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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.

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 52

PARTICULATE EVALUATION

OF

Reviewed AS

COKE OVEN BATTERY NO. 1 COMBUSTION STACK

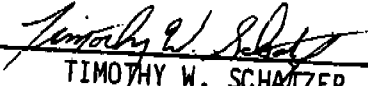
AT

SHENANGO INCORPORATED
NEVILLE ISLAND PLANT
PITTSBURGH, PENNSYLVANIA 15225

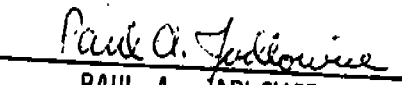
BCM NO. 00-4810-29

OCTOBER 10, 1989

PREPARED BY:


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PITTSBURGH, PENNSYLVANIA 15206

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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

<u>Run No.</u>	<u>Compliance Limit</u>	<u>Measured Concentration</u>
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 °F
- Gas Moisture % by Volume
- Particulate Concentration gr/dscf
- Opacity %

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.



TABLE 1

SUMMARY OF RESULTS

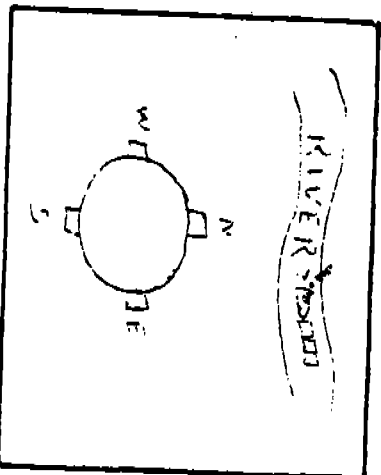
COKE OVEN BATTERY NO. 1 COMBUSTION STACK

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 0.0195
Average Opacity (%)	0.5	1.4	1.0	0.97
Number of Readings 20% for 120 min. observation	0	9	5	4.7

APPENDIX A

FIELD DATA

7/14/89

EPA MF 75
FIELD DATAPLANT SHENKONGDATE 9-19-89SAMPLING LOCATION #1 BATTERY STACKSAMPLE TYPE METHPDSRUN NUMBER 1OPERATOR TLJAMBIENT TEMPERATURE 70°FBAROMETRIC PRESSURE 29.63STATIC PRESSURE (IP) 29.61FILTER NUMBER (S) 0130PRIORITY NO. & CO. 84

PROBE LENGTH AND TYPE 7' 55
 NOZZLE I.D. .515
 ASSUMED MOISTURE % 15
 SAMPLE BOX NUMBER 582-125
 METER BOX NUMBER 582-125
 METER ΔH 2.015 Δ = 1.006
 K FACTOR 0.9
 PRE-TEST LEAK CHECK RATE 0.011 CFM @ 15
 POST TEST LEAK CHECK RATE 0.006 CFM @ 15
 REFERENCE ΔP 0.054

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

SAMPLE NO.	ELAPSED SAMPLING TIME min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (W.P. #)	VELOCITY HEAD (in. H ₂ O)	ORIFICE PRESSURE DIFFERENTIAL (in. H ₂ O)		STACK TEMPERATURE (°F)	DRY GAS METER TEMPERATURE (°F)		PUMP VACUUM (in. Hg)	SAMPLE BOX TEMPERATURE (°F)	IMPIDER TEMPERATURE (°F)
					DESIRED	ACTUAL		INLET	OUTLET			
1	5	1311	918.07	0.070	2.8	2.8	527	99	75	5	254	43
2	10	1318	983.55	0.075	2.6	2.6	532	104	77	6	250	50
3	15	1323	987.63	0.075	2.6	2.6	535	112	83	6	249	58
4	20	1328	991.90	0.075	2.6	2.6	561	114	86	6	250	60
5	25	1333	196.13	0.080	2.8	2.8	566	115	87	6	253	62
6	30	1338	600.49	0.080	2.8	2.8	565	116	87	6	254	63
7												
8												
9												
10												
11	35	1345	000.49									
12	40	1350	004.87	0.080	2.8	2.8	503	113	89	6	260	60
13	45	1355	009.22	0.080	2.8	2.8	524	118	90	6	259	60
14	50	1400	013.74	0.089	3.0	3.0	556	119	90	6	277	58
15	55	1405	018.27	0.085	3.0	3.0	573	123	93	8	240	60
16	60	1410	023.30	0.110	3.0	3.0	580	123	93	8	253	64

Moisture Recd-397

PLANT

SHERMAN

DATE

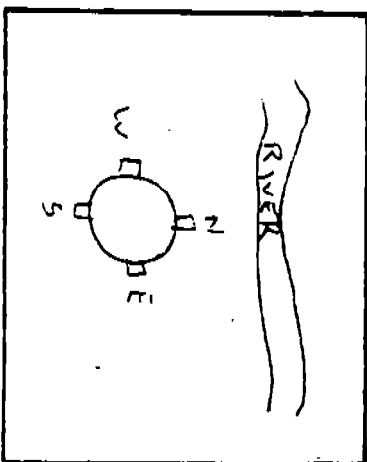
7-17-77

RUN NO.

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. clock)	GAS METER READING (ft^3)	VELOCITY HEAD (30 in. H_2O)	ORIFICE PRESSURE DIFFERENTIAL (ΔH in. H_2O)		STACK TEMPERATURE ($^{\circ}\text{F}$)	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, $^{\circ}\text{F}$	IMPIINGER TEMPERATURE, $^{\circ}\text{F}$	PR TEMP $^{\circ}\text{F}$
					DESIRED	ACTUAL		INLET ($^{\circ}\text{F}$)	OUTLET ($^{\circ}\text{F}$)				
5	(start)	1425	028.222	0.084	2.8	2.8	536	112	92	6	264	60	244
1	165	1430	032.65	0.084	2.6	2.6	523	115	91	5	264	60	
1	170	1444	036.83	0.070	2.4	2.4	552	117	91	5	251	62	
2	175	1443	040.590	0.070	2.4	2.4	555	111	94	5	243	62	
2	180	1445	045.60	0.075	2.6	2.6	572	119	93	6	247	62	
3	185	1450	049.26	0.075	2.6	2.6	577	120	92	6	246	64	
3	190	1455	053.516	0.075	2.6	2.6							
E	(start)	1505	053.516										
1	195	1510	053.63	0.115	3.9	3.9	510	114	90	8	262	64	
1	200	1515	062.76	0.075	2.6	2.6	508	115	92	6	262	67	
2	205	1520	066.32	0.050	1.3	1.8	548	115	92	6	265	68	
2	210	1525	070.37	0.065	2.3	2.3	556	120	93	7	268	70	
3	215	1530	074.61	0.075	2.6	2.6	569	121	95	7	267	72	
3	220	1535	078.918	0.075	2.6	2.6							
			104.218	0.279			2.775	550.833	102.075				

EPA METHOD 35
FIELD DATA

PLANT Shenandoah
DATE 9-20-83
SAMPLING LOCATION PI BATTERY STICK
SAMPLE TYPE METHO 5
RUN NUMBER 2
OPERATOR TCB
AMBIENT TEMPERATURE 68°F
BAROMETRIC PRESSURE 29.69"
STATIC PRESSURE (IP) 29.62
FILTER NUMBER (SI) 2112
PITOT TUBE NO. & CP. 84



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

WIND SPEED 386

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, MIN	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (4 in. H ₂ O)	ORIFICE PRESSURE (4 in. H ₂ O)		STACK TEMPERATURE (°F)	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET	OUTLET			
N	10	0945	088.96	3.2	3.2	534	86	63	6	241	38
	10	0950	093.56	3.2	3.2	547	97	68	6	252	56
	15	0955	098.15	3.3	3.3	556	104	73	6	261	60
	20	1000	102.95	3.2	3.2	566	105	74	6	260	60
	25	1005	107.47	3.2	3.2	570	106	75	6	258	61
	30	1010	112.048	3.2	3.2	574	108	77	6	259	68
W	35	1018	112.048	3.2	3.2	574	108	77	6	259	68
	40	1023	116.36	3.0	3.0	543	94	78	5	258	52
	45	1028	120.83	3.2	3.2	546	103	78	6	259	52
	50	1033	—	3.2	3.2	559	106	80	6	262	56
	55	1038	120.07	3.2	3.2	567	112	83	6	266	56
	55	1043	134.65	3.0	3.0	576	114	85	6	261	58
			137.19				114	86	6	252	58

PROBE LENGTH AND TYPE 7' 55
NOZZLE I. D. .575
ASSUMED MOISTURE, % 15
SAMPLE BOX NUMBER 582-115
METER BOX NUMBER 2015
METER ΔH 0.95
K FACTOR 0.95
PRE-TEST LEAK CHECK RATE .013 CFM @
POST TEST LEAK CHECK RATE .007 CFM @
REFERENCE ΔP 0.05

57m 13c 2.11.14

5.5 5.5

PLANT SHEPHERDS

9-20-89

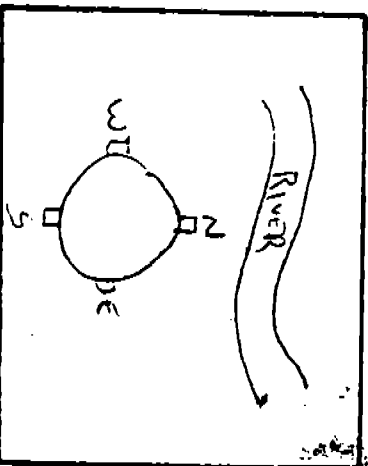
ON NO

4

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. clock)	GAS METER READING in. H ₂ O	VELOCITY HEAD (in. H ₂ O)	ORIFICE PRESSURE DIFFERENTIAL (in. H ₂ O)		STAGNATION TEMPERATURE (°F)	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPIPING TEMPERATURE, °F
					DESIRED	ACTUAL		INLET	OUTLET			
1	65	1105	139.190	0.085	3.2	3.2	534	106	81	6	274	47
2	70	1110	140.40	0.085	3.2	3.2	532	108	82	6	215	49
3	75	1115	152.97	0.080	3.0	3.0	536	109	83	6	263	50
4	80	1120	157.47	0.085	3.2	3.2	546	110	83	6	254	50
5	85	1125	162.34	0.095	3.5	3.5	558	113	85	7	240	52
6	90	1130	167.443	0.090	3.4	3.4	566	115	87	7	242	54
7	95	1137	167.143	0.090	3.4	3.4	569	117	88	6	259	57
8	100	1142	175.61	0.070	2.6	2.6	533	110	86	6	255	53
9	105	1147	179.78	0.070	2.6	2.6	549	112	87	6	259	56
10	110	1157	184.17	0.075	2.8	2.8	556	115	88	6	259	57
11	115	1202	188.45	0.070	2.6	2.6	563	117	90	6	259	57
12	120	1207	192.701	0.070	2.6	2.6	569	119	91	6	261	60
13			106.36	0.284	3.04		551.666	94.645				

FIELD DATA

PLANT 5 HENAPUGS
DATE 9-22-81
SAMPLING LOCATION #1 BONEY STAG
SAMPLE TYPE METHOD S
RUN NUMBER 3
OPERATOR TLS
AMBIENT TEMPERATURE ~ 72°F
BAROMETRIC PRESSURE 29.67
STATIC PRESSURE, (PSI) 29.61
FILTER NUMBER (S) 5
PILOT TUBE NO. & CP. .84



PROBE LENGTH AND TYPE 7' 55"
NOZZLE I.D. 1.515
ASSUMED MOISTURE, % 15
SAMPLE BOX NUMBER _____
METER BOX NUMBER 586-125
METER ΔH_0 2.015 $\delta = 1.300$
K FACTOR _____
PRE-TEST LEAK CHECK RATE 0.15 CSM @ _____
POST TEST LEAK CHECK RATE 0.05 CSM @ _____
REFERENCE ΔP _____

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE SAMPLING ORIFICE NUMBER	GLASSED SAMPLING TIME min	CLOCK TIME (24 Hr. CLOCK)	GAS METER READING (V. M.)	VELOCITY HEAD 1/8" P. in. H ₂ O	ORIFICE PRESSURE DIFFERENTIAL 1/4" in. H ₂ O		STACK TEMPERATURE (F. °)	DRY GAS METER TEMPERATURE INLET OUTLET		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °	IMPIGNER TEMPERATURE °
					DESIRED	ACTUAL		INLET	OUTLET			
N	0	11:35	199.521									
	5	11:35.5	201.18	0.080	3.0	3.0	530	120	87	4	252	40
	10	11:40.1	207.83	0.085	3.2	3.2	532	121	87	4	247	40
	15	11:40.5	212.51	0.085	3.2	3.2	546	124	92	5	248	46
	20	11:41.1	217.19	0.085	3.2	3.2	559	126	94	5	246	48
	25	11:41.5	222.32	0.110	4.0	4.0	567	130	97	5	249	50
	30	11:42.0	227.532	0.110	4.0	4.0	572	132	98	5	256	51
S	START	11:30	227.791									
	35	11:35	232.02	0.070	2.6	2.6	519	124	78	4	248	50
	40	11:40	236.23	0.065	2.5	2.5	520	126	99	4	246	50
	45	11:45	240.86	0.085	3.2	3.2	533	128	100	5	240	54
	50	11:50	245.40	0.090	3.4	3.4	550	130	101	5	250	56
							560	133	102	6	251	56

PLANT SHENANDO

DATE 9-20-89

RUN NO.

W

TRAVERSE POINT NUMBER	ELAPSED SAMPLING TIME, min	CLOCK TIME (24 hr. CLOCK)	GAS METER READING (V, I, N) (25.631)	VELOCITY HEAD (Δp), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE (T_m), °F		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGET TEMPERATURE °F
					DESIRED	ACTUAL		INLET	OUTLET			
5	START	(1505)										
	65	1510	260.17	0.085	3.2	3.2	537	127	100	8	261	56
	70	1515	261.73	0.080	3.0	3.0	540	128	101	9	261	51
	75	1520	261.25	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	0.015	2.8	2.8	550	133	103	7	260	63
	90	1535	282.530	0.015	2.8	2.8	573	134	105	7	259	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	68
	110	1600	298.95	0.065	2.5	2.5	551	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	1279		2.975	544.375	113.5				

VISIBLE EMISSIONS OBSERVATION FORM

OVER DANIEL R. PETROVAY

9-20-89

CITY SHENANGO STEEL INC

OBSERVATION PERIOD: START: 0940

FINISH: 1040

OBSERVATION POINT: SW PARKING LOT

TOWNS NEXT TO OFFICE

RE: #1 BATTERY STACK

DISTANCE FROM: 200 yds

DIRECTION FROM: S.W.

HEIGHT: 700 FT

SPEED: 9 mph

DIRECTION: North

TEMPERATURE: 30.2278° 81% HUM 63°

CONDITION: 100% CLEAR

GROUND: BLUE SKY

WINDING CONDITIONS: Good

TYPE OF EMISSIONS: BLACK + BROWN

REMARKS: RUN #2

IF READINGS ≥ 20%: 2

IF READINGS ≥ 60%: 0

WIND OPACITY: 1.25%

DATE:

SIGNATURE: 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
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	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

VISIBLE EMISSIONS OBSERVATION FORM

NAME: DANIEL R. PETROVICH

DATE: 9-20-84

CITY: SHENANGO STEEL INC.

OBSERVATION PERIOD: START: 1040

FINISH: 1140

OBSERVATION POINT: S.W. VISITORS PARKING

LOCATION: NEXT TO OFFICE + GRAY TANK

TYPE: #1 BATTERY STACK

DISTANCE FROM: 200 yds

DIRECTION FROM: S.W.

HEIGHT: 400 ft

WIND: NORTH

SPEED: 12 MPH

DIRECTION: NORTH

TEMPERATURE: 30-57 68% 67°

CONDITION: 90% CLEAR - 10%

OTHER CLOUDS:

GROUND: Blue Sky

WIND CONDITIONS: Good

TYPE OF EMISSIONS: BLACK + BROWNISH

REMARKS:

TESTS: RUN #2

OP READINGS @ 20%: 7

OP READINGS @ 60%: 0

FACE OPACITY: 1.56%

REMARKS:

SIGNATURE: Daniel R. Petrovich

×	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

×	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

VISIBLE EMISSIONS OBSERVATION FORM

OVER DANIEL R. PETROVAY

9-20-89

CITY SHENANDO ST. STEEL INC.

OBSERVATION PERIOD: START: 1140

FINISH: 1206

OBSERVATION POINT: S.W. U.S. TORS

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

TEMPERATURE: 67°

CONDITION: 80% CLEAR + 20% WHITE

DS

GROUND: BLUE SKY + WHITE CLOUDS

WINDING CONDITIONS: Good

TYPE OF EMISSIONS: BLACK + BROWNISH

REMARKS: RUN #2

IF READINGS ≥ 20%: 0

IF READINGS ≥ 60%: 0

PERCENTAGE OPACITY: 0.3%

DATE: 9-20-89

SIGNATURE: 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
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				

X	0	15	30	45
30				
31				
32				
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VISIBLE EMISSIONS OBSERVATION FORM

OVER DANIEL R. PETROVAY

9-20-89

CITY SHENANGO STEEL INC.

OBSERVATION PERIOD: START: 1350

FINISH: 1450

OBSERVATION POINT: S.W. VISITORS

W. SIDE NEXT TO OFFICE

REF: #1 BATTERY STACK

DISTANCE FROM: 200 YDS.

DIRECTION FROM: S.W.

HEIGHT: 400 FT

SPEED: 7-10 MPH

DIRECTION: EAST

TEMPERATURE: 70°

WEATHER CONDITION: 95% CLEAR + 5% WHITE

WIND

GROUND: BLUE + WHITE SKIES

WINDY CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #3

PERCENT READINGS ≥ 20%: 0

PERCENT READINGS ≥ 60%: 0

PERCENT OPACITY: 1.25%

DATE:

SIGNATURE: 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
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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

Part 2 of 2

×	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

VISIBLE EMISSIONS OBSERVATION FORM

OVER DANIEL R. PETROVAY

9-20-89

CITY SHENANGO STEEL INC.

OBSERVATION PERIOD: START: 1450

FINISH: 1550

OBSERVATION POINT: S.W. U.S. TARS

ONLY 40 FT ACROSS OFFICE AREA GRAY TANK

NOTE: #1 BATTERY STACK

DISTANCE FROM: 200 yds

DIRECTION FROM: S.W.

HEIGHT: 400 FT

WIND: EAST

SPEED: 10 MPH

DIRECTION: EAST

TEMPERATURE: 77°

CONDITION: 95% CLEAR BLUE SKIES

CLOUD COVER:

GROUND: BLUE SKIES + WHITE

WIND:

WEATHER CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #3

IF READINGS ≥ 20%: 0

IF READINGS ≥ 60%: 0

PERCENT OPACITY: 0.8%

REMARKS:

SIGNATURE: Daniel R. Petrovay

×	0	15	30	45
0	○	○	○	○
1	○	○	○	○
2	○	○	○	○
3	○	○	○	○
4	○	○	○	○
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10	○	○	○	○
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25	○	○	○	○
26	○	○	○	○
27	○	○	○	○
28	○	○	○	○
29	○	○	○	○

×	0	15	30	45
30	○	○	○	○
31	○	○	○	○
32	○	○	○	○
33	○	○	○	○
34	○	○	○	○
35	○	○	○	5
36	5	5	5	○
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

OVER DANIEL R. PETRAJAY
9-20-89

CITY SHENANDO STEEL INC

OBSERVATION PERIOD: START: 1550

FINISH: 1609

OBSERVATION POINT: S.W. VISITORS

1/2 LOT NEXT TO OFFICE GRAY TANK

NO. 1 BATTERY STACK

DISTANCE FROM: 200 YDS

DIRECTION FROM: S.W

HEIGHT: 400 FT.

SPEED: 10 MPH

DIRECTION: EAST

TEMPERATURE: 80°

WEATHER CONDITION: 100% CLEAR BLUE

WIND: 15

CLOUDS: BLUE SKY

WINDING CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #3

READINGS ≥ 20%: 5

READINGS ≥ 60%: 0

PERCENTAGE OPACITY: 3.38%

DATE: 9-20-89

SIGNATURE: Daniel R. PetraJay

×	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
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VISIBLE EMISSIONS OBSERVATION FORM

OVER Daniel R. Petrovsky

9-89-89

CITY Shenandoah, Inc.

OBSERVATION PERIOD: START: 1300

FINISH: 1400

OBSERVATION POINT: S.W. Parking Lot

PLANTS NEXT TO OFFICE

TYPE: # 1 BATTERY STACK

DISTANCE FROM: 200 yds

DIRECTION FROM: S.W.

HEIGHT: 400 FT.

WIND: NORTH EAST

SPEED: 5 MPH

DIRECTION: N.E.

TEMPERATURE: 67°

WEATHER CONDITION: 100% overcast

CLOUDS: White + Gray clouds

WINDY CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #1

SP. READINGS ≥ 20%: 0

SP. READINGS ≥ 60%: 0

SMOKE OPACITY: 0.3%

REMARKS:

SIGNATURE: Daniel R. Petrovsky

×	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

×	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
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
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 CHANGING

START 2nd PORT

VISIBLE EMISSIONS OBSERVATION FORM

OVER DANIEL R. PETRAWAY

9-19-89

CITY SHENANGO STEEL INC.

OBSERVATION PERIOD: START: 1400

FINISH: 1500

OBSERVATION POINT: S.W. PARKING LOT

STOPS NEXT TO OFFICE

CE: = 1 BATTERY STACK

DISTANCE FROM: 200 yds

DIRECTION FROM: S.W.

HEIGHT: 400 FT.

WIND: EAST

SPEED: 6 mph

DIRECTION: EAST

TEMPERATURE: 69° **HUM.** 65%

CONDITION: 80% OVERCAST 20% C

SKY: CL

GROUND: WHITE CLOUD WITH SOME

SKY: CL

WINDING CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #1

IF READINGS ≥ 20%: 3

IF READINGS ≥ 60%: 0

PERCENTAGE OPACITY: 1.6%

TESTS: 1.6%

TESTER: Daniel R. Petraway

×	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	20
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

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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

VISIBLE EMISSIONS OBSERVATION FORM

NAME: DANIEL R. PETROUAY

DATE: 9-29-89

CITY: Shenandoah Steel Inc.

OBSERVATION PERIOD: START: 1500

FINISH: 1536

OBSERVATION POINT: S.W. PARKING LOT

LOCATION: NEXT TO OFFICE

UNIT: # 1 BATTERY STACK

DISTANCE FROM: 200 YDS

DIRECTION FROM: S.W.

HEIGHT: 400 FT.

WIND: SOUTH

SPEED: 3 MPH

DIRECTION: SOUTH

TEMPERATURE: 30.21° 58° HUM. 73°

WEATHER CONDITION: 50% CLEAR + 50% CLOUDY

MOON: 50% CLEAR + 50% CLOUDY

COLOR: BLUE SKY

WIND CONDITIONS: Good

TYPE OF EMISSIONS: BLACK

TESTS: RUN #1

READING 20%: 0

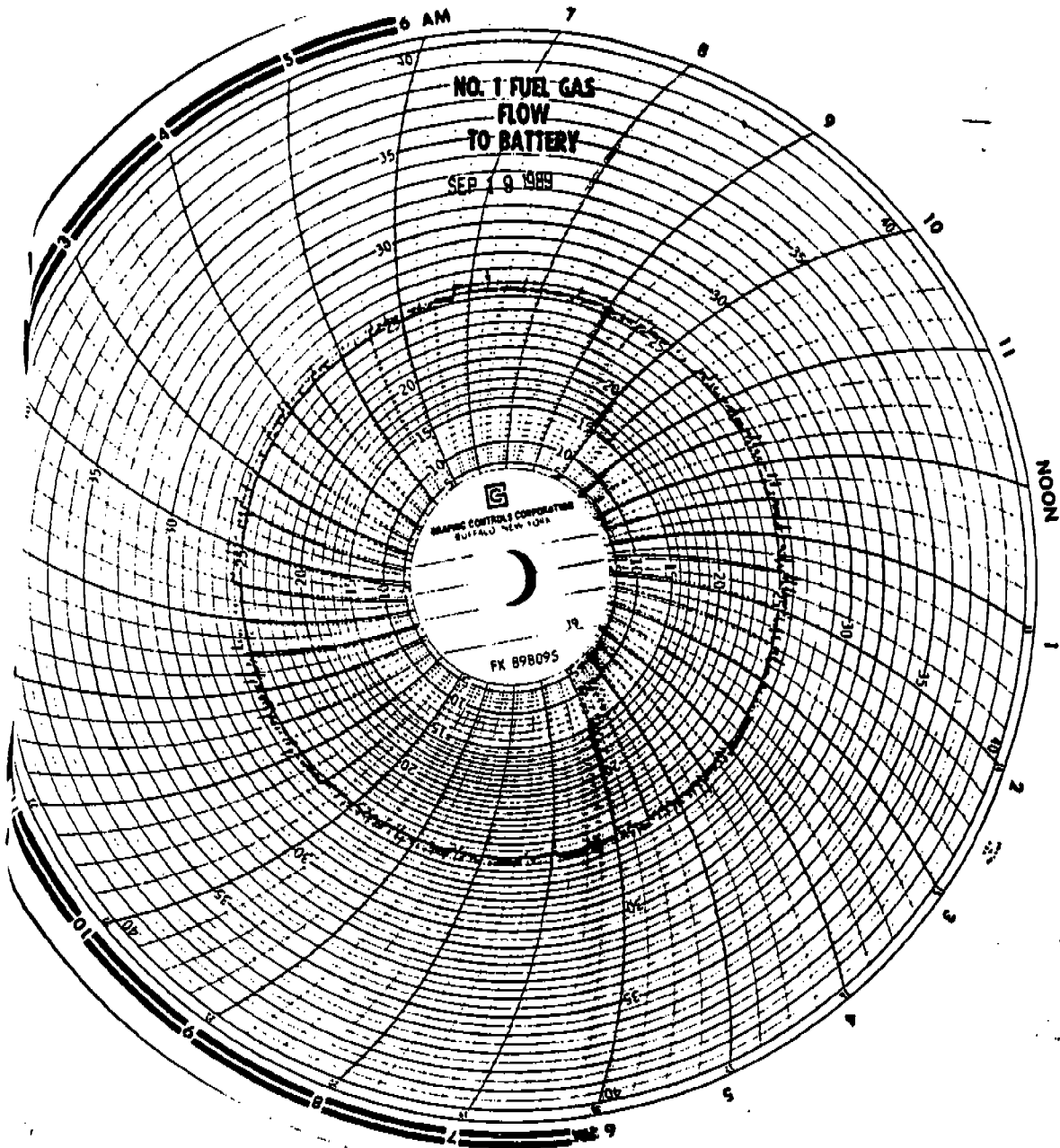
READING 60%: 0

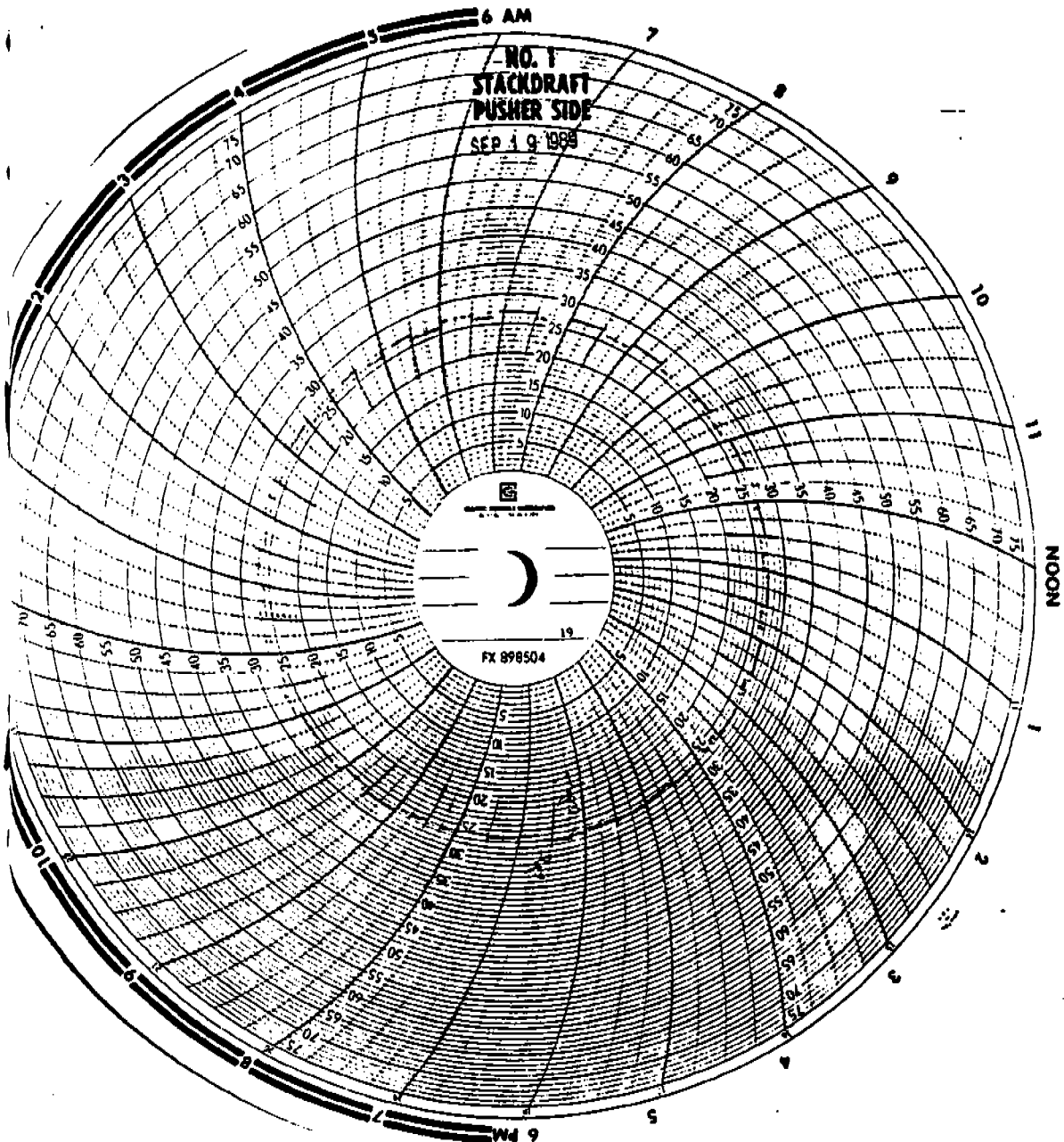
OPACITY: 0%

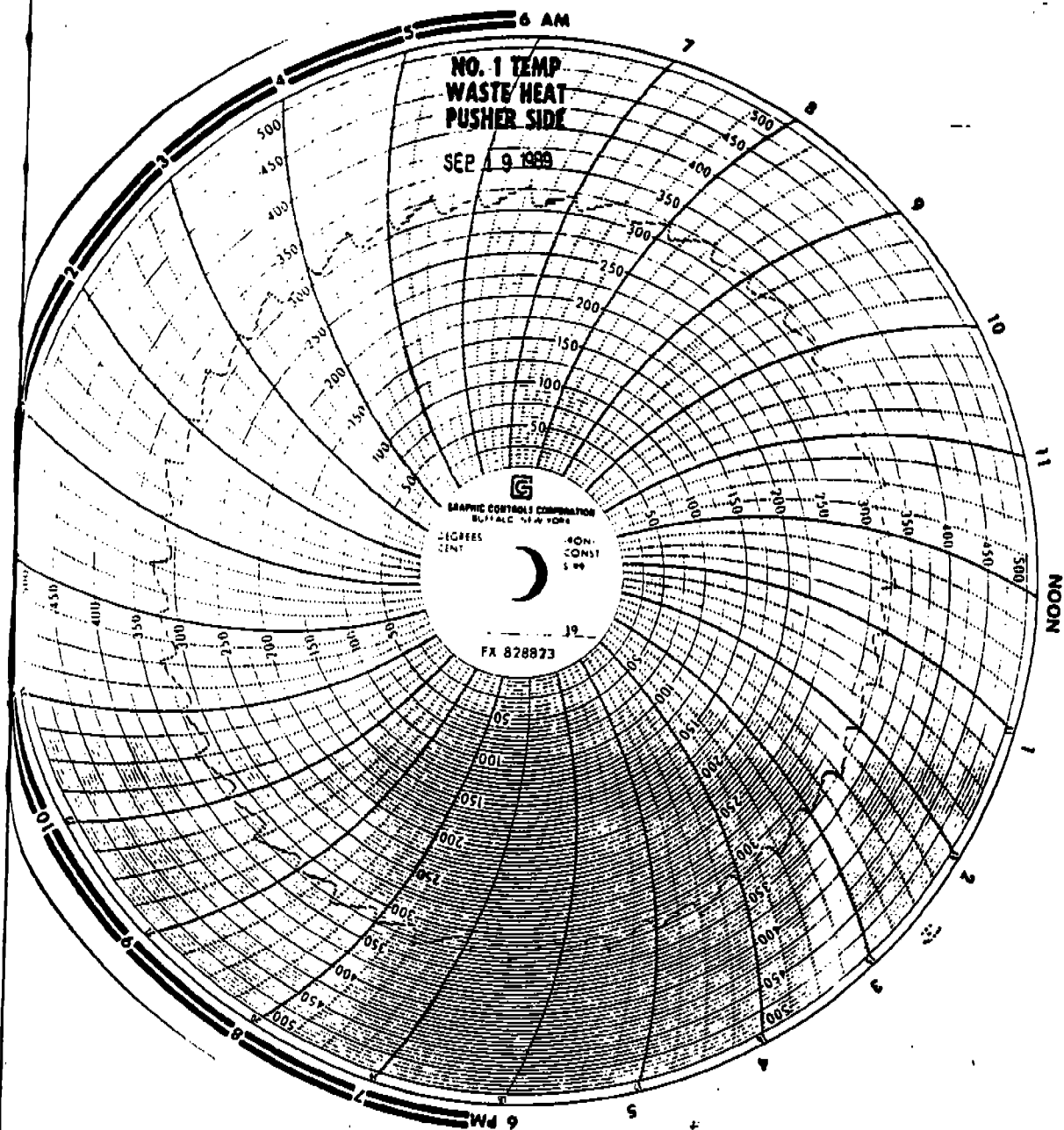
SIGNATURE: Daniel R. Petrouay

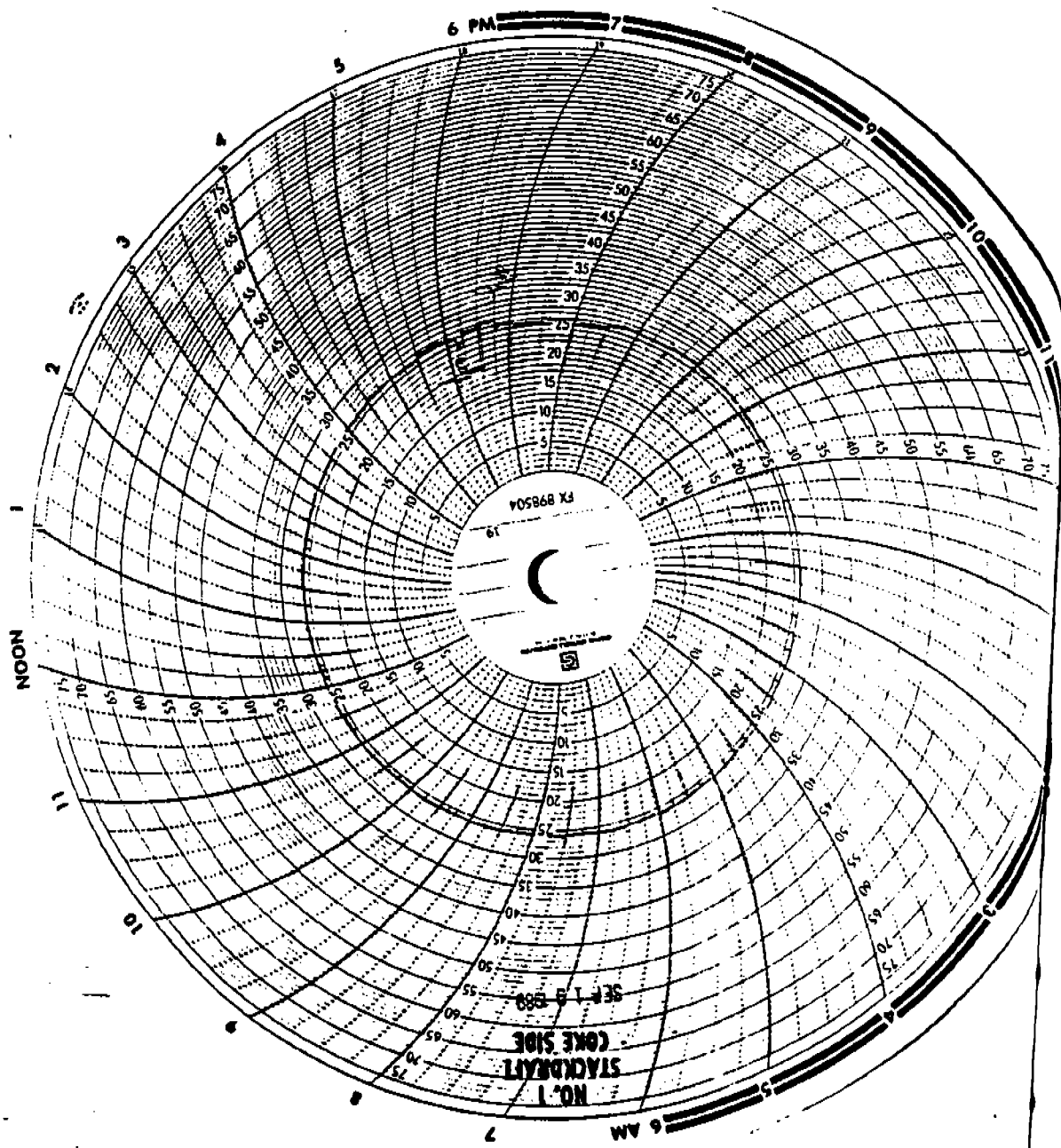
LAST REPORT	0	15	30	45
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5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
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24	0	0	0	0
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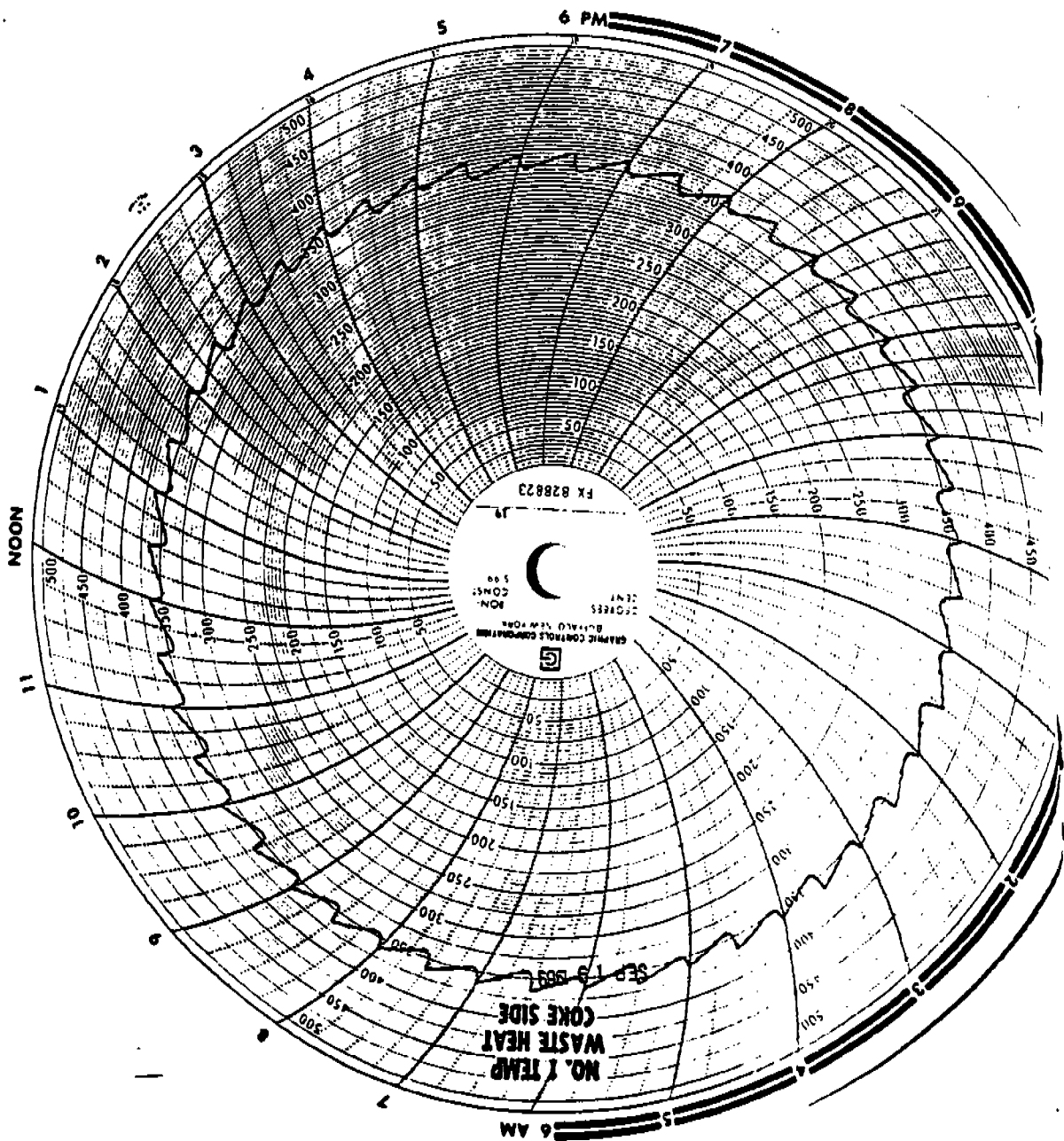
0	15	30	45
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31	0	0	0
32	0	0	0
33	0	0	0
34	0	0	0
35	0	0	0
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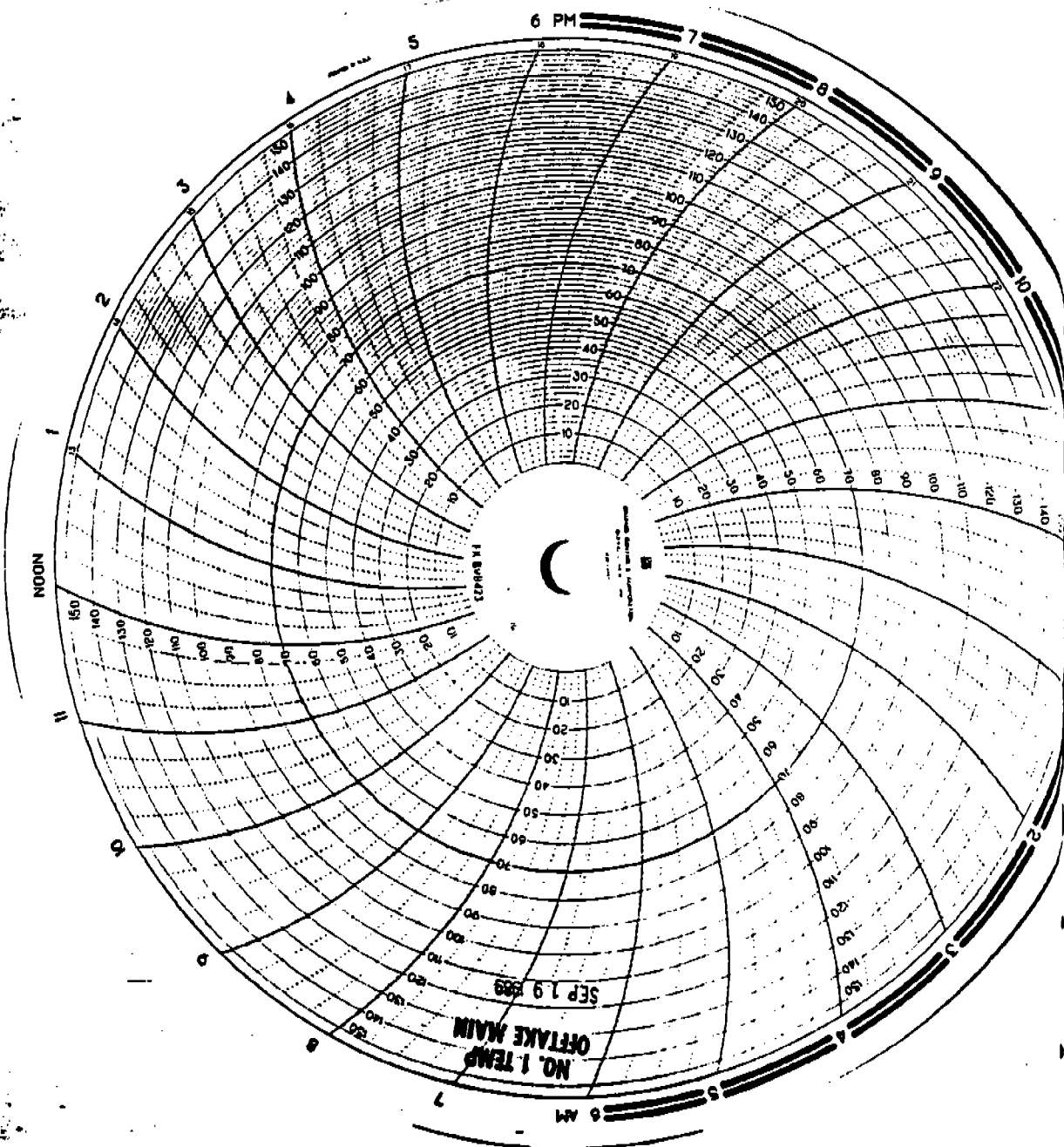


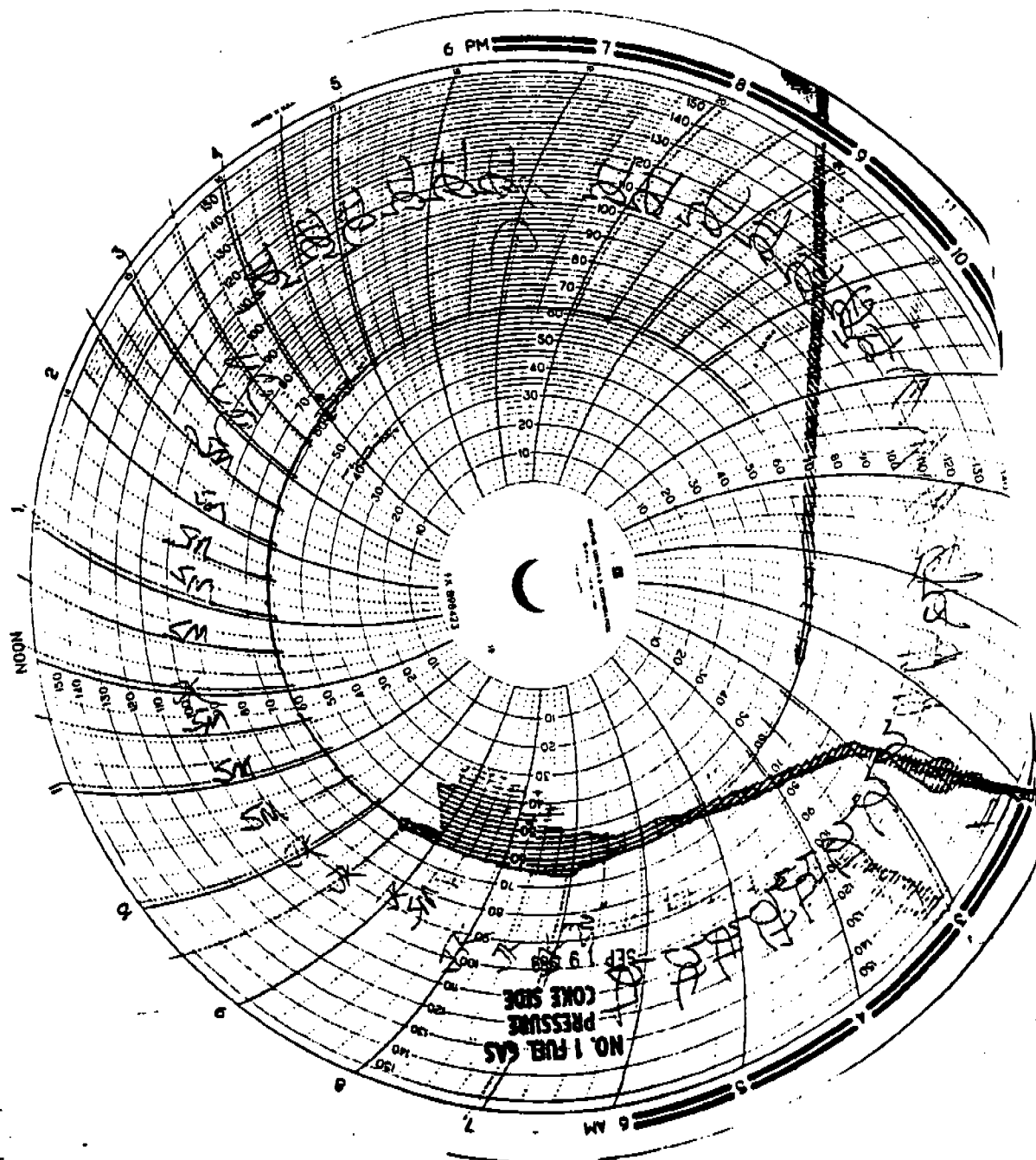


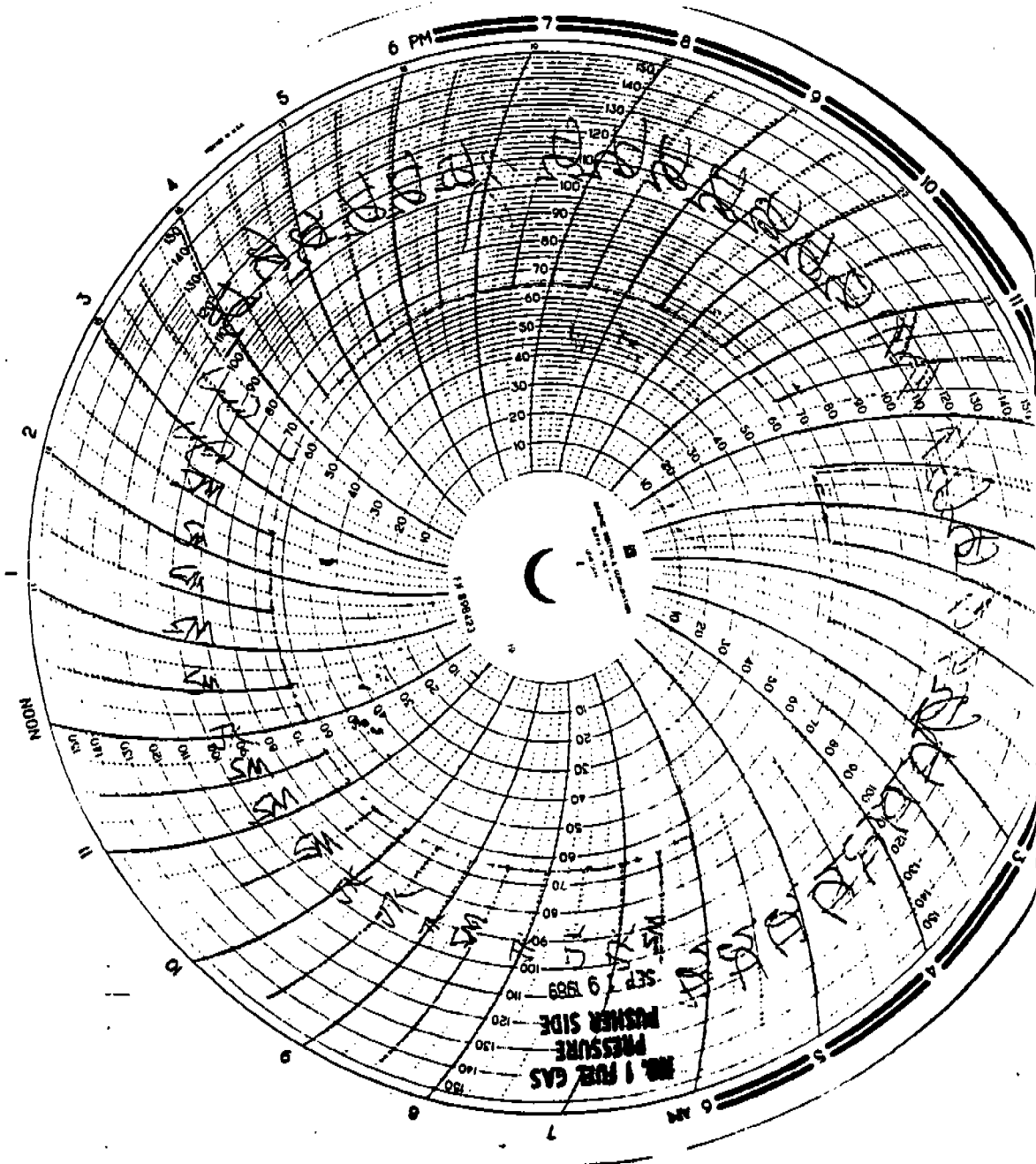


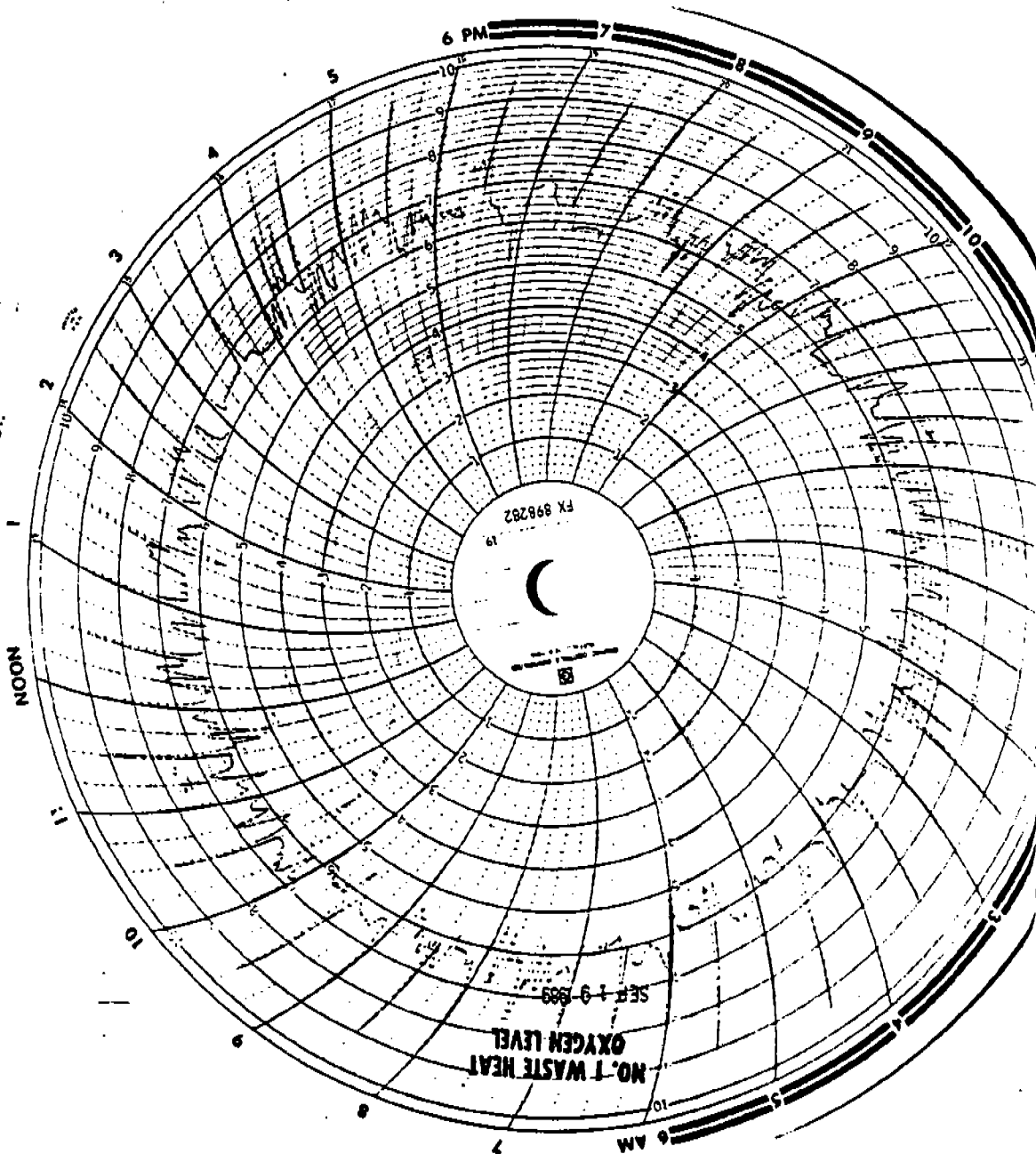


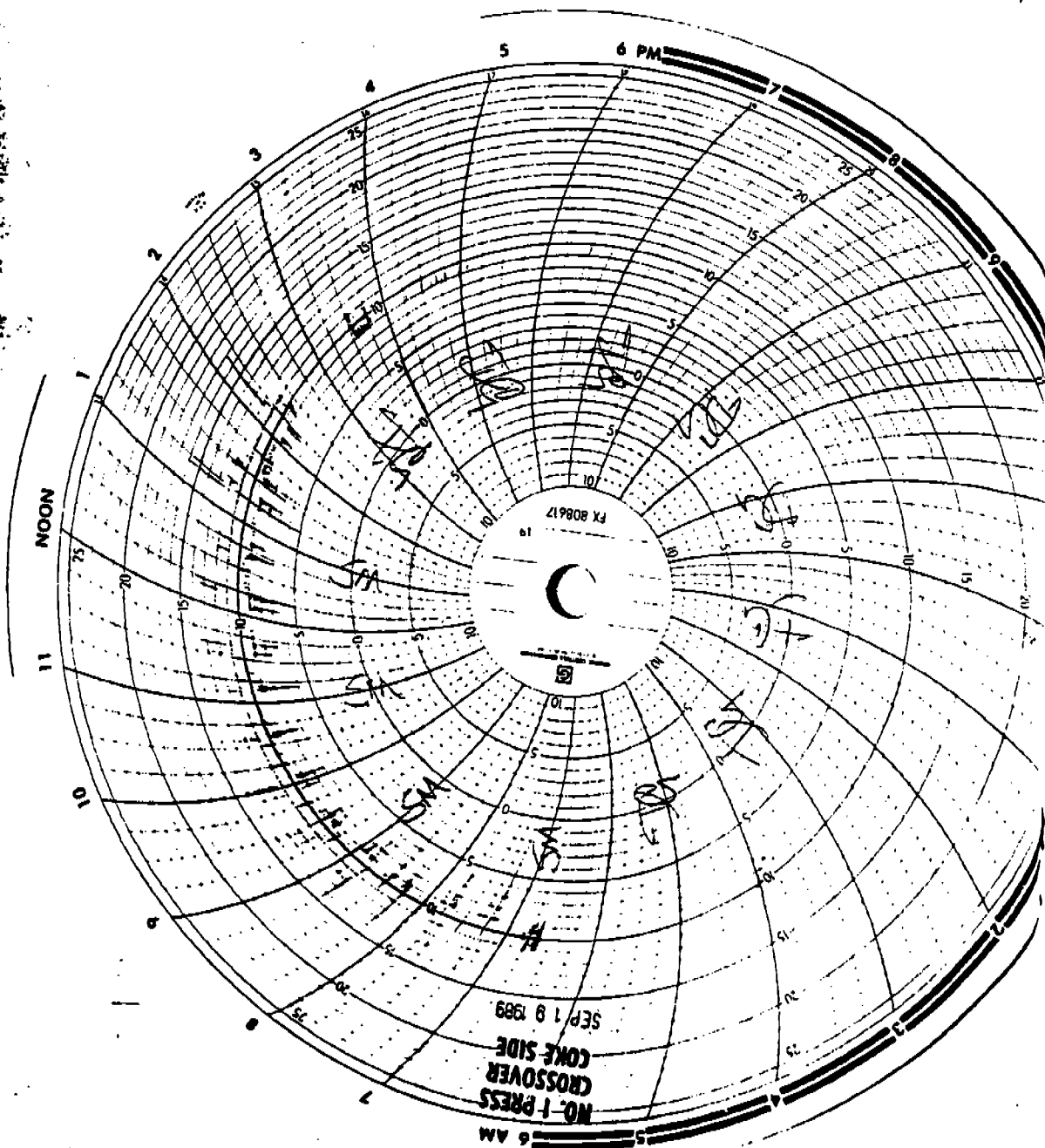


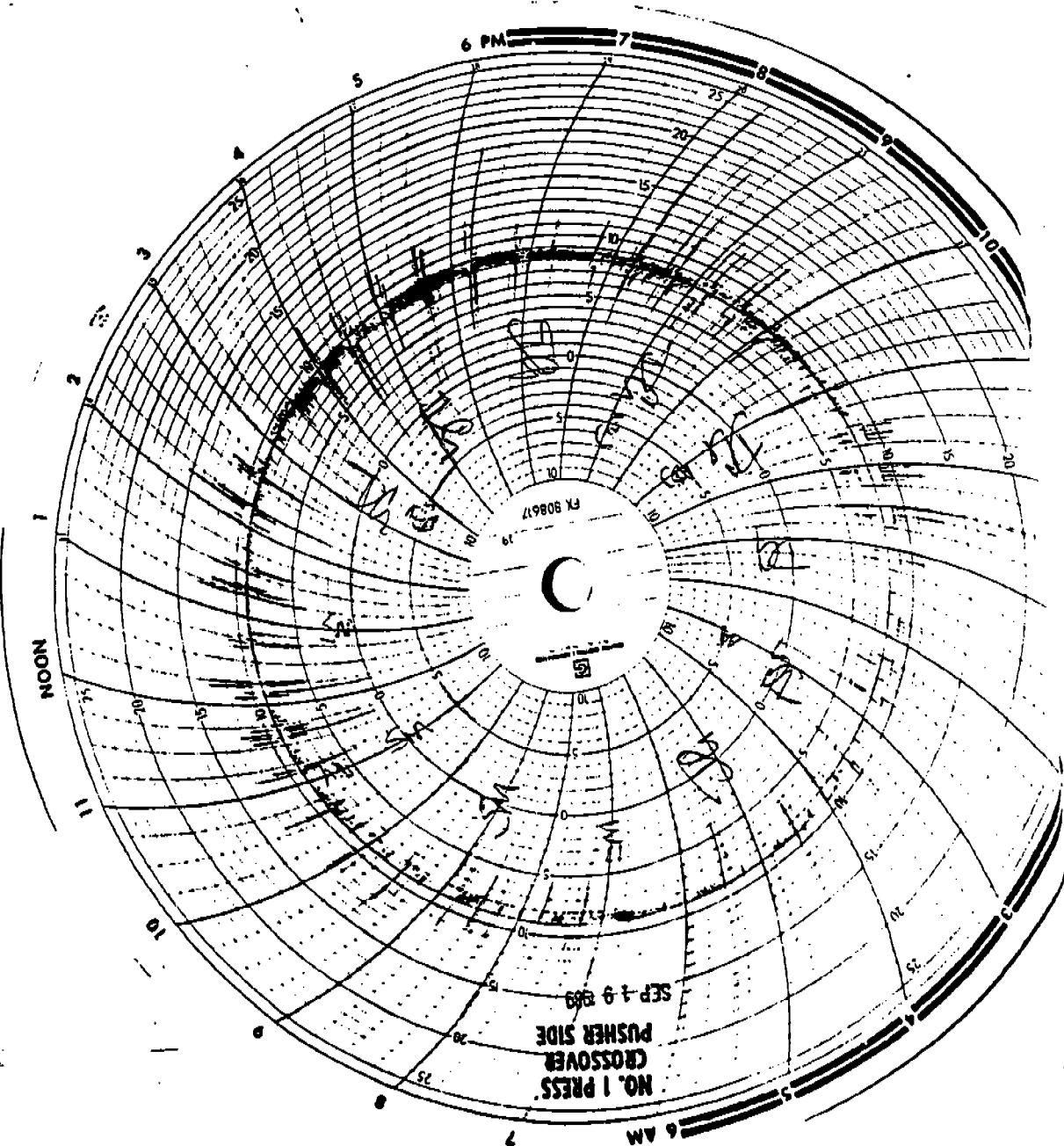


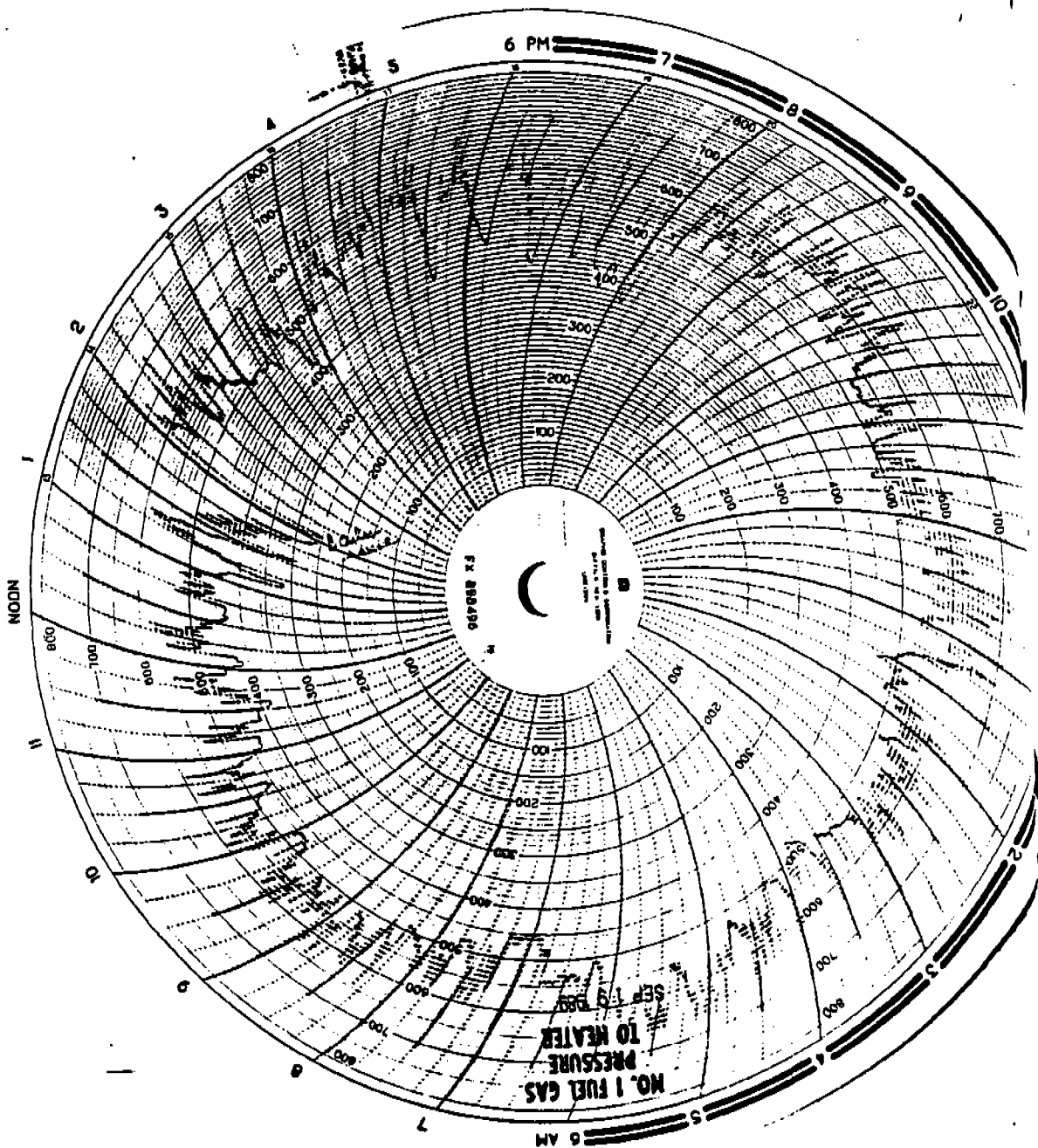


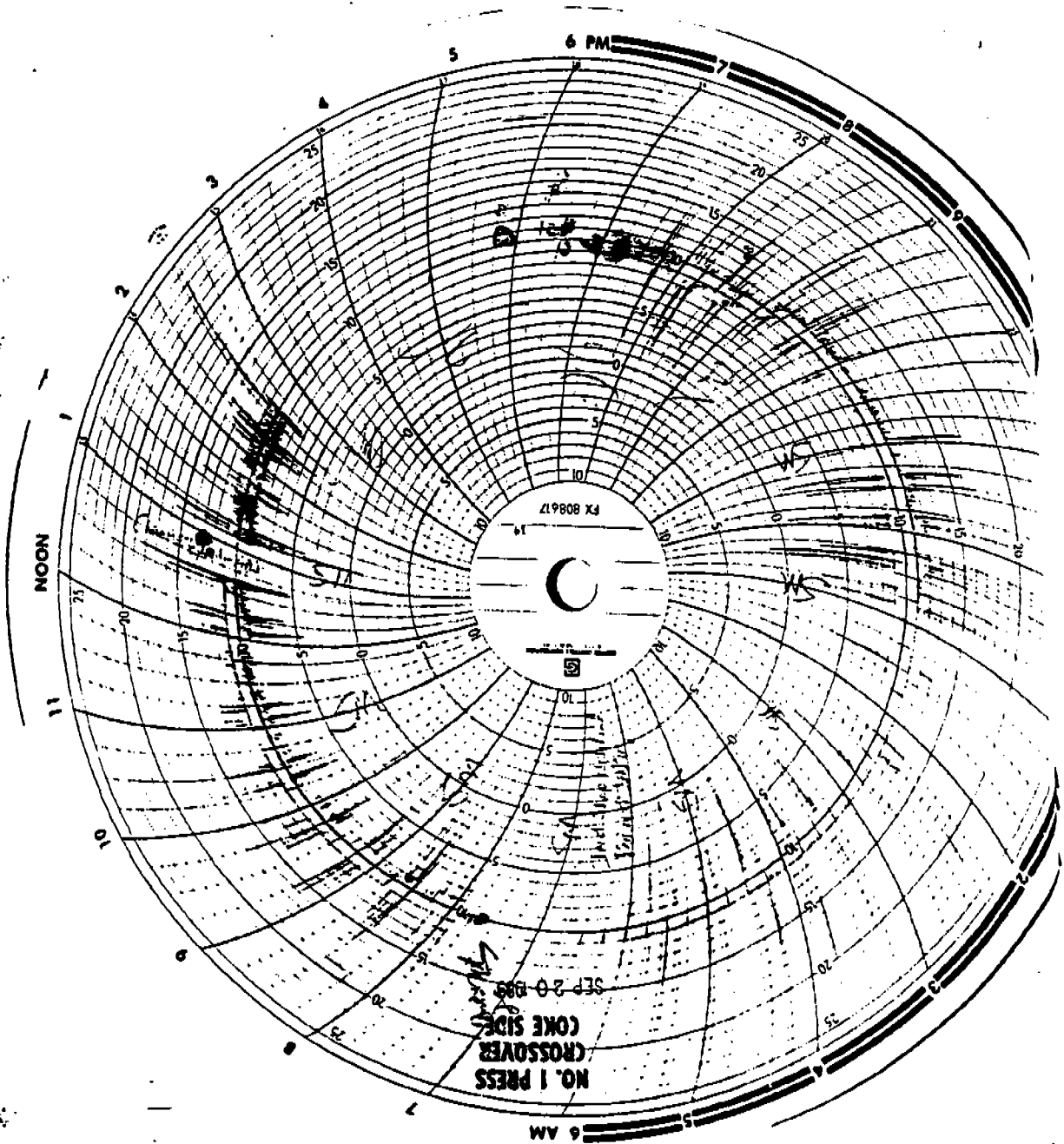


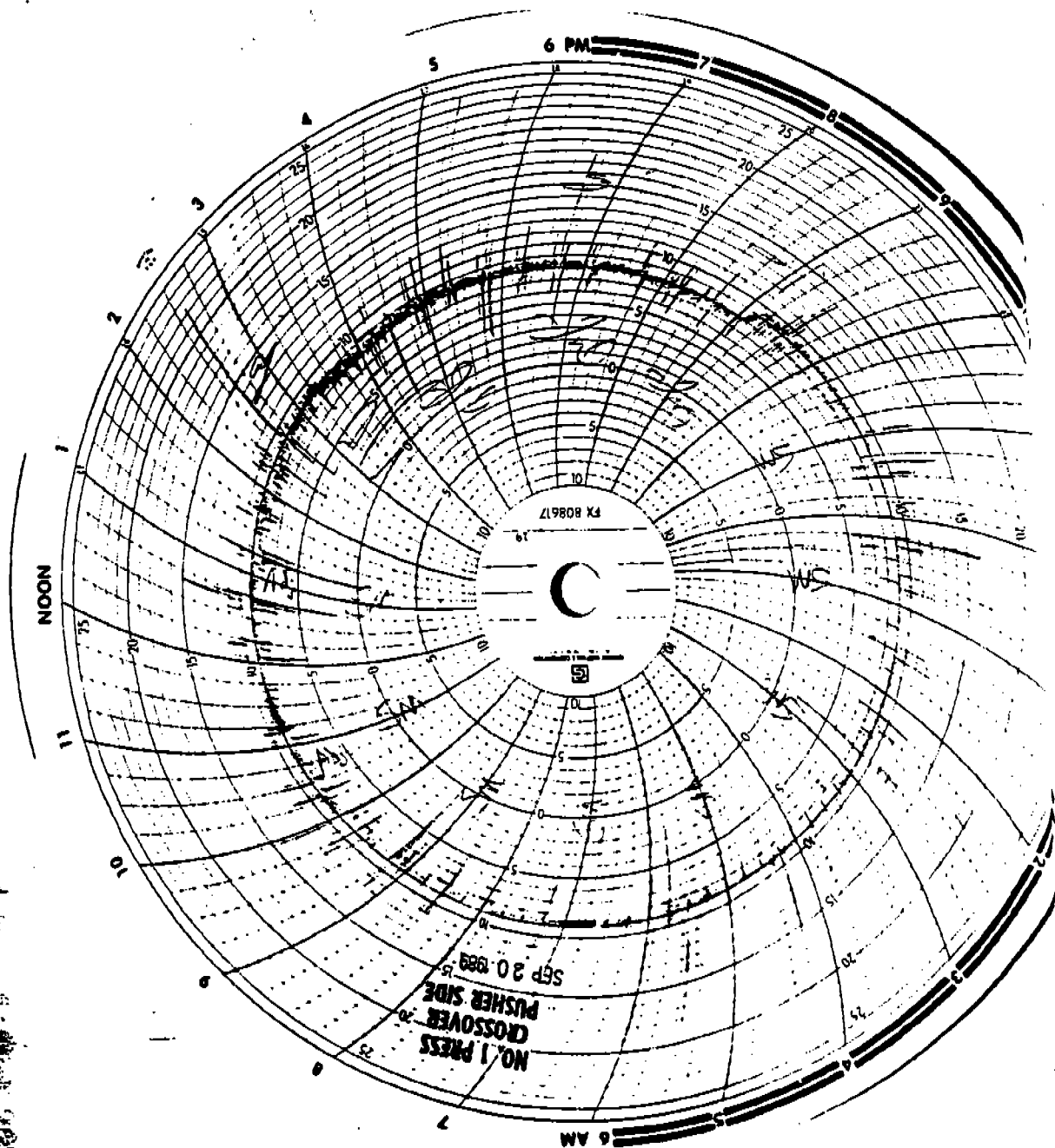


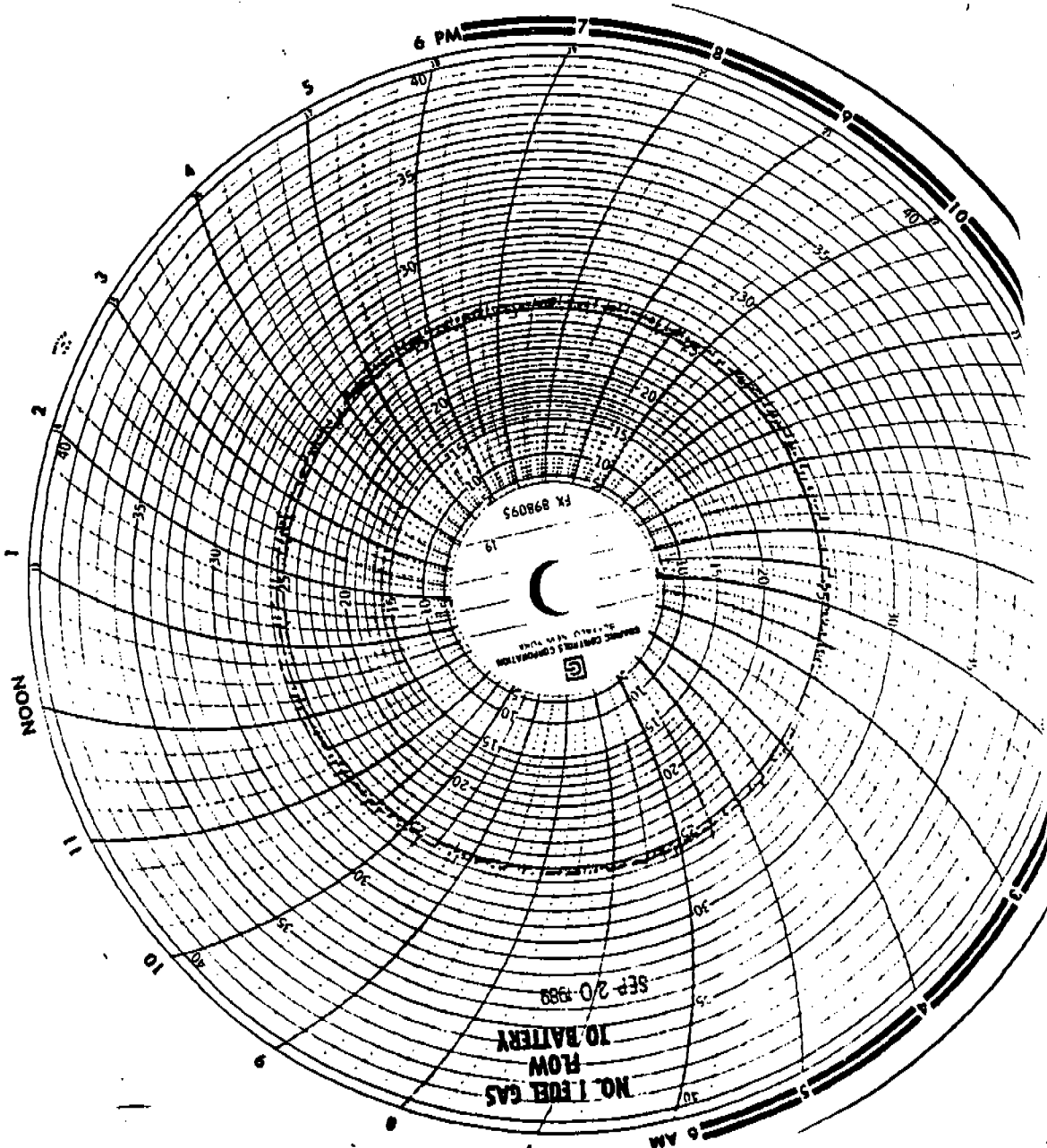


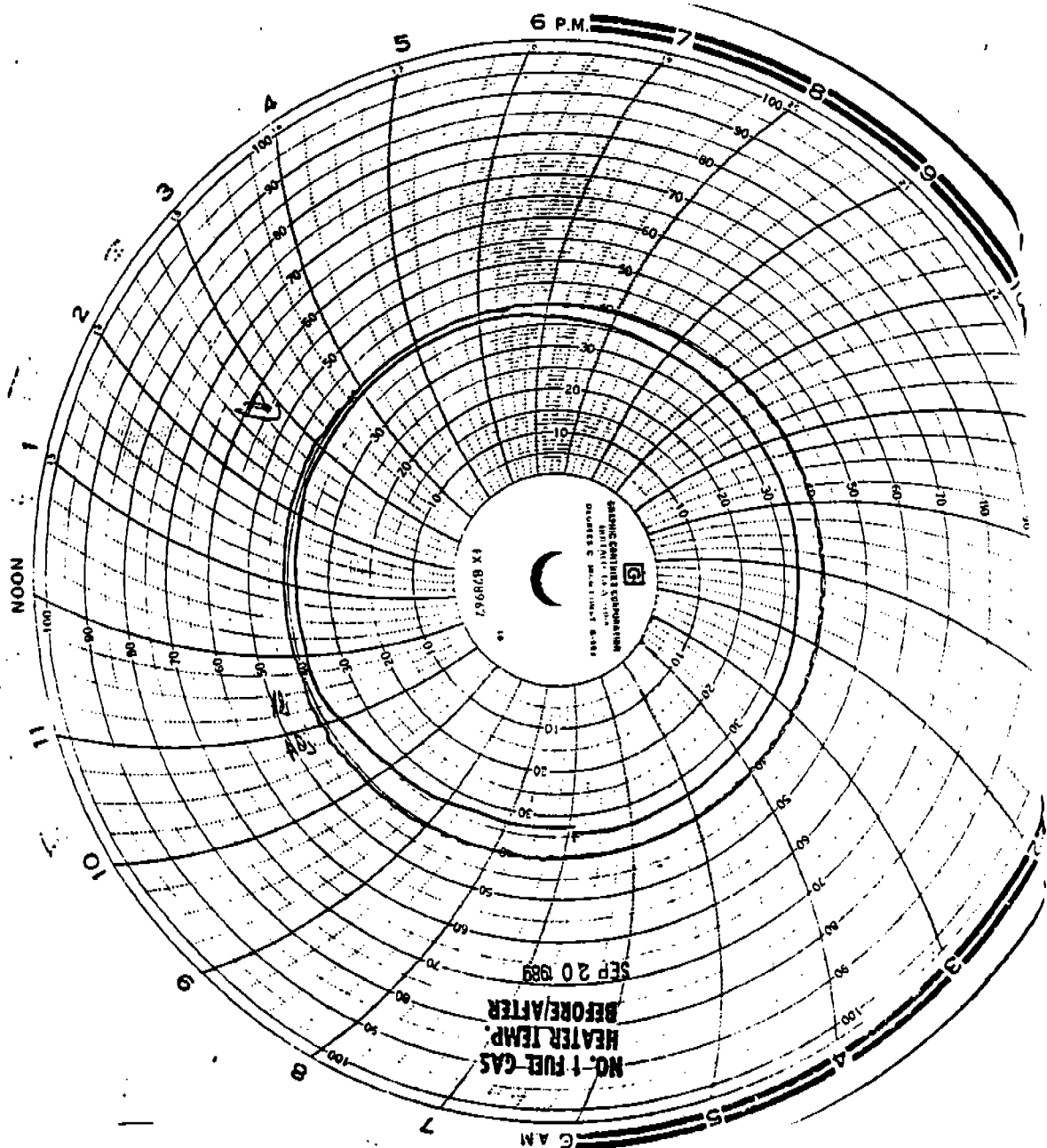


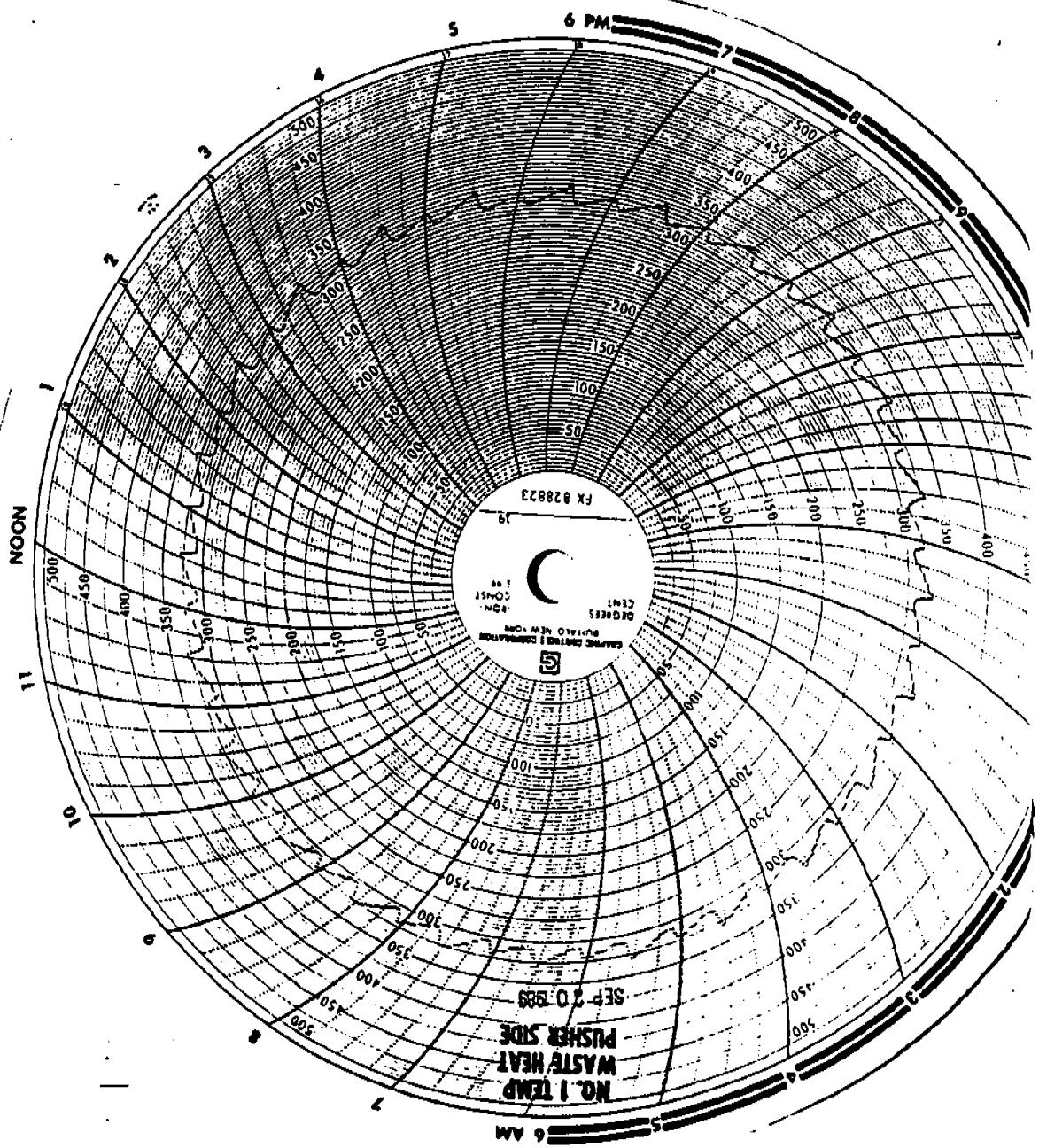


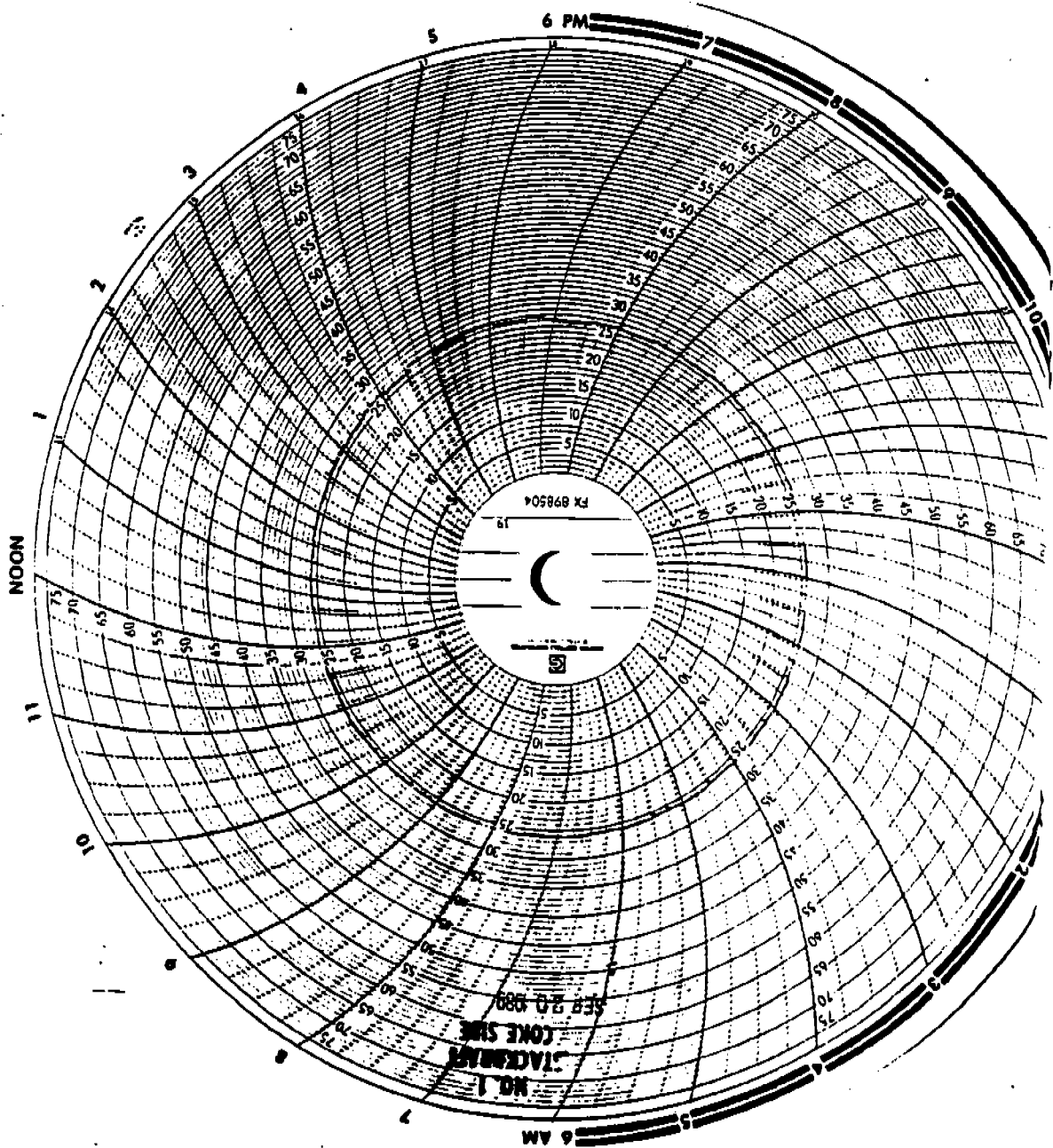


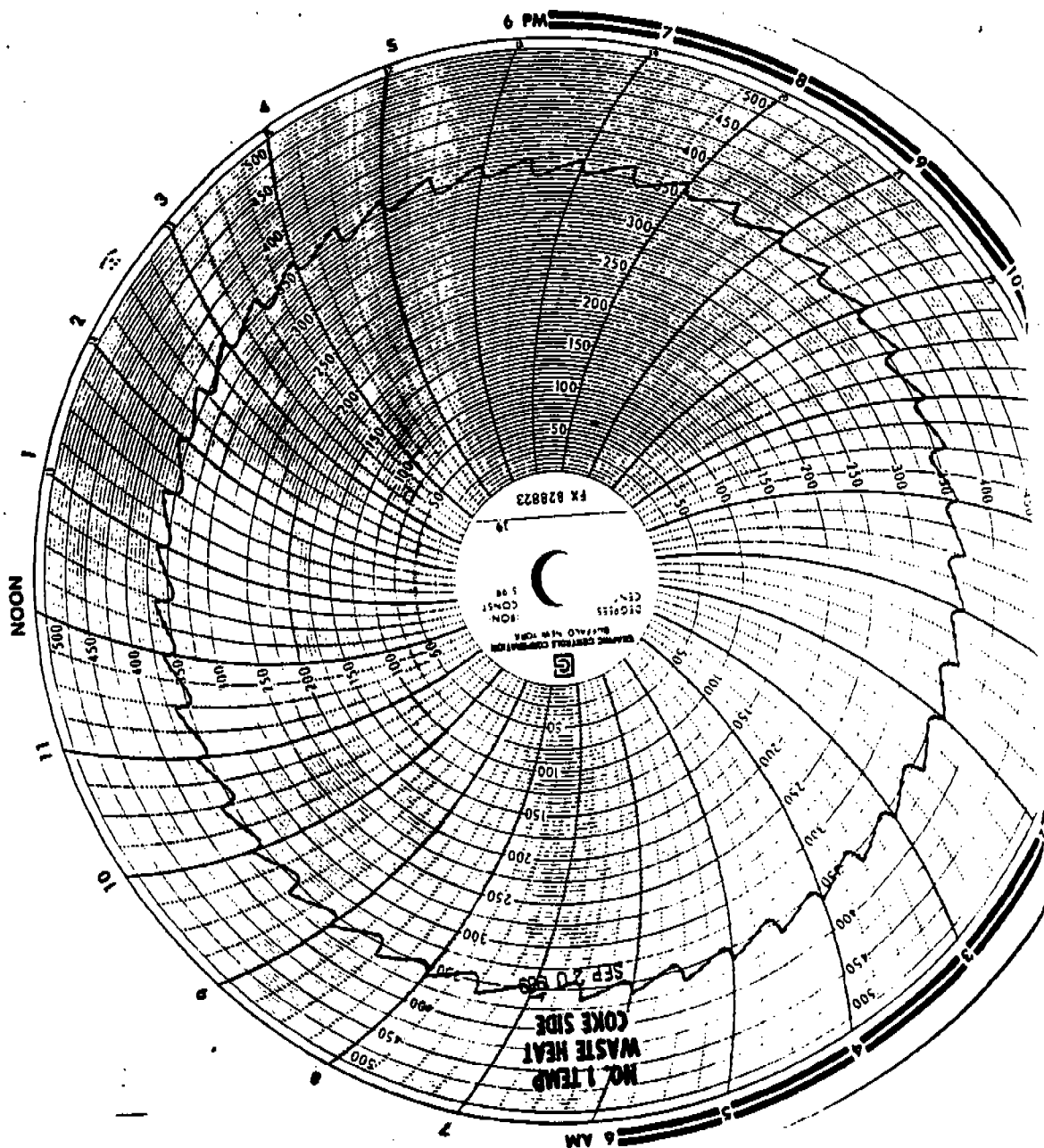


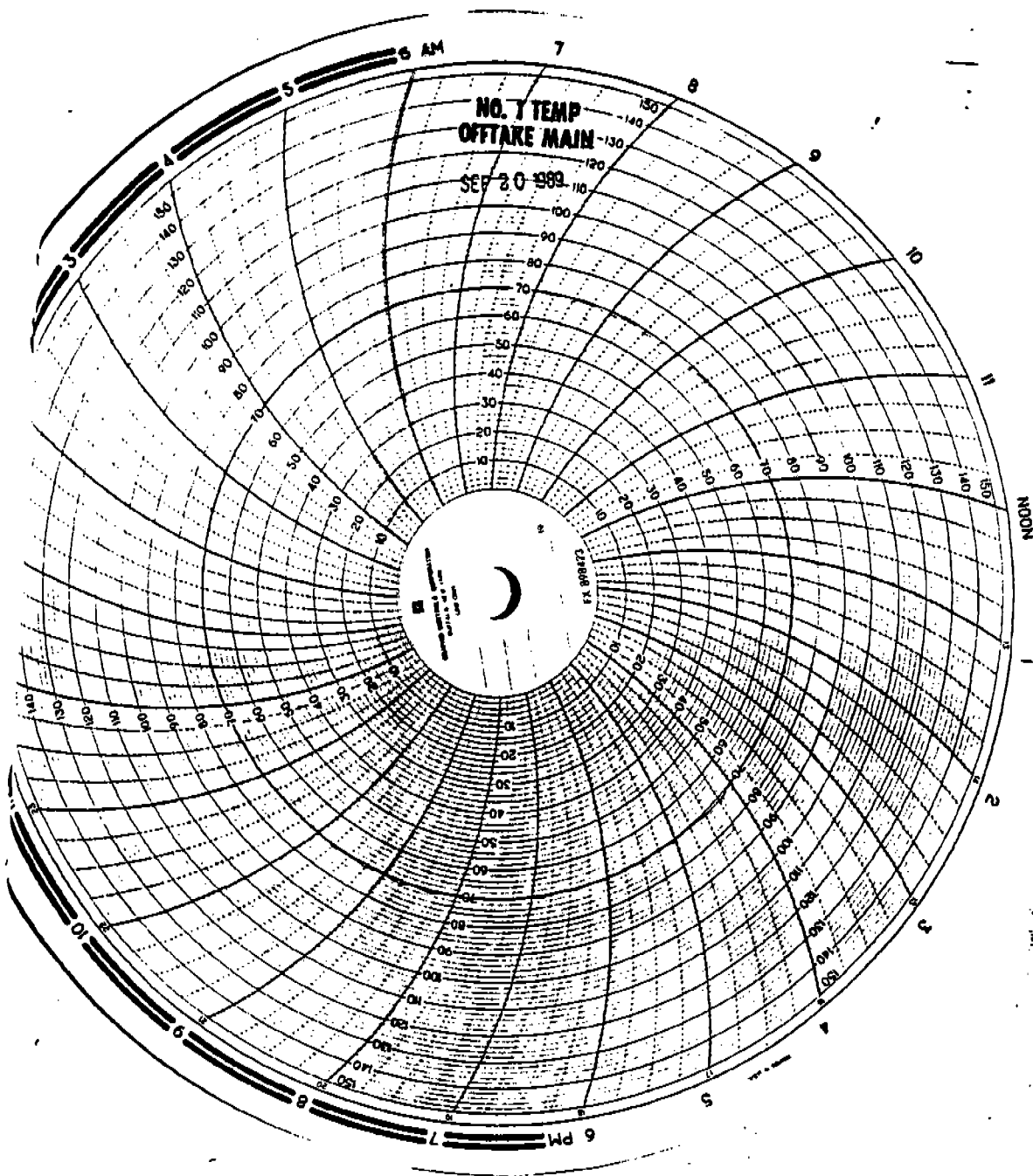


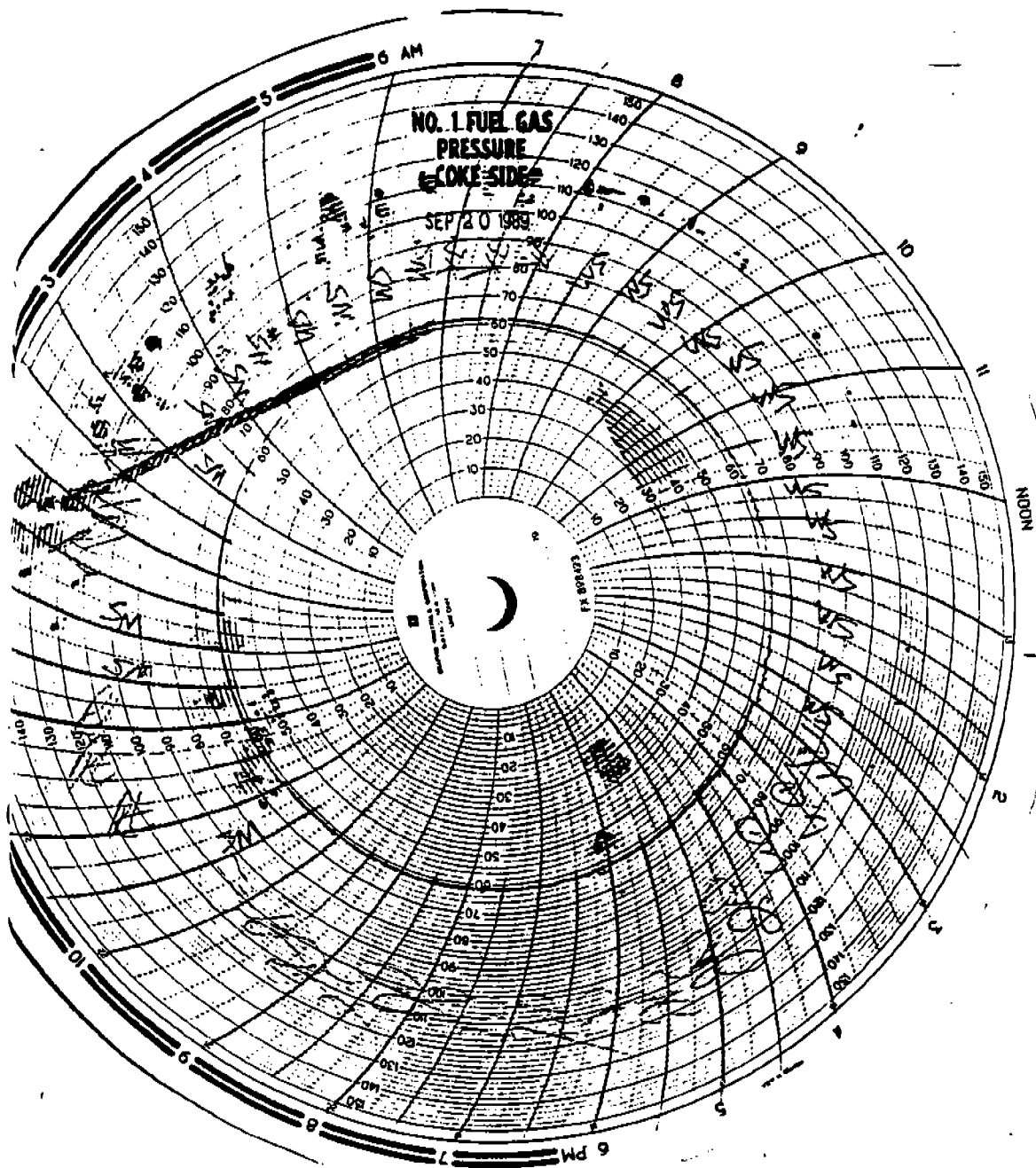


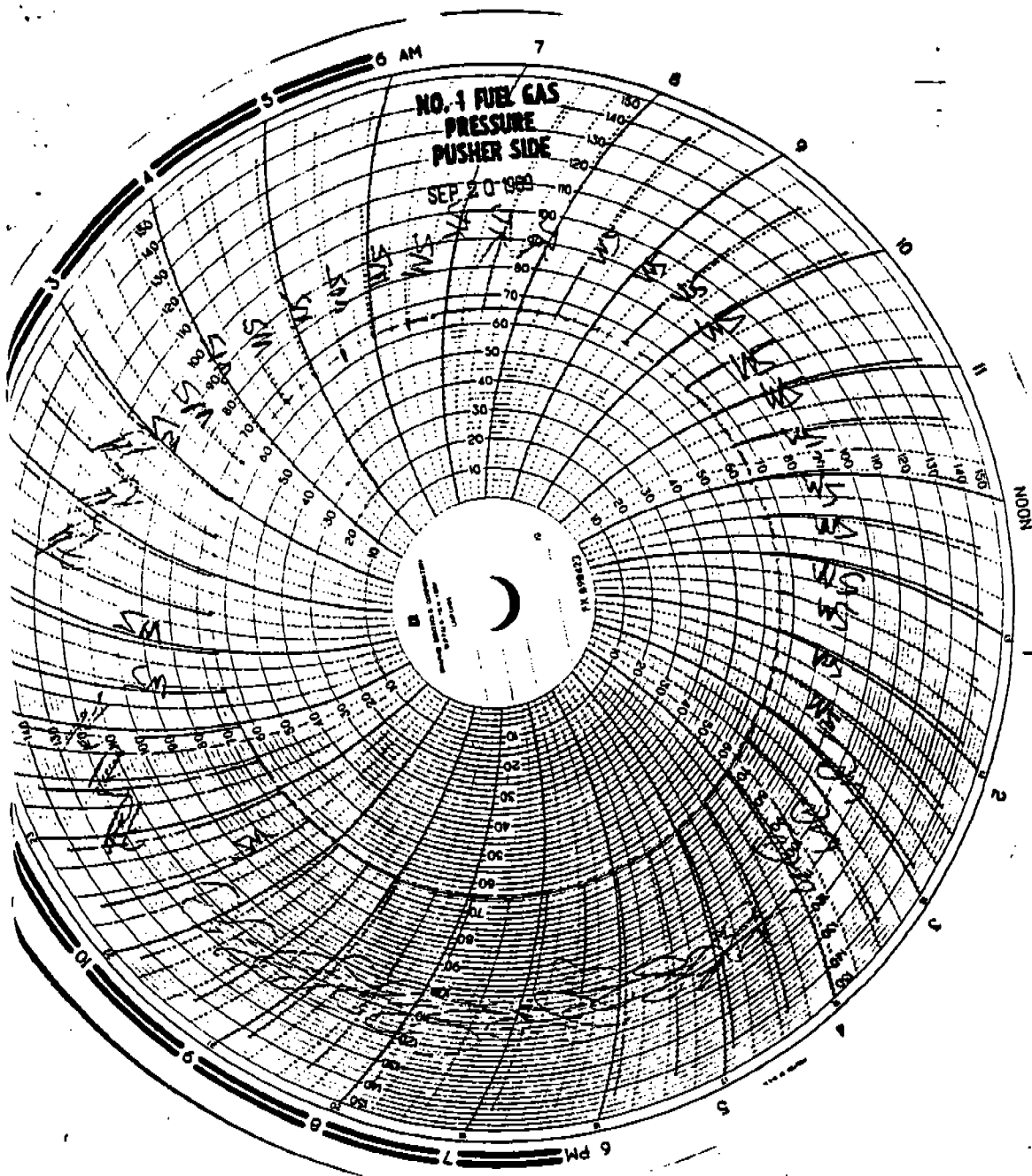


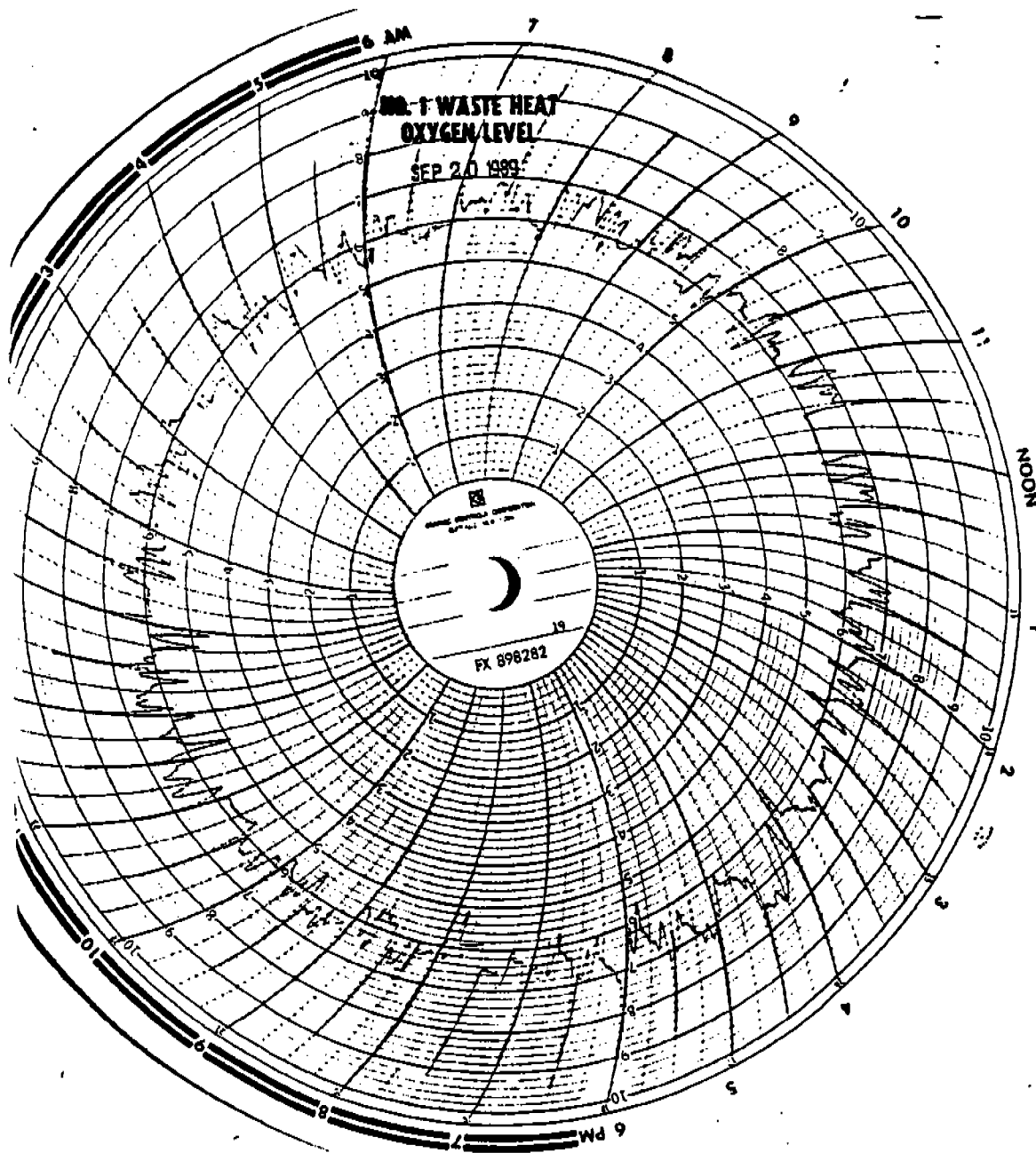


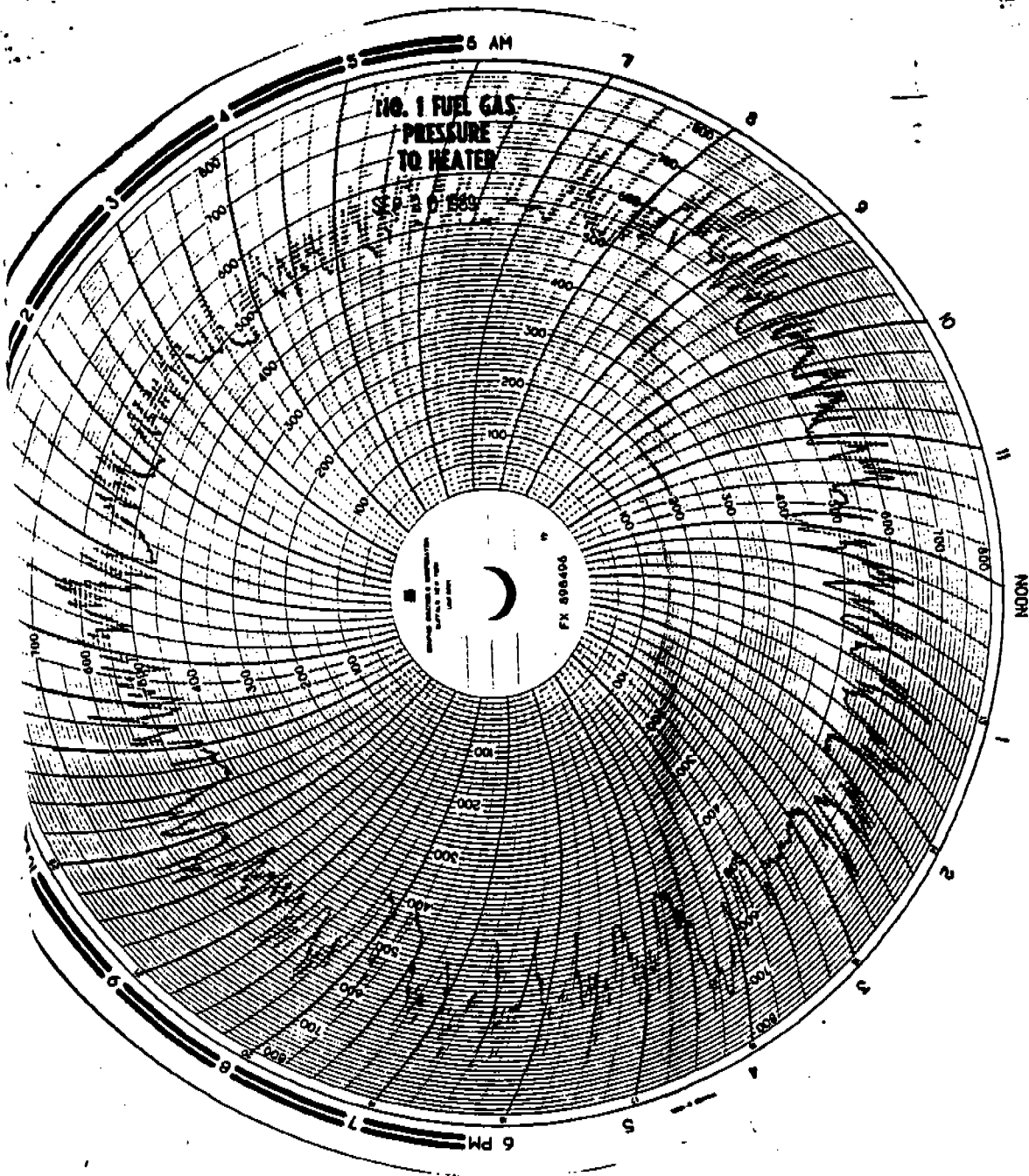












APPENDIX B
CALCULATIONS

BLANK ANALYTICAL DATA

Plant SHENANGO

Sample location No. 1 BATTERY STACK

Type of blank ACETONE

Container number 4W

Density of blank (ρ_a) 0.7857 g/ml

Blank volume (V_a) 150 ml

Gross wt. 107417.9 mg

Tare wt. 107417.2 mg

Weight of blank (m_a) 0.7 mg

$$C_a = \frac{m_a}{V_a \rho_a} = \frac{(0.7)}{(150)(0.7857)} = 0.0059 \text{ mg/g}$$

ANALYTICAL PARTICULATE DATA

Plant SHENANGO Date 9-19-89 Run No. 1Sample 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
 $W_a = C_a V_{aw} p_a = (0.0059) (175) (0.7857) = 0.8112$ mg
 Gross wt 107308.3 mg
 Tare wt 107237.0 mg
 Less acetone blank wt (W_a) 0.8 mg
 Weight of particulate in acetone rinse 70.5 mg

Water rinse container No. _____
 Water rinse volume (V_{ww}) _____ ml
 Water blank residue concentration (C_w) _____ mg/g
 $W_w = C_w V_{ww} p_w = () () () =$ mg
 Gross wt _____ mg
 Tare wt _____ mg
 Less water blank wt (W_w) _____ mg
 Weight of particulate in water rinse _____ mg

Filter No. D136

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

ANALYTICAL PARTICULATE DATA

Plant SHENANGO Date 9-20-89 Run No. 3Sample location No. 1 BATTERY STACK

Density of acetone (ρ_a) 0.7857 g/ml
Acetone rinse container No. 4V
Acetone rinse volume (V_{aw}) 189 ml
Acetone blank residue concentration (C_a) 0.0059 mg/g
 $W_a = C_a V_{aw} \rho_a = (0.0059) (189) (0.7857) = 0.8761$ mg
Gross wt 104204.9 mg
Tare wt 104069.2 mg
Less acetone blank wt (W_a) 0.9 mg
Weight of particulate in acetone rinse 134.7 mg

Water rinse container No. _____
Water rinse volume (V_{wv}) _____ ml
Water blank residue concentration (C_w) _____ mg/g
 $W_w = C_w V_{wv} \rho_w = () () () =$ mg
Gross wt _____ mg
Tare wt _____ mg
Less water blank wt (W_w) _____ mg
Weight of particulate in water rinse _____ mg

Filter No. 0139

Gross wt	_____	mg
Average Gross wt	<u>408.7</u>	mg
Tare wt	<u>400.2</u>	mg
Weight of particulate on filter(s)	<u>8.5</u>	mg
Weight of particulate in acetone rinse	<u>134.7</u>	mg
Weight of particulate in water rinse	_____	mg
Total weight of particulate	<u>143.2</u>	mg

SHENANGO
NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-19-89
RUN 1

EPA METHOD 5

SYMBOL	DESCRIPTION	VALUE
Theta	= Duration of test, min.	
Vm	= Dry sample volume	120
	(meter conditions), cu. ft.	104.318
SQRT(dP)	= Average of square roots of pitot pressure differential, in. H ₂ O	0.279
dH	= Orifice pressure drop, in. water	
Ts	= Average stack temperature, deg. F	2.78
Tm	= Average dry gas meter temperature, deg. F	550.8
		102.9
CO ₂	= CO ₂ in stack gas, %	
O ₂	= O ₂ in stack gas, %	5.5
CO	= CO in stack gas, %	11.0
N ₂	= N ₂ in stack gas, %	0.0
Pbar	= Barometric pressure, in. Hg	83.5
Ps	= Stack pressure (absolute), in. Hg.	29.66
Cp	= Pitot correction factor, dimensionless	29.61
		0.84
Y	= Dry gas meter correction factor	
Dn	= Diameter of nozzle, in.	1.006
Ds	= Diameter of stack, in.	0.515
Vwc	= Volume of liquid collected in impingers and silica gel, ml	114
		392.0
Wt	= Total particulate catch, mg	78.4
An	= Area of the nozzle, sq. ft.	
As	= Area of the stack, sq.ft.	0.00145
Md	= Dry molecular weight of stack gas, lb/lb-mole	70.88
		29.32
Vw(std)	= Volume of liquid collected, cu .ft.	
Ms	= Molecular weight of stack gas, lb/lb-mole	18.451
		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
		120
Theta	= Duration of test, min.	= 108.360
Vm	= Dry sample volume (meter conditions), cu. ft.	= 0.284
SQRT(ΔP)	= Average of square roots of pitot pressure differential, in. H ₂ O	= 3.04
dH	= Orifice pressure drop, in. water	= 551.7
Ts	= Average stack temperature, deg. F	= 94.6
Tm	= Average dry gas meter temperature, deg. F	= 5.5
CO ₂	= CO ₂ in stack gas, %	= 10.5
O ₂	= O ₂ in stack gas, %	= 0.0
CO	= CO in stack gas, %	= 84.0
N ₂	= N ₂ in stack gas, %	= 29.69
Pbar	= Barometric pressure, in. Hg	= 29.62
Ps	= Stack pressure (absolute), in. Hg.	= 0.84
Cp	= Pitot correction factor, dimensionless	= 1.006
Y	= Dry gas meter correction factor	= 0.515
Dn	= Diameter of nozzle, in.	= 114
Ds	= Diameter of stack, in.	= 386.0
Vwc	= Volume of liquid collected in impingers and silica gel, ml	= 161.3
Wt	= Total particulate catch, mg	
		0.00145
An	= Area of the nozzle, sq. ft.	= 70.88
As	= Area of the stack, sq.ft.	= 29.30
Md	= Dry molecular weight of stack gas, lb/lb-mole	= 18.169
Vw(std)	= Volume of liquid collected, cu .ft.	= 27.62
Ms	= Molecular weight of stack gas, lb/lb-mole	= 103.710
Vm(std)	= Dry sample volume (standard conditions), cu .ft.	= 22.68
Vs	= Stack velocity, ft/sec	

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

9-20-89
RUN 3

EPA METHOD 5

SYMBOL	DESCRIPTION	VALUE
		120
Theta	= Duration of test, min.	107.622
Vm	= Dry sample volume (meter conditions), cu. ft.	0.279
SQRT(dP)	= Average of square roots of pitot pressure differential, in. H ₂ O	2.98
dH	= Orifice pressure drop, in. water	544.4
Ts	= Average stack temperature, deg. F	113.5
Tm	= Average dry gas meter temperature, deg. F	5.5
CO ₂	= CO ₂ in stack gas, %	10.5
O ₂	= O ₂ in stack gas, %	0.0
CO	= CO in stack gas, %	84.0
N ₂	= N ₂ in stack gas, %	29.68
Pbar	= Barometric pressure, in. Hg	29.61
Ps	= Stack pressure (absolute), in. Hg.	0.84
Cp	= Pitot correction factor, dimensionless	1.006
Y	= Dry gas meter correction factor	0.515
Dn	= Diameter of nozzle, in.	114
Ds	= Diameter of stack, in.	407.1
Vwc	= Volume of liquid collected in impingers and silica gel, ml	143.2
Wt	= Total particulate catch, mg	
		0.00145
An	= Area of the nozzle, sq. ft.	70.88
As	= Area of the stack, sq.ft.	29.30
Md	= Dry molecular weight of stack gas, lb/lb-mole	19.162
Vw(std)	= Volume of liquid collected, cu .ft.	27.48
Ms	= Molecular weight of stack gas, lb/lb-mole	99.567
Vm(std)	= Dry sample volume (standard conditions), cu .ft.	22.26
Vs	= Stack velocity, ft/sec	

SHENANGO
NO. 1 COKE OVEN BATTERY COMBUSTION STACK

9-20-89
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

APPENDIX C
CALIBRATIONS

DRY GAS METER AND ORIFICE SYSTEM CALIBRATION

DATE 7-7-80 OPERATOR D. PETROVAY CONSOLE NUMBER 582-125

Orifice Manometer Setting in. H ₂ O	Minimum Volume of Gas cc ³	WET TEST METER GAS VOLUMES AND TEMPERATURES					DRY TEST METER GAS VOLUMES AND TEMPERATURES					Total Test Time Minutes	Barometer Reading, Inches Hg p _b		
		Initial		Final		Avg. Temp. °F T _w	Net Volume cc ³ V _w	Initial		Final				Avg. Temp. °F T _d	Net Volume cc ³ V _d
		cc ³ V _{w1}	Temp. °F T _{w1}	cc ³ V _{wf}	Temp. °F T _{wf}			cc ³ V _{d1}	Temp. °F T _{d1}	cc ³ V _{do}	Temp. °F T _{do}				
0.5	5	0.000	82	5.001	82	5.001	82	826.819	831.172	114	102	5.153	108	13.20	29.29
0.75	5	0.000	82	5.001	82	5.001	82	831.172	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	842.908	120	104	5.210	112	9.44	29.29
1.50	10	0.000	82	10.002	82	10.002	82	842.583	853.043	129	107	10.480	118	16.01	29.29
2.00	10	0.000	82	10.000	82	10.000	82	853.063	863.501	128	108	10.519	118	14.00	29.29
2.50	10														

CALCULATIONS

$$V = \frac{(V_2 - V_1) (P_b + \frac{\Delta H}{13.6})}{(P_b + \frac{\Delta H}{13.6}) (T_u + 460)}$$

$$AHG = \frac{0.0317 (AH)}{(P_b + \frac{\Delta H}{13.6}) (T_u + 460)} \left[\frac{(T_u + 460) \rho}{(V_u)} \right]^2$$

Calc. By: TLJS
Checked By:
Date:

AH	GAS VOLUME CALCULATIONS				AHG CALCULATIONS				AHG
	V ₁	V ₂	Temp. T ₁	Avg. Temp. T _u	V ₁	V ₂	Temp. T ₁	Avg. Temp. T _u	
0.5	15.001	129.29	111	108	1.01	1.01	1.01	1.01	1.950
0.75	15.107	129.29	111	108	1.01	1.01	1.01	1.01	1.855
1.00	15.210	129.29	112	108	1.00	1.00	1.00	1.00	1.981
1.50	10.003	129.29	118	108	1.01	1.01	1.01	1.01	2.114
2.00	10.000	129.29	118	108	1.00	1.00	1.00	1.00	2.175
2.50									
	AVERAGE 1.006				AVERAGE 2.015				

CONSTRUCTION STANDARDS :

1. D_t - between 0.48 and 0.95 centimeters
2. $P_a = P_b$ $1.05 D_t \leq P \leq 1.50 D_t$
3. $\alpha_1, \alpha_2 < 10^\circ$
4. $\beta_1, \beta_2 < 5^\circ$
5. $Z \leq 0.32$ cm
6. $W \leq 0.08$ cm

PITOT ALIGNMENT STANDARDS :

1. $X \geq 3/4$ in.
2. l_p must be higher than N_p
3. $Z \geq 1.90$ cm
4. $Y \geq 3$ in.

TYPE S PITOT CALIBRATION STANDARDS

DRAWN BY: JSA PROJECT NO:
SCALE: NONE FILE NO:
DATE: SEPT. 1988 SHEET 1 OF 4

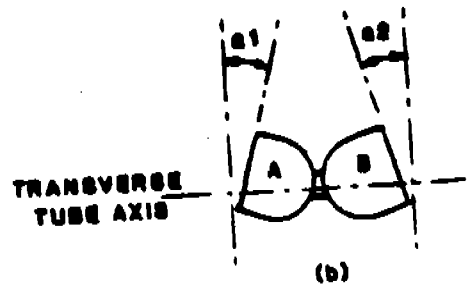
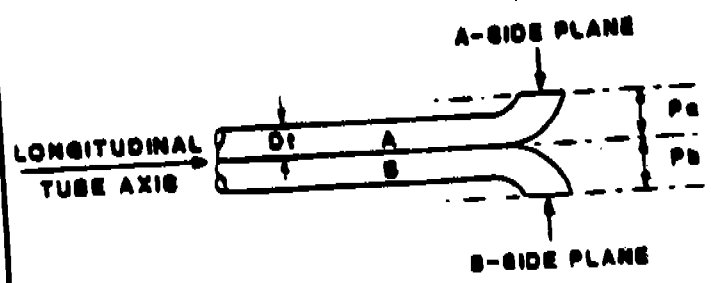
BCM

BCM Engineers

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CONSTRUCTION CALIBRATIONS



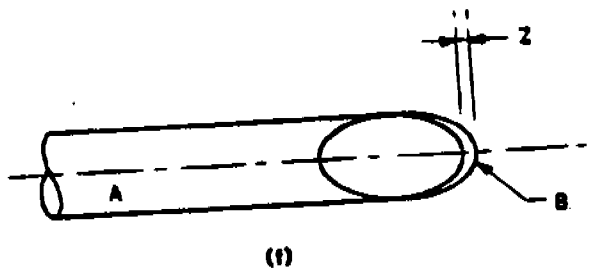
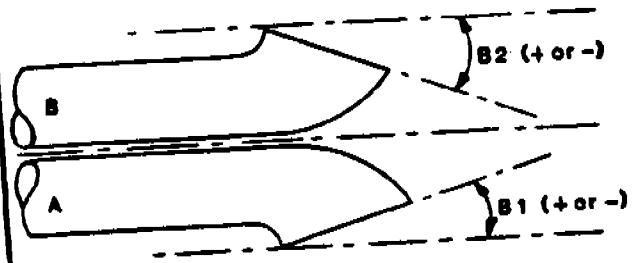
$D_t =$ 0.95

$P_a =$ 1.27

$P_b =$ 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

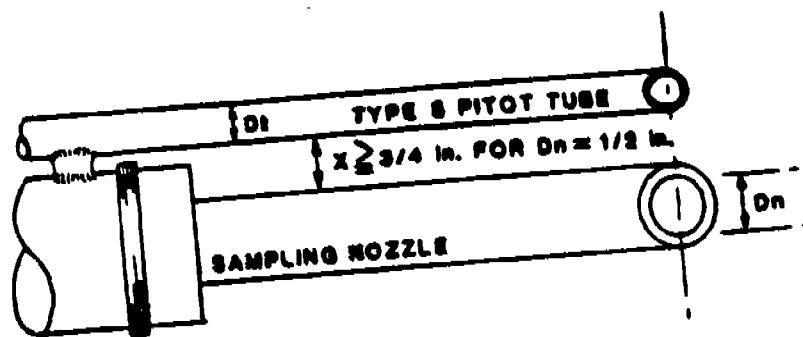


BCM Engineers

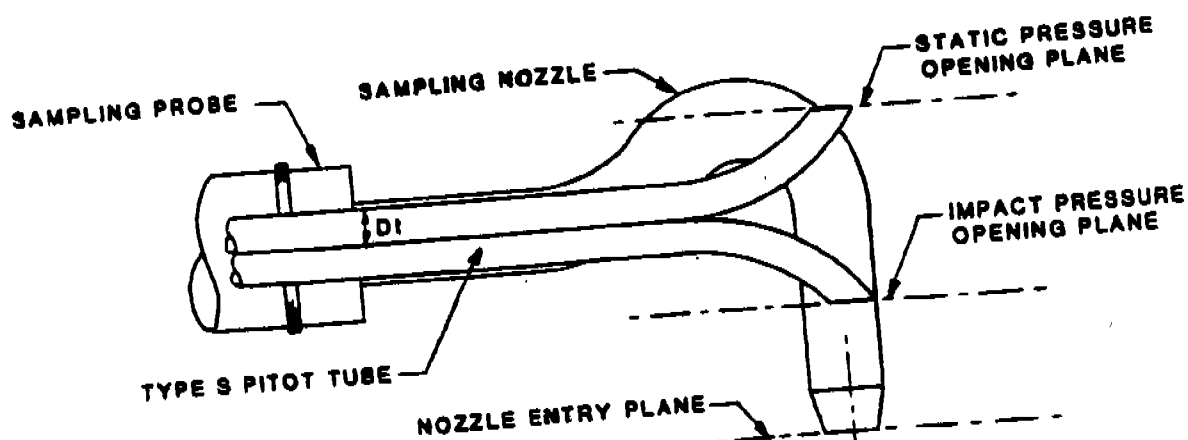
Engineers Planners Scientists and Laboratory Services
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DRAWN BY: JSA PROJECT NO:
SCALE: NONE FILE NO:
DATE: SEPT. 1989 SHEET 2 OF 4

PITOT ALIGNMENT CALIBRATIONS



$X = \underline{\geq 3/4"} \underline{\hspace{1cm}}$



Is I_p higher than $N_p = \underline{\text{YES}}$

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

TYPE S PITOT TUBE CALIBRATION SHEET

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

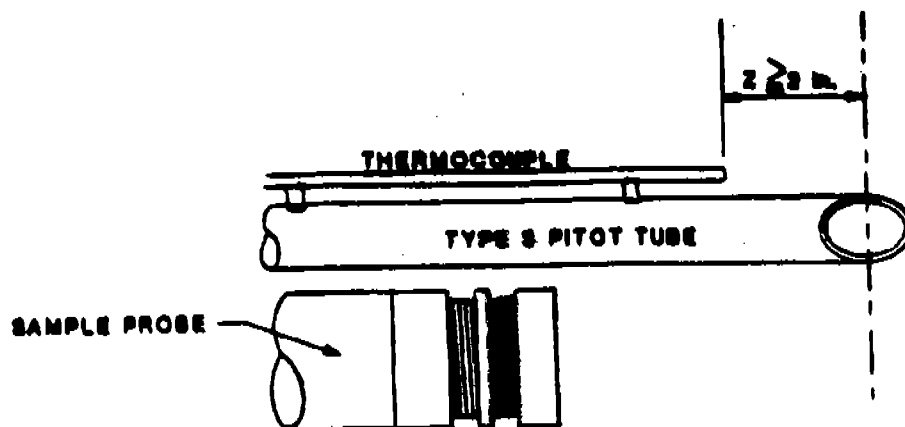


BCM Engineers

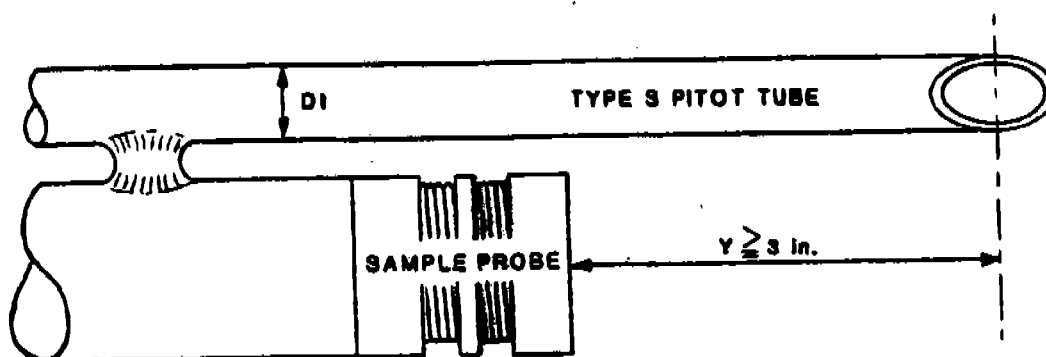
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PITOT ALIGNMENT CALIBRATIONS



$z = \underline{\quad 2 \text{''} \quad}$



$y = \underline{\quad 3 \text{''} \quad}$

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

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DRAWN BY: JSA

PROJECT NO:

SCALE: NONE

FILE NO:

DATE: SEPT. 1989

SHEET 4 OF 4

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

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



Shenango
INCORPORATED

(53)

~~GTZ~~ → JDG
GTZ

21 NOV. 1989

PLANTS
NEVILLE ISLAND, PA
SHARPSVILLE, PA
COKE OVENS
NEVILLE ISLAND, PA

WUC
See me on this
morning 12/1
DM

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.

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

Nicholas S. Buchko
Environmental Compliance Engineer