Commonwealth of Pennsylvania
Environmental Resources
January 9, 1990

Subject: Source Test Review

To: Data File
CNG Transmission Corporation
Tioga Compressor Station
Farmington Township, Tioga County

From: John S. Pitulski
Air Quality Program Specialist
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Through: Chief, Source Testing and Monitoring Section

Engine Nos. 1 and 2 at CNG Corporation Tioga Compressor Station are 4200 HP natural gas fired reciprocating units manufactured by Dressor-Rand, Inc.

Scott Environmental Services was retained by CNG to conduct a series of emission compliance tests on the exhausts of both engines. The scope of the test program involved the determination of emission rates of nitrogren oxides (NOx), carbon monoxide (CO) and non-methane hydrocarbons (NMHC). The tests appear to have been conducted in accordance with all applicable tests methods and are acceptable to the Department.

The following data was extracted from the test report:

Engine No. 1			
Test Run Number*	1 - B	1 - C	1 - D
Test Date	10/17/89	10/17/89	10/17/89
NOx Emission Rate (gm/HP - hr)	2.58	2.50	2.57
CO Emission Rate (gm/HP - hr)	1.88	1.96	1.98
NMHC Emission Rate (gm/HP - hr)	0.34	0.40	0.36
Engine No. 2			
Test Run Number	1	2	3
Test Date	10/12/89	10/12/89	10/12/89
NOx Emission Rate (gm/HP - hr)	2.80	2.48	2.62
CO Emission Rate (gm/HP - hr)	1.74	1.72	1.76
NMHC Emission Rate (gm/HP - hr)	0.53	0.29	0.29

*Test Run 1 - A on Engine No. 1 was voided due to unacceptable zero and span drift.

Allowable Emission Rates

Nitrogen Oxides (gm/HP - hr)	3.0
Carbon Monoxide (gm/HP - hr)	2.0
Non-Methane Hydrocarbons (gm/HP - hr)	0.5

cc: Mr. Richard L. Maxwell, Jr., Williamsport Regional Office
Permit File #59-399-008
EPA/RSL
Reading File
Doug Lesher

JSP:rjr

COMMONWEALTH OF PENNSYLVANIA

December 5, 1989

SUBJECT: Stack Test Report
CNG Transmission Corporation
Tioga Compressor Station
Farmington Township, Tioga County
Plan Approval #59-399-008

TO: Rick St. Louis
Chief, Source Testing Unit

FROM: Richard L. Maxwell, Jr.
Chief, Engineering Services
Bureau of Air Quality Control
Williamsport Regional Office

Enclosed is a test report for NOx, CO, methane and total hydrocarbon testing performed by Scott Environmental Technology on 10/12 and 10/17/89 on two 4200 HP natural gas-fired clean burn reciprocating engines at CNG's Tioga Compressor Station. Would you please have someone on your staff review this test report for Chapter 139 conformance, etc.

Also enclosed is a copy of my test observation memo.

RLM/skb

Enclosures

cc: File

COMMONWEALTH OF PENNSYLVANIA

October 20, 1989

SUBJECT: CNG Transmission Corporation
Farmington Township, Tioga County
Plan Approval #59-399-008

TO: Files

FROM: Richard L. Maxwell, Jr.
Chief, Engineering Services
Bureau of Air Quality Control
Williamsport Regional Office

On 10/12/89, I observed the performance of two NOx, CO, THC and methane source tests on engine #2 at CNG's Tioga Compressor Station. On 10/13/89, I observed the performance of one NOx, CO, THC and methane source test on engine #1 at the same facility. The testing was performed by Michael Gallagher and two other individuals from Scott Environmental Services. Jon Kinney of CNG and two representatives of Dresser-Rand (the engine vendor) were also on-site for both days.

The test runs were one hour in duration. Moisture tests were being done simultaneously with the sampling and velocity traverses were being done before and after the test runs (one port before and the second port after).

Due to excessive pressure problems (35 inches of mercury) encountered at the original sampling location, the testing was occurring in the exhaust of the silencer. A 30 inch high stack extension with sampling ports 24 inches from the exit point was added to the 91 inch high, 42 inch diameter engine stack to accommodate sampling. This extension was discussed with Tom Bianca and Rick St. Louis on 9/29/89. I was also informed that straightening vanes had been added to the base of the engine stacks.

The analyzers used for the testing appeared to be the same as those used on 7/11/89 except for the THC analyzer. A Beckman 402 FID analyzer was being used for THC analysis.

Instrument calibration took place prior to the commencement of testing and in between test runs (although not with all range calibration gases). The calibration gases used are identified in attached sheets labeled "span values".

CNG personnel were monitoring various engine operating parameters (rpm, ignition timing, suction pressure, discharge pressure, etc.) throughout the tests and were additionally determining engine horsepower independently of the regular horsepower monitoring system. I also monitored these parameters (data attached).

Testing was delayed on the 12th due to a false hot bearing alarm on engine #2. Once this alarm was inhibited, the first test was attempted at 12:20 p.m., but had to be interrupted due to the existence of methane values in excess of the THC values. A leak in the THC sample line was subsequently found and repaired. Test #1 was started over at 1:25 p.m. and ended at 2:25 p.m. Test #2 was started at 3:45 p.m. and ended at 4:45 p.m. The third test was performed after I left the site.

On the 13th, the first test run was attempted at approximately 10:25 a.m. but was aborted due to excessive NOx concentrations. The air/fuel ratio on engine #1 was readjusted from .50 to .52 and the "new" first test was begun at 1:43 p.m. Prior to restarting, all instruments were re-calibrated and a new (one port only) velocity traverse performed. I left the site prior to the performance of the second and third tests.

The proposed test (#1 test) span check on the 13th showed excessive drift for NOx and THC. See attached.

Other items of interest were:

- The stack temperatures were determined to be approximately 520-530°F, well below the 700°F used in the PSD modeling.

- The adjustment to air/fuel ratio made to engine #1 on 10/13 was claimed not to have any significant effect on fuel economy. The company was advised that the air/fuel ratio would have to permanently remain at the adjusted setting (assuming that the tests showed compliance).

- On 10/16/89 I received a phone message from Jon Kinney that engine #1 had failed to show compliance with the NMHC emission standards and that retesting was scheduled for 10/17/89. No department personnel were in attendance.

RLM/skb

CNG - TIOGA STATION

10/12/89 - ENGINE #2

DATA FROM STATION COMPUTER

TIME	ENGINE HORSEPOWER	ENGINE SPEED	AIR MANIFOLD PRESSURE	SUCTION PRESSURE	DISCHARGE PRESSURE	TIMING	GAS CONSUMPTION	TURBO SPEED	COMMENTS
									#1 TEST STARTS
12:20									
12:25	4178 HP	331 RPM	36.8" Hg	656 psi	1613 psi	7°	32 MCFH	12,390 RPM	
12:34	4272	333	36.9	659	1612	7	33	12,401	
12:50	4294	330	36.5	658	1614	7	32	12,368	TEST INTERRUPTED - THE SAMPLE LINE LEA
									#1 RESTART
1:25									
1:30	4273	330	37.0	658	1614	7	32	12,454	
1:48	4239	331	36.7	658	1613	7	32	12,438	
2:02	4244	330	37.4	662	1613	7	33	12,519	
2:18	4159	330	37.2	661	1615	7	32	12,519	
									#1 TEST OVER
2:25									#2 TEST STARTS
3:45									
3:49	4284	330	37.7	665	1615	7	32	12,556	
3:56	4187	331	37.3	661	1617	7	33	12,513	
4:17	4272	330	37.2	664	1615	7	32	12,519	
4:38	4256	330	37.6	661	1615	7	33	12,549	
									#2 TEST OVER
4:45									

CNG - TIOGA STATION

10/12/89 - ENGINE #2

TIME		NOx	CO	THC	CH_4	O_2	CO_2		COMMENTS			
									#1 TEST STARTS			
12:20		37%	47%									
12:29		35	47									
12:43		43	45-46									
12:50								TEST STOPPED - THC SAMPLE LINE LEAK				
1:25								#1 TEST RESTARTED				
1:33		36-37	46-47	42-43	23-24	66-67	26					
1:43		38-40	45-47									
1:51		34	47	43	23-24	66.5	25.5					
2:05		38	45									
2:14		37	47					#1 TEST OVER				
2:25		41	44.5					#2 TEST STARTS				
3:45												
3:53		35	47	42		66.5	25.5					
3:57		35	47									
4:12		32	47	43	24.5	67	25.5					
4:20		33	46									
4:32		30	48									
4:41		31-32	47.5					#2 TEST OVER				
4:45												

NOTE: ALL READINGS % OF SCALE, SEE ATTACHED FOR SPAN VALUES.

CNE — TOGA STATION

10/12/89

ENGINE # 2

SPAN VALUES

FOR PERIOD 12:20 — 2:25 :

NOx : 20.5% OF SCALE = 100.3 ppm NOx

42.0% " " = 230 "

52.0% " " = 300 "

CO : 15.5% OF SCALE = 59.8 ppm CO

25.5% " " = 101 "

95.0% " " = 504 "

THC : 27% OF SCALE = 501.7 ppm THC (AS METHANE)

48.5% " = 1004 "

93.5% " = 2010 "

CH_4 : 15.5% OF SCALE = 501.7 ppm CH_4

27% " = 1004 "

55.5% " = 2010 "

O_2 : 31% OF SCALE = 6% O_2

56% " = 12% "

89.5% " = 20.8% "

CO_2 : 36.5% OF SCALE = 5% CO_2

65.5% " = 10% "

96 [illegible]% " = 15% "

CNG – TIOGA STATION
10/12/89
ENGINE 2
SPAN VALUES

FOR PERIOD 3:45 – 4:45 :

NOx :	17.5%	OF SCALE	=	100.3	ppm NOx	(CHECKED)
	38.0%	"	=	230	"	(CHECKED)
	48.0%	"	=	300	"	(CHECKED)
CO :	15.5%	OF SCALE	=	59.8	ppm CO	(ASSUMED)
	25%	"	=	101	"	(CHECKED)
	95.0	"	=	504	"	(ASSUMED)
THC :	27%	OF SCALE	=	501.7	ppm THC AS METHANE	(ASSUMED)
	49.0%	"	=	1004	"	(CHECKED)
	93.5%	"	=	2010	"	(ASSUMED)
CH_4 :	15.5%	OF SCALE	=	501.7	CH_4	(ASSUMED)
	27%	"	=	1004	"	(CHECKED)
	55.5%	"	=	2010	"	(ASSUMED)
O_2 :	31%	OF SCALE	=	6%	O_2	(ASSUMED)
	56.5%	"	=	12%	"	(CHECKED)
	89.5%	"	=	20.8%	"	(ASSUMED)
CO_2 :	36.5%	OF SCALE	=	5%	CO_2	(ASSUMED)
	66%	"	=	10%	"	(CHECKED)
	96%	"	=	15%	"	(ASSUMED)

CNG - TIOGA STATION

10/13/09 - ENGINE #1

DATA FROM STATION

TIME	ENGINE HORSEPOWER	ENGINE SPEED	AIR MANIFOLD PRESSURE	SUCTION PRESSURE	DISCHARGE PRESSURE	TIMING	GAS CONSUMPTION	TURBO SPEED	COMMENTS
10:10	4278 HP	331 RPM	35.7 "Hg	651 psi	1601 psi	7°	33 MCFH	12,266	
10:36	4276	330	36.1	653	1602	7	33	12,229	
11:18	4253	330	35.2	648	1602	7	32	12,137	
1:43									#1 TEST STARTS
1:47	4240	330	37.6	647	1603	7	32	12,530	
1:49	4199	331	38.0	650	1603	7	32	12,573	
2:19	4246	331	38.0	651	1604	7	32	12,567	
2:43									#1 TEST OVER

CNG – TIOGA STATION

10/13/89 – ENGINE #1

DATA FROM PORTABLE M...

TIME		AIR/FUEL RATIO	FUEL MANIFOLD PRESSURE	RIGHT AIR MANIFOLD PRESSURE	TIMING	FUEL TEMP.	AIR MANIFOLD TEMP	ENGINE SPEED	SUCTION PRESSURE	DISCHARGE PRESSURE	COMMENTS	
1:27		.52	35.8" Hg	39.16" Hg	6.94°		120°F				#1 TEST	STARTS
1:43												
1:49		.52	35.82	37.96	6.96	62.9°F	119.6					
2:15		.52	36.00	38.28	6.85	60.87	120					
2:29		.52	36.00	37.78	6.92	60.87	119.6					
2:30		.52	35.98	38.1	6.89	63.6	120.6	331 RPM	652 psi	1604 psi		
2:41											#1 TEST	OVER

CNG - TIOGA STATION

10/13/89 - ENGINE #1

TIME		NOx	CO	THC	CH_4	O_2	CO_2	COMMENTS
11:13		61-62	43-44					
11:25		60	44-45					
11:30		65-70	43-44					
11:39		62-69	44-45					
11:53		64-70	44-45					
1:43		45	50	42		67.5	24.5	#1 TEST STARTS
1:52		45	50					
1:59		39.5	51	42	27-28	67.5	24.5	
2:11		42	50.5					
2:21		44	50					
2:30		44	49					
2:39		41	50.5	42		68.5	24.5	
2:43								#1 TEST OVER

NOTE: ALL READINGS % OF SCALE SEE ATTACHED FOR SPAN VALUES

CNG - TIOGA STATION

10/13/89

ENGINE #1

SPAN VALUES

FOR PERIOD 11:13 — 11:53 :

NOx :	2.5%	OF SCALE	=	0
	22%	"	=	100.3 ppm NOx
	44%	"	=	230 "
	55%	"	=	300 "
CO :	1.5%	OF SCALE	=	0
	16%	"	=	59.8 ppm CO
	26%	"	=	101 "
	96%	"	=	504 "
THC :	5%	OF SCALE	=	0
	22.5	"	=	501.7 ppm THC AS METHANE
	51.5%	"	=	1004 "
CH_4 :	2%	OF SCALE	=	0
	15.5%	"	=	501.7 ppm CH_4
	28.5%	"	=	1004
O_2 :	4%	OF SCALE	=	0
	31.5%	"	=	6% O_2
	56.5%	"	=	12% "
	90.5%	"	=	20.8% "
CO_2 :	4.5%	OF SCALE	=	0
	35%	"	=	5% CO_2
	64%	"	=	10% "
	95%	"	=	14.67 "

CNG – TIOGA STATION

10/13/89

ENGINE #1

SPAN VALUES

FOR PERIOD 1:43 – 2:43 :

NO_x: 24% OF SCALE = 100.3 ppm NOx (CHECKED)

49.5% " = 230 " (CHECKED)

62.5% " = 300 " (CHECKED)

CO : 16% OF SCALE = 59.8 ppm CO (CHECKED)

25.5% " = 101 " (CHECKED)

THC : 25% OF SCALE = 501.7 ppm THC AS METHANE (CHECKED)

45% " = 1004 " (CHECKED)

CH_4 : 16% OF SCALE = 501.7 ppm CH_4 (CHECKED)

30% " = 1004 " (CHECKED)

O_2 : 56% OF SCALE = 12% O_2 (CHECKED)

CO_2 : 64% OF SCALE = 10% CO_2 (CHECKED)

ALL OTHERS ASSUMED TO BE THE SAME AS FOR 11:13 – 11:53 PERIOD.

NOTE: ABOVE VALUES ARE PRE-TEST. POST TEST SPANS SHOWED NOX + THC TO BE OFF:

NOX	THC
22.5% = 100.3	23.5% = 501.7
46% = 230	41.5% = 1004
59% = 300	

CNG Transmission
Corporation

November 27, 1989

RECEIVED
NOV 29 1989
DER-AIR QUALITY CONTROL
WILLIAMSPORT REGION

Mr. Richard L. Maxwell
Department of Environmental Resources
Bureau of Air Quality Control
200 Pine Street
Williamsport, PA 17701

RE: Tioga Station Emission Test

Dear Mr. Maxwell:

Enclosed is a report on the compliance emission test performed at CNG's Tioga Station. Thanks for your cooperation. If you have any questions, please call me at 304/623-8457.

Sincerely yours,

Jon Kinney

Jonathan A. Kinney, Engineer
Environmental Codes and
Standards

Enclosure

SET 1314-01-1189

RECEIVED
NOV 29 1989
DER-AIR QUALITY CONTROL
WILLIAMSPORT REGION

EMISSIONS TESTING FOR
CNG TRANSMISSION CORPORATION
TIOGA COUNTY COMPRESSOR STATION

Prepared for:

CNG Transmission Corporation
P.O. Box 2450
455 West Main Street
Clarksburg, West Virginia

November 1989

SCOTT ENVIRONMENTAL TECHNOLOGY, INC.
Plumsteadville, Pennsylvania 18949

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SET 1314-01-1189

1.0 INTRODUCTION

CNG Transmission Corporation operates two 4200 HP Dresser-Rand Model TCV-10 natural gas fired reciprocating engines at their Tioga County compressor station. CNG Corporation, represented by Mr. Jonathan Kinney, contracted Scott Environmental Technology, Inc. (Scott) to perform a series of tests on those engines. The purpose of the testing was to determine the emission rate to the atmosphere of nitrogen oxides (NO_x), carbon monoxide (CO), total hydrocarbons (THC), methane (CH_4), and nonmethane hydrocarbons (NMHC) by difference.

The testing of Engine No. 1 was performed on October 17, 1989 and Engine No. 2 was performed on October 12, 1989. The Scott crew was composed of Messrs. Michael Gallagher, Todd Breuer, and Jeff Poiron. The testing was observed by Mr. Richard Maxwell, Air Pollution Control Engineer, PA DER, and Mr. Jonathan Kinney, Engineer, CNG Transmission Corp.

A total of three (3) acceptable emission test series were performed on each engine. Section 2 of this report presents a summary of the test results. Section 3 discusses the sampling and analytical procedures used during the test program. The appendices of this report contain copies of all field data, analytical data, calculations, and equipment calibration data. Sample times were coordinated with plant personnel to ensure that the process conditions met CNG's requirements and were acceptable for testing. Process conditions and parameters were maintained by CNG and have been included in the appendices of this report.

SET 1314-01-1189

2.0 SUMMARY OF RESULTS

Three emission tests were conducted on Engine No. 1 and three emission tests were conducted on Engine No. 2. Each test was performed within 10% of the design capability of the engine. The operational parameters of the engine were maintained by CNG personnel and have been included in the appendices of this report.

Table 2-1 presents a summary of the various stack gas parameters measured during each test. Table 2-2 presents the average concentrations of each gas measured. Table 2-3 is a summary of the emission rates for CO, NO_x, CH_4, THC, and NMHC. Results are presented in grams per hour (g/hr), pounds per hour (lbs/hr), and grams per horse power hour (g/HP-HR).

Run number 1 on engine number 1 (Table 2-1) was voided due to unacceptable zero and span drift which occurred during the sample run.

Copies of all field data, strip charts, calculations, calibration data, process information, and computer generated summaries may be found in the appendices of this report.

Scott Environmental Technology Inc.

TABLE 2-1

CNG TRANSMISSION CORPORATION, TIOGA STATION
MEASURED STACK GAS PARAMETERS

Parameter									
Engine No.	1	1	1	1	Test Average	2	2	2	Test Average
Run No.	1-A	1-B	1-C	1-D		2-1	2-2	2-3	
Date	10/17	10/17	10/17	10/17	10/17	10/12	10/12	10/12	10/12
Gas Flow Rate (dscf/min)	16834	17156	17484	17637	17278	16654	16506	16558	16572
(acf/min)	35386	36140	36389	37343	36314	35879	35727	35894	35833
Stack Temp. (°F)	513	517	515	515	515	522	532	532	529
Oxygen (%)	15.2	15.1	15.2	15.3	15.2	15.0	14.9	14.9	14.9
Carbon Dioxide (%)	3.3	3.2	3.2	3.2	3.2	3.3	3.4	3.4	3.4
Moisture (%)	6.0	6.0	5.0	6.6	5.9	7.56	7.16	7.40	7.37

Scott Environmental Technology Inc.

TABLE 2-2

CNG TRANSMISSION CORPORATION, TIOGA STATION
MEASURED GAS CONCENTRATIONS

Parameter									
Engine No.	1	1	1	1	1	2	2	2	2
Run No.	*1-A	1-B	1-C	1-D	Test Average	2-1	2-2	2-3	Test Average
Date	10/17	10/17	10/17	10/17	10/17	10/12	10/12	10/12	10/12
Oxygen (%)	15.19	15.13	15.23	15.30	15.22	14.93	14.92	15.03	14.96
Carbon dioxide (%)	3.28	3.24	3.19	3.22	3.22	3.41	3.36	3.31	3.36
Carbon monoxide (ppm)	262.30	237.01	240.25	240.46	239.24	223.06	223.77	227.81	224.88
Nitrogen oxide (ppm)	183.18	198.00	185.91	190.71	191.54	218.76	196.56	207.11	207.48
Total Hydrocarbons (ppm as CH_4)	1009.83	965.78	1012.92	1000.45	993.05	934.58	928.22	936.22	933.01
Methane (ppm)	923.16	891.04	926.41	924.35	913.93	816.64	862.27	869.51	849.47

* Run 1-A voided, unacceptable zero and span drift.
Results not included in averages.

Scott Environmental Technology Inc.

TABLE 2-3

CNG TRANSMISSION CORPORATION, TIOGA STATION
EMISSION RATE SUMMARY

Parameter									
Engine No.	1	1	1	1	1	2	2	2	2
Run No.	*1-A	1-B	1-C	1-D	Test Average	2-1	2-2	2-3	Test Average
Date	10/17	10/17	10/17	10/17	10/17	10/12	10/12	10/12	10/12
Carbon monoxide									
(lbs/hr)	19.5	17.7	18.3	18.2	18.2	16.2	16.1	16.5	16.3
(g/hr)	8841	8019	8315	8395	8253	7354	7312	7467	7378
(g/HP-hr)	2.09	1.88	1.96	1.98	1.94	1.74	1.72	1.76	1.74
(tons/yr)	85.4	77.5	80.2	81.0	79.6	71.0	70.5	72.3	71.4
Nitrogen dioxide									
(lbs/hr)	22.1	24.4	233	24.1	23.9	26.1	23.3	24.6	24.7
(g/hr)	10027	11046	10570	10937	10851	11847	10550	11151	11183
(g/HP-hr)	2.36	2.58	2.50	2.57	2.55	2.80	2.48	2.62	2.63
(tons/yr)	96.8	106.9	102.1	105.6	104.9	114.3	102.1	107.7	108.0
Total Hydrocarbons									
(lbs/hr)	42.5	41.4	44.3	44.1	43.3	38.9	38.3	38.7	38.6
(g/hr CH_4)	19271	18783	20076	20002	19620	17644	17368	17573	17528
Methane									
(lbs/hr)	38.8	38.2	40.5	40.7	39.8	34.0	35.6	36.0	35.2
(g/hr)	17617	17329	18361	18481	18057	15417	16134	16321	15957
Non-Methane Hydrocarbons									
(lbs/hr)	3.65	3.20	3.78	3.35	3.44	4.91	2.72	2.76	3.46
(g/hr)	1653.9	1453.6	1714.6	1521.5	1563.2	2226.6	1234.0	1252.2	1570.9
(g/HP-hr)	0.39	0.34	0.40	0.36	0.37	0.53	0.29	0.29	0.37
(tons/yr)	16.0	14.0	16.6	14.7	15.1	21.5	11.9	12.1	15.2

* Run 1-A voided, unacceptable zero and span drift.
Results not included in averages.

SET 1314-01-1189

3.0 FACILITY DESCRIPTION

The compressor station consists of two 4200 HP Dresser-Rand Model TCV-10 natural gas fired reciprocating engines. The exhaust leaves each engine through a 24-inch diameter duct before exiting through a silencer and vertical exhaust stack outside the engine building. Figure 3-1 shows the sample port locations for each engine. Figure 3-2 presents the sample point locations sampled during each test. The exhaust ducting for each of the two engines was identical.

The measurement site was located in a 38.50 inch ID circular duct greater than 77 inches (2.0 duct diameters) downstream of the nearest flow disturbance and greater than 20 inches (0.5 duct diameters) upstream of the nearest flow disturbance. As required by EPA Method 1 and 2 criteria the minimum number of 16 traverse points, 8 along each of two (2) diameters.

The PA DER plan approval specifies that air contaminant emissions from each of the two engines shall not exceed the following rates:

Nitrogen oxides----------3.0 grams/HP-HR
Carbon monoxide----------2.0 grams/HP-HR
Non-Methane hydrocarbons-----0.5 grams/HP-HR

The combined air contaminant emission from the two Dresser-Rand TCV-10 engines, the Sivalls indirect-fired gas heater, the Natco indirect-fired regenerative gas heater, and the natural gas-fired boiler shall not exceed the following rates:

Nitrogen oxides---------- 262.1 tons/year
Carbon monoxide---------- 162.2 tons/year
Non-Methane hydrocarbons--- 40.6 tons/year

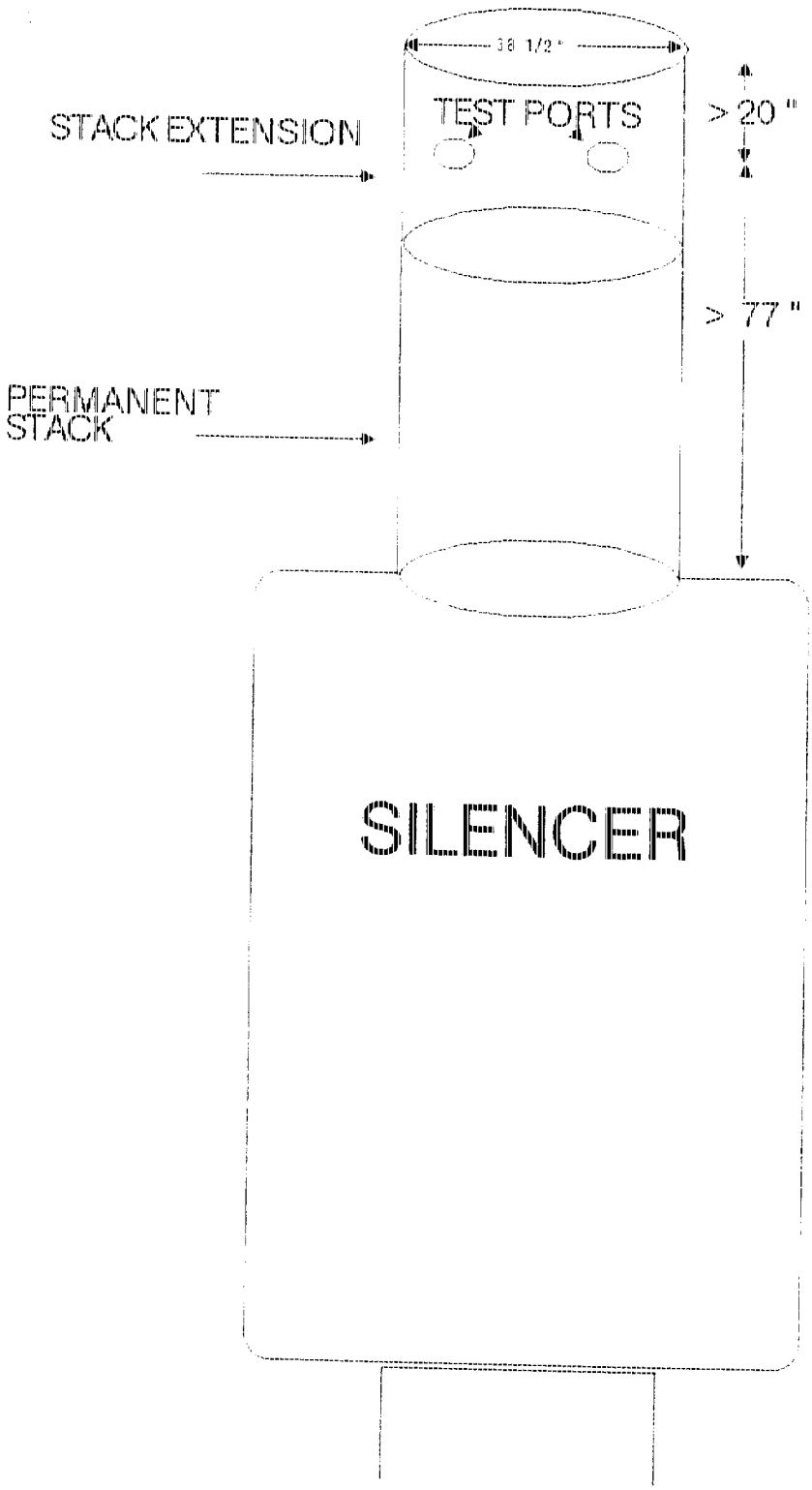
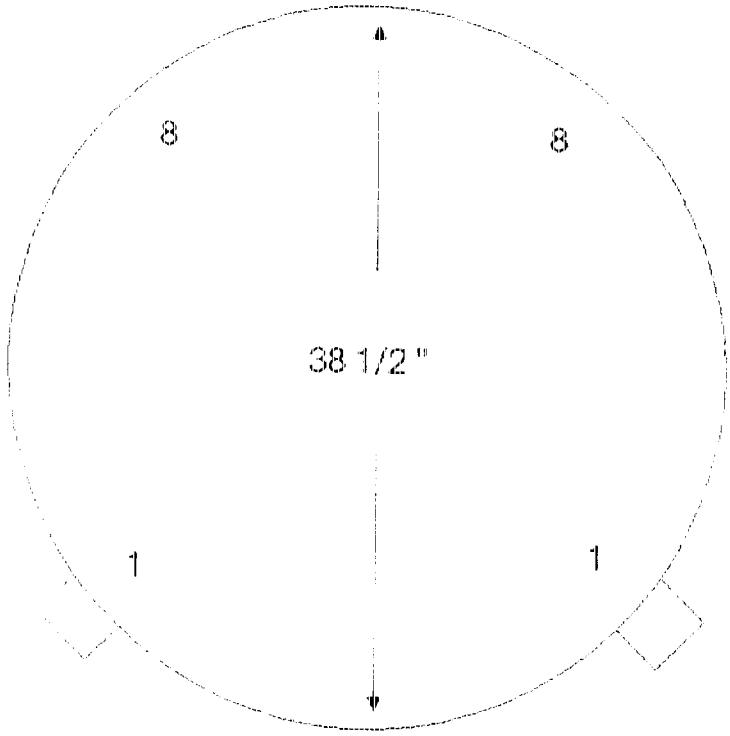


FIGURE 3 — 1 SAMPLE PORT LOCATION



Traverse Point Number	Point Location (inches from outside wall)
1	2.98
2	5.79
3	9.22
4	14.19
5	27.82
6	32.78
7	36.21
8	39.02

FIGURE 3 — 2 SAMPLE POINT LOCATION

4.0 SAMPLING AND ANALYTICAL PROCEDURES

The primary objective of the test program was to evaluate the two engines emissions to the atmosphere. The procedures employed for testing were as defined in EPA Reference Methods 1, 2, 3A, 4, 7E, 10, 18, and 25A. A stainless steel probe was inserted into the stack. The probe was equipped with a three-way valve out of the stack. The valve permitted directing either the stack gas or zero/span gases through the heated teflon sample line to the instrument's manifold.

All analyzers were located in the Scott mobile laboratory which was brought to the site. The laboratory provided a clean environment for the analyzers. The stack gas was analyzed for velocity, O_2, CO_2, NO_x, CO, CH_4, and NMHC (by difference). A brief description of the analytical methods used follows.

Nondispersive infrared spectroscopy was used for CO and CO_2. Each of these gases absorbs infrared radiation of a characteristic wavelength. The absorption is proportional to the concentration of the pollutant. Oxides of nitrogen were measured by chemiluminescence where the characteristic light emitted by the gas phase reaction of NO with ozone and resulting decay of excited NO_2 is measured. Total hydrocarbons were measured using a flame ionization detector burning sample gas in a hydrogen flame and measuring the electron flow resulting from the ionization of oxidizing C to CO_2 in the flame. CH_4 was measured using a gas chromatograph with a flame ionization detector.

Each analyzer was given a multipoint calibration prior to the test using zero and three span gases to establish instrument linearity. Following the tests, instrument zero and span checks were established with a single gas. The span was selected to be representative of concentrations observed in the stack.

The procedures employed to determine stack gas moisture content were consistent with those specified by EPA Reference Method 4. Stack gas

velocity was measured with an S-type pitot tube equipped with a type K thermocouple for determining flue gas temperature. Velocity head pressure was measured using an inclined manometer having a full range of 0 to 10 inches H_2O. Velocity measurements were made concurrent with each moisture and pollutant determination.

APPENDIX A

ENGINE NO. 1 FIELD DATA

Project Number _____

Plant CNG Tioga Station

Date 10-17-89

Sample Location Engine #1 - Stack

Run Number #1 - A

Operators M.A. Gallagher

Ambient Temperature _____

Barometer 27.97

Static Pressure -0.65/-0.61

Pitot Factor 0.84

Estimates for K-Factor Determination

P_s = _____

$\%O_2$ = _____

$\%CO_2$ = _____

T_s = _____

T_m = _____

B_{WS} = _____

Y_d = 0.9931

dH@ = 2.00

Stack ID 38.5

K = NA

Test Number _____

Meter Box Number RAC 3

Meter Box Number _____

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O 26.0

grams Silica Gel 4.6

$\%O_2$ 15.19

$\%CO_2$ 3.28

Nozzle ID NA

Start Time 1044

Finish Time 1144

	Initial	Final
Inches Hg	17	14.5
Leak Rate	<0.001	<0.001

H P = 4240

Qwss = 0.006 Vm 26.5

Traverse Point	Sampling Time	Gas Meter Reading Init. 352.997	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.
A-1	0 1044		0.88		512					
2	10 1054	356.3	0.94	0.50	513	48	47	10		
3	20 1104	360.4	0.94	0.50	515	56	49	10		
4	30 1114	365.4	0.94	0.50	516	64	51	10		
5	40 1124	368.8	0.93	0.50	516	75	57	10		
6	50 1134	373.3	0.93	0.50	515	75	60	10		
7	60 1144	376.844	0.81	0.50	514	81	65	10		
8			0.57		510					
B-1			0.88		512					
2			0.90		513					
3			0.94		514					
4			0.95		514					
5			0.87		515					
6			0.75		514					
7			0.75		514					
8			0.59		510					
Total										
Average			0.909		513					

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Scott Environmental Technology Inc.

Project Number _____

Plant CMG TIXOA STATION

Date 10-17-89

Sample Location Engine #1-Stack

Run Number #1-B

Operators M.D. Gallagher

Ambient Temperature _____

Barometer 29.97

Static Pressure 0.58/-0.39

Pitot Factor 0.84

Estimates for K-Factor Determination

P_s = _____

$\%O_2$ = _____

$\%CO_2$ = _____

T_s = _____

T_m = _____

P_{WS} = _____

Y_d = 0.9931

dH@ = 2.00

Stack ID 28.5"

K = NA

Test Number _____

Meter Box Number RAC 3

Meter Box Number _____

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O 28.0

grams Silica Gel 34.8

$\%O_2$ 15.13

$\%CO_2$ 3.24

Nozzle ID NA

Start Time 1310

Finish Time _____

HP-4279

	Initial	Final
Inches Hg	22	14.5
Leak Rate	0.004	0.001

Traverse Point	Sampling Time	Gas Meter Reading Init. 377.061	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.	
A-1	0 1310		0.92		514						
2	10 1320	381.0	0.96	0.50	517	51	51	11			
3	20 1330	—	0.99	0.50	519	61	52	11			
4	30 1340	389.1	0.99	0.50	520	67	57	11			
5	40 1350	392.9	0.95	0.50	519	75	60	11			
6	50 1400	397.5	0.92	0.50	520	78	63	11			
7	60 1410	—	0.89	0.50	519	78	64	11			
8	65 1415	403.122	0.63	0.50	506	77	65	11			
B-1			~~0.88~~ 0.90		518						
2			~~0.90~~ 0.92		515						
3			0.94		~~514~~ 517						
4			0.95		518						
5			~~0.87~~ 0.92		518						
6			~~0.75~~ 0.87		518						
7			0.75		~~514~~ 517						
8			0.59		516						
Total											
Average											

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Scott Environmental Technology Inc.

Project Number

Plant CNG TIOGA STATION

Date 10-17-89

Sample Location Engine #1 - Stack

Run Number #1 - CU

Operators M.D. Gallagher

Ambient Temperature

Barometer 29.97

Static Pressure -0.39/-0.32

Pitot Factor ~~1.07~~ 0.84

Estimates for K-Factor Determination

P_s =

$\%O_2$ =

$\%CO_2$ =

T_s =

T_m =

B_{ws} = 0.0497

Y_d = 0.9931

dH@ = 2.00

Stack ID 38.5"

K = NA

Test Number

Meter Box Number RAC3

Meter Box Number

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O 23.0

grams Silica Gel 3.3

% O_2 ~~15.18~~ 15.23

% CO_2 ~~3.20~~ 3.19

Nozzle ID NA

Start Time 1509

Finish Time 1609

HP: 4235

Inches Hg 17 14

Leak Rate 0.001 0.001

Traverse Point	Sampling Time	Gas Meter Reading Init. 403.255	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.	
A-1	0 1509		1.00		512						
2	10 1519	407.4	1.00	0.50	512	51	51	11			
3	20 1529	—	1.05	0.50	515	63	54	11			
4	30 1539	416.8	1.05	0.50	516	70	57	11			
5	40 1549	420.0	1.00	0.50	517	71	59	11			
6	50 1559	423.9	0.96	0.50	516	72	61	11			
7	60 1609	428.415	0.86	0.50	515	72	61	11			
8			0.62		510						
B-1			0.90		513						
2			0.92		515						
3			0.94		517						
4			0.95		518						
5			0.92		518						
6			0.89		518						
7			0.75		517						
8			0.53		516						
Total											
Average											

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Scott Environmental Technology Inc.

A-4

Project Number

Plant CNG Tioga Station

Date 10-17-89

Sample Location Engine #1 - Stack

Run Number #1 - D

Operators M.D. Gallagher

Ambient Temperature

Barometer 29.97

Static Pressure -0.32 / -0.70

Pitot Factor 0.84

	Initial	Final
Inches Hg	17	16
Leak Rate	0.002	0.002

Estimates for K-Factor Determination

P_s =

$\%O_2$ =

$\%CO_2$ =

T_s =

T_m =

B_{WS} =

Y_d = 0.9931

$dH@$ = 2.00

Stack ID 38.5"

K - NA

Test Number

Meter Box Number CAC 3

Meter Box Number

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O

grams Silica Gel

% O_2 ~~15.28~~ 15.30

% CO_2 3.22

Nozzle ID NA

Start Time 1643

Finish Time

HP = 4250

Traverse Point	Sampling Time	Gas Meter Reading Init. 430.146	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.
A-1	0 1643		0.62		510					
2	10 1653		1.00	0.50	512	56	54	10		
3	20 1703	439.0	1.00	0.50	512	64	57	10		
4	30 1713	443.2	1.05	0.50	515	73	59	10		
5	40 1723	447.5	1.05	0.50	516	77	62	10		
6	50 1733	451.3	1.00	0.50	517	77	63	10		
7	60 1743	455.944	0.96	0.50	516	77	64	10		
8			0.86		515					
B-1			0.93		515					
2			0.96		515					
3			0.99		515					
4			1.05		516					
5			1.00		516					
6			0.93		517					
7			0.86		517					
8			0.78		515					
Total										
Average										

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Scott Environmental Technology Inc.

SAMPLE RECOVERY DATA

Plant: SNG Tioga Station

Date: 10-17-99

Sampling Location: Engine #2 outlet stack

Sample Type: moisture (EPA Method 4)

Run Number:

Sample Box Number:

Clean-up Man: M. D. Gallagher

Job Number:

Comments:

FRONT HALF

Filter Number: NA

Description of Filter:

MOISTURE

	A	B	C	D
Impingers				
Final Volume:	226.0 ml	228.0 ml	223.0	228 ml
Initial Volume:	200.0 ml	[illegible] ml	200.0	200.0 ml
Net Volume:	26.0 ml	28.0 ml	23.0	28 ml
Total H_2O:				
Silica Gel				
Final Volume:	462.8 g	468.6 g	463.2	471.3 g
Initial Volume	~~462.8~~ 459.2 g	[illegible] g	459.9	463.2 g
Net Volume	7.6 g	6.8 g	3.3	8.1 g
Total Moisture:	30.6	34.8	36.3	36.1

Description of Impinger Catch:

O_2

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: Unit 1 Run A
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

O_2 Span Gas Conc.:	0	6	14	20.8
Meter/Recorder Reading:	1	25.5	53	86
A	2		53.5	86
B	2		53.5	
C	2			
D	2		53.5	

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	% ppm	Time HR:MIN	Chart Reading	Scale Factor	% ppm
1045	64.5			Run C			
1050	64.5						
1055	64.5			1509	64.5		
1100	64.5			1514	64.5		
1105	64.5			1519	64.5		
1110	64			1524	64.5		
1115	64.5			1529	64.5		
1120	64.5			1534	64.5		
1125	64.5			1539	64.5		
1130	64.5			1544	64.5		
1135	64.5			1549	64.5		
1140	64.5			1554	64.5		
1145	64.5	64.5	15.19	1559	64.5		
				1604	65		
				1609	65	64.58	15.19
1312	64			Run D			
1317	64						
1322	64			1658	65		
1327	64			1703	65		
1332	64			1708	65		
1337	64.5			1713	65		
1342	64.5			1718	65		
1347	64.5			1723	65		
1352	64.5			1728	65		
1357	64.5			1733	65		
1402	64.5			1738	65		
1407	64.5			1743	65		
1412	64.5	64.3	15.1	1748	65		
				1753	65		
				1758	65	65	15.28

CO_2

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: Unit #1 Run A
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

CO_2 Span Gas Conc.:	0	5	10	14.6	
Meter/Recorder Reading:	4	35.5	64	91	
	4	33.5	66	89	
	4		61		
	4		61		
	4		61.5		

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	% ~~ppm~~
1045	23			Run C			
1050	23						
1055	22.5			1509	22.5		
1100	22.5			1514	23		
1105	23			1519	23		
1110	23			1524	22.5		
1115	23			1529	22.5		
1120	22.5			1534	22.5		
1125	22.5			1539	22.5		
1130	22.5			1544	22.5		
1135	22.5			1549	22.5		
1140	22.5			1554	22.5		
1145	22.5			1559	22.5		
				1604	22.5		
				1609	22.5	22.58	3.20
1318	23			Run D			
1317	23						
1322	23			1658	23		
1327	23			1703	23		
1332	22.5			1708	23		
1337	22.5			1713	23		
1342	22.5			1718	23		
1347	22.5			1723	23		
1352	22.5			1728	22.5		
1357	22.5			1733	22.5		
1402	22.5			1738	22.5		
1407	22.5			1743	22.5		
1412	22.5	22.7	3.2	1748	22.5		
				1753	22.5		
				1758	22.5	22.73	3.22

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: Unit 1 (A)
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

CO Span Gas Conc.:	0	59.8	101	509	
Meter/Recorder Reading:	2	16.5	26	96	
A	2		26		
B	2		26		
C	2		26		
CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)	0	2	26		

Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
1045	52			Run C			
1050	54						
1055	53			1509	49.5		
1100	54			1514	49		
1105	53.5			1519	49		
1110	55			1524	50		
1115	55			1529	50		
1120	55			1534	49.5		
1125	55			1539	49.5		
1130	56			1544	50		
1135	56.5			1549	50		
1140	56.5			1554	50.5		
1145	56			1559	50.5		
				1604	50.5		
				1609	50	49.95	247.06
1312	51			Run D			
1317	49						
1322	49			1658	50		
1327	49			1703	49.5		
1332	49			1708	49.5		
1337	49			1713	49		
1342	49.5			1718	49.5		
1347	49.5			1723	49.5		
1352	49			1728	49.5		
1357	49			1733	50		
1402	49.5			1738	50		
1407	49.5			1743	50		
1412	49	49.3	244.0	1748	50		
				1753	50.5		
				1758	51	49.55	247.06

NO_x

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run:
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

NO_x Span Gas Conc.:	0	100.3	230	300	
Meter/Recorder Reading:	2	34	84.5	95.5	
A	2.5	37.5	80.0	96	
B	3.0		80.0		
C					
D	3	39.25	83.0	100	

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

	Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
A	1045	62			Run C			
	1050	62						
	1055	61			1509	64		
	1100	65			1514	64		
	1105	63			1519	65		
	1110	61			1524	63		
	1115	59.5			1529	64		
	1120	62			1534	63		
	1125	60			1539	63		
	1130	60			1544	62		
	1135	59			1549	63		
	1140	58.5			1554	62		
	1145	59	60.0		1559	62		
					1604	62		
					1609	64	63.2	186.6
B	1312	70			Run D			
	1317	67						
	1322	67			1658	63		
	1327	67			1703	64		
	1332	68			1708	65		
	1337	67			1713	64		
	1342	66			1718	64		
	1347	67			1723	63		
	1352	68			1728	63		
	1357	68			1733	63.5		
	1402	65			1738	63		
	1407	65			1743	64		
	1412	65	66.92	198.8	1748	63		
					1753	63		
					1758	64	63.58	183.66

38.38 81.5 98

CARLE

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:
CH_4 Span Gas Conc.: 0 501.7 1004 2501
Meter/Recorder Reading: 2.5 17 32 76.5
A 2.5 — 31.75 76.5
B 2.5 — 31
C 2.5 — 32
D 2.5

Run: Unit 1 Run A
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
1045	29.75			Run C			
1050	29.25						
1055	29.50			1509	29.75		
1100	29.50			1514	29.5		
1105	29.25			1519	29		
1110	29.25			1524	30		
1115	30.0			1529	29.75		
1120	29.5			1534	29.75		
1125	30			1539	29.75		
1130	29.75			1544	29.5		
1135	29.75			1549	30		
1140	29.75			1554	30		
1145	30	29.67		1559	30		
				1604	30		
				1609	30	29.77	926.9
1312	29			Run D			
1317	28.25						
1322	28.5			1658	29.75		
1327	28.25			1703	29.75		
1332	28.5			1708	29.75		
1337	28.5			1713	29.5		
1342	29			1718	—		
1347	29			1723	30		
1352	28.5			1728	29.5		
1357	28.5			1733	29.5		
1402	28.75			1738	29.5		
1407	28.75			1743	30		
1412	28.75	29.6	886.9	1748	30		
				1753	29.5		
				1758	29.75	29.73	927.2

F.D

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG - Tioga
Date: 10-17-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

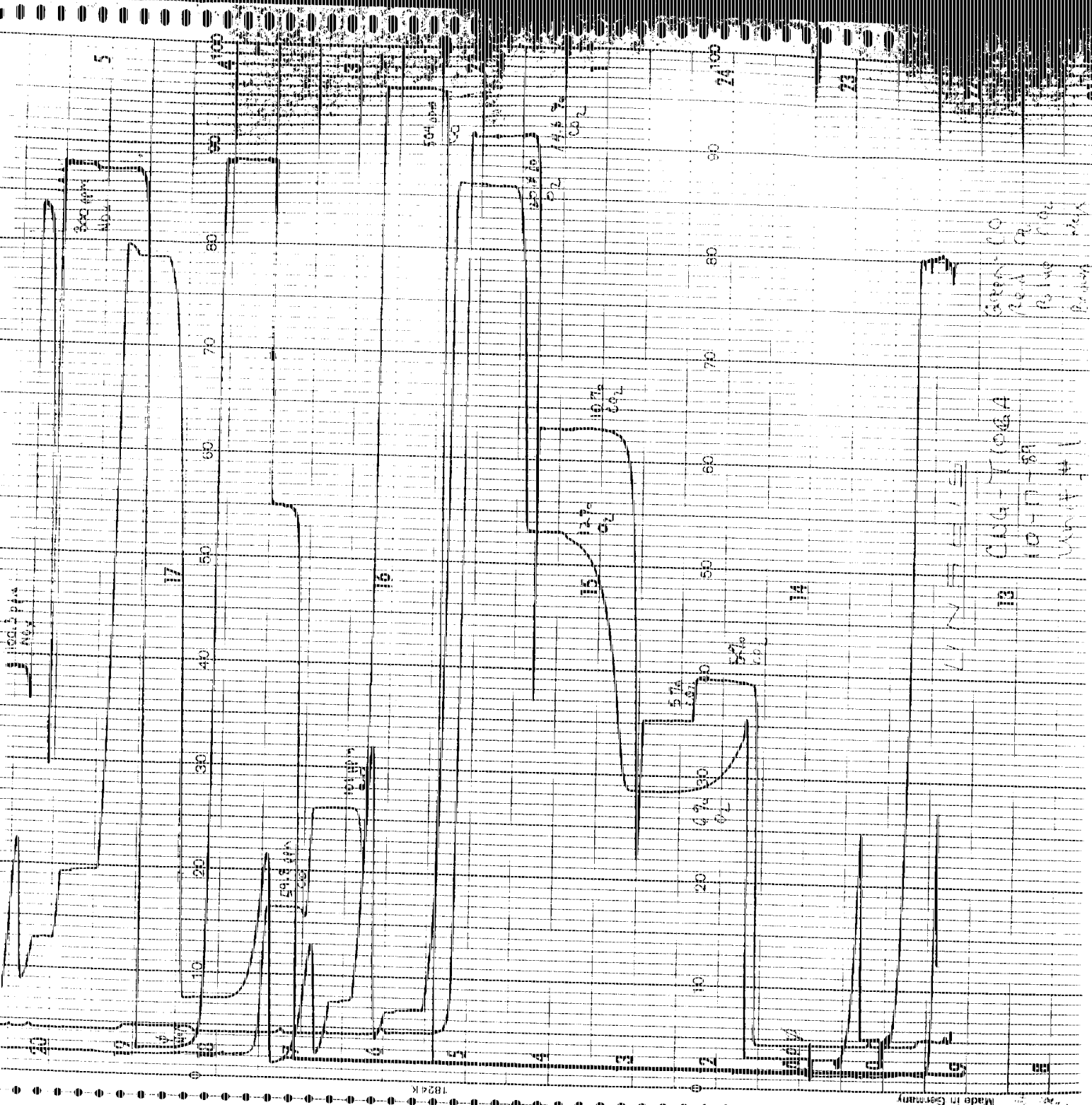
Run: Unit 1 Run A
Pollutant:
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

F.D Span Gas Conc.:	0	504.7	1009	2521
Meter/Recorder Reading:	4.0	20.0	36	85.0
A	4.0	19	35	82
B	4.0	19	34	80
			33.5	79.5

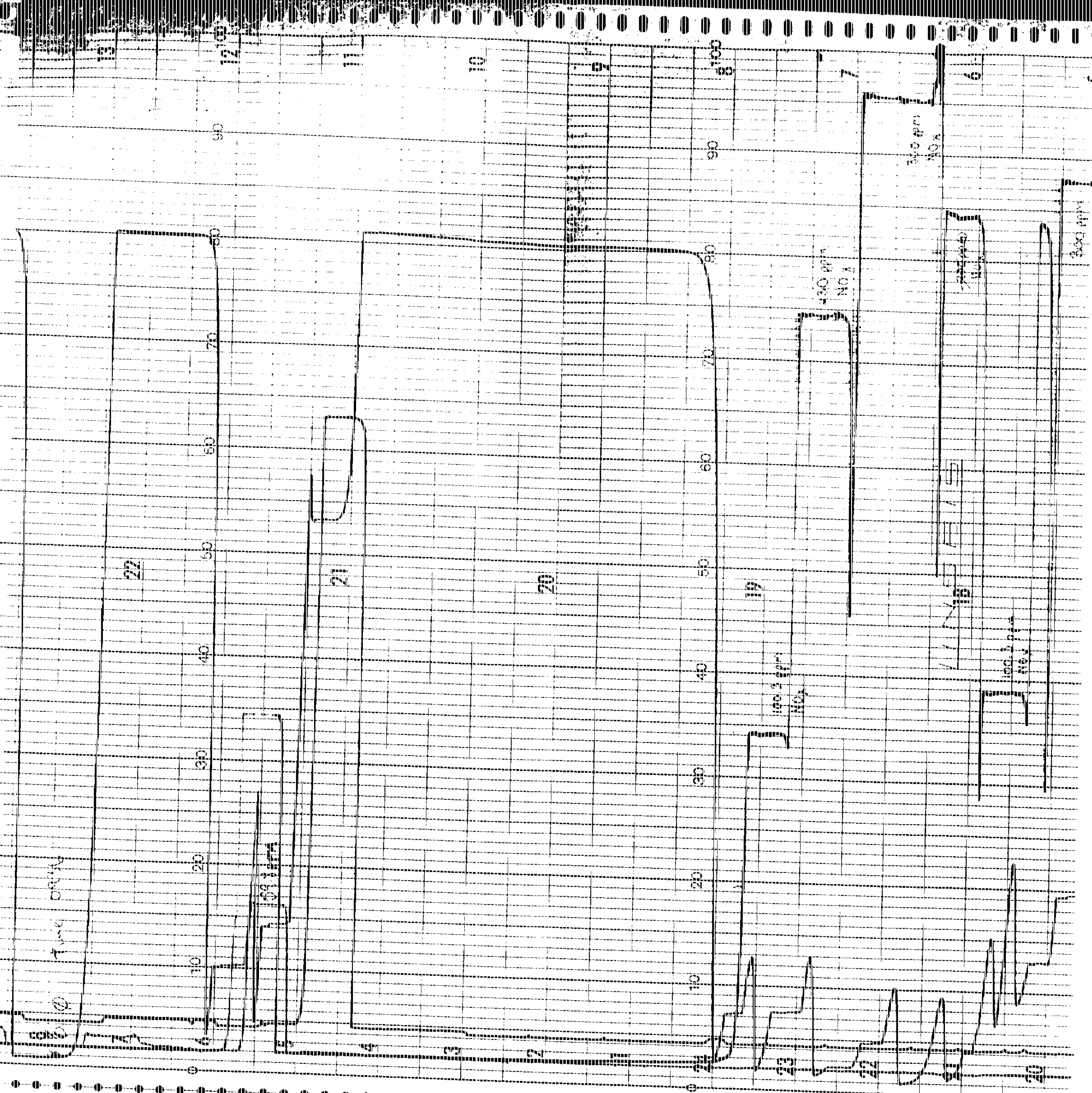
CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

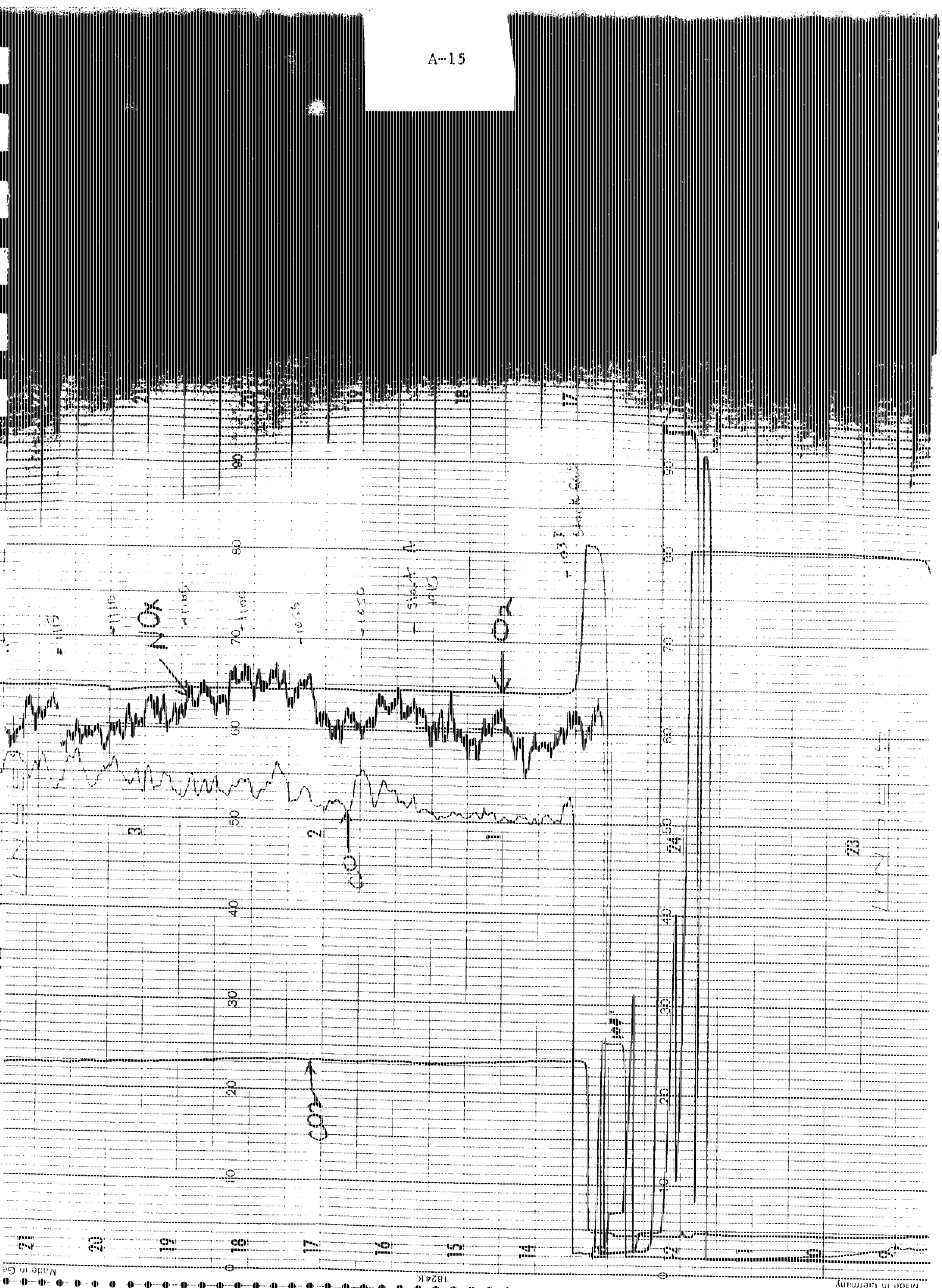
C	4.0	19	33.5	
D	4.0		33.0	

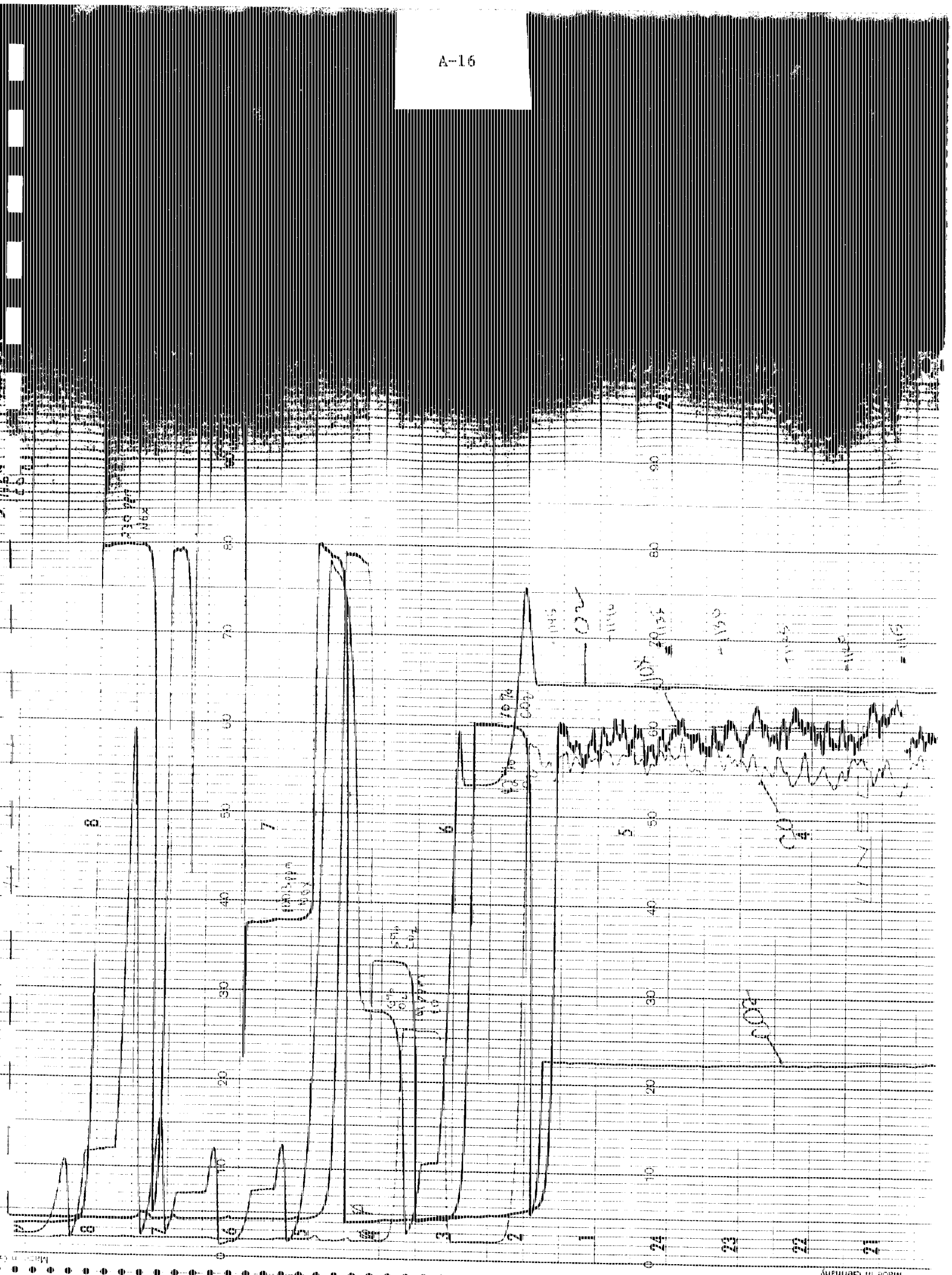
Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
1045	33.5			Run C			
1050	33.5						
1055	33			1509	31.5		
1100	33.5			1514	31.5		
1105	33.5			1519	32		
1110	33.5			1524	32.5		
1115	34			1529	32		
1120	33.5			1534	32		
1125	33.5			1539	32		
1130	33			1544	32		
1135	33.5			1549	32.5		
1140	33.5			1554	32.5		
1145	33.5	33.46		1559	32.5		
				1604	32.5		
				1609	32	32.1	948.27
B 1312	31			Run D			
1317	31.5						
1322	31.5			1658	32		
1327	31.5			1703	32		
1332	31.5			1708	31.5		
1337	31.5			1713	31.5		
1342	31.5			1718	31.5		
1347	32			1723	31.5		
1352	31.5			1728	32		
1357	31.5			1733	32		
1402	31.5			1738	32		
1407	32			1743	32		
1412	32	31.6	921.9	1748	32		
				1753	31.5		
				1758	31.5	31.77	927.29

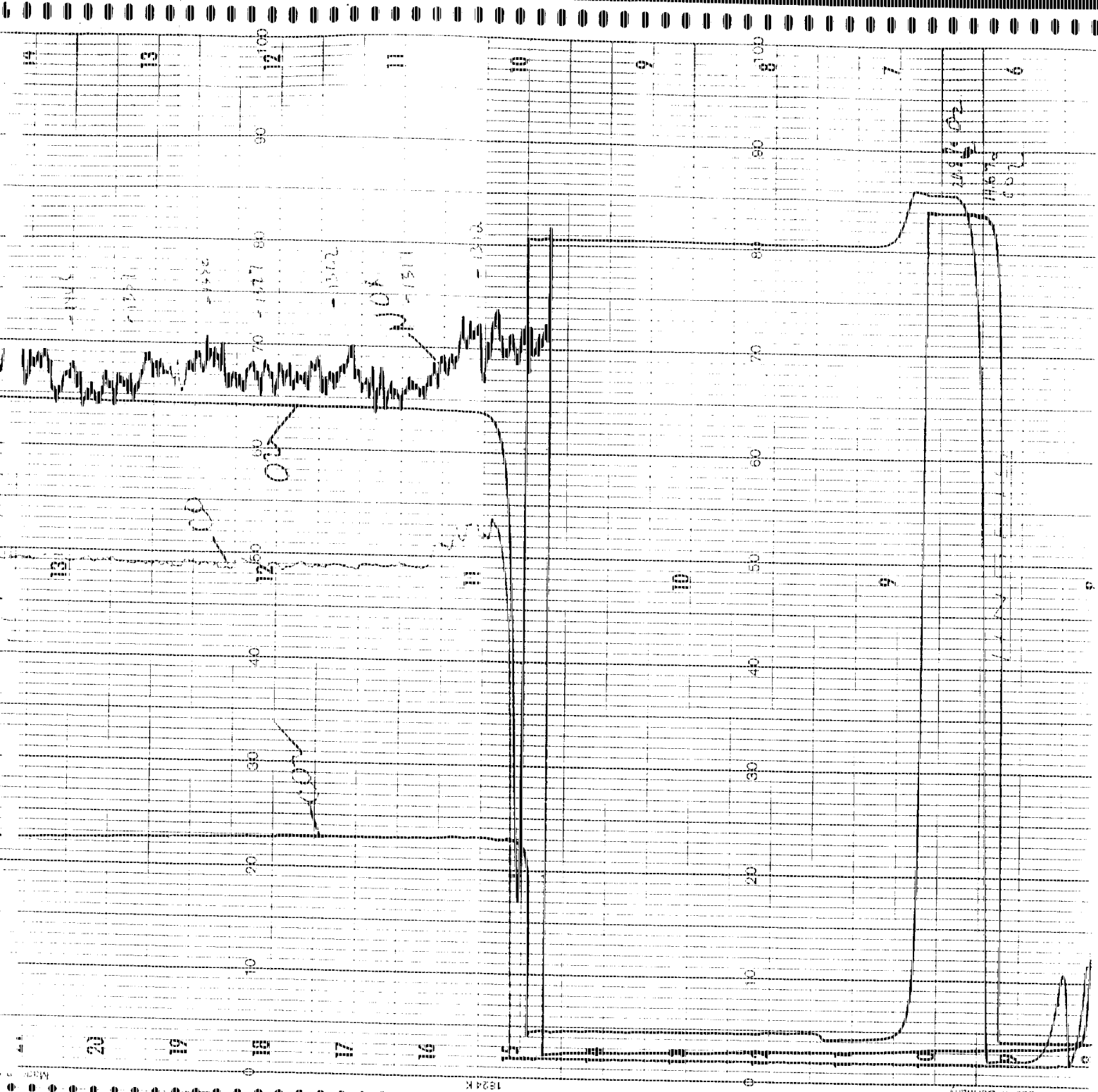


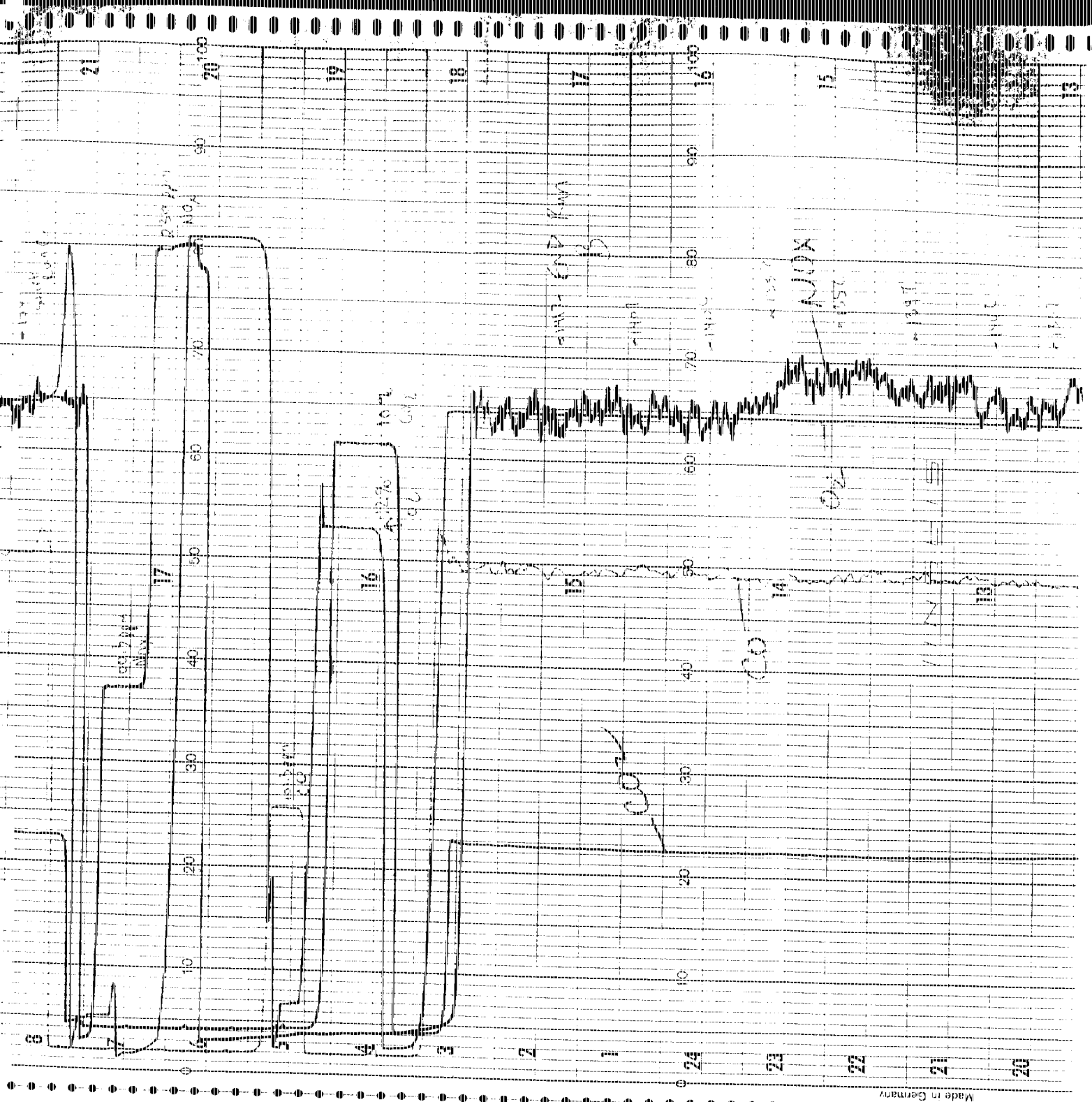
A-14

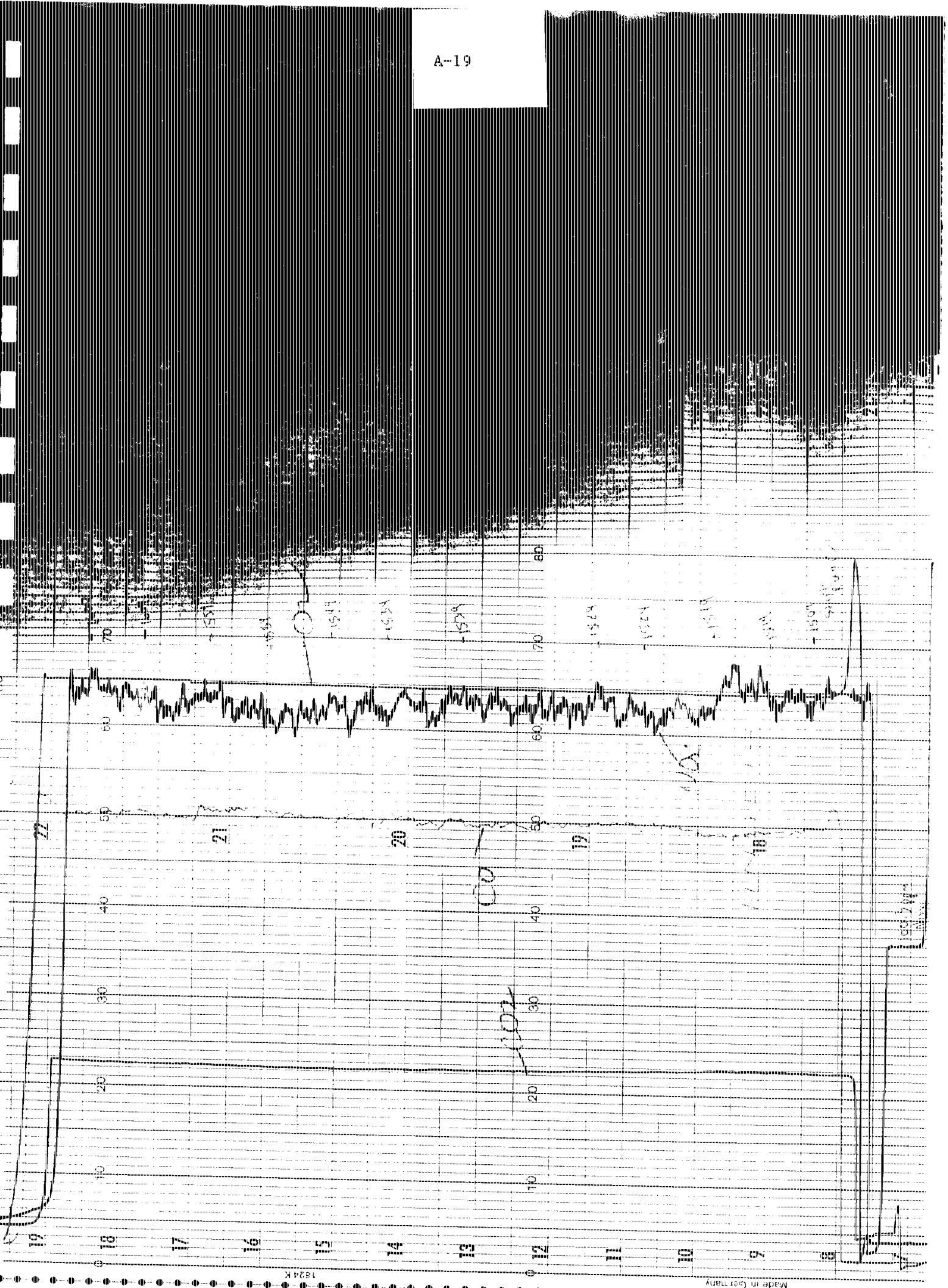


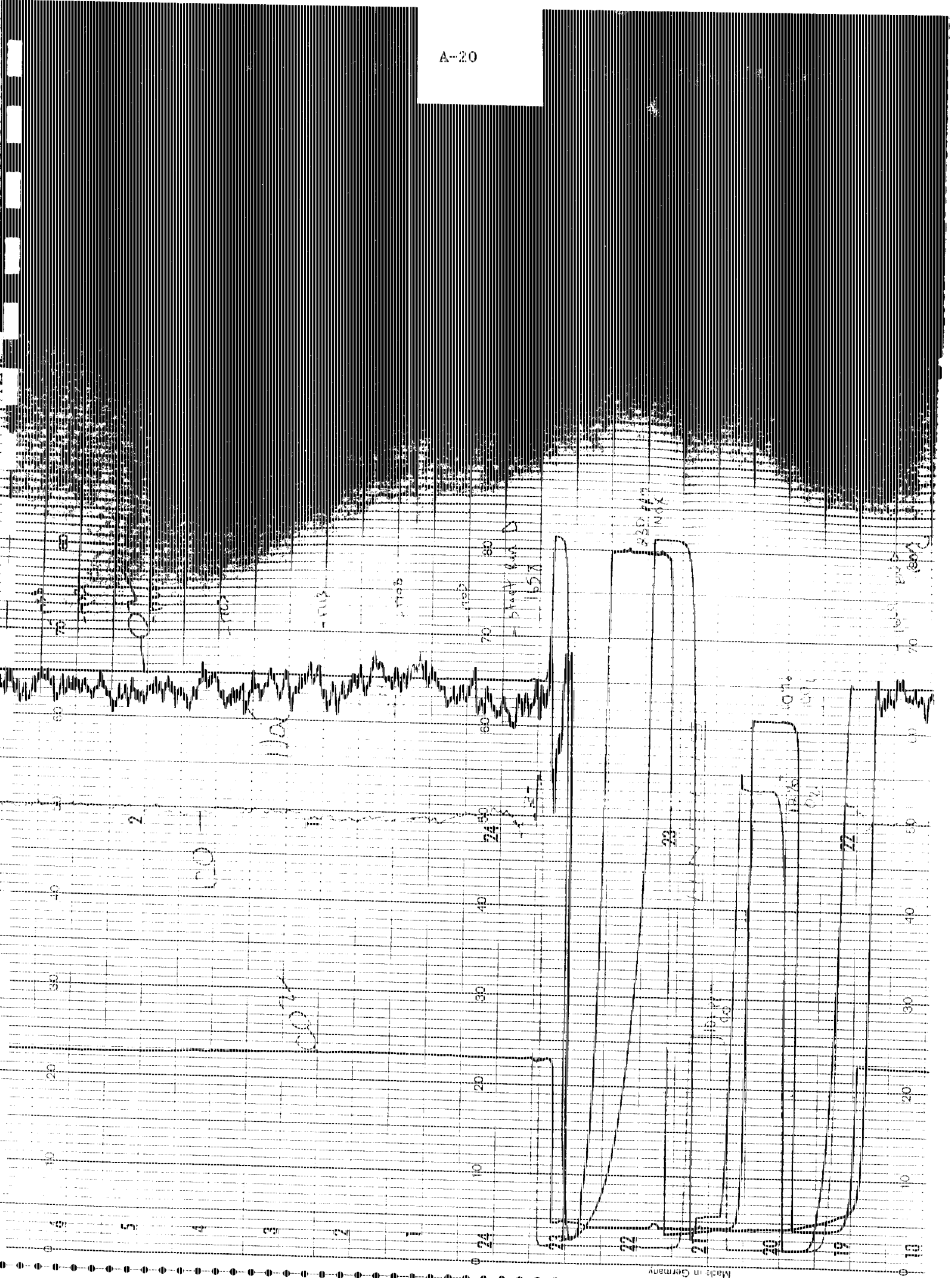

NOx
O2
CO
CO2
Made in Germany
1824K

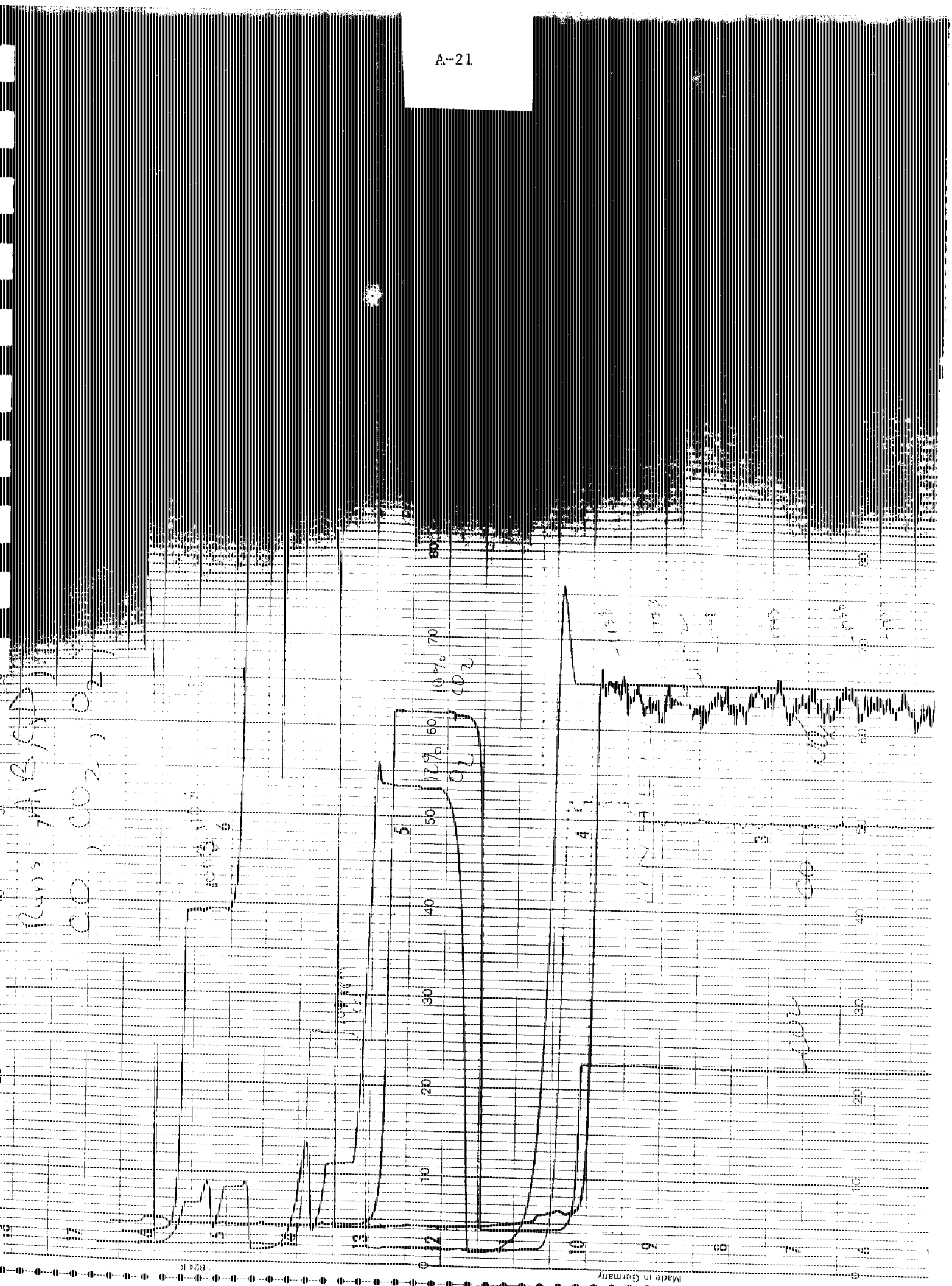


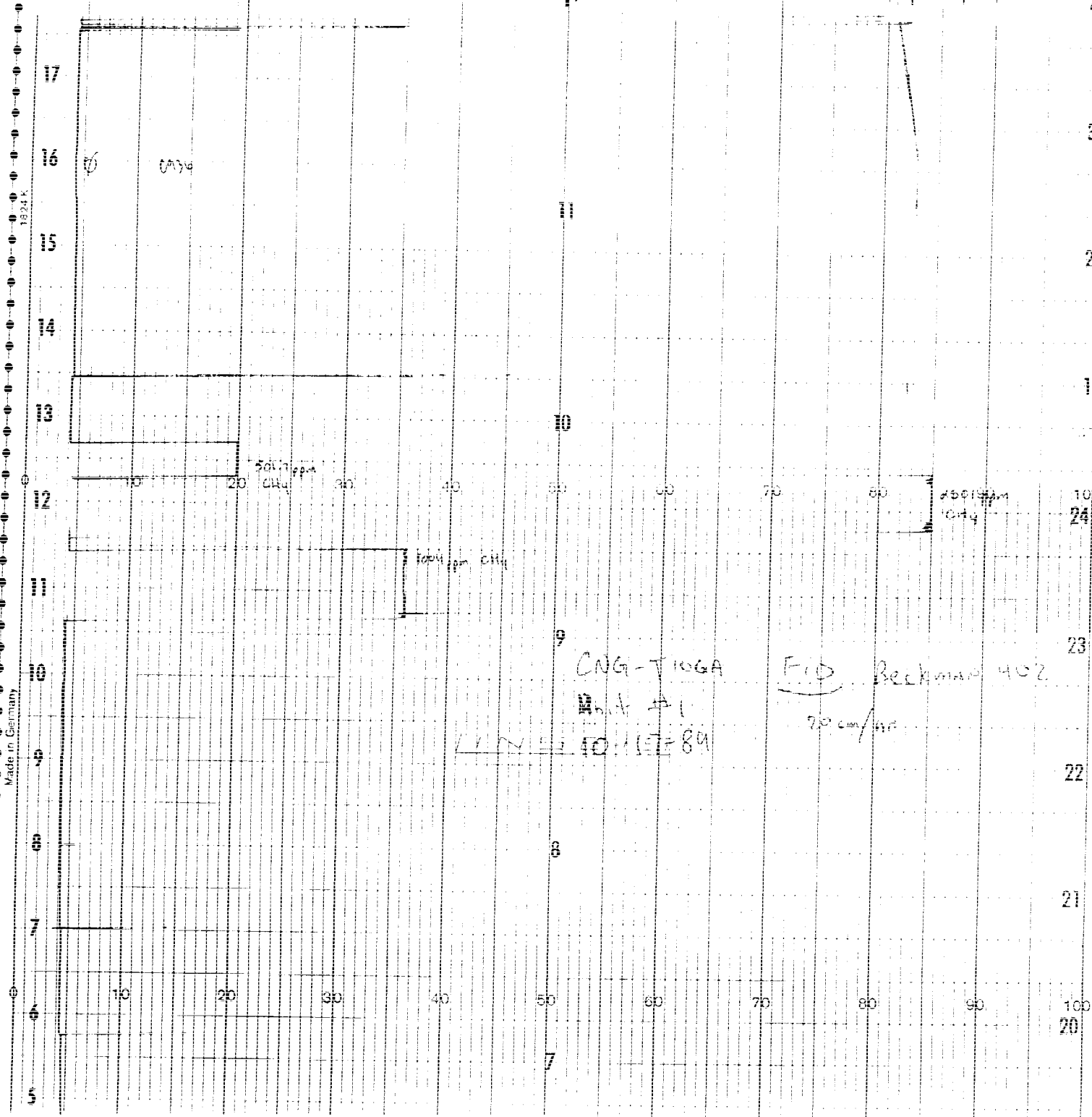



Made in Germany

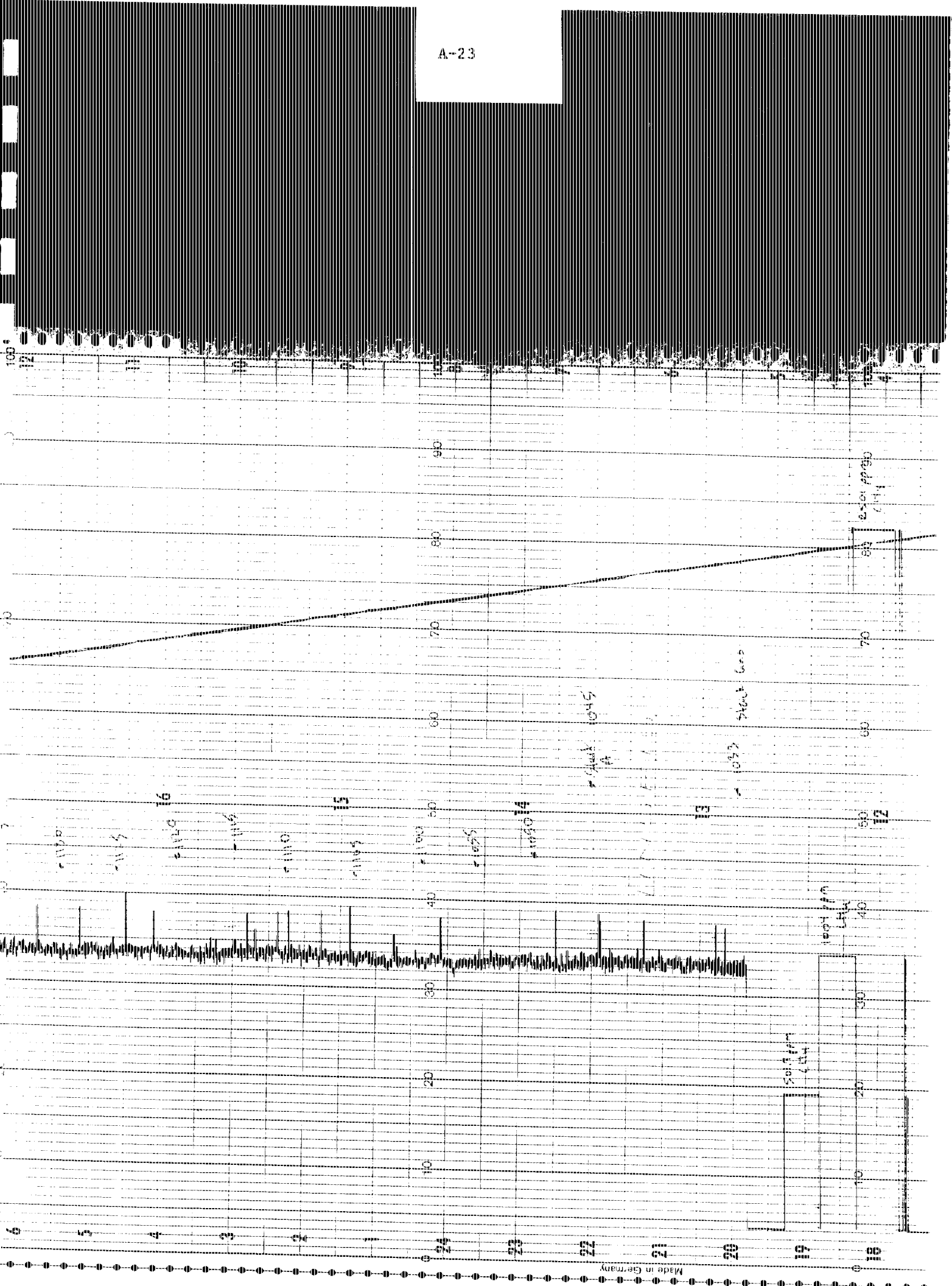

Made in Germany
1824 K

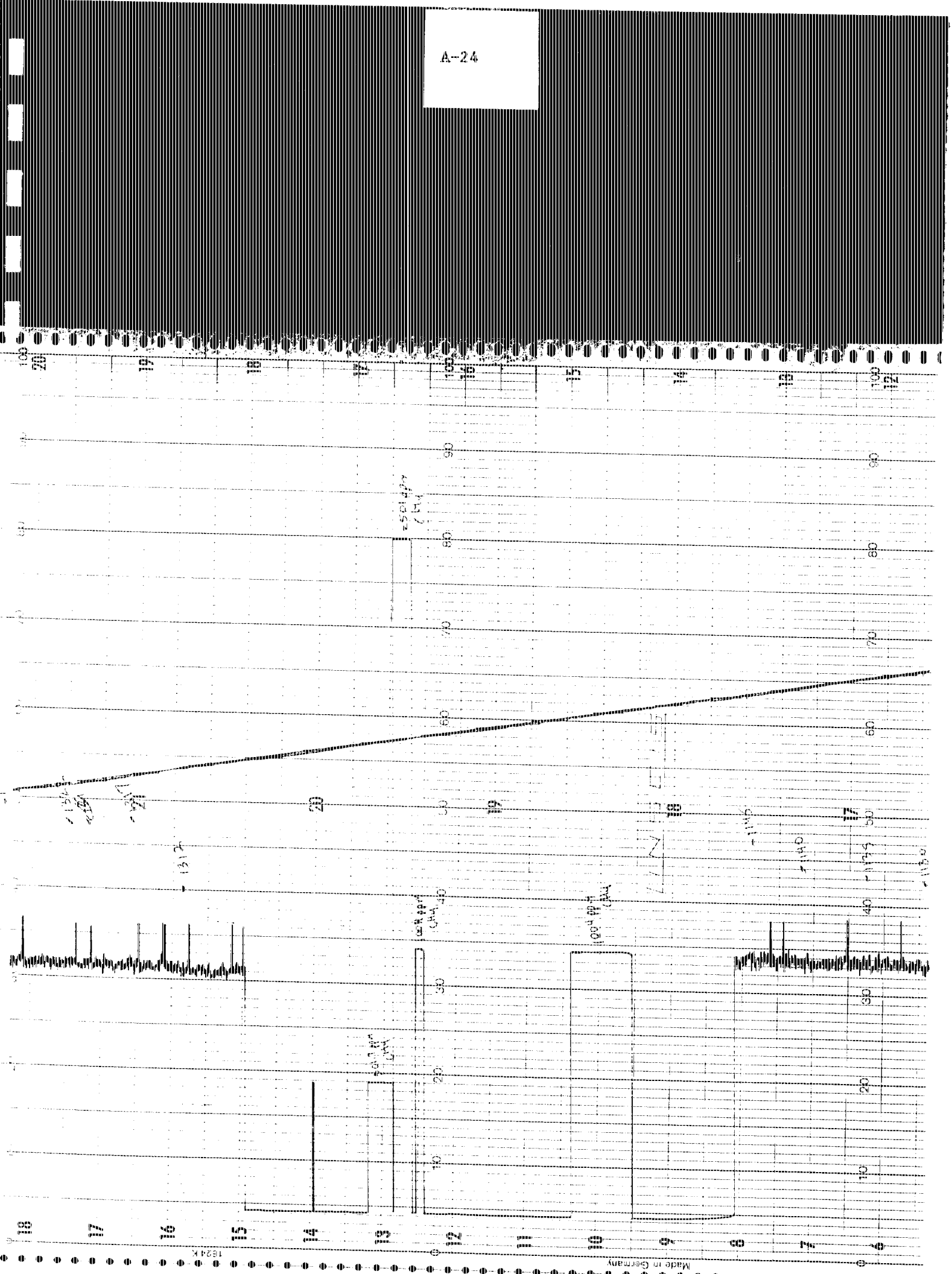

Made in Germany


Made in Germany

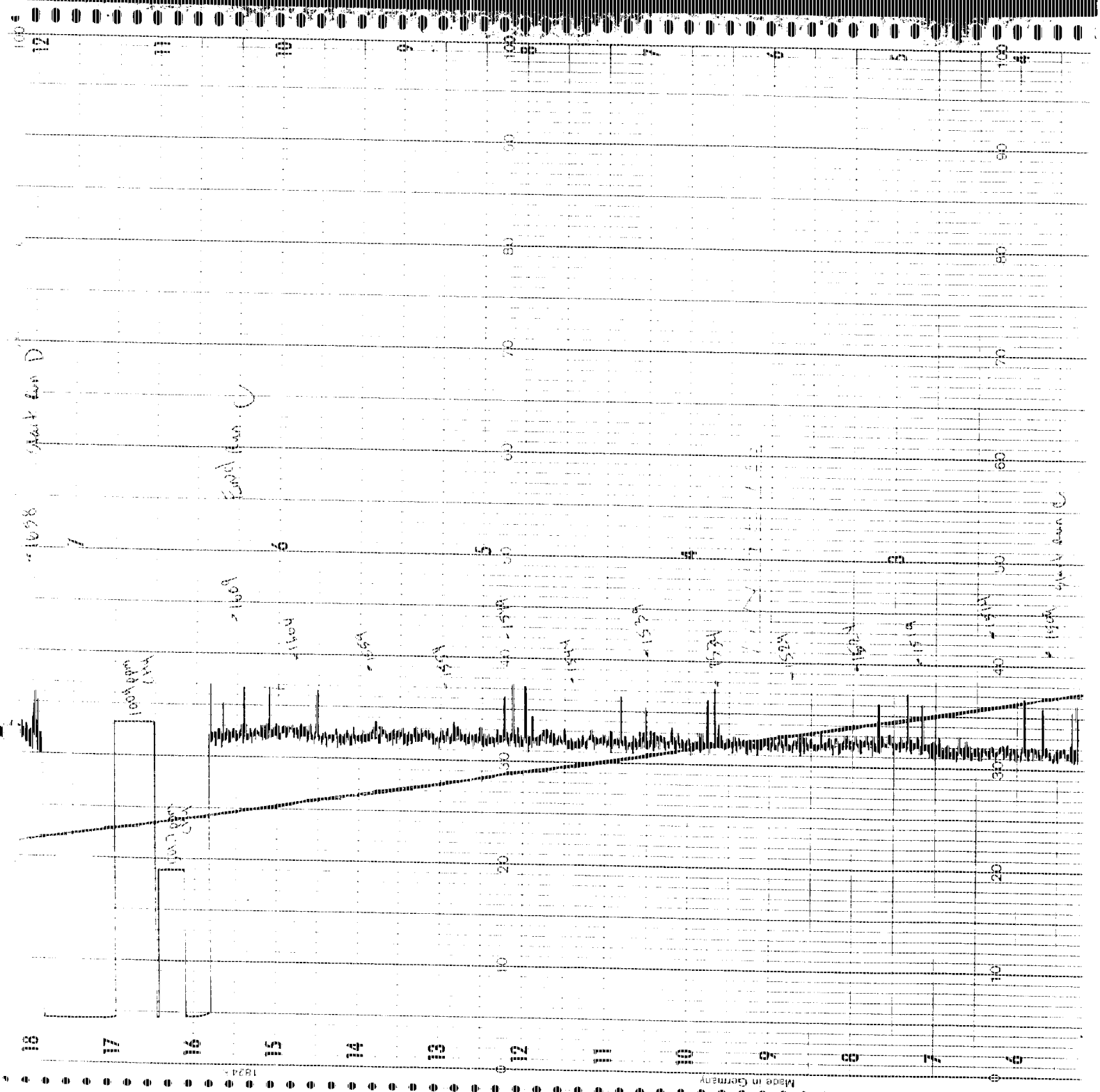

CNG-T10GA
FID Beckman 402
Unit #1
20 cm/hr
1004 ppm CH4
Made in Germany

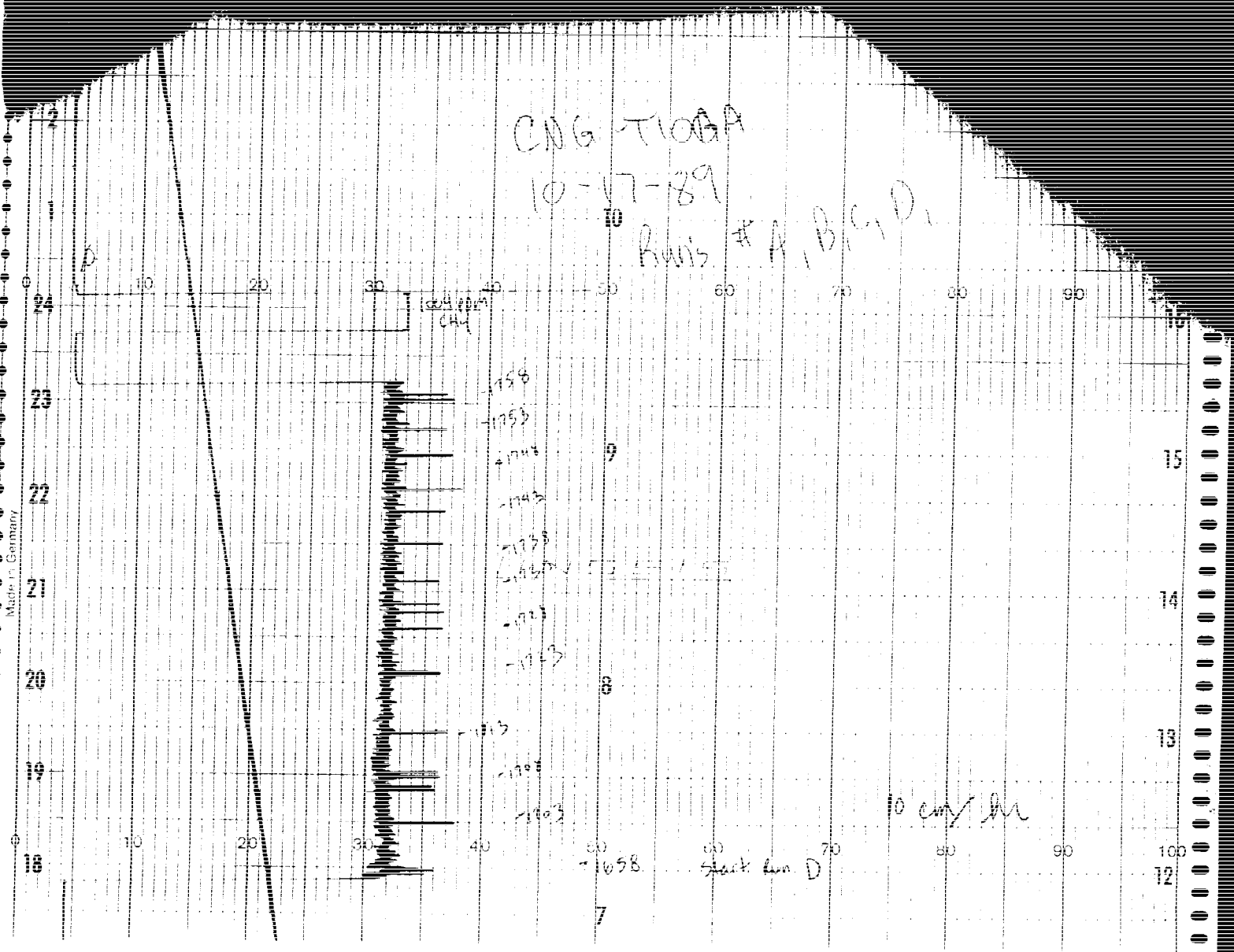
A-22

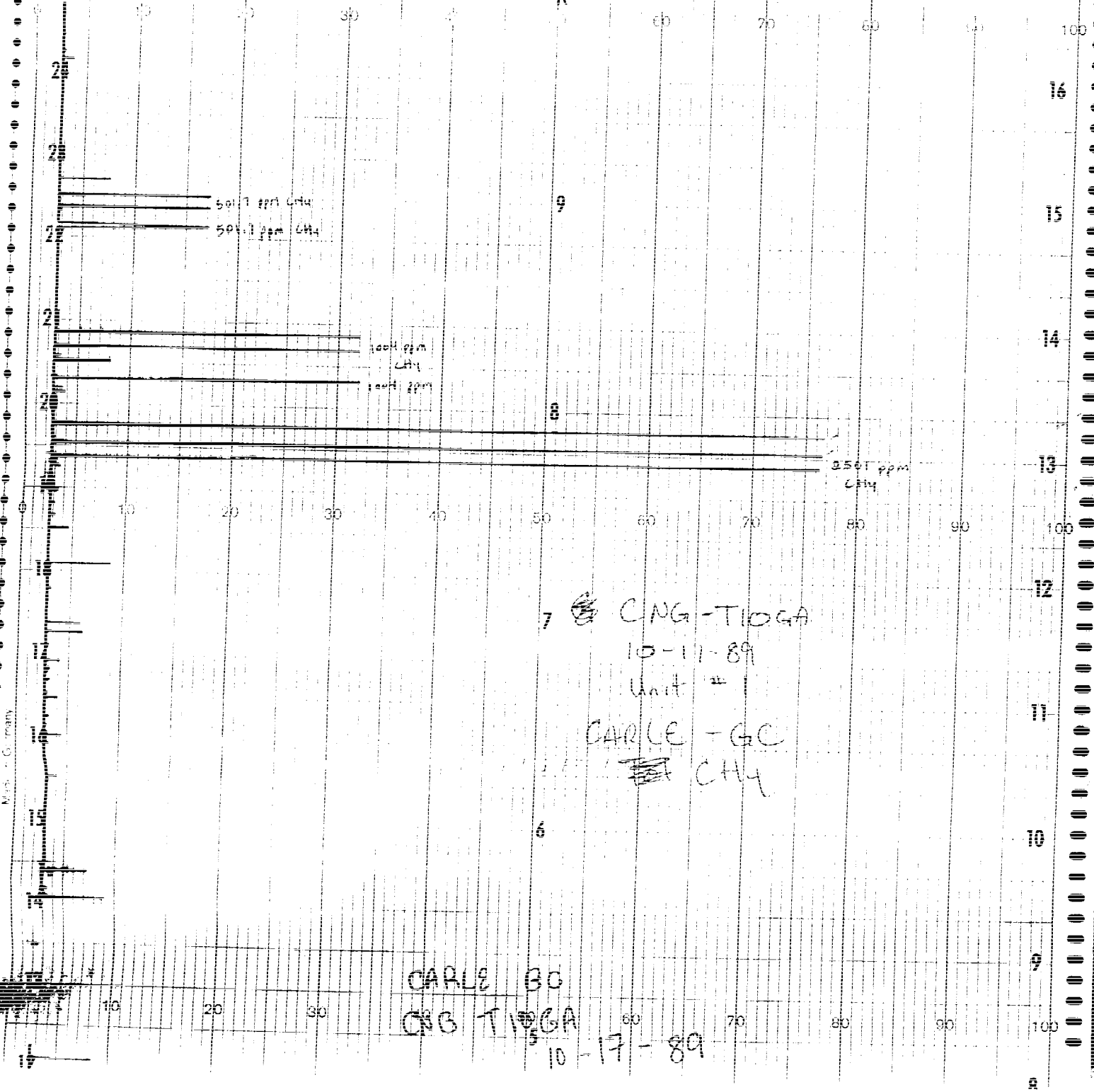

Made in Germany


Made in Germany
1621K

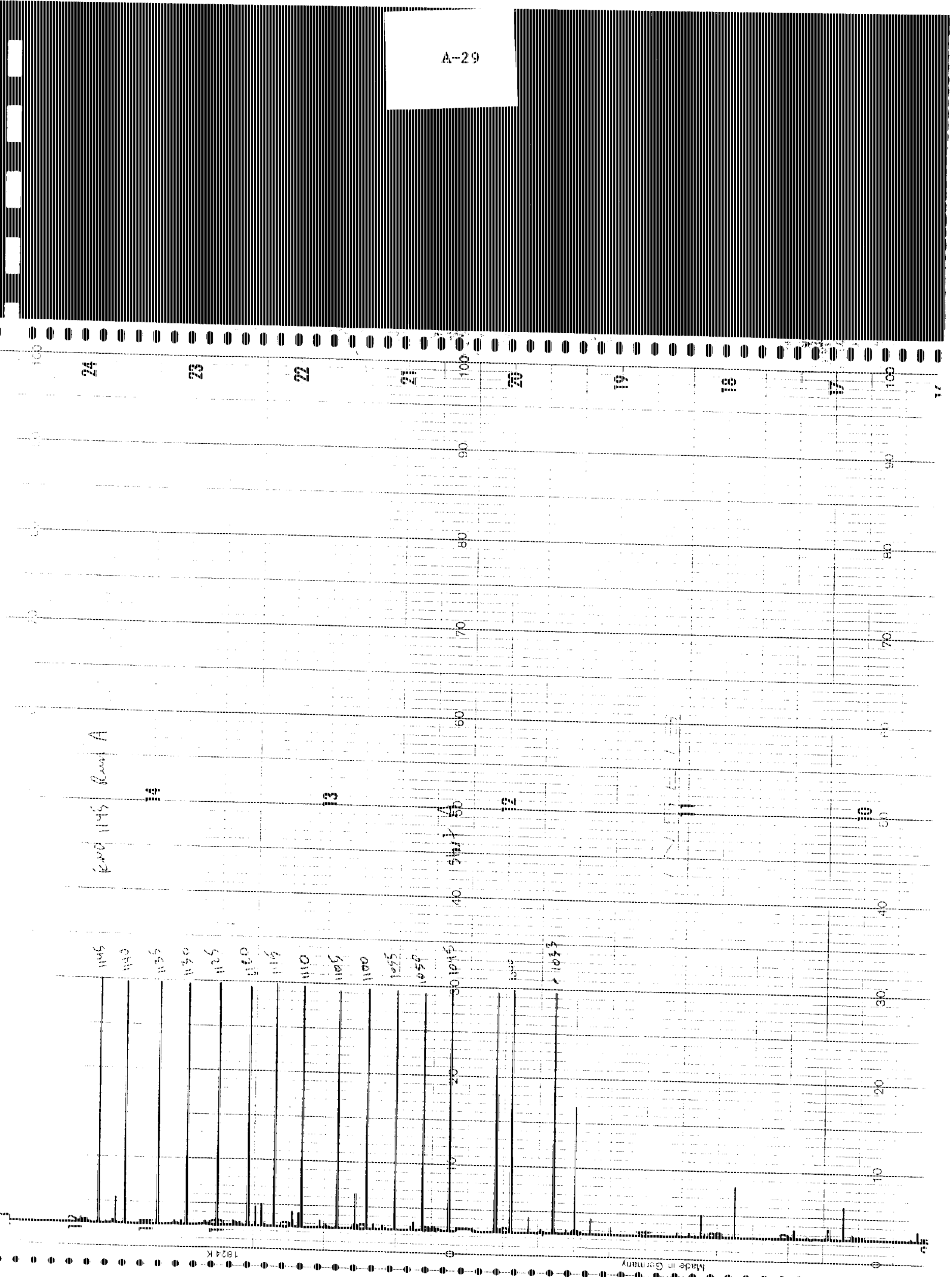
Made in Germany

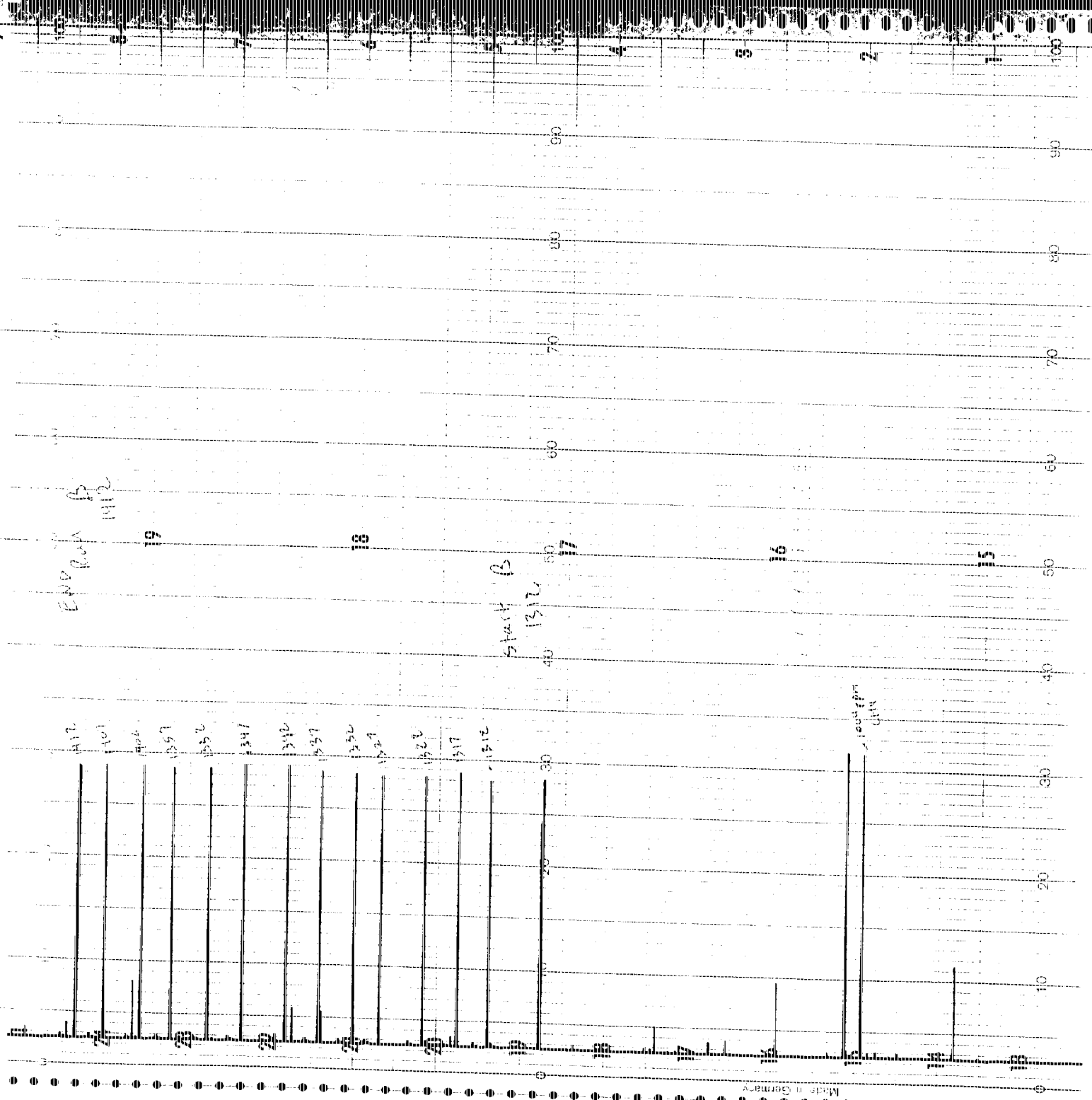

Made in Germany

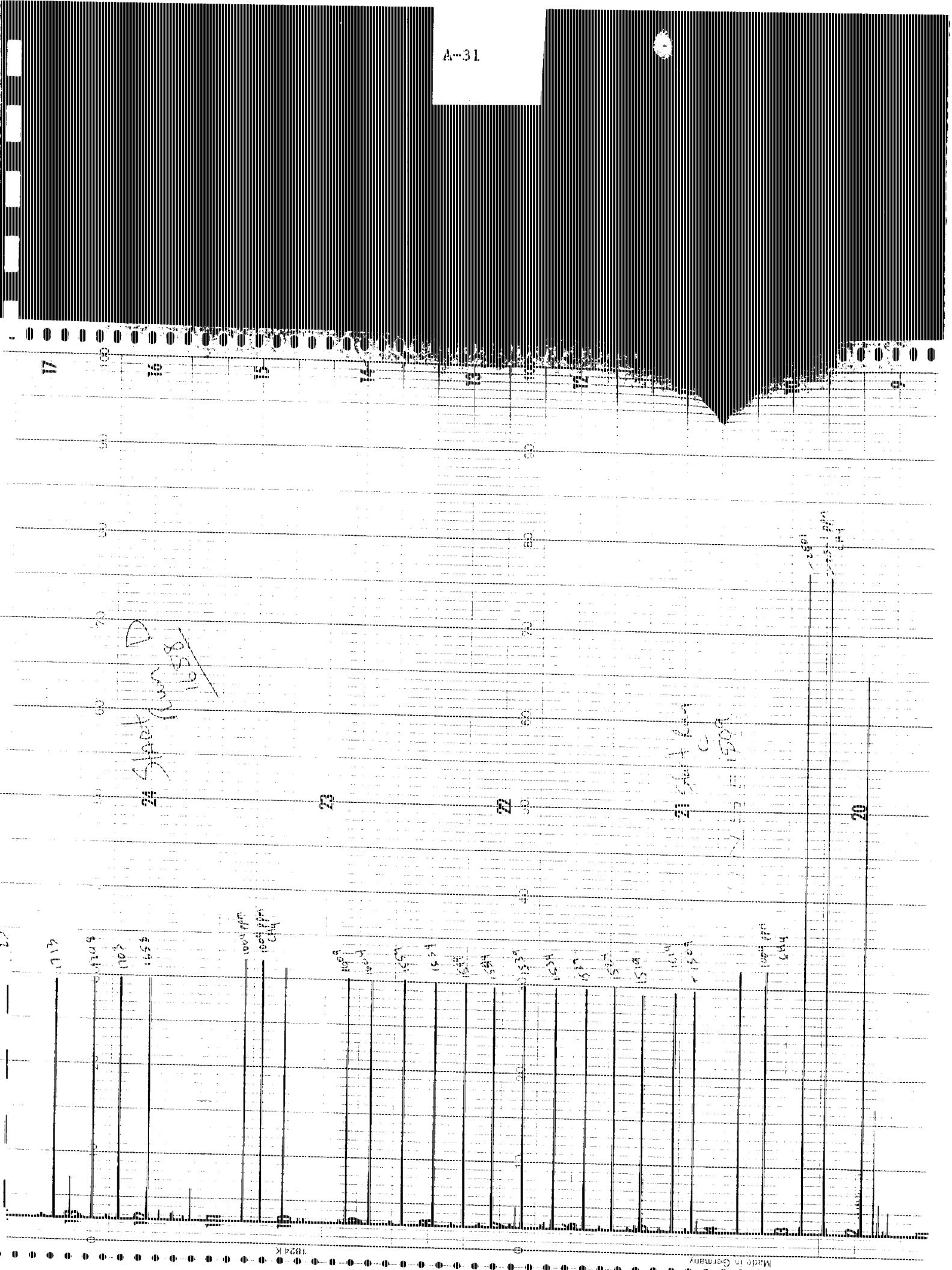

CNG-TIOGA
10-17-89
Run's # A, B, C, D,
1004 ppm CH4
-1758
-1753
-1748
-1743
-1738
-1723
-1713
-1708
-1703
10 cm/hr
+1658
Start Run D
Made in Germany


CNG-TIOGA
10-11-89
Unit #1
CARLE-GC
CH4
CARLE GC
CNG TIOGA
10-17-89

A-28


24
23
22
21
20
19
18
17
14
13
12
11
10
1824 K
Made in Germany


End Rad B
1412
Start B
1312
Made in Germany


Made in Germany
1824K

APPENDIX B

ENGINE NO. 2 FIELD DATA

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CNG - Tioga Station
DATE 10-11-89
SAMPLING LOCATION Unit #1 and #2 - outlet stacks
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE (DISTANCE A) 40.25"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE (DISTANCE B) 1.75"
STACK I.D., (DISTANCE A - DISTANCE B) 38.50"
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR M. D. Gallagher

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOC FROM OUTSIDE OF NI (SUM OF COLUMNS 4
1	0.032	38.50	1.232	1.75	2.982
2	0.105		4.043		5.793
3	0.194		7.469		9.219
4	0.323		12.436		14.186
5	0.677		26.065		27.815
6	0.806		31.031		32.781
7	0.895		34.458		36.208
8	0.968		37.268		39.018

EPA (Dur) 232
4/72

Project Number

Plant CNG TIOGA STATION

Date 10-12-89

Sample Location Unit # 2 Stack

Run Number #2 - 1

Operators M.D. Gallagher

Ambient Temperature 78

Barometer 27.99

Static Pressure 0.72/-0.71

Pitot Factor 0.84

Estimates for Kfactor Determination

P_s =

$\%O_2$ =

$\%CO_2$ =

T_s =

T_m =

B_{WS} =

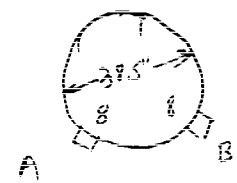
Y_d = 0.9931

dH@ = 2.00

Stack ID 38.5"

K = NA

HP= 4232



Test Number

Meter Box Number RAC 3

Meter Box Number

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O 28

grams Silica Gel 10.8

% O_2 14.93

% CO_2 3.41

Nozzle ID NA

Start Time 1325

Finish Time 1425

	Initial	Final
Inches Hg	22	14
Leak Rate	0.007	0.007

Traverse Point	Sampling Time	Gas Meter Reading Init. 198.825	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.
A-1	0 1325		0.85/0.85	0.50	509/507					
2	10 1335	202.7	0.88/0.84	0.50	509/510	70	67	9		
3	20 1345	206.8	0.89/0.88	0.50	510/511	77	70	10		
4	30 1355	—	0.93/0.92	0.50	511/512	85	74	10		
5	40 1405	214.9	0.96/0.93	0.50	512/512	85	77	10		
6	50 1415	—	0.91/0.87	0.50	512/513	91	80	10		
7	60 1425	223.361	0.84/0.81	0.50	510/513	93	83	10		
8			0.70/0.70		508/511					
B-1			0.89		531					
2			0.92		532					
3			0.89		533					
4			0.93		534					
5			0.94		535					
6			0.91		534					
7			0.83		532					
8			0.60		530					
Total										
Average										

Unit down repeat traverse

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Scott Environmental Technology Inc.

B-3

Project Number _____ Estimates for Reactor Cleaning Ton Test Number _____

Plant CNG TIOGA STATION

Date 10-12-89

Sample Location Unit #2 Stack

Run Number #2-2

Operators M.D. Gallagher

Ambient Temperature 70°

Barometer 28.03

Static Pressure 0.71 / 0.71

Pitot Factor 0.84

P_s = NA

$\%O_2$ = _____

$\%CO_2$ = _____

T_s = _____

T_m = _____

B_{WS} = _____

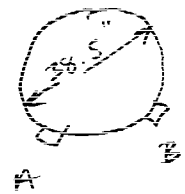
Y_d = 0.9931

dH@ = 2.00

Stack ID 38.5"

K = NA

HP=4251



Meter Box Number RAC 3

Meter Box Number _____

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O _____

grams Silica Gel _____

$\% O_2$ 14.92

$\% CO_2$ 3.36

Nozzle ID NA

Start Time 1544

Finish Time 1644

	Initial	Final
Inches Hg	22	15
Leak Rate	0.003	0

Traverse Point	Sampling Time	Gas Meter Reading Init. 223.406	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.
A-1	0 1544		0.88		530					
2	10 1554	227.28	0.88	0.50	531	72	72	"		
3	~~20~~ 22 1606	232.44	0.90	0.50	533	80	74	"		
4	30 1614	235.28	0.94	0.50	533	[illegible]	[illegible]	"		
5	~~40~~ 44 1628	241.24	0.88	0.50	533	[illegible]	80	12		
6	50 1635	244.38	0.83	0.50	533	[illegible]	[illegible]	13		
7	60 1644	247.635	0.81	0.50	532	[illegible]	82	13		
8			0.50		528					
B-1			0.89		531					
2			0.92		532					
3			0.89		533					
4			0.93		534					
5			0.94		535					
6			0.91		534					
7			0.83		532					
8			0.60		530					
Total										
Average										

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Scott Environmental Technology Inc.

Project Number _____

Plant CNG Tioga

Date 10-12-89

Sample Location Unit #2 Stack

Run Number #2 - 3

Operators M O Gallagher

Ambient Temperature _____

Barometer 28.04

Static Pressure -0.71 / -0.56

Pitot Factor 0.84

Dry Gas Meter

Inches Hg 18 14

Leak Rate 0.002 0.003

Formula for K factor determination

P_s = _____

$\%O_2$ = _____

$\%CO_2$ = _____

T_s = _____

T_m = _____

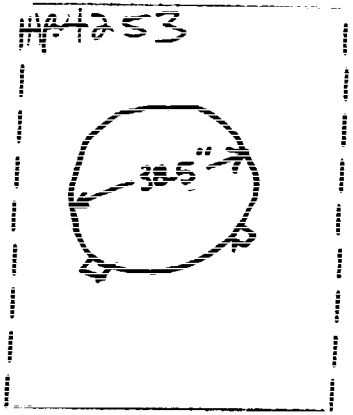
B_{ws} = _____

Y_d = 0.9931

dHg = _____

Stack ID 38.5

K = NA



Test Number _____

Meter Box Number RAC 3

Meter Box Number _____

Probe Heater Setting NA

Filter Heater Setting NA

Total ml H_2O 229

grams Silica Gel _____

% O_2 15.03

% CO_2 3.31

Nozzle ID NA

Start Time 18:[illegible]

Finish Time 19:29

Traverse Point	Sampling Time	Gas Meter Reading Init. 247.832	Vel. Press. dP	Orif. Press. dH	Stack Temp. T_s	Meter Temp. T_m In	Meter Temp. T_m Out	Pump Vacuum	Impinger Temp.	Temp.
A-1	0	247.832	0.88	0.50	530					
2	10	251.85	0.88	0.50	531	75	75	10		
3	~~20~~ 25	257.80	0.90	0.50	533	83	78	11		
4	30	259.73	0.94	0.50	533	89	80	11		
5	40	263.80	0.88	0.50	533	91	80	11		
6	50	267.78	0.83	0.50	533	93	82	11		
7	60	271.798	0.81	0.50	532	96	84	11		
8			0.50	0.50	528	97	85	11		
B-1			0.88		529					
2			0.88		529					
3			0.90		532					
4			0.95		533					
5			0.96		533					
6			0.89		533					
7			0.84		533					
8			0.72		532					
Total										
Average										

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Scott Environmental Technology Inc.

SAMPLE RECOVERY DATA

Plant: CNG Tioga Station

Date: 10-12-99

Sampling Location: Unit #2 - outlet stack

Sample Type: M4 - Moisture

Run Number:

Sample Box Number:

Clean-up Man: M. D. Gallagher

Job Number:

Comments:

FRONT HALF

Filter Number: NA

Description of Filter:

MOISTURE

	Run No. 1		Run No. 2		Run No. 3	
Impingers						
Final Volume:	228.0	ml	224.0	ml	228.0	ml
Initial Volume:	200.0	ml	200.0	ml	200.0	ml
Net Volume:	28.0	ml	24.0	ml	28.0	ml
Total H_2O:						
Silica Gel						
Final Volume:	466.3	g	460.0	g	470.7	g
Initial Volume	456.5	g	448.0	g	462.0	g
Net Volume	10.8	g	12.0	g	8.7	g
Total Moisture:	38.8		36.0		36.7	

Description of Impinger Catch:

O_3

RED

CONTINUOUS ANALYZER DAILY DATA

Plant: CMG 77069
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:
Span Gas Conc.: 0 6 12 20.8
Meter/Recorder Reading: 4.5 31 56 89.5

Run: #2-1
Pollutant: O_3
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

1 4.5
2 4.5
3 4.5

56.5
56.5
56.5

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	% ~~ppm~~	Time HR:MIN	Chart Reading	Scale Factor	% ~~ppm~~
~~[illegible]~~	~~[illegible]~~			Run 3			
1325	66.5	14	14.9	1730	67		
1330	66.5		14.9	1735	67		
1335	66.5		14.9	1740	67		
1340	66.5		14.9	1745	67		
1345	66.5		14.9	1750	67		
1350	66.5		14.9	1755	67		
1355	66.5		14.9	1800	67.5		
1400	66.5		14.9	1805	67		
1405	66.5		14.9	1810	66.5		
1410	67		15.01	1815	67		
1415	67		15.01	1820	67		
1420	66.5		14.9	1825	67		
1425	66.5		14.9	1830	67		
					67		14.99
Run 2							
1545	66.5						
1550	66.5						
1555	66.5						
1600	66.5						
1605	66.5						
1610	67						
1615	67						
1620	66.5						
1625	66.5						
1630	66.5						
1635	66.5						
1640	66.5						
1645	66.5						
	66.58	14.89					

CO_2 Blue

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG 7100A
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: #2-1
Pollutant: CO_2
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

Span Gas Conc.:	12	5	10	15
Meter/Recorder Reading:	4	36.5	65.5	96
	34		66	
	34		66	
	34		66.5	

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	% ~~ppm~~	Time HR:MIN	Chart Reading	Scale Factor	% ~~ppm~~
~~[illegible]~~	~~[illegible]~~			Run 3			
1325	26	3.48	3.48	1730	25		
1330	25.5	3.40	3.40	1735	25		
1335	25.5		3.40	1740	25		
1340	25.5		3.40	1745	25		
1345	25.5		3.40	1750	25		
1350	26		3.48	1755	25		
1355	25.5		3.40	1800	25		
1400	25		3.31	1805	25		
1405	25.5		3.40	1810	25		
1410	25.5		3.40	1815	25		
1415	25.5		3.40	1820	25		
1420	25.5		3.40	1825	25		
1425	25.5		3.40	1830	25		
					250		3.30
Run 2							
1545	25.5						
1550	25.5						
1555	25.5						
1600	25.5						
1605	25.5						
1610	25						
1615	25.5						
1620	25.5						
1625	25						
1630	25						
1635	25						
1640	25						
1645	25						
	250	3.33%					

CO
Green

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG Tioga
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: #2-1
Pollutant: CO
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

Span Gas Conc.:	0	59.8	101	504	
Meter/Recorder Reading:	1.5	15.5	25.5	95	
	1 1.5		25		
	2 1.5		25.5		

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)
3 1.5 25.5

	Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
					Run 3			
	1237	~~49~~						
	~~1239~~							
Run 1					1730	47.5		
	1325	46			1735	48		
	1330	46.5			1740	47.5		
	1335	46.5			1745	47		
	1340	46.5			1750	47		
	1345	47.5			1755	47		
	1350	46			1800	46		
	1355	44.5			1805	47		
	1400	46.5			1810	46		
	1405	46			1815	47		
	1410	46.5			1820	47		
	1415	46			1825	46.5		
	1420	46.5			1830	47		
	1425	44.5 / 46	230.8 / 54.96 / 22.3	adj		46.96		235.59
Run 2	1545	46.5						
	1550	46.5						
	1555	46						
	1600	47						
	1605	47						
	1610	47.5						
	1615	46.5						
	1620	46						
	1625	47						
	1630	47.5						
	1635	47						
	1640	48						
	1645	48						
		46.96	235.89					

NOx
Brown

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG Tioga
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: #2-1
Pollutant: NOx
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

Span Gas Conc.:	0	100 ppm	230	300	
Meter/Recorder Reading:	2	~~20~~	~~45.5~~	~~60.0~~	
	2	20.5	42.0	52	
	3	17.5	38.0	48	
		19.5	40.5	49.5	

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
Run #1				Run 3			
~~1321~~	~~35~~						
1325	39.5			1730	34		
1330	41.5			1735	34		
1335	36			1740	35		
1340	38.5			1745	34.5		
1345	36			1750	33.5		
1350	36			1755	35		
1355	39			1800	36		
1400	35			1805	36		
1405	40			1810	37.5		
1410	35			1815	36		
1415	37			1820	33.5		
1420	37.5			1825	35		
1425	39 / 37.69			1830	35.5 / 35.04	207.33	
Run #2							
1545	37						
1550	34						
1555	36						
1600	34.5						
1605	35						
1610	33						
1615	35						
1620	35.5						
1625	33						
1630	32.						
1635	35						
1640	32						
1645	32.5 / 34.49	197.20					

Run 2
= 3
= 17.5
= 38.0
= 48.0
Post
= 3.0
= 38

4253 AV

CARLE

CONTINUOUS ANALYZER DAILY DATA

Plant: CNG Tioga
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

Run: #2-1
Pollutant: CH_4
Sample Size:
Analyzer Serial No.:
Analyze Model: Carle 211
Output Signal Format:

Span Gas Conc.:	0	501.7	1004	2010
Meter/Recorder Reading:	2	15.5	28	55.5

1 28
2 29
3

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

	Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
Run 1					RUN #3			
	1325	23.5		822.3				
	1330	24		841.2				
	1335	23.5		822.3	1730	25		
	1340	23.5		822	1735	25		
	1345	24		841.2	1740	25.5		
	1350	23.5		822.3	1745	25.5		
	1355	23		803.4	1750	24.5		
	1400	23.25		822.3	1755	25		
	1405	23.5		822.3	1800	25		
	1410	23.75		822.3	1805	25		
	1415	23.75		822.3	1810	24.5		
	1420	23.25		803.4	1815	25		
	1425	23.5		822.3	1820	25		
		23.5			1825	25		
					1830	25.5		860.13
Run 2								
	1545	24.5						
	1550	24.5						
	1555	24.5						
	1600	25						
	1605	24.5						
	1610	25						
	1615	24.5						
	1620	24.5						
	1625	24.5						
	1630	25						
	1635	25						
	1640	25.5						
	1645	25.5						
		24.91	857.68					

F-2

CONTINUOUS ANALYZER DAILY DATA

Plant: CMG 7106A
Date: 10-12-89
Operator:
Strip Chart
Recorder Type:
Inst. Span Range:

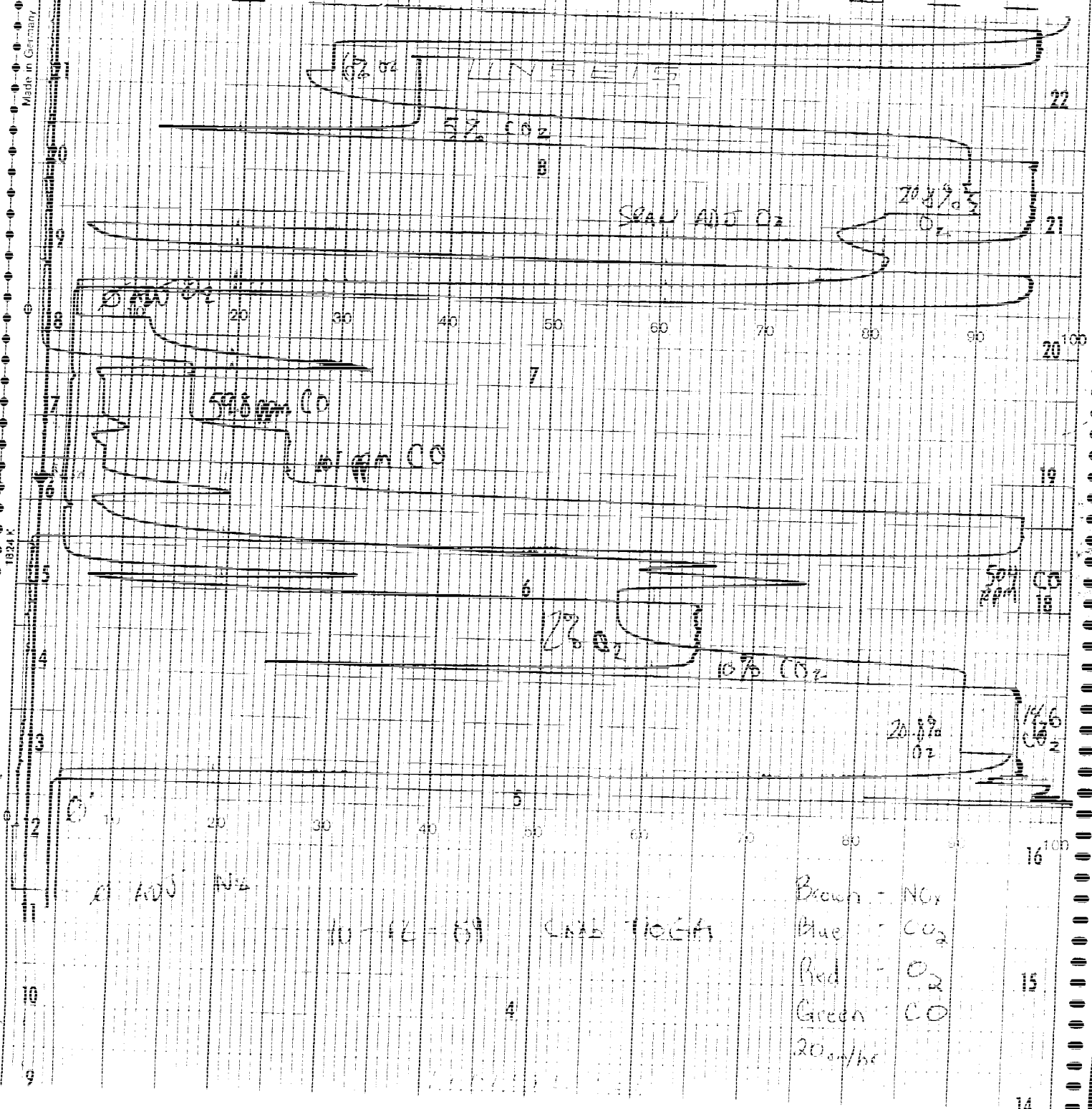
Run: #2-1
Pollutant: TMC (as CH_4)
Sample Size:
Analyzer Serial No.:
Analyze Model:
Output Signal Format:

Span Gas Conc.:	0	50.7	100.4	120.0
Meter/Recorder Reading:	5.0	27	48.5	93.5

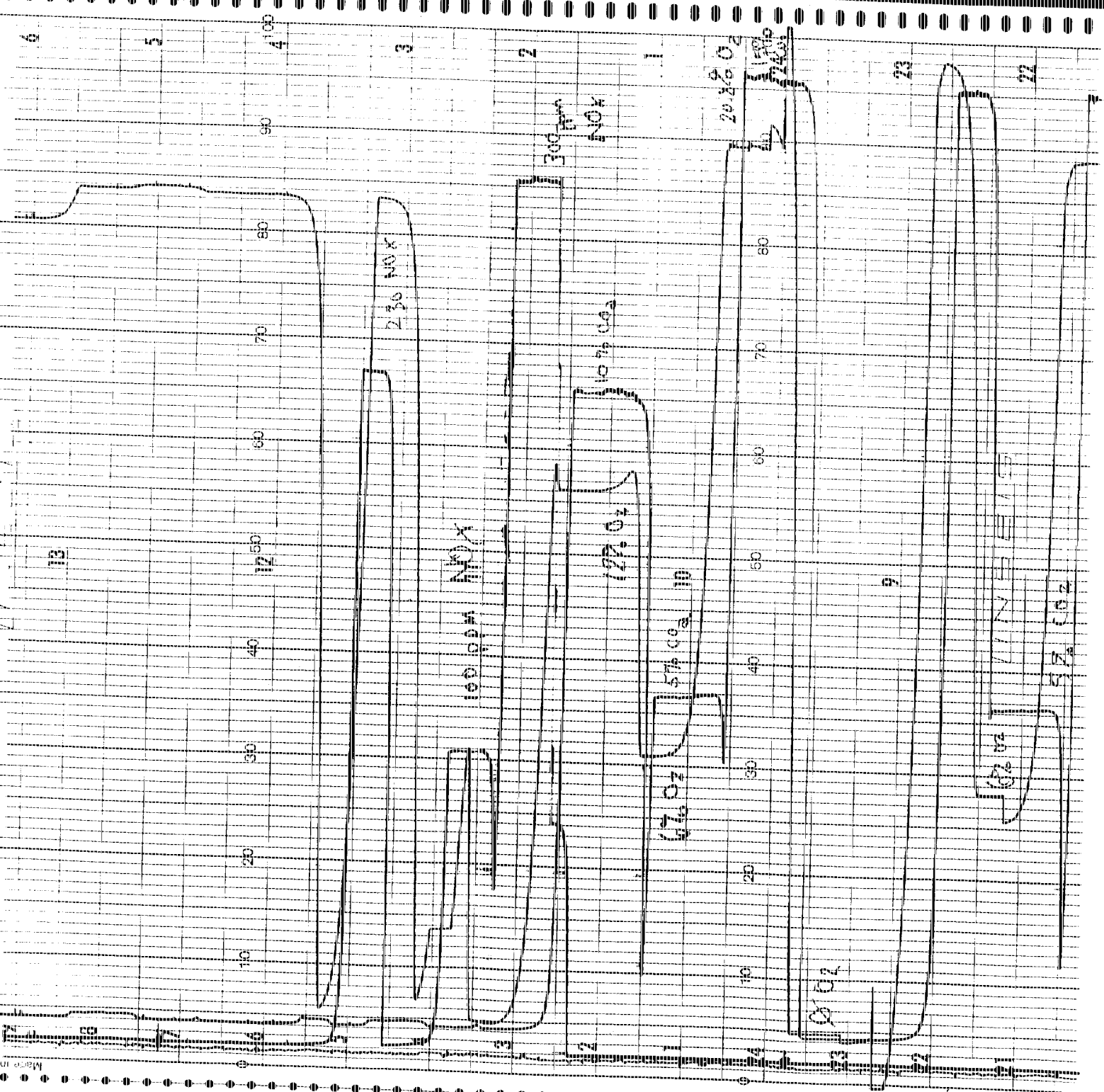
3) 5.5 49.0
2) 5.5 49.0

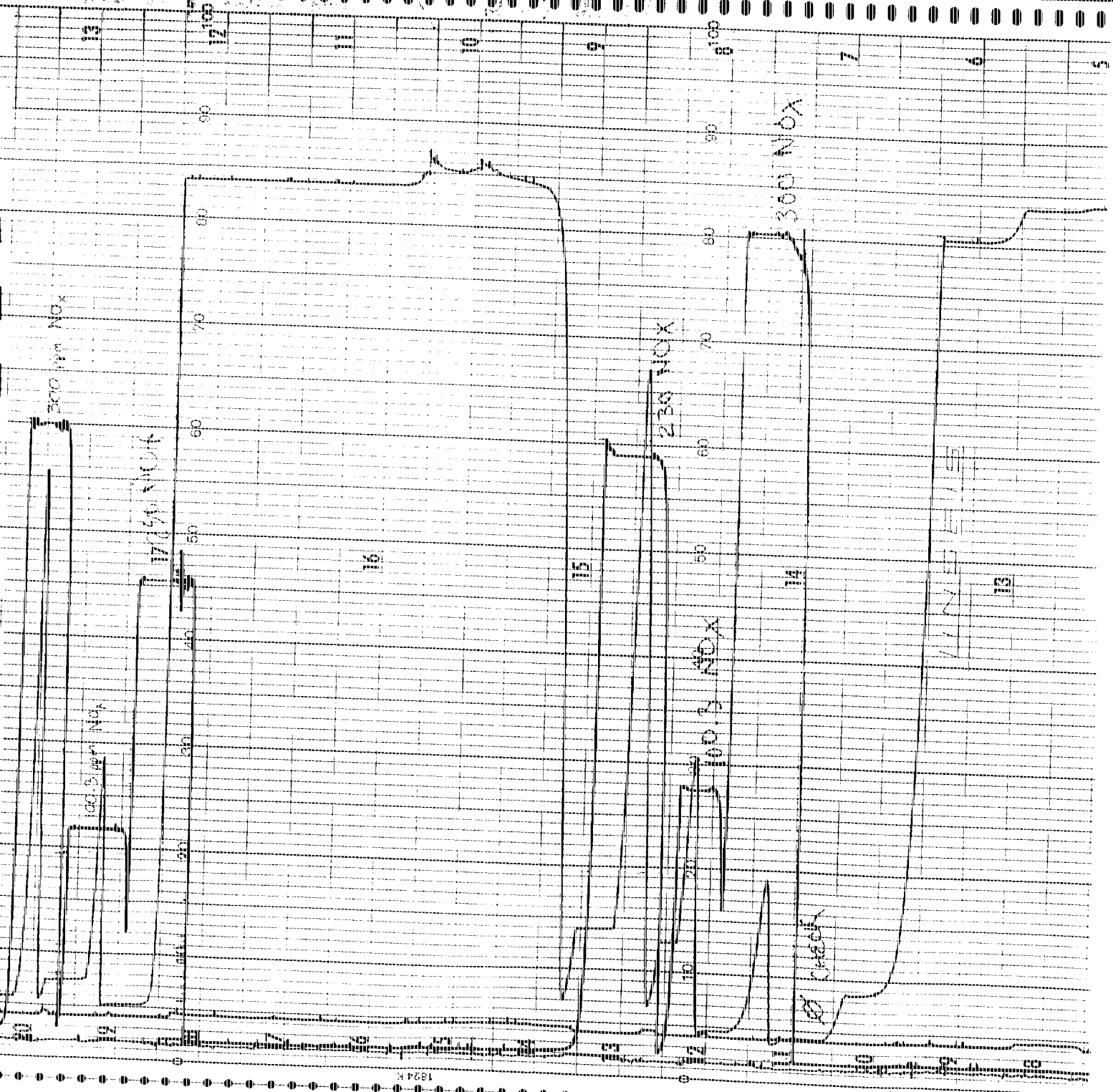
CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)
3) 5.5 50.0

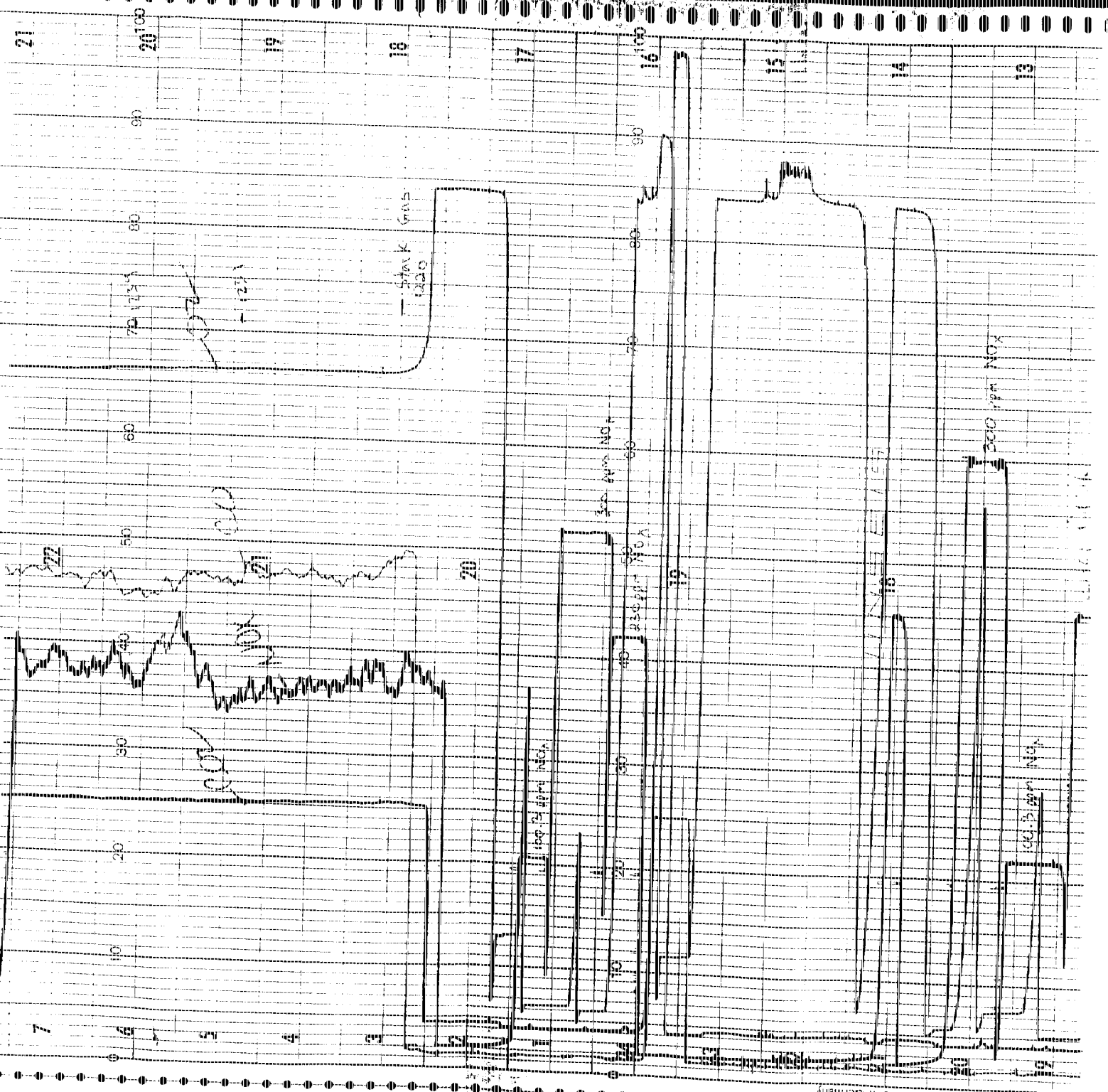
Time HR:MIN	Chart Reading	Scale Factor	ppm	Time HR:MIN	Chart Reading	Scale Factor	ppm
				Run 3			
1325	42.5			1730	44		
1330	43.5			1735	44		
1335	42.5			1740	43		
1340	43.0			1745	44.5		
1345	43			1750	44		
1350	43			1755	43.5		
1355	43			1800	43		
1400	44			1805	43.5		
1405	43.5			1810	42.5		
1410	43.5			1815	44		
1415	43.5			1820	44		
1420	42			1825	42.5		
1425	42.5 / 43.12		869.8	1830	44 / 43.58		872.20
Run #2 1545	42.5						
1550	42.5						
1555	43.5						
1600	43						
1605	43.5						
1610	43						
1615	43.5						
1620	42.5						
1625	43						
1630	44						
1635	42.5						
1640	44						
1645	44 / 43.19	860.5 + 7.12% Moisture					

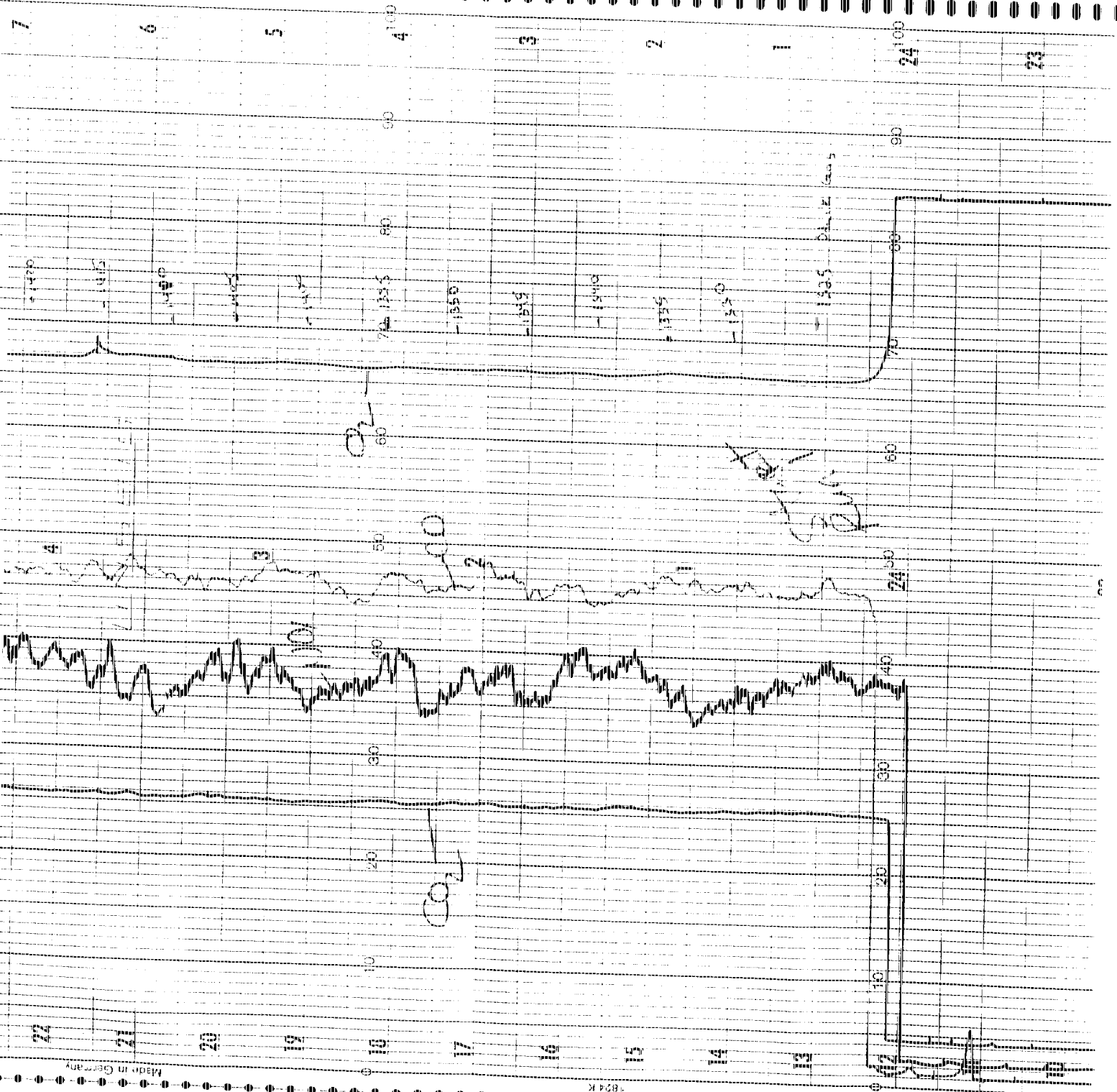


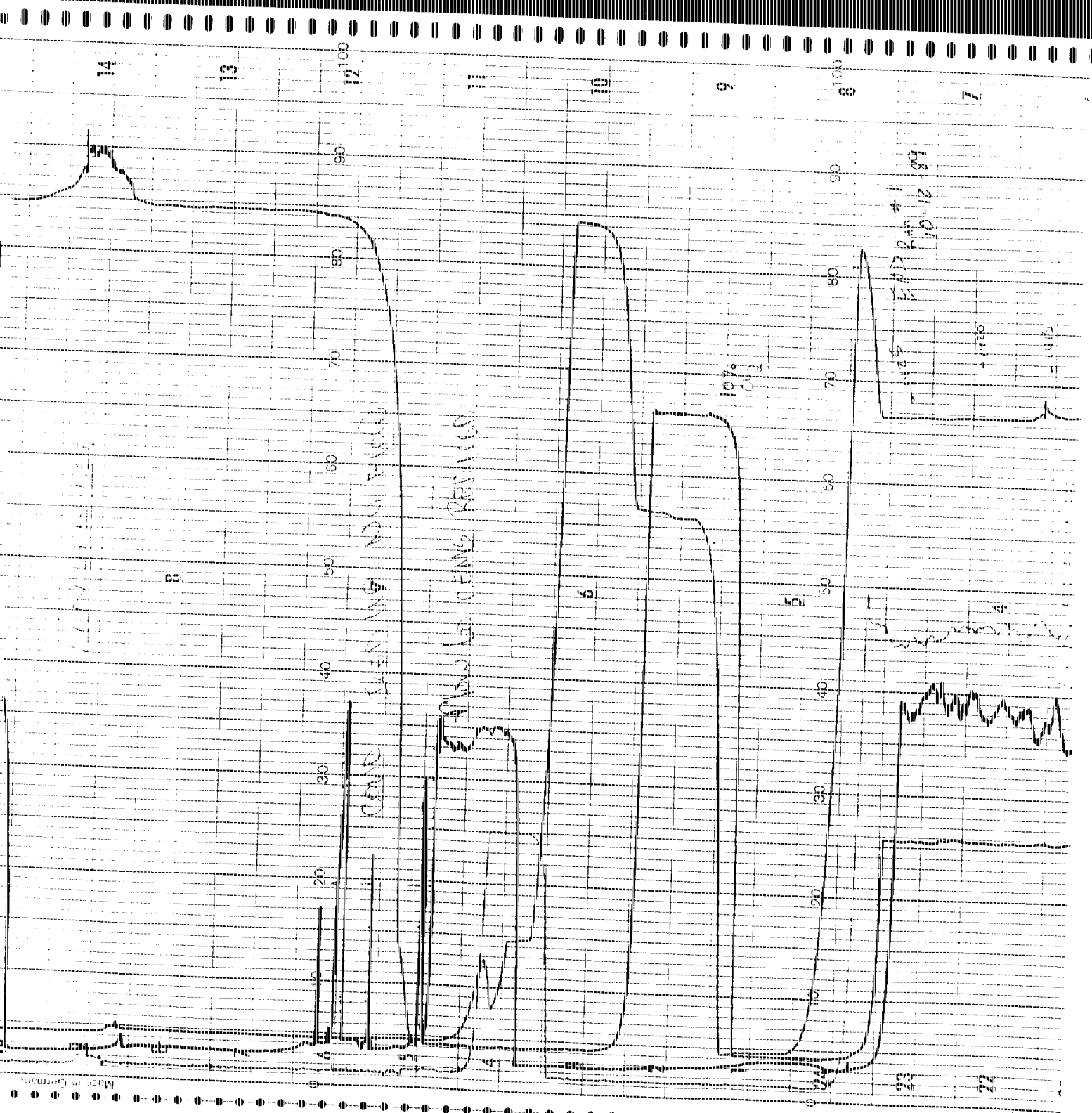
Made in Germany
1824 K

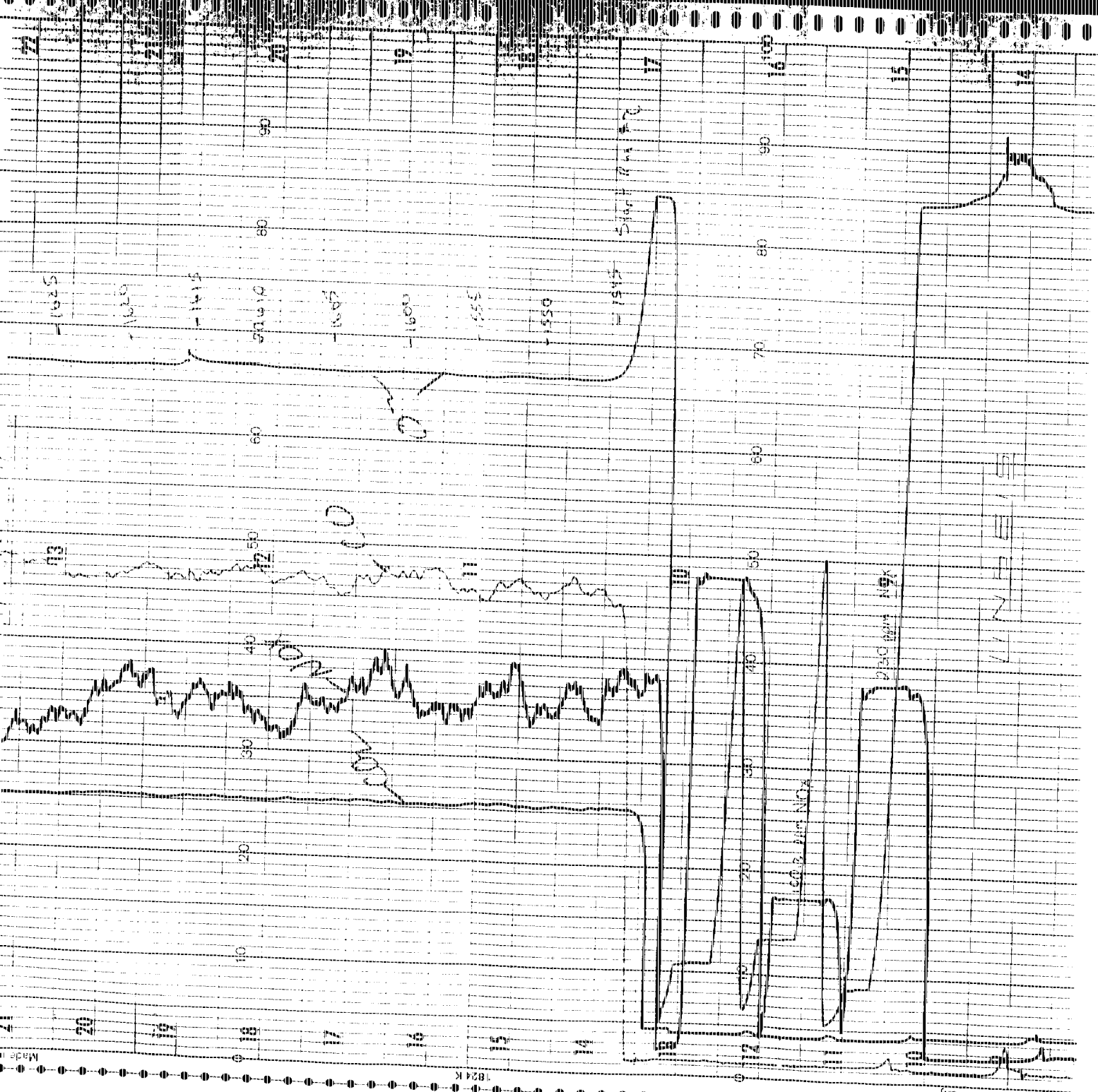


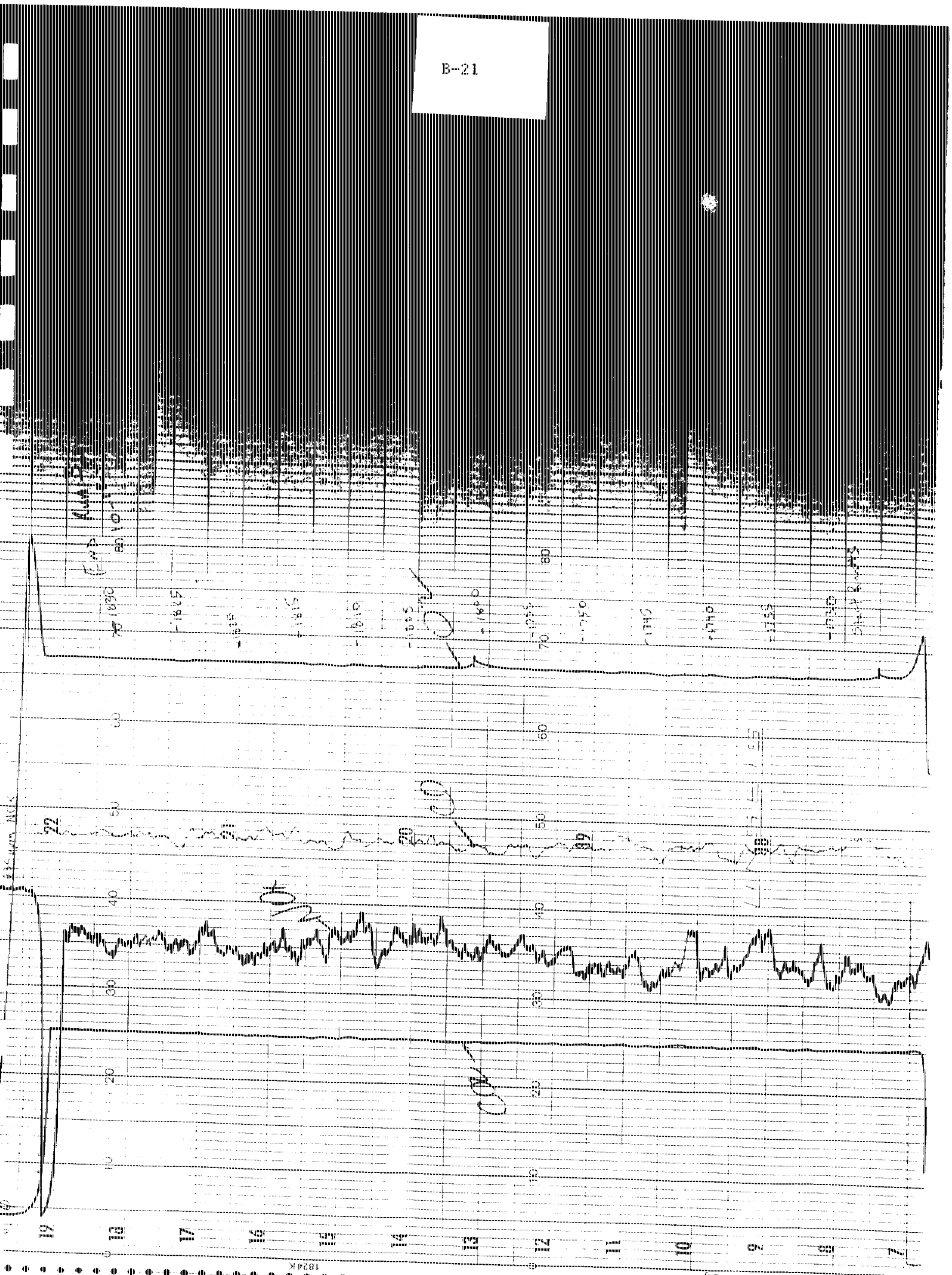

300 NOx
230 NOx
300 NOx
1824 K

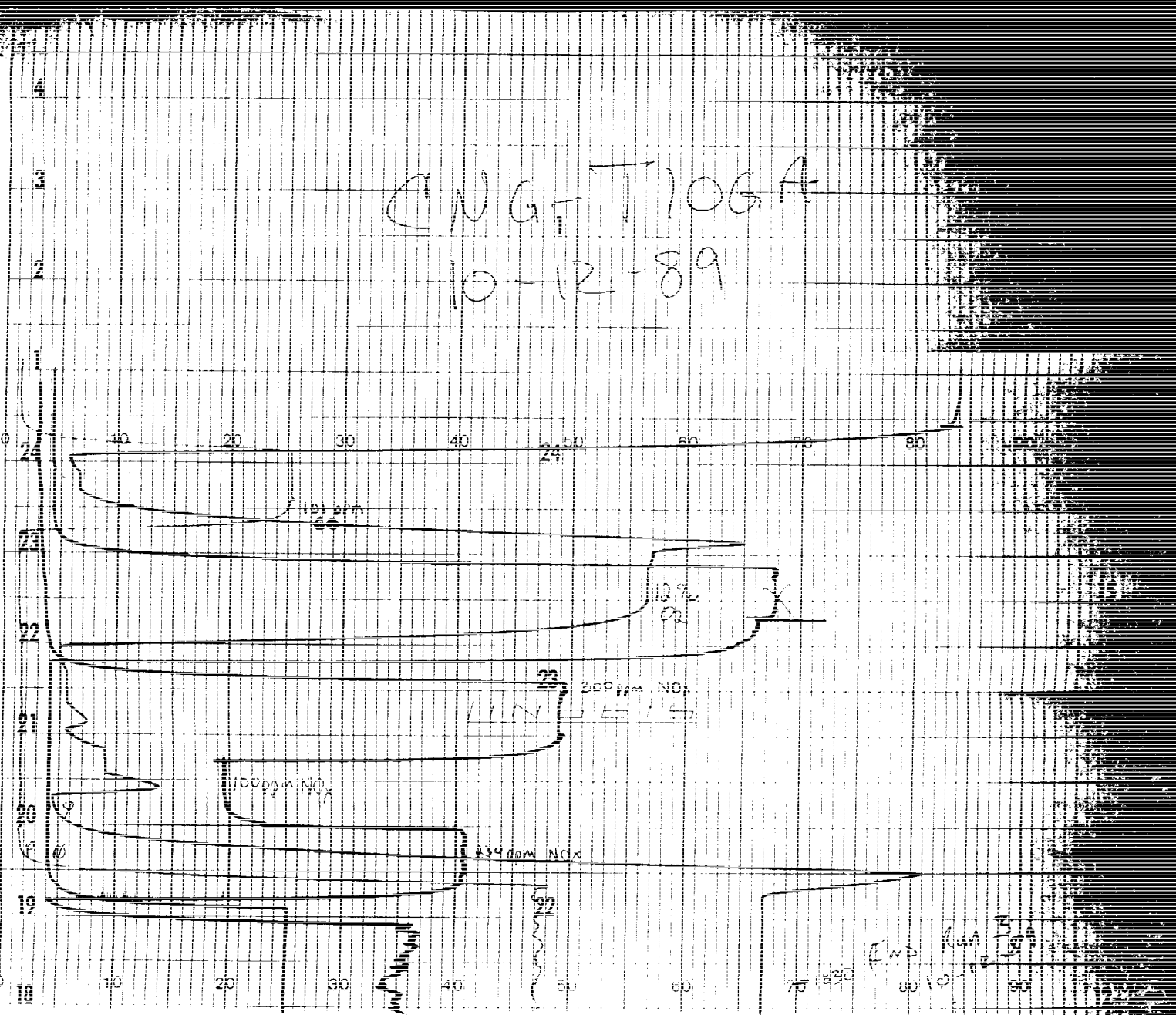

Stack Gas
300 ppm NOx
100.3 ppm NOx

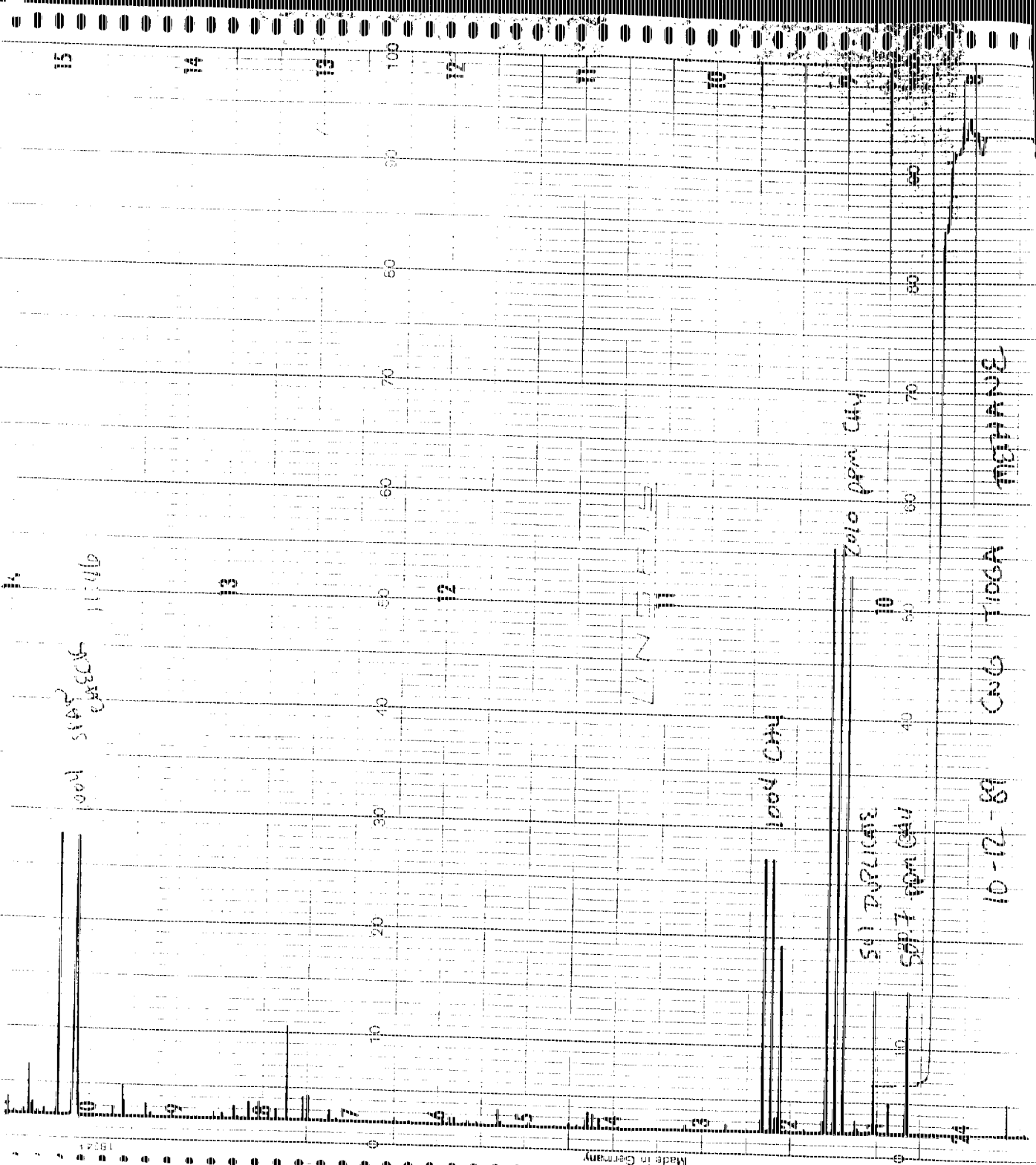

Made in Germany

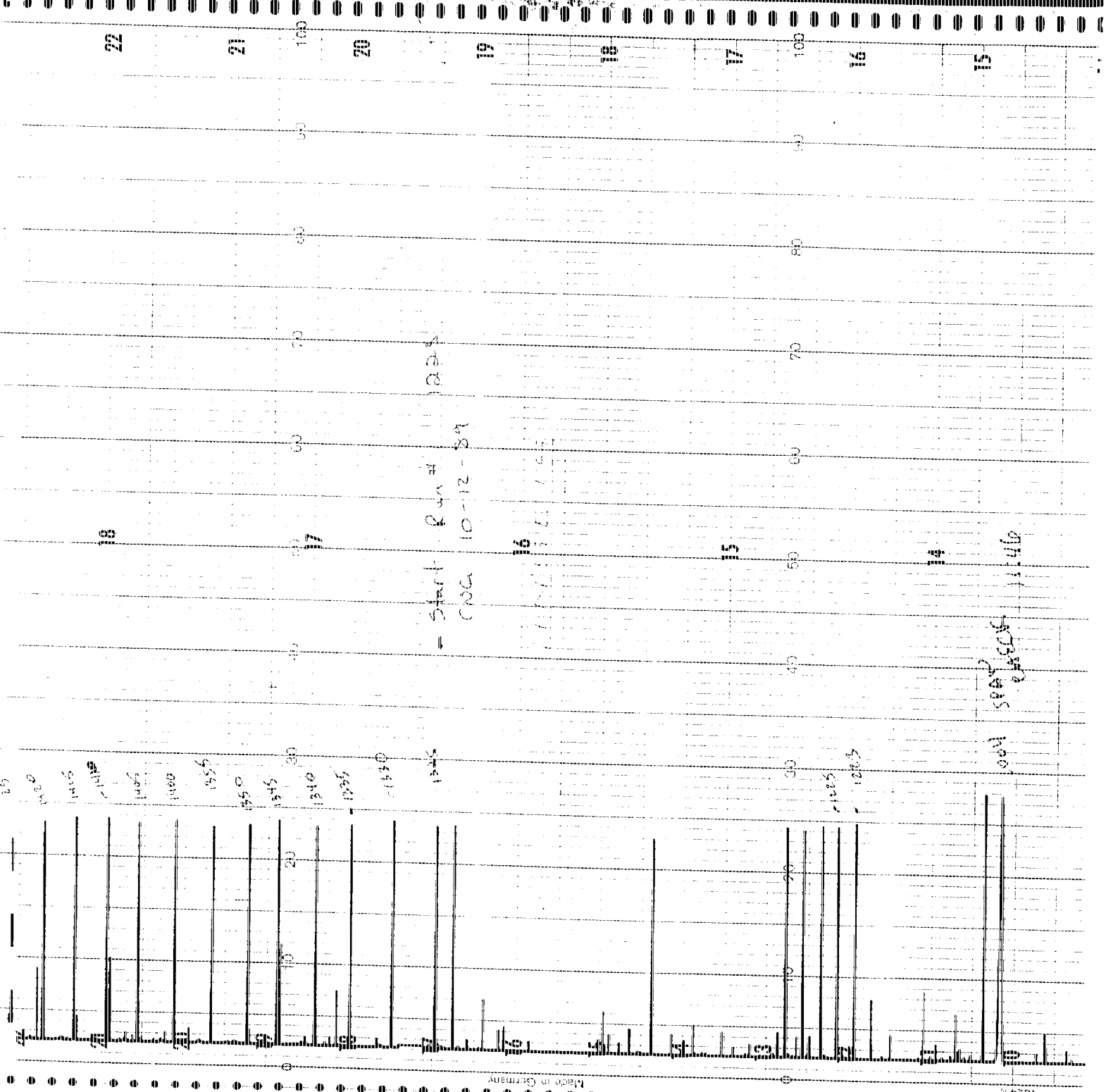


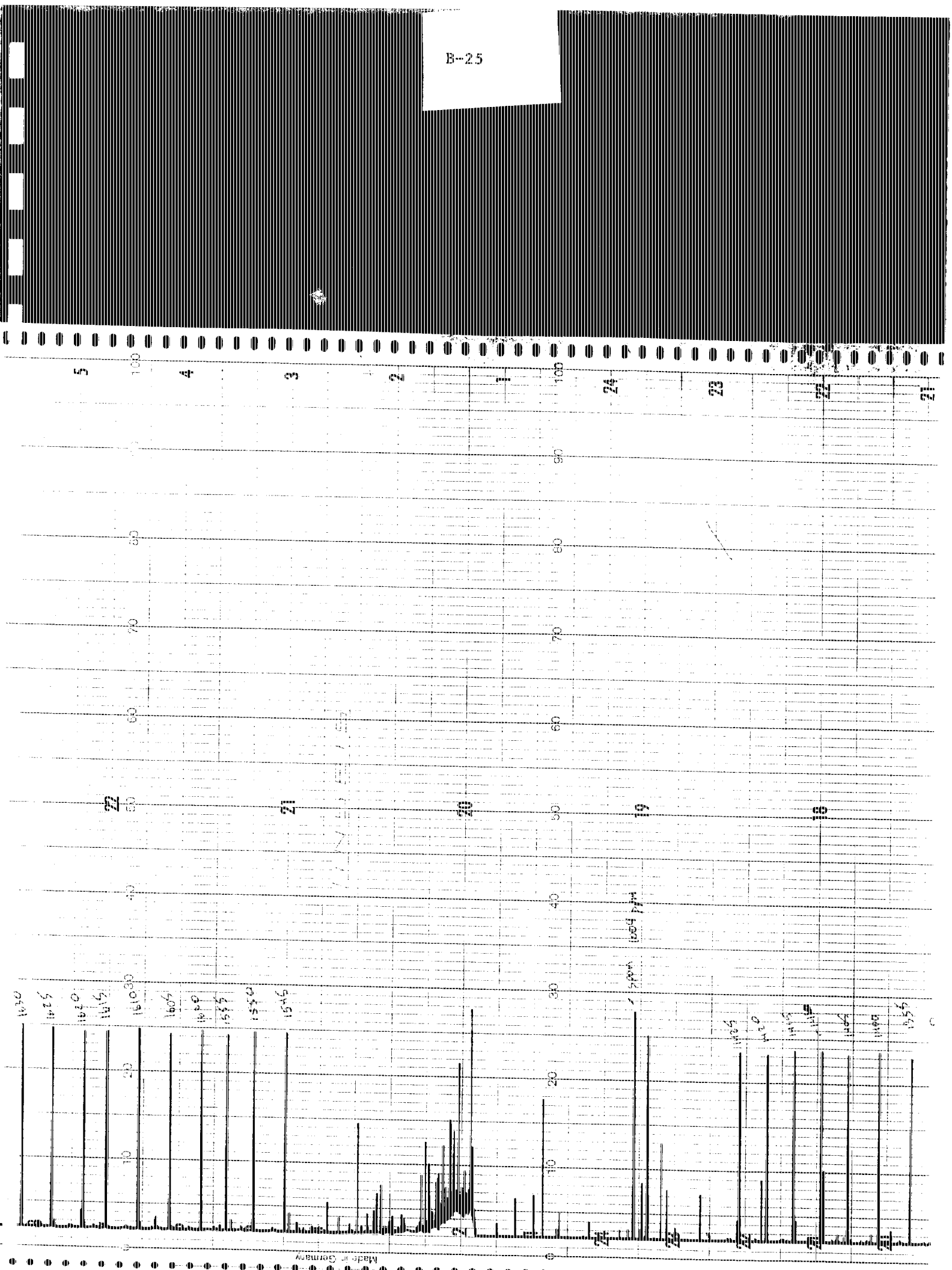


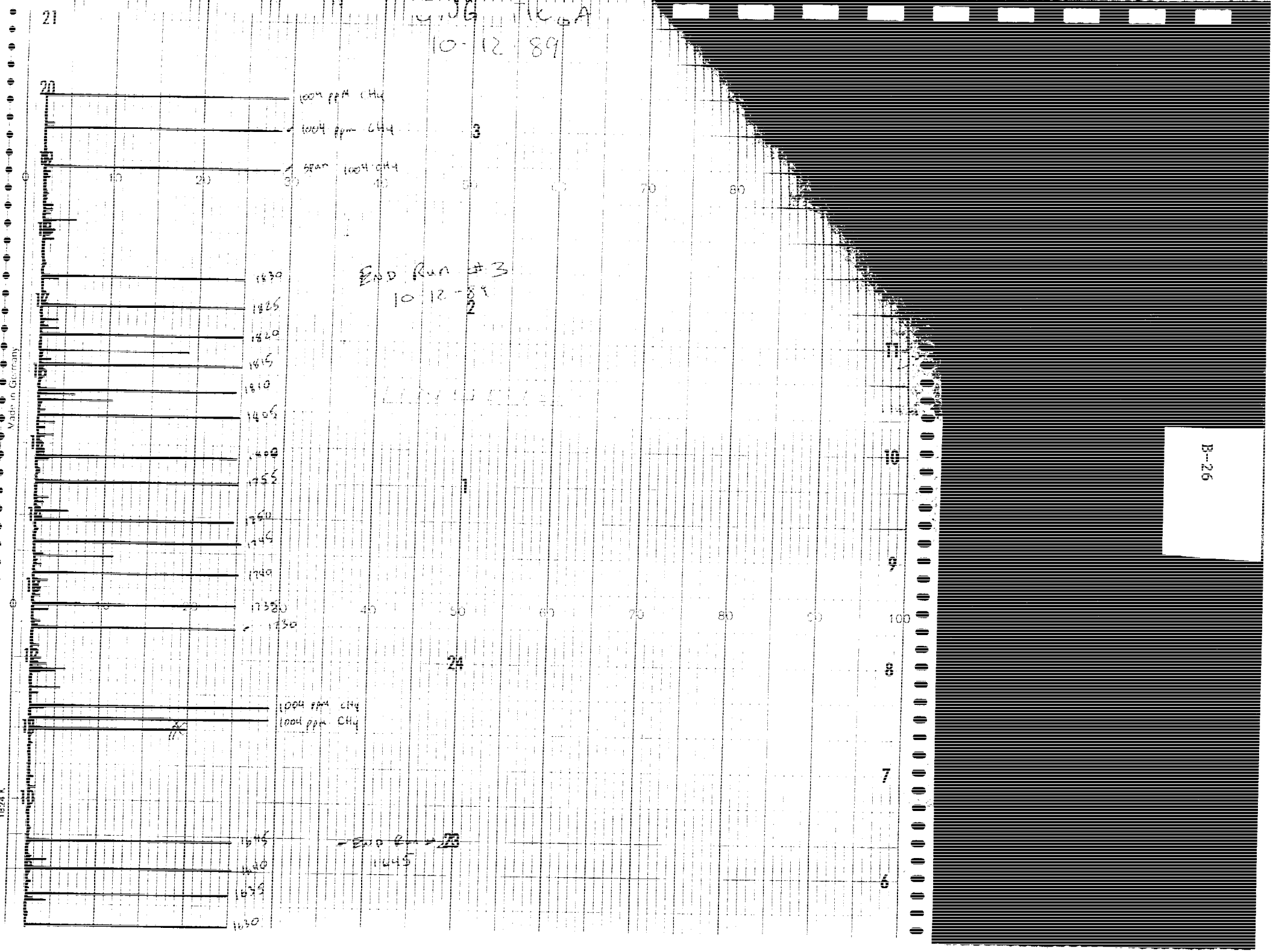


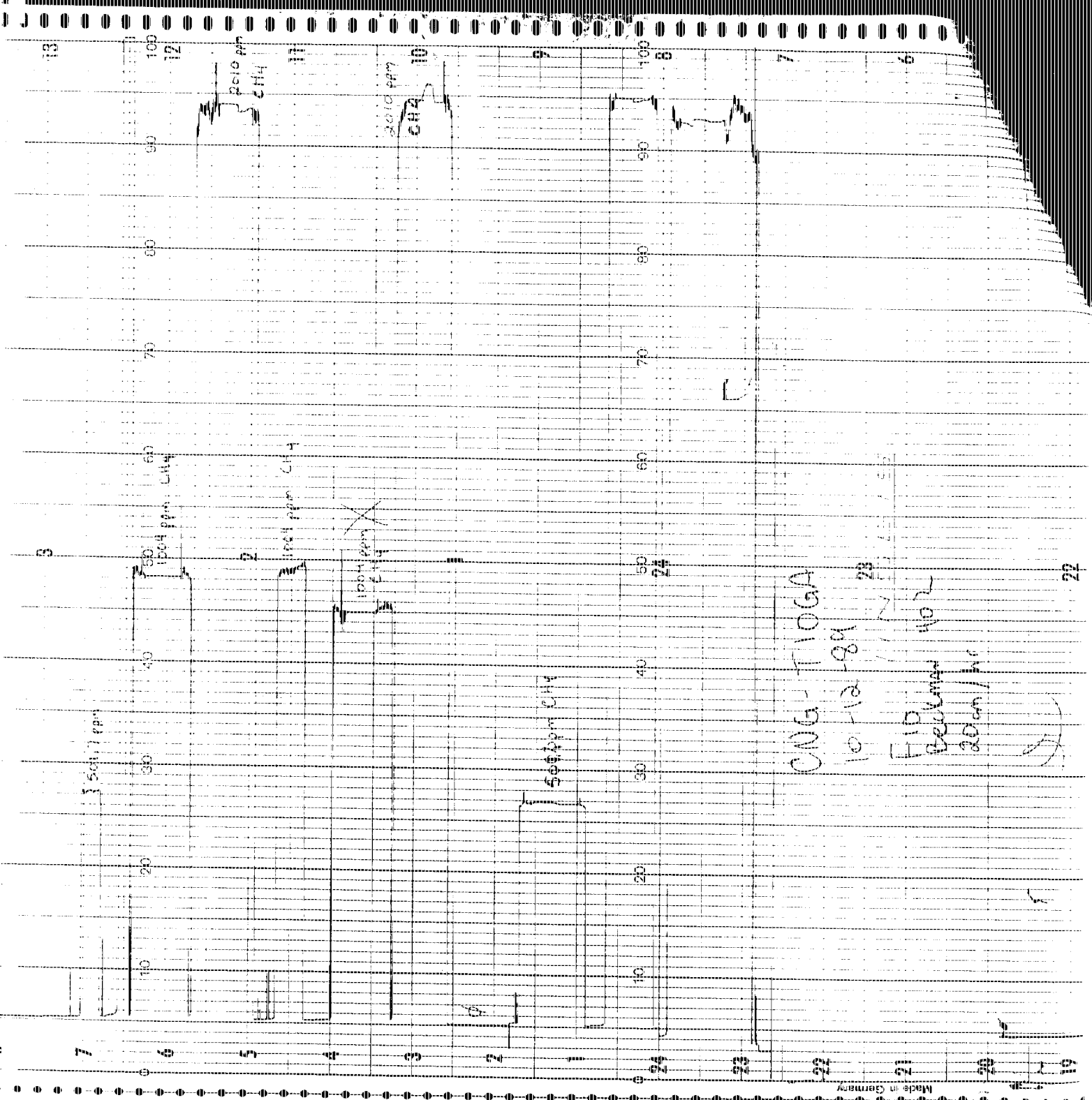

CNG-TIOGA
10-12-89
101 ppm CO
12% O2
300 ppm NOx
100 ppm NOx
339 ppm NOx
END RUN 3
10-12-89

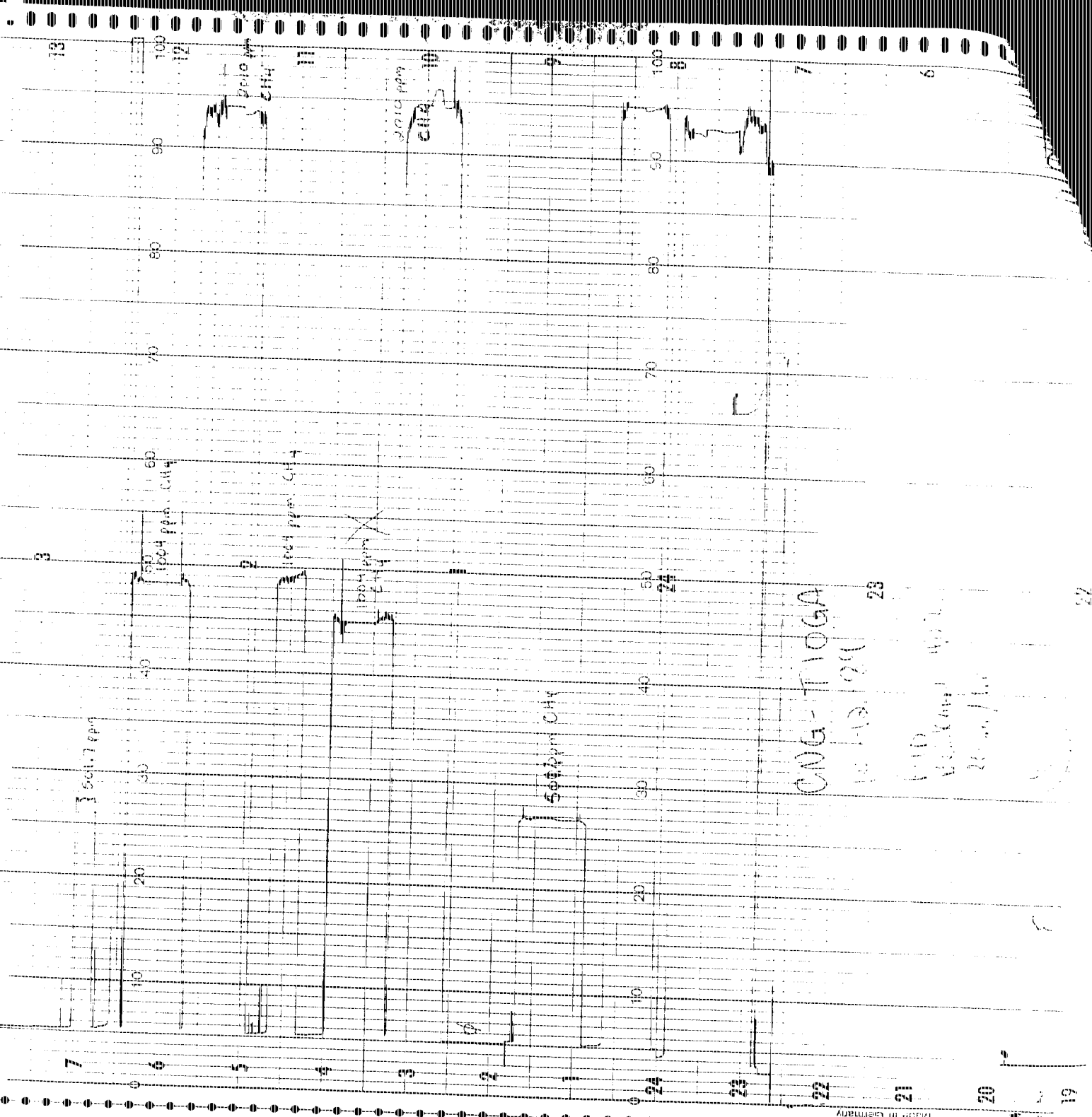

1004 CH4
2010 ppm CH4
10-12-89 CNG TIDGA METHANE
Made in Germany

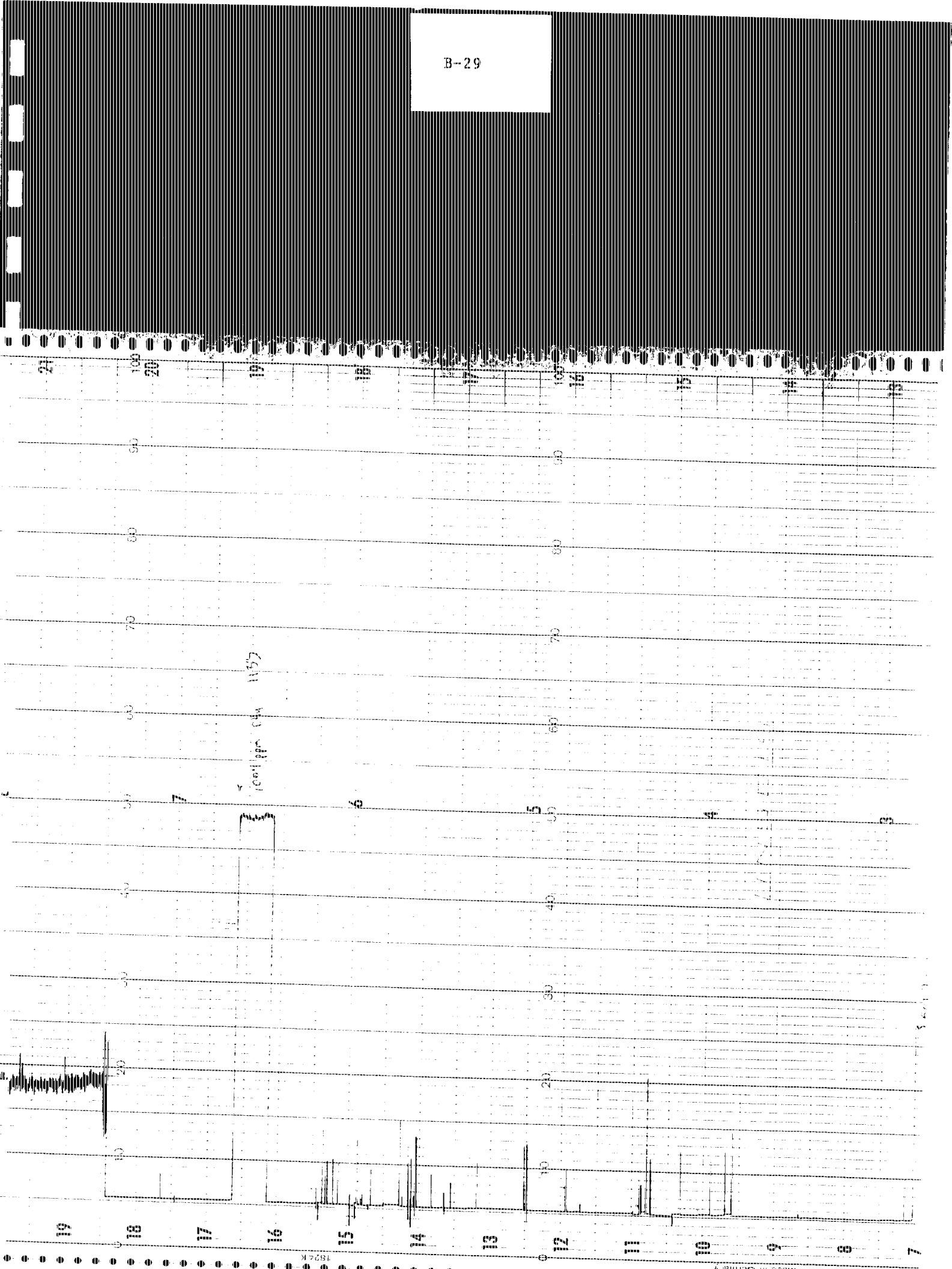

Start Run # 1225
CNG 10-12-89
Made in Germany

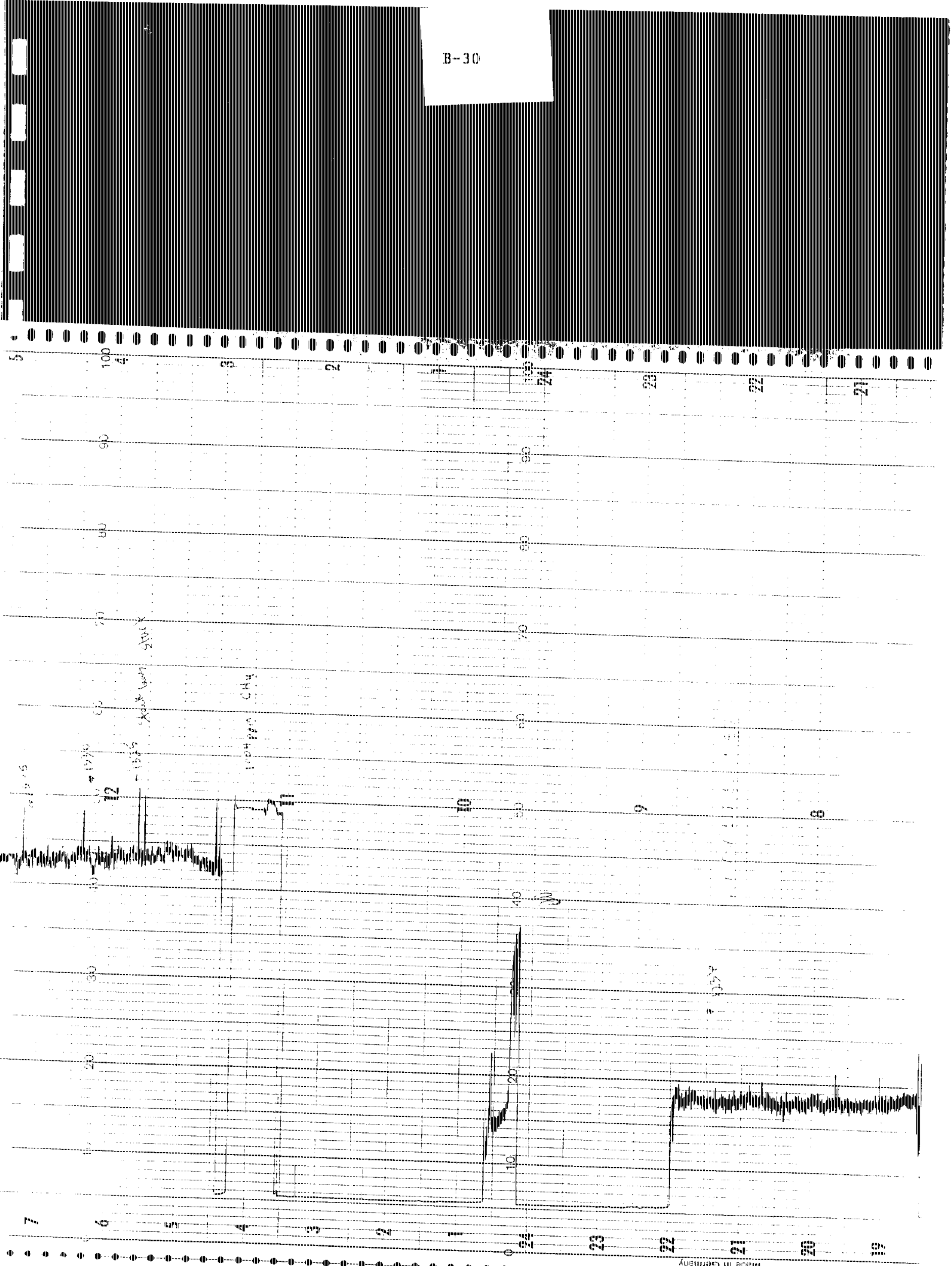

Made in Germany

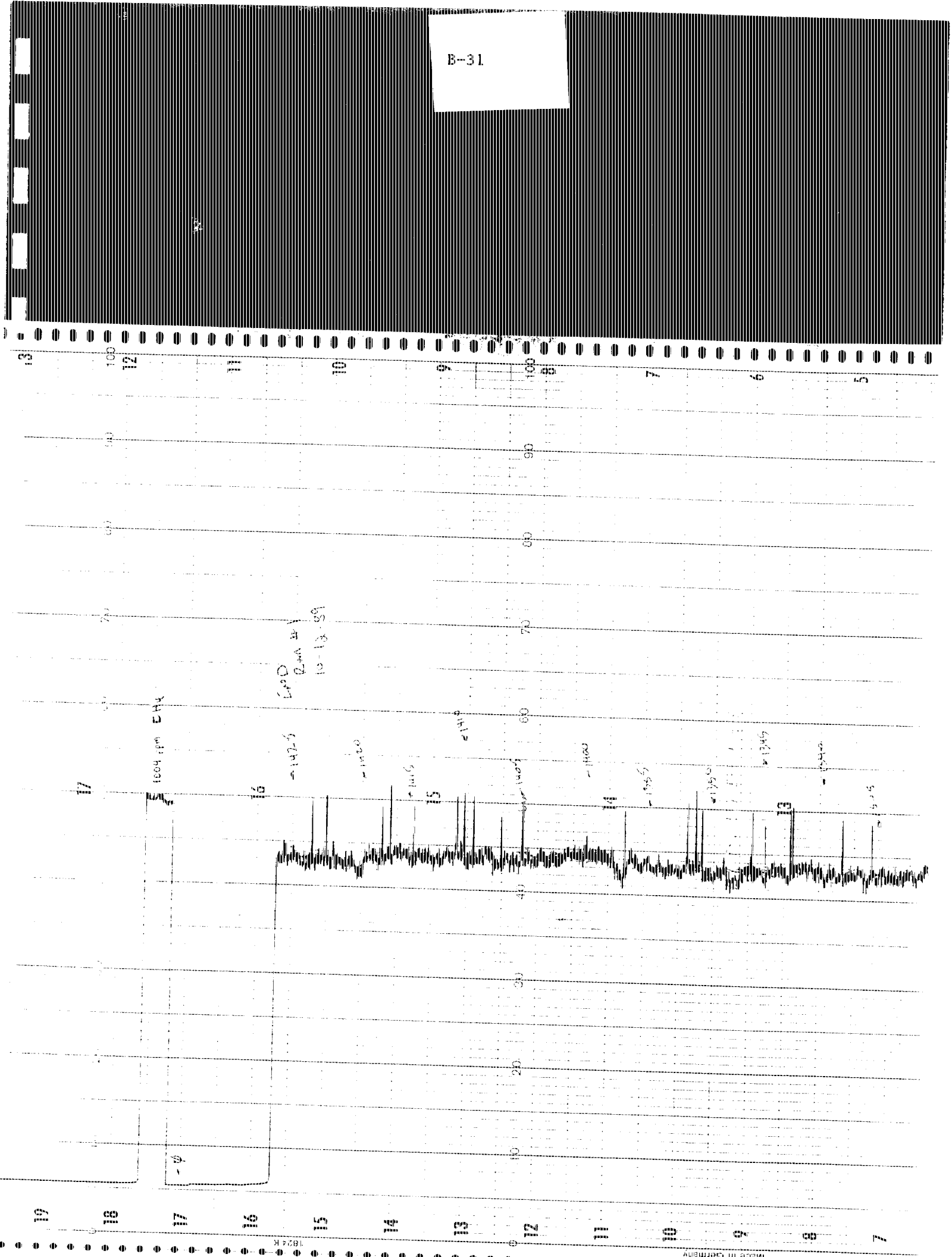

10-12-89
1000 ppm CH4
1000 ppm CH4
1000 ppm CH4
End Run #3
10-12-89
1000 ppm CH4
1000 ppm CH4
End Run #2
Made in Germany

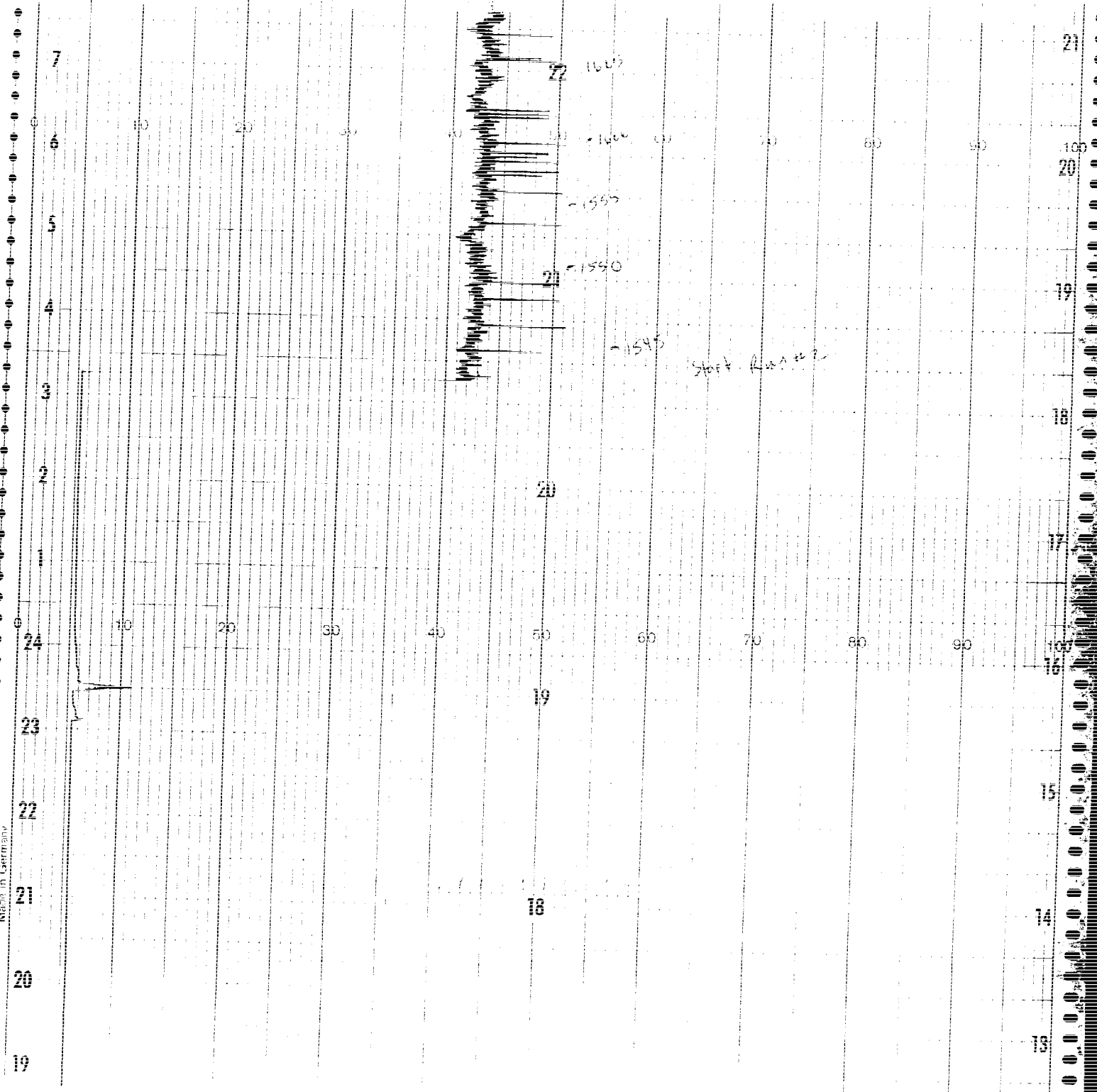

CNG - TIOGA
10-12-89
FID
Beckman 402
20cm/hr
2010 ppm CH4
1004 ppm CH4
Made in Germany


CNG - TIOGA

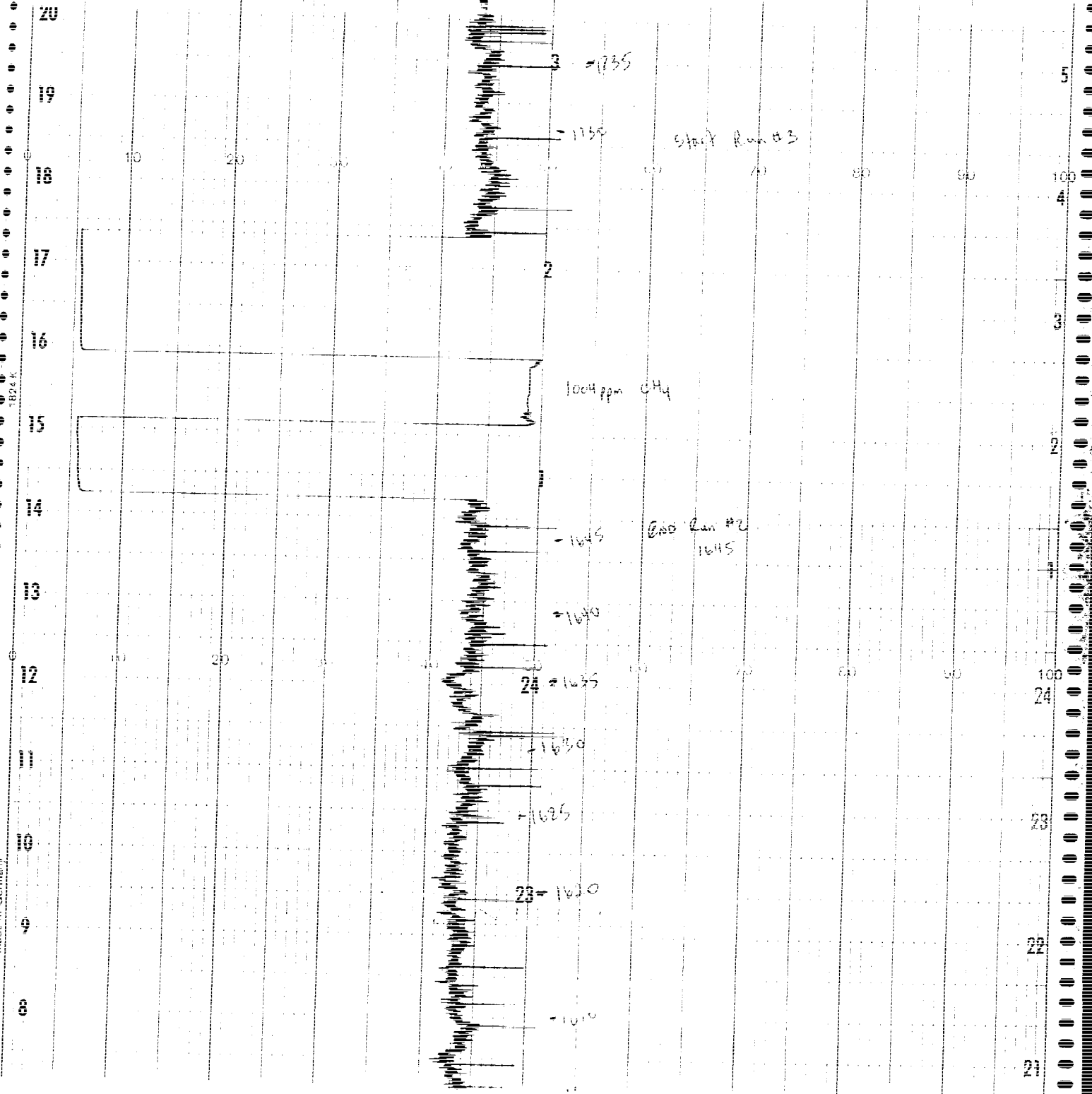


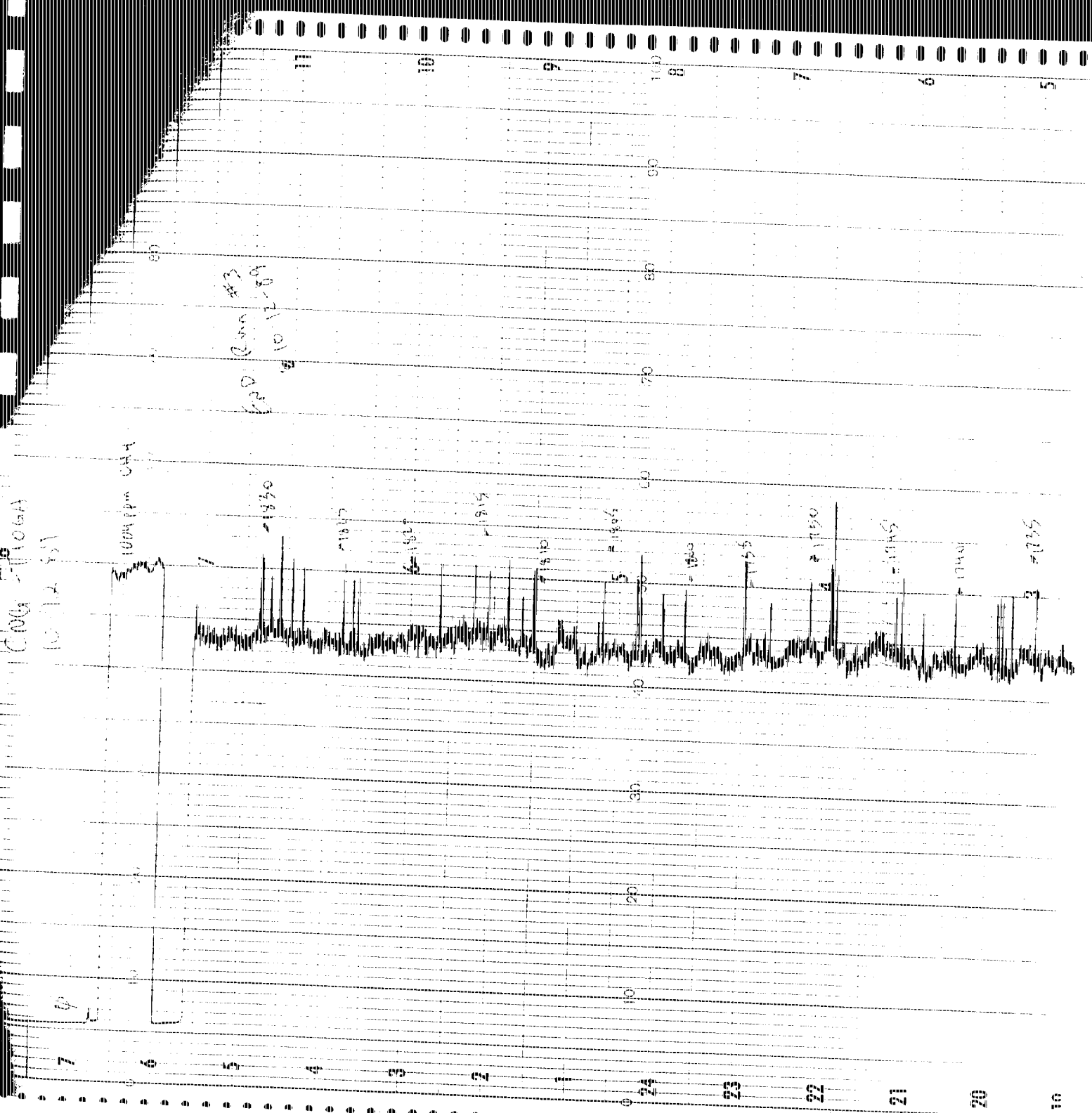

Made in Germany


1004 ppm CH4
10-13-89
1824 K



B-32


Start Run #3
1004 ppm CH4
End Run #2
1645



APPENDIX C

ENGINE NO. 1 CALCULATIONS AND SUMMARIES

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

U.S. EPA
PARTICULATE CALCULATIONS
RUN [illegible] #1-A

PLANT : [illegible] TIOGA STATION
DATE : [illegible]
TEMP. LOCATION : [illegible] OUTLET [illegible]
OPERATING COND. : COMPLIANT

SAMPLE TIME	=	[illegible]	min.	NOZZLE DIA.	=	[illegible]
BAR. PRESSURE	=	[illegible]	[illegible]	NOZZLE AREA	=	[illegible] Sq.Ft.
STD. PRESSURE	=	[illegible]	[illegible]	METER ORIFICE	=	[illegible] in. H2O
[illegible] STACK AREA	=	[illegible]	Sq.Ft.	METER VOLUME	=	[illegible] Cu.Ft.
[illegible]		[illegible]		METER TEMP.	=	[illegible] DEG. [illegible]
GAS ANALYSIS	=	[illegible]	[illegible]	STACK TEMP.	=	[illegible] DEG. [illegible]
		[illegible]	[illegible]	[illegible]	=	[illegible] in. H2O
		[illegible]	[illegible]	[illegible]	=	[illegible]
		[illegible]	[illegible]	METER [illegible]	=	[illegible]
GAS ANALYSIS	=	[illegible]	grams			

****

[illegible] = [illegible] x [illegible] = [illegible]

[illegible] = [illegible] x Vm [illegible] / [illegible] = [illegible]

[illegible] = [illegible] = [illegible]

[illegible] = [illegible] = [illegible]

[illegible] = [illegible] = [illegible]

[illegible] = [illegible] = [illegible]

[illegible] = [illegible] = [illegible]

[illegible] = [illegible] = [illegible] cfm

[illegible] = [illegible] = [illegible] kcf/min

[illegible] = [illegible] = ERR

****

[illegible] = [illegible] x grams [illegible] = [illegible] grams/dscf

[illegible] = [illegible] = [illegible] gr/min [illegible]

[illegible] = [illegible] = [illegible] grains/[illegible]

[illegible] = [illegible] = [illegible] lbs/dscf

EM [illegible] = grams/Vm(std) [illegible] Qs(std) = [illegible] grams/min

EM [illegible] = [illegible] = [illegible] lbs/hr

U.S. EPA
PARTICULATE CALCULATIONS
RUN [illegible]

PLANT [illegible]
DATE [illegible]
SAMP. LOCATION : ENGINE #1 OUTLET STACK
OPERATOR [illegible]

SAMPLE TIME	=	[illegible]	min.	NOZZLE DIA.	=	[illegible]
BAR. PRESSURE	=	[illegible]	in.Hg	NOZZLE AREA	=	[illegible]
STA. PRESSURE	=	[illegible]	in.Hg	METER ORIFICE	=	[illegible]
EFF. STACK AREA	=	[illegible]	Sq.Ft.	METER VOLUME	=	[illegible]
[illegible]	=	[illegible]		METER TEMP	=	[illegible]
[illegible]	=	[illegible]		STACK TEMP.	=	[illegible]
		[illegible]		[illegible]	=	[illegible]
		[illegible]		COND. [illegible]	=	[illegible]
		[illegible]		METER	=	[illegible]
[illegible]		[illegible]				

****

[illegible]	=	[illegible]	scf
[illegible]	=	[illegible]	scf
[illegible]	=	[illegible]	
[illegible]	=	[illegible]	
[illegible]	=	[illegible]	
[illegible]	=	[illegible]	
[illegible]	=	[illegible]	[illegible]
[illegible]	=	[illegible]	[illegible]
[illegible]	=	[illegible]	[illegible]
[illegible]	=	ERR	[illegible]

****

[illegible]	=	[illegible]	grains/dscf
[illegible]	=	[illegible]	gr/dscf
[illegible]	=	[illegible]	grains/acf
[illegible]			
[illegible]	=	[illegible]	lbs/dscf
[illegible]	=	[illegible]	grams/min
[illegible]	=	[illegible]	lbs/hr

U.S. EPA
PARTICULATE CALCULATIONS
RUN NO. #1-C

PLANT : CNG TIOGA STATION
DATE : 10-17-89
SAMP. LOCATION : ENGINE #1 OUTLET STACK
OPERATING COND.: COMPLIANCE

SAMPLE TIME	= 60.0	min.	NOZZLE DIA.	=	***	in.
BAR. PRESSURE	= 27.97	in.Hg	NOZZLE AREA	=	0	Sq.Ft.
STK. PRESSURE	= 27.94	in.Hg	METER ORIFICE	=	0.500	in. H2O
EFF. STACK AREA	= 8.08	Sq.Ft.	METER VOLUME	=	25.160	Cu.Ft.
Cp	= 0.84		METER TEMP.	=	522	DEG. R
GAS ANALYSIS	= 3.2	% CO2	STACK TEMP.	=	975	DEG. R
	15.2	% O2	SQ.RT. dP	=	0.945	in. H2O
	0.0	% CO	COND.(Vic)	=	26.3	ml
	81.6	% N2	METER Y	=	0.993	
LAB ANALYSIS	= *******	grams				

****

Vw(std) = 0.04707 x Vic = 1.238 scf

Vm(std) = 17.647 x Vm x Y x (Pb + (dH / 13.6)) / (Tm) = 23.656 scf

Bws = Vw(std) / (Vm(std) + Vw(std)) = 0.050

%EA =(%O2 - 0.5%CO) / (0.264%N2 x (%O2 - 0.5%CO)) = 0.046

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.12

Ms = (Md x (1-Bws)) + (18.0 x Bws) = 28.57

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts) / (Ms x Ps)] = 75.0 ft/sec

Qs = vs x As x 60 = 36389 acf/min

Qs(std)=Qs x (1-Bws)x(528/(Ts)) x (Ps/29.92)= 17484 dscf/min

I = (Ts) x [(0.00267 x Vic) + (Vm(std) / 17.647)] x 100 / (Time x Ps x An x vs x 60) = ERR %

****

cs = 15.432 x grams / Vm(std) = 0.0000 grains/dsc
cs (adjusted to 7% O2) = cs x 14/21-O2(orsat) = 0.0000 gr/dscf 7%
grains/acf = cs x 17.647xPs x (1-Bws) / (Ts) = 0.0000 grains/scf

C = cs / 7000 = 0.00E+00 lbs/dscf
EM (grams/minute) = (grams/Vm(std)) x Qs(std) = 0.0000 grams/min
EM = C x Qs(std) x 60 = 0.000 lbs/hr

[illegible]

TEST SUMMARY
PARTICULATE EMISSIONS TEST RESULTS

PLANT [illegible] TIOGA STATION
DATE [illegible]-89
SAMPLING LOCATION ENGINE #1 OUTLET STACK
OPERATING COND. : COMPLIANCE

	RUN NO. #1-A	RUN NO. #1-B	RUN NO. #1-C	RUN NO. #1-D	TEST AVERAGE
GAS FLOW RATE					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
STACK TEMP. DEG. F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ISOKINETIC	ERR	ERR	ERR	ERR	ERR
MOISTURE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE VOLUME	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
METER TEMP. DEG. F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PART. EMISSIONS LB / MM Btu					

CNG [illegible]
[illegible] #1
10-17-[illegible]

	[illegible]	#1 [illegible]
	[illegible]	[illegible]
Calibration	[illegible]	[illegible]
	[illegible]	20.5
	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
1050	[illegible]	[illegible]
1055	[illegible]	[illegible]
[illegible]	54.5	[illegible]
1105	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] 20
1120	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]	[illegible] 46	[illegible]

[illegible]

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

Engine #1

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]

Std Err of Coef. [illegible]

[illegible]

[illegible]

CNG [illegible] Station
Engine #1
10-17-[illegible]

		[illegible] #1-5	
		[illegible]	Recorder
Calibration		0	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]

Time		
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s) [illegible]	
Std Err of Coef. [illegible]	

[illegible]

NG Tioga Station
Engine #1
[illegible]

	[illegible]	#1 [illegible]
Calibration	[illegible]	Recorder
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	15.05
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	64	[illegible]
[illegible]	64	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

CNG Tioga Station
[illegible] #1
10-17-90

	CO2 ppm conc.	#1 Recorder
Calibration	[illegible]	4
	5	[illegible]
	[illegible]	[illegible]
	15	[illegible]

[illegible]		
[illegible]	[illegible]	[illegible]
[illegible]	23	[illegible]
[illegible]	23	[illegible]
1027	23	[illegible]
[illegible]	22.5	[illegible]
[illegible]	22.5	[illegible]
[illegible]	22.5	[illegible]
1047	[illegible]	[illegible]
[illegible]	22.5	[illegible]
1057	22.5	[illegible]
[illegible]	22.5	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	2.34

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

[illegible]NG T[illegible] [illegible]
Engine #[illegible]
[illegible]

		41-B	
		[illegible]	[illegible]
Calibration		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
Samples			
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible].48	
[illegible]	[illegible]	243.46	
[illegible]	49	243.46	
[illegible]	49	243.46	
[illegible]	48	[illegible]	
[illegible]	[illegible]	36.21	
1347	48	[illegible].46	
[illegible]	48	[illegible]	
[illegible]	[illegible]	243.46	
[illegible]	[illegible]	[illegible]	
[illegible]	13.5	246.[illegible]	
[illegible]	[illegible]	243.[illegible]	
[illegible]	[illegible]	[illegible]	

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible] 192759
Std Err of Coef. [illegible]

Adjust measured [illegible] for CO2
[illegible] actual = [illegible] measured x (1 - [illegible])
where
[illegible] measured = 244.[illegible]
%CO2 = [illegible]
[illegible] actual = [illegible]

[illegible] Stage Station
[illegible] #1
[illegible]

	NOx	#1-2
	Spec. cond.	recorder
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible]		
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

[illegible] Station
Engine #[illegible]
[illegible]-17-[illegible]

	CEM	
	Span [illegible]	[illegible]
[illegible]		[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Temp [illegible]

[illegible]	38	[illegible]
[illegible]	38.75	[illegible]
[illegible]	38.5	[illegible]
[illegible]	38.25	[illegible]
[illegible]	38.5	387.[illegible]
1337	38.5	[illegible]
1342	39	[illegible]
1347	39	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	38.[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]408266
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

[illegible] Stage Station
Engine #1
10-17-[illegible]

	THC [illegible]	#1-3
	[illegible]	recorder
Calibration		4.35
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regression [illegible]

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef	[illegible]

Sample

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Avg	[illegible]	[illegible]

Adjust measured THC for H2O:
THC dry = THC wet x (1 - [illegible])
where
THC x [illegible] (measured) = [illegible]
H2O = [illegible]
THC dry = [illegible]

NG [illegible] Station
Engine #1
[illegible]

	[illegible]	#1-[illegible]
	Span [illegible]	Recorder
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Temp.		
[illegible]	[illegible]	[illegible]
1514	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1544	[illegible]	[illegible]
1549	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

[illegible]
[illegible]
[illegible]

	X	Y
	Dyed [illegible]	recorder
Calibration	[illegible]	[illegible]
		[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regression output

Constant	[illegible]
Std Error of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	4
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Error of Coef.	[illegible]

Data		
1509	[illegible]	[illegible]
1514	[illegible]	[illegible]
1519	[illegible]	[illegible]
1524	[illegible]	[illegible]
1529	[illegible]	[illegible]

[illegible] Bridge Station
Engine #1
[illegible]

	O2	#1 O2
	Open Conc.	Recorder
Calibration	[illegible]	4
	5	[illegible]
	10	[illegible]
	[illegible]	[illegible]

Sample

[illegible]	22.5	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1524	22.5	[illegible]
1529	22.5	[illegible]
1534	22.5	[illegible]
1539	22.5	[illegible]
1544	22.5	[illegible]
1549	22.5	[illegible]
1554	22.5	[illegible]
[illegible]	[illegible]	[illegible]
1604	22.5	[illegible]
[illegible]	[illegible]	[illegible]
AVG	22.58	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	4
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

[illegible] Station
Engine #1
[illegible]-17-9[illegible]

Calibration	CO [illegible]	Recorder
	39.6	15.5
	[illegible]	20
	.04	4

Sample

1[illegible]	49.5	246.26
1514	49	243.54
15[illegible]	49	243.54
1534	50	249.01
1539	50	249.01
1534	49.5	245.28
1539	49.5	245.28
1544	50	249.01
1549	50	249.01
1554	50.5	251.75
15[illegible]	50.5	251.75
[illegible]4	[illegible].5	[illegible]
[illegible]	50	249.[illegible]
[illegible]	49.85	[illegible]8.[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible].738001
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	0.1[illegible]
Std Err of Coef.	[illegible].007[illegible]

Adjust measured CO for CO2.
CO actual = CO measured x (1 - .0[illegible]2/[illegible]);
where:
CO measured = 246.[illegible]
CO2 = [illegible]
CO actual = 24[illegible]

[illegible] Tinga station
Engine #[illegible]
10-17-[illegible]

	NOx	#1-C
	span conc.	Recorder
Calibration	1	[illegible]
	100	35
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample		
[illegible]	[illegible]	[illegible]
1514	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	64	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1544	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficients: [illegible]
Std Err of Coef: [illegible]

[illegible] Tioga [illegible]
[illegible] #1
[illegible] 17-[illegible]

	THA	#1-C
	open [illegible]	recorder
Calibration	0	[illegible]
	[illegible]	17
	1[illegible]4	[illegible]
	[illegible]	[illegible]

Sample

1509	[illegible]	[illegible]
1514	[illegible]	[illegible]17.32
1519	[illegible]	[illegible]0.45
1524	[illegible]	[illegible]34.19
1529	[illegible].75	[illegible]25.76
1534	[illegible].75	[illegible]25.76
1539	[illegible].75	[illegible]25.76
1544	[illegible]	[illegible]17.32
1549	[illegible]	[illegible]34.19
1554	[illegible]	[illegible]34.19
1559	[illegible]	[illegible]34.19
1604	[illegible]	[illegible]
1609	[illegible]	[illegible]
AVG	[illegible]	[illegible]26.41

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]196157
R Squared	[illegible]999[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]29607
Std Err of Coef	[illegible]003104

[illegible] Stage Station
Engine #1
[illegible]-17-89

	THC [illegible] (CH4)	#1-[illegible]
	Span [illegible]	Recorder
Calibration	[illegible]	4.25
	301.7	[illegible]
	1004	[illegible]
	[illegible]	[illegible]

Regress on Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	0.999856
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef	0.000251

Sample

1509	[illegible]	[illegible]
1514	[illegible]	[illegible]
1519	32	942.77
1524	32.5	[illegible]
1529	32	942.77
1534	[illegible]	942.77
1539	32	942.77
1544	[illegible]	942.77
1549	32.5	[illegible]
1554	[illegible]	[illegible]
1559	[illegible]	[illegible]
1564	[illegible]	[illegible]
1569	[illegible]	[illegible]
AVG	[illegible]	[illegible]

Adjust measured THC for H2O.

THC dry = THC wet x (1 - [illegible]H2O/[illegible])

where

THC wet (measured) = [illegible]46.65

[illegible] = 4.[illegible]

THC dry = 1012.[illegible]

CNG Tioga Station
Engine #1
10-17-[illegible]

	O2	#1 B
	Span Const.	Recorder
Calibration	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

1658	65	15.[illegible]
1703	65	15.30
1708	65	15.30
1712	65	15.30
1718	65	15.[illegible]
1723	65	15.[illegible]
1728	65	15.30
1732	65	15.30
1738	65	15.30
1743	65	15.30
1748	65	15.30
1753	65	15.[illegible]
1758	65	15.[illegible]
AVG	65.[illegible]	15.[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

[illegible] Flood Station

Engine #1

[illegible]

	[illegible]	#1-[illegible]	
	Open Hand		Recorder
Calibration	0		[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]

Sample

1658	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1710	23	3.27
1710	23	3.27
[illegible]	[illegible]	[illegible]
1738	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1738	22.5	3.13
[illegible]	22.5	[illegible]
1748	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
AVG	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef	[illegible]

[illegible] Tiers Station
Engine #1
[illegible]

	CO	[illegible]
	Span Conc	Recorded
Calibration	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

1698	[illegible]	249.01
1703	[illegible]	246.57
1708	[illegible]	246.57
1713	[illegible]	243.[illegible]
1718	49.5	246.57
1723	[illegible]	246.57
1728	[illegible]	246.57
1733	[illegible]	[illegible]
1738	50	[illegible]
1743	[illegible]	[illegible]
1746	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1758	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef	[illegible]

Adjust measured CO for CO2

CO actual = CO measured x [illegible]

where

CO measured = 248.47

CO2 [illegible]

CO actual = [illegible]

CNG Tioga Station
Engine #1
10-17-8[illegible]

	NOx	#1 [illegible]
	span cond.	recorder
[illegible] Abrasion	[illegible]	[illegible]
	100 [illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

1650	[illegible]	185.45
1700	64	188.67
1708	65	[illegible]
1710	[illegible]	[illegible]
1718	[illegible]	188.67
1720	63	185.48
1725	[illegible]	185.48
1730	[illegible]	[illegible]
1735	63	185.48
1740	64	188.67
1748	[illegible]	185.48
1750	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

AVG [illegible] [illegible] Actual for span [illegible]
NOx [illegible] [illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

CNG Tioga Station
Engine #1
10-17-89

	CO2	NOx	
	Span Conc.		Recorder
Calibration	0		2.5
	511.[illegible]		17
	1004		33
	[illegible]		[illegible]
Sample			
1658	14.75	195.7[illegible]	
1703	29.75	421.7[illegible]	
1708	29.75	421.7[illegible]	
1713	29.5	417.[illegible]	
1718			
1723	30	424.1[illegible]	
1728	29.5	417.[illegible]	
1733	29.5	417.33	
1738	29.5	417.[illegible]	
1743	30	424.1[illegible]	
1748	30	424.19	
1753	29.5	417.[illegible]	
[illegible]	29.75	[illegible]	
Avg	29.71	424.35	

Regression Output:

Constant	[illegible]
Std Err of Y Est	14.457
R Squared	0.9999[illegible]
No. of Observations	4
Degrees of Freedom	2

X Coefficient(s) [illegible]23637
Std Err of Coef 0.050104

CNG Tioga Station
Engine #1
10-17-90

	THC (as CH4) span conc.	#1-D recorder
Calibration	0	1.25
	531.7	19
	1304	53.35
	1501	70.5

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible] 471241
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	0.029798
Std Err of Coef.	0.000251

Sample

1658	32	942.77
1703	32	942.77
1708	31.5	925.94
1713	31.5	925.94
1718	31.5	925.94
1723	31.5	925.94
1728	32	942.77
1733	32	942.77
1738	32	942.77
1743	32	942.77
1748	32	942.77
1753	31.5	925.94
1758	31.5	925.94
AVG	31.77	935.00

Adjust measured THC for H2O.

THC dry = THC wet x (1 + (%H2O/100))

where

THC wet (measured) = 935.00

%H2O = 6.59

THC dry = 1000.45

APPENDIX D

ENGINE NO. 2 CALCULATIONS AND SUMMARIES

U.S. EPA
PARTICULATE CALCULATIONS
RUN # [illegible] - 1

PLANT : [illegible]
DATE : [illegible]
CAMP. LOCATION : UNIT #2 STACK
OPERATING COND. : COMPLIANCE

SAMPLE TIME	= [illegible]	min.	NOZZLE DIA.	=	***	in.
BAR. PRESSURE	= [illegible]	in.Hg	NOZZLE AREA	=	[illegible]	Sq.Ft.
STD. PRESSURE	= [illegible]	in.Hg	METER ORIFICE	=	[illegible]	in. H2O
EFF. STACK AREA	= [illegible]	Sq.Ft.	METER VOLUME	=	[illegible]	Cu.Ft.
Cp	= [illegible]		METER TEMP.	=	[illegible]	DEG. F
GAS ANALYSIS	[illegible]	[illegible]	STACK TEMP.	=	[illegible]	DEG. F
	[illegible]	[illegible]	SQ.RT. [illegible]	=	[illegible]	in. H2O
	[illegible]	[illegible]	COND. [illegible]	=	[illegible]	ml
	[illegible]	[illegible]	METER [illegible]		[illegible]	
GAS ANALYSIS	*******	grams				

****

Vw(std) = [illegible] x Vic	=	[illegible]	scf
Vm(std) = 17.647 x Vm x [illegible] x ([illegible] + (dH / 13.6)) / Tm	=	22.336	scf
Bwo = Vw(std) / (Vm(std) + Vw(std))	=	[illegible]	
GEA = (SO2 - 0.5670) x (0.2048*N2 x SO2 - 0.5600)	=	[illegible]	
Mf = (44 x [illegible]) + [illegible] x [illegible] + [illegible] x [illegible] + [illegible]	=	[illegible]	
Ms = (Mf x (1-Bws)) + [illegible]	=	[illegible]	
Vs = [illegible] x [illegible] x (Sq.Rt. [illegible] x (Sq.Rt. Ts) / Ms x Ps))	=	[illegible]	ft/sec
Qs = Vs x As x 60	=	[illegible]	acf/min
Qs(std)=Qs x (1-Bws)x(528/(Ts)) x (Ps/29.92)=		16654	dscf/min
I = (Ts) x ((0.00267 x Vic) + (Vm(std) / 17.647)) / (100 x (Time x Ps x An x Vs x 60))	=	ERR	%

****

Cs = 17.4[illegible] x grams / Vm(std)	=	0.0000	grains/dscf
Cs (adjusted to 7% O2) = Cs x (14/21 - 1)(ersat)	=	0.0000	gr/dscf 7%
grains/acf = Cs x 17.647*Ps x (1-Bws) / (Ts)	=	0.0000	grains/acf
C = Cs / 7000	=	0.00E+00	lbs/dscf
EM (grams/minute) = (grams/Vm(std)) x Qs(std)	=	0.0000	grams/min
EM = C x Qs(std) x 60	=	0.000	lbs/hr

[illegible] EPA
[illegible] PARTICULATE SAMPLING
SDN NO. =1 -

PLANT [illegible] PULGA
DATE [illegible] 12-90
TEMP. [illegible] PRESSURE [illegible]
OPERATOR [illegible] SCHEIRANE

SAMPLE TIME	= 30.0	MIN.	NOZZLE DIA.	=	[illegible]
[illegible] TEMPERATURE	= 85.0	[illegible]	NOZZLE AREA	=	[illegible]
[illegible] PRESSURE	= 27.98	[illegible]	METER ORIFICE	=	0.200 [illegible]
[illegible] STACK AREA	= 5.00	[illegible]	METER VOLUME	=	[illegible]
[illegible]	= [illegible]		METER TEMP.	=	[illegible]
[illegible]	= [illegible]	[illegible]	STACK TEMP	=	[illegible]
	[illegible]	[illegible]	[illegible]	=	[illegible]
	[illegible]	[illegible]	[illegible]	=	[illegible]
	[illegible]	[illegible]	METER Y	=	[illegible]
[illegible]	[illegible]	[illegible]			

[illegible] = [illegible] * [illegible] = [illegible] acf

[illegible] = [illegible] * [illegible] * (Pb + (dH / 13.6)) / [illegible] = 21.072 scf

Vm3 = Vm(std) / Vm(act) * (Vm(std)) = 1.072

[illegible] = [illegible] * [illegible] * [illegible] * (Pbc + 0.5970) = [illegible]

[illegible] = [illegible] * [illegible] * [illegible] * [illegible] = [illegible]

[illegible] = [illegible] * [illegible] = [illegible] * [illegible] = [illegible]

[illegible] = [illegible] / [illegible] * [illegible] * [illegible] / [illegible] = [illegible] ft/sec

[illegible] = [illegible] * [illegible] = [illegible] cfm/min

[illegible] = [illegible] * (1-Bws) * [illegible] / (Ts) * (Ps [illegible]) = [illegible] dscf/min

[illegible] = (Ts) * [illegible] / Vm(std) * (Vm(std) / 17.647) / [illegible] / (Ts * Ps * A * [illegible]) = [illegible] %

[illegible] = [illegible] * (grams / Vm(std))
[illegible] = [illegible] * [illegible] * [illegible] / [illegible] (Vm(std))
grains/acf = [illegible] * 17.647/Ps * (1-Bws) / Ts) = [illegible] grains/acf

[illegible] = [illegible] / [illegible]
[illegible] (grams/minute) = (grams/Vm(std)) * Qs(std) = [illegible] lbs/hr
[illegible] = [illegible] * Qs(std) / [illegible] = [illegible] grams/min
= [illegible] lbs/hr

[illegible]
[illegible] CALCULATIONS
[illegible] #2 - [illegible]

[illegible]
DATE [illegible]-89
SAMP. LOCATION : [illegible] #[illegible]
OPERATING COND. : [illegible]

SAMPLE TIME	= [illegible]	[illegible]	NOZZLE DIA.	= [illegible]	
BAR. PRESSURE	= 29.04	[illegible]	NOZZLE AREA	= [illegible]	Sq.Ft.
STK. PRESSURE	= [illegible]	[illegible]	METER ORIFICE	= [illegible]	[illegible]
STK. [illegible] AREA	= [illegible]	Sq.Ft.	METER VOLUME	= [illegible]	Cu.Ft.
[illegible]	= [illegible]		METER TEMP	= [illegible]	DEG. [illegible]
[illegible] ANALYSIS	= [illegible]	[illegible]	[illegible] TEMP.	= [illegible]	DEG. [illegible]
	[illegible]	[illegible]	[illegible]	= [illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	= [illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	= [illegible]	
[illegible]	= [illegible]	grams			

Vw(std) = 0.04707 x Vlc = [illegible] scf

Vm(std) = 17.647 x Vm x Y x (Pb + [illegible]/13.6) / Tm = [illegible] scf

Bws = Vw(std) / (Vm(std) + Vw(std)) = [illegible]

[illegible]

[illegible]

[illegible]

Vs = [illegible] / Ms x Ts [illegible] = [illegible] ft/sec

[illegible] = Vs x As x 60 = [illegible] ft/min

[illegible] (1-Bws) [illegible] Ps/29.92) = [illegible] dscf/min

I = [illegible] x (0.00267 x [illegible] + Vm(std) / 17.647) / [illegible] Time x Ps x [illegible] x Vs x 60) = [illegible]

[illegible] = 15.432 x grams / Vm(std) = [illegible] grains/dscf
[illegible] adjusted to [illegible] = [illegible] x (21-[illegible]) = [illegible]
grains/acf = [illegible] x 17.647 x Ps x (1-Bws) / Ts = [illegible] grains/acf

[illegible] / 7000 = [illegible]E-[illegible] lbs/dscf
EM (grams/minute) = (grams/Vm(std)) x Qs(std) = [illegible] grams/min
EM = [illegible] x Qs(std) x 60 = [illegible] lbs/hr

TEST SUMMARY
PARTICULATE EMISSIONS TEST RESULTS

DATE: [illegible]
SAMPLING LOCATION: UNIT #1 STACK
OPERATING MODE: COMPLIANCE

* *

	RUN NO. #2 - [illegible]	RUN NO. #2 - [illegible]	RUN NO. #2 - [illegible]	TEST AVERAGE
GAS FLOW RATE [illegible] [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
STACK TEMP DEG. F	[illegible]	[illegible]	[illegible]	[illegible]
ISOKINETIC %	ERR	ERR	ERR	ERR
MOISTURE [illegible]	7.[illegible]	7.[illegible]	7.40	7.[illegible]
SAMPLE VOLUME [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IMPINGER VOL. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FILTER TEMP. DEG. F	[illegible]	[illegible]	[illegible]	[illegible]
PART. EMISSIONS lbs / MM Btu				

NO Close Station
Engine #1
[illegible]

	32	40-1	
	Span conc		Response
Calibration	[illegible]		4.5
	[illegible]		[illegible]
	12		[illegible]
	[illegible]		89.5

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficients	[illegible]
Std Err of Coef	[illegible]

Sample

1325	66.5	14.91
1330	[illegible]	14.91
[illegible]	66.5	14.91
1340	[illegible]	[illegible]
[illegible]	[illegible]	4.91
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4.91
[illegible]	[illegible]	[illegible]
[illegible]	67	[illegible]
1415	67	[illegible]
1420	66.5	14.91
[illegible]	[illegible]	[illegible]
AVG	[illegible]	[illegible]

[illegible] Stage Station
Engine #1
10-12-89

	CO2	#2-1
	Open Loop	Recorder
Calibration	[illegible]	4
	[illegible]	[illegible]
	[illegible]	15.5
	[illegible]	[illegible]

Sample

1305	[illegible]	[illegible].40
[illegible]	13.5	[illegible].4[illegible]
1325	13.5	[illegible].4[illegible]
1340	[illegible]	[illegible].40
1345	[illegible]	[illegible].40
1350	[illegible]	[illegible].40
1355	35.[illegible]	[illegible].40
1400	35	[illegible]
1415	[illegible]	[illegible]
[illegible]	[illegible]	[illegible].40
[illegible]	[illegible]	40
[illegible]	[illegible]	[illegible].40
[illegible]	[illegible]	[illegible].40
[illegible]	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s) [illegible]	
Std Err of Coef. [illegible]	

[illegible] Station
[illegible]
[illegible]

	[illegible]	[illegible]
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

[illegible]	45	[illegible]
[illegible]	55.5	[illegible]
1305	[illegible]	[illegible]
1340	46.5	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	120.3[illegible]
[illegible]	[illegible]	[illegible]
1400	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

Adjust measured CO for [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

[illegible] Station
[illegible] #2
[illegible]

	NOx	#C-1	
	Span Gas		[illegible]
[illegible]	[illegible]		[illegible]
	139		[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]

Sample

1025	[illegible]	[illegible]
1036	42.5	[illegible]
1035	[illegible]	[illegible]
1040	38.5	[illegible]
1045	36	198.65
1051	36	199.65
[illegible]	[illegible]	[illegible]
1400	35	[illegible]
1405	[illegible]	[illegible]
1410	35	[illegible]
1415	37	[illegible]
1420	[illegible]	[illegible]
1425	[illegible]	[illegible]

AVG [illegible] [illegible] [illegible]
[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) 0.166950
Std Err of Coef. [illegible]

CNG Tioga Station
Ladies #2
10-12-[illegible]

	TH4	#2 [illegible]	
	[illegible]		[illegible]
Calibration		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]

Table

1325	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1340	[illegible]	[illegible]
1345	[illegible]	[illegible]
1350	[illegible]	[illegible]
1355	[illegible]	[illegible]
1400	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

Constant	[illegible]
Std Err of Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

[illegible] Flange Station
Engine [illegible]
[illegible]

	THC (ug C/l)	#2-1
	Span conc	recorder
Calibration	0	5
	591.7	37
	104	[illegible]
	110	[illegible]

Sample

1335	[illegible]	[illegible]
1340	[illegible]	[illegible]
1345	[illegible]	[illegible]
1350	[illegible]	[illegible]
1355	[illegible]	[illegible]
1400	[illegible]	[illegible]
1405	[illegible]	[illegible]
1410	[illegible]	[illegible]
1415	[illegible]	[illegible]
1420	[illegible]	[illegible]
1425	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]4005
Std Err of Coef	[illegible]0000280

Adjust measured THC for H2O.

THC dry = THC wet x (1 - %H2O/100)

where

THC wet (measured) = [illegible]

%H2O = [illegible]

THC dry = [illegible]

[illegible] Tiepa Station
[illegible]
[illegible]

	02	[illegible]
	[illegible]	[illegible]
[illegible]		[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample:

1545	[illegible]	[illegible]
1550	[illegible]	[illegible]
1555	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1615	[illegible]	[illegible]
1620	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

Constant	[illegible]
Std Err of Y Est	[illegible]
[illegible] Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficients:	[illegible]
Std Err of Coef:	[illegible]

[illegible] Station
Engine #[illegible]
[illegible]

	[illegible]	[illegible]	
		[illegible]	[illegible]
Calibration		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]
		[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1600	[illegible]	[illegible]
1605	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1615	[illegible]	[illegible]
[illegible]	25.[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]942013
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

[illegible] Tioga Station
[illegible] #2
[illegible]-89

	[illegible]	[illegible]
	[illegible] conc	Recorder
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

1545	45	[illegible]
1550	46.5	[illegible].56
1555	46.5	[illegible]
[illegible]	46.5	[illegible]
[illegible]	47.5	[illegible]
1610	46	[illegible].91
1615	44.5	222.65
1620	45.[illegible]	[illegible].66
[illegible]25	46	[illegible]
[illegible]	46.5	[illegible].56
[illegible]35	46	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible].5	222.[illegible]
AVG	[illegible].12	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	4
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]31575
Std Err of Coef.	[illegible].006667

Adjust measured CO for CO2.
CO actual = CO measured × (1 − [illegible])
where:
CO measured = [illegible]
%CO2 = [illegible].36
CO actual = [illegible]

LNG Tank Station
Region 10
[illegible]

NOX [illegible]

	Test Temp.	Leak Rate
Calibration	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regress		
1500	[illegible]	[illegible]
1550	[illegible]	[illegible]
1555	[illegible]	[illegible]
1600	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1620	[illegible]	[illegible]
1625	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

AVG [illegible] [illegible] Model Leak Rate
NOX g/h = [illegible]

Regression [illegible]

Intercept	[illegible]
Std Error of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Error of Coef.	[illegible]

[illegible]

[illegible]

Calibration	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible]

Sample		
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

Constant	[illegible]
Std Error of Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Error of Coef.	[illegible]

CMS Tioga Station
Engine #2
[illegible]-12-89

	THC (as CH4) span [illegible]	#2-2 recorder
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regress[illegible]

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Err of Coef.	[illegible]

Sample

[illegible]	42.5	[illegible]
[illegible]	42.5	[illegible]
[illegible]	[illegible]	[illegible]
1600	43	[illegible]
1605	[illegible]	[illegible]
[illegible]	43	[illegible]
1615	[illegible]	[illegible]
1620	[illegible]	[illegible]
[illegible]	43	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Adjust measured THC for H2O:

THC dry = THC wet x (1 - (%H2O/100))

where

THC wet (measured) = [illegible]

[illegible]

THC dry = [illegible]

CNG [illegible] Station
Engine #2
[illegible]

	O2	#2 [illegible]
	Span [illegible]	Recorder
Calibration	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

[illegible]	67	[illegible]
[1735]	67	15.03
1740	67	15.03
1745	67	15.03
1750	67	15.03
[1755]	67	15.03
1800	67.5	15.15
1805	67	15.0[illegible]
1810	65.5	14.91
[illegible]	67	15.0[illegible]
[1820]	67	15.03
[illegible]	67	[illegible]
[illegible]	67	[illegible]
AVG	67.00	15.[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

[illegible] Chase Station
Tacoma WA
[illegible]

	302	42-3
	Type cond.	recorder
[illegible]	0	4
	5	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regression Output

Constant	[illegible]
Std Error of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	[illegible]
Std Error of Coef.	[illegible]

Table

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible] Station
[illegible] #2
[illegible]-89

	[illegible]	[illegible]	
	[illegible]		[illegible]
[illegible]			[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]
	[illegible]		[illegible]

Sample

[illegible]	[illegible]	[illegible]
1735	[illegible]	241.[illegible]
1740	17.5	[illegible]
1745	17	[illegible]
1750	17	[illegible]
[illegible]	17	[illegible]
[illegible]	16	[illegible]
[illegible]	17	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	17	[illegible]
[illegible]	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	4
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

Adjust [illegible] CO for [illegible]:

CO = [illegible] + CO measured [illegible]

where

CO measured = [illegible]

[illegible]

[illegible]

[illegible] Station
[illegible] #2
[illegible]

	NOx	[illegible]
	[illegible]	recorder
Calibration	[illegible]	[illegible]
	[illegible]	17 [illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

[illegible]		
[illegible]	31	[illegible]
1735	[illegible]	[illegible]
1740	33	[illegible]
1745	34 [illegible]	[illegible]
[illegible]	33.[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	36	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
AVE	[illegible].64	[illegible].79

[illegible] for span and zero drift
[illegible] = [illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

CNG Trage Station
Engine #2
[illegible]

	CH4	#2
	span [illegible]	recorder
Calibration	0	2
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Sample

1700	25	[illegible]
1735	25	869.51
1740	25.5	888.34
1745	25.5	888.34
1750	24.5	850.68
1755	25	869.51
1800	25	869.51
1805	25	869.51
1810	24.5	850.68
1815	25	869.51
[illegible]	25	869.51
[illegible]	25	869.51
[illegible]	25	869.51
[illegible]	25.00	869.51

Regression Output

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]
X Coefficient(s)	0.026550
Std Err of Coef	[illegible]

[illegible]
[illegible] #2
[illegible]

	THC (as CH4)	[illegible]
	[illegible] conc	recorder
Calibration	0	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Regression Output:

Constant	[illegible]
Std Err of Y Est	[illegible]
R Squared	[illegible]
No. of Observations	[illegible]
Degrees of Freedom	[illegible]

X Coefficient(s) [illegible]
Std Err of Coef. [illegible]

[illegible]		
[illegible]	44	[illegible]
[illegible]	44	984 [illegible]
[illegible]	43	[illegible]
1745	44.5	[illegible]
[illegible]	44	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] 41
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	894 [illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Adjust measured THC for H2O:
THC dry = THC wet x (1 + [illegible])
where:
THC wet measured = [illegible]
H2O = [illegible]
THC dry = [illegible]

APPENDIX E

CALIBRATION DATA

CEM CALIBRATIONS

- Calibration data for the CEMS may be found in Appendicies A and B, Field Data.

- Calibration summaries for the CEMS may be found in Appendicies C and D, Calculations and Summaries.

Date 10-19-89
Project CNG T106A

Meter ID RAC#3
Orifice ID B

ΔH	METER Temp IN	METER Temp out	Ambient Temp	P_b	Meter Volume I	Meter Volume F	Meter Volume	T
0.85	104	89	62	29.42	573.359	580.981	7.622	15
0.85	04	89	62	29.42	580.981	588.593	7.612	15
0.86	104	89	62	29.42	588.593	598.778	10.185	20
			16.67°C					5x
		46.5						

Orifice $\left[\dfrac{(\text{orifice } K')(P_b)(35.4)(\theta)}{\sqrt{\text{Ambient Temp °C} + 273}}\right] = m^3 \text{ orifice}$

Meter Box $\dfrac{17.64 \cdot \left(P_b + \Delta H/13.6\right) \cdot V_m \cdot \cancel{Y_d}}{460 + T_m} \div 35.31 = m^3 \text{ Box}$

$$100 - \left(\frac{m^3 \text{ orifice} - m^3 \text{ Box}}{m^3 \text{ orifice}}\right) = Y$$

K' 3.0632×10^{-4}

orifice m^3	Box m^3
0.202	0.201
0.202	0.201
0.270	0.269

Y = 0.995
Y = 0.995
Y = 0.996
Y =
Y =

APPENDIX F

ENGINE OPERATIONAL DATA

STATION 02 ENGINE 01 OPERATION DATA ALM 3 17:55:44

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4193 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12116 RPM
Air Manifold Pressure	36.7 "Hg

GAS FLOW

Suction Header	1
Suction Press	642
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity---	
Minimum(MMCFD)	67
Maximum(MMCFD)	111
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	73
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	%
Turbo Bypass	35 %

'NM :##SYSP.000 PRINTER 0 FAULT 0 NORMAL 0

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-17-89

Final Run

A/F Ratio Locked In @ 0.515

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 17:56:48
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	551	1	83	1	85	1	190
2	597	2	620	2	82	2	81	2	190
3	555	3	570	3	81	3	80	3	189
4	605	4	635	4	80	4	78	4	189
5	577	5	596	5	83	5	79		

Temperature Control Fans			
Air Manifold		120	120
After Water	IN	116	SP
After Water	OUT	130	
Difference		-14	
Fan #1 Control		6	100%
Fan #2 Control		8	SP
Jacket Water	IN	150	
Jacket Water	OUT	160	160
Difference		-10	SP
Fan #1 Control		7	100%
Fan #2 Control		7	SP
Gas Discharge	IN	193	
Gas Discharge	OUT	100	100
Difference		93	SP
Fan #1 Control		50	
Fan #2 Control		50	

AVERAGES
L 578 R 594
OVERALL 586

AVERAGES
L 81 R 80
OVERALL 80

AVERAGE
189

Engine Oil	IN 143	PreTurbine	EX 684	Fuel	
Engine Oil	OUT 155	PostTurbine	EX 507	Supply	
Turbo Lube Oil	150	Exhaust	Stack 44	65	

!NM :##SYSF.000 PRINTER 0 FAULT 0 NORMAL G
Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 01 OPERATION DATA ALM 3 17:29:33
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4241 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12170 RPM

Air Manifold Pressure 27.0 "Hg

GAS FLOW

Suction Header	1
Suction Press	647
Dschrge Header	2
Dschrge Press	1587
---Pumping Capacity---	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	25

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	36 %

!NM :##SYSP.000 PRINTER 0 FAULT 0 NORMAL G
ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-17-89

```
STATION 02                    ENGINE 01   TEMPERATURE ( F) DATA                ALM 3 17:29:03
                POWER CYLINDERS                                                  TIOGA STORAGE
   CYLINDER HEADS                FUEL   VALVES        COMPRESSOR   Temperature Control Fans
   Left       Right              Left     Right       DISCHARGES   Air Manifold
 1    557    1    551         1    83    1    83          1         After Water    IN          SP
 2    598    2    617         2    83    2    81          2         After Water   OUT
 3    557    3    571         3    80    3                3         Difference
 4    605    4    635         4    81    4                4         Fan #1 Control
 5    580    5    596         5    83    5                          Fan #2 Control             BP

                                                                    Jacket Water   IN
     AVERAGES                  AVERAGES          AVERAGE            Jacket Water OUT
 L          R                L          R                           Difference                 SP
   OVERALL                    OVERALL                               Fan #1 Control
                                                                    Fan #2 Control             BP

 Engine Oil   IN          PreTurbine   EX          Fuel             Gas Dischrge   IN
 Engine Oil  OUT          PostTurbine  EX         Supply            Gas Dischrge OUT
 Turbo Luce Oil           Exhaust   Stack                           Difference                 SP
                                                                    Fan #1 Control
                                                                    Fan #2 Control

!NM   :##SYSP.000                PRINTER 0 FAULT                                0          NORMAL G
Eng Oper   Sta Misc    StaYardA   StaYardB   Sta Mode   SetPoint    Eng Menu   MainMenu
```

STATION 02 ENGINE 01 OPERATION DATA ALM 3 16:57:11

TIGGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4267 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12229 RPM

Air Manifold Pressure 37.5 "Hg

GAS FLOW

Suction Header	1
Suction Press	647
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	34 %

INM :#SYSP.000 PRINTER 0 FAULT 0 NORMAL G

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10/17/89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 16:54:42

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	554	1	551	1	83	1	85	1	190
2	597	2	618	2	82	2	81	2	188
3	552	3	568	3	81	3	79	3	190
4	604	4	635	4	81	4	78	4	187
5	577	5	595	5	83	5	79		

Temperature Control Fans		
Air Manifold	121	120
After Water IN	117	SP
After Water OUT	130	
Difference	-13	
Fan #1 Control	9	100%
Fan #2 Control	9	BP
Jacket Water IN	149	
Jacket Water OUT	160	160
Difference	-11	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	192	
Gas Dischrge OUT	99	100
Difference	93	SP
Fan #1 Control	48	
Fan #2 Control	48	

AVERAGES
L 576 R 593
OVERALL 584

AVERAGES
L 82 R 80
OVERALL 81

AVERAGE
188

Engine Oil IN 143
Engine Oil OUT 156
Turbo Lube Oil 147

PreTurbine EX 683
PostTurbine EX 509
Exhaust Stack 43

Fuel Supply
62

NM :##SYSP.000 PRINTER 0 FAULT 0 NORMAL G

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 01 OPERATION DATA ALM 3 15:15:28

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4226 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed 12159 RPM

Air Manifold Pressure 36.9 "Hg

GAS FLOW

Suction Header	1
Suction Press	645
Dschrge Header	2
Dschrge Press	1586
----Pumping Capacity---	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	12
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	°
Exhaust Oxygen	%
Turbo Bypass	31 %

DC :INSTRAIR.PRES.

lsarSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu 110.04297 HIALPM 6 MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 15:16:02
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	557	1	551	1	82	1	83	1	189
2	598	2	622	2	82	2	82	2	187
3	556	3	571	3	81	3	78	3	189
4	606	4	638	4	80	4	77	4	188
5	578	5	598	5	82	5	78		

AVERAGES		AVERAGES		AVERAGE
L 579	R 596	L 81	R 79	188
OVERALL 587		OVERALL 80		

Temperature Control		Fans
Air Manifold	120	120
After Water IN	117	SP
After Water OUT	131	
Difference	-14	
Fan #1 Control	9	100%
Fan #2 Control	9	SP
Jacket Water IN	149	
Jacket Water OUT	160	160
Difference	-11	SP
Fan #1 Control	8	100%
Fan #2 Control	8	SP
Gas Discharge IN	192	
Gas Discharge OUT	100	100
Difference	92	SP
Fan #1 Control	51	
Fan #2 Control	51	

Engine Oil IN 141	PreTurbine EX 687	Fuel				
Engine Oil OUT 156	PostTurbine EX 510	Supply				
Turbo Lube Oil 153	Exhaust Stack 42	65				

'OC :INSTRAIR.PRES.

110.04297 HIALRM 6

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 01 OPERATION DATA ALM 3 15:15:45

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4198 BHp
Engine Speed:	
Actual	328 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12154 RPM

Air Manifold Pressure 36.9 "Hg

GAS FLOW

Suction Header	1
Suction Press	645
Dschrge Header	2
Dschrge Press	1587
---Pumping Capacity---	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H20)	74
Flowrate(MCFH)	32

TIOGA STORAGE

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	xxx %
Turbo Bypass	31 %

DC :INSTRAIR.PRES.

YearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu 110.04297 HIALRM 0 MainMenu

10-17-89

STATION 02

ENGINE 01 TEMPERATURE (F) DATA

ALM 3 15:16:18
TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	550	1	82	1	85	1	190
2	598	2	620	2	83	2	83	2	189
3	556	3	573	3	82	3	78	3	189
4	605	4	639	4	79	4	77	4	186
5	577	5	598	5	81	5	78		

Temperature Control Fans		
Air Manifolo	121	120
After Water IN	115	SP
After Water OUT	131	
Difference	-16	
Fan #1 Control	10	100%
Fan #2 Control	10	SP

Jacket Water IN	149	
Jacket Water OUT	159	160
Difference	-10	SP
Fan #1 Control	7	100%
Fan #2 Control	7	SP

AVERAGES
L 578 R 596
OVERALL 587

AVERAGES
L 81 R 80
OVERALL 80

AVERAGE
188

Engine Oil IN	145	
Engine Oil OUT	155	
Turbo Lube Oil	152	
PreTurbine EX	687	
PostTurbine EX	509	
Exhaust Stack	41	
Fuel Supply	62	

Gas Dischrge IN	192	
Gas Dischrge OUT	100	100
Difference	92	SP
Fan #1 Control	51	
Fan #2 Control	51	

!DC :INSTRAIR.PRES.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode 110.04297 SetPoint Eng Menu HIALRM G MainMenu

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 14:45:45
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4217 BHp
Engine Speed:	
Actual	328 RPM
Set Point	0 %
Engine Torque:	
Actual	99 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12180 RPM

Air Manifold Pressure 37.1 "Hg

GAS FLOW

Suction Header	1
Suction Press	647
Dschrge Header	2
Dschrge Press	1586
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	40
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	31 %

DDC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode 110.04297 SetPoint Eng Menu HIALRM 6 MainMenu

10-17-89

STATION 02

ENGINE 01 TEMPERATURE (F) DATA

ALM 3 14:47:09
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	555	1	552	1	81	1	83	1	187
2	597	2	620	2	83	2	90	2	189
3	556	3	570	3	80	3	80	3	189
4	604	4	638	4	81	4	77	4	188
5	578	5	596	5	82	5	77		

Temperature Control Fans		
Air Manifold	121	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	10	100%
Fan #2 Control	10	BP
Jacket Water IN	151	
Jacket Water OUT	160	160
Difference	-9	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

AVERAGES
L 578 R 595
OVERALL 586

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
188

Engine Oil IN 141
Engine Oil OUT 155
Turbo Lube Oil 151

PreTurbine EX 687
PostTurbine EX 509
Exhaust Stack 44

Fuel Supply
65

!DC :INSTRAIR.PRES.

110.04297

HIALRM G

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 01 OPERATION DATA ALM 2 14:46:32

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	2
Horsepower	4262 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12164 RPM

Air Manifold Pressure 37.0 "Hg

GAS FLOW

Suction Header	1
Suction Press	647
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	31 %

IDC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 110.04297 Eng Menu HIALRM 0 MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 14:47:26

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	551	1	82	1	85	1	189
2	598	2	621	2	81	2	80	2	189
3	552	3	569	3	79	3	78	3	188
4	605	4	639	4	79	4	77	4	188
5	577	5	597	5	82	5	79		

AVERAGES
L 577 R 595
OVERALL 586

AVERAGES
L 80 R 79
OVERALL 79

AVERAGE
188

Engine Oil IN 143
Engine Oil OUT 155
Turbo Lube Oil 154

PreTurbine EX 687
PostTurbine EX 509
Exhaust Stack 42

Fuel Supply
65

Temperature Control Fans

Air Manifold		120	120
After Water	IN	116	SP
After Water	OUT	130	
Difference		-14	
Fan #1 Control		9	100%
Fan #2 Control		9	SP
Jacket Water	IN	151	
Jacket Water	OUT	160	160
Difference		-9	SP
Fan #1 Control		8	100%
Fan #2 Control		8	SP
Gas Dischrge	IN	191	
Gas Dischrge	OUT	100	100
Difference		91	SP
Fan #1 Control		52	
Fan #2 Control		52	

!DC :INSTRAIR.PRES.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

110.04297 HIALRM G

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 14:15:02
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4245 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12197 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	646
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	10
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	32 %

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu HIALRM G MainMenu

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STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 14:14:34

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	555	1	550	1	83	1	83	1	186
2	598	2	618	2	82	2	80	2	189
3	557	3	572	3	79	3	78	3	186
4	605	4	639	4	80	4	79	4	186
5	580	5	598	5	82	5	78		

AVERAGES
L 579 R 595
OVERALL 587

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
186

Engine Oil IN 141
Engine Oil OUT 156
Turbo Lube Oil 153

PreTurbine EX 686
PostTurbine EX 509
Exhaust Stack 42

Fuel Supply
65

Temperature Control Fans

Air Manifold		120	120
After Water	IN	115	SP
After Water	OUT	131	
Difference		-16	
Fan #1 Control		11	100%
Fan #2 Control		11	SP
Jacket Water	IN	149	
Jacket Water	OUT	160	160
Difference		-11	SP
Fan #1 Control		8	100%
Fan #2 Control		8	BP
Gas Discnrge	IN	191	
Gas Discnrge	OUT	100	100
Difference		91	SP
Fan #1 Control		52	
Fan #2 Control		52	

'DC :INSTRAIR.PRES.

110.04297 HIALFM G

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 14:15:15
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4255 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12197 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	646
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity----	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage--------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	33

MISCELLANEOUS

Ignitionliming	[illegible]
Exhaust Oxygen	[illegible] %
Turbo Bypass	32 %

'DC :INSTRAIR.PRES.

110.04297

HIALRM G

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10 - 17 - 89

STATION 02

ENGINE 01 TEMPERATURE (F) DATA

ALM 3 14:14:41
TIOGA STORAGE

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	555	1	550	1	83	1	83	1	186
2	598	2	618	2	82	2	80	2	189
3	557	3	572	3	79	3	78	3	186
4	605	4	639	4	80	4	79	4	186
5	580	5	598	5	82	5	78		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	115	SP
After Water OUT	131	
Difference	-16	
Fan #1 Control	11	100%
Fan #2 Control	11	SP

Jacket Water IN	149	
Jacket Water OUT	160	160
Difference	-11	SP
Fan #1 Control	8	100%
Fan #2 Control	8	SP

AVERAGES
L 579 R 595
OVERALL 587

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
186

Gas Discrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

Engine Oil IN 141
Engine Oil OUT 156
Turbo Lube Oil 153

PreTurbine EX 636
PostTurbine EX 509
Exhaust Stack 42

Fuel Supply 65

'DC :INSTRAIR.PRES.
ng Oper Sta Misc StaYard4 StaYard8 Sta Mode 110.04297 SetPoint Eng Menu HIALRM G MainMenu

STATION 02 ENGINE 01 OPERATION DATA ALM 3 13:45:51

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4267 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed 12197 RPM

Air Manifold Pressure 37.2 "Hg

GAS FLOW

Suction Header	1
Suction Press	647
Dschrge Header	2
Dschrge Press	1586
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

TIDGA STORAGE

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	16
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	31 %

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode 89.9570I1 SetPoint Eng Menu LOALRM G MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 13:47:46
TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	555	1	554	1	81	1	83	1	190
2	598	2	618	2	81	2	80	2	186
3	554	3	572	3	79	3	78	3	186
4	604	4	636	4	81	4	77	4	189
5	578	5	597	5	82	5	77		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	10	100%
Fan #2 Control	10	BP

Jacket Water IN	149	
Jacket Water OUT	159	160
Difference	-7	SP
Fan #1 Control	7	100%
Fan #2 Control	7	BP

Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

AVERAGES
L 577 R 595
OVERALL 586

AVERAGES
L 80 R 79
OVERALL 79

AVERAGE
187

Engine Oil IN 141
Engine Oil OUT 156
Turbo Lube Oil 150

Preturbine EX 686
PostTurbine EX 510
Exhaust Stack 42

Fuel Supply
63

DC :INSTRAIR.PRES.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode 09.957031 SetPoint Eng Menu LOALRM 0 MainMenu

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 13:46:11
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4256 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12207 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	649
Dschrge Header	2
Dschrge Press	1587
---Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	31 %

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 69.957031 Eng Menu LOALRM 0 MainMenu

10-17-89

TATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 13:48:03

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	551	1	81	1	83	1	187
2	599	2	622	2	81	2	79	2	186
3	556	3	573	3	79	3	77	3	186
4	604	4	639	4	79	4	77	4	188
5	581	5	598	5	82	5	78		

AVERAGES		AVERAGES		AVERAGE
L 579	R 596	L 80	R 78	186
OVERALL 587		OVERALL 79		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	117	SP
After Water OUT	130	
Difference	-13	
Fan #1 Control	9	100%
Fan #2 Control	9	BP
Jacket Water IN	152	
Jacket Water OUT	159	160
Difference	-7	SP
Fan #1 Control	7	100%
Fan #2 Control	7	BP
Gas Discnrge IN	191	
Gas Discnrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

Engine Oil IN	141	PreTurbine EX	687	Fuel			
Engine Oil OUT	156	PostTurbine EX	509	Supply			
Turbo Lube Oil	152	Exhaust Stack	42	63			

DC :INSTRAIR.PRES. 89.957031 LOALRM G

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4286 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed 12191 RPM

Air Manifold Pressure 37.1 "Hg

GAS FLOW

Suction Header	1
Suction Press	650
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
---------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	36

See

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	%
Turbo Bypass	33 %

A1 :REGEN.HEATER.ALRM

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF NORMAL Eng Menu MainMenu

10-17-89

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	558	1	554	1	82	1	83	1	189
2	599	2	622	2	81	2	80	2	186
3	560	3	573	3	80	3	81	3	186
4	607	4	640	4	79	4	77	4	186
5	578	5	600	5	85	5	78		

AVERAGES
L 580 R 597
OVERALL 588

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
186

Temperature Control Fans		
Air Manifold	120	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	11	100%
Fan #2 Control	11	BP
Jacket Water IN	150	
Jacket Water OUT	159	160
Difference	-9	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	53	
Fan #2 Control	83	

See ↓

Engine Oil IN 141
Engine Oil OUT 155
Turbo Lube Oil 147

PreTurbine EX 690
PostTurbine EX 509
Exhaust Stack 45

Fuel Supply 52

A1 :REGEN.HEATER.ALRM

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-17-89

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4257	BHp
Engine Speed:		
Actual	329	RPM
Set Point	0	%
Engine Torque:		
Actual	102	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed 12191 RPM

Air Manifold Pressure 37.0 "Hg

GAS FLOW

Suction Header	1
Suction Press	651
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
-------Fuel Usage-------	
Pressure(PSI)	96
Differ("H20)	75
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51	See
PreOil Filter	59	↓
PreOil Strainer	55	
Turbo Oil	18	
Jacket Water	13	
Fuel Manifold	36	

MISCELLANEOUS

IgnitionTiming	7	
Exhaust Oxygen<<<<	%	
Turbo Bypass	32	%

!A1 :REGEN.HEATER.ALRM

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 9 OFF Eng Menu NORMAL C Mainmenu

10-17-89

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	558	1	554	1	83	1	83	1	186
2	600	2	622	2	82	2	80	2	187
3	559	3	573	3	79	3	78	3	186
4	607	4	642	4	80	4	77	4	189
5	560	5	599	5	92	5	77		

AVERAGES
L 580 R 598
OVERALL 589

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
187

Temperature Control		Fans
Air Manifold	120	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	11	100%
Fan #2 Control	11	BP

See

Jacket Water IN	150	
Jacket Water OUT	159	150
Difference	-9	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP

Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	53	
Fan #2 Control	53	

Engine Oil IN 141
Engine Oil OUT 156
Turbo Lube Oil 149

PreTurbine EX 689
PostTurbine EX 509
Exhaust Stack 42

Fuel Supply 65

'A1 :REGEN.HEATER.ALRM
Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoints 0 OFF Eng Menu NORMAL O MainMenu

10-17-89

10-17-89

STATION 02 ENGINE 01 OPERATION DATA ALM 3 12:47:49

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4264 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12223 RPM

Air Manifold Pressure 37.4 "Hg

GAS FLOW

Suction Header	1
Suction Press	651
Dschrge Header	1
Dschrge Press	1587
----Pumping Capacity----	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage--------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	26

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	36 %

'A1 :REGEN.HEATER.ALRM

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF NORMAL C Eng Menu MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 12:48:05

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	558	1	552	1	82	1	83	1	186
2	599	2	621	2	82	2	81	2	186
3	558	3	572	3	80	3	78	3	186
4	607	4	640	4	80	4	77	4	186
5	580	5	597	5	82	5	78		

AVERAGES
L 580 R 596
OVERALL 588

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
186

Engine Oil IN 143
Engine Oil OUT 155
Turbo Lube Oil 151

PreTurbine EX 688
PostTurbine EX 506
Exhaust Stack 40

Fuel Supply
64

TIOGA STORAGE

Temperature Control Fans		
Air Manifold	121	120
After Water IN	119	SP
After Water OUT	130	
Difference	-11	
Fan #1 Control	11	100%
Fan #2 Control	11	SP
Jacket Water IN	150	
Jacket Water OUT	160	160
Difference	-10	SP
Fan #1 Control	8	100%
Fan #2 Control	8	SP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	53	
Fan #2 Control	53	

A1 :REGEN.HEATER.ALRM

0 OFF NORMAL C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 12:47:34
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4266 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12229 RPM

Air Manifold Pressure 37.4 "Hg

GAS FLOW

Suction Header	1
Suction Press	651
Dschrge Header	1
Dschrge Press	1588
----Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	36 %

!A1 :REGEN.HEATER.ALRM

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL S MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 12:47:58
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	558	1	552	1	82	1	83	1	186
2	599	2	621	2	82	2	81	2	187
3	558	3	572	3	79	3	78	3	186
4	607	4	640	4	80	4	77	4	186
5	580	5	597	5	83	5	78		

AVERAGES		AVERAGES		AVERAGE
L 580	R 596	L 81	R 79	186
OVERALL 588		OVERALL 80		

Temperature Control Fans		
Air Manifold	121	120
After Water IN	116	SP
After Water OUT	130	
Difference	-14	
Fan #1 Control	11	100%
Fan #2 Control	11	BP
Jacket Water IN	150	
Jacket Water OUT	160	160
Difference	-10	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	53	
Fan #2 Control	53	

Engine Oil IN	143	FreTurbine EX	687	Fuel			
Engine Oil OUT	155	PostTurbine EX	507	Supply			
Turbo Lube Oil	147	Exhaust Stack	40	64			

'A1 :REGEN.HEATER.ALRM

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-17-89

STATION 02 ENGINE 01 OPERATION DATA ALM 3 12:20:03

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4290 DHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12277 RPM

Air Manifold Pressure 37.8 "Hg

GAS FLOW

Suction Header	1
Suction Press	651
Dschrge Header	2
Dschrge Press	1580
---Pumping Capacity---	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
-------Fuel Usage------	
Pressure(PSI)	95
Differ("H2O)	76
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	34 %

!A1 :REGEN.HEATER.ALRM

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 12:20:37

TIOGA STORAGE

CYLINDER	POWER CYLINDERS HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	557	1	552	1	82	1	83	1	186	
2	599	2	620	2	82	2	80	2	187	
3	554	3	572	3	80	3	78	3	186	
4	607	4	639	4	80	4	78	4	186	
5	577	5	599	5	83	5	77			
AVERAGES				AVERAGES				AVERAGE		
L 578		R 596		L 81		R 79		186		
OVERALL 587				OVERALL 80						

Temperature Control Fans		
Air Manifold	121	120
After Water IN	116	SP
After Water OUT	131	
Difference	-15	
Fan #1 Control	11	100%
Fan #2 Control	11	BP
Jacket Water IN	152	
Jacket Water OUT	160	160
Difference	-8	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	190	
Gas Dischrge OUT	100	100
Difference	90	SP
Fan #1 Control	53	
Fan #2 Control	53	

Engine Oil IN	143	PreTurbine EX	687	Fuel					
Engine Oil OUT	156	PostTurbine EX	507	Supply					
Turbo Lube Oil	154	Exhaust Stack	42	64					

Al :REGEN.HEATER.ALRM

mq Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10 - 17 - 89

STATION 02

ENGINE 01 OPERATION DATA

ALM 3 12:20:17
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4272 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12282 RPM
Air Manifold Pressure	37.8 "Hg

GAS FLOW

Suction Header	1
Suction Press	651
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity--	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	76
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	58
Turbo Oil	13
Jacket Water	13
Fuel Manifold	38

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	34 %

A1 :REGEN.HEATER.ALRM
learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF NORMAL C
Eng Menu MainMenu

10 - 17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 3 12:20:34

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	557	1	554	1	82	1	83	1	187
2	597	2	618	2	82	2	80	2	185
3	555	3	571	3	80	3	79	3	185
4	606	4	639	4	79	4	77	4	186
5	578	5	597	5	82	5	79		

AVERAGES
L 578 R 595
OVERALL 586

AVERAGES
L 81 R 79
OVERALL 80

AVERAGE
185

Engine Oil IN 141
Engine Oil OUT 156
Turbo Lube Oil 149

PreTurbine EX 686
PostTurbine EX 504
Exhaust Stack 40

Fuel Supply
62

TIOGA STORAGE

Temperature Control Fans			
Air Manifold		120	120
After Water	IN	115	SP
After Water	OUT	131	
Difference		-16	
Fan #1 Control		11	100%
Fan #2 Control		11	BP
Jacket Water	IN	151	
Jacket Water	OUT	160	160
Difference		-9	SP
Fan #1 Control		8	100%
Fan #2 Control		8	BP
Gas Dischrge	IN	191	
Gas Dischrge	OUT	99	100
Difference		92	SP
Fan #1 Control		52	
Fan #2 Control		52	

!A1 :REGEN.HEATER.ALRM

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

STATION 02

ENGINE 01 OPERATION DATA

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4225	BHp
Engine Speed:		
Actual	328	RPM
Set Point	0	%
Engine Torque:		
Actual	101	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed	12245	RPM
Air Manifold Pressure	37.3	"Hg

GAS FLOW

Suction Header	1
Suction Press	644
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	66
Maximum(MMCFD)	111
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

11:45:27

TIOGA STORAGE

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	28 %

A1 :REGEN.HEATER.ALRM

earSDs	Eng Temp	StaYardA	StaYardB	Sta Mode	SetPoint	0 OFF	NORMAL C
						Eng Menu	MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	552	1	78	1	81	1	187
2	595	2	620	2	81	2	79	2	187
3	552	3	570	3	79	3	75	3	189
4	605	4	638	4	79	4	75	4	187
5	578	5	597	5	82	5	77		

	AVERAGES		AVERAGES		AVERAGE
	L 577	R 595	L 79	R 77	187
	OVERALL 586		OVERALL 78		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	113	SP
After Water OUT	131	
Difference	-18	
Fan #1 Control	11	100%
Fan #2 Control	11	BP
Jacket Water IN	150	
Jacket Water OUT	160	160
Difference	-10	SP
Fan #1 Control	8	100%
Fan #2 Control	8	SP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

11:46:22

Engine Oil IN	141	PreTurbine EX	684	Fuel	
Engine Oil OUT	155	PostTurbine EX	506	Supply	
Turbo Lube Oil	149	Exhaust Stack	40	51	

A1 :REGEN.HEATER.ALRM

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

STATION 02

ENGINE 01 OPERATION DATA

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4221 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12240 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	645
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	111
----------Fuel Usage--------	
Pressure(PSI)	96
Differ("H2O)	73
Flowrate(MCFH)	32

[redacted]

11:45:46

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	28 %

A1 :REGEN.HEATER.ALRM

learsDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF NORMAL C Eng Menu MainMenu

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	554	1	551	1	81	1	81	1	187
2	598	2	620	2	81	2	79	2	189
3	554	3	568	3	79	3	75	3	186
4	602	4	638	4	78	4	77	4	186
5	576	5	597	5	82	5	77		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	113	SP
After Water OUT	131	
Difference	-18	
Fan #1 Control	11	100%
Fan #2 Control	11	BP

11:46:05

Jacket Water IN	149	
Jacket Water OUT	160	160
Difference	-11	SP
Fan #1 Control	7	100%
Fan #2 Control	7	BP

AVERAGES
L 576 R 594
OVERALL 585

AVERAGES
L 80 R 77
OVERALL 78

AVERAGE
187

Engine Oil IN	144	
Engine Oil OUT	155	
Turbo Lube Oil	152	
PreTurbine EX	684	
PostTurbine EX	504	
Exhaust Stack	37	
Fuel Supply	64	

Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	52	
Fan #2 Control	52	

A1 :REGEN.HEATER.ALRM

Eng Uper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 6 11:15:25
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4227 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12250 RPM
Air Manifold Pressure	37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	646
Dscnrge Header	2
Dscnrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

Ignitiontiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	27 %

.DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

89.957031 LOALRM 6

10 - 17 - 89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 6 11:15:54
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	554	1	550	1	78	1	79	1	188
2	597	2	618	2	78	2	77	2	188
3	555	3	569	3	77	3	75	3	187
4	603	4	638	4	77	4	75	4	187
5	577	5	598	5	79	5	75		

Temperature Control Fans		
Air Manifold	121	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	9	100%
Fan #2 Control	9	SP

AVERAGES		AVERAGES		AVERAGE
L 577	R 594	L 77	R 76	187
OVERALL 585		OVERALL 76		

Jacket Water IN	151
Jacket Water OUT	159 160
Difference	-8 SP
Fan #1 Control	7 100%
Fan #2 Control	7 SP

Engine Oil IN	141	PreTurbine EX	687	Fuel	
Engine Oil OUT	155	PostTurbine EX	509	Supply	
Turbo Lube Oil	152	Exhaust Stack	37	60	

Gas Dischrge IN	192	
Gas Dischrge OUT	100	100
Difference	92	SP
Fan #1 Control	52	
Fan #2 Control	52	

DC :INSTRAIR.PRES.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode 89.957031 SetPoint Eng Menu LOALRM G MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 6 11:15:24
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4227 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12250 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	546
Dschrge Header	2
Dschrge Press	1587
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	27 %

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu 89.957031 LOALRM 6

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 6 11:15:55

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	554	1	550	1	78	1	79	1	188
2	597	2	618	2	78	2	77	2	188
3	555	3	569	3	77	3	75	3	187
4	603	4	638	4	77	4	75	4	187
5	577	5	598	5	79	5	75		

AVERAGES
L 577 R 594
OVERALL 585

AVERAGES
L 77 R 76
OVERALL 76

AVERAGE
187

Engine Oil IN 141
Engine Oil OUT 155
Turbo Lube Oil 152

PreTurbine EX 687
PostTurbine EX 509
Exhaust Stack 37

Fuel Supply
60

TIOGA STORAGE

Temperature Control Fans			
Air Manifold		121	120
After Water	IN	115	SP
After Water	OUT	130	
Difference		-15	
Fan #1 Control		9	100%
Fan #2 Control		9	BP
Jacket Water	IN	151	
Jacket Water	OUT	159	160
Difference		-8	SP
Fan #1 Control		7	100%
Fan #2 Control		7	BP
Gas Dischrge	IN	192	
Gas Dischrge	OUT	100	100
Difference		92	SP
Fan #1 Control		52	
Fan #2 Control		52	

:DC :INSTRAIR.PRES.
Eng Oper Sta Misc StaYardA StaYard3 Sta Mode SetPoint Eng Menu MainMenu
.7-OCT-89 11:19:26.44 A1 :REGEN.HEATER.ALRM 89.957031 LOALRM G
1 ON ALARM C

STATION 02

ENGINE 01 OPERATION DATA

10-17-89

ALM 6 10:46:02

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4240 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12234 RPM

Air Manifold Pressure 37.4 "Hg

GAS FLOW

Suction Header	1
Suction Press	645
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	111
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	60
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	33 %

!DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

89.957031 LOALRM 0

10-17-89

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 5 10:46:26

TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	555	1	550	1	78	1	80	1	189
2	595	2	618	2	78	2	75	2	189
3	554	3	571	3	75	3	75	3	187
4	602	4	637	4	77	4	75	4	188
5	577	5	597	5	77	5	75		

Temperature Control		Fans
Air Manifold	121	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	10	100%
Fan #2 Control	10	BP
Jacket Water IN	150	
Jacket Water OUT	160	160
Difference	-10	SP
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Gas Dischrge IN	191	
Gas Dischrge OUT	99	100
Difference	92	SP
Fan #1 Control	53	
Fan #2 Control	53	

AVERAGES
L 576 R 594
OVERALL 585

AVERAGES
L 77 R 76
OVERALL 76

AVERAGE
188

Engine Oil IN	143	PreTurbine EX	686	Fuel	
Engine Oil OUT	154	PostTurbine EX	509	Supply	
Turbo Lube Oil	147	Exhaust Stack	39	50	

DC :INSTRAIR.PRES.

89.957031

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu LOALRM 5 MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 5 10:45:42
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4232 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12229 RPM

Air Manifold Pressure 37.4 "Hg

GAS FLOW

Suction Header	1
Suction Press	646
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity----	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	59
PreOil Strainer	56
Turbo Oil	18
Jacket Water	13
Fuel Manifold	35

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	32 %

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu 89.957031 LOALRM 6

10-17-89

LTATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 6 10:46:42

TIOGA STORAGE

	POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES
1	552	1	548	1	77	1	78	1	189
2	598	2	620	2	78	2	77	2	189
3	552	3	569	3	75	3	75	3	188
4	604	4	637	4	77	4	74	4	188
5	577	5	596	5	79	5	75		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	115	SP
After Water OUT	131	
Difference	-16	
Fan #1 Control	9	100%
Fan #2 Control	9	BP

Jacket Water IN	150	
Jacket Water OUT	159	160
Difference	-9	SP
Fan #1 Control	7	100%
Fan #2 Control	7	BP

AVERAGES
L 576 R 594
OVERALL 585

AVERAGES
L 77 R 75
OVERALL 76

AVERAGE
188

Engine Oil IN	143	PreTurbine EX	686	Fuel	
Engine Oil OUT	154	PostTurbine EX	504	Supply	
Turbo Lube Oil	153	Exhaust Stack	39	57	

Gas Dischrge IN	192	
Gas Dischrge OUT	99	100
Difference	93	SP
Fan #1 Control	53	
Fan #2 Control	53	

DC :INSTRAIR.PRES.

ng Oper Sta Misc StaYardA StaYardB Sta Mode 89.957031 SetPoint Eng Menu LOALRM G MainMenu

10-17-89

STATION 02

ENGINE 01 OPERATION DATA

ALM 6 10:06:57
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4278	BHp
Engine Speed:		
Actual	329	RPM
Set Point	0	%
Engine Torque:		
Actual	102	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed	12250	RPM

Air Manifold Pressure 37.6 "Hg

GAS FLOW

Suction Header	1
Suction Press	648
Dschrge Header	2
Dschrge Press	1588
----Pumping Capacity---	
Minimum(MMCFD)	68
Maximum(MMCFD)	113
--------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	60
PreOil Strainer	56
Turbo Oil	17
Jacket Water	13
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7	
Exhaust Oxygen	<<<	%
Turbo Bypass	35	%

DC :INSTRAIR.PRES.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu 89.957031 LOALRM 6

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 6 10:08:08

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	557	1	552	1	75	1	77	1	187
2	597	2	618	2	75	2	75	2	187
3	554	3	570	3	72	3	72	3	189
4	604	4	636	4	72	4	71	4	186
5	574	5	596	5	75	5	72		

AVERAGES
L 577 R 594
OVERALL 585

AVERAGES
L 73 R 73
OVERALL 73

AVERAGE
187

Engine Oil IN 141
Engine Oil OUT 153
Turbo Lube Oil 150

PreTurbine EX 684
PostTurbine EX 503
Exhaust Stack 36

Fuel Supply
57

TIOGA STORAGE

Temperature Control Fans			
Air Manifold		119	120
After Water	IN	113	SP
After Water	OUT	129	
Difference		-16	
Fan #1 Control		9	100%
Fan #2 Control		9	BP
Jacket Water	IN	153	
Jacket Water	OUT	160	160
Difference		-7	SP
Fan #1 Control		7	100%
Fan #2 Control		7	BP
Gas Dischrge	IN	191	
Gas Dischrge	OUT	100	100
Difference		91	SP
Fan #1 Control		54	
Fan #2 Control		54	

DC :INSTRAIR.PRES.

89.957031 LOALRM 6

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-17-89

STATION 02 ENGINE 01 OPERATION DATA ALN 6 10:07:15

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4267 BHp
Engine Speed:	
Actual	329 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12250 RPM

Air Manifold Pressure 37.5 "Hg

GAS FLOW

Suction Header	1
Suction Press	648
Dschrge Header	2
Dschrge Press	1589
----Pumping Capacity--	
Minimum(MMCFD)	67
Maximum(MMCFD)	112
--------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	75
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	51
PreOil Filter	60
PreOil Strainer	56
Turbo Oil	17
Jacket Water	13
Fuel Manifold	26

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	<<< %
Turbo Bypass	35 %

DC :INSTRAIR.PRES.

89.957031

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu LOALRM 6 MainMenu

STATION 02 ENGINE 01 TEMPERATURE (F) DATA ALM 6 10:07:51
TIOGA STORAGE

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	556	1	548	1	75	1	77	1	189
2	598	2	616	2	75	2	74	2	186
3	552	3	569	3	72	3	70	3	188
4	603	4	635	4	74	4	72	4	189
5	575	5	596	5	75	5	72		

AVERAGES		AVERAGES		AVERAGE
L 576	R 592	L 74	R 73	188
OVERALL 584		OVERALL 73		

Temperature Control Fans		
Air Manifold	119	120
After Water IN	115	SP
After Water OUT	130	
Difference	-15	
Fan #1 Control	8	100%
Fan #2 Control	8	BP
Jacket Water IN	150	
Jacket Water OUT	160	160
Difference	-10	SP
Fan #1 Control	8	100%
Fan #2 Control	8	SP
Gas Dischrge IN	191	
Gas Dischrge OUT	100	100
Difference	91	SP
Fan #1 Control	55	
Fan #2 Control	55	

Engine Oil IN	141	PreTurbine EX	684	Fuel			
Engine Oil OUT	153	PostTurbine EX	507	Supply			
Turbo Lube Oil	154	Exhaust Stack	38	57			

!DC :INSTRAIR.PRES.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode 89.957031 SetPoint Eng Menu LOALRM 6 MainMenu

10/11/89
Engine #2 Emission Test

Time	5:45	6:45	6:45	7:15
Engine Speed	329	330	329	Comp off
Horsepower	1307	1288	1273	7:00
Suction	661	661	662	P.M
Discharge	1615	1615	1617	
Airman Press	37.5	37.6	37.7	Not needed
Fuelman Press	37	37	37	
Timing	7°	7°	7°	
Man Temp	119	120	120	
Eng Oil Temp Out	168°	168°	168°	
Temp Out	160	160	160	

STATION-02

ENGINE 02 OPERATION DATA

ALM 3 16:45:33
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4301 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	102 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12540 RPM

Air Manifold Pressure 37.6 "Hg

GAS FLOW

Suction Header	1
Suction Press	660
Dschrge Header	2
Dschrge Press	1617
----Pumping Capacity--	
Minimum(MMCFD)	62
Maximum(MMCFD)	103
--------Fuel Usage------	
Pressure(PSI)	95
Differ("H2O)	79
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	42 %

!E2 :UVCGI.INHIB.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

DATE- 10-12-89

Ran out of paper

STATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 16:45:48
TIOGA STORAGE

CYLINDER HEADS Left	Right	POWER CYLINDERS FUEL VALVES Left	Right	COMPRESSOR DISCHARGES
1	1	1	1	
2	2	2	2	
3	3	3	3	
4				

Temperature Control Fans		
Air Manifold		
After Water	IN	SP
After Water	OUT	
Difference		
Fan #1 Control		
Fan #2 Control		BP
Jacket Water	IN	
Jacket Water	OUT	
Difference		SP
Fan #1 Control		
Fan #2 Control		BP
Gas Dischrge	IN	
Gas Dischrge	OUT	
Difference		SP
Fan #1 Control		
Fan #2 Control		

AVERAGES L	R	OVERALL	AVERAGES L	R	OVERALL	AVERAGE

Engine Oil	IN	PreTurbine	EX
Engine Oil	OUT	PostTurbine	EX
Turbo Lube Oil		Exhaust	Stack

Fuel Supply

E2 :UVCGI.INHIB.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

DATE - 10-12-89

STATION 02

ENGINE 02 OPERATION DATA

TIOGA STORAGE

'Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Lr 1 Step	0
Horsepower	4285 BHp
Engine Speed:	
Actual	331 RPM
Set Point	0 %
Engine Torque:	
Actual	100 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12546 RPM

Air Manifold Pressure 37.6 "Hg

GAS FLOW

Suction Header	1
Suction Press	663
Dschrge Header	2
Dschrge Press	1615
----Pumping Capacity---	
Minimum(MMCFD)	61
Maximum(MMCFD)	101
--------Fuel Usage-------	
Pressure(PSI)	96
Differ("H20)	78
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	40 %

E2 :UVCGI.INHIB.

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-12-89
16:15 PM

STATION 02

ENGINE 02 TEMPERATURE (F) DATA

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		CYLINDER HEADS Right		FUEL VALVES Left		FUEL VALVES Right		COMPRESSOR DISCHARGES	
1	624	1	569	1	91	1	94	1	200
2	635	2	650	2	89	2	89	2	193
3	593	3	587	3	85	3	88	3	192
4	589	4	657	4	88	4	88	4	192
5	613	5	609	5	91	5	89		

AVERAGES		AVERAGES		AVERAGE
L 610	R 614	L 88	R 89	194
OVERALL 612		OVERALL 88		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	118	SP
After Water OUT	141	
Difference	-23	
Fan #1 Control	17	100%
Fan #2 Control	17	BP
Jacket Water IN	153	
Jacket Water OUT	159	160
Difference	-6	SP
Fan #1 Control	30	100%
Fan #2 Control	30	SP
Gas Dischrge IN	195	
Gas Dischrge OUT	109	100
Difference	86	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

Engine Oil IN	156	PreTurbine EX	719	Fuel
Engine Oil OUT	168	PostTurbine EX<<<<		Supply
Turbo Lube Oil	166	Exhaust Stack	39	70

E2 :UVCGI.INHIB.

0 OFF NORMAL C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

STATION 02

ENGINE 02 OPERATION DATA

ALM 3 15:49:53
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4284	BHp
Engine Speed:		
Actual	330	RPM
Set Point	0	%
Engine Torque:		
Actual	103	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed	12556	RPM

Air Manifold Pressure 37.7 "Hg

GAS FLOW

Suction Header	1
Suction Press	665
Dschrge Header	2
Dschrge Press	1615
----Pumping Capacity---	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
-------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	73
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	<<<< %
Turbo Bypass	40 %

E2 :UVCGI.INHIB.

0 OFF NORMAL C

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 15:50:34
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	625	1	571	1	91	1	95	1	199
2	636	2	649	2	89	2	89	2	190
3	595	3	585	3	85	3	88	3	192
4	591	4	657	4	88	4	89	4	193
5	614	5	612	5	91	5	89		

AVERAGES		AVERAGES		AVERAGE
L 612	R 614	L 88	R 90	193
OVERALL 613		OVERALL 89		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	119	SP
After Water OUT	141	
Difference	-22	
Fan #1 Control	19	100%
Fan #2 Control	19	BP
Jacket Water IN	154	
Jacket Water OUT	160	160
Difference	-6	SP
Fan #1 Control	35	100%
Fan #2 Control	35	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	110	100
Difference	85	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

Engine Oil IN	156	PreTurbine EX	721	Fuel	
Engine Oil OUT	169	PostTurbine EX<<<<		Supply	
Turbo Lube Oil	167	Exhaust Stack	40	71	

!E2 :UVCGI.INHIB.
ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 0 OFF Eng Menu NORMAL C MainMenu

10-12-89

TATION 02 ENGINE 02 OPERATION DATA ALM 3 15:14:54
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4230 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	101 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12546 RPM

Air Manifold Pressure 37.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	663
Dschrge Header	2
Dschrge Press	1615
----Pumping Capacity---	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
--------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	77
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	%
Turbo Bypass	39 %

.EIA :#OCTIME.ERROR.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM MainMenu C

TATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 15:15:24

TIOGA STORAGE

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	624	1	570	1	89	1	92	1	199
2	635	2	649	2	88	2	88	2	192
3	595	3	586	3	85	3	86	3	192
4	589	4	655	4	86	4	87	4	192
5	613	5	611	5	89	5	88		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	118	SP
After Water OUT	141	
Difference	-23	
Fan #1 Control	18	100%
Fan #2 Control	18	BP
Jacket Water IN	154	
Jacket Water OUT	159	160
Difference	-5	SP
Fan #1 Control	34	100%
Fan #2 Control	34	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	109	100
Difference	86	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

AVERAGES
L 611 R 614
OVERALL 612

AVERAGES
L 87 R 88
OVERALL 87

AVERAGE
193

Engine Oil IN 156
Engine Oil OUT 168
Turbo Lube Oil 165

PreTurbine EX 719
PostTurbine EX<<<<
Exhaust Stack 37

Fuel Supply
69

E1A :#OCTIME.ERROR.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM C MainMenu

10-12-89

TATION 02

ENGINE 02 OPERATION DATA

ALM 3 15:15:09
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4324 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	100 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed 12508 RPM

Air Manifold Pressure 37.1 "Hg

GAS FLOW

Suction Header	1
Suction Press	662
Dschrge Header	2
Dschrge Press	1617
---Pumping Capacity--	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
--------Fuel Usage--------	
Pressure(PSI)	95
Differ("H2O)	76
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	39 %

E1A :#OCTIME.ERROR.

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM MainMenu C

TATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 15:15:43

TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	624	1	569	1	89	1	94	1	199
2	635	2	649	2	89	2	87	2	192
3	595	3	588	3	83	3	86	3	192
4	590	4	655	4	86	4	87	4	192
5	613	5	611	5	89	5	87		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	118	SP
After Water OUT	141	
Difference	-23	
Fan #1 Control	18	100%
Fan #2 Control	18	BP
Jacket Water IN	153	
Jacket Water OUT	160	160
Difference	-7	SP
Fan #1 Control	34	100%
Fan #2 Control	34	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	109	100
Difference	86	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

AVERAGES
L 611 R 614
OVERALL 612

AVERAGES
L 87 R 88
OVERALL 87

AVERAGE
193

Engine Oil IN 156
Engine Oil OUT 168
Turbo Lube Oil 165

PreTurbine EX 720
PostTurbine EX<<<<
Exhaust Stack 37

Fuel Supply
69

E1A :#OCTIME.ERROR.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM C MainMenu

10-12-89

STATION 02

ENGINE 02 OPERATION DATA

ALM 3 14:48:12
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4206 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	103 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12556 RPM

Air Manifold Pressure 37.6 "Hg

GAS FLOW

Suction Header	1
Suction Press	662
Dschrge Header	2
Dschrge Press	1615
----Pumping Capacity---	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
---------Fuel Usage-------	
Pressure(PSI)	96
Differ("H2O)	78
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	<<< %
Turbo Bypass	37 %

!E1A :#OCTIME.ERROR.

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM MainMenu C

STATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 14:48:57

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	624	1	569	1	89	1	94	1	199
2	632	2	647	2	89	2	87	2	192
3	592	3	586	3	85	3	86	3	192
4	589	4	654	4	86	4	87	4	192
5	611	5	609	5	89	5	87		

AVERAGES		AVERAGES		AVERAGE
L 609	R 613	L 87	R 88	193
OVERALL 611		OVERALL 87		

Engine Oil IN	154	PreTurbine EX	719	Fuel	
Engine Oil OUT	168	PostTurbine EX	<<<<	Supply	
Turbo Lube Oil	166	Exhaust Stack	26	68	

TIOGA STORAGE

Temperature Control Fans		
Air Manifold	120	120
After Water IN	117	SP
After Water OUT	141	
Difference	-24	
Fan #1 Control	16	100%
Fan #2 Control	16	BP
Jacket Water IN	152	
Jacket Water OUT	160	160
Difference	-8	SP
Fan #1 Control	36	100%
Fan #2 Control	36	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	108	100
Difference	87	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

'E1A :#OCTIME.ERROR.

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM C MainMenu

10-12-89

STATION 02 ENGINE 02 OPERATION DATA ALM 3 14:48:33

TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4195	BHp
Engine Speed:		
Actual	330	RPM
Set Point	0	%
Engine Torque:		
Actual	101	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed	12551	RPM

Air Manifold Pressure 37.6 "Hg

GAS FLOW

Suction Header	1
Suction Press	662
Dschrge Header	2
Dschrge Press	1615
----Pumping Capacity--	
Minimum(MMCFD)	61
Maximum(MMCFD)	101
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	74
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	<<< %
Turbo Bypass	38 %

'E1A :#OCTIME.ERROR.

1 ON ALARM C

:learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

STATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 14:49:15
TIOGA STORAGE

CYLINDER		POWER CYLINDERS HEADS		FUEL VALVES		COMPRESSOR DISCHARGES	
Left		Right		Left	Right		
1	624	1	569	1 89	1 94	1	199
2	632	2	647	2 88	2 88	2	192
3	592	3	588	3 85	3 86	3	192
4	589	4	653	4 86	4 85	4	192
5	611	5	610	5 89	5 88		

AVERAGES	AVERAGES	AVERAGE
L 609 R 613	L 87 R 88	193
OVERALL 611	OVERALL 87	

Temperature Control Fans		
Air Manifold	120	120
After Water IN	117	SP
After Water OUT	140	
Difference	-23	
Fan #1 Control	16	100%
Fan #2 Control	16	BP
Jacket Water IN	152	
Jacket Water OUT	160	160
Difference	-8	SP
Fan #1 Control	36	100%
Fan #2 Control	36	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	109	100
Difference	86	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

Engine Oil IN	154	PreTurbine EX	719	Fuel			
Engine Oil OUT	168	PostTurbine EX	<<<<	Supply			
Turbo Lube Oil	166	Exhaust Stack	36	68			

!E1A :#OCTIME.ERROR.

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM C MainMenu

10-12-89 ALM 3 14:12:06
TIOGA STORAGE

'ATION Ø2

ENGINE Ø2 OPERATION DATA

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	4285 BHp
Engine Speed:	
Actual	332 RPM
Set Point	Ø %
Engine Torque:	
Actual	1ØØ %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	12530 RPM

Air Manifold Pressure 37.5 "Hg

GAS FLOW

Suction Header	1
Suction Press	661
Dschrge Header	2
Dschrge Press	1614
---Pumping Capacity--	
Minimum(MMCFD)	6Ø
Maximum(MMCFD)	1Ø1
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	77
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	46
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	2Ø
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	35 %

.J1A :#OCTIME.ERROR.

1 ON ALARM C

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10 - 12 - 89

TATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 14:14:12 TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	624	1	569	1	87	1	92	1	199
2	633	2	649	2	86	2	86	2	192
3	592	3	583	3	82	3	85	3	192
4	588	4	653	4	85	4	85	4	192
5	611	5	609	5	87	5	86		

AVERAGES
L 609 R 612
OVERALL 610

AVERAGES
L 85 R 86
OVERALL 85

AVERAGE
193

Engine Oil IN 154
Engine Oil OUT 168
Turbo Lube Oil 165

PreTurbine EX 717
PostTurbine EX<<<<
Exhaust Stack 34

Fuel Supply
66

Temperature Control Fans

Air Manifold		120	120
After Water	IN	116	SP
After Water	OUT	141	
Difference		-25	
Fan #1 Control		19	100%
Fan #2 Control		19	BP
Jacket Water	IN	154	
Jacket Water	OUT	161	160
Difference		-7	SP
Fan #1 Control		37	100%
Fan #2 Control		37	BP
Gas Dischrge	IN	195	
Gas Dischrge	OUT	109	100
Difference		86	SP
Fan #1 Control		MAX	
Fan #2 Control		MAX	

I1A :#OCTIME.ERROR.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint 1 ON Eng Menu ALARM C MainMenu

10-12-89

TATION Ø2 ENGINE Ø2 OPERATION DATA ALM 3 14:12:52
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	4265 BHp
Engine Speed:	
Actual	33Ø RPM
Set Point	Ø %
Engine Torque:	
Actual	1ØØ %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	12533Ø RPM

Air Manifold Pressure 37.5 Hg

GAS FLOW

Suction Header	1
Suction Press	663
Dschrge Header	2
Dschrge Press	1613
---Pumping Capacity--	
Minimum(MMCFD)	61
Maximum(MMCFD)	1Ø1
-------Fuel Usage-----	
Pressure(PSI)	95
Differ("H2O)	76
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	2Ø
Jacket Water	12
Fuel Manifold	37

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	35 %

E1A :#OCTIME.ERROR.

1 ON ALARM C

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

TATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 14:13:32 TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	622	1	569	1	87	1	92	1	199
2	633	2	648	2	86	2	86	2	192
3	592	3	586	3	82	3	85	3	192
4	588	4	654	4	85	4	85	4	192
5	610	5	607	5	87	5	86		

AVERAGES		AVERAGES		AVERAGE
L 609	R 612	L 85	R 86	193
OVERALL 610		OVERALL 85		

Temperature Control Fans		
Air Manifold	120	120
After Water IN	117	SP
After Water OUT	141	
Difference	-24	
Fan #1 Control	19	100%
Fan #2 Control	19	BP
Jacket Water IN	154	
Jacket Water OUT	161	160
Difference	-7	SP
Fan #1 Control	37	100%
Fan #2 Control	37	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	109	100
Difference	86	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

Engine Oil IN 154	PreTurbine EX 716	Fuel					1 ON	ALARM	C
Engine Oil OUT 168	PostTurbine EX<<<<	Supply							
Turbo Lube Oil 165	Exhaust Stack 34	66							

E1A :#OCTIME.ERROR.

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10 - 12 - 89

STATION Ø2 ENGINE Ø2 OPERATION DATA ALM 3 13:46:Ø7
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	4298 BHp
Engine Speed:	
Actual	33Ø RPM
Set Point	Ø %
Engine Torque:	
Actual	1ØØ %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	12487 RPM

Air Manifold Pressure 37.2 "Hg

GAS FLOW

Suction Header	1
Suction Press	66Ø
Dschrge Header	2
Dschrge Press	1613
---Pumping Capacity--	
Minimum(MMCFD)	59
Maximum(MMCFD)	99
-------Fuel Usage------	
Pressure(PSI)	95
Differ("H2O)	74
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	46
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	<<< %
Turbo Bypass	35 %

T2A :PCYLLAVG.TEMP. 6.ØØØ9E+Ø2 DEG-F HIALRM C

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10 - 12 - 89

STATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 13:46:52 TIOGA STORAGE

POWER CYLINDERS								COMPRESSOR	
CYLINDER	HEADS		FUEL	VALVES		DISCHARGES			
Left	Right		Left	Right					
1	622	1	569	1	88	1	89	1	2Ø1
2	631	2	644	2	85	2	87	2	194
3	591	3	584	3	83	3	83	3	192
4	586	4	657	4	83	4	85	4	190
5	609	5	610	5	86	5	87		

Temperature Control Fans		
Air Manifold	121	120
After Water IN	119	SP
After Water OUT	142	
Difference	-23	
Fan #1 Control	20	100%
Fan #2 Control	20	BP
Jacket Water IN	153	
Jacket Water OUT	160	160
Difference	-7	SP
Fan #1 Control	39	100%
Fan #2 Control	39	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	108	100
Difference	87	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

AVERAGES
L 607 R 612
OVERALL 609

AVERAGES
L 85 R 86
OVERALL 85

AVERAGE
194

Engine Oil IN 153
Engine Oil OUT 168
Turbo Lube Oil 166

PreTurbine EX 719
PostTurbine EX<<<<
Exhaust Stack 34

Fuel Supply
68

'E2A :PCYLLAVG.TEMP. 6.0009E+02 DEG-F HIALRM C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

Engine Running and Loaded OPERATIONS DATA 10-12-89 13:46

ENGINE RUNNING STATUS

Control	AUTO	
Load Step	0	
Horsepower	4240	BHp
Engine Speed:		
Actual	330	RPM
Set Point	0	%
Engine Torque:		
Actual	98	%
Set Point	100	%

TURBOCHARGER STATUS

Turbine Speed	12460	RPM

Air Manifold Pressure 36.9 "Hg

GAS FLOW

Suction Header	1
Suction Press	659
Dschrge Header	2
Dschrge Press	1614
---Pumping Capacity--	
Minimum(MMCFD)	60
Maximum(MMCFD)	100
-------Fuel Usage------	
Pressure(PSI)	96
Differ("H2O)	77
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	46
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	38

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	35 %

!E2A :PCYLLAVG.TEMP. 6.0009E+02 DEG-F HIALRM C

ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

STATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 13:47:32
TIOGA STORAGE

POWER CYLINDERS CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	524	1	568	1	86	1	94	1	2Ø1
2	633	2	643	2	87	2	85	2	194
3	592	3	584	3	83	3	85	3	194
4	586	4	657	4	83	4	87	4	193
5	61Ø	5	6Ø9	5	88	5	86		

AVERAGES		AVERAGES		AVERAGE
L 6Ø9	R 612	L 85	R 87	195
OVERALL 61Ø		OVERALL 86		

Temperature Control Fans		
Air Manifold	12Ø	12Ø
After Water IN	118	SP
After Water OUT	141	
Difference	-23	
Fan #1 Control	2Ø	1ØØ%
Fan #2 Control	2Ø	BP
Jacket Water IN	154	
Jacket Water OUT	159	16Ø
Difference	-5	SP
Fan #1 Control	39	1ØØ%
Fan #2 Control	33	BP
Gas Dischrge IN	195	
Gas Dischrge OUT	1Ø8	1ØØ
Difference	87	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

Engine Oil IN 156	PreTurbine EX 719	Fuel
Engine Oil OUT 168	PostTurbine EX<<<<	Supply
Turbo Lube Oil 164	Exhaust Stack 34	68

E2A :PCYLLAVG.TEMP. 6.ØØØ9E+Ø2 DEG-F HIALRM C

Eng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10 - 12 - 89

STATION Ø2

ENGINE Ø2 OPERATION DATA

ALM 3 13:14:58
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	42Ø4 BHp
Engine Speed:	
Actual	331 RPM
Set Point	Ø %
Engine Torque:	
Actual	1ØØ %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	12422 RPM

Air Manifold Pressure 36.8 "Hg

GAS FLOW

Suction Header	1
Suction Press	658
Dschrge Header	2
Dschrge Press	1612
---Pumping Capacity--	
Minimum(MMCFD)	6Ø
Maximum(MMCFD)	99
------Fuel Usage------	
Pressure(PSI)	95
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	46
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	2Ø
Jacket Water	12
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	37 %

E2A :PCYLLAVG.TEMP. 6.ØØØ9E+Ø2 DEG-F HIALRM C

earSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10 - 12 - 89

STATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 13:16:19 TIOGA STORAGE

CYLINDER HEADS Left		Right		POWER CYLINDERS FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	624	1	572	1	87	1	92	1	2ØØ
2	633	2	647	2	86	2	86	2	193
3	595	3	589	3	83	3	85	3	193
4	588	4	655	4	85	4	86	4	193
5	611	5	61Ø	5	88	5	87		

AVERAGES		AVERAGES		AVERAGE
L 61Ø	R 614	L 85	R 87	194
OVERALL 612		OVERALL 86		

Engine Oil IN	154	PreTurbine EX	717	Fuel
Engine Oil OUT	167	PostTurbine EX<<<<		Supply
Turbo Lube Oil	164	Exhaust Stack	3Ø	66

Temperature Control Fans		
Air Manifold	121	12Ø
After Water IN	119	SP
After Water OUT	141	
Difference	-22	
Fan #1 Control	15	1ØØ%
Fan #2 Control	15	BP
Jacket Water IN	154	
Jacket Water OUT	16Ø	16Ø
Difference	-6	SP
Fan #1 Control	45	1ØØ%
Fan #2 Control	45	BP
Gas Dischrge IN	196	
Gas Dischrge OUT	1Ø8	1ØØ
Difference	88	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

!E2A :PCYLLAVG.TEMP. 6.ØØØ9E+Ø2 DEG-F HIALRM C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

STATION Ø2

ENGINE Ø2 OPERATION DATA

ALM 3 13:15:39
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	41Ø3 BHp
Engine Speed:	
Actual	331 RPM
Set Point	Ø %
Engine Torque:	
Actual	1ØØ %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	124Ø6 RPM

Air Manifold Pressure 36.3 "Hg

GAS FLOW

Suction Header	1
Suction Press	659
Dschrge Header	2
Dschrge Press	1612
---Pumping Capacity--	
Minimum(MMCFD)	6Ø
Maximum(MMCFD)	1ØØ
-------Fuel Usage------	
Pressure(PSI)	95
Differ("H2O)	79
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	47
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	20
Jacket Water	12
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen	[illegible] %
Turbo Bypass	37 %

'E2A :PCYLLAVG.TEMP. 6.0009E+Ø2 DEG-F HIALRM C

learSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

STATION 02 ENGINE 02 TEMPERATURE (F) DATA ALM 3 13:16:59 TIOGA STORAGE

CYLINDER		POWER CYLINDERS HEADS		FUEL VALVES		COMPRESSOR DISCHARGES	
Left		Right		Left	Right		
1	624	1	568	1 87	1 94	1	200
2	633	2	647	2 86	2 86	2	193
3	593	3	592	3 83	3 85	3	193
4	588	4	657	4 85	4 86	4	193
5	610	5	609	5 88	5 87		

AVERAGES		AVERAGES		AVERAGE
L 609	R 614	L 85	R 87	194
OVERALL 611		OVERALL 86		

Engine Oil IN	154	PreTurbine EX	717	Fuel	
Engine Oil OUT	167	PostTurbine EX	<<<<	Supply	
Turbo Lube Oil	165	Exhaust Stack	30	68	

Temperature Control Fans		
Air Manifold	121	120
After Water IN	119	SP
After Water OUT	141	
Difference	-22	
Fan #1 Control	15	100%
Fan #2 Control	15	BP
Jacket Water IN	154	
Jacket Water OUT	161	160
Difference	-7	SP
Fan #1 Control	46	100%
Fan #2 Control	46	BP
Gas Discharge IN	186	
Gas Discharge OUT	187	100
Difference	89	SP
Fan #1 Control	MAX	
Fan #2 Control	MAX	

E2A :PCYLLAVG.TEMP.

6.0009E+02 DEG-F HIALRM C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

STATION 02 ENGINE 02 OPERATION DATA

Engine Running and Loading

ENGINE RUNNING STATUS

Control	AUTO
Load Site	[illegible]
Horsepower	1174 BHp
Engine Speed:	
Actual	330 RPM
Set Point	[illegible]
Engine Torque:	
Actual	[illegible]
Set Point	[illegible]

TOP DEHYDRATOR STATUS

[illegible] Speed	[illegible] RPM

[illegible]

GAS FLOW

Suction Header	[illegible]
Suction Press	[illegible]
Dschrge Header	[illegible]
Dschrge Press	[illegible]
---Pumping Capacity---	
Minimum(MMCFD)	[illegible]
Maximum(MMCFD)	[illegible]
---Fuel Usage---	
Pressure(PSI)	[illegible]
Differ(H2O)	[illegible]
Flowrate(MCFH)	[illegible]

PRESSURE [illegible]

Engine Lube [illegible]	[illegible]
Fuel Filter	[illegible]
Fuel Strainer	[illegible]
Turbo Oil	[illegible]
Jacket Water	[illegible]
Fuel Manifold	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

10-12-89

STATION 02 — ENGINE 02 TEMPERATURE (F) DATA — [illegible] 12:45:5[illegible] — TIOGA STORAGE

POWER CYLINDERS								COMPRESSOR		Temperature Control		
CYLINDER HEADS				FUEL VALVES				DISCHARGES				
Left		Right		Left		Right				Air Manifold	119	103
										After Water IN	117	SP
1	[illegible]	1	558	1	97	1	92	1	200	After Water OUT	142	
2	[illegible]	2	544	2	95	2	95	2	193	Difference	-23	
3	590	3	571	3	93	3	95	3	193	Fan #1 Control	[illegible]	100%
4	587	4	[illegible]	4	93	4	95	4	192	Fan #2 Control	[illegible]	SP
5	605	5	607	5	97	5	95					
										Jacket Water IN	15[illegible]	
										Jacket Water OUT	158	150
AVERAGES				AVERAGES				AVERAGE		Difference	-7	SP
L 587		R 612		L 95		R 97			194	Fan #1 Control	[illegible]	100%
OVERALL 600				OVERALL 96						Fan #2 Control	[illegible]	SP

Engine Oil IN 154	PreTurbine EX 715	Fuel	Gas Dischrge IN	195	
Engine Oil OUT [illegible]	PostTurbine EX [illegible]	Supply	Gas Dischrge OUT	106	100
[illegible] Lube Oil 154	Exhaust Stack 29	[illegible]	Difference	89	SP
			Fan #1 Control	[illegible]	
			Fan #2 Control	[illegible]	

[illegible] AVG. TEMP. 6.0209E+02 DEG-F [illegible]

[illegible] Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu Mainten[illegible]

10-12-89

STATION Ø2

ALM 3 12:49:14
TIOGA STORAGE

ENGINE Ø2 OPERATION DATA

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	Ø
Horsepower	4236 BHp
Engine Speed:	
Actual	33Ø RPM
Set Point	Ø %
Engine Torque:	
Actual	99 %
Set Point	1ØØ %

TURBOCHARGER STATUS

Turbine Speed	12395 RPM

Air Manifold Pressure 36.7 "Hg

GAS FLOW

Suction Header	1
Suction Press	656
Dschrge Header	2
Dschrge Press	1612
---Pumping Capacity--	
Minimum(MMCFD)	6Ø
Maximum(MMCFD)	1ØØ
------Fuel Usage-----	
Pressure(PSI)	95
Differ("H2O)	77
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	46
PreOil Filter	53
PreOil Strainer	52
Turbo Oil	3Ø
Jacket Water	12
Fuel Manifold	36

MISCELLANEOUS

IgnitionTiming	7
Exhaust Oxygen<<<<	%
Turbo Bypass	42 %

E2A :PCYLLAVG.TEMP.
ClearSDs Eng Temp StaYardA StaYardB Sta Mode SetPoint 6.0009E+02 DEG-F Eng Menu HIALRM C MainMenu

10-12-89

STATION Ø2 ENGINE Ø2 TEMPERATURE (F) DATA ALM 3 12:47:37 TIOGA STORAGE

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	622	1	57Ø	1	87	1	92	1	2ØØ
2	631	2	644	2	86	2	86	2	193
3	592	3	592	3	82	3	85	3	193
4	585	4	655	4	85	4	85	4	192
5	6Ø9	5	6Ø7	5	87	5	86		

AVERAGES
L 6Ø7 R 613
OVERALL 61Ø

AVERAGES
L 85 R 86
OVERALL 85

AVERAGE
194

Engine Oil IN 152
Engine Oil OUT 166
Turbo Lube Oil 163

PreTurbine EX 715
PostTurbine EX<<<<
Exhaust Stack 29

Fuel Supply
68

Temperature Control Fans

Air Manifold		121	12Ø
After Water	IN	119	SP
After Water	OUT	139	
Difference		-2Ø	
Fan #1 Control		15	1ØØ%
Fan #2 Control		15	BP
Jacket Water	IN	152	
Jacket Water	OUT	158	16Ø
Difference		-6	SP
Fan #1 Control		37	1ØØ%
Fan #2 Control		37	BP
Gas Dischrge	IN	196	
Gas Dischrge	OUT	1Ø7	1ØØ
Difference		39	SP
Fan #1 Control		MAX	
Fan #2 Control		MAX	

'E2A :PCYLLAVG.TEMP. 6.ØØØ9E+Ø2 DEG-F HIALRM C

ng Oper Sta Misc StaYardA StaYardB Sta Mode SetPoint Eng Menu MainMenu

10-12-89

TATION 02 ENGINE 02 OPERATION DATA ALM 3 12:11:16
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4296 BHp
Engine Speed:	
Actual	330 RPM
Set Point	0 %
Engine Torque:	
Actual	98 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12444 RPM

Air Manifold Pressure [illegible] Hg

GAS FLOW

Suction Header	1
Suction Press	656
Dschrge Header	2
Dschrge Press	1613
----Pumping Capacity--	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
-------Fuel Usage-------	
Pressure(PSI)	94
Differ("H2O)	73
Flowrate(MCFH)	33

PRESSURES (PSI)

Engine Lube Oil	[illegible]
PreOil Filter	[illegible]
PreOil Strainer	[illegible]
Turbo Oil	[illegible]
Jacket Water	[illegible]
Fuel Manifold	[illegible]

MISCELLANEOUS

Ignition Timing	[illegible]
Exhaust Oxygen	[illegible]
Turbo Bypass	[illegible]

[illegible] :MPSYSP.000 PRINTER 0 FAULT 0 NORMAL 3

Gas Bus Eng Temp StaYardn StaYardB Sta Mode SetPoint Eng Menu [illegible]

10-12-89

STATION 62 ENGINE 02 TEMPERATURE (F) DATA ALM 3 12:12:06

POWER CYLINDERS

CYLINDER HEADS Left		Right		FUEL VALVES Left		Right		COMPRESSOR DISCHARGES	
1	613	1	565	1	87	1	91	1	201
2	624	2	635	2	86	2	86	2	193
3	583	3	577	3	85	3	85	3	193
4	575	4	548	4	85	4	86	4	193
5	599	5	600	5	87	5	86		

AVERAGES
L 598 R 605
OVERALL 601

AVERAGES
L 86 R 86
OVERALL 86

AVERAGE
195

Engine Oil IN 151 Preturbine EX 704 Fuel
Engine Oil OUT 150 Postturbine EX 710 Supply
Turbo Lube Oil 150 Manual Stack 56 1

Temperature Control Fans

Air Manifold	20	20
After Water IN	119	HP
After Water OUT	138	
Difference	-19	
Fan #1 Control	17	100%
Fan #2 Control	15	HP
Jacket Water IN	160	
Jacket Water OUT	167	160
Difference	-7	SP
Fan #1 Control	35	100%
Fan #2 Control	35	HP
Gas Discharge IN	192	
Gas Discharge OUT	104	100
Difference	91	SP
Fan #1 Control	64	
Fan #2 Control	41	

PM [illegible] PRINTER 0 FAULT 0 NORMAL G
Up Uper Sta Misc StaYardA StaYardS Sta Mode SetPoint Eng Menu Mainmenu
2-OCT-89 12:13:39.72 E2A :FCYLLAVG.TEMP. 6.0000E+02 DEG-F HEALTH C

10-12-89

STATION 62 ENGINE 02 OPERATION DATA ALM [illegible]
TIOGA STORAGE

Engine Running and Loaded

ENGINE RUNNING STATUS

Control	AUTO
Load Step	0
Horsepower	4183 BHp
Engine Speed:	
Actual	331 RPM
Set Point	0 %
Engine Torque:	
Actual	98 %
Set Point	100 %

TURBOCHARGER STATUS

Turbine Speed	12417 RPM

[illegible] Manifold Pressure 37.2 [illegible]

GAS FLOW

Suction Header	1
Suction Press	659
Dschrge Header	2
Dschrge Press	1612
----Pumping Capacity----	
Minimum(MMCFD)	61
Maximum(MMCFD)	102
------Fuel Usage------	
Pressure(PSI)	94
Differ("H2O)	75
Flowrate(MCFH)	32

PRESSURES (PSI)

Engine Lube Oil	[illegible]
Pre Oil Filter	[illegible]
Pre Oil Strainer	[illegible]
Turbo Oil	[illegible]
Jacket Water	[illegible]
Fuel Manifold	[illegible]

MISCELLANEOUS

Ignition Timing	[illegible]
Exhaust Oxygen	[illegible]
Turbo Bypass	[illegible]

E2A [illegible] TEMP. 6.000RE-02 SEC-- [illegible]

Loads	Eng Temp	StaYardA	StaYardB	Sta Mode	SetPoint	Eng Mode	[illegible]

10-12-89

STATION 02 ENGINE 02 TEMPERATURE (F) DATA FLM 3 12:12:45

TIOGA STORAGE

POWER CYLINDERS						COMPRESSOR	
CYLINDER HEADS			FUEL	VALVES		DISCHARGES	
Left		Right	Left	Right			
1	414	1	562	1	87	1	92	1	201
2	428	2	537	2	86	2	88	2	193
	534	3	580	3	83	3	85	3	193
4	578	4	560	4	86	4	86	4	193
5	579	5	601	5	87	5	88		

Temperature Control Fans			
Air Manifold		120	123
After Water	IN	112	SP
After Water	OUT	102	
Difference		-10	
Fan #1 Control		15	100%
Fan #2 Control		15	SP
Jacket Water	IN	150	
Jacket Water	OUT	152	152
Difference		2	SP
Fan #1 Control		12	100%
Fan #2 Control		0	SP
Gas Discharge	IN	105	
Gas Discharge	OUT	101	103
Difference		-4	SP
Fan #1 Control		35	
Fan #2 Control		35	

AVERAGES		AVERAGES		AVERAGE
L 500	R 505	L 85	R 87	175
SPECIAL 503		SPECIAL 86		

Engine Oil	IN 152	Precurtains	EX 200	Fuel
Engine Oil	OUT 154	PostDarkene	EX 200	Supply
Turbo Lube Oil	136	Exhaust Stack	75	75

ESC:PESILF16.12MF.

DO Upper	TE Rise	Generator	GtsYards	Sta Mode	SetPoint	Eng Pent	Command	6.0007e+02	DEG-F	HIGHSPEED