

Service
Training
Calibration
Certification
Maintenance

Universal Thermal Services
Allen R. Hildebrand (President)
E7064 Knopp Road
Manawa, Wisconsin 54949
Phone – Fax 920-596-2983
uts@wolfnet.net

Metco 9MC Plasma Certificate of Calibration

Form # 9MC Rev P 2/18/2009

Cert. No.: 2009-922

Page: 1 of 7

Customer: ABC	Console: Metco 9MC	Powder Feeder: 9MP	Distribution Box: 9MCD
Address: 1365 Newton	S/N: 9MP AM9255935-4	Serial Number: 9MP EM94169318-1	Serial Number: N/A
City: Boucherville	Device ID#: M-140		
State: Quebec	Booth #: #4	Powder Feeder:	Power Supply: 9MR
Zip: J4B 5H2	Calibration As Received:	Serial Number:	Serial Number: KD350778
Name: John	With in 3%: No		
Phone #: 451-449-4612	Adjustments: Yes		

N.I.S.T. Instruments Used for This Calibration

Test Inst: Press. Transducer	Test Inst: Multi Meter	Test Inst: Amp Clamp Meter	Test Inst:
Make: Fluke	Make: Fluke	Make: Fluke	Make:
Model: PV350	Model: 87V	Model: i1010	Model:
Serial No: 107	Serial No: 88190113	Serial No: 91562357	Serial No:
Next Cal. Due: 1/6/2010	Next Cal. Due: 6/27/2009	Next Cal. Due: 3/11/2009	Next Cal. Due:

Test Inst: Low Flow Mass Flow Meter	Test Inst: Medium Flow Mass Flow Meter
Make: Alicat Scientific 0-75 scfh	Make: Alicat Scientific 0-400 scfh
Model: PUC-50SLPM	Model: PUC-250SLPM
Serial No: 44770	Serial #: 44771
Next Cal. Due: 1/13/20010	Next Cal. Due: 1/13/20010

Flow Tube	Accuracy	Tube Pressure	Tube Scale	Scfh Per Metco
Argon flow meter	± 3%	75 psi	0-300 scfh	296
Hydrogen flow meter	± 3%	50 psi	0-42 scfh	42
Helium flow meter	± 3%	75 psi	0-225 scfh	225
Nitrogen flow meter	± 3%	75 psi	0-300 scfh	353

System Performance w/Parameters as Provided by the Operator Initially

Gas	Pressure	Gas [Ball] Flow	Amps	Volts As Found
Ar	75	120	System 450	58.7
H2	50	15	Gun Type	Volts As Left
N2			3MB	56.1
He				

Notes:
 Console Air Purge Safety Test: Pass
 Door Switch Safety Test: Pass
 Argon Supply Test: Pass
 Hydrogen Supply Test: Pass
 Nitrogen Supply Test: N/A
 Helium Supply Test: N/A
 E-Stop Console: Pass

Caution: Lowered the Argon and H2 flows by 5% or This made for a 2.7 volt cooler parameter.
Air Vibrator Gauges are not used and for reference only.

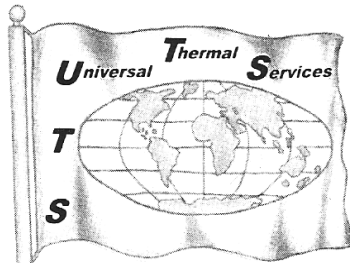
Green 0-3% Acceptable
 color: orange;">Orange 3.1-5% Alert
 color: red;">Red 5.1 and up Fail

Calibrated By: Allen Hildebrand
Calibrated Date: 4/16/2009

Next Calibration Due: 10/16/2009

Signature:

All instruments have been calibrated against standards traceable to NIST. This Certification Sheet must not be altered in any way!



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Customer ABC

Air Gauges

Form # 9MC Rev P 2/18/2009

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Console: Metco 9MC Serial Number: 9MP AM9255935-4 Booth: #4

Testing Instrument: Press. Transducer PV350 Serial Number: 107 Testing Instrument: Multi Meter 87V Serial Number: 88190113

Vibrator Air #1

For Reference Only

Device Under Test: Vibrator #1 Gauge Pressure Full Scale [FS] 60 PSI Device ID #:

Pressure (PSI) Set Point	Gauge Reading	NIST Pressure	Actual PSI Deviation	PSI % Deviation	As Left Gauge Reading	As Left PSI Deviation	As Left PSI % Deviation			
10										
20										
30										
40										
50										
60										

Vibrator Air #2

For Reference Only

Device Under Test: Vibrator #2 Gauge Pressure Full Scale [FS] 60 PSI Device ID #:

Pressure (PSI) Set Point	Gauge Reading	NIST Pressure	Actual PSI Deviation	PSI % Deviation	As Left Gauge Reading	As Left PSI Deviation	As Left PSI % Deviation			
10										
20										
30										
40										
50										
60										

Cooling Air

Device Under Test: Cooling Air Gauge Pressure Full Scale [FS] 120 PSI Device ID #:

Pressure (PSI) Set Point	Gauge Reading	NIST Pressure	Actual PSI Deviation	PSI % Deviation	As Left Gauge Reading	As Left PSI Deviation	As Left PSI % Deviation			
20	20	20.0	0.0	0.0	20.0	0.0	0.0			
40	40	40.0	0.0	0.0	40.0	0.0	0.0			
60	60	59.5	-0.5	-0.4	59.5	-0.5	-0.4			
80	80	78.5	-1.5	-1.3	78.5	-1.5	-1.3			
100	100	98.6	-1.4	-1.2	98.6	-1.4	-1.2			
120										

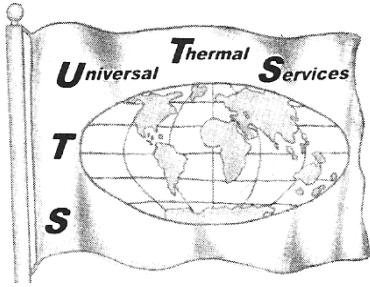
Calibrated By: Allen Hildebrand

Calibrated Date: 4/16/2009

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Gas Gauges

Form # 9MC Rev P 2/18/2009

Cert. No. : 2009-922

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Console:	Metco 9MC	Serial Number:	9MP AM9255935-4	Booth :	#4
Testing Instrument:	Press. Transducer PV350	Serial Number:	107	Testing Instrument:	Multi Meter 87V
				Serial Number:	88190113

Primary Gas Pressure Gauge

Device Under Test:	Arc Gas Gauge	Pressure Full Scale [FS]	100 PSI	Device ID #:						
Pressure (PSI) Set Point	Gauge Reading	NIST Pressure	Actual PSI Deviation	PSI % Deviation	As Left Gauge Reading	As Left PSI Deviation	As Left PSI % Deviation			
40	40	39.6	-0.4	-0.4	39.6	-0.4	-0.4			
50	50	50.1	0.1	0.1	50.1	0.1	0.1			
60	60	60.3	0.3	0.3	60.3	0.3	0.3			
70	70	70.1	0.1	0.1	70.1	0.1	0.1			
80	80	80.0	0.0	0.0	80.0	0.0	0.0			
90	Max									
100										

Secondary Gas Pressure Gauge

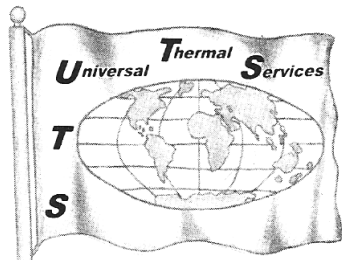
Device Under Test:	Sec. Gas Gauge	Pressure Full Scale [FS]	100 PSI	Device ID #:						
Pressure (PSI) Set Point	Gauge Reading	NIST Pressure	Actual PSI Deviation	PSI % Deviation	As Left Gauge Reading	As Left PSI Deviation	As Left PSI % Deviation			
40	40	40.0	0.0	0.0	40.0	0.0	0.0			
50	50	50.0	0.0	0.0	50.0	0.0	0.0			
60	60	59.5	-0.5	-0.5	59.5	-0.5	-0.5			
70	70	69.6	-0.4	-0.4	69.6	-0.4	-0.4			
80	80	79.6	-0.4	-0.4	79.6	-0.4	-0.4			
90	90	89.6	-0.4	-0.4	89.6	-0.4	-0.4			
100	100	98.8	-1.2	-1.2	98.8	-1.2	-1.2			

Calibrated By: Allen Hildebrand
Calibrated Date: 4/16/2009

Next Calibration Due: 10/16/2009

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Amperage and Voltage Meter

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Console:	Metco 9MC	Serial Number:	9MP AM9255935-4	Booth :	#4				
Device ID #:									
Testing Instrument:	Amp Clamp Meter	i1010	Serial Number:	91562357	Testing Instrument:	Multi Meter	87V	Serial Number:	88190113

Amp Meter

Device Under Test:	Digital Amp Meter	Amps Full Scale [FS]	2000				
Amps Set Point	Meter Reading	NIST Meter	Actual Amps Deviation	% Amps Deviation	As Left Meter Reading	As Left Amps Deviation	% As Left Deviation
300	300	300.0	0.0	0.0	300.0	0.0	0.0
400	400	404.0	4.0	0.2	404.0	4.0	0.2
500	500	508.0	8.0	0.4	508.0	8.0	0.4
600	600	610.0	10.0	0.5	610.0	10.0	0.5
700	700	713.0	13.0	0.7	713.0	13.0	0.7
800	800	815.0	15.0	0.8	815.0	15.0	0.8
900							
1000							

Volt Meter

Device Under Test:	Digital Volt Meter	Volts Full Scale [FS]	200				
Volt Meter Set Point	Meter Reading	NIST Meter	Volts Deviation	% Volts Deviation	Volts As Left Meter Reading	As Left Volts Deviation	% As Left Deviation
36	36	36.0	0.0	0.0	36.0	0.0	0.0
40	40	40.0	0.0	0.0	40.0	0.0	0.0
50	50	50.0	0.0	0.0	50.0	0.0	0.0
60	60	60.0	0.0	0.0	60.0	0.0	0.0
70	70	70.1	0.1	0.0	70.1	0.1	0.0

System Performance w/Parameters after Calibration

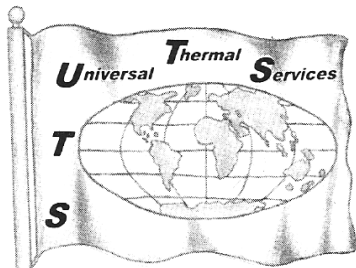
Gas	Pressure	Gas [Ball] Flow	Amps
Ar	75	120	450
H2	50	15	Volts
N2			56
He			

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Hydrogen Flow

Tube Scale 0-42 @ 50 psi H2 @ 70°F

Form # 9MC Rev P 2/18/2009

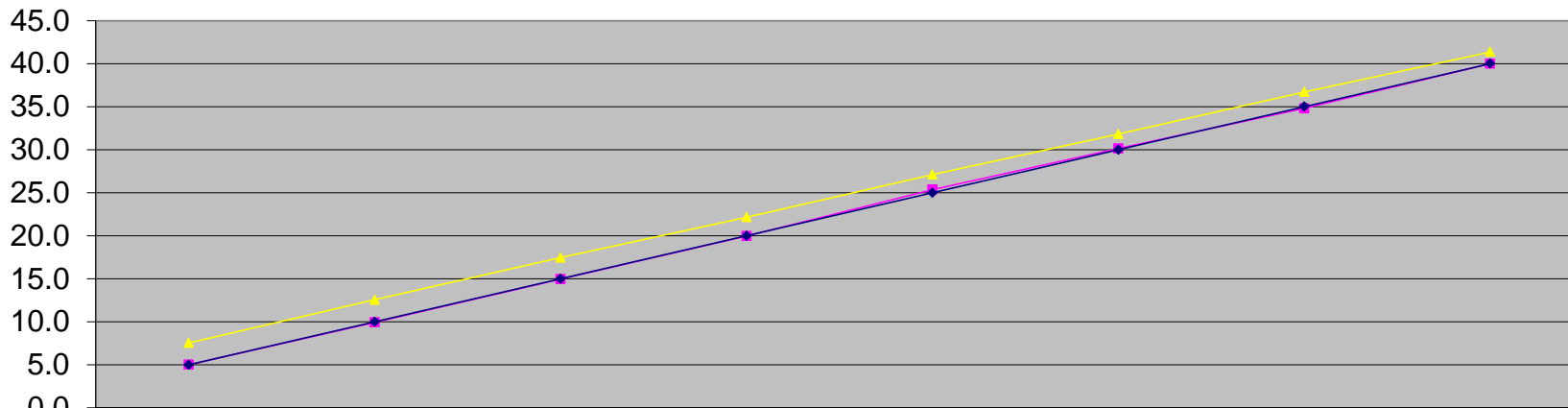
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Console:	Metco 9MC	Serial Number:	9MP AM9255935-4	Type of Gas:	Hydrogen	Full Flow SCFH [FS]:	42
Device ID #:		Booth:	#4				
Device Under Test:	Secondary Gas Flow Tube		Scale Rate:	Flow is in SCFH			

Testing Instrument:	Mass Flow Meter	Alicat Scientific 0-75 scfh	Serial Number:	44770			
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Metco Flow Tube SCFH Set Point	Metco Flow Tube SCFH Converted	As Found Actual SCFH	As Found Actual SCFH Deviation	As Found SCFH % Deviation	As Left Actual SCFH	As Left SCFH Deviation	As Left SCFH % Deviation	Previous SCFH
5	5	7.6	2.6	6.1	5.0	0.0	0.0	
10	10	12.6	2.6	6.1	9.9	-0.1	-0.2	
15	15	17.5	2.5	5.9	15.0	0.0	-0.1	
20	20	22.2	2.2	5.1	20.0	0.0	-0.1	
25	25	27.1	2.1	5.0	25.4	0.4	0.9	
30	30	31.8	1.8	4.3	30.1	0.1	0.3	
35	35	36.7	1.7	4.0	34.8	-0.2	-0.5	
40	40	41.4	1.4	3.2	40.0	0.0	0.0	



	1	2	3	4	5	6	7	8
Flow SCFH As Found	7.6	12.6	17.5	22.2	27.1	31.8	36.7	41.4
Flow SCFH As Left	5.0	9.9	15.0	20.0	25.4	30.1	34.8	40.0
SCFH Target Values	5	10	15	20	25	30	35	40

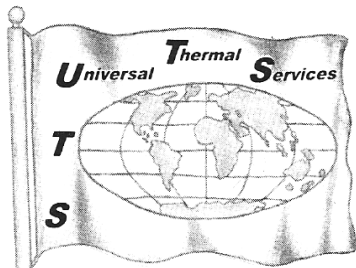
Adjusted over 5%

Calibrated By: Allen Hildebrand
Calibrated Date: 4/16/2009

Next Calibration Due: 10/16/2009

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Argon Flow

Tube Scale 0-300 @ 75 psi Ar @ 70°F

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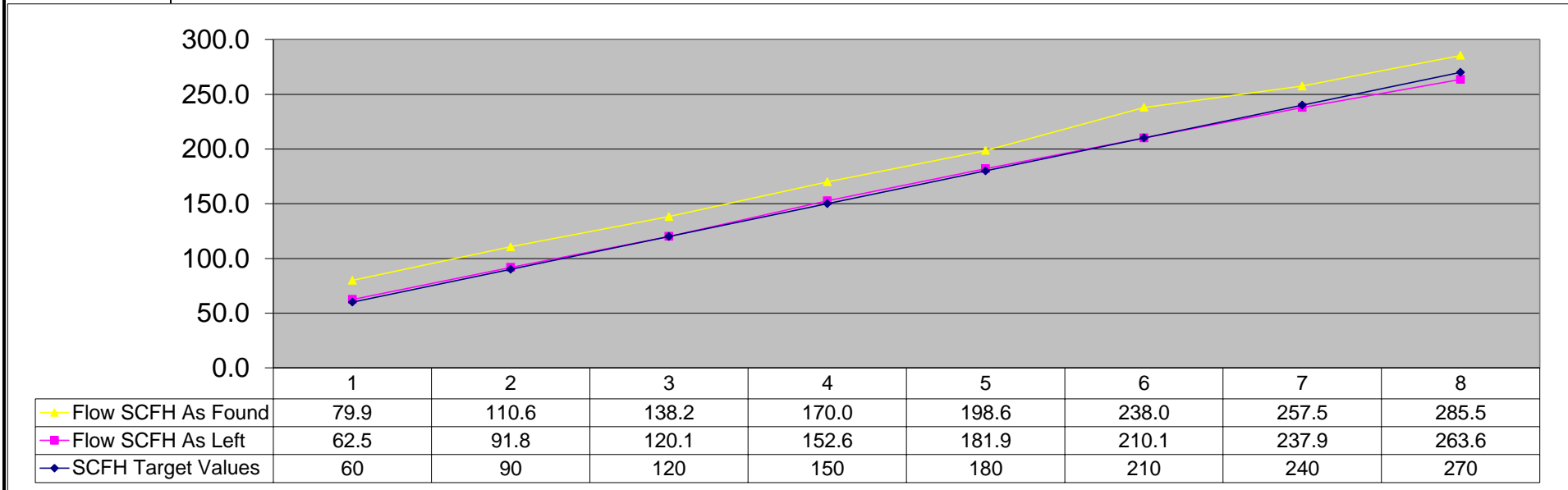
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Console:	Metco 9MC	Serial Number:	9MP AM9255935-4	Type of Gas:	Argon	Full Flow SCFH [FS]:	296
Device ID #:		Booth:	#4				
Device Under Test:	Primary Gas Flow Tube		Scale Rate:	Flow is in SCFH			

Testing Instrument:	Mass Flow Meter	Alicat Scientific 0-400 scfh	Serial Number:	PUC-250SLPM	
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Metco Flow Tube SCFH Set Point	Metco Flow Tube SCFH Converted	As Found Actual SCFH	As Found Actual SCFH Deviation	As Found SCFH % Deviation	As Left Actual SCFH	As Left SCFH Deviation	As Left SCFH % Deviation	Previous SCFH
60	60	79.9	19.9	6.7	62.5	2.5	0.8	
90	90	110.6	20.6	7.0	91.8	1.8	0.6	
120	120	138.2	18.2	6.1	120.1	0.1	0.0	
150	150	170.0	20.0	6.8	152.6	2.6	0.9	
180	180	198.6	18.6	6.3	181.9	1.9	0.6	
210	210	238.0	28.0	9.5	210.1	0.1	0.0	
240	240	257.5	17.5	5.9	237.9	-2.1	-0.7	
270	270	285.5	15.5	5.2	263.6	-6.4	-2.2	



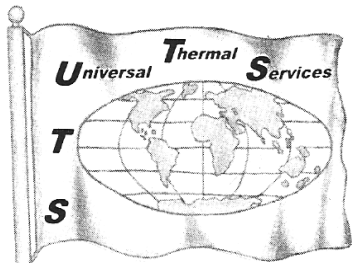
Adjusted outside of 5%

Calibrated By: Allen Hildebrand
Calibrated Date: 4/16/2009

Next Calibration Due: 10/16/2009

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Customer: ABC

Helium Flow

Tube Scale 0-225 @ 75 psi He @ 70°F

Form # 9MC Rev P 2/18/2009

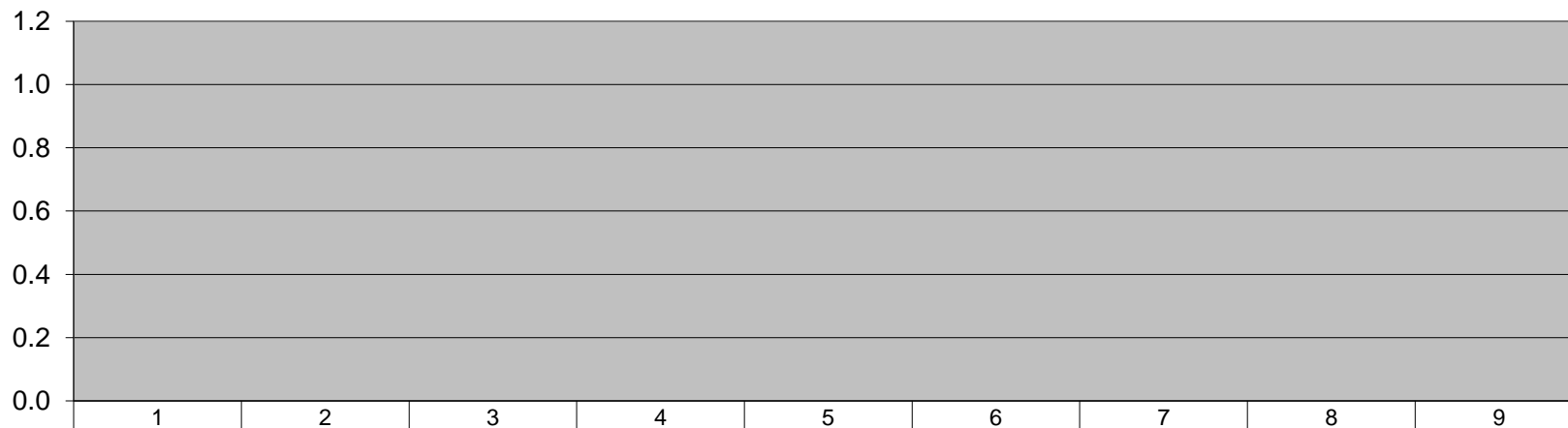
Cert. No: 2009-922

Not Used For Reference Only

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Console:	Metco 9MC	Serial Number:	9MP AM9255935-4	Type of Gas:	Helium	Full Flow SCFH [FS]:	225		
Device ID #:		Booth:	#4						
Device Under Test:	Secondary Gas Flow Tube		Scale Rate:	Flow is in SCFH					
Testing Instrument:	Mass Flow Meter	Alicat Scientific 0-400 scfh	Serial Number:	PUC-250SLPM	Testing Instrument:	Multi Meter	87V	Serial Number:	88190113

Metco Flow Tube SCFH Set Point	Metco Flow Tube SCFH Converted	As Found Actual SCFH	As Found Actual SCFH Deviation	As Found SCFH % Deviation	As Left Actual SCFH	As Left SCFH Deviation	As Left SCFH % Deviation	Previous SCFH
20								
40								
60								
80								
100								
120								
140								
160								
180								



- Flow SCFH As Found
- Flow SCFH As Left
- SCFH Target Values

Calibrated By: Allen Hildebrand
Calibrated Date: 4/16/2009

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