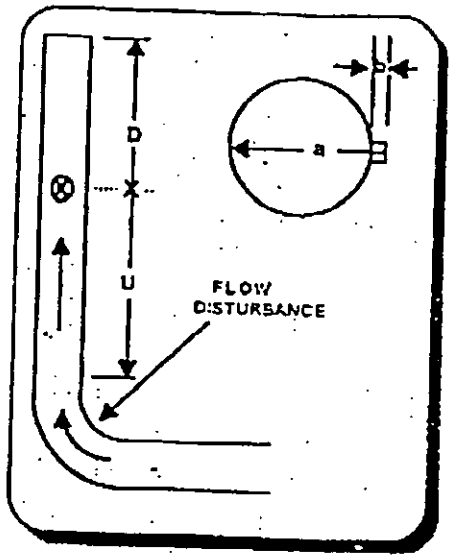
Distance from *upstream* disturbance (u) : _____

Distance from *downstream* disturbance (d) : _____

Outside of port to *far side* of stack (a) : _____

Outside of port to *near side* of stack (b) : _____

Inside Stack Diameter (a-b) : _____



Point #	% from wall to point	" from wall to point (c)	Port length (b)	" from probe tip to point (b+c)

TRAVERSE POINT LOCATIONS FOR RECTANGULAR DUCTS

PLANT _____

DATE _____

SAMPLING LOCATION _____

INSIDE STACK DIMENSIONS _____ X _____

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (Distance B) _____

EQUIVALENT STACK I.D. _____

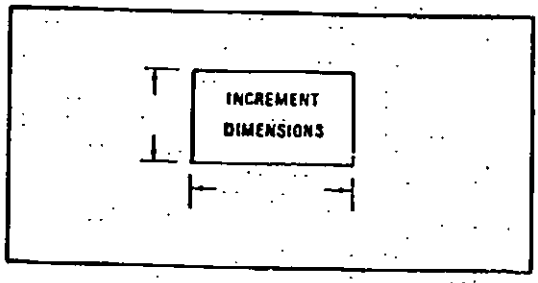
NEAREST UPSTREAM DISTURBANCE _____

NEAREST DOWNSTREAM DISTURBANCE _____

NUMBER OF TRAVERSE POINTS _____ ARRAY _____ X _____

CALCULATOR _____

ILLUSTRATE PORT LOCATIONS AND STACK DIMENSIONS



TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE POINT (Distance A)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF DISTANCES A+B)	PORT LOCATION	DISTANCE FROM EDGE OF STACK

TRAVERSE POINT LOCATIONS FOR RECTANGULAR DUCTS

PLANT _____

DATE _____

SAMPLING LOCATION _____

INSIDE STACK DIMENSIONS _____ X _____

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (Distance B) _____

EQUIVALENT STACK I.D. _____

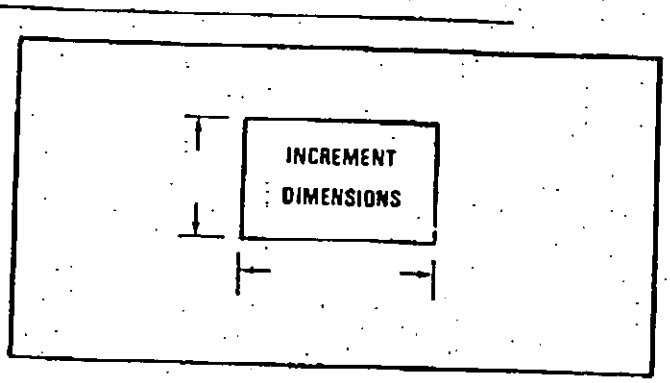
NEAREST UPSTREAM DISTURBANCE _____

NEAREST DOWNSTREAM DISTURBANCE _____

NUMBER OF TRAVERSE POINTS _____ ARRAY _____ X _____

CALCULATOR _____

ILLUSTRATE PORT LOCATIONS AND STACK DIMENSIONS



TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE POINT (Distance A)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF DISTANCES A+B)	PORT LOCATION	DISTANCE FROM EDGE OF STACK

FBT

SECTION B - EMISSION POINTS, AFFECTED FACILITIES, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS

01 (01) - 2 Electric Arc Furnaces(EAFs), Baghouse, and Dust Handling equipment

Description: Two Swindell-Dresser electric arc furnaces with combined capacity of 40 tons/hr, the MicroPul baghouse with a designed particulate control efficiency of 98%, and the associated dust handling equipment.

Construction commenced: 1952

APPLICABLE REGULATIONS:

401 KAR 61:075 - Steel plants and furnaces using existing electric arc furnaces.

401 KAR 63:020 - Potentially hazardous matter or toxic substance (State Origin).

1. **Operating Limitations:**

   Steel production rate shall not exceed 40 tons/hour for the 2 electric arc furnaces combined - Condition imposed in permit O-83-36 to preclude the applicability of Regulations 401 KAR 59:570 and 59:575, Standards of performance for steel plants.

   The average amperage of the fans, calculated on a per shift basis, used in exhausting the emissions to the baghouses, during operation of the hood to capture emissions from the furnace, shall equal or exceed the levels established during the latest performance test and approved by the Division.

   Compliance with the steel production, transformer power output, fan amperage, limits shall be demonstrated through monitoring and recordkeeping as specified below.

2. **Emission Limitations:**

   Particulate emissions from the baghouse(s) shall not exceed 0.01 grains/dscf (23 mg/dscm) - 401 KAR 61:075 Section 3(1)(a).

   Visible emissions from the concentrated discharge baghouse(s) shall not exceed 10% opacity - 401 KAR 61:075 Section 3(1)(b)1.

   Visible emissions from shop not captured to the baghouse(s) shall not exceed 20% opacity for more than 11 times as observed at 15 second intervals over a period of any 60 consecutive minutes - 401 KAR 61:075 Section 3(1)(c).

   Visible emissions from the dust handling equipment of the baghouse shall not equal or exceed 10% opacity - 401 KAR 61:075 Section 3(2).

3. **Testing Requirements:**

   A stack test shall be conducted within a year of issuance of this permit to determine compliance with the allowable particulate emissions rates, as listed in this permit. The owner or operator shall notify the Division of the performance test at least 30 days prior to the proposed test date and shall obtain approval from the Division for the procedures that will be used to determine compliance.

   Method 5 shall be used to determine compliance with the particulate matter concentration limits listed in the permit. The sampling time and sample volume for each run shall be at least 4 hours and 4 ½ dscm (160 dscf).

Commonwealth of Kentucky
Natural Resources and Environmental Protection Cabinet
Department for Environmental Protection
Division for Air Quality
803 Schenkel Lane
Frankfort, Kentucky 40601
(502) 573-3382

AIR QUALITY PERMIT

Permittee Name:	Green River Steel Corporation
Mailing Address:	4701 US 60 East, Owensboro, Kentucky 42303

is authorized to operate a steel mill

Source Name:	Green River Steel Corporation
Mailing Address:	Same as above
Source Location:	4701 US 60 East, Owensboro, Kentucky 42303
PERMIT TYPE:	Federally-Enforceable Title V
Review Type:	Operating
Permit Number:	V-97-054
Log Number:	F006
Application Complete Date:	May 15, 1997
KYEIS ID #:	077-0920-0008
AFS Plant ID #:	21-059-00008
SIC Code:	3312
Region:	HENDERSON-EVANSVILLE
County:	Daviess
Issuance Date:	August 28, 1998
Expiration Date:	August 28, 2003

John E. Hornback, Director
Division for Air Quality

TABLE OF CONTENTS

SECTION A - PERMIT AUTHORIZATION

Pursuant to a duly submitted application which was determined to be administratively and technically complete, the Kentucky Division for Air Quality hereby authorizes the operation of the equipment described herein in accordance with the terms and conditions of this permit. This permit has been issued under the provisions of Kentucky Revised Statutes Chapter 224 and regulations promulgated pursuant thereto.

The permittee shall not construct, reconstruct, or modify any affected facilities without first having submitted a complete application and receiving a permit for the planned activity from the permitting authority, except as provided in this permit or in the Regulation 401 KAR 50:035, Permits.

Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by this Cabinet or any other federal, state, or local agency.

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. However, these provisions do not shield the source from violations of the applicable requirements being established and documented through other evidence, nor does it relieve the source from its obligation to comply with the underlying emission limits or other applicable requirements being monitored. The preamble to EPA's credible evidence rule specifically states that a permit cannot shield a source from enforcement based on evidence not specified in the permit.