Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

(53)

GTZ → JDG

GTZ
21 NOV. 1989

Shenango
INCORPORATED

PLANTS
NEVILLE ISLAND, PA
SHARPSVILLE, PA

COKE OVENS
NEVILLE ISLAND, PA

WUC
See me on this
morning 12/1
DM

NOV 1 0 1989

November 13, 1989

Allegheny County Health Department
Bureau of Air Pollution Control
301 - 39th Street
Pittsburgh, Pa. 15201

Attention: Mr. Ronald J. Chleboski
Deputy Director

Subject: #1 Coke Oven Battery
Stack Test

Dear Mr. Chleboski:

On September 19-20, 1989 BCM Engineers Inc. conducted a particulate emissions compliance test on the #1 coke oven battery combustion stack at Shenango's Coke & Iron Division. The stack compliance test consisted of three two-hour runs as described in a previously submitted protocol and was witnessed by Bureau personnel. The final report, titled "Particulate Evaluation of Coke Oven Battery No. 1 Combustion Stack at Shenango Incorporated" is attached for your review.

.012 .024 .022

The results indicate that the first test run, which was conducted on September 19th, demonstrated compliance with the 0.015 gr/dscf standard. The second and third test runs, conducted on September 20th, indicated elevated particulate emissions. In all three tests, however, the opacities averaged less than 1%. Test #1 had an average opacity of 0.5% and did not contain any readings >20% opacity. The second test averaged 1.4% opacity and only exceeded 20% opacity for 2 minutes and 15 seconds. Test #3 had an average opacity of 1.0% and only exceeded 20% opacity for 1 minute and 15 seconds.

Shenango has internally evaluated the conditions which may have contributed to the elevated particulate emissions at the same time that corresponding opacity measurements were well within the Bureau standards. Shenango has concluded that the major change in coking schedules, which occurred between July 8th and August 11th

as a result of coal mine production stoppages, adversely affected the emission discharges from the coke battery. During this period when coking times increased from 18.3 hours to 30 hours and then decreased back to 18.3 hours the battery experienced an abnormal amount of expansion and contraction of the brickwork. This expansion/contraction phenomenon lead to the development of cracks in the brickwork which in turn caused additional particulate emissions to be discharged.

To counter the effects of increased cracks in the brickwork Shenango has undertaken the following three phased program to reduce combustion stack emissions:

Shenango has sprayed all charging holes on the #1 battery to patch any cracks which may have developed in this area of the ovens.

Shenango has patched all corbel areas to repair cracks in these areas.

Shenango is currently waterblasting all goosenecks on the #1 battery to allow for a freer flow of coke oven gas from the ovens and therefore result in less pressure being applied on the oven walls. The reduction in oven pressure should result in the reduction of stack emissions due to oven wall leakage.

Shenango has scheduled BCM Engineers Inc. to conduct a re-evaluation of the combustion stack discharge on December 5-6, 1989. The same protocol which was submitted to the Bureau on July 6, 1989 will be followed.

Should you wish to further discuss the information contained in this letter, please contact me at 777-6655. I will contact Bill Clark of the Bureau to advise him of the stack test scheduled for early December.

Very truly yours,

Nicholas S. Buchko
Environmental Compliance Engineer

cc: G Owens
J McEwen
B Erhardt
V Pendergast
P Belculfine
R Cusano
File

THERMOCOUPLE CALIBRATION DATA SHEET

Thermocouple No. : 7-1 Date: 10-3-89

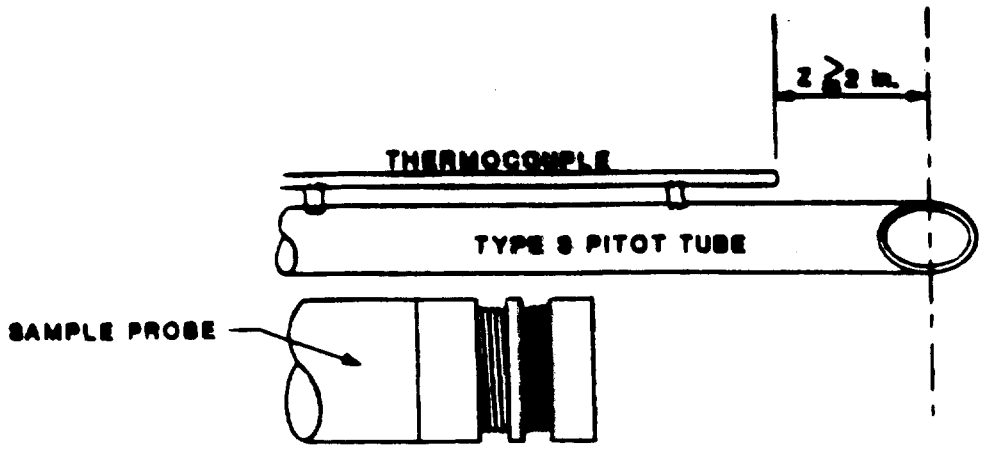
Ambient Temperature: ~70 °F Barometric Pressure: 29.27" Hg

Calibrator: TWS Reference: Mercury-in-glass: ✓

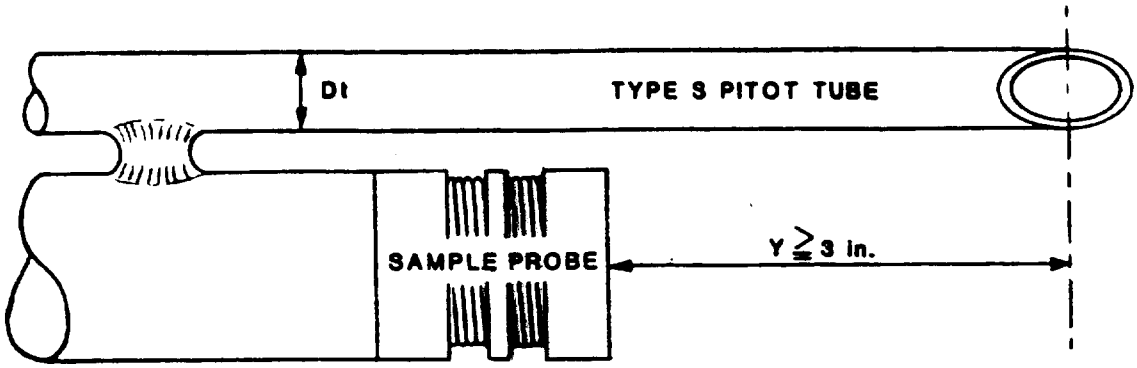
Other: _____

Reference Point No.	Source (Specify)	Reference Thermometer Temperature °F	Thermocouple Potentiometer Temperature °F	Difference %
1	AMBIENT AIR	72	65	10.8
2	OIL	373	370	0.8
3	WATER	212	217	2.3
			Average % Difference	4.6

PITOT ALIGNMENT CALIBRATIONS



Z = 2"



Y = 3"

Determined Coefficient 0.84

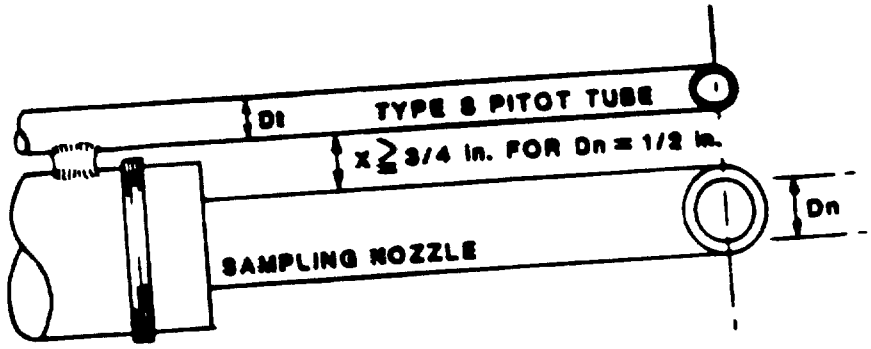
Pitot I.D. No. 7-1 Date 8-24-89 Performed By TWS

TYPE S PITOT TUBE
CALIBRATION SHEET

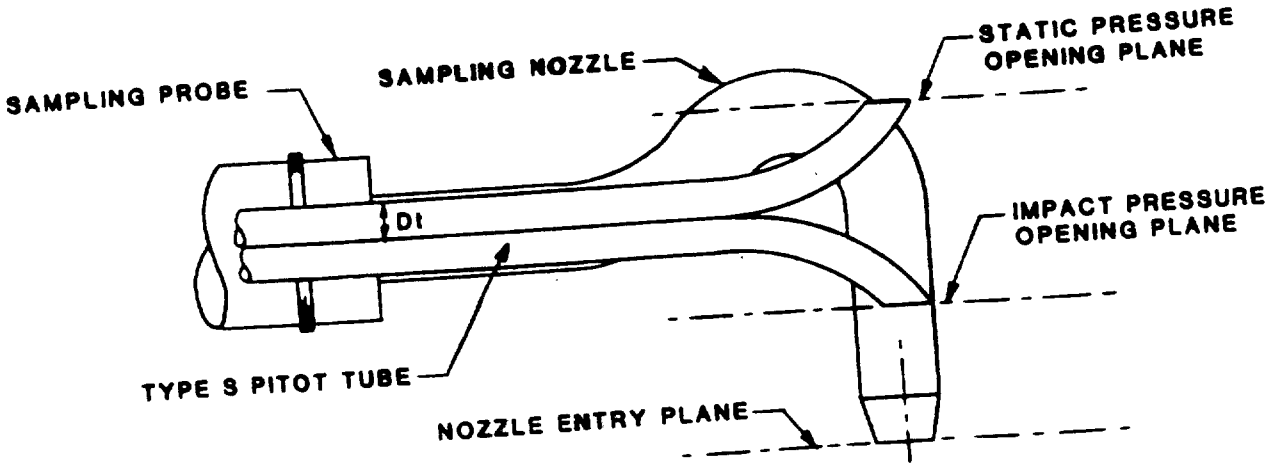
BCM Engineers
Engineers Planners Scientists and Laboratory Services
5777 Baum Boulevard • Pittsburgh PA 15206 • (412) 361-6000

DRAWN BY: JSA PROJECT NO:
SCALE: NONE FILE NO:
DATE: SEPT. 1989 SHEET 4 OF 4

PITOT ALIGNMENT CALIBRATIONS



X = ≥ 3/4"



Is Ip higher than Np = YES

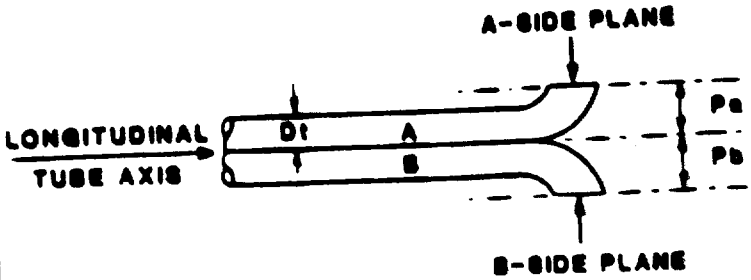
Pitot I.D. No. 7-1 Date 8-24-89 Performed By TWS

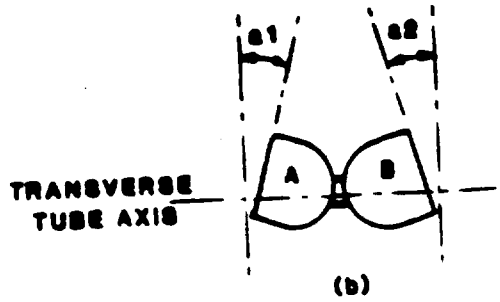
TYPE S PITOT TUBE
CALIBRATION SHEET

BCM Engineers
Engineers Planners Scientists and Laboratory Services
5777 Baum Boulevard • Pittsburgh PA 15206 • (412) 361-6000

DRAWN BY: JSA PROJECT NO:
SCALE: NONE FILE NO:
DATE: SEPT. 1989 SHEET 3 OF 4

CONSTRUCTION CALIBRATIONS





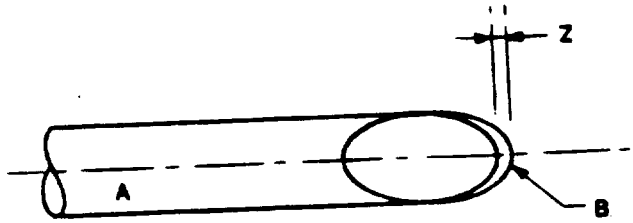
Dt = 0.95

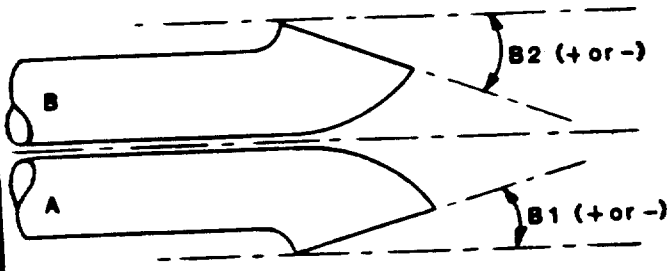
Pa = 1.27

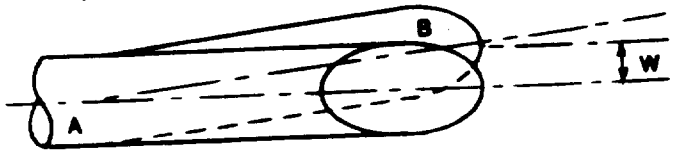
Pb = 1.27

a1 = 0

a2 = 0







B1 = 0

B2 = 0

Z = 0

W = 0

Pitot I.D. No. 7-1 Date 8-24-89 Performed By TWS

TYPE S PITOT
CALIBRATION SHEET

BCM Engineers
Engineers Planners Scientists and Laboratory Services
5777 Baum Boulevard • Pittsburgh PA 15206 • (412) 361-6000

DRAWN BY: JSA PROJECT NO:
SCALE: NONE FILE NO:
DATE: SEPT. 1989 SHEET 2 OF 4

CONSTRUCTION STANDARDS :

1. Dt - between 0.48 and 0.95 centimeters

2. Pa = Pb $1.05\ Dt \leqq P \leqq 1.50\ Dt$

3. a1 , a2 < 10°

4. B1 , B2 < 5°

5. $Z \leqq 0.32$ cm

6. $W \leqq 0.08$ cm

PITOT ALIGNMENT STANDARDS :

1. $X \geqq 3/4$ in.

2. Ip must be higher than Np

3. $Z \geqq 1.90$ cm

4. $Y \geqq 3$ in.

TYPE S PITOT
CALIBRATION STANDARDS

BCM Engineers
Engineers, Planners, Scientists and Laboratory Services
5777 Baum Boulevard • Pittsburgh, PA 15206 • (412) 361-6000

DRAWN BY: JSA
PROJECT NO:
SCALE: NONE
FILE NO:
DATE: SEPT. 1989
SHEET 1 OF 4

DRY GAS METER AND ORIFICE SYSTEM CALIBRATION

DATE 7-7-89 OPERATOR D. PETROVAY CONSOLE NUMBER 582-125

Orifice Manometer Setting In. H_2O ΔH	Minimum Volume of Gas ft^3	WET TEST METER GAS VOLUMES AND TEMPERATURES						DRY TEST METER GAS VOLUMES AND TEMPERATURES						Total Test Time Minutes θ	Barometer Reading, Inches Hg P_b
		Initial		Final				Initial	Final						
		ft^3 V_{w_i}	Temp. °F T_{w_i}	ft^3 V_{w_f}	Temp. °F T_{w_f}	Net Volume ft^3 V_w	Avg. Temp. °F T_w	ft^3 V_{d_i}	ft^3 V_{d_o}	Temp. °F T_{d_i}	Temp. °F T_{d_o}	Net Volume ft^3 V_d	Avg. Temp. °F T_d		
0.5	5	0.000	82	5.001	82	5.001	82	826.819	831.972	114	102	5.153	108	13.20	29.29
0.75	5	0.000	82	5.001	82	5.001	82	831.972	837.159	119	103	5.187	111	10.54	29.29
1.00	5	0.000	82	5.000	82	5.000	82	837.373	842.583	120	104	5.210	112	9.44	29.29
1.50	10	0.000	82	10.002	82	10.002	82	842.583	853.063	129	107	10.480	118	16.01	29.29
2.00	10	0.000	82	10.000	82	10.000	82	853.063	863.582	128	108	10.519	118	14.00	29.29
2.50	10														

CALCULATIONS

$$Y = \frac{(V_w)(P_b)(T_d + 460)}{(V_d)\left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$$

$$\Delta H@ = \frac{0.0317\,(\Delta H)}{(P_b)(T_d + 460)}\left[\frac{(T_w + 460)\,\theta}{(V_w)}\right]^2$$

Calc. By: TWS

Checked By:

Date:

ΔH	GAMMA CALCULATIONS	Y	$\Delta H@$ CALCULATIONS	$\Delta H@$
0.5	$\frac{(5.001)(29.29)(108 + 460)}{(5.153)\left(29.29 + \frac{0.5}{13.6}\right)(82 + 460)}$	1.01	$\frac{0.0317\,(0.5)}{(29.29)(108 + 460)}\left[\frac{(82 + 460)(13.20)}{(5.001)}\right]^2$	1.950
0.75	$\frac{(5.001)(29.29)(111 + 460)}{(5.187)\left(29.29 + \frac{0.75}{13.6}\right)(82 + 460)}$	1.01	$\frac{0.0317\,(0.75)}{(29.29)(111 + 460)}\left[\frac{(82 + 460)(10.54)}{(5.001)}\right]^2$	1.855
1.00	$\frac{(5.000)(29.29)(112 + 460)}{(5.210)\left(29.29 + \frac{1.00}{13.6}\right)(82 + 460)}$	1.00	$\frac{0.0317\,(1.00)}{(29.29)(112 + 460)}\left[\frac{(82 + 460)(9.44)}{(5.000)}\right]^2$	1.981
1.50	$\frac{(10.002)(29.29)(118 + 460)}{(10.480)\left(29.29 + \frac{1.50}{13.6}\right)(82 + 460)}$	1.01	$\frac{0.0317\,(1.50)}{(29.29)(118 + 460)}\left[\frac{(82 + 460)(16.01)}{(10.002)}\right]^2$	2.114
2.00	$\frac{(10.000)(29.29)(118 + 460)}{(10.519)\left(29.29 + \frac{2.00}{13.6}\right)(82 + 460)}$	1.00	$\frac{0.0317\,(2.00)}{(29.29)(118 + 460)}\left[\frac{(82 + 460)(14.00)}{(10.000)}\right]^2$	2.175
2.50	$\frac{(\quad)(\quad)(\quad + 460)}{(\quad)\left(\quad + \frac{\quad}{13.6}\right)(\quad + 460)}$		$\frac{0.0317\,(\quad)}{(\quad)(\quad + 460)}\left[\frac{(\quad + 460)(\quad)}{(\quad)}\right]^2$	
	AVERAGE	1.006	AVERAGE	2.015

APPENDIX C

CALIBRATIONS

SHENANGO **9-20-89**
NO. 1 COKE OVEN BATTERY COMBUSTION STACK **RUN 3**

EPA METHOD 5

SYMBOL		DESCRIPTION		VALUE
Qs	=	Stack gas flow, acfm	=	94675.4
Qs(std)	=	Stack gas flow, dscfm	=	41305.6
Ts	=	Average stack temperature, deg. F	=	544.375
Bws	=	Moisture content of the gas stream, %	=	16.14
CO2	=	CO2 in stack gas, %	=	5.5
O2	=	O2 in stack gas, %	=	10.5
CO	=	CO in stack gas, %	=	0
N2	=	N2 in stack gas, %	=	84
I	=	Isokinetic ratio, percent	=	98.5
C's	=	Particulate concentration, gr/dscf	=	0.0221
E	=	Particulate emission rate,lb/hr	=	7.84

SHENANGO
NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-20-89
RUN 3

EPA METHOD 5

SYMBOL		DESCRIPTION		VALUE
Theta	=	Duration of test, min.	=	120
Vm	=	Dry sample volume (meter conditions), cu. ft.	=	107.622
SQRT(dP)	=	Average of square roots of pitot pressure differential, in. H2O	=	0.279
dH	=	Orifice pressure drop, in. water	=	2.98
Ts	=	Average stack temperature, deg. F	=	544.4
Tm	=	Average dry gas meter temperature, deg. F	=	113.5
CO2	=	CO2 in stack gas, %	=	5.5
O2	=	O2 in stack gas, %	=	10.5
CO	=	CO in stack gas, %	=	0.0
N2	=	N2 in stack gas, %	=	84.0
Pbar	=	Barometric pressure, in. Hg	=	29.68
Ps	=	Stack pressure (absolute), in. Hg.	=	29.61
Cp	=	Pitot correction factor, dimensionless	=	0.84
Y	=	Dry gas meter correction factor	=	1.006
Dn	=	Diameter of nozzle, in.	=	0.515
Ds	=	Diameter of stack, in.	=	114
Vwc	=	Volume of liquid collected in impingers and silica gel, ml	=	407.1
Wt	=	Total particulate catch, mg	=	143.2

An	=	Area of the nozzle, sq. ft.	=	0.00145
As	=	Area of the stack, sq.ft.	=	70.88
Md	=	Dry molecular weight of stack gas, lb/lb-mole	=	29.30
Vw(std)	=	Volume of liquid collected, cu .ft.	=	19.162
Ms	=	Molecular weight of stack gas, lb/lb-mole	=	27.48
Vm(std)	=	Dry sample volume (standard conditions), cu .ft.	=	99.567
Vs	=	Stack velocity, ft/sec	=	22.26

SHENANGO
NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-20-89
RUN 2

EPA METHOD 5

SYMBOL		DESCRIPTION		VALUE
Qs	=	Stack gas flow, acfm	=	96460.9
Qs(std)	=	Stack gas flow, dscfm	=	42409.3
Ts	=	Average stack temperature, deg. F	=	551.666
Bws	=	Moisture content of the gas stream, %	=	14.91
CO2	=	CO2 in stack gas, %	=	5.5
O2	=	O2 in stack gas, %	=	10.5
CO	=	CO in stack gas, %	=	0
N2	=	N2 in stack gas, %	=	84
I	=	Isokinetic ratio, percent	=	99.9
C's	=	Particulate concentration, gr/dscf	=	0.0240
E	=	Particulate emission rate,lb/hr	=	8.71

SHENANGO

NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-19-89
RUN 1

EPA METHOD 5

SYMBOL		DESCRIPTION		VALUE
Theta	=	Duration of test, min.	=	120
Vm	=	Dry sample volume (meter conditions), cu. ft.	=	104.218
SQRT(dP)	=	Average of square roots of pitot pressure differential, in. H2O	=	0.279
dH	=	Orifice pressure drop, in. water	=	2.78
Ts	=	Average stack temperature, deg. F	=	550.8
Tm	=	Average dry gas meter temperature, deg. F	=	102.9
CO2	=	CO2 in stack gas, %	=	5.5
O2	=	O2 in stack gas, %	=	11.0
CO	=	CO in stack gas, %	=	0.0
N2	=	N2 in stack gas, %	=	83.5
Pbar	=	Barometric pressure, in. Hg	=	29.68
Ps	=	Stack pressure (absolute), in. Hg.	=	29.61
Cp	=	Pitot correction factor, dimensionless	=	0.84
Y	=	Dry gas meter correction factor	=	1.006
Dn	=	Diameter of nozzle, in.	=	0.515
Ds	=	Diameter of stack, in.	=	114
Vwc	=	Volume of liquid collected in impingers and silica gel, ml	=	392.0
Wt	=	Total particulate catch, mg	=	78.4

An	=	Area of the nozzle, sq. ft.	=	0.00145
As	=	Area of the stack, sq.ft.	=	70.88
Md	=	Dry molecular weight of stack gas, lb/lb-mole	=	29.32
Vw(std)	=	Volume of liquid collected, cu .ft.	=	18.451
Ms	=	Molecular weight of stack gas, lb/lb-mole	=	27.53
Vm(std)	=	Dry sample volume (standard conditions), cu .ft.	=	98.190
Vs	=	Stack velocity, ft/sec	=	22.31

SHENANGO
NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-20-89
RUN 2

EPA METHOD 5

SYMBOL		DESCRIPTION		VALUE
Theta	=	Duration of test, min.	=	120
Vm	=	Dry sample volume (meter conditions), cu. ft.	=	108.360
SQRT(dP)	=	Average of square roots of pitot pressure differential, in. H2O	=	0.284
dH	=	Orifice pressure drop, in. water	=	3.04
Ts	=	Average stack temperature, deg. F	=	551.7
Tm	=	Average dry gas meter temperature, deg. F	=	94.6
CO2	=	CO2 in stack gas, %	=	5.5
O2	=	O2 in stack gas, %	=	10.5
CO	=	CO in stack gas, %	=	0.0
N2	=	N2 in stack gas, %	=	84.0
Pbar	=	Barometric pressure, in. Hg	=	29.69
Ps	=	Stack pressure (absolute), in. Hg.	=	29.62
Cp	=	Pitot correction factor, dimensionless	=	0.84
Y	=	Dry gas meter correction factor	=	1.006
Dn	=	Diameter of nozzle, in.	=	0.515
Ds	=	Diameter of stack, in.	=	114
Vwc	=	Volume of liquid collected in impingers and silica gel, ml	=	386.0
Wt	=	Total particulate catch, mg	=	161.3

An	=	Area of the nozzle, sq. ft.	=	0.00145
As	=	Area of the stack, sq.ft.	=	70.88
Md	=	Dry molecular weight of stack gas, lb/lb-mole	=	29.30
Vw(std)	=	Volume of liquid collected, cu .ft.	=	18.169
Ms	=	Molecular weight of stack gas, lb/lb-mole	=	27.62
Vm(std)	=	Dry sample volume (standard conditions), cu .ft.	=	103.710
Vs	=	Stack velocity, ft/sec	=	22.68

ANALYTICAL PARTICULATE DATA

Plant SHENANGO Date 9-20-89 Run No. 3

Sample location No. 1 BATTERY STACK

Density of acetone (pa) 0.7857 g/ml
Acetone rinse container No. 4V
Acetone rinse volume (Vaw) 189 ml
Acetone blank residue concentration (Ca) 0.0059 mg/g
Wa = Ca Vaw pa = (0.0059) (189) (0.7857) = 0.8761 mg
Gross wt 104204.8 mg
Tare wt 104069.2 mg
Less acetone blank wt (Wa) 0.9 mg
Weight of particulate in acetone rinse 134.7 mg

Water rinse container No.
Water rinse volume (Vww) ml
Water blank residue concentration (Cw) mg/g
Ww = Ca Vww pa = ( ) ( ) ( ) = mg
Gross wt mg
Tare wt mg
Less water blank wt (Wa) mg
Weight of particulate in water rinse mg

Filter No. 0139
Gross wt mg
Average Gross wt 408.7 mg
Tare wt 400.2 mg
Weight of particulate on filter(s) 8.5 mg
Weight of particulate in acetone rinse 134.7 mg
Weight of particulate in water rinse — mg
Total weight of particulate 143.2 mg

ANALYTICAL PARTICULATE DATA

Plant SHENANGO Date 9-19-89 Run No. 1

Sample location No. 1 BATTERY STACK

Density of acetone (pa) 0.7857 g/ml

Acetone rinse container No. 4M

Acetone rinse volume (Vaw) 175 ml

Acetone blank residue concentration (Ca) 0.0059 mg/g

Wa = Ca Vaw pa = (0.0059) (175) (0.7857) = 0.8112 mg

Gross wt 107308.3 mg

Tare wt 107237.0 mg

Less acetone blank wt (Wa) 0.8 mg

Weight of particulate in acetone rinse 70.5 mg

Water rinse container No.

Water rinse volume (Vww) ml

Water blank residue concentration (Cw) mg/g

Ww = Ca Vww pa = ( ) ( ) ( ) = mg

Gross wt mg

Tare wt mg

Less water blank wt (Wa) mg

Weight of particulate in water rinse mg

Filter No. 0136

Gross wt 416.0 mg

Average Gross wt 416.0 mg

Tare wt 408.1 mg

Weight of particulate on filter(s) 7.9 mg

Weight of particulate in acetone rinse 70.5 mg

Weight of particulate in water rinse — mg

Total weight of particulate 78.4 mg

BLANK ANALYTICAL DATA

Plant SHENANGO

Sample location No. 1 BATTERY STACK

Type of blank ACETONE

Container number 4W

Density of blank (pa) 0.7857 g/ml

Blank volume (Va) 150 ml

Gross wt. 107417.9 mg

Tare wt. 107417.2 mg

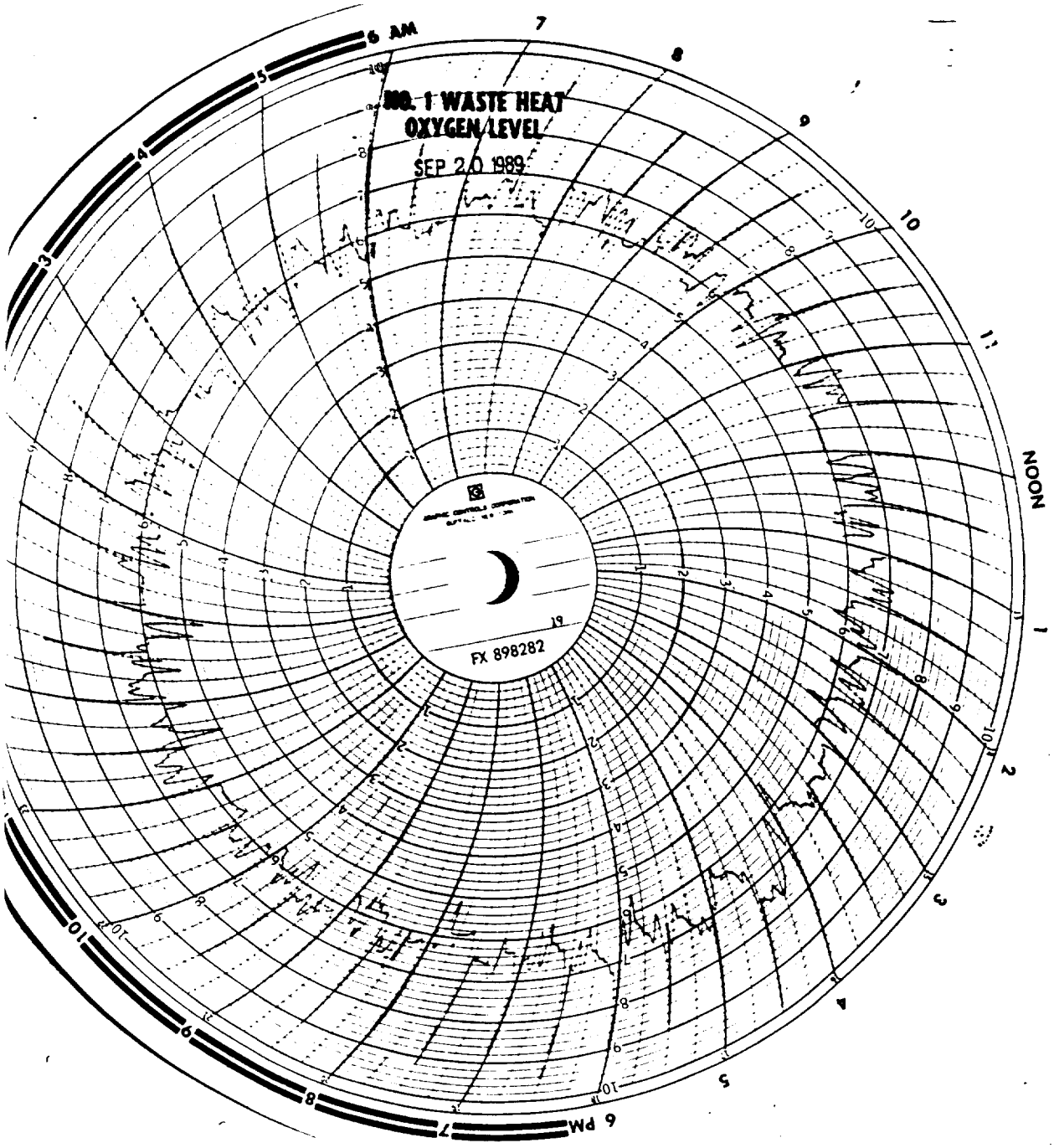
Weight of blank (ma) 0.7 mg

$$Ca = \frac{ma}{Va\ pa} = \frac{(0.7)}{(150)(0.7857)} = 0.0059 \text{ mg/g}$$

APPENDIX B

CALCULATIONS

NO. 1 FUEL GAS
PRESSURE
TO HEATER
SEP 2 0 1989
6 AM
NOON
6 PM
FX 898496


NO. 1 WASTE HEAT
OXYGEN LEVEL
SEP 20 1989
FX 898282
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6 PM
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NO. 1 FUEL GAS
PRESSURE
PUSHER SIDE
SEP 20 1989
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NOON
6 PM

NO. 1 FUEL GAS
PRESSURE
COKE SIDE
SEP 20 1989
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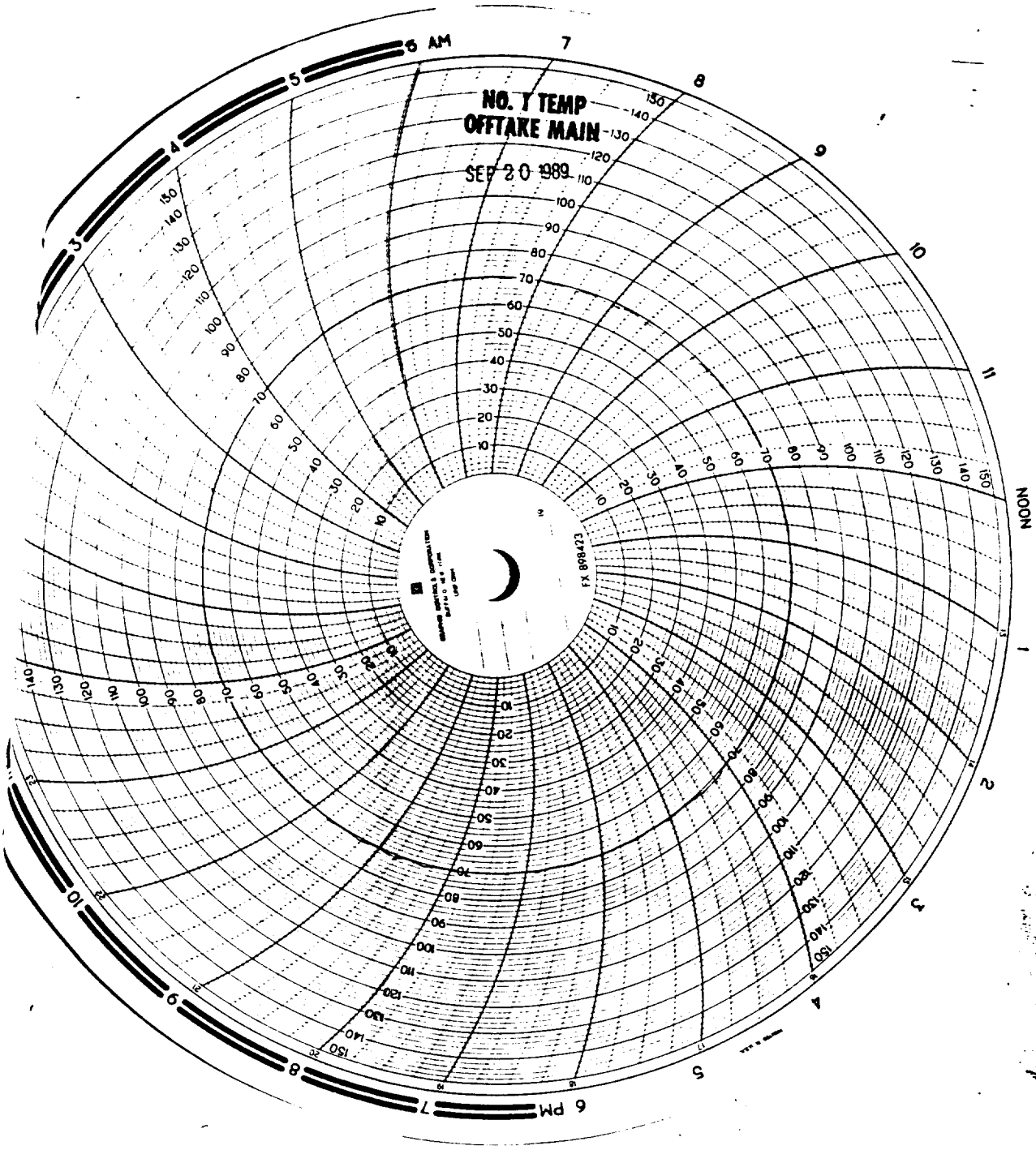
NOON
6 PM


NO. 1 TEMP
OFFTAKE MAIN
SEP 30 1989
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NOON
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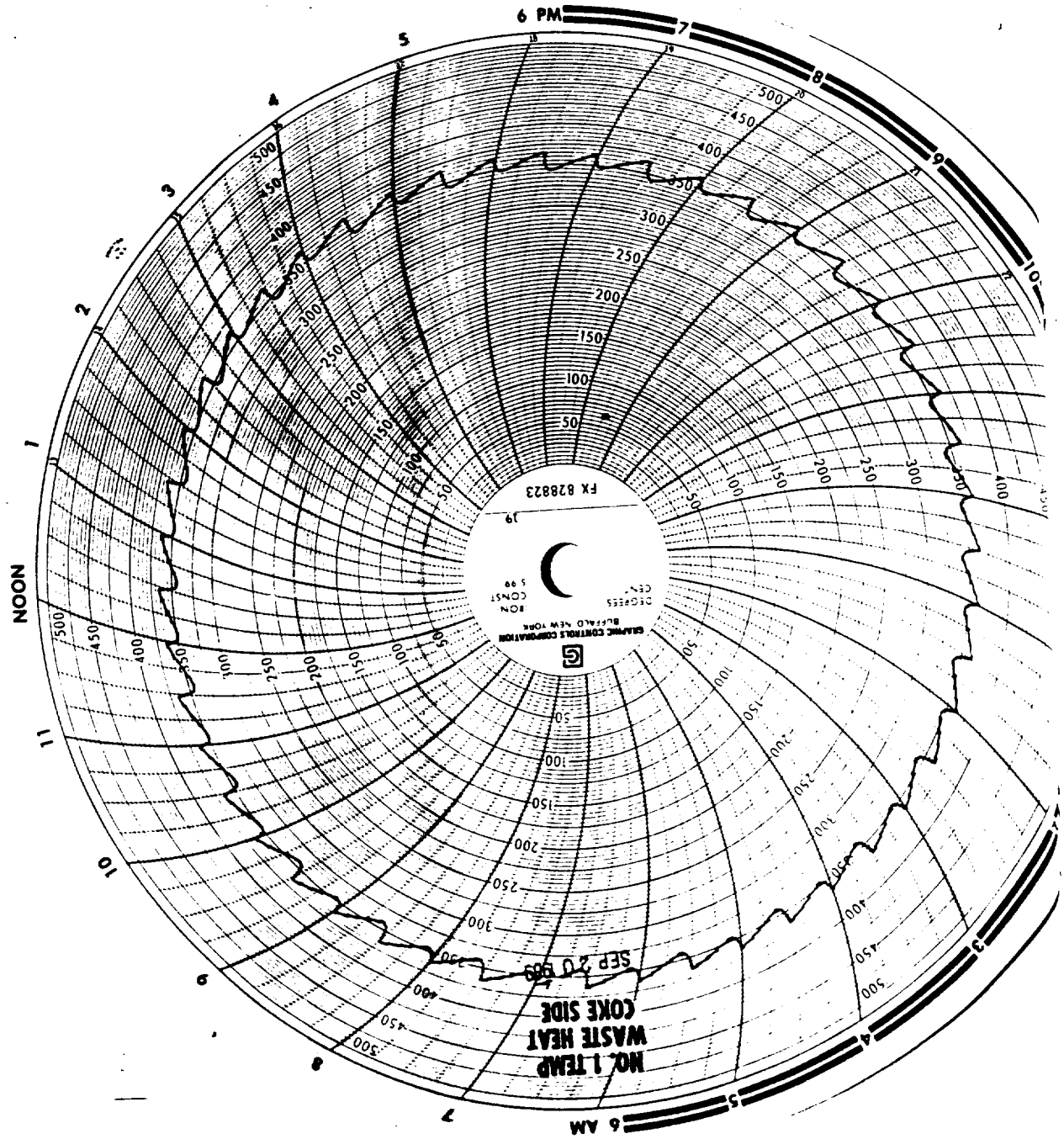
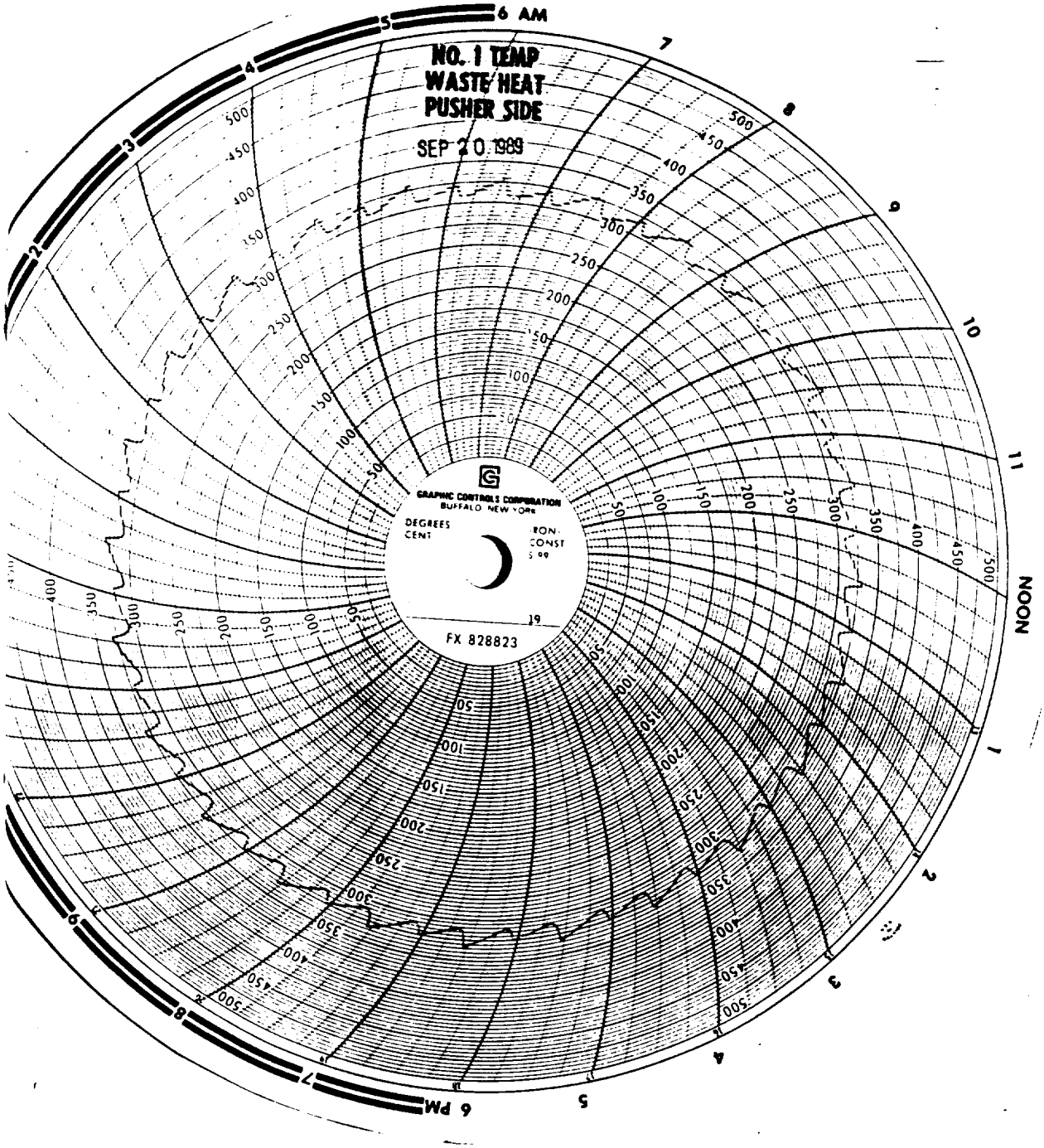
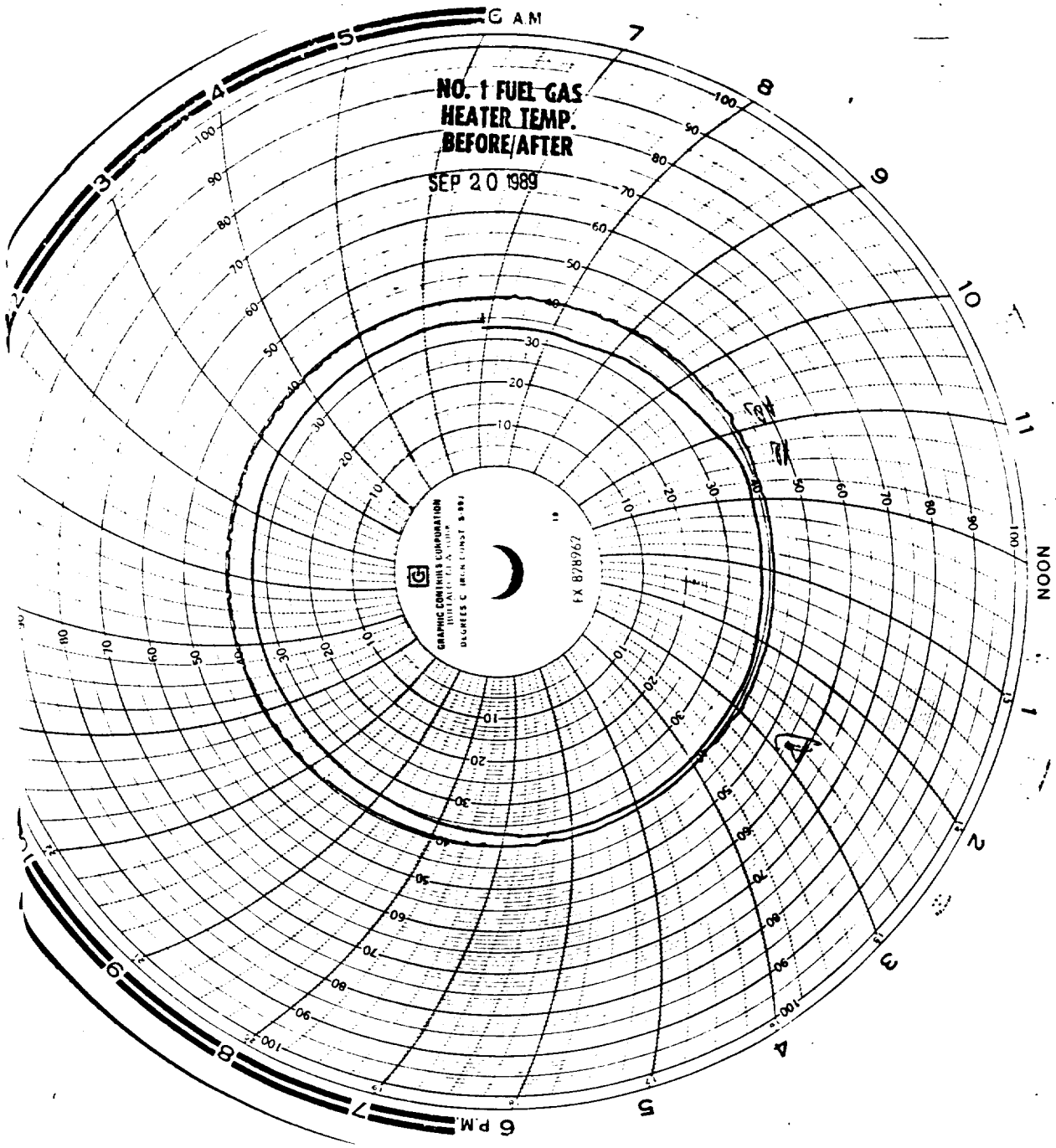
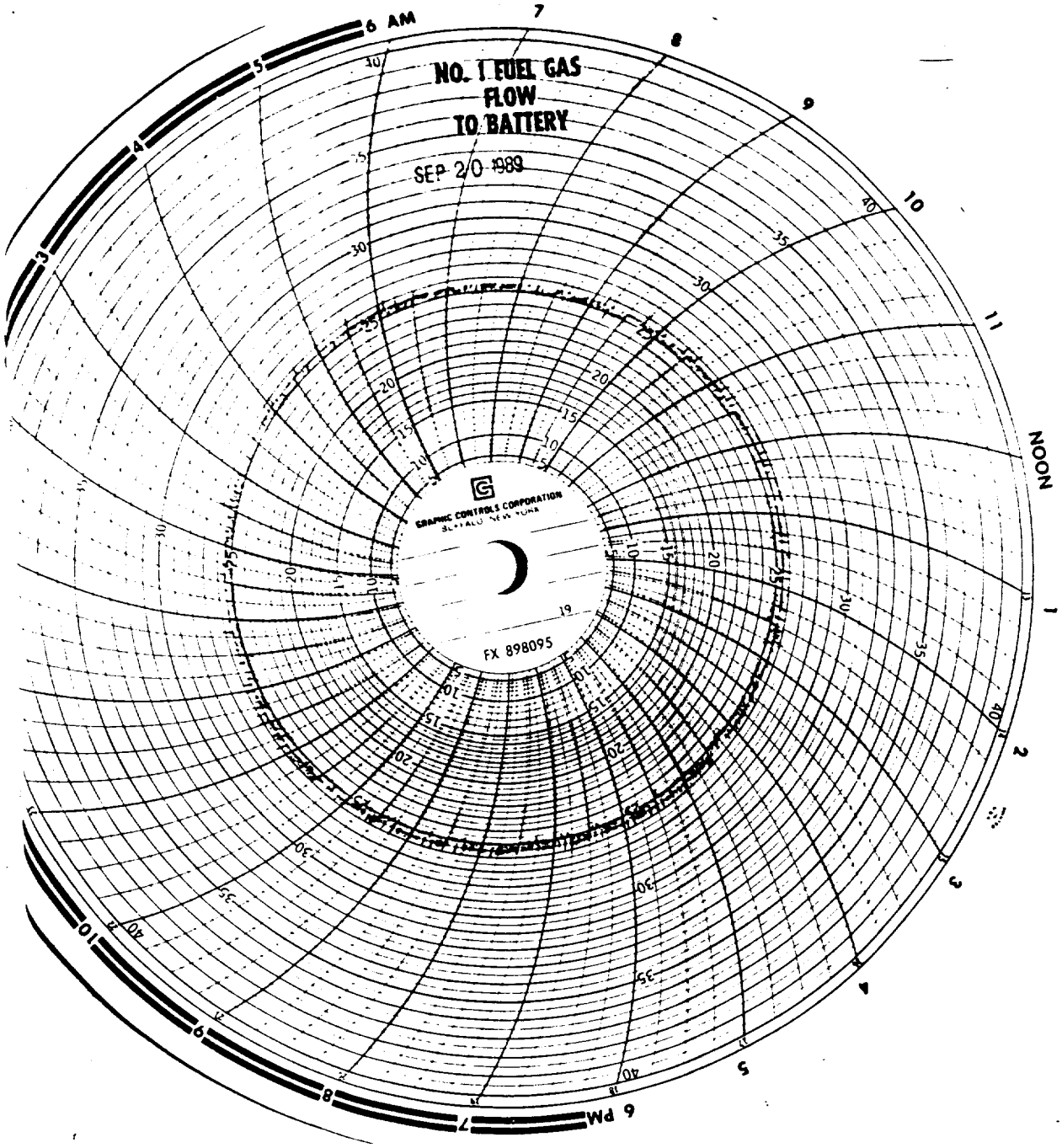
FX 898423

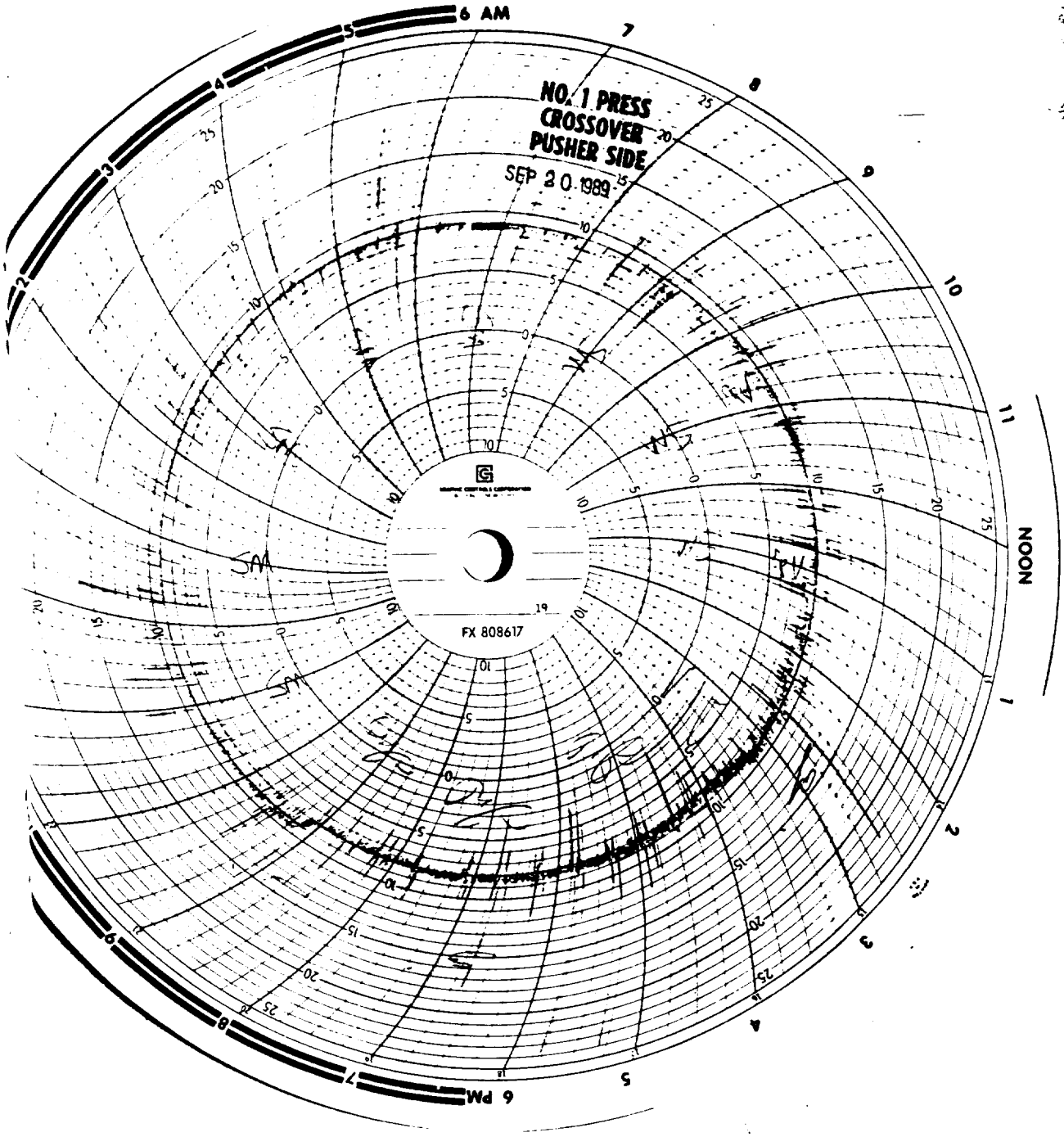

6 PM
NOON
6 AM
FX 828823
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
NO. 1 TEMP
WASTE HEAT
COKE SIDE
SEP 2 0 1989

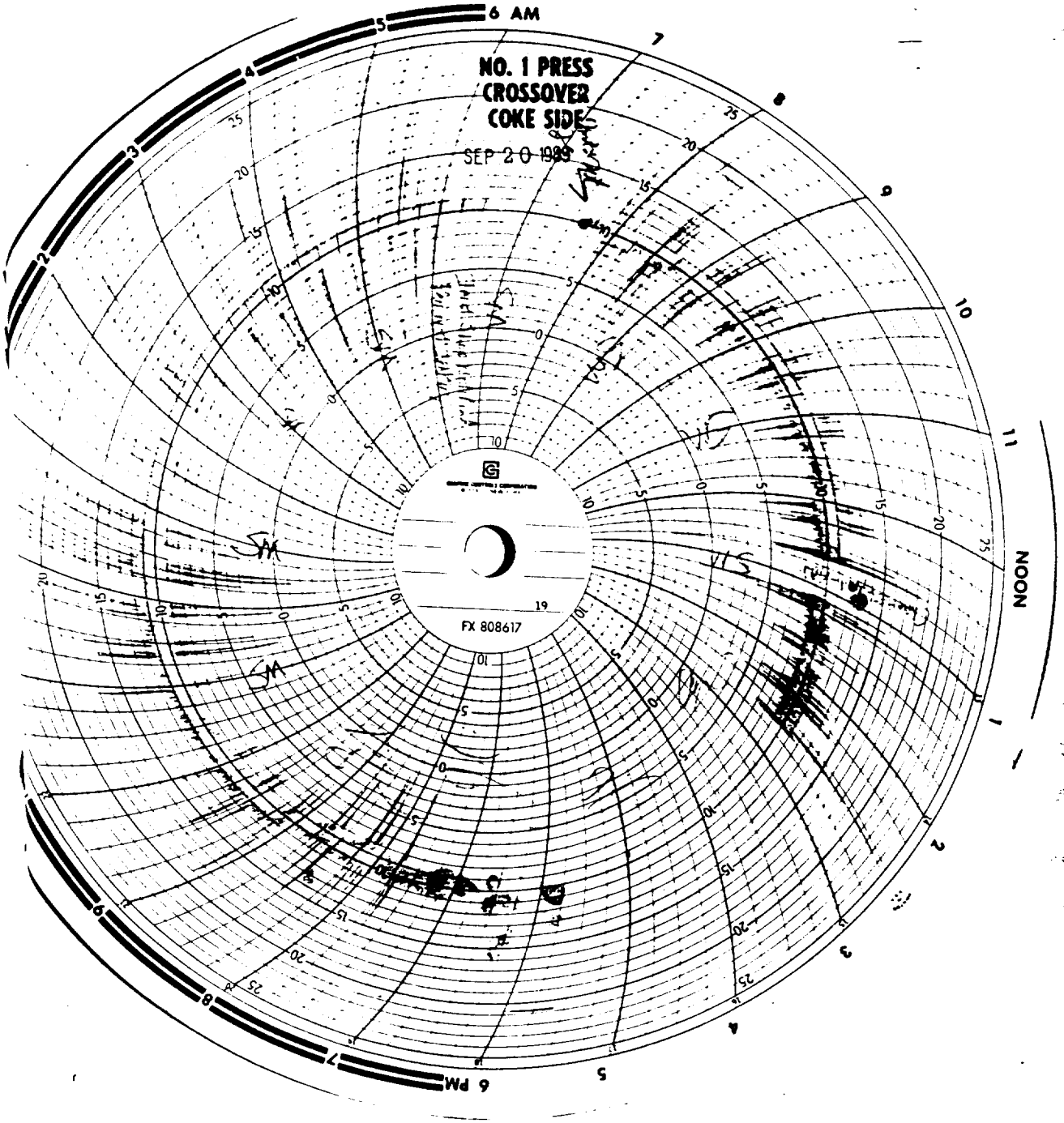
NO. 1
STACKMAN
COKE SIDE
SEP 20 1989
FX 898504
6 AM
6 PM
NOON

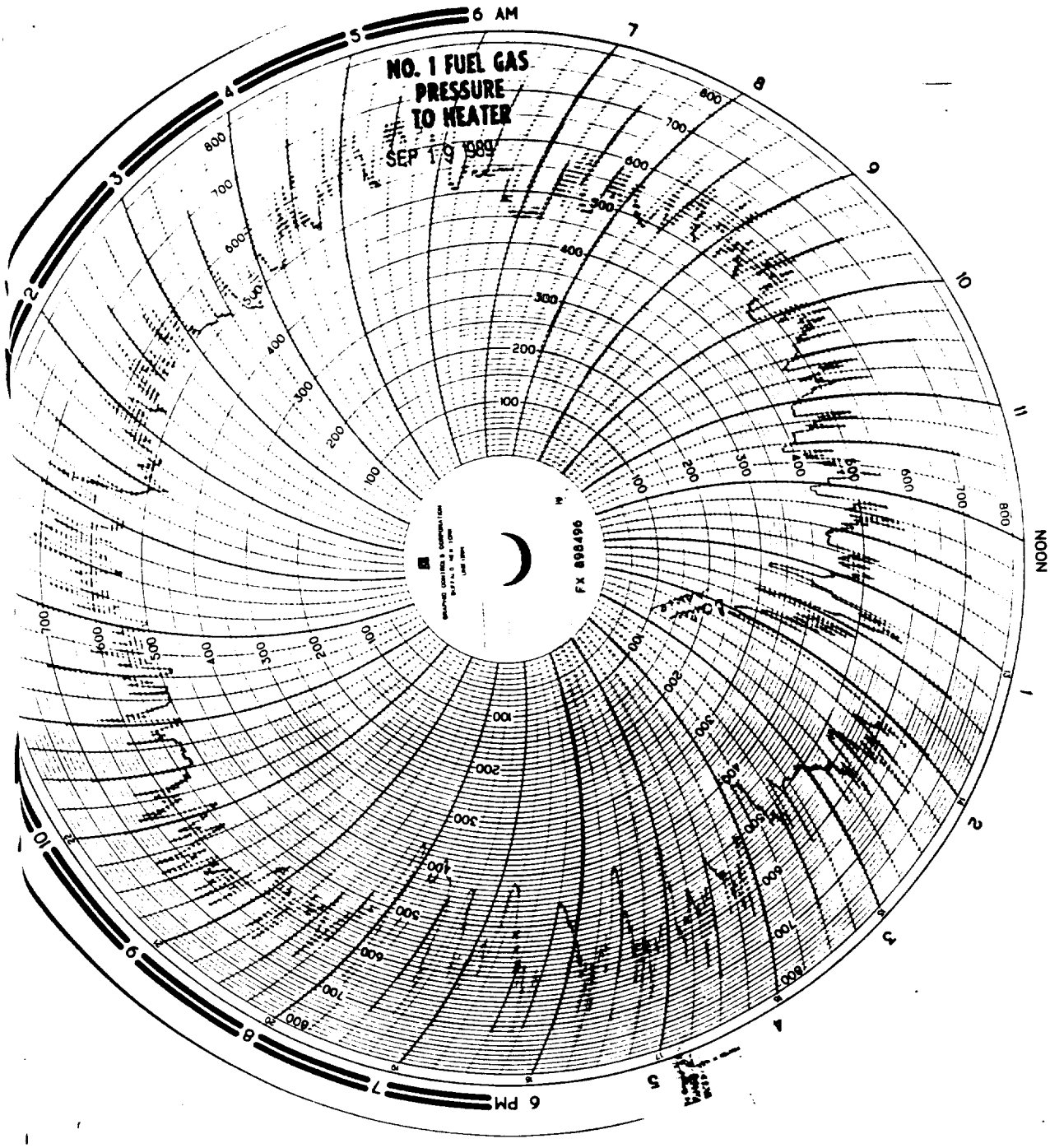

NO. 1 TEMP
WASTE HEAT
PUSHER SIDE
SEP 20 1989
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
DEGREES
CENT
FX 828823
6 AM
NOON
6 PM

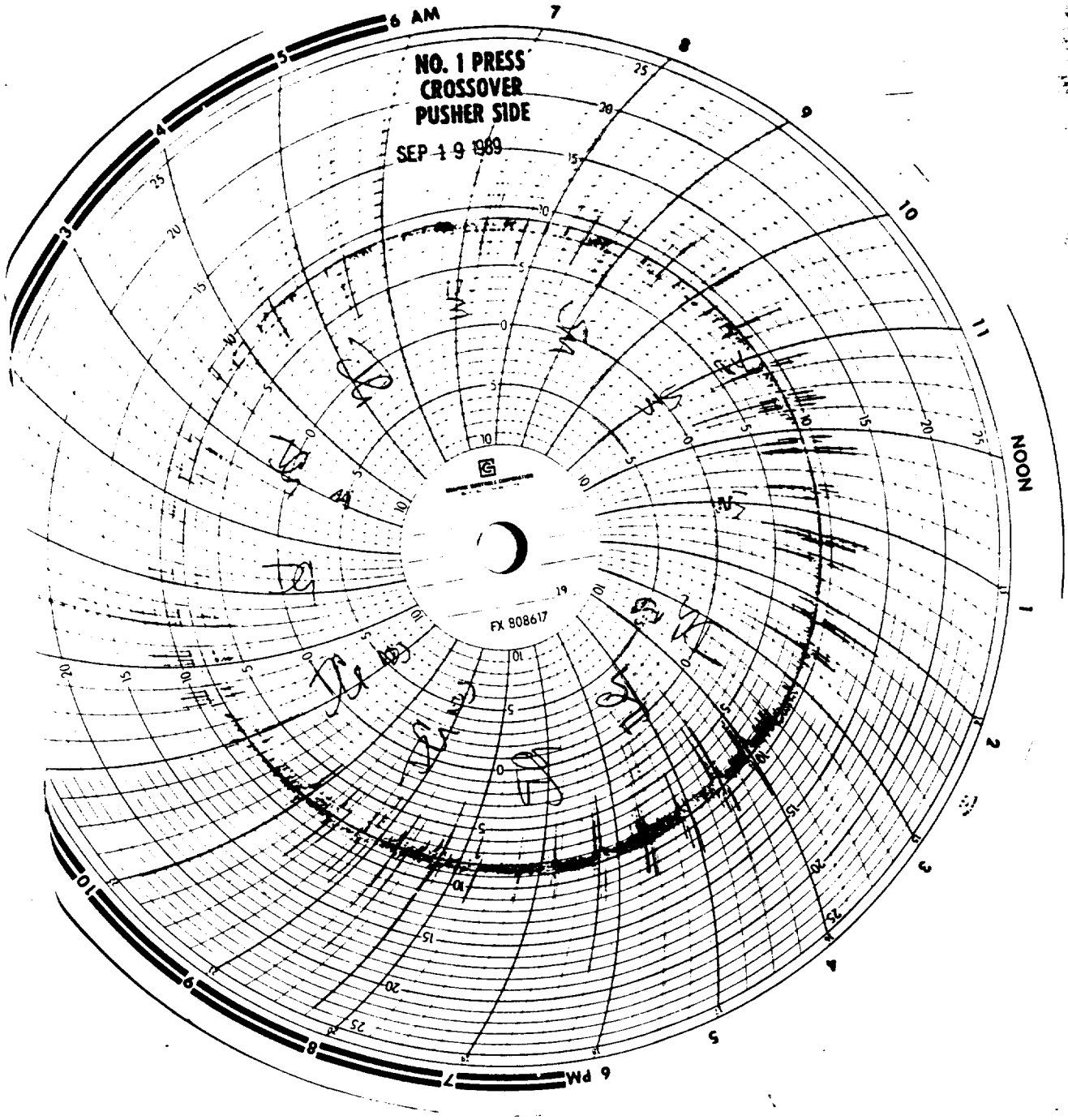

NO. 1 FUEL GAS
HEATER TEMP.
BEFORE/AFTER
SEP 20 1989
6 A.M
NOON
6 P.M.
GRAPHIC CONTROLS CORPORATION
EX 878962

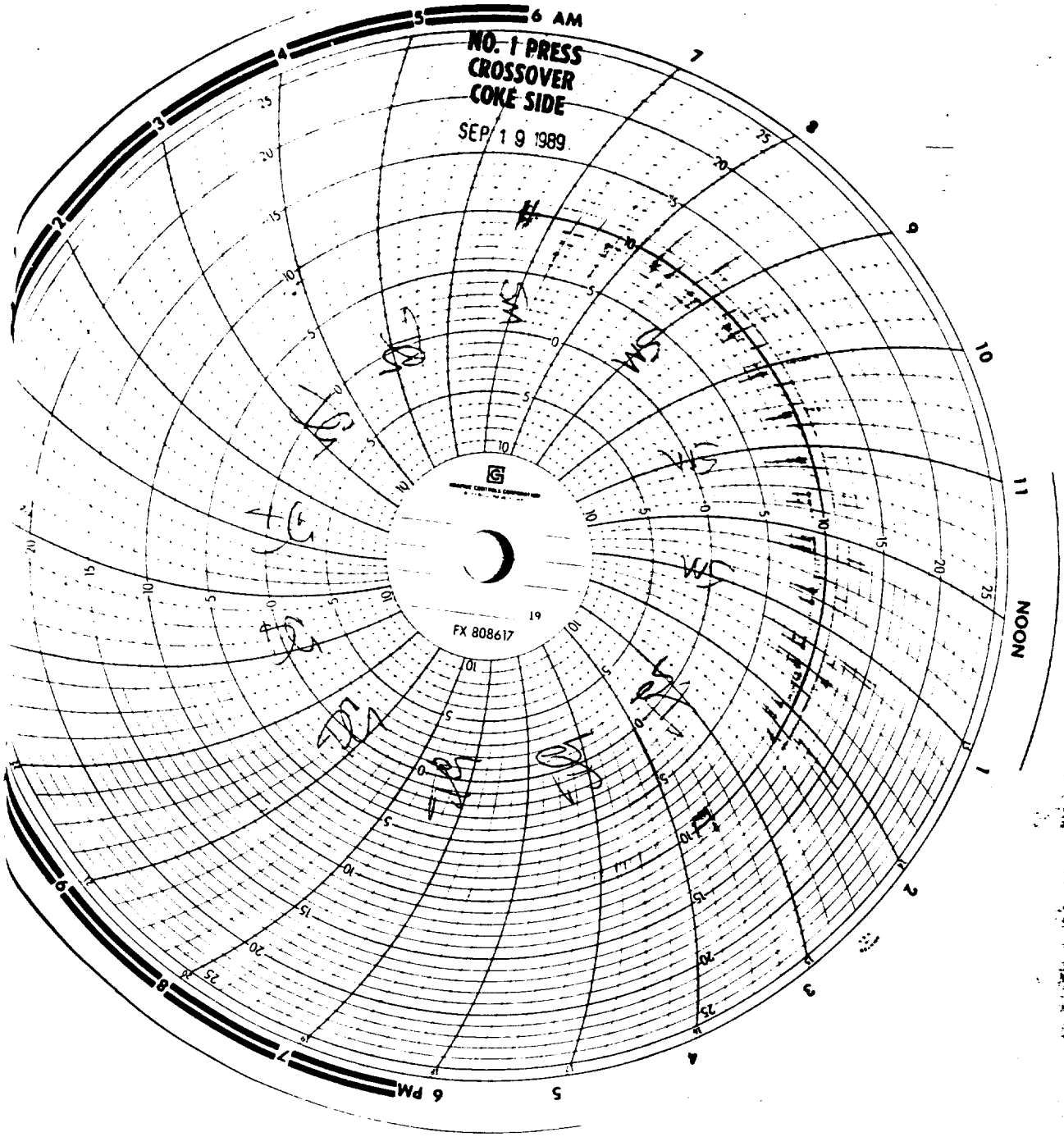

NO. 1 FUEL GAS
FLOW
TO BATTERY
SEP 20 1989
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
FX 898095
6 AM
NOON
6 PM

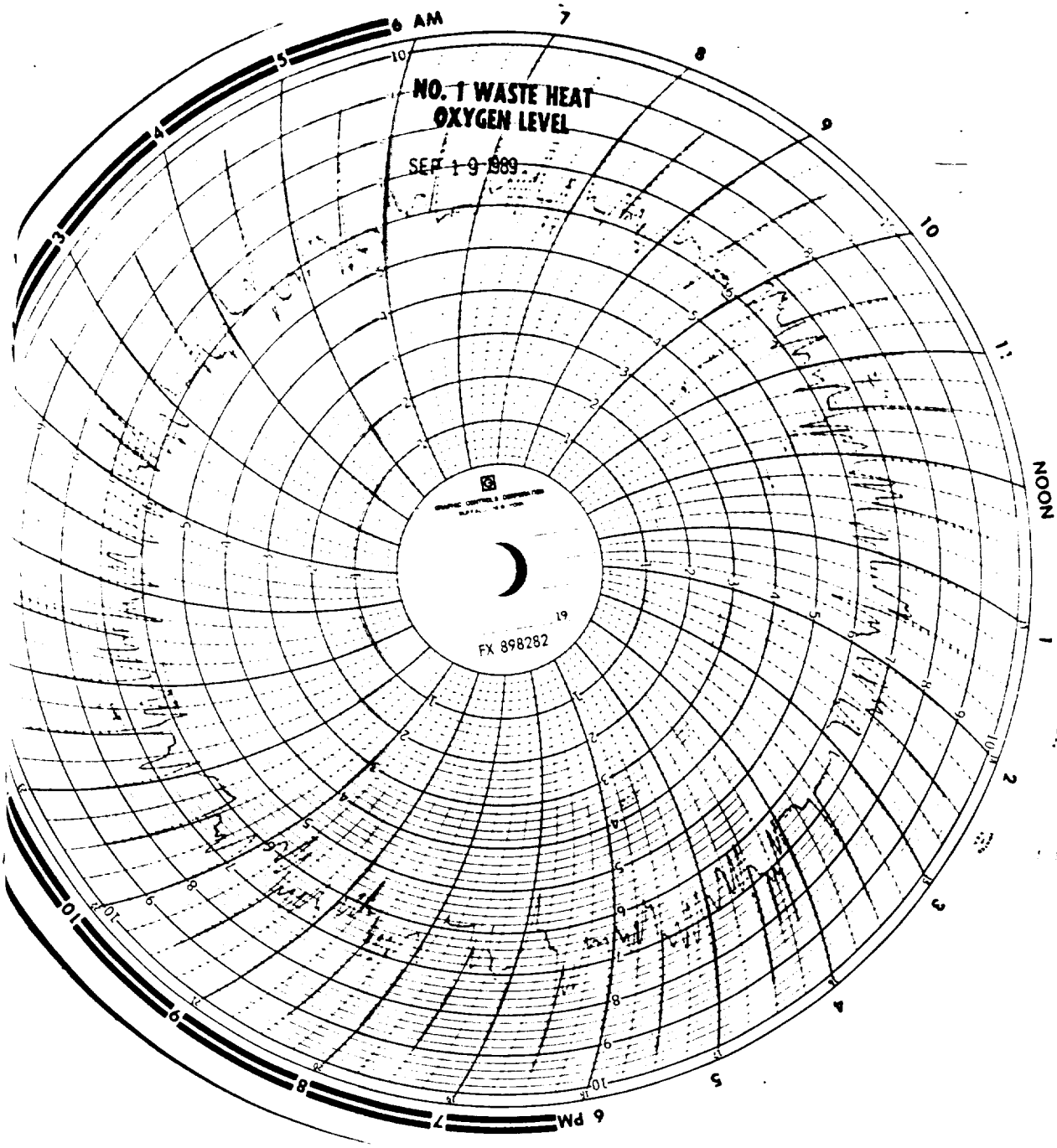

NO. 1 PRESS
CROSSOVER
PUSHER SIDE
SEP 20 1989
FX 808617
6 AM
NOON
6 PM


NO. 1 PRESS
CROSSOVER
COKE SIDE
SEP 20 1989
6 AM
NOON
6 PM
FX 808617


NO. 1 FUEL GAS
PRESSURE
TO HEATER
SEP 19 1989
6 AM
NOON
6 PM
FX 898496

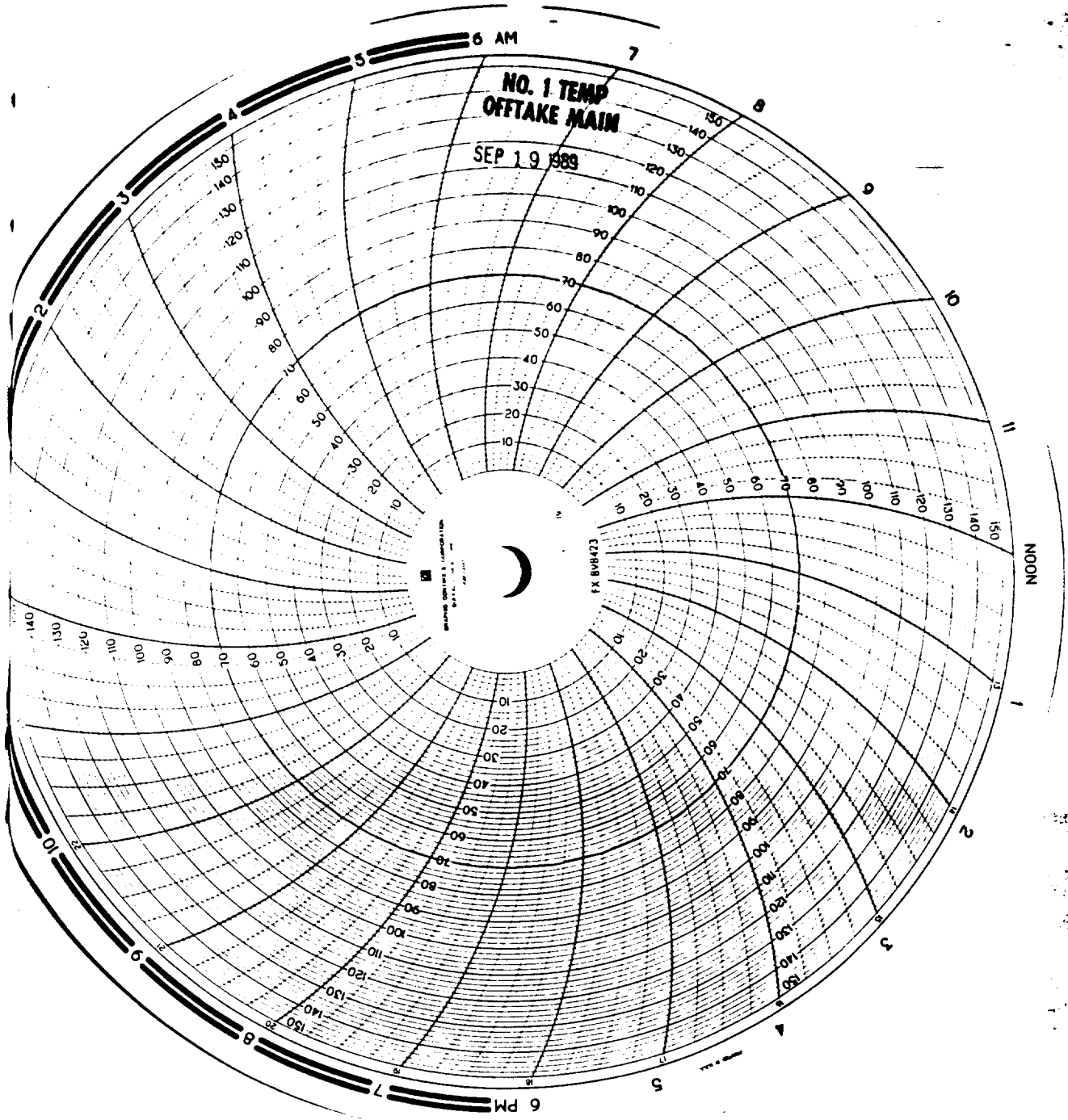

NO. 1 PRESS
CROSSOVER
PUSHER SIDE
SEP 19 1989
6 AM
NOON
6 PM
FX 808617

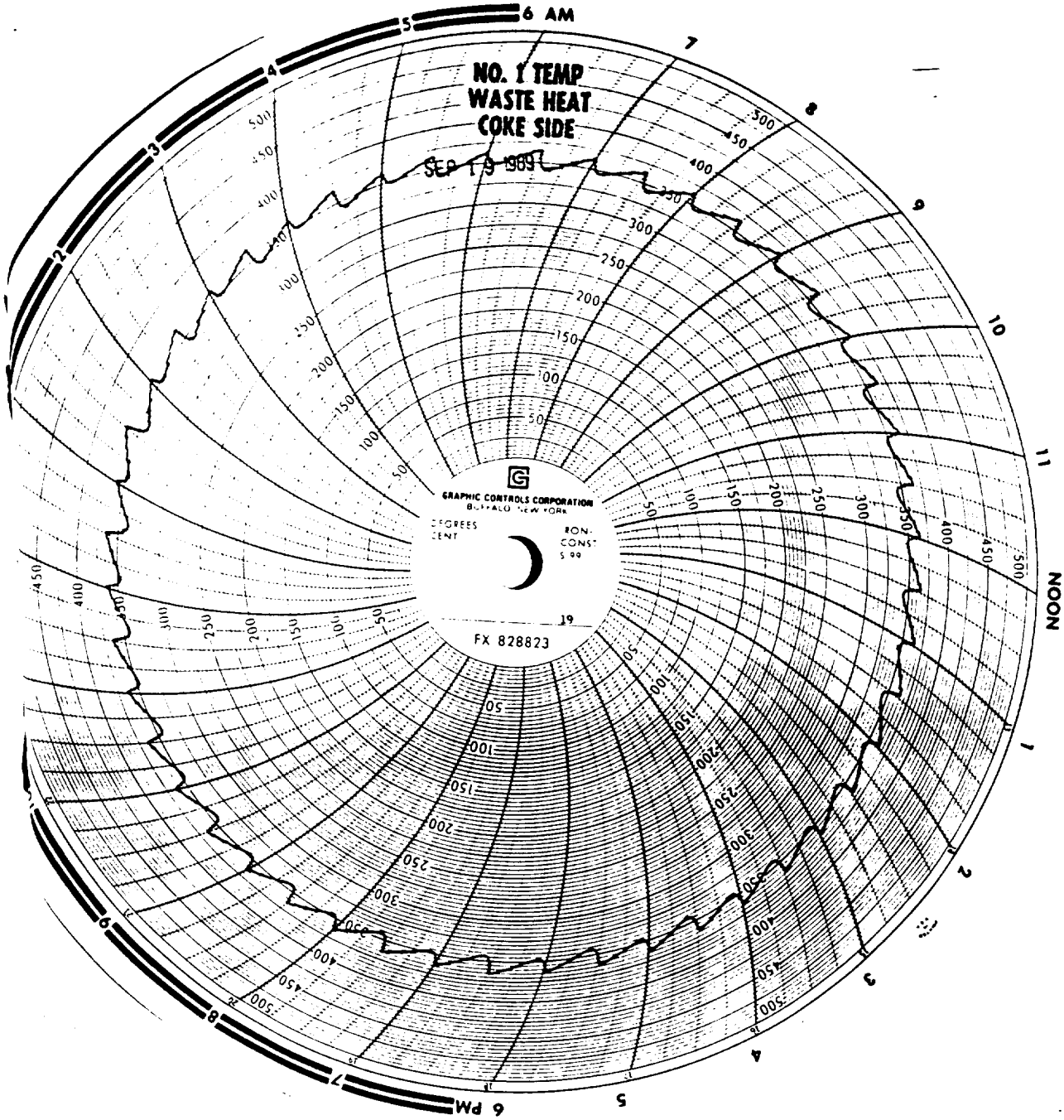

NO. 1 PRESS
CROSSOVER
COKE SIDE
SEP 1 9 1989
6 AM
NOON
6 PM
FX 808617

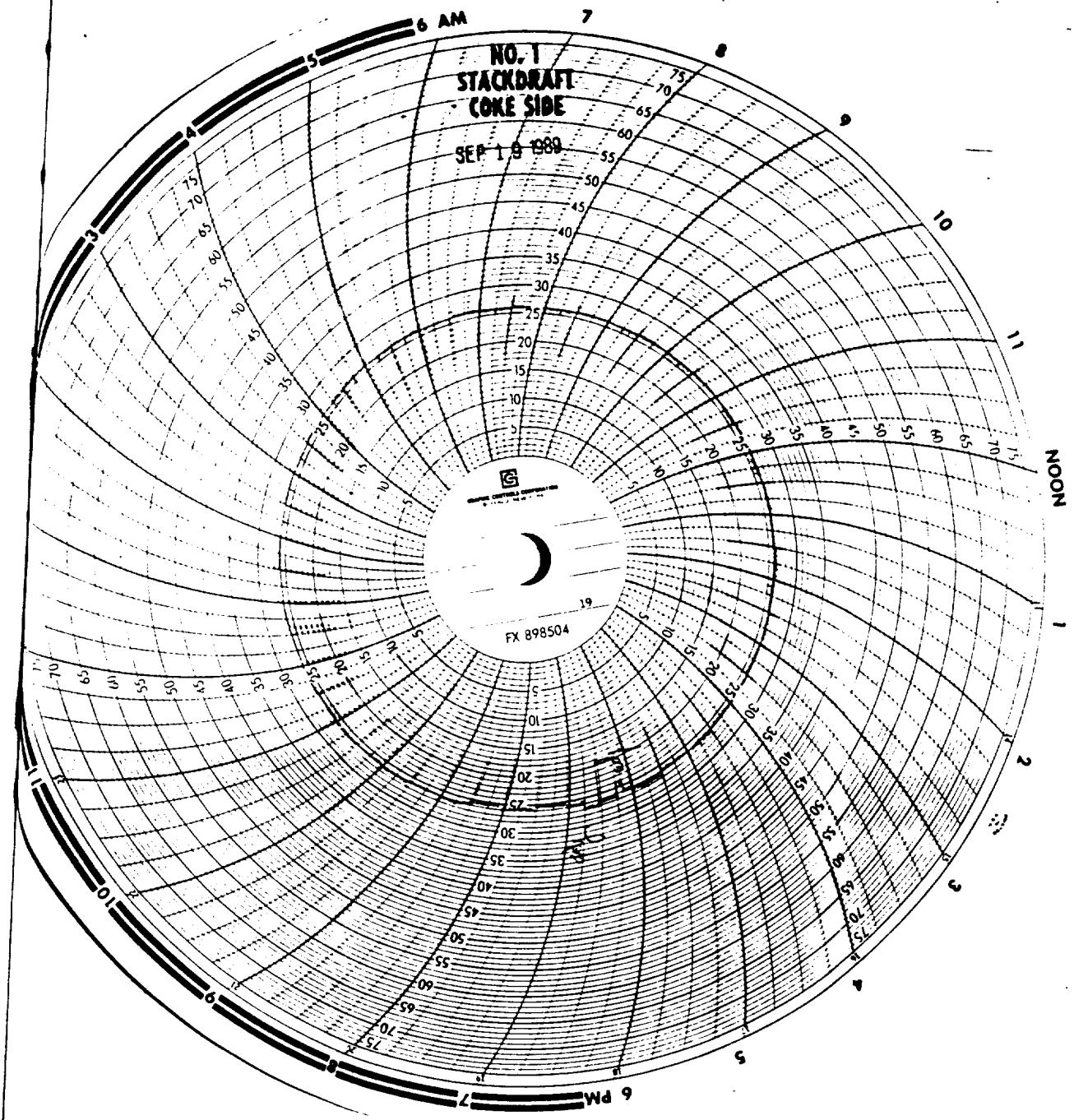

NO. 1 WASTE HEAT
OXYGEN LEVEL
SEP 1 9 1989
FX 898282
6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
8
9
10
11
12
1
2
3
4
5
6
7
8
9
10

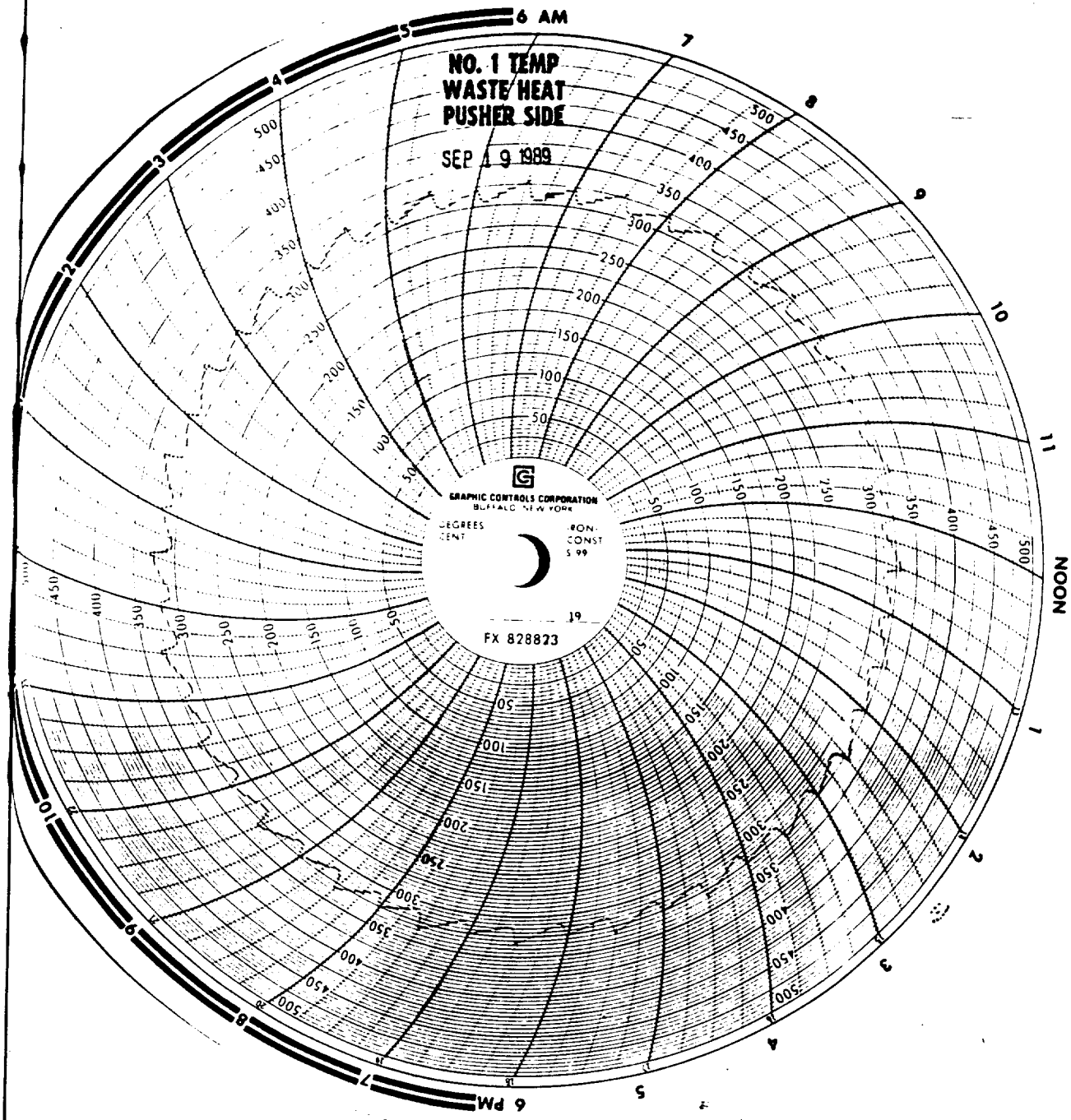
NO. 1 FUEL GAS
PRESSURE
MUSHER SIDE
SEP 19 1989
6 AM
6 PM
NOON

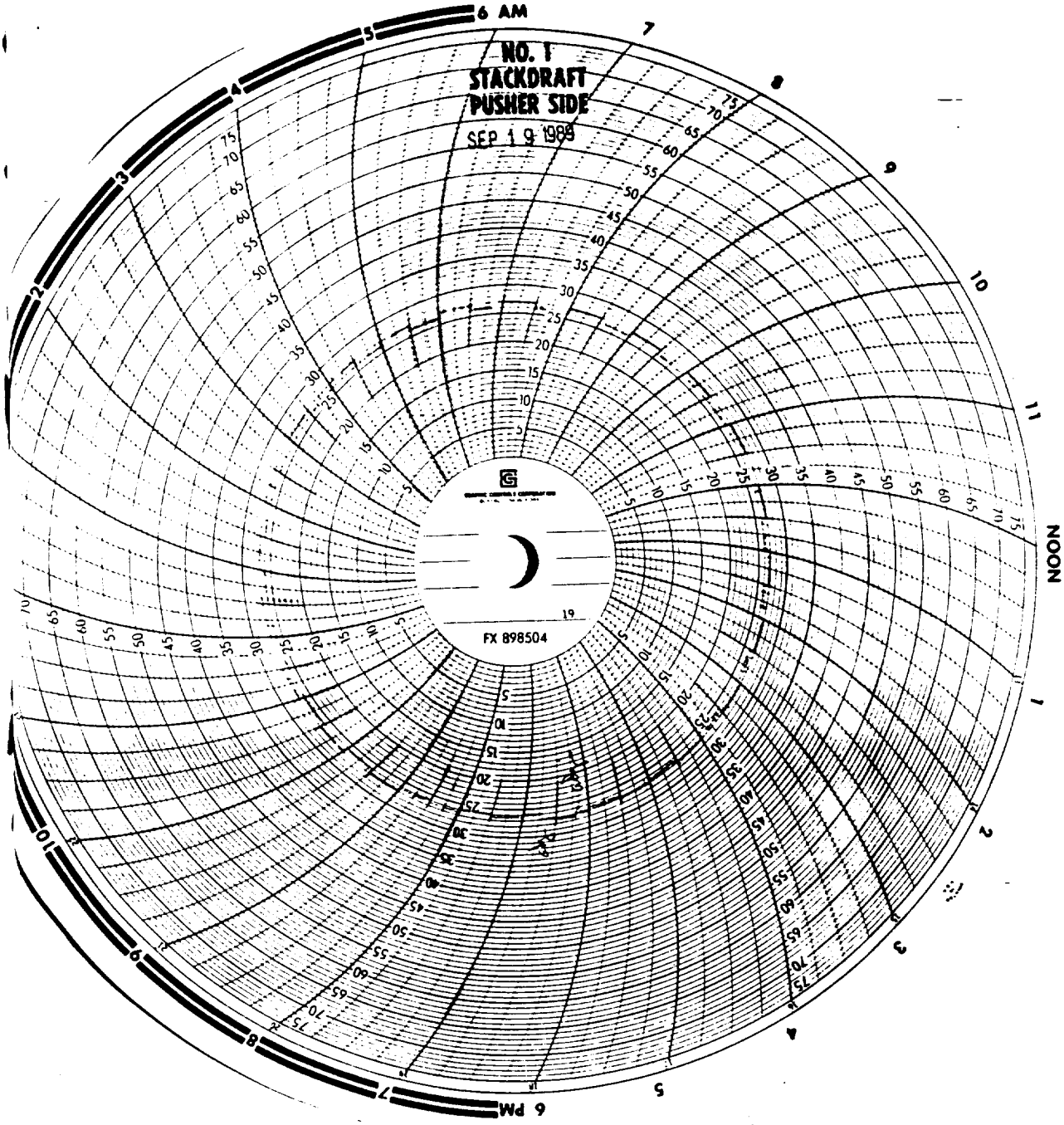
NO. 1 FUEL GAS
PRESSURE
COKE SIDE
SEP 19 1989
NOON
6 PM
6 AM

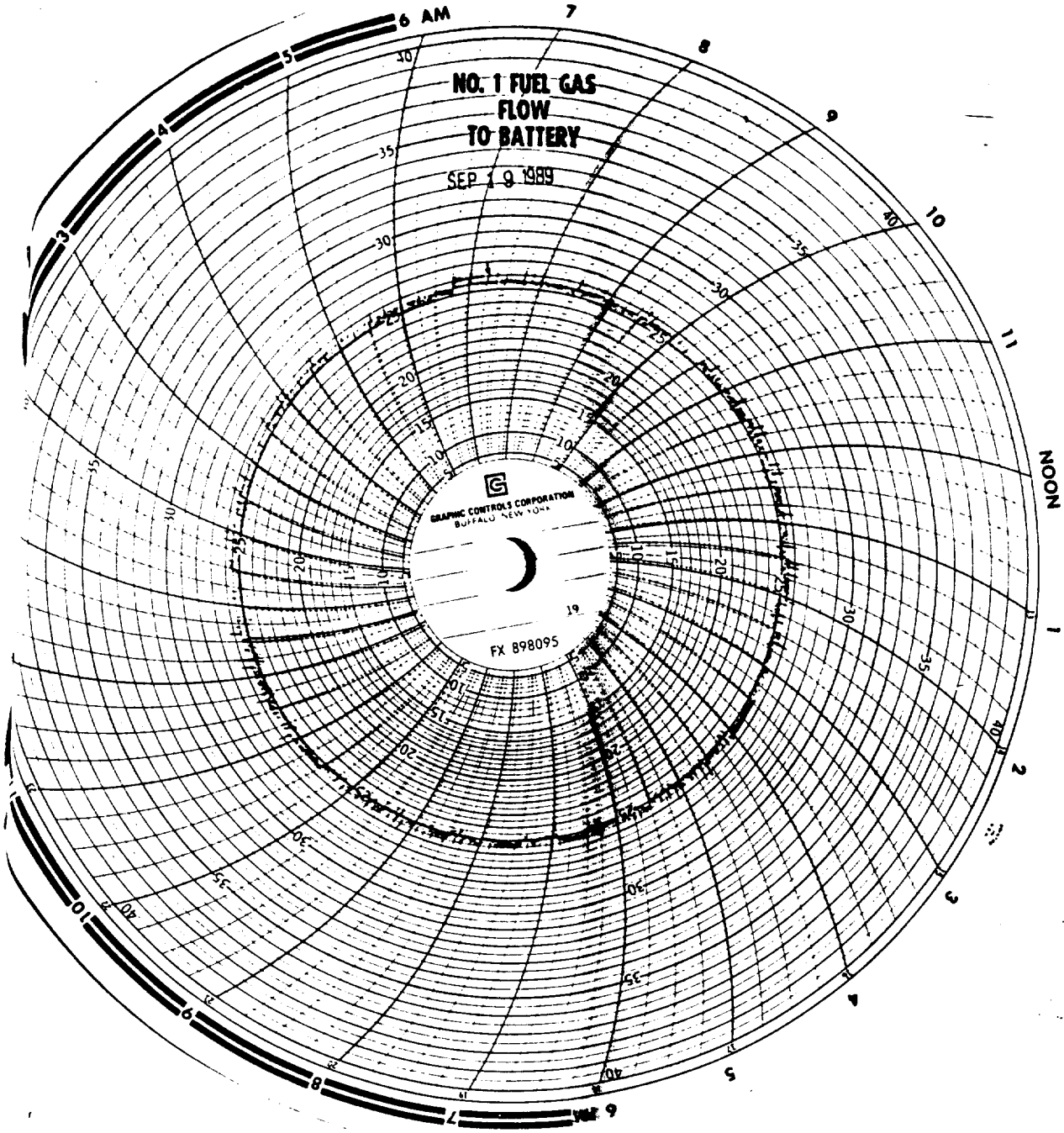

NO. 1 TEMP
OFFTAKE MAIN
SEP 19 1989
6 AM
NOON
6 PM
FX BVR423


NO. 1 TEMP
WASTE HEAT
COKE SIDE
SEP 19 1989
6 AM
NOON
6 PM
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
FX 828823


NO. 1
STACKDRAFT
COKE SIDE
SEP 19 1989
6 AM
NOON
6 PM
FX 898504


NO. 1 TEMP
WASTE HEAT
PUSHER SIDE
SEP 19 1989
6 AM
NOON
6 PM
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
FX 828823


NO. 1
STACKDRAFT
PUSHER SIDE
SEP 1 9 1989
6 AM
NOON
6 PM
FX 898504


NO. 1 FUEL GAS
FLOW
TO BATTERY
SEP 1 9 1989
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
FX 898095
6 AM
NOON

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-29-89
ITY Shenango Steel Inc.
VATION PERIOD: START: 1500
FINISH: 1536

VATION POINT: S.W. Parking Lot
ors Next to Office
E: # 1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W.
HEIGHT: 400 ft.
South
SPEED: 3 mph
DIRECTION: South
ATURE: 30.21 BP. 58% HUM. 72°
ONDITION: 50% Clear + 50% Cloudy

OUND: 50% Clear + 50% Cloudy
e + Blue Sky
NG CONDITIONS: Good

OF EMISSIONS: Black

TS: Run #1

READINGS ≥ 20%: 0
READINGS ≥ 60%: 0
E OPACITY: 0 %

URE: Daniel R. Petrovay

LAST PORT	0	15	30	45
0	O	O	O	O
1	O	O	O	O
2	O	O	O	O
3	O	O	O	O
4	O	O	O	O
5	O	O	O	O
6	O	O	O	O
7	O	O	O	O
8	O	O	O	O
9	O	O	O	O
10	O	O	O	O
11	O	O	O	O
12	O	O	O	O
13	O	O	O	O
14	O	O	O	O
15	O	O	O	O
16	O	O	O	O
17	O	O	O	O
18	O	O	O	O
19	O	O	O	O
20	O	O	O	O
21	O	O	O	O
22	O	O	O	O
23	O	O	O	O
24	O	O	O	O
25	O	O	O	O
26	O	O	O	O
27	O	O	O	O
28	O	O	O	O
29	O	O	O	O

	0	15	30	45
30	O	O	O	O
31	O	O	O	O
32	O	O	O	O
33	O	O	O	O
34	O	O	O	O
35	O	O	O	O
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petroway
9-29-89
ITY Shenango Steel Inc.
VATION PERIOD: START: 1400
FINISH: 1500

VATION POINT: S.W. Parking Lot
tors Next To Office
CE: # 1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W.
HEIGHT: 400 ft.
EAST
SPEED: 6 mph
DIRECTION: East
RATURE: 69° HUM. 65%
ONDITION: 80% Overcast 20%
Sky
ROUND: White Cloud with Some
Sky
ING CONDITIONS: Good

OF EMISSIONS: Black

NTS: Run #1

F READINGS ≥ 20%: 3
F READINGS ≥ 60%: 0
CE OPACITY: 16.6 %
S:

ATURE: Daniel R. Petroway

	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	5	10
9	10	10	10	15
10	15	15	15	10
11	10	10	5	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	5	5	10
19	10	15	20	20
20	20	15	15	10
21	5	5	5	5
22	5	5	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

Pole change

Start 3rd pole

	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	5	5
42	5	5	5	5
43	5	5	5	5
44	5	5	5	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Pole change

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-19-89
ITY Shenango Inc.
VATION PERIOD: START: 1300
FINISH: 1400

VATION POINT: S.W. Parking Lot
ors Next to Office
E: # 1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W.
HEIGHT: 400 FT.
North East
SPEED: 5 MPH
DIRECTION: N.E.
RATURE: 67°
ONDITION: 100% overcast

ROUND: White + Gray Clouds

NG CONDITIONS: Good

OF EMISSIONS: Black

NTS: Run # 1

F READINGS ≥ 20%: 0
F READINGS ≥ 60%: 0
CE OPACITY: 0.3%
S:

TURE: Daniel R Petrovay

X	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
START 8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

X	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	5	5	5	10
Port Change 38	10	10	10	10
39	5	5	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
Start 2nd Port 46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-20-89
ITY Shenango Steel Inc
VATION PERIOD: START: 1550
FINISH: 1609

VATION POINT: S.W. Visitors
ng Lot Next to Office Gray Tank
E: #1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W
HEIGHT: 400 ft.

SPEED: 10 MPH
DIRECTION: East
RATURE: 80°
ONDITION: 100% Clear Blue
S
ROUND: Blue Sky

NG CONDITIONS: Good

OF EMISSIONS: Black

TS: Run #3

F READINGS ≥ 20%: 5
F READINGS ≥ 60%: 0
E OPACITY: 3.38%
S:

TURE: Daniel R. Petrovay

X	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	5	5	5	5
3	5	5	5	5
4	5	5	5	0
5	0	0	0	0
6	0	0	5	10
7	10	15	15	15
8	20	20	25	25
9	20	15	10	5
10	5	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

X	0	15	30	45
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-20-89
ITY Shenango Steel Inc.
VATION PERIOD: START: 1450
FINISH: 1550

VATION POINT: S.W. Visitors
ing Lot Across Office Area Gray Tank
E: #1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W.
HEIGHT: 400 ft
EAST
SPEED: 10 mph
DIRECTION: EAST
RATURE: 77°
ONDITION: 95% Clear Blue Skies
Cloud cover
ROUND: Blue skies + white
ds
NG CONDITIONS: Good

OF EMISSIONS: Black

NTS: Run #3

F READINGS ≥ 20%: 0
F READINGS ≥ 60%: 0
E OPACITY: .08%
S:

TURE: Daniel R. Petrovay

	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

Port Orange

3rd Port

	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	5
36	5	5	5	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Port Orange

Last Port

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-20-89
ITY Shenango Steel Inc.
VATION PERIOD: START: 1350
FINISH: 1450

VATION POINT: S.W. Visitors
ng Lot next to office
E: #1 Battery Stack
DISTANCE FROM: 200yds
DIRECTION FROM: S.W.
HEIGHT: 400 ft

SPEED: 7-10 mph
DIRECTION: East
RATURE: 70°
ONDITION: 95% Clear + 5% White
ds
ROUND: Blue + white skies

NG CONDITIONS: Good

OF EMISSIONS: Black

NTS: Run #3

F READINGS ≥ 20%: 0
F READINGS ≥ 60%: 0
E OPACITY: 1.25%
S:

TURE: Daniel R. Petrovay

	0	15	30	45
0	0	0	0	0
1	0	0	0	5
2	10	10	10	10
3	10	10	5	5
4	5	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

Port Chamber

	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	5	5	5	5
35	10	15	15	10
36	5	5	5	5
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	5	10	10
53	10	15	15	10
54	10	10	10	10
55	5	5	5	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

2nd Port

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-20-89
ITY Shenango Steel Inc.
VATION PERIOD: START: 1140
FINISH: 1206

VATION POINT: SW visitors
ng Lot Next office Gray Tank
E: #1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W
HEIGHT: 400 ft

SPEED: 10 mph
DIRECTION: North
RATURE: 67°
ONDITION: 80% Clear + 20% white
ds
ROUND: Blue Sky + White Clouds

NG CONDITIONS: Good

OF EMISSIONS: Black + Brownish

NTS: Run #2

F READINGS ≥ 20%: 0
F READINGS ≥ 60%: 0
CE OPACITY: 0.3%
S:

TURE: Daniel R. Petrovay

	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	5	5
25	5	5	5	5
26				
27				
28				
29				

	0	15	30	45
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
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57				
58				
59				

VISIBLE EMISSIONS OBSERVATION FORM

IVER Daniel R. Petrovay

9-20-84

LITY Shenango Steel Inc.

RVATION PERIOD: START: 1040

FINISH: 1140

RVATION POINT: S W Visitors Parking

Next to office • Gray tank

CE: #1 Battery stack

DISTANCE FROM: 200yds

DIRECTION FROM: S W

HEIGHT: 400ft

North

SPEED: 12 MPH

DIRECTION: North

ERATURE: 30 25T 68% 67°

CONDITION: 90% clear - 10%

te clouds

GROUND: Blue sky

ING CONDITIONS: Good

R OF EMISSIONS: Black + Brownish

te

NTS: Run #2

OF READINGS ≥ 20%: 7

OF READINGS ≥ 60%: 0

AGE OPACITY: 1.56%

S:

ATURE: Daniel R. Petrovay

	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	5	5	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	10	10	15
29	20	20	15	15

Port change

Start 3rd Port

	0	15	30	45
30	10	5	5	5
31	5	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	5	10
37	10	15	20	20
38	25+	25	20	15
39	15	10	10	5
40	5	5	5	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Port change

Start last Port

VISIBLE EMISSIONS OBSERVATION FORM

VER Daniel R. Petrovay
9-20-89
LITY Shenango Steel Inc
VATION PERIOD: START: 0940
FINISH: 1040

VATION POINT: SW Parking Lot
tors Next to office
CE: #1 Battery Stack
DISTANCE FROM: 200 yds
DIRECTION FROM: S.W.
HEIGHT: 400 ft

SPEED: 9 mph
DIRECTION: North
RATURE: 30.22 ft B.P. 81% Hum 63°
CONDITION: 100% Clear

ROUND: Blue Sky

NG CONDITIONS: Good

OF EMISSIONS: Black + Brown

NTS: Run #2

F READINGS ≥ 20%: 2
F READINGS ≥ 60%: 0
GE OPACITY: 1.25%
S:

ATURE: Daniel R. Petrovay

	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	5	5	5
3	5	5	5	5
4	5	5	5	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	5
8	5	5	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	5	5
16	5	10	15	15
17	20	20	15	15
18	10	10	5	5
19	5	5	5	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

		0	15	30	45
Port Change	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
Port Change Finish	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
Start 2nd Port	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	10	10	10
	45	10	5	5	5
	46	5	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

CO_2 5.0 5.0

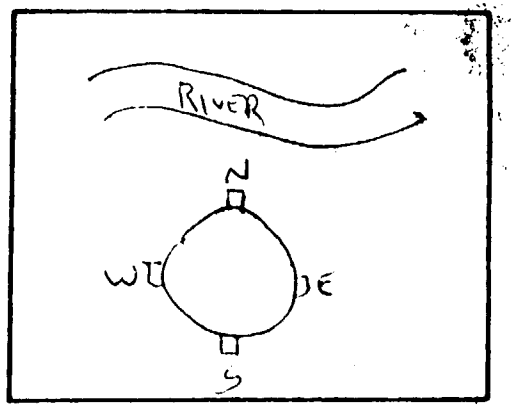
PLANT Shenango DATE 9-20-89 RUN NO. 3

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
S	START	1505	255.631										
	65	1510	260.19	0.085	3.2	3.2	537	127	100	8	261	56	248±25
	70	1515	264.93	0.080	3.0	3.0	540	128	101	8	261	59	
	75	1520	269.25	0.070	2.6	2.6	544	131	102	6	262	60	
	80	1525	273.66	0.075	2.8	2.8	537	131	100	6	262	61	
	85	1530	278.11	0.075	2.8	2.8	550	133	103	7	260	63	
	90	1535	282.530	0.075	2.8	2.8	573	134	105	7	254	64	
E	START	1540	282.530										
	95	1545	286.44	0.060	2.3	2.3	511	122	100	4	264	64	
	100	1550	290.46	0.060	2.3	2.3	512	123	102	4	263	66	
	105	1555	294.73	0.070	2.6	2.6	525	126	102	4	266	69	
	110	1600	298.95	0.065	2.5	2.5	557	128	102	4	263	70	
	115	1605	303.15	0.065	2.5	2.5	562	128	103	4	263	72	
	120	1610	307.143	0.060	2.3	2.3	563	129	104	4	263	74	
			107.622	.279		2.975	544.375	113.5					

EPA MI 15

FIELD DATA

PLANT SHENANGO
DATE 9-20-89
SAMPLING LOCATION #1 BATTERY STACK
SAMPLE TYPE METHOD 5
RUN NUMBER 3
OPERATOR TWS
AMBIENT TEMPERATURE ~72°F
BAROMETRIC PRESSURE 29.68
STATIC PRESSURE, (P_s) 29.61
FILTER NUMBER (s)
PITOT TUBE No. & Cp. .84



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 7' SS
NOZZLE I.D. .515
ASSUMED MOISTURE, % 15
SAMPLE BOX NUMBER
METER BOX NUMBER 582-125
METER ΔH@ 2.015 γ = 1.006
K FACTOR
PRE-TEST LEAK CHECK RATE .016 CFM @ 15 "Hg
POST TEST LEAK CHECK RATE .005 CFM @ 15 "Hg
REFERENCE Δp

READ AND RECORD ALL DATA EVERY 5 MINUTES

407.1

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
N	0	1350	199.521										
	5	1355	203.18	0.080	3.0	3.0	530	120	87	4	252	40	248 ± 25
	10	1400	207.83	0.085	3.2	3.2	532	121	87	4	247	40	
	15	1405	212.51	0.085	3.2	3.2	546	124	92	5	248	46	
	20	1410	217.19	0.085	3.2	3.2	559	126	94	5	246	48	
	25	1415	222.32	0.110	4.0	4.0	567	130	97	5	249	50	
	30	1420	227.532	0.110	4.0	4.0	572	132	98	5	256	51	
S	START	1430	227.791										
	35	1435	232.02	0.070	2.6	2.6	519	124	98	4	248	50	
	40	1440	236.33	0.065	2.5	2.5	520	126	99	4	246	50	
	45	1445	240.86	0.085	3.2	3.2	533	128	100	5	240	54	
	50	1450	245.66	0.090	3.4	3.4	550	130	101	5	250	56	
	[illegible]	[illegible]	[illegible]	[illegible]	3.7	3.7	560	133	102	6	251	56	

STATIC 0.18

5.5 5.5

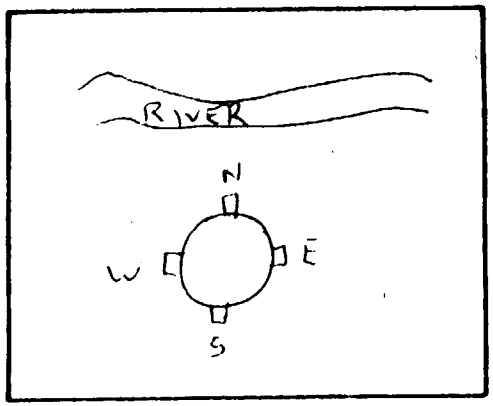
PLANT SHEMANGO 9-20-89 [illegible]N NO. 2

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
W	START	1100	139.190										
	1 65	1105	—	0.085	3.2	3.2	534	106	81	6	274	47	248±25
	70	1110	[illegible]	0.085	3.2	3.2	532	108	82	6	275	49	
	2 75	1115	152.97	0.080	3.0	3.0	536	109	83	6	263	50	
	80	1120	157.47	0.085	3.2	3.2	546	110	83	6	254	50	
	3 85	1125	162.34	0.095	3.5	3.5	558	113	85	7	240	52	
	90	1130	167.143	0.090	3.4	3.4	566	115	87	7	242	54	
S	START	1137	167.143	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	1 95	1142	—	0.070	2.6	2.6	533	110	86	6	255	53	
	100	1147	175.61	0.070	2.6	2.6	534	111	86	6	255	53	
	2 105	1152	179.78	0.070	2.6	2.6	549	112	87	6	259	56	
	110	1157	184.17	0.075	2.8	2.8	556	115	88	6	259	57	
	3 115	1202	188.45	0.070	2.6	2.6	563	117	90	6	259	57	
	120	1207	192.701	0.070	2.6	2.6	569	119	91	6	261	60	
			108.36	.284	3.041		551.666	94.645					
1-AVE 2 6 PR 5 MIN.													

EPA METHOD 5

FIELD DATA

PLANT Shenango
DATE 9-20-89
SAMPLING LOCATION #1 Battery Stack
SAMPLE TYPE Method 5
RUN NUMBER 2
OPERATOR TLS
AMBIENT TEMPERATURE ~68°F
BAROMETRIC PRESSURE 29.69
STATIC PRESSURE, (P_s) 29.62
FILTER NUMBER (s) 0112
PITOT TUBE No. & Cp. .84



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 7' SS
NOZZLE I.D. .575
ASSUMED MOISTURE, % 15
SAMPLE BOX NUMBER —
METER BOX NUMBER 582-125
METER ΔH@ 2.015 γ = 1.006
K FACTOR 0.95
PRE-TEST LEAK CHECK RATE .013 CFM @ 14 "Hg
POST TEST LEAK CHECK RATE .007 CFM @ 15 "Hg
REFERENCE Δp 0.05

READ AND RECORD ALL DATA EVERY 5 MINUTES

moisture 38%

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
N	0	0940	084.341										
	1 5	0945	088.96	0.085	3.2	3.2	534	86	63	6	241	38	248±25
	10	0950	093.56	0.085	3.2	3.2	547	97	68	6	252	56	
	2 15	0955	098.15	0.090	3.3	3.3	556	104	73	6	261	60	
	20	1000	102.95	0.085	3.2	3.2	566	105	74	6	260	60	
	3 25	1005	107.47	0.085	3.2	3.2	570	106	75	6	258	61	
	30	1010	112.048	0.085	3.2	3.2	574	108	77	6	259	68	
W	START	1019	112.048	0.075	2.8	2.8	526	94	78	5	258	52	
	1 35	1023	116.36	0.080	3.0	3.0	543	103	78	6	259	52	
	40	1028	120.83	0.085	3.2	3.2	546	106	80	6	262	56	
	2 45	1033	—	0.085	3.2	3.2	559	112	83	6	266	56	
	50	1038	130.07	0.085	3.2	3.2	567	114	85	6	261	58	
	55	3 1043	134.65	0.080	3.0	3.0	576	114	86	6	252	58	

PLANT SHENANGO DATE 9-19-89 RUN NO. 1

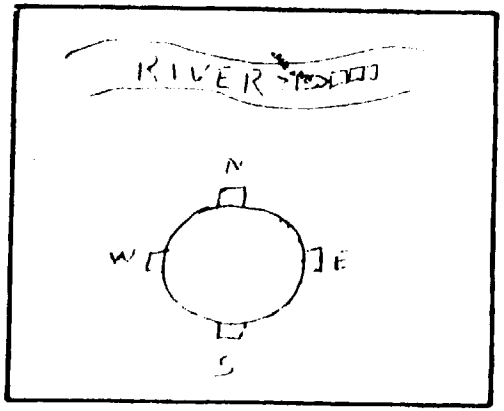
TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
S	START	1425	028.222										248 ± 25
1	65	1430	032.65	0.080	2.8	2.8	536	112	92	6	264	60	
1	70	1435	036.93	[illegible]	2.6	2.6	523	115	91	5	263	57	
2	75	1440	040.90	0.070	2.4	2.4	552	117	91	5	251	60	
2	80	1445	045.00	0.070	2.4	2.4	555	117	94	5	245	62	
3	85	1450	049.26	0.075	2.6	2.6	572	119	93	6	247	62	
3	90	1455	053.516	0.075	2.6	2.6	577	120	92	6	246	64	
E	START	1505	053.516										
1	95	1510	058.63	0.115	3.9	3.9	510	114	90	8	262	64	
1	100	1515	062.76	0.075	2.6	2.6	508	115	92	6	262	65	
2	105	1520	066.32	0.050	1.8	1.8	548	115	92	6	265	67	
2	110	1525	070.37	0.065	2.3	2.3	556	120	93	7	268	68	
3	115	1530	074.61	0.075	2.6	2.6	569	121	95	7	267	70	
3	120	1535	078.918	0.075	2.6	2.6	569	122	92	7	244	72	
			104.218	.279		2.775	550.833	102.	875				

EPA MT 5

FIELD DATA

29.63

PLANT SHENANGO
DATE 9-19-89
SAMPLING LOCATION #1 BATTERY STACK
SAMPLE TYPE METHOD 5
RUN NUMBER 1
OPERATOR TWS
AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE 29.63
STATIC PRESSURE, (P_s) 29.61
FILTER NUMBER (s) 0130
PITOT TUBE No. & Cp. .84



PROBE LENGTH AND TYPE 7' SS
NOZZLE I.D. .515
ASSUMED MOISTURE, % 15
SAMPLE BOX NUMBER —
METER BOX NUMBER 582-125
METER ΔH@ 2.015 γ=1.006
K FACTOR 0.9
PRE-TEST LEAK CHECK RATE .011 CFM @ 14 "Hg
POST TEST LEAK CHECK RATE .006 CFM @ 14 "Hg
REFERENCE Δp .054

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

MOISTURE PICKUP - 392

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMPERATURE, °F
IV	0	1308	974.100										
1	5	1313	979.07	0.030	2.8	2.8	527	99	75	5	254	43	245 ±25°
2	10	1318	983.55	0.075	2.6	2.6	532	104	77	6	250	50	
3	15	1323	987.63	0.015	2.6	2.6	555	112	83	6	249	58	
4	20	1328	991.90	0.015	2.6	2.6	561	114	86	6	250	60	
5	25	1333	996.13	0.080	2.8	2.8	566	115	87	6	253	62	
6	30	1338	000.495	0.080	2.8	2.8	565	116	87	6	254	63	
IV	START	1345	000.490										
1	35	1350	004.87	0.080	2.8	2.8	523	113	89	6	260	60	
2	40	1355	009.22	0.080	2.8	2.8	524	118	90	6	259	60	
3	45	1400	013.74	0.085	3.0	3.0	556	119	90	6	247	58	
4	50	1405	018.27	0.085	3.0	3.0	573	123	93	8	240	60	
5	55	1410	022.80	0.110	3.8	3.8	580	123	93	8	253	64	

APPENDIX A

FIELD DATA

BCM

TABLE 1

SUMMARY OF RESULTS

COKE OVEN BATTERY NO. 1 COMBUSTION STACK

Parameter	Run No. 1	Run No. 2	Run No. 3	Average
Gas Flow (ACFM)	94,888	96,461	94,675	95,341
Gas Flow (DSCFM)	41,291	42,409	41,306	41,669
Gas Temp. (^{o}F)	551	552	544	549
Gas Moisture (%)	15.8	15.1	16.1	15.7
Isokinetic (%)	97.1	99.9	98.5	98.5
Part. Emission (gr/dscf)	0.0123	0.0240	0.0221	0.0195 ~~0.195~~
Average Opacity (%)	0.5	1.4	1.0	0.97
Number of Readings |20% for 120 min. observation	0	9	5	4.7

BCM

3.0 PROCEDURES

The field sampling program was performed on September 19 and 20, 1989. The BCM test personnel consisted of Messrs. Timothy Schatzer, James Phillippi, and Daniel Petrovay. Mr. Bruce Earhardt served as plant coordinator. The tests were witnessed by Messrs. John Logan and Dan Nadzum of the Allegheny County Health Department.

3.1 FIELD WORK

All test and analytical procedures and field data sheets, including visual emissions data, are contained in Appendix A.

An exception to EPA Method 5 was the use of a heated, flexible, teflon-lined probe extension. This modification was necessary to connect the rigid probe with the heated sample box.

3.2 ANALYSIS

All analytical data sheets and calculations are contained in Appendix B.

3.3 CALIBRATIONS

Field equipment calibrations are contained in Appendix C.

4.0 SUMMARY OF RESULTS

4.1 NO. 1 BATTERY COMBUSTION STACK

Table 1 presents a summary of the results of the particulate testing for No. 1 Battery Combustion Stack. The particulate grain loading ranged from 0.0123 gr/dscf to 0.0240 gr/dscf. The average of the three test runs was 0.0195 gr/dscf. The compliance limit was 0.015 gr/dscf. The average opacity during the three test runs was less than one percent.

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1.0 EXECUTIVE SUMMARY

Shenango Incorporated retained BCM Engineers Inc. (BCM) to perform a particulate emission test on the Coke Oven Battery No. 1 Combustion Stack. Testing and analyses were conducted according to EPA Methods 1 through 5 and 9. The test results are to be used to demonstrate compliance with limitations set forth by the Allegheny County Health Department. The compliance limits and measured particulate emissions were as follows:

NO. 1 BATTERY

Run No.	Compliance Limit	Measured Concentration
1	0.015 gr/dscf	0.0123 gr/dscf
2	0.015 gr/dscf	0.0240 gr/dscf
3	0.015 gr/dscf	0.0221 gr/dscf
Avg.	0.015 gr/dscf	0.0195 gr/dscf

2.0 SCOPE AND OBJECTIVES

The scope of this project included the determination of the following parameters for each test run:

- Gas Flow — ACFM and DSCFM
- Gas Temperature — ^{o}F
- Gas Moisture — % by Volume
- Particulate Concentration — gr/dscf
- Opacity — %

BCM

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APPENDICES

Appendix A Field Data

Appendix B Calculations

Appendix C Calibrations

TABLE

Table 1 Summary of Results Coke Oven Battery No. 1 Combustion Stack 3

PARTICULATE EVALUATION

OF

COKE OVEN BATTERY NO. 1 COMBUSTION STACK

AT

SHENANGO INCORPORATED
NEVILLE ISLAND PLANT
PITTSBURGH, PENNSYLVANIA 15225

BCM NO. 00-4810-29

OCTOBER 10, 1989

PREPARED BY:

TIMOTHY W. SCHATZER
PROJECT SCIENTIST

REVIEWED BY:

PAUL A. JADLOWIEC
SECTION MANAGER

BCM ENGINEERS INC.
5777 BAUM BOULEVARD
PITTSBURGH, PENNSYLVANIA 15206