

Commonwealth of Pennsylvania
Environmental Resources
June 1, 1992

Subject: Source Test Review

To: Data File
Transcontinental Gas Pipe Line Corporation (TRANSCO)
Station 515
Bear Creek Township, Luzerne County

From: William Schneider *WS*
Air Pollution Control Engineer
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Through: Chief, Source Testing and Monitoring Section *CS?*

TRANSCO operates a 11,604 HP Solar natural gas fired turbine and the No. 5 3400 HP Cooper 10V-250 natural gas fired reciprocating engine. A clean burn retrofit was recently installed on the engine.

Permit 41-328-001 required an emission evaluation of the engine before and after the retrofit and an emission evaluation of the turbine in the same season as the post-retrofit engine test. Scott Environmental conducted post-retrofit tests on 1/7/92 (engine and turbine) and on 1/21/92 (engine after adjustments were made). The turbine was evaluated for NO_x (Method 7E and 20) and CO (Method 10) in the exhaust of a 92 inch square duct. The engine was additionally tested for non-methane hydrocarbons (Method 25A and Method 18) in the exhaust of a 35.5 inch ID stack. A pretest protocol was approved by the Department. All tests are acceptable to the Department, with the following comments:

1. An incorrect equation was used to convert total hydrocarbon concentration to dry conditions. Using the correct equation did not change any reported values listed in this report.
2. The 1/21/92 values for CO were not corrected for CO_2 as required by Method 10. The CO data was recalculated by me.

June 1, 1992

The following results were extracted from the test report:

Mars Turbine (1/7/92)

		Run 1	Run 2	Run 3
CO	ppm	6.1	5.3	3.1
	ppm @ 15% O ₂	6.1	5.2	3.0
	lb/hr	1.96	1.66	0.97
NO _x	ppm	140.2	142.9	142.8
	ppm @ 15% O ₂	140.2	140.5	140.0
	lb/hr	74.15	73.69	73.53
NMHC	ppm	0.0	6.6	0.0
	ppm @ 15% O ₂	0.0	6.5	0.0
	lb/hr	0.00	1.19	0.00

Engine 5 (1/7/92)

		Run 1	Run 2	Run 3
CO	ppm	110.6	107.0	106.8
	ppm @ 15% O ₂	104.7	101.3	102.1
	lb/hr	6.78	6.47	6.36
NO _x	ppm	266.0	316.0	327.0
	ppm @ 15% O ₂	251.9	299.3	312.7
	lb/hr	26.80	31.40	31.99

Engine 5 (1/21/92)

		Run 1	Run 2	Run 3
CO*	ppm	117.3	129.7	129.4
	ppm @ 15% O ₂	130.6	131.9	125.2
	lb/hr	9.10	9.34	8.85
NO _x	ppm	85.1	73.1	77.4
	ppm @ 15% O ₂	94.7	74.4	74.9
	lb/hr	10.84	8.85	8.69

*corrected by me

Process data is available with the report.

cc: File No. 40-328-001
 Jim Parette, Northeast Regional Office
 Krishnan Ramamurthy, A&C
 EPA/RSL
 Reading File - Source Testing

WBS:djg

**Transcontinental Gas
Pipe Line Corporation**
A Teco Energy company

2800 Post Oak Boulevard
P. O. Box 1396
Houston, Texas 77251-1396
713-439-2000

FEDERAL EXPRESS

March 19, 1992

Mr. Jim Parette
Commonwealth of Pennsylvania
Dept. of Environmental Resources
Bureau of Air Quality Control
Cross Valley Center
667 North River Street
Wilkes-Barre, Pennsylvania 18705

Re: Test Results for Turbine Addition
and Clean Burn Conversion at
Station 515, Bear Creek, Luzerne County, PA
Permit No. 40-328-001

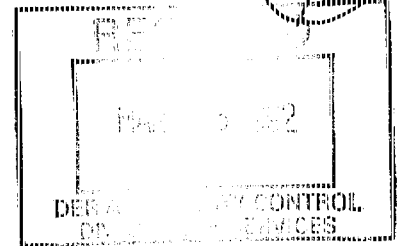
Dear Mr. Parette:

Enclosed herewith Transcontinental Gas Pipe Line Corporation (TGPL) is providing you with two copies of the Emission Test Report for the Solar Mars Turbine and associated Clean Burn Conversion (Unit #5) at Station 515. The report was prepared by Scott Environmental Technology for stack testing conducted on January 7 and 21, 1992. Also, enclosed under separate cover, please find operating logs for both the turbine and the Clean Burn engine, which contain data on operating parameters monitored during testing.

The existing Unit #5 is an Cooper 10V-250, 3400 HP, natural gas-fired reciprocating engine. The unit was converted to a "clean burn" engine to offset emission increases associated with the addition of the new Solar Mars natural gas-fired turbine, the latter being a peaking unit (operations not to exceed 100 days/Y) at Station 515.

Please be advised that Solar Turbines, Inc. has revised its guaranteed emission rates for the Mars turbine. The new guaranteed rates are 79.3 lbs/hr for NO_x, 5.8 lbs/hr for CO and 1.6 lbs/hr for UHC. The new rates are more conservative than original estimates and reflect operation of the turbine at colder ambient temperatures. The new rates can be considered the maximum not to be exceeded.

The turbine tested well below the manufacturer's revised guaranteed emission rates, 73.8 lbs/hr for NO_x (vs. 79.3 lbs/hr guaranteed), 1.5 lbs/hr for CO (vs. 5.8 guaranteed) and 0.4 lbs/hr for UHC (vs. 1.6 guaranteed). The Clean Burn engine also tested well below the manufacturer's guaranteed emission rates, 9.4 lbs/hr for NO_x (vs. 29.9 lbs/hr guaranteed) and 9.3 lbs/hr for CO (vs. 15.0 guaranteed).



SCOTT ENVIRONMENTAL TECHNOLOGY
10000 WILSON ROAD
SUITE 100
DALLAS, TEXAS 75243
(214) 343-1100

AIR QUALITY

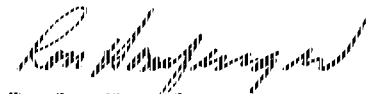
Based on these and earlier actual stack test data, TGPL is taking the liberty of resubmitting two tables (see attachments) which were contained in its original permit application of July 16, 1990, in order to quantify expected changes in emissions from Station 515. Table 2-5 shows existing emissions, i.e. emissions before addition of the turbine and Clean Burn Conversion, which is revised to incorporate actual stack test data on Unit #5 in the pre-conversion state (testing conducted by Scott Environmental on 7-24-91). Table 2-6 shows emissions after modifications, which is revised to incorporate the results of the latest test data.

As indicated in Table 2-6, based on historical operations, TGPL anticipates a net annual reduction in NO_x emissions of 241.9 T/Y from the Station.

TGPL assumes that the reduction, as documented herein, will be available to it in the form of increased operating hours for the new turbine addition or offset credits toward future development as provided by Title 25 of Rules and Regulations, §127.67, "Conditions for banking of emission offsets". TGPL would appreciate receiving instructions from you if additional documentation requirements are applicable.

Please contact me if you have questions (713-439-2335).

Very truly yours,



R. L. Honefenger
Staff Engineer

RLH/mpa

Enclosure

cc: Director
Air, Toxic and Radiation Division
U.S. EPA, Region III
841 Chestnut Street
Philadelphia, PA 19107

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SECTION

AIR QUALITY
SECTION

Transcontinental Gas Pipe Line Corporation
Station 515

TABLE 2-5 (Revised) Existing Emissions
(i.e. before any modifications)

Emission Source	Manufacturer	Emission Rates (lb/hr)			Expected Hrs/Yr	Expected Emissions (Tons/Yr)		
		NO _x	CO	UHC		NO _x	CO	UHC
#1	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#2	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#3	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#4	Cooper	176.6	4.6	3.8	3954	349.1	9.1	7.5
#5	Cooper	176.6	4.6	3.8	3954	349.1	9.1	7.5
Existing (Before Modifications)						1845.4	49.7	38.7

Emission rates shown for sources #1, #2 and #3 (all three being Cooper GMWC-10, 3,400 HP engines) are taken from "Compilation of Emissions Data for Stationary Reciprocating Gas Engines and Gas Turbines in Use by the Natural Gas Pipeline Transmission Industry," Southwest Research Institute, Project PR-15-613, May 1968. Emission rates for sources #4 and #5 (both being Cooper 10V-250, 3,400 HP engines) are revised based on actual stack testing on Unit #5, which was conducted at Station 515 by Scott Environmental Technology, Inc. on July 24, 1991.

DATE: 08/20/92 BY: JH
 PROJECT: 92-001
 DRAWING: 92-001-01

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AIR QUALITY

Transcontinental Gas Pipe Line Corporation
Station 515

TABLE 2-6 (Revised) Emissions After Turbine
Replacement/Clean Burn Conversion of Unit #5

Emission Source	Manufacturer	Emission Rates (lb/hr)			Expected Hrs/Yr	Expected Emissions (Tons/Yr)		
		NO _x	CO	UHC		NO _x	CO	UHC
#1	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#2	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#3	Cooper	193.4	5.3	4.0	3954	382.4	10.5	7.9
#4	Cooper	176.6	4.6	3.8	3954	349.1	9.1	7.5
#5	Cooper ("Clean Burn")	9.4	9.3	4.5	3954	18.6	18.4	9.1
#6	Solar	73.8	1.5	0.4	2400	88.6	1.8	0.5
After Modifications						1603.5	60.8	40.8
Before Modifications						1845.4	49.7	38.7
Net Increase (or Decrease)						(241.9)	11.1	2.1

The emission rates shown above are based on the same stack test data and assumptions developed for Table 2-5.
Emission rates shown for sources #5 and #6 are based on actual stack testing conducted by Scott Environmental on
January 7 and 21, 1992.

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AIR QUALITY

TRANSCONTINENTAL GAS PIPE LINE CORPORATION

STATION 515

BEAR CREEK, PA

MONITORING OF TURBINE OPERATING PARAMETERS

FOR

AIR EMISSIONS TESTING

UNIT: SOLAR MARK TURBINE

DATE: JANUARY 7, 1992

07 MAR 20 PM 02 23
UNIT 515
STATION 515
BEAR CREEK, PA

AIR QUALITY

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Time	2:45	3:00	3:15	3:30	3:45	4:00
Ambient Temp.	30	30	30			
Ambient Pressure	28.74	28.74	28.74			
Relative Humidity						
Power Turbine Inlet Temp. T-5	1292	1292	1291	1290	1290	1293
Exhaust Air Flow Rate	101.5	101.3	101.5	101.6	101.3	101.5
Fuel Flow Rate						
% Gas Turbine Speed - ACP	98.2	97.9	98.1	98.1	98.2	98.3
% Power Turbine Speed - APT	93.6	93.4	93.6	93.6	93.5	93.2
Turbine Air Comp Discharge Press. P-6	197.3	196.1	197.4	197.5	197.7	197.6

Date 1-2-92

Date

Time	Suction #	Discharge #	Flow	Suction #	Discharge #	Flow
8 AM						
9 AM	727	925	762			
10 AM	725	943	746			
11 AM	705	929	746			
12 Noon	693	936	733			
1 PM	710	951	730			
2 PM	725	989	730			
3 PM	742	1039	724			
4 PM	764	1064	710			
5 PM						
6 PM						
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11 PM						
12 AM						
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4 AM						
5 AM						
6 AM						
7 AM						

Remarks: 1-2-92-7:40 AM Turbine on line for emission testing/3 recip

162 hrs on mtg / 162:00 hours to log per one recip

3:45 PM Test complete - hours to log given digitalis count

up 3 units - 5 total

Daily Log for Turbine Compressor

	8 AM	10 AM	12 ¹⁵ PM	2 PM	4 PM	6 PM	8 PM
1							
2	MC P %	97.2	98.3	98.1	98.1		
3	NPT %	92	94.3	94.3	93.7		
4	Engine - T1 Temp	36	35.7	36.5	36		
5	Engine - T5 Air Temp	1287	1291	1289	1290		
6	Engine PCO sig	196	199	197	198		
7	Lube System Header Temp.	98.2	109.9	111.3	110.4		
8	Lube System Header Temp.	37	37	36.7	36.6		
9	Compressor Suction Pressure	750	705	701	725		
10	Compressor Discharge Temp.	81	82	81.6	85		
11	Compressor Discharge Pressure	999	993	999	999		
12	Drains	187	194	195	194		
13	Drains	129	138	140	139		
14	Drains	129	139	140	139		
15	Drains	129	139	140	139		
16	Drains	129	139	140	139		
17	Drains	129	139	140	139		
18	Drains	129	139	140	139		
19	Drains	129	139	140	139		
20	Drains	129	139	140	139		
21	Drains	129	139	140	139		
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27	Drains	129	139	140	139		
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LOCATION OF PROBES	8 AM Y/X	10 AM Y/X	12 PM Y/X	2 PM Y/X	4 PM Y/X	6 PM Y/X	8 PM Y/X	10 PM Y/X
ACCESSORY GEARBOX	2.6	2.3	2.4	2.4				
#1 BEARING GAS PRODUCER	284 / .159	270 / .171	254 / .163	244 / .166				
#2 BEARING GAS PRODUCER	109 / .915	99 / 1.040	91 / 1.051	91 / 1.038				
#3 BEARING POWER TURB.	1358 / 1.165	1442 / 1.282	1451 / 1.177	1482 / 1.270				
#4 BEARING POWER TURB.	260 / .219	263 / .264	262 / .272	261 / .248				
#5 BEARING POWER TURB.	463 / .393	451 / .451	420 / .430	381 / .403				
COMPRESSOR FORWARD	619 / .479	591 / .567	574 / .593	561 / .493				
COMPRESSOR AFT	426 / .515	444 / .531	376 / .527	363 / .518				
COMPRESSOR AXIAL	-2.7	-1.1	-1.0	-1.0				

[illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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TRANSCONTINENTAL GAS PIPE LINE CORPORATION

STATION 515

BEAR CREEK, PA

MONITORING OF CLEAN BURN ENGINE OPERATING PARAMETERS

PCOL

AIR EMISSIONS TESTING

UNIT: CLEAN BURN CONVERSION (UNIT #5)

DATE: JANUARY 21, 1992

Reading Recorded
from Computer

Air Emission Testing / Monitoring of
#5 Main Unit - Clean Burn Conversion

DATE 1-21-72
Sta. 515

Time	9:35 A	9:50	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00
Torque	99.8	100.7	100.5	101	99.2	99.1	100.3	100.1	100.3	100.4	100
Horsepower - BHP	3394	3437	3416	3434	3385	3384	3437	3403	3424	3412	3405
RPM	250	250	250	250	250	250	250	250	250	250	250
Bucket Step Number	4	4	4	5	4	5	4	4	4	4	4
Section Header Pressure	752	749	745	744	743	741	736	735	732	730	725
Diack Header Pressure	1010	1010	1009	1008	1006	1004	998	996	994	992	987
Ambient Temp	25	26.3	26.4	27.4	28.4	28.4	29.2	28.8	30.9	31.0	30.3
Ambient Pres. Hg											
Units on line	124	124	124	124	124	124	124	124	124	124	
ATW.	1038										

Remarks

Oper. in Local Auto Control
Ignition Timing 4° BTDC / Power Supply 24 VDC
Operator

~~SECRET~~

[illegible]

Remarks	Panel in Local	Auto Control	Power Supply on/off
Ignition Timing	4-875C	/	operator

John Carter

4. Mission Testing / Marking of

[illegible]

<u>Remarks</u>	<u>Ignition Timing</u>	<u>Air to Control</u>	<u>Power Supply</u>	<u>Oil/Water</u>
Dwell in Local	4-6 TDC	/	/	/
operator	operator			

Headings
 Headed From
 Page 4 of 4

Air Emission Testing / Monitoring of
 #5 Main Unit - Clean Run Conversion

1/21/92

Time	8:00 AM	8:15 AM	8:30 AM	8:45 AM	9:00 AM	9:15 AM	9:30 AM	9:45 AM	10:00 AM	10:15 AM	10:30 AM
Eng. RPM	250	250	250	250	250	250	250	250	250	250	250
Turbo RPM	1235	1240	1235	1235	1240	1240	1240	1245	1250	1240	1240
Before Turbo Temp	628°	630°	630°	625°	630°	630°	630°	635°	630°	630°	630°
Cyl Exhaust Temp	640° / 550°	645° / 550°	645° / 550°	645° / 550°	645° / 550°	645° / 550°	645° / 580°	650° / 550°	645° / 550°	645° / 550°	645° / 550°
Scavenging Air Manifold Temp Left & Right	86° / 84°	84° / 84°	86° / 84°	87° / 85°	87° / 85°	88° / 86°	89° / 88°	89° / 87°	89° / 88°	90° / 90°	90° / 90°
Turbo By-Pass Valve Position	2	2	2	2	2	2	2	2	2	2	2
Exhaust Back Pressure (inches Hg)	18	18	18	17.5	18	18	18	17.5	18	18	17.5
Scavenging Air Manifold Pressure (inches Hg)	23.5	24	23.5	23.5	23.5	23.5	24.0	23.5	23.5	23.5	23.5
Fuel Line Pressure Before & After Gov	40/47	40/46	40/46	39/46	39/46	39/46	39/46	40/46	39/46	39/46	39/46

Notes: Turbo By-Pass Scale 1-10 (10 is open)

Panel in local Control Room Supply 24 inch DC Note: Turbo By-Pass out of position

Remarks: Panel in local Control Room Supply 24 inch DC operator OK

~~$\frac{N}{S}$~~ [illegible]

STATION 615 ENGINE SUMMARY

09:33:53
01/21/92

REC'DS HU #1-85

SUCT BPPAS DISCH
VALVE VALVE VALVE

W/	MODE	STATUS	% TORQ	RPM	RPM	FUEL	FLOW	STEP	VALVE	VALVE	VALVE
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
2	LOCAL	ONLINE	101.1	3355	246	0.0	249	6	OPEN	CLOSED	OPEN
3	LOCAL	ONLINE	99.0	3364	249	0.0	248	7	OPEN	CLOSED	OPEN
4	MANUAL	ONLINE	60.3	2401	232	0.0	185	15	OPEN	CLOSED	OPEN
5	LOCAL	ONLINE	101.1	3431	239	0.0	260	4	OPEN	CLOSED	OPEN

THIS LOCATION IS UNDER STATION CTRL AND IS FLOWING EAST TO MARKET

STA SUCT PRES 754 STA DISCH PRES 1009 STA FLOW 1004 START AIN 202

STATION 515 HOURLY REPORT

JAN 21/92 09:08

STA SUOT. PRESS. : 745
SUCTION TEMP. : 37
SUCTION HP : 26263
STATION HP : 26263
FUEL RATE : 2.8382

STA DISCH. PRESS. : 1528
DISCHARGE TEMP. : 83
STATION FLOW : 178
STA COMP. RATIO : 1.3465

M/V STATUS

AVERAGE VALUES

M/V	MODE	STATUS	TORQUE	BHP	RPM	FT3/ BHP-HR	FLOW MMSOFT	STEP NO.
-----	------	--------	--------	-----	-----	----------------	----------------	----------

1	LOCAL AUTO	AVAILABLE	0	0	0	0.00	0	16
2	LOCAL AUTO	ON-LINE	100	3377	248	0.00	256	7
3	LOCAL AUTO	ON-LINE	100	3388	248	0.00	254	8
4	MANUAL	ON-LINE	81	1288	235	0.00	187	15
5	LOCAL AUTO	ON-LINE	100	3416	250	0.00	261	4

AVERAGE VALUES

M/V	MODE	STATUS	BHP	FT3/ BHP-HR	FLOW MMSOFT
-----	------	--------	-----	----------------	----------------

5	LOCAL AUTO	ON-LINE	12312	74.81	662
---	------------	---------	-------	-------	-----

STATION CONTROL MODE IS PERCENT HORSEPOWER SET POINT
SURGE SPEED CONTROL IS INACTIVE

AMBIENT TEMP : 26.4 DEG F
PERCENT HP SET : 100 %HP DISC PRESS SET : 1528 PSIG FLOW SET : 0 MMSOFT

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

STATION 615 ENGINE SUMMARY

09/29/93
01/21/92

RECIPS NO 41-85

SUC PIPES DISCH
SUC VALVE OPEN CLOSED
SUC VALVE OPEN CLOSED

R/U	MODE	STATUS	% TORQ	RHP	RPM	FUEL	FLOW	STEP	VALVE	VALVE	DISCH
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
2	LOCAL	ON LINE	100.0	3306	247	0.0	241	7	OPEN	CLOSED	OPEN
3	LOCAL	ON LINE	99.3	3348	249	0.0	237	8	OPEN	CLOSED	OPEN
4	MANUAL	ON LINE	99.7	2492	232	0.0	188	15	OPEN	CLOSED	OPEN
5	LOCAL	ON LINE	99.1	3364	236	0.0	244	4	OPEN	CLOSED	OPEN

THIS LOCATION IS UNDER STATION CTRL AND IS FLOWING EAST TO MARKET

STA SUC PIPES 742 STA DISCH PIPES 1006 STA FLOW 1755 STA START AIR 242

STATION 515 HOURLY REPORT

Jan 21/92 19:09

STA SHOT PRESS.	737	PSIG	STA DISCH. PRESS.	998	PSIG
SUCTON TEMP.	37	DEGT	DISCHARGE TEMP.	83	DEGT
STATION HP	25268	HP	STATION FLOW	1749	MG/SEC
FUEL RATE	2.9456	FT3/HR	STA COMP RATIO	1.3477	

M/O STATUS

AVERAGE VALUES

M/O	MODE	STATUS	TORQUE	BHP	HPH	FT3/HR	FLOW	STEP NO.
							MG/SEC	

1	LOCAL AUTO	AVAILABLE	0	0	0	0.00	0	16
2	LOCAL AUTO	ON-LINE	101	3388	247	0.00	241	7
3	LOCAL AUTO	ON-LINE	09	3355	248	0.00	237	7
4	MANUAL	ON-LINE	01	2612	229	0.00	182	15
5	LOCAL AUTO	ON-LINE	100	3309	250	0.00	245	4

TURBINE STATUS

AVERAGE VALUES

M/O	MODE	STATUS	BHP	FT3/HR	FLOW
					MG/SEC

6	LOCAL AUTO	ON-LINE	12619	74.58	646
---	------------	---------	-------	-------	-----

STATION CONTROL MODE IS PERCENT HONSEPOWER SET POINT

SURGE SPEED CONTROL IS INACTIVE

AMBIENT TEMP : 28.2 DEG-F

PERCENT HP OPT : 100 ZHP DISC. PRESS SPT : 1005 PSIG FLOW SPT : 5 MG/SEC

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

STATION 615 ENGINE SUMMARY

10:30:24
01/21/92

REC'DS MU #1-45

END	MODE	STATUS	% TORQ	SWP	RRR	FUEL	FLOW	STP	VALVE	SWCT	SWP45	DISCH	DISCH
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED		
2	LOCAL	ON_LINE	100.1	0007	249	0.0	037	7	OPEN	CLOSED	OPEN		
3	LOCAL	ON_LINE	100.3	0009	240	0.0	036	7	OPEN	CLOSED	OPEN		
4	REMOVED	ON_LINE	79.0	0779	056	0.0	100	13	OPEN	CLOSED	OPEN		
5	LOCAL	ON_LINE	100.4	0000	250	0.0	040	4	OPEN	CLOSED	OPEN		

THIS LOCATION IS UNDER STATION CTRL AND IS RUNNING EAST TO MARKET

SWCT PRES 701 STA DISCH PRES 993 STA FLOW 1754 START AIR 049

STATION 515 HOURLY REPORT

Jan 21/82 11:59

STA SUOT. PRESS.	725	PSIG	STA DISCH. PRESS.	889	PSIG
SUCTION TEMP.	37	DEG F	DISCHARGE TEMP.	84	DEG F
STATION HP	26538	HP	STATION FLOW	1743	MMSCFD
FUEL RATE	2.6627	FT3/BHP	STA COMP RATIO	1.3668	

M/O STATUS

AVERAGE VALUES

M/O	MODE	STATUS	TORQUE	BHP	RPM	FT3/ BHP-HR	FLOW MMSCFD	STEP NO.
-----	------	--------	--------	-----	-----	----------------	----------------	----------

1	LOCAL AUTO	AVAILABLE	0	0	0	0.00	0	16
2	LOCAL AUTO	ON-LINE	100	3379	248	0.00	238	7
3	LOCAL AUTO	ON-LINE	100	3392	248	0.00	237	7
4	HANDAL	ON-LINE	00	2653	244	0.00	189	16
5	LOCAL AUTO	ON-LINE	100	3493	265	0.00	243	4

TURBINE STATUS

AVERAGE VALUES

M/O	MODE	STATUS	BHP	FT3/ BHP-HR	FLOW MMSCFD
-----	------	--------	-----	----------------	----------------

6	LOCAL AUTO	ON-LINE	12037	74.35	839
---	------------	---------	-------	-------	-----

STATION CONTROL MODE IS PERCENT HORSEPOWER SET POINT

SURGE SPEED CONTROL IS INACTIVE

AMBIENT TEMP : 36.3 DEG-F

PERCENT HP SET : 100 %HP DISC PRESS SET : 1005 PSIG FLOW SET : 0 MMSCFD

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

STATION 616 ENGINE SUMMARY

11:34:27
01/21/92

REPORTS HU #1-45

F/N	MODE	STATUS	% TORQ	RMP	RPM	TUEL	TLOH	STEP	SUOT		
									VALUE	VALUE	VALUE
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
2	LOCAL	ON LINE	100.1	3309	247	0.0	233	7	OPEN	CLOSED	OPEN
3	LOCAL	ON LINE	100.6	3406	248	0.0	233	7	OPEN	CLOSED	OPEN
4	MANUAL	ON LINE	79.3	2779	254	0.0	193	15	OPEN	CLOSED	OPEN
5	LOCAL	ON LINE	100.6	3406	250	0.0	230	4	OPEN	CLOSED	OPEN

THIS LOCATION IS UNDER STATION CTRL AND IS FLOWING EAST TO MARKET

STA SUOT PRES 723 STA DISCH PRES 909 STA FLOW 1730 STAT AIB 240

STATION 515 HOURLY REPORT

Jan 21/92 12:08

STA SUOT. PRESS.	725	PSIG	STA DISCH. PRESS.	1225	PSIG
SUCTION TEMP.	37	DEGF	DISCHARGE TEMP.	86	DEGF
STATION HP	25779	HP	STATION FLOW	1889	MG/HR
FUEL RATE	2.8747	FT3/HR	STA COMP. RATIO	1.3772	

M/O STATUS

AVERAGE VALUES

M/O MODE

STATUS

STORAGE BHP

GEN BHP

FT3/HR

MG/HR

STEP NO.

1	LOCAL AUTO	AVAILABLE	5	5	5	5.55	5	15
2	LOCAL AUTO	ON-LINE	1225	3378	248	5.55	232	8
3	LOCAL AUTO	ON-LINE	1225	3386	248	5.55	231	8
4	MANUAL	ON-LINE	88	2748	254	5.55	182	15
5	LOCAL AUTO	ON-LINE	1225	3405	250	5.55	238	8
TURBINE STATUS								
AVERAGE VALUES								
M/O	MODE	STATUS	BHP	FT3/HR	MG/HR	FLOW	MG/HR	STEP NO.
5	LOCAL AUTO	ON-LINE	12795	74.22	636			

STATION CONTROL MODE IS PERCENT HENSEPOWER SET POINT

SURGE SPEED CONTROL IS INACTIVE

AMBIENT TEMP : 36.0 DEG-F

PERCENT HP SET : 100 BHP DISC. PRESS. SET : 1225 PSIG FLOW SET : 5 MG/HR

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

STATION 615 ENGINE SUMMARY

12:38:49
01/21/92

REPORTS TO #1-#5

R/N	MODE	STATUS	% TORQ	RHP	RPM	FUEL	FLOW	STEP	SUCT			PRESS			DISCH		
									VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED						
2	LOCAL	ON_LINE	101.1	3065	252	0.0	011	10	OPEN	CLOSED	OPEN						
3	LOCAL	ON_LINE	101.3	3401	249	0.0	012	10	OPEN	CLOSED	OPEN						
4	REVERSAL	ON_LINE	03.0	2524	220	0.0	100	10	OPEN	CLOSED	OPEN						
5	LOCAL	ON_LINE	100.2	3400	249	0.0	016	0	OPEN	CLOSED	OPEN						

THIS LOCATION IS UNDER STATION CTRL AND IS FLOWING EAST TO MARKET

STA SUCT PRESS 733 STA DISCH PRESS 1000 STA FLOW 1041 STA START AIR 240

STATION 615 ENGINE SUMMARY

12/26/49
01/21/52

REVIEWS NO #1-#5

NO	MODE	STATUS	% TORQ	RPM	RPM	FUEL	FLOW	STEP	SHUT		
									VALVE	WIPAS	DISCH
1	LOCAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
2	MANUAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
3	MANUAL	AVAILABLE	0.0	0	0	0.0	0	16	CLOSED	OPEN	CLOSED
4	MANUAL	AVAILABLE	0.0	0	1	0.0	0	15	CLOSED	OPEN	CLOSED
5	LOCAL	ON LINE	100.4	3414	250	0.0	245	7	OPEN	CLOSED	OPEN

THIS LOCATION IS UNDER STATION CTRL AND IS FLOWING EAST TO MARKET

STA SHUT PRESS 774 STA DISCH PRESS 1666 STA FLOW 1115 START AIR 2500

STATION 515 HOURLY REPORT

Jan 21/92 13:09

STA GGT. PRESS.	788	PSIG	STA DISCH. PRESS.	1883	PSIG
SUCTION TEMP.	39	DEGF	DISCHARGE TEMP.	84	DEGF
STATION HP	15587	HP	STATION FLOW	1119	MG/HR
FUEL RATE	4.4537	FT3/HRP	STA COMP RATIO	1.3424	

AVERAGE VALUES

H/O	MODE	STATUS	FLOW				STEP NO.
			STORAGE	BHP	RTM	FT3/HRP	

1	LOCAL AUTO	AVAILABLE	0	0	0	0.00	0	15
2	MANUAL	AVAILABLE	99	2753	246	0.00	213	15
3	MANUAL	AVAILABLE	99	2832	243	0.00	211	15
4	MANUAL	AVAILABLE	82	1649	228	0.00	188	15
5	LOCAL AUTO	ON-LINE	155	3397	255	0.00	228	8

AVERAGE VALUES

H/O	MODE	STATUS	BHP	FT3/HRP	FLOW	MG/HR	MG/HR
-----	------	--------	-----	---------	------	-------	-------

5	LOCAL AUTO	ON-LINE	13582	74.15	873		
---	------------	---------	-------	-------	-----	--	--

STATION CONTROL MODE IS PERCENT HORSEPOWER SET POINT

GURGE SPEED CONTROL IS INACTIVE

AMBIENT TEMP : 31.7 DEG-F

PERCENT HP SET : 155 ZRP DISC. PRESS SET : 1285 PSIG FLOW SET : 0 MG/HR

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

STATION 515 HOURLY REPORT

Jan 21/82 14:00

STA SHOT. PRESS.	820	PSIG	STA DISCH. PRESS.	1162	PSIG
SUCTION TEMP.	38	DEG F	DISCHARGE TEMP.	83	DEG F
STATION HP	15280	HP	STATION FLOW	1194	MG/HR
FUEL RATE	4.3041	FT3/HR	STA COMP RATIO	1.3285	

W/O STATUS

W/O	MODE	STATUS	TORQUE	HP	RPM	FT3/HR	FLOW	STEP NO.
-----	------	--------	--------	----	-----	--------	------	----------

1	LOCAL AUTO	AVAILABLE	0	0	0	0.00	0	16
2	MANUAL	AVAILABLE	0	0	0	0.00	0	16
3	MANUAL	AVAILABLE	0	0	0	0.00	0	16
4	MANUAL	AVAILABLE	0	0	0	0.00	0	15
5	LOCAL AUTO	ON-LINE	99	3324	280	0.00	261	9

TURBINE STATUS

W/O	MODE	STATUS	HP	FT3/HR	FLOW
-----	------	--------	----	--------	------

5	LOCAL AUTO	ON-LINE	12184	67.39	881
---	------------	---------	-------	-------	-----

STATION CONTROL MODE IS PERCENT HORSEPOWER SET POINT
 SURGE SPEED CONTROL IS INACTIVE
 AMBIENT TEMP : 32.2 DEG F
 PERCENT HP SET : 100 HP DISC. PRESS SET : 1005 PSIG FLOW SET : 0 MG/HR

>>> THIS STATION IS CURRENTLY FLOWING EAST TO MARKET AND IS UNDER STATION CONTROL <<<

SET 1490-01-0392-215

AIR QUALITY

92 MAR 20 PM 12:28

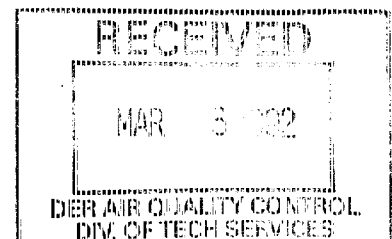
SCOTT ENVIRONMENTAL TECHNOLOGY
A DIVISION OF NATIONAL AIR NETWORK, INC.
PLUMSTEADVILLE, PENNSYLVANIA 18949

EMISSION TEST REPORT FOR
TRANSCONTINENTAL GAS PIPE LINE CORP.
STATION NUMBER 515
BEAR CREEK, PENNSYLVANIA

Prepared for:

Mr. Ron Honefanger
Staff Engineer
Transcontinental Gas Pipe Line Corporation
2800 Post Oak Boulevard
P.O. Box 1396
Houston, Texas 77251

March 1992



SCOTT ENVIRONMENTAL TECHNOLOGY
A Division of National Air Network, Inc.
Plumsteadville, Pennsylvania 18949

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SET 1490-01-0392-215

1.0 INTRODUCTION

The Transcontinental Gas Pipe Line Corporation (Transco) of Houston, Texas received a construction permit from the Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Air Quality (PADER). Permit number 41-328-001 was issued January 28, 1992 for construction of a 13,604 HP Solar Mars natural gas fired turbine and the installation of a clean burn retrofit on an existing 3400 HP Cooper 10V-250 natural gas fired reciprocating engine. The permit required an emissions evaluation of the reciprocating engine before and after the clean burn retrofit. It also required that the turbine and engine post retrofit emission evaluations be conducted within the same season.

Scott Environmental Technology performed an emissions evaluation of the Solar Mars turbine, and the #5 reciprocating engine at the Transco Station 515 located in Bear Creek, Pennsylvania. The purpose of the test program conducted on January 7-8, 1992 was to quantify emissions of certain criteria pollutants from the turbine and the retrofitted #5 reciprocating engine. Triplicate one hour tests were conducted on each source while operating at 100% load (normal operation). In agreement with PADER officials and Transco personnel, no tests were conducted at reduced load points, because each source is normally operated at maximum capacity.

SET 1490-01-0392-215

An additional series of triplicate tests were conducted on January 21, 1992 to quantify emission from the exhaust of the #5 reciprocating engine. Test results from the evaluation conducted on January 8, indicated NO_x emissions in excess of manufacturer's specifications. Engine adjustments were made prior to the reevaluation of the #5 reciprocating engine.

Transco personnel were responsible for monitoring, recording, and maintaining process conditions necessary to document the operation of each source during the test program. This data is not included in this test report, but may be obtained upon request through Transco personnel. Copies of all calculations, test results, field data, and calibration data are contained within this report.

SET 1490-01-0392-215

2.0 TEST LOCATIONS

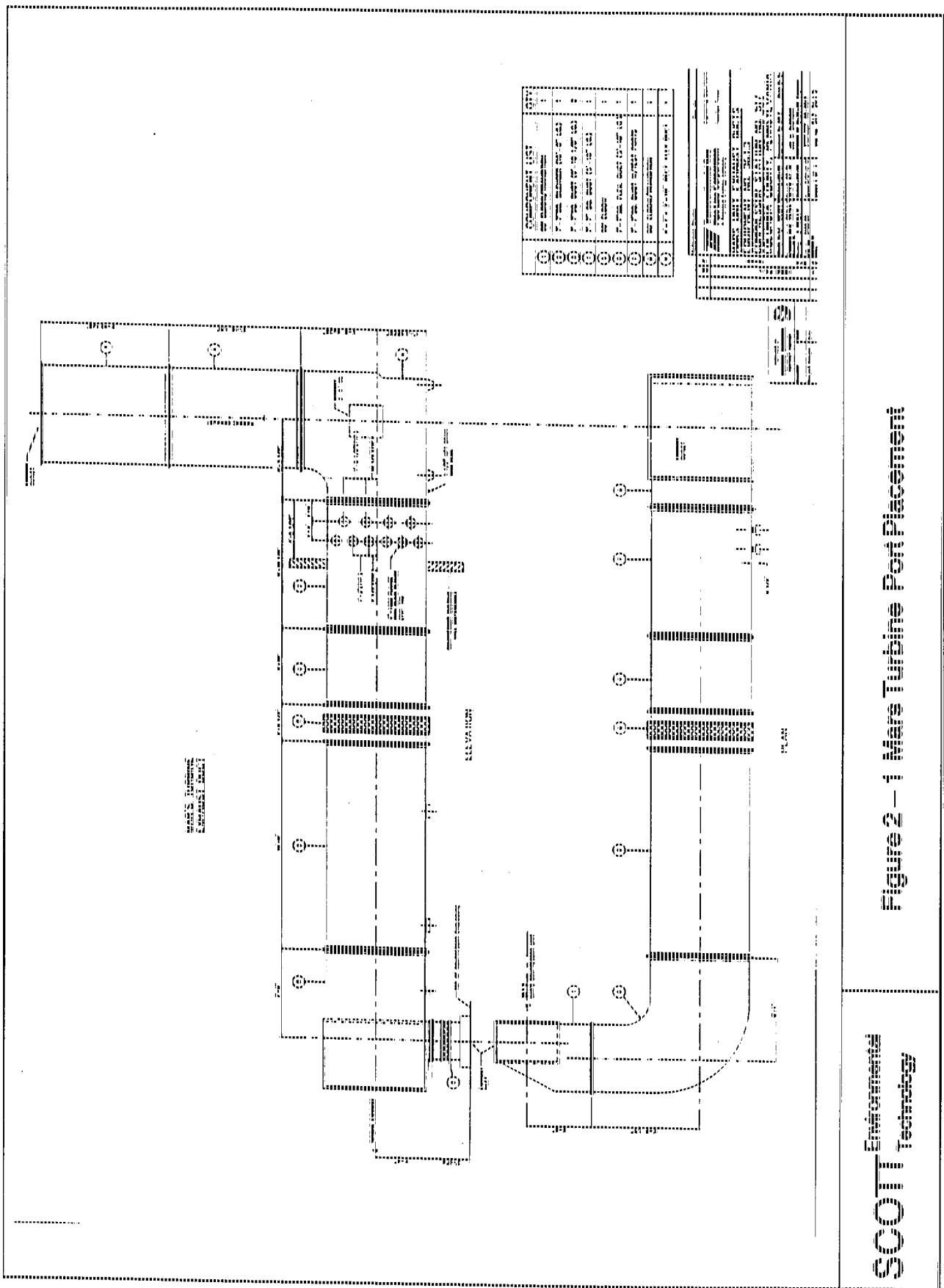
2.1 Solar Mars Turbine

The Solar Mars Turbine exhaust was equipped with a 92 inch square duct. The sample ports were located approximately 390 inches (4.2 equivalent diameters) downstream and 48 inches (0.55 equivalent diameters) upstream of the nearest flow disturbances. A total of 30 traverse points were selected due to the relatively large duct size. Placement of the four ports and five traverse points (five per port) was to allow for sampling at the centroid of each of 20 equal areas in the duct. Figures 2-1 and 2-2 present illustrations of the sample port and traverse point locations for the turbine.

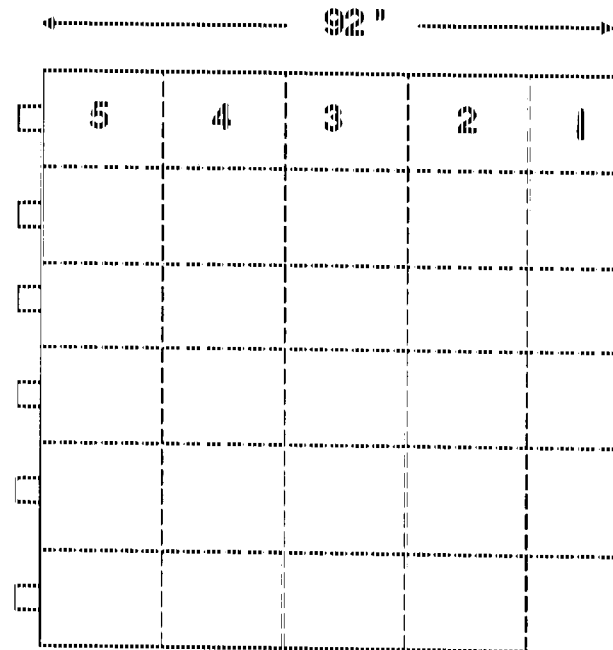
2.2 Reciprocating Engine

The Cooper 10V-250 reciprocating engine exhaust was equipped with a 35.25 inch I.D. circular stack. Two sample ports were located at 90 degree planes to each other, 75 inches (2 diameters) downstream and 21 inches (0.6 diameters) upstream of the nearest flow disturbances.

A total of 16 sample traverse points were selected. Figures 2-3 and 2-4 present illustrations of the sample port and traverse point locations for the reciprocating engine.



SET 1490-01-0392-215



TRAVERSE POINT	DISTANCE FROM BACK WALL
1	9.2"
2	27.6"
3	46.0"
4	64.4"
5	82.8"

SET 1490-01-0392-215

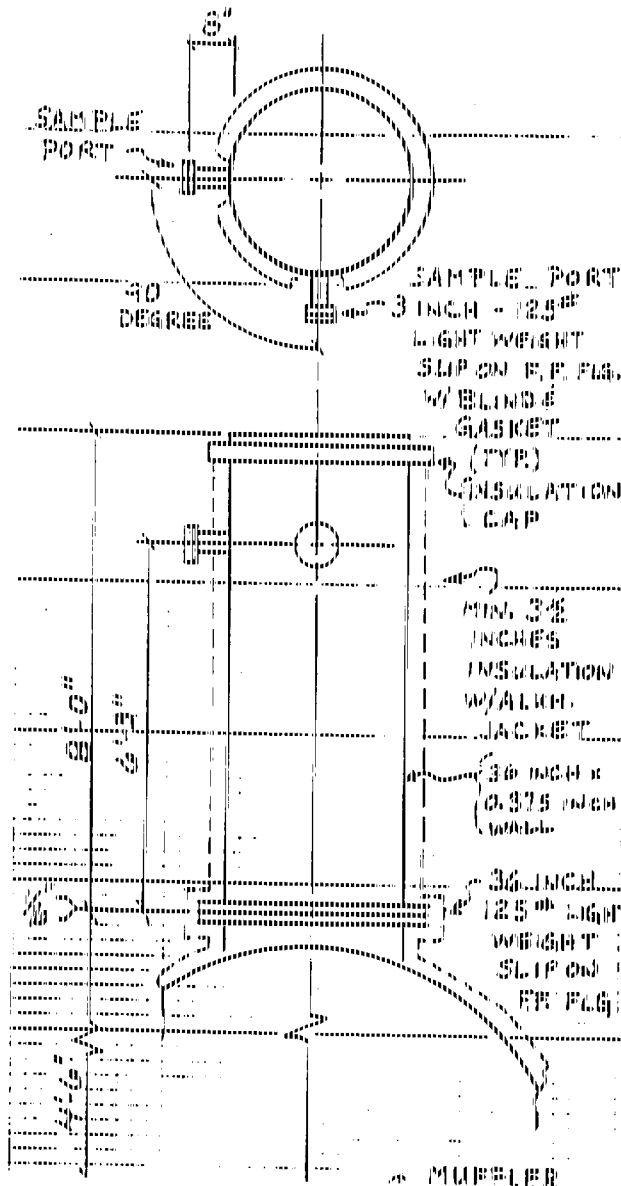
1294-104
REV. 11-91

TRANSITION/INITIAL GAS PIPE LINE CONNECTION
DATA SHEET

Subject	STATION 415 UNIT 5	Engineered by	DATE	5-22-91
Drawn by	RESEARCH ENGINEERS - PLANT ENGINEER	Location	STATION 415	
Work Order	5059-027	Calculated by	J.A. Phillips	5-22-91

SKETCH

NEW MUFFLER TAIL PIECE W/ SAMPLE PORTS



NOTES:

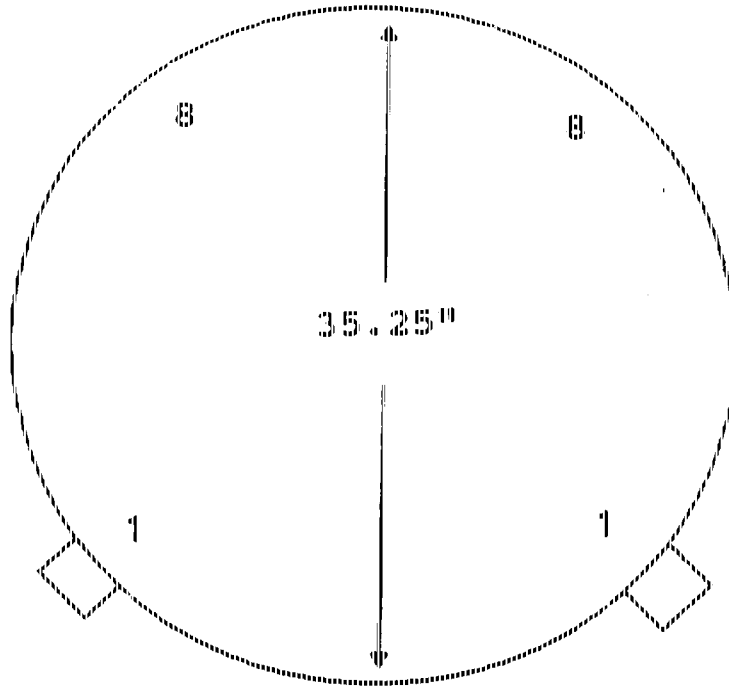
1. SAMPLE PORTS SHALL BE INSTALLED 90 DEGREES APART. PORTS SHALL BE FLUSH WITH STACK INSIDE WALL.
2. SAMPLE PORTS SHALL BE 3 INCH SCH. 40 PIPE WITH 125# FLAT FACE SLIP ON FLANGES, BLIND AND GASKET SHALL BE PROVIDED.
3. STACK INSULATION SHALL BE MINIMUM 3/4 INCHES MINIMUM JACKET.
4. EXHAUST TEMPERATURE AT 100% LOAD IS 570°F

SCOTT Environmental Technology

FIGURE 2-3

ENGINE #5 TEST PORT LOCATION

SET 1490-01-0392-215



Traverse Point Number	% of Diameter	Point Location Inches from Wall
1	3.2	1.1
2	10.5	3.7
3	19.4	6.8
4	32.3	11.4
5	67.7	23.9
6	80.6	28.4
7	89.5	31.6
8	96.8	34.1

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3.0 SAMPLING AND ANALYTICAL PROCEDURES

The procedures employed for testing followed guidelines set in the Code of Federal Regulations Title 40, Part 60, Appendix A. More specifically, the following list of US EPA Reference Methods were utilized.

Method 1	"Sample and Velocity Traverse for Stationary Sources";
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S pitot tube)";
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentration in Emission From Stationary Sources (Instrumental Analyzer Procedure)";
Method 4	"Determination of Moisture Content in Stack Gases";
Method 7E	"Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure)";
Method 10	"Determination of Carbon Monoxide Emissions From Stationary Sources";
Method 18	"Measurement of Gaseous Organic Compound Emissions by Gas Chromatography";
Method 20	"Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions From Stationary Gas Turbines";
Method 25A	"Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer".

Carbon Monoxide (CO), Nitrogen Oxides (NO_x), and Non-methane Hydrocarbon (NMHC) emissions were determined for the Solar Mars turbine. Additionally, CO, NO_x, and NMHC concentrations

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corrected to 15% oxygen were reported for the turbine. Emission concentrations and rates of CO and NO_x were determined for the #5 reciprocating engine. Sections 3.1 thru 3.7 contain a more detailed explanation of the sampling and analytical procedures.

3.1 Volumetric Flow/Moisture

Stack gas volumetric flow (ACFM, DSCFM) was determined through procedures found in EPA Reference Methods 1, 2, 3A and 4.

Prior to sampling, each stack was carefully measured to determine the actual dimensions. Stack gas velocity was measured with a detached S-type pitot tube, equipped with a type-K thermocouple for determining flue gas temperature. Stack gas temperature and velocity head pressure were recorded for each traverse point. Traverse points were determined in accordance with EPA Reference Method 1 and can be found in Figures 2-2 and 2-4 of this report.

An inclined oil manometer, with a range of 0-10 inches H₂O was attached to the S-type pitot for velocity head pressure measurements.

Flue gas moisture content was determined employing EPA Reference Method 4 procedures. Gas was extracted from the source through a stainless steel probe connected to a short 3/8" O.D. polypropylene line. The polypropylene line was connected to an EPA Method 5 type impinger train. The impinger train was immersed in

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an ice bath to enhance condensation. The net increase of water volume in the impingers, plus the net weight gain of the silica gel drying impinger, (1 gram = 1 ml) was recorded as the volume of water collected.

Velocity traverses were conducted at the beginning and end of each one hour test period. Stack gas moisture content tests were performed concurrently with each one hour test.

Pitot tubes, temperature sensing equipment, and dry gas volume meters are calibrated according to procedures outlined in EPA Reference Methods 2 and 5. Pitot tube and moisture train leak checks were conducted prior to and at the conclusion of each test, in accordance with procedures within EPA Reference Method 2 and 5.

3.2 Sample Acquisition

The gaseous pollutant analyzers were located within the Scott mobile emissions monitoring laboratory. This provided a clean climate controlled environment for the analyzers. Gas sample was extracted from the source through two 3/8" sintered metal probes and transported through 3/8" heat traced teflon sample lines.

Each probe was equipped with an out of stack three-way valve. The valves permitted the system to select stack or calibration gas through the system. A mid-point calibration gas was directed from the three-way valve through the sampling system to assure the absence of significant sampling bias. This was

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conducted for each analyzer prior to testing. Additionally, a sampling system leak check was conducted at the beginning and conclusion of each triplicate test series.

Two 3/8" sample lines are contained within the same insulated wrap. Both of the lines were connected directly to the inlet panel located on the side of the laboratory.

One line leads directly to the high temperature (190°) Flame Ionization Detector. This allows the gas to be analyzed for Total Hydrocarbons on a wet basis, and eliminates the risk of a negative bias due to condensation.

The other line is connected to the sample conditioning system. The gas is filtered to remove particulate matter and enters a refrigerated coil condenser. The sample pump exhausts the gas into a manifold. From the manifold, the sample gas stream enters a series of variable rate rotometers (one for each analyzer). A portion of the gas flows directly through a bypass rotameter to enhance the response time of the system.

All analyses, except for Total Hydrocarbons (THC's) were conducted on a dry basis.

3.3 Oxygen/Carbon Dioxide

Flue gas O_2 and CO_2 concentrations were determined instrumentally by procedures outlined in EPA Method 3A. The instruments employed were the MSA Paramagnetic Oxygen, and Beckman

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865 Non-dispersive Infrared (NDIR) CO₂ analyzers. The analyzers were calibrated with EPA Protocol 1 standard mixtures of O₂ and CO₂.

3.4 Carbon Monoxide

Flue gas CO concentration was measured with a Horiba Model AIA -23 NDIR analyzer, employing EPA Method 10 procedures. CO₂ interference was eliminated by directing the sample gas through an Ascarite/Drierite scrubber tube, prior to analysis. CO values were adjusted back to actual conditions by incorporating the simultaneous average CO₂ concentration observed. This was accomplished using equation 5-1 located within the calculations section of this report.

The CO analyzer was calibrated with EPA Protocol 1 standard mixtures. Copies of the calibration gas certificates are included in the appendices of this report.

3.5 Nitrogen Oxides

Flue gas NO_x concentration was determined under EPA Methods 7E and 20 employing a Horiba Model CLA Chemiluminescent Analyzer equipped with an NO₂ converter. The NO_x analyzer was calibrated with EPA Protocol 1 standard mixtures of NO/NO₂. Copies of the calibration gas certificates are included in the appendices of this report.

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3.6 Non-Methane Hydrocarbons

NMHC's were determined analytically by calculating the difference between total hydrocarbon and methane hydrocarbon concentrations of the flue gas.

Total hydrocarbon was determined with a high temperature (190 °C) Horiba Model FIA-34A Flame Ionization Analyzer. As mentioned previously, this analysis was conducted on a wet basis. Therefore, the values obtained from each test were adjusted back to a calculated dry basis by incorporating the simultaneous moisture tests. This was calculated applying equation 5-2 located in the calculations section of this report.

Methane (CH_4) hydrocarbon was determined on a semi-continuous dry basis with a Model 211 Carle Gas Chromatograph employing EPA Method 18 procedures. The gas chromatograph was equipped with a Flame Ionization Detector (FID) and a manually activated sample solenoid switch. Sample gas purges the sample loop when the sample solenoid is not activated. Sample injections were manually activated approximately every 5 to 6 minutes. A Spectra Physics Model SP 4290 Integrator was used to quantify peak area output from the GC-FID. Copies of all GC-FID data are included in the appendices of this report.

The average concentration of methane was calculated for each test run. The THC (dry) emission value was calculated, and the difference between THC (dry) and CH_4 emissions was reported as

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the total Non-methane Hydrocarbons.

The GC-FID and THC analyzers were calibrated with NBS traceable mixtures of methane. Copies of the calibration gas certificates are included in the appendices of this report.

3.7 Data Acquisition

An Odessa DSM 3260 data acquisition system was used to process the analog output from each of the continuous analyzers. This system converts the analyzer voltage output into engineering units based on a linear relationship between concentration and voltage output. This is accomplished via an RS-232 communication port directly connected to a portable computer. The computer enables the DSM 3260 to be programmed and records the data in a readable format. One and five minute averages were recorded during each one hour test period. The five minute averages were compiled to calculate an average concentration for each analyzer during each one hour test period. Additionally, a continuous strip chart recorder trace of each analyzers output was obtained. Copies of the recorder trace and Odessa DSM 3260 outputs are included within the appendices of this report.

Analyzer output from the evaluation conducted on January 21, 1992 was reduced manually from the strip chart due to a malfunction in the data acquisition system. Linear regression was utilized to establish an equation for each individual test parameter. The average analyzer response was obtained from the strip chart and recorded on a data sheet at two minute intervals.

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The two minute averages were compiled to form an average output value for each analyzer. These average values were applied to their respective linear equations. The mathematical equations used in the determination of average analyzer outputs are contained within Appendix C of this report.

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4.0 RESULTS

Table 4-1 summarizes the results from the emissions tests conducted on the 13,604 HP Solar Mars Turbine. There were no exceedances of the emission standards contained within the construction permit approval number 41-328-001 for the Solar Mars Turbine exhaust evaluation.

Table 4-2 summarizes the results from the January 8, 1992 evaluation conducted on the 3000 HP Cooper 10V-250 reciprocating engine #5 exhaust. The NO_x emissions exceeded the manufacturer's specification of 29.9 pounds per hour NO_x . The engine emissions were reevaluated after some adjustments.

Table 4-3 summarizes the results from the January 21, 1992 reevaluation conducted on the reciprocating engine #5. There were no exceedances of the manufacturer's specifications during reevaluation.

--1.7--

TABLE 4-1

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TRINCO STATION 515
MARS TURBINE TEST RESULTS

Date	1-07-92	1-07-92	1-07-92	AVERAGE
Run ID	RUN 1	RUN 2	RUN 3	
Start Time	1130	1250	1435	
Finish Time	1230	1350	1535	
Velocity (ft/sec)	57.04	56.77	56.66	56.82
ACFM	201,172	200,209	199,432	200,404
DSCFM	74,144	72,279	72,186	72,870
Stack Temperature(°F)	863	862	864	863
% Moisture	6.10	6.10	5.90	5.37
% O2	15.00	14.90	14.88	14.93
% CO2	3.00	2.93	2.82	2.92
POLLUTANT CONCENTRATION (ppm)				
CO	6.1	5.3	3.1	6.8
CO @ 15% O2	6.1	5.2	3.0	6.8
NOx	140.2	142.9	142.8	142.0
NOx @ 15% O2	140.2	140.5	140.0	140.2
THC	.0	6.6	.0	2.2
THC @ 15% O2	.0	6.5	.0	2.2
CH4	.0	.0	.0	.0
CH4 @ 15% O2	.0	.0	.0	.0
MMHC	.0	6.6	.0	2.2
MMHC@ 15% O2	.0	6.5	.0	2.2
POLLUTANT EMISSION (lbs./hr.)				
CO	1.96	1.66	.97	1.53
NOx	74.15	73.68	73.53	73.79
THC	.00	1.19	.00	.40
CH4	.00	.00	.00	.00
MMHC	.00	1.19	.00	.40

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TABLE 4-2

TRANSCO STATION 515
ENGINE 5 TEST RESULTS

Date	1-08-92	1-08-92	1-08-92	AVERAGE
Run ID	RUN 1	RUN 2	RUN 3	
Start Time	805	940	1055	
Finish Time	905	1040	1155	
Velocity (ft/sec)	68.73	69.53	68.90	69.05
ACFM	27,948	28,272	28,017	28,079
DSCFM	14,123	13,930	13,715	13,923
Stack Temperature (°F)	524	530	532	529
t Moisture	3.00	4.90	5.40	4.43
t O2	14.67	14.67	14.73	14.69
t CO2	3.25	3.25	3.18	3.23
POLLUTANT CONCENTRATION (ppm)				
CO	110.6	107.0	106.8	108.1
CO @ 15% O2	104.7	101.3	102.1	102.7
NOx	266.0	316.0	327.0	303.0
NOx @ 15% O2	251.9	299.3	312.7	288.0
POLLUTANT EMISSION (lbs./hr.)				
CO	6.78	6.47	6.36	6.54
NOx	26.80	31.40	31.99	30.06

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TABLE 4-3

TRANSCO STATION 515
ENGINE 5 TEST RESULTS

Date	1-21-92	1-21-92	1-21-92	AVERAGE
Run ID	RUN 1	RUN 2	RUN 3	
Start Time	1039	1252	1406	
Finish Time	1139	1352	1506	
Velocity (ft/sec)	82.85	76.96	72.95	77.59
ACPH	33,685	31,293	29,664	31,547
BSCPH	17,462	16,587	15,746	16,731
Stack Temperature(°F)	487	482	484	484
% Moisture	4.70	5.30	5.00	5.00
% O2	15.60	15.10	14.80	15.17
% CO2	2.50	2.50	2.60	2.53
POLLUTANT CONCENTRATION (ppm)				
CO	¹⁷ 150.3	^{24.7} 139.0	^{29.0} 132.9	138.7
CO @ 15% O2	^{0.6} 133.9	^{0.9} 139.9	^{1.5} 134.5	132.6
NOx	85.1	73.1	77.4	78.5
NOx @ 15% O2	96.7	74.4	74.9	81.3
POLLUTANT EMISSION (lbs./hr.)				
CO	9.33	9.58	9.09	9.33
NOx	10.34	8.65	8.69	9.40

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5.0 CALCULATION

The following calculations were used to determine the results of this emissions evaluation.

5.1 CO Adjustment for CO₂

$$CO_{(a)} = CO_{(o)} \times (100 - \% CO_{2(o)}) / 100$$

where: $CO_{(a)}$ = Carbon monoxide actual
 $CO_{(o)}$ = Carbon monoxide observed
 $\% CO_{2(o)}$ = Carbon dioxide observed

5.2 THC Adjustment to Dry Basis

$$THC_{(d)} = THC_{(o)} \times (1 + (Bws))$$

Where: $THC_{(d)}$ = Total Hydrocarbon ppmv (dry)
 $THC_{(o)}$ = Total Hydrocarbon ppmv (observed)
Bws = Moisture content of flue gas

5.3 Pollutant Concentration Adjusted to 15% O₂

$$PPM @ 15\% O_2 = ppm \times (5.9 / (20.9 - \%O_2))$$

Where: ppm = pollutant concentration
 $\%O_2$ = observed O₂ concentration

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5.4 Pollutant Emission

$$\text{lbs/hr} = (\text{ppm} \times \text{M.W.} \times \text{DSCFM} \times 60) / 387e^6$$

Where: ppm = pollutant concentration

M.W. = pollutant molecular weight

DSCFM = volumetric flow rate of flue gas

APPENDIX A
CONTINUOUS ANALYZER OUTPUT (TURBINE)

12:31:28 0007 00 TRANSC0515 01/07/92 MARS TURBINE RUN 1

	01	02	03	04	05	06	07	08
CHAN	CO	CO2	CO2	NOX	NONE	THC	NONE	NONE
UNITS	PPM	%	%	PPM	NONE	PPM	NONE	NONE
FSCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
ZERO	0.0	0.00	0.00	0.0	0.000	0	0.000	0.000
IFSCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
DP/EX	1/ 0	2/ 0	2/ 0	1/ 0	3/ 0	0/ 0	3/ 0	3/ 0
11:35	7.0	14.96	3.08	138.3	0.000	-11	0.000	0.000
11:40	6.9	14.98	3.10	138.3	0.000	-11	0.000	0.000
11:45	7.0	14.99	3.13	138.5	0.000	-11	0.000	0.000
11:50	7.2	15.00	3.14	139.2	0.000	-10	0.000	0.000
11:55	6.9	15.00	3.10	140.0	0.000	-10	0.000	0.000
12:00	7.0	15.01	3.04	140.6	0.000	-10	0.000	0.000
12:05	5.9	15.03	3.02	140.7	0.000	-10	0.000	0.000
12:10	5.3	15.03	3.01	141.0	0.000	-11	0.000	0.000
12:15	5.2	15.03	3.01	141.2	0.000	-12	0.000	0.000
12:20	5.3	15.01	2.94	141.2	0.000	-13	0.000	0.000
12:25	4.9	15.01	2.89	141.2	0.000	-11	0.000	0.000
12:30	8.2	15.01	2.85	142.5	0.000	-10	0.000	0.000
AVG=	6.4	15.00	3.03	140.2		0		

ADDED 6.1

13:52:18 0007 00 TRANSC0515 01/07/92 MARS TURBINE RUN 2

	01	02	03	04	05	06	07	08
CHAN	CO	CO2	CO2	NOX	NONE	THC	NONE	NONE
UNITS	PPM	%	%	PPM	NONE	PPM	NONE	NONE
PSCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
ZERO	0.0	0.00	0.00	0.0	0.000	0	0.000	0.000
IFSCCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
DP/EX	1/ 0	2/ 0	2/ 0	1/ 0	3/ 0	0/ 0	3/ 0	3/ 0

12:55	15.5	14.96	3.02	138.8	0.000	24	0.000	0.000
13:00	11.5	14.96	3.03	141.8	0.000	18	0.000	0.000
13:05	2.8	14.96	2.98	143.4	0.000	09	0.000	0.000
13:10	3.0	14.94	2.99	143.1	0.000	06	0.000	0.000
13:15	4.8	14.93	2.96	144.0	0.000	05	0.000	0.000
13:20	5.9	14.90	2.93	143.6	0.000	05	0.000	0.000
13:25	4.0	14.90	2.89	143.0	0.000	04	0.000	0.000
13:30	4.3	14.89	2.89	143.6	0.000	02	0.000	0.000
13:35	3.7	14.88	2.88	143.9	0.000	01	0.000	0.000
13:40	3.0	14.85	2.87	143.3	0.000	-02	0.000	0.000
13:45	3.9	14.84	2.88	143.6	0.000	-03	0.000	0.000
13:50	3.5	14.83	2.89	143.0	0.000	-05	0.000	0.000

AVG= 5.5 14.90 2.93 142.9 6.2

ADDED 5.3

ADDED 6.6

15:36:30 0007 00 TRANSC0515 01/07/92 MARS TURBINE RUN 3

	01	02	03	04	05	06	07	08
CHAN	CO	O2	CO2	NOX	NONE	THC	NONE	NONE
UNITS	PPM	%	%	PPM	NONE	PPM	NONE	NONE
FSCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
ZERO	0.0	0.00	0.00	0.0	0.000	0	0.000	0.000
IFSCL	250.0	25.00	20.00	300.0	1.000	1100	1.000	1.000
DP/EX	1/ 0	2/ 0	2/ 0	1/ 0	3/ 0	0/ 0	3/ 0	3/ 0

14:40	3.5	14.86	2.92	142.7	0.000	--08	0.000	0.000
14:45	3.5	14.88	2.93	142.7	0.000	--08	0.000	0.000
14:50	3.3	14.88	2.85	142.7	0.000	--07	0.000	0.000
14:55	3.2	14.86	2.83	142.8	0.000	--08	0.000	0.000
15:00	3.0	14.86	2.79	142.7	0.000	--08	0.000	0.000
15:05	2.9	14.88	2.75	142.7	0.000	--09	0.000	0.000
15:10	2.9	14.89	2.76	142.8	0.000	--08	0.000	0.000
15:15	2.8	14.89	2.77	143.0	0.000	--09	0.000	0.000
15:20	2.9	14.88	2.80	142.8	0.000	--09	0.000	0.000
15:25	3.5	14.88	2.83	142.7	0.000	--08	0.000	0.000
15:30	3.7	14.89	2.82	142.7	0.000	--09	0.000	0.000
15:35	3.7	14.90	2.79	143.0	0.000	--09	0.000	0.000

AVG=	3.2	14.88	2.82	142.8		0		
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AVG= 3.1

APPENDIX B

CONTINUOUS ANALYZER OUTPUT (ENGINE #5; 1-8, 92)

ENGINE 5 Run 1

09:08:00 0008 00 TRANSC0515 01/08/92

	01	02	03	04
CHAN	CO	CO2	CO2	NOX
UNITS	PPM	%	%	PPM
FSCCL	250.0	25.00	20.00	1100
ZERO	0.0	0.00	0.00	0
IFSCCL	250.0	25.00	20.00	1100
DP/EX	1/ 0	2/ 0	2/ 0	0/ 0

08:10	112.3	14.52	3.19	279
08:15	112.8	14.52	3.22	278
08:20	113.3	14.54	3.25	276
08:25	113.9	14.55	3.29	274
08:30	115.1	14.58	3.30	271
08:35	115.3	14.61	3.29	259
08:40	116.2	14.61	3.24	254
08:45	116.4	14.65	3.20	249
08:50	113.4	14.64	3.22	276
08:55	113.4	14.63	3.24	272
09:00	114.2	14.64	3.25	259
09:05	115.1	14.65	3.25	250

AVG==	114.3	14.60	3.25	266
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ADDED 115.6

ENGINE 5 RUN 2

10:44:00 0008 00 TRANSC0515 01/08/92

	01	02	03	04
CHAN	CO	CO2	CO2	NOX
UNITS	PPM	%	%	PPM
FSCL	250.0	25.00	20.00	1100
ZERO	0.0	0.00	0.00	0
IFSC	250.0	25.00	20.00	1100
DP/EX	1/ 0	2/ 0	2/ 0	0/ 0
09:45	110.9	14.65	3.22	305
09:50	110.4	14.65	3.21	307
09:55	112.3	14.65	3.27	293
10:00	112.0	14.66	3.26	291
10:05	111.9	14.68	3.28	294
10:10	110.9	14.66	3.31	306
10:15	110.1	14.65	3.36	318
10:20	110.5	14.68	3.32	324
10:25	109.8	14.69	3.23	328
10:30	110.0	14.70	3.17	331
10:35	109.8	14.70	3.18	337
10:40	109.1	14.70	3.20	352
AVG=	110.6	14.67	3.25	316
ADJUSTED	107.0			

ENGINE 5 RUN 3

11:56:51 0008 00 TRANSC0515 01/08/92

	01	02	03	04
CHAN	CO	O2	CO2	NOX
UNITS	PPM	%	%	PPM
FSCL	250.0	25.00	20.00	1100
ZERO	0.0	0.00	0.00	0
IFSC	250.0	25.00	20.00	1100
DP/EX	1/ 0	2/ 0	2/ 0	0/ 0

11:00	108.1	14.69	3.19	348
11:05	107.3	14.71	3.22	356
11:10	106.6	14.70	3.27	384
11:15	107.9	14.70	3.26	351
11:20	110.8	14.74	3.27	324
11:25	109.5	14.74	3.27	340
11:30	108.4	14.73	3.20	356
11:35	112.6	14.75	3.12	291
11:40	114.0	14.78	3.05	280
11:45	113.5	14.76	3.04	291
11:50	112.0	14.75	3.09	299
11:55	112.9	14.73	3.15	306

AVG= 110.3 14.73 3.18 327

ADJUSTED 106.8

APPENDIX C

CONTINUOUS ANALYZER OUTPUT (ENGINE #5; 1-21, 92)

1- 21-92 ENGINE 5 RUN 1

	CO	CO2	O2	NOX
RESPONSE	0	0	0	0
CHART	13	26.8	23.5	15
UNITS (x)	52	54	47.5	29.5
	96	89.5	82	75

	CO	CO2	O2	NOX
CAL GAS	0	0	0	0
VALUES (y)	30.1	5.4	6.05	149.1
	128.3	9.9	12	299
	240	17.2	20.9	746

SLOPE(m)	2.4901	0.1905	0.2545	9.9709
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PPM	120.3	2.5	15.6	85.1
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LINEAR EQUATION

CO= $y=2.4901 \cdot x + 49.6$

CO2= $y=0.11905 \cdot x + 13.2$

O2= $y=0.2545 \cdot x + 61.1$

NOX= $y=9.9709 \cdot x + 8.5$

PB-2552
29.72

CONTINUOUS ANALYZER DAILY DATA

Plant: TRANSO S/S Run: RUN 1
 Date: 1/21/92 Pollutant: CO, CO₂, CO, NOx
 Operator: ALAN LEE Sample Size: _____
 Strip Chart Analyzer Serial No.: _____
 Recorder Type: _____ Analyze Model: _____
 Inst. Span Range: _____ Output Signal Format: _____
 Span Gas Conc.: _____
 Meter/Recorder Reading: _____

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

10:35 RUN 1 ENGINE 5 1/21/92

Time	Chart	Scale	ppm	Time	Chart	Scale	ppm
HR:MIN	Reading	Factor		HR:MIN	Reading	Factor	
10:35	CO	0.1	10.0				
10:37	57	63.7	12				
39	54.5	63.7	10.5				
41	54.5	63.7	10.5				
43	54	63.7	10.5				
45	54	63.7	10.0				
47	54	63.7	10.0				
49	54	63.7	10.5				
51	54.5	63.7	10.5				
53	54	63.7	10.5				
55	54	63.7	10.5				
57	51.2	63.7	12.0				
59	52	63.7	11.5				
11:00	51.5	63.7	12.0				
02	51.5	63.7	12.0				
04	52	63.7	11.5				
06	52	63.7	12.0				
08	52	63.7	12.0				
10	51.5	63.7	12.0				
12	51	63.7	12.0				
14	52	63.7	11.0				
16	52.5	63.7	11.0				
18	52	63.7	12				
20	52	63.7	11.5				
22	52.2	63.7	11.5				
24	52	63.7	11.5				
26	52	63.7	11.0				
28	52	63.7	11.0				
30	52	63.7	11.5				
32	52	63.7	11.5				
34	51.5	63.7	11.5				
36	50.5	63.7	12				
38:0	3	1.5	3				
40:0	15	29.5	26.2				
42:0	54.5	50	22.4				



Pg = 29.74

CONTINUOUS ANALYZER DAILY DATA

Plant: TRANSCO STATION 515 Run: RUN 2
 Date: 1/21/92 Pollutant: _____
 Operator: MARACEE Sample Size: _____
 Strip Chart _____ Analyzer Serial No.: _____
 Recorder Type: _____ Analyze Model: _____
 Inlet Span Range: _____ Output Signal Format: _____
 Span Gas Conc.: _____
 Meter/Recorder Readings: _____

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

CO				CO ₂			
Time	Chart	Scale	ppm	Time	Chart	Scale	ppm
HR:MIN	Reading	Factor		HR:MIN	Reading	Factor	
00:52	5.9	16.5	10				
01	5.9	17.0	10				
02	5.9	16.5	10				
03	5.9	16.2	10.5				
04	5.9	16.5	10.0				
05	5.9	16.2	11				
06	5.9	16.2	11				
07	5.9	16.2	11				
08	5.9	16.2	11				
09	5.9	16.2	11				
10	5.9	16.2	11				
11	5.9	16.2	11				
12	5.9	16.2	11				
13	5.9	16.2	11				
14	5.9	16.2	11				
15	5.9	16.2	11				
16	5.9	16.2	11				
17	5.9	16.2	11				
18	5.9	16.2	11				
19	5.9	16.2	11				
20	5.9	16.2	11				
21	5.9	16.2	11				
22	5.9	16.2	11				
23	5.9	16.2	11				
24	5.9	16.2	11				
25	5.9	16.2	11				
26	5.9	16.2	11				
27	5.9	16.2	11				
28	5.9	16.2	11				
29	5.9	16.2	11				
30	5.9	16.2	11				
31	5.9	16.2	11				
32	5.9	16.2	11				
33	5.9	16.2	11				
34	5.9	16.2	11				
35	5.9	16.2	11				
36	5.9	16.2	11				
37	5.9	16.2	11				
38	5.9	16.2	11				
39	5.9	16.2	11				
40	5.9	16.2	11				
41	5.9	16.2	11				
42	5.9	16.2	11				
43	5.9	16.2	11				
44	5.9	16.2	11				
45	5.9	16.2	11				
46	5.9	16.2	11				
47	5.9	16.2	11				
48	5.9	16.2	11				
49	5.9	16.2	11				
50	5.9	16.2	11				
51	5.9	16.2	11				
52	5.9	16.2	11				
53	5.9	16.2	11				
54	5.9	16.2	11				
55	5.9	16.2	11				
56	5.9	16.2	11				
57	5.9	16.2	11				
58	5.9	16.2	11				
59	5.9	16.2	11				
60	5.9	16.2	11				
61	5.9	16.2	11				
62	5.9	16.2	11				
63	5.9	16.2	11				
64	5.9	16.2	11				
65	5.9	16.2	11				
66	5.9	16.2	11				
67	5.9	16.2	11				
68	5.9	16.2	11				
69	5.9	16.2	11				
70	5.9	16.2	11				
71	5.9	16.2	11				
72	5.9	16.2	11				
73	5.9	16.2	11				
74	5.9	16.2	11				
75	5.9	16.2	11				
76	5.9	16.2	11				
77	5.9	16.2	11				
78	5.9	16.2	11				
79	5.9	16.2	11				
80	5.9	16.2	11				
81	5.9	16.2	11				
82	5.9	16.2	11				
83	5.9	16.2	11				
84	5.9	16.2	11				
85	5.9	16.2	11				
86	5.9	16.2	11				
87	5.9	16.2	11				
88	5.9	16.2	11				
89	5.9	16.2	11				
90	5.9	16.2	11				
91	5.9	16.2	11				
92	5.9	16.2	11				
93	5.9	16.2	11				
94	5.9	16.2	11				
95	5.9	16.2	11				
96	5.9	16.2	11				
97	5.9	16.2	11				
98	5.9	16.2	11				
99	5.9	16.2	11				
100	5.9	16.2	11				

1-21-92 ENGINE S RUN 2

RESPONSE	CO	CO2	O2	NOX	CAL
CHART	0	0	0		0
UNITS (x)	13	26.8	23.5		15
	52	54	47.5		29.5
	96	89.5	82		75
CAL GAS	0	0	0		0
VALUES (y)	30.1	5.4	6.05		149.1
	128.3	9.9	12		299
	240	17.2	20.9		746
SLOPE(m)	2.4901	0.1905	0.2545		9.9709
PPM	133.0	2.5	15.1		73.1

LINEAR EQUATION

CO=	$y=2.4901*54.8$
CO2=	$y=0.11905*13.4$
O2=	$y=0.2545*59.3$
NOX=	$y=9.9709*7.3$

CONTINUOUS ANALYZER DAILY DATA

Plant: TRANSCO 575 Run: ENV 3
 Date: May 14, 1972 Pollutant: _____
 Operator: W. J. BAKER Sample Size: _____
 Strip Chart _____ Analyzer Serial No.: _____
 Recorder Type: _____ Analyze Model: _____
 Inac. Span Range: _____ Output Signal Format: _____
 Span Gain Conc.: _____
 Meter/Recorder Readings: _____

CALIBRATION (SCALE FACTOR/LINEAR REGRESSION, ETC.)

	CO	CO ₂	O ₂	NO _x				
	Time	Chart	Scale		Time	Chart	Scale	
	HR:MIN	Reading	Factor	PPM	HR:MIN	Reading	Factor	PPM
12	6.4	12	61.2	9				
14	5.8.7	12	61.5	10.5				
16	5.8.5	12	61.5	10.5				
18	5.8.5	12	61.5	10.6				
20	5.7.5	12.2	61.2	11				
22	5.6.7	12.2	61.2	11				
24	5.6	12.2	61.2	11				
26	5.6.5	12.2	61.2	10.5				
28	5.7	12.1	61.2	11				
30	5.7.5	12	61.1	11				
32	5.7	12	61	11				
34	5.7.5	12	61	11				
36	5.7	12	61	11				
38	5.7	16.7	61	11				
40	5.7	12	61	11.3				
42	5.7.5	16.7	61	11				
44	5.7	16.7	61	11				
46	5.7.5	16.7	61	11				
48	5.7	16.8	61	10.2				
50	5.7.5	16.3	61	10.6				
52	5.7	16.4	61	10.5				
54	5.7	16.5	61	10.5				
56	5.7	16.8	61	11				
58	5.7.5	16.2	61	11				
60	5.7	16.4	61	11				
62	5.7	16.5	61	10.6				
64	5.7	16.6	61	10.6				
66	5.7	16.6	61	10.5				
68	5.7	16.8	61	10.5				
70	5.7	17.0	61	10.5				
72	5.7	17.0	61	10.2				
74	5.7	17.0	61	10.2				
76	5.7	17.0	61	10.2				
78	5.7	17.0	61	10.2				
80	5.7	17.0	61	10.2				
82	5.7	17.0	61	10.2				
84	5.7	17.0	61	10.2				
86	5.7	17.0	61	10.2				
88	5.7	17.0	61	10.2				
90	5.7	17.0	61	10.2				
92	5.7	17.0	61	10.2				
94	5.7	17.0	61	10.2				
96	5.7	17.0	61	10.2				
98	5.7	17.0	61	10.2				
100	5.7	17.0	61	10.2				
102	5.7	17.0	61	10.2				
104	5.7	17.0	61	10.2				
106	5.7	17.0	61	10.2				
108	5.7	17.0	61	10.2				
110	5.7	17.0	61	10.2				
112	5.7	17.0	61	10.2				
114	5.7	17.0	61	10.2				
116	5.7	17.0	61	10.2				
118	5.7	17.0	61	10.2				
120	5.7	17.0	61	10.2				
122	5.7	17.0	61	10.2				
124	5.7	17.0	61	10.2				
126	5.7	17.0	61	10.2				
128	5.7	17.0	61	10.2				
130	5.7	17.0	61	10.2				
132	5.7	17.0	61	10.2				
134	5.7	17.0	61	10.2				
136	5.7	17.0	61	10.2				
138	5.7	17.0	61	10.2				
140	5.7	17.0	61	10.2				
142	5.7	17.0	61	10.2				
144	5.7	17.0	61	10.2				
146	5.7	17.0	61	10.2				
148	5.7	17.0	61	10.2				
150	5.7	17.0	61	10.2				
152	5.7	17.0	61	10.2				
154	5.7	17.0	61	10.2				
156	5.7	17.0	61	10.2				
158	5.7	17.0	61	10.2				
160	5.7	17.0	61	10.2				
162	5.7	17.0	61	10.2				
164	5.7	17.0	61	10.2				
166	5.7	17.0	61	10.2				
168	5.7	17.0	61	10.2				
170	5.7	17.0	61	10.2				
172	5.7	17.0	61	10.2				
174	5.7	17.0	61	10.2				
176	5.7	17.0	61	10.2				
178	5.7	17.0	61	10.2				
180	5.7	17.0	61	10.2				
182	5.7	17.0	61	10.2				
184	5.7	17.0	61	10.2				
186	5.7	17.0	61	10.2				
188	5.7	17.0	61	10.2				
190	5.7	17.0	61	10.2				
192	5.7	17.0	61	10.2				
194	5.7	17.0	61	10.2				
196	5.7	17.0	61	10.2				
198	5.7	17.0	61	10.2				
200	5.7	17.0	61	10.2				



1-21-92 ENGINE 5 RUN 3

	CO	CO2	O2	NOX	CAL
RESPONSE	0	0	0		0
CHART	13	26.8	23.5		15
UNITS (x)	52	54	47.5		29.5
	96	89.5	82		75

	CO	CO2	O2		CAL
CAL GAS	0	0	0		0
VALUES (y)	30.1	5.4	6.05		149.1
	128.3	9.9	12		299
	240	17.2	20.9		746

SLOPE (m)	2.4901	0.1905	0.2545		9.9709
-----------	--------	--------	--------	--	--------

PPM	132.9	2.6	14.8		77.4
-----	-------	-----	------	--	------

LINEAR EQUATION

CO= $y=2.4901x+54.8$

CO2= $y=0.11905x+13.8$

O2= $y=0.2545x+59.1$

NOX= $y=9.9709x+7.3$

APPENDIX D
EPA METHODS 1-4 FIELD DATA. (TURBINE)

PLANT : TRANSCO
 DATE : 1/ 7/92
 SAMP.LOCATION : TURBINE EXHAUST
 RUN # : 1
 START TIME : 1130
 FINISH TIME : 1230

SAMPLE TIME (ti) =	60 minutes	WETTER ORIFICE (di) =	1.30 in. H2O
BAR. PRESSURE (Pb)=	28.74 in. Hg	WETTER VOLUME (Vw) =	33.011 cu. ft.
STK. PRESSURE (Ps)=	-1.645 in. H2O	WETTER TEMP. (Tn) =	50 °F
STACK AREA (As) =	58.778 sq.ft.	SQRT. dP =	.626 in. H2O
STACK TEMP. (Ts) =	863 °F	COND. LIQ. (Vlc) =	30.9 ml.
Pitot Factor (Cp) =	.84	WETTER Y (Td) =	1.0167
GAS ANALYSIS =	3 % CO2	STD. TEMP. (Tstd) =	70 °F
	15 % O2		
	82 % N2		

```

=====
Vw(std) = (Tstd+460) / 29.92 x [Pb + (di / 13.6)]
          / (Tn+460) x Td x Vn                                = 33.614 dry std. cu.ft.

Vn(std) = 0.04707 x Vlc                                      = 1.45 cu. ft.

Bwn = Vw(std) / [Vn(std) + Vn(std)]                          = .041

Nd = (.44 x %CO2) + (.32 x %O2) + (.28 x (TN2 + %CO2))      = 29.08 lb./lb.-mole (dry basis)

Ns = [Nd x (1-Bwn)] + (18.0 x Bwn)                            = 28.63 lb./lb.-mole (stack)

Vs = 85.49 x Cp x (SQRT[di]) x [SQRT((Ts+460)/Ns/Ps)]        = 57.04 ft. per second

Qs = Vs x As x 60                                              = 201,172 cu.ft. per minute(actual)

Qs(std)=Qs x (1-Bws) x (Tstd+460) / (Ts+460) x (Pb+Ps/13.6) / 29.92 = 74,144 cu.ft. per minute(dry,std.)
=====

```

PLANT : TRANSOCO
 DATE : 1/ 7/92
 SAMP. LOCATION : TURBINE EXHAUST
 RUN # : 2
 START TIME : 1250
 FINISH TIME : 1350

SAMPLE TIME (ML) =	60 minutes	METER ORIFICE (dH) =	1.30 in. H2O
BAR. PRESSURE (Pb) =	28.74 in. Hg	METER VOLUME (Vm) =	40.946 cu. ft.
STK. PRESSURE (Ps) =	-1.635 in. H2O	METER TEMP. (Tm) =	51 °F
STACK AREA (As) =	58.778 sq.ft.	SQRT. dP =	.6205 in. H2O
STACK TEMP. (Ts) =	862 °F	COND. LIQ. (Vlc) =	57.3 ml
Pitot Factor (Cp) =	.84	METER Y (Yd) =	1.0169
GAS ANALYSIS =	2.93 % CO2	STD. TEMP. (Tstd) =	70 °F
	14.9 % O2		
	82.17 % N2		

$Vn(std) = (Tstd+460) / 29.92 \times [Pb + (dH / 13.6)]$
 $\quad \quad \quad / (Tm+460) \times Yd \times Vm$
= 61.613 dry std. cu.ft.

$Vv(std) = 0.04707 \times Vlc$
= 2.70 cu. ft.

$Bws = Vv(std) / [Vn(std) + Vv(std)]$
= .061

$Hd = (.44 \times \%CO2) + (.32 \times \%O2) + [.24 \times (\%H2 + \%CO)]$
= 29.06 lb./lb.-mole (dry basis)

$Hs = [Hd \times (1-Bws)] + (14.0 \times Bws)$
= 28.39 lb./lb.-mole (stack)

$Vs = 85.49 \times Cp \times [SQRT(dP)] \times [SQRT[(Ps+460)/Hs/Ps]]$
= 56.77 ft. per second

$Qs = Vs \times As \times 60$
= 200,209 cu.ft. per minute(actual)

$Qs(std)=Qs \times (1-Bws) \times (Tstd+460) / (Ts+460) \times (Pb+Ps/13.6) / 29.92$
= 72,279 cu.ft. per minute(dry,std.)

PLANT : TRANSOCO
 DATE : 1/ 7/92
 SAMP. LOCATION : TURBINE EXHAUST
 RUN # : 3
 START TIME : 1435
 FINISH TIME : 1535

SAMPLE TIME (Mt)	=	60 minutes	METER ORIFICE (dH)	=	1.20 in. H2O
BAR. PRESSURE (Pb)	=	28.74 in. Hg	METER VOLUME (Vm)	=	39.304 cu. ft.
STK. PRESSURE (Ps)	=	-.64 in. H2O	METER TEMP. (Tm)	=	55 °F
STACK AREA (As)	=	58.778 sq.ft.	SQRT. dP	=	.619 in. H2O
STACK TEMP. (Ts)	=	464 °F	COND. LIQ. (Vlc)	=	52.5 ml
Pitot Factor (Cp)	=	.84	METER Y (Td)	=	1.0169
GAS ANALYSIS	=	2.82 % CO2	STD. TEMP. (Tstd)	=	70 °F
		14.88 % O2			
		82.3 % N2			

$Vn(std) = (Tstd+460) / 29.92 \times [Pb + (dH / 13.6)]$
 $/ (Tm+460) \times Yd \times Vm$ = 39.624 dry std. cu.ft.

$Vw(std) = 0.04707 \times Vlc$ = 2.47 cu. ft.

$Bws = Vw(std) / [Vn(std) + Vw(std)]$ = .059

$Hd = (.44 \times \%CO2) + (.32 \times \%O2) + [.28 \times (\%N2 + \%CO)]$ = 29.05 lb./lb.-mole (dry basis)

$Md = [Hd \times (1-Bws)] + (18.0 \times Bws)$ = 23.40 lb./lb.-mole (stack)

$Vs = 85.49 \times Cp \times \{SQRT(dP)\} \times [SQRT((Ts+460)/Ts/Ps)]$ = 56.66 ft. per second

$Qs = Vs \times As \times 60$ = 199,432 cu.ft. per minute(actual)

$Qs(std) = Qs \times (1-Bws) \times (Tstd+460) / (Ts+460) \times (Pb+Ps/13.6) / 29.92$ = 72,186 cu.ft. per minute(dry, std.)

TRANS CO
TURBINE RONS 1-3
STATION SIS

	Run 1			Run 2			Run 3			
	PORT	AP	TS		AP	TS	AP	TS	STATIC	
A	1	.23	867		.25	844	.21	860	STATIC 1	-0.66
	2	.30	867		.28	857	.24	863	STATIC 2	-0.63
	3	.38	867		.44	864	.47	866	STATIC 3	-0.64
	4	.37	868		.37	866	.40	868		
	5	.26	850		.25	834	.28	856		
B	1	.22	861		.19	853	.27	849		
	2	.37	859		.41	857	.38	858		
	3	.69	866		.68	866	.66	868		
	4	.65	868		.65	870	.63	870		
	5	.53	865		.46	863	.44	867		
C	1	.15	867		.24	859	.26	861		
	2	.38	869		.38	866	.37	865		
	3	.66	870		.69	869	.65	869		
	4	.74	862		.75	872	.69	869		
	5	.63	866		.60	870	.60	869		
D	1	.06	848		.06	833	.05	864		
	2	.12	864		.10	861	.06	864		
	3	.38	866		.38	867	.37	866		
	4	.57	870		.62	870	.57	868		
	5	.59	870		.52	868	.58	869		
	Pb =		29.74							
706	Pp =		0.63		0.622		0.619			
6	Ts =		865		860		864			
	V/c									

SAMPLE RECOVERY DATA

Place: Transco BC
 Date: 1-6-91
 Sampling Location: Turbine Outlet
 Sample Type: moisture
 Run Number: 1
 Sample Box Number: 2
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

FRONT END

Filter Number: _____
 Description of Filter: _____

METHOD

Impinger

Final Volume:	<u>124</u>	ml	<u>100</u>	ml	_____	ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>117</u>	ml
Net Volume:	_____	ml	_____	ml	_____	ml
Total H ₂ O:	_____	_____	_____	_____	_____	_____

Silica Gel

Final Volume:	<u>2.00</u>	g	_____	g	_____	g
Initial Volume:	<u>2.34</u>	g	_____	g	_____	g
Net Volume:	_____	g	_____	g	_____	g
Total Moisture:	<u>0.34</u>	_____	_____	_____	_____	_____

Description of Impinger Catch: _____



SAMPLE RECOVERY DATA

Plant: Transco - B.C.
 Date: 1-6-91
 Sampling Location: Turbine Outlet
 Sample Type: Moisture
 Run Number: 2
 Sample Box Number: 2
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

FRONT HALF

Filtror Number: _____
 Description of Filtror: _____

MOISTURE

Impingers

Final Volume:	<u>150</u> ml	<u>100</u> ml	_____ ml
Initial Volume:	<u>100</u> ml	<u>100</u> ml	<u>NT</u> ml
Net Volume:	_____ ml	_____ ml	_____ ml
Total H ₂ O:	_____	_____	_____

Silica Gel

Final Volume:	<u>246.0</u> g	_____ g	_____ g
Initial Volume:	<u>238.7</u> g	_____ g	_____ g
Net Volume:	_____ g	_____ g	_____ g
Total Moisture:	_____	_____	_____

Description of Impinger Catch: _____



SAMPLE RECOVERY DATA

Place: Trusco - Bear Creek
 Date: 1-6-91
 Sampling Location: Turbine outlet
 Sample Type: moisture
 Run Number: #3
 Sample Box Number: 3
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

PIPETT BULK

Pipet Number: _____
 Description of Pipet: _____

MOISTURE

Impingers

Final Volume:	<u>142</u>	ml	<u>100</u>	ml	_____	ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>MT</u>	ml
Net Volume:	_____	ml	_____	ml	_____	ml
Total H ₂ O:	_____	_____	_____	_____	_____	_____

Silica Gel

Final Volume:	<u>264.8</u>	g	_____	g	_____	g
Initial Volume:	<u>254.3</u>	g	_____	g	_____	g
Net Volume:	_____	g	_____	g	_____	g
Total Moisture:	_____	_____	_____	_____	_____	_____

Description of Impinger Catch: _____



Estimation for K-Factor Determination

Project Number

Plant TRANSO 515

Test Number

Date 1-7-91

Water Box Number

Sample Location Airline Outlet

Water Box Number

Run Number 3

Probe Heater Setting

Operator ML

Filter Heater Setting

Ambient Temperature

Total ± 1 H₂O

Barometer 28.74

grams silicone Gel

Static Pressure

P_{s0} = 1.0167

Pitot Factor .84

P_{s002}

Inches Hg

Stack ID 42x92"

Nozzle ID

K =

Start Time

Leak Rate

Finish Time

Peak Rate									
Traverse Point	Sampling Time	Gas Meter Reading	Vel. Press. dp	Orif. Press. dm	Stack Temp. T _s	Water Temp. T _w	Pump Vacuum	Impinger Temp.	Temp.
		Init. 756.533				In Out			
	5	759.785		1.2		47 45	16		
	10	763.050		1.2		56 45	16		
	15	766.285		1.2		61 46	16		
	20	769.750		1.2		63 46	16		
	25	772.825		1.2		64 46	16		
	30	776.255		1.2		65 47	16		
	35	779.015		1.2		65 46	16		
	40	782.445		1.2		65 47	16		
	45	785.920		1.2		66 47	16		
	50	789.270		1.2		67 48	16		
	55	792.350		1.2		68 49	16		
	60	795.837		1.2		68 49	16		
							</		

APPENDIX E

EPA METHODS 1-4 FIELD DATA (ENGINE #5; 1-8-92)

PLANT : PRINSCO
 DATE : 1/ 8/92
 SAMP. LOCATION : ENGINE # 5 EXHAUST
 RUN # : 1
 START TIME : 805
 FINISH TIME : 905

SAMPLE TIME (M)	=	60 minutes	METER ORIFICE (dH)	=	1.40 in. H2O
BAR. PRESSURE (Pb)	=	28.96 in. Hg	METER VOLUME (Vm)	=	36.744 cu. ft.
SKN. PRESSURE (Ps)	=	-1.495 in. H2O	METER TEMP. (Tm)	=	65 °F
STACK AREA (As)	=	6.7769 sq.ft.	SQRT. dP	=	.3805 in. H2O
STACK TEMP. (Ts)	=	524 °F	COND. LIQ. (Vlc)	=	23.2 ml
Pitot Factor (Cp)	=	.84	METER Y (Yd)	=	.9917
GAS ANALYSES	=	3.25 % CO2	STD. TEMP. (Tstd)	=	70 °F
		14.67 % O2			
		82.08 % N2			

$Vm(std) = (Tstd+460) / 29.92 \times [Pb + (dH / 13.6)]$
 $\quad \quad \quad / (Tm+460) \times Yd \times Vm$
= 35.732 dry std. cu.ft.

$Vw(std) = 0.04707 \times Vlc$
= 1.09 cu. ft.

$Bws = Vw(std) / [Vm(std) + Vw(std)]$
= .030

$Hd = (.44 \times \%CO2) + (.32 \times \%O2) + [.28 \times (\%N2 + \%CO)]$
= 29.11 lb./lb.-mole (dry basis)

$Hs = [Hd \times (1-Bws)] + (18.0 \times Bws)$
= 28.78 lb./lb.-mole (stack)

$Vs = 35.49 \times Cp \times [SQRT(dP)] \times [SQRT((Ts+460)/(Ms/Ps))]$
= 68.73 ft. per second

$Qs = Vs \times As \times 60$
= 27,943 cu.ft. per minute(actual)

$Qs(std) = Qs \times (1-Bws) \times (Tstd+460) / (Ts+460) \times (Pb+Ps/13.6) / 29.92$
= 14,123 cu.ft. per minute(dry, std.)

PLANT : TRANSOCO
 DATE : 1/ 8/92
 SAMP.LOCATION : ENGINE # 5 EXHAUST
 RUN # : 2
 START TIME : 940
 FINISH TIME : 1040

SAMPLE TIME (ti) =	60 minutes	METER ORIFICE (di) =	1.20 in. H2O
BAR. PRESSURE (Pb)=	28.98 in. Hg	METER VOLUME (Vn) =	31.26 cu. ft.
STK. PRESSURE (Ps)=	- .53 in. H2O	METER PRCP. (Pn) =	.67 "P
STACK AREA (As) =	6.7769 sq.ft.	SQRT. dP	.465 in. H2O
STACK TEMP. (Ts) =	530 "P	COND. LIQ. (Vlc) =	33.2 ml
Pitot Factor (Cp) =	.84	METER Y (Yd) =	.9917
GAS ANALYSIS =	3.25 % CO2	STD. TEMP. (Tstd) =	70 "P
	14.67 % O2		
	82.08 % N2		

$Vn(std) = (Vn + 460) / 29.92 \times [Pb + (di / 13.6)]$
 $\quad \quad \quad / (Pn + 460) \times Yd \times Vn$ = 30.269 dry std. cu.ft.

$Vv(std) = 0.04707 \times Vlc$ = 1.56 cu. ft.

$Bws = Vv(std) / [Vn(std) + Vv(std)]$ = .049

$Hd = (.64 \times \%CO2) + (.32 \times \%O2) + [.28 \times (\%N2 + \%CO)]$ = 29.11 lb./lb.-mole (dry basis)

$Hs = [Hd \times (1 - Bws)] + (18.0 \times Bws)$ = 28.57 lb./lb.-mole (stack)

$Vs = 45.49 \times Cp \times \{SQRT[dP]\} \times \{SQRT[(Ts + 460) / (Ps / Ps)]\}$ = 69.53 ft. per second

$Qs = Vs \times As \times 60$ = 28,272 cu.ft. per minute(actual)

$Qs(std) = Qs \times (1 - Bws) \times (Tstd + 460) / (Ts + 460) \times (Pb + Ps / 13.6) / 29.92$ = 13,930 cu.ft. per minute(dry, std.)

PLANT : TRAFSCO
 DATE : 1/ 8/92
 SAMP. LOCATION : ENGINE / 5 EXHAUST
 RUN # : 3
 START TIME : 1055
 FINISH TIME : 1155

SAMPLE TIME (H)	=	60 minutes	METER ORIFICE (dH)	=	1.20 in. H ₂ O
BAR. PRESSURE (Pb)	=	29 in. Hg	METER VOLUME (Vn)	=	38.816 cu. ft.
SMK. PRESSURE (Ps)	=	-.5 in. H ₂ O	METER TEMP. (Tn)	=	74 °F
STACK AREA (As)	=	6.7769 sq.ft.	SQRT. dP	=	.8755 in. H ₂ O
STACK TEMP. (Ts)	=	532 °F	COND. LIQ. (Vlc)	=	45.4 ml
Pitot Factor (Cp)	=	.84	METER T (Td)	=	.9917
GRS ANALYSIS	=	3.18 % CO ₂	STD. TEMP. (Tstd)	=	70 °F
		14.73 % O ₂			
		82.09 % N ₂			

$Vn(std) = (Tstd+460)/29.92 \times [Pb + (dH / 13.6)]$
 $\quad \quad \quad / (Tn+460) \times Vn \times Vn$
= 37.143 dry std. cu.ft.

$Vv(std) = 0.04707 \times Vlc$
= 2.14 cu. ft.

$Bws = Vv(std) / [Vn(std) + Vv(std)]$
= .054

$Md = (.44 \times \%CO_2) + (.32 \times \%O_2) + [.28 \times (\%H_2 + \%CO)]$
= 29.10 lb./lb.-mole (dry basis)

$Mb = [Md \times (1-Bws)] + (18.0 \times Bws)$
= 28.50 lb./lb.-mole (stack)

$Vs = 55.49 \times Cp \times (SQRT[dP]) \times [SQRT[(Ts+460)/(Ms/Ps)]]$
= 68.90 ft. per second

$Qs = Vs \times As \times 60$
= 28,017 cu.ft. per minute(actual)

$Qs(std)=Qs \times (1-Bws) \times (Tstd+460)/[(Ts+460) \times (Pb+Ps/13.6)]/29.92$
= 13,715 cu.ft. per minute(dry, std.)

TRANSCO
ENGINE #5 POST RETROFIT

		RUN 1		RUN 2		RUN 3			
POINT		Δp	T_s		Δp	T_s		Δp	T_s
A	1	.94	514		0.84	528		0.90	531
	2	.97	521		0.86	528		0.94	532
	3	.82	520		0.79	527		0.83	532
	4	.74	519		0.70	527		0.75	532
	5	.65	519		0.68	527		0.69	532
	6	.71	518		0.64	528		0.72	532
	7	.76	518		0.73	528		0.76	532
	8	.74	516		0.71	522		0.80	531
B	1	.54	517		0.53	526		0.52	528
	2	.60	518		0.57	527		0.59	529
	3	.57	518		0.58	527		0.56	530
	4	.57	518		0.58	527		0.58	530
	5	.86	521		0.89	529		0.92	532
	6	1.1	523		1.1	529		1.1	534
	7	1.2	524		1.2	532		1.3	534
	8	1.0	518		0.95	530		1.1	532
STATIC		-0.47			-0.54			-0.52	
$\bar{\Delta p}$		.887			.874			0.896	
T_s		519			528			531	

Project Number 184
 Plant Transco Bear Creek
 Date 1-8-92
 Sample Location Engine Outlet
 Run Number 1
 Operator ML
 Ambient Temperature 75°F
 Barometer 30.0
 Static Pressure 184
 Pitot Factor 1.84

Estimates for K-Factor Determination

$P_1 =$ _____
 $P_2 =$ _____
 $P_{O_2} =$ _____
 $T_1 =$ _____
 $T_2 =$ _____
 $S_{H_2O} =$ _____
 $V_d = 0.9917$
 $d_{H_2O} =$ _____
 Stack ID 35 1/4"
 $K =$ _____

Water Box Number _____
 Meter Box Number _____
 Probe Meter Setting _____
 Filter Meter Setting _____
 Total H₂O _____
 grams silica gel _____
 $K_{O_2} =$ _____
 $K_{CO_2} =$ _____
 Humidity ID _____
 Start Time _____
 Finish Time 0900

Injection # 15
 Leak Rate 1000

Traverse Point	Sampling Time	Gas Meter Reading	Vel. Press. dp	Orif. Press. dH	Stack Temp. T _s	Water Temp. T _w	Pump Temp. T _p
	5	95.99		1.2		In 71	Out 59 3.5
	10	100.94		1.2		73	59 3.5
	15	101.457	Pressure	3 water	out 64	57	2
	20	103.025					
	25						
	30	102.015		1.2		70	57 4
	35	110.180		1.2		72	58 4
	40	113.285	114.451	1.0			
	45	116.519		1.5		68	57 3
	50	120.075		1.5		70	58 3
	55	123.290		1.5		72	58 3
	60	126.59		1.5		75	59 3
		132.845		1.5		76	60 3
Total							
Average							
Page 19	5/89						

SAMPLE RECOVERY DATA

Plant: TRANSO
 Date: 1-7-92
 Sampling Location: ENGINE #5
 Sample Type: ML
 Run Number: 1
 Sample Box Number:
 Clean-up Man: 13
 Job Number:
 Comments:

FRONT HALF

Pileur Number:
 Description of Pileur:

MOISTURE

Impingers

Pland Volume:	<u>110</u>	ml	<u>100</u>	ml	<u></u>	ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>OTT</u>	ml
Net Volume:	<u></u>	ml	<u></u>	ml	<u></u>	ml
Total H ₂ O:	<u>10</u>		<u>0</u>		<u></u>	

Silica Gel

Pland Volume:	<u>234.9</u>	g	<u></u>	g	<u></u>	g
Initial Volume:	<u>230.3</u>	g	<u></u>	g	<u></u>	g
Net Volume:	<u></u>	g	<u></u>	g	<u></u>	g
Total Moisture:	<u>5.2</u>		<u></u>		<u></u>	

Description of Impinger Catch:



Tested for K-Factor Determination

Project Number TRANSO 515
 Date 1-8-92
 Sample Location Engage
 Run Number 2
 Operators AB
 Ambient Temperature _____
 Barometer 29.90
 Static Pressure _____
 Pitot Factor .34

Inches Hg 6" 5"
 Leak Rate .005 .002

Point	Time	Gas Meter Reading	Vel. Press.	Oris. Press.	Stack Temp.	Meter Temp.	Pump Temp.	Vacuum	Temp.
5		139.41		1.2		68	59	1	
10		142.20		1.2		72	60	1	
15		145.41		1.2		74	60	2	
21		149.20		1.2		74	60	2	
26.5		152.57		1.2		75	61	2	
31		155.52		1.2		75	61	2	
35		157.810		1.2		74	60	2	
42.5		162.530		1.2		74	60	2	
45		164.055		1.2		74	60	2	
50		167.154							

Meter Box Number _____
 Meter Box Number _____
 Probe Heater Setting _____
 Pilzer Heater Setting _____
 Total H₂O _____
 Probe Silica Gel _____
 H₂ _____
 H₂O₂ _____
 Needle ID _____
 Start Time 09:39
 Finish Time _____

Total

Average
 Form 39 3/89

SAMPLE RECOVERY DATA

Plate: TRANSO BONE CREEK
 Date: 1-7-92
 Sampling Location: STONE #5
 Sample Type: MD
 Run Number: 2
 Sample Bag Number: 2
 Cleanup Date: 1/2
 Job Number: _____
 Comments: _____

PLATE HALF

Plate Number: _____
 Description of Plate: _____

RECOVERY

Amplagore

Final Volume:	<u>130</u>	ml	<u>98</u>	ml	_____ ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>MTT</u> ml
Net Volume:	_____	ml	_____	ml	_____ ml
Total H ₂ O:	<u>30</u>	_____	<u>2</u>	_____	<u>0</u>

Silica Gel

Final Volume:	<u>241.5</u>	g	_____	g	_____ g
Initial Volume:	<u>236.3</u>	g	_____	g	_____ g
Net Volume:	_____	g	_____	g	_____ g
Total Media Loss:	<u>5.2</u>	_____	_____	_____	_____

Description of Amplagore Catalyst: _____



SAMPLE RECOVERY DATA

Plant: TRANSCO BEAR Creek
 Date: 1-7-92
 Sampling Location: down E of S
 Sample Type: Mel
 Run Number: 3
 Sample Box Number: 3
 Clean-up Man: EB
 Job Number: _____
 Comments: _____

PRECIPITATE

Precip Number: _____
 Description of Precip: _____

WATER

Sample Water

Plant Volume:	<u>132</u>	ml	<u>63</u>	ml	_____	ml
Receiving Volume:	<u>61</u>	ml	<u>62</u>	ml	<u>177</u>	ml
Net Volume:	_____	ml	_____	ml	_____	ml
Total H ₂ O:	<u>61</u>	ml	<u>3</u>	ml	_____	ml

Effluent Water

Plant Volume:	<u>248.9</u>	g	_____	g	_____	g
Receiving Volume:	<u>241.5</u>	g	_____	g	_____	g
Net Volume:	_____	g	_____	g	_____	g
Total Media Water:	<u>7.4</u>	g	_____	g	_____	g

Description of Sample Water: _____



Project Number

Plant 184500 515

Date 26-9-1

Sample Location 30000

Run Number 3

Operator

Ambient Temperature

Barometer

Static Pressure

Pilot Factor 10

Inches Hg

Leak Rate 100

Estimates for X-Tester Determination

T₁ =

T₂ =

T₃ =

T₄ =

T₅ =

T₆ =

T₇ =

T₈ =

T₉ =

T₁₀ =

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Project Number

Plant 184500 515

Date 26-9-1

Sample Location 30000

Run Number 3

Operator

Ambient Temperature

Barometer

Static Pressure

Pilot Factor 10

Inches Hg

Leak Rate 100

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Water Box Number

Probe Heater Setting

Filter Heater Setting

Total H₂O

Water Box Number

Pressure

Sampling

Gas Meter Reading

Vol. Press.

Orif. Press.

Start Temp.

Water Temp.

Vacuum

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

Temp.

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APPENDIX F

RPA METHODS 1-4 FIELD DATA (ENGINEER #5; 1-21-92)

PLANT : TRANSCO
 DATE : 1/22/99
 SAMP. LOCATION : BUCKLE # 5
 RUN # : 1A
 START TIME : 1053
 FINISH TIME : 1139

SAMPLE TIME (min)	=	60 minutes	WATER CRUISE (min)	=	1.10 in. H ₂ O
SOL. PRESSURE (Ps)	=	29.72 in. Hg	WATER VOLUME (Vw)	=	36.847 cu. ft.
STACK PRESSURE (Pg)	=	.25 in. H ₂ O	WATER TEMP. (Tw)	=	65 °F
STACK AREA (As)	=	6.7769 sq.ft.	SQRZ. dz	=	1.113 in. H ₂ O
STACK TEMP. (Ts)	=	684 °F	COND. LIQ. (Vlc)	=	18.7 ml
Stack Factor (Cp)	=	.84	WATER V (Vd)	=	.9417
GAS ANALYSIS	=	2.5 % CO ₂	SED. TEMP. (Tsed)	=	70 °F
		15.6 % O ₂			
		81.8 % N ₂			

```

=====
Vw(dry) = (Tsed-60)/(29.92 x (Ps + (dz / 13.6))
          / ((29-60) x Vw + Vw)
          = 36.755 dry std. cu.ft.

Vw(wet) = 3.04707 x Vlc
          = 1.02 cu. ft.

Dw = Vw(wet) / (Vw(wet) + Vw(dry))
     = .027

Hd = (.46 x CO2) + (.32 x H2O) + (.28 x (O2 + N2))
     = 29.02 lbs./lb.-mole (dry basis)

Hs = (Hd x (1-Dw)) + (13.6 x Dw)
     = 28.55 lbs./lb.-mole (stack)

Vs = 85.13 x Cp x (SQRZ(dz)) x (SQRZ((29-60)/HsTs))
     = 84.64 ft. per second

Qs = Vs x As x 60
     = 36,343 cu.ft. per minute(actual)

Qs(dry)=Qs x (1-Dw)x(Tsed-60)/((Ts-60)x(Ps+Ps/13.6)/29.92
     = 36,221 cu.ft. per minute(dry,std)
=====
  
```

PLANT : TEANSCO
 DATE : 1/25/94
 SAMP LOCATION : EUGENE J 5
 RUN # : 18
 START TIME : 1036
 FINISH TIME : 1136

SAMPLE TIME (M) =	60 minutes	WATER ORIFICE (DH) =	1.10 in. H2O
BAR. PRESSURE (Pb) =	29.72 in. Hg	WATER VOLUME (Vw) =	14.867 cu. ft.
SUP. PRESSURE (Pa) =	1.42 in. H2O	WATER TEMP. (Tw) =	65 °F
STACK AREA (As) =	6.7769 sq.ft.	SQRTP. DP =	1.07 in. H2O
STACK TEMP. (Ts) =	684 °F	COND. TEMP. (Tdc) =	38.7 °C
Stack Factor (Cp) =	1.04	WATER V (Vw) =	.9917
GAS ANALYSES =	2.1 % CO2	SQRTP. TEMP. (Tstd) =	70 °F
	15.4 % O2		
	81.9 % N2		

```

=====
Vw(std) = (Pstd+460) / 29.92 x (Pb + (DH / 13.6))
          / (29+460) x Vw x Vw                                     =    36.775 dry std. cu.ft.

Vw(std) = 0.54707 x Vdc                                           =    1.14 cu. ft.

Dw = Vw(std) / (Vw(std) + Vw(std))                                 =    .549

Hd = (.46 x 1002) + (.32 x 154) + (.28 x (302 + 460))           =    29.04 lb./lb.-mole (dry basis)

Ws = [Hd x (1-Dw)] + (14.0 x Dw)                                  =    24.50 lb./lb.-mole (stack)

Vs = 05.43 x Cp x [SQRTP(DP)] x [SQRTP((29+460)/(Ts+460))]      =    11.25 ft. per second

Cs = Vs x As x 60                                                  =    11,036 cu.ft. per minute(actual)

Cs(std)=Cs x (1-Dw)x(Pstd+460)/(29+460)x(Pb+Ps/13.6)/29.92      =    17,502 cu.ft. per minute(dry, std.)
=====
  
```

PLANT : PRUGCO
 DATE : 1/11/92
 SAMPLE LOCATION : ROOM F 5
 RUN # : 21
 START TIME : 1352
 END TIME : 1352

SAMPLE TIME (tS) =	60 minutes	ROOM CORRECTION (dR) =	1.20 in. H2O
BAR. PRESSURE (PB) =	31.72 in. Hg	ROOM VOLUME (Vn) =	46.46 cu. ft.
SKE. PRESSURE (Ps) =	.67 in. H2O	ROOM TEMP. (Tn) =	68 °F
SAMPLE AREA (As) =	6.7969 sq.ft.	SQRT. SF	1.049 in. H2O
SAMPLE TEMP. (Ts) =	401. °F	COND. EQ. (VLe) =	43.1 in
Plate Factor (Cp) =	.04	ROOM P (Pd) =	.9917
GAS ANALYSE :	2.5 % CO2	STD. TEMP. (Tstd) =	70 °F
	15.1 % CO		
	82.6 % N2		

```

Vn(Std) = (Tstd+460) / 29.32 x (Ps + (dR / 13.6)
          / (Pd+460) x Vn x Vn
= 36.145 dry std. cu.ft.

Vn(Std) = 1.04707 x VLe
= 2.05 cu. ft.

Dn = Vn(Std) / [Vn(Std) + Vn(Std)]
= .053

Hd = [.46 x %CO2] + [.32 x %CO] + [.78 x (%N2 + %O2)]
= 29.05 lb./lb.-mole (dry basis)

Dh = [Hd x (1-Dn)] + [18.0 x Dn]
= 28.42 lb./lb.-mole (stack)

Vs = 05.03 x Cp x [SQRT(dR)] x [SQRT((Ts+460)/(Pd+460))]
= 79.04 ft. per second

Cs = Vs x Dh x 60
= 32,141 cu.ft. per minute(Actual)

Cs(Std) = Cs x (1-Dn)x(Tstd+460)/(Pd+460)x(Pb+460)/13.6 / 29.32
= 17,046 cu.ft. per minute(dry, std.)
  
```

PLANT : TRANSCO
 DATE : 5/21/91
 SAMP. LOCATION : WINGS # 5
 RUN # : 20
 START TIME : 1256
 FINISH TIME : 1352

SAMPLE TIME (M) =	60 minutes	WATER ORIFICE (dH) =	1.30 in. H ₂ O
BAR. PRESSURE (Ps) =	29.72 in. Hg	WATER VOLUME (Vw) =	36.46 cu. ft.
STK. PRESSURE (Pg) =	3.55 in. H ₂ O	WATER SHIP. (Vw) =	60 "P
STACK AREA (As) =	5.7769 sq.ft.	SQR. dP =	3.99 in. H ₂ O
STACK TEMP. (Ts) =	403 "F	COND. LIQ. (Vlc) =	13.1 ml
Barot Factor (Cp) =	.06	WATER Y (Yd) =	.9917
GAS ANALYSIS =	2.54 CO2	STD. TEMP. (Tstd) =	70 "F
	15.14 O2		
	82.44 N2		

```

=====
Vw(std) = (29.72-460)/ 24.92 x (Ps + (32 / 1.3,5))
          / (Vw-460) x 24 x Vw                                = 35.145 dry std. cu.ft.

Vw(std) = 0.04777 x Vw                                         = 1.73 cu. ft.

Dws = Vw(std) / (Vw(std) + Vw(std))                             = .053

Hd =(1.44 x 6354)+(1.32 x 402)+(1.30 x (132 + 6354))          = 23.00 lb./lb.-note (dry basis)

Hs = (Hd x (1-Dws)) + (20.0 x Dws)                             = 23.42 lb./lb.-note (stack)

Vg = 35.49 x Cp x (SQR(dP)) x (SQR(1/3-460)/46/Ps)]           = 71.93 ft. per second

Qs = Vg x As x 60                                              = 30,464 cu.ft. per minute(actual)

Qs(std)=Qs x (1-Dws)x(Tstd+460)/(29.72+460)x(29.72/24.92)    = 15,320 cu.ft. per minute(dry, std.)
=====
  
```

STAGE : TRANSOM
 DATE : 1/21/92
 SAMP. LOCATION : INSIDE # 5
 RUN # : 36
 START TIME : 1456
 FINISH TIME : 1506

SAMPLE TIME (dt)	=	60 minutes	HEPB. ORIFICE (de)	=	1.50 in. H2O
BAG. PRESSURE (Ps)	=	29.72 in. Hg	HEPB. VOLUME (Vn)	=	33.687 cu. ft.
SK. PRESSURE (Ps)	=	.35 in. H2O	HEPB. TEMP. (Tn)	=	67 °F
STACK AREA (As)	=	1.7769 sq.ft.	SQR. DP	=	.980 in. H2O
STACK TEMP. (Ts)	=	403 °F	COND. LIQ. (VLe)	=	17.4 ml
Piche Factor (Cp)	=	.04	HEPB. T (Tn)	=	.3417
SG ANALYSIS	=	2.6 t CO2	STD. TEMP. (Tstd)	=	70 °F
		14.0 t O2			
		83.6 t N2			

$Vn(std) = (Tstd+459) / 29.92 \times (Ps + (dt / 13.6))$
 $/ (Pstd+60) \times Vn \times Vn$ = 35.464 dry std. cu.ft.

$Vn(std) = 1.04707 \times VLe$ = 1.76 cu. ft.

$Dos = Vn(std) / [Vn(std) + Vn(std)]$ = .450

$Dd = (.44 \times 1602) + (.32 \times 602) + .28 \times (302 + 400)$ = 29.51 lb./lb.-mole (dry basis)

$Ds = [Dd \times (1-Dos)] + (16.0 \times Dos)$ = 28.46 lb./lb.-mole (stack)

$Vs = 35.49 \times Cp \times (3(SQR[dp]) \times (SQR[(28+459)/Us/Es]))$ = 76.64 ft. per second

$Qs = Vs \times As \times 60$ = 30,441 cu.ft. per minute(actual)

$Qs(std)=Qs \times (1-Dos) \times (Tstd+459) / (Pstd+60) \times (Ps+Ps/13.6) / 29.92$ = 16,167 cu.ft. per minute(dry, std.)

NAME : BRUNCO
 DATE : 1/14/92
 SMP LOCATION : ROOM # 5
 CON # : 58
 START TIME : 1406
 FINISH TIME : 1506

SAMPLE SIZE (Ml) =	60 ml/box	WATER ORIFICE (IN) =	2.10 in. H2O
BAR. PRESSURE (PB) =	23.72 in. Hg	WATER VOLUME (Vw) =	13.607 cu. ft.
SEC. PRESSURE (PS) =	.53 in. H2O	WATER PHE. (PW) =	67 °P
SUACE AREA (As) =	5.7969 sq. ft.	WATER DP =	.937 in. H2O
SUACE TEMP. (Ts) =	400 °F	COND. LIQ. (VLC) =	37.4 ml
Plant Factor (Cp) =	.04	WATER P (Pd) =	.9917
GAS ANALYSIS =	2.6 L CO2	SEC. PHE. (Psb) =	70 °P
	14.8 L CO		
	82.6 L H2		

```

=====
Vw(Std) = (28639460) / 29.92 x [(31 - (38 / 33.6)]
          / (10-004) x 23 x Vw                                = 35.464 dry std. cu.ft.

Vw(Std) = 0.00707 x VLC                                       = 1.76 cu. ft.

Rws = Vw(Std) / [Vw(Std) + Vw(Std)]                             = .050

Hd =(1.44 x 6322)+(1.11 x 832)+(1.26 x (403 + 632))          = 29.01 lb./lb.-cycle (dry basis)

Hs = [Hd x (1-Rws)] + (13.0 x Hws)                             = 30.46 lb./lb.-cycle (stack)

Vs = 35.49 x Cp x [SQRT(33)] x [SQRT((286440)/Hs/Ps)]         = 71.06 ft. per second

Hs = Vs x As x 60                                              = 38,884 cu.ft. per minute(Actual)

Hs(Std)=Hs x (1-Rws)(Pd+460)/(10-060)x(28-Ps/13.6)/29.92    = 35,324 cu.ft. per minute(dry, std.)
=====
  
```


SAMPLE RECOVERY DATA

Place: Transco R.C.
 Date: 1-21-92
 Sampling Location: Outlet
 Sample Type: M-4
 Run Number: 1-2
 Sample Bag Number: 81
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

PILLOCK BALP

Pillock Number: _____
 Description of Pillocks: _____

MOISTURE

Empiagore

Pillock Volume:	<u>234</u>	ml	_____	ml	_____	ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>100</u>	ml
Net Volume:	_____	ml	_____	ml	_____	ml
Total H ₂ O:	<u>34</u>	_____	_____	_____	_____	_____

Silica Gel

Pillock Volume:	<u>221.7</u>	g	_____	g	_____	g
Initial Volume:	<u>217.0</u>	g	_____	g	_____	g
Net Volume:	_____	g	_____	g	_____	g
Total Moisture:	<u>4.7</u>	_____	_____	_____	_____	_____

Description of Empiagore Catalyst: _____

PLACE Tramco 815
 DATE 1-21-62
 TEST LOCATION Engine #5
 AIRFUEL

ENGINE NO.
 TESTER'S NAME
 TEST TYPE
 TEST COMMENTS (200-2500 RPM)
 TEST COMMENTS (500-1000 RPM)

TEST NO.
 LABORATORY CP
 DATE MADE
 DATE USED
 S. G.
 REMARKS

Run #1-2
 Start

A				B			
Sampling Point	AP S.G. 0.20	P ₀ Static Temp. S.G. 0.20	P ₀ Static Pressure S.G. 0.20	Sampling Point	AP S.G. 0.20	P ₀ Static Temp. S.G. 0.20	P ₀ Static Pressure S.G. 0.20
1	1.6	486	2.6	1	1.7	486	
2	1.4	487		2	1.6	486	
3	1.5	487		3	1.7	486	
4	1.6	487		4	1.7	486	
5	1.3	487		5	1.5	487	
6	1.5	486		6	1.5	486	
7	1.7	486		7	1.7	486	
8	1.2	486		8	1.5	485	
9				9			
10				10			
11				11			
12				12			
TOTAL				TOTAL			
Ave. 1.113 486				Ave. 1.113 486			

ENGINE SPEED/TESTER'S NAME

CALCULATED BY
 DATE

1. P_0 (Corrected) = + 400 = mm Hg
2. A_0 (Standard/None) = " mm Hg
3. P_0 (Standard/None) = P_{app} = $P_{app} + 400$ = mm Hg
4. P_{app} (Static pressure in the gas stream, proportional by volume) = mm Hg
5. V_0 (Corrected volume) = $C_p \times C_p \times \left(\frac{P_0}{P_{app}} \right)^{1/2} \times \left(\frac{A_0}{A_{app}} \right)^{1/2}$ = mm Hg
6. Q_{ad} (Standard Gas Flow Rate) = $\frac{P_0}{P_{app}} \times V_0 \times A_0 \times (1 - \frac{P_{app}}{P_0})$ = mm Hg

W_g (Standard Gas Weight of each gas, dry basis) = 10.0 (Standard Gas) = mm Hg

W_g (Standard Gas Weight of each gas, wet basis) = 10.0 (Standard Gas) = mm Hg

C_p (Corrected gas composition) = 1.113 = mm Hg

DSCFM = 18153

DSCFM 17375
 ACFM 35883



U.S. Environmental Protection Agency

P age = Standard deviation percentage (SDPR) (44.44)² =
 T page = Standard deviation percentage (SDPR) of (44.44) = 44.44%

17 SEP 1964

-

Estimates for 2-Factor Determination

Project Number Transco 515
 Date 1-21-92
 Sample Location Outlet Dams 5
 Run Number 2
 Operators ML + SH
 Ambient Temperature -5° C
 Barometer 27.2 29.72
 Static Pressure _____
 Pitot Factor 1.84

Water Box Number _____
 Meter Box Number 1
 Meter Box Number _____
 Probe Meter Setting AA
 Filter Meter Setting AA
 Total ml H₂O 38
 Gross Solute del _____
 % O₂ _____
 % CO₂ _____
 Module ID AA
 Start time 12:52
 Finish time _____

Time	See Meter Reading	Vol. Press.	Grav. Press.	Stack Temp.	Water Temp.	Pump Temp.	Impinger Temp.
Point	Time	Init.	012.901	40	40	40	40
8	018.275		1.1		62	38	
12	020.620		1.1		76	61	
18	24.610		1.1		76	61	
24	28.565		1.2		76	62	
30	32.355		1.2		77	62	
36	36.210		1.2		76	62	
42	40.050		1.2		76	62	
48	43.975		1.2		76	62	
54	47.720		1.2		76	63	
60	49.361		1.2		76	63	
Total	36.46		1.2		68	2	
9789							
9789							

SAMPLE RECOVERY DATA

Plant: Transco RC
 Date: 1-21-92
 Sampling Location: Outlet
 Sample Type: WW-4
 Run Number: 112
 Sample Box Number: 429
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

FACTS FILE

Pileup Number: _____
 Description of Pileup: _____

ANALYSIS

Sampling

Pitot Volume:	<u>13.29</u>	ml	<u>13.29</u>	ml	_____ ml
Initial Volume:	<u>100</u>	ml	<u>100</u>	ml	_____ ml
Net Volume:	<u>3.29</u>	ml	<u>0</u>	ml	_____ ml
Total H ₂ O:	_____		_____		_____

Solids G/L

Pitot Volume:	<u>238.9</u>	g	_____ g	_____ g
Initial Volume:	<u>238.9</u>	g	_____ g	_____ g
Net Volume:	_____	g	_____ g	_____ g
Total Moisture:	<u>5.1</u>		_____	_____

Description of Sampling Contain: _____

Estimates for 2-Zeater Determination

Project Number Transco
 Plant 1-21-92
 Sample Location Outlet Engine #3
 Run Number 3
 Operators ML + SH
 Ambient Temperature -5°C
 Barometer 27.8 29.72
 Static Pressure 94
 Pitot Factor 94
 Stack ID 17
 Stack ID 17
 Stack ID 17

Meter Box Number 1
 Meter Box Number 1
 Probe Meter Setting 1
 Filter Meter Setting 1
 Total H₂O 1
 Gross Sulfur Gas 1
 T O₂ 1
 T CO₂ 1
 Sample ID 17
 Start Time 11:06
 Finish Time 11:06

Inches Hg 16"

Leak Rate 1000

Traverse Point	Sampling Time	See Meter Reading	Vel. Press.	Diff. Press.	Stack Temp.	Meter Temp.	Temp. (Target)	Temp.
		Int. 049.548	4"	4"	T _s	T _m	Vacuum	Temp.
6	053.280	1.1	1.1	1.1	64	58	2	40
12	57.165	1.1	1.1	1.1	64	59	2	39
18	60.700	1.1	1.1	1.1	73	60	2	40
24	64.327	1.1	1.1	1.1	74	60	2	39
30	667.990	1.1	1.1	1.1	74	61	2	39
36	671.660	1.1	1.1	1.1	75	61	2	45
42	675.325	1.1	1.1	1.1	76	62	2	45
48	678.975	1.1	1.1	1.1	76	62	2	45
54	682.600	1.1	1.1	1.1	76	62	2	45
60	683.235	1.1	1.1	1.1	76	62	2	45
Total	33657	1.1	1.1	1.1	76	62	2	45
Average	33657	1.1	1.1	1.1	76	62	2	45
Stack ID	17	1.1	1.1	1.1	76	62	2	45

SAMPLE RECOVERY DATA

Plant: Trento
 Date: 1-21-92
 Sampling Location: Outlet Engine #5
 Sample Type: MT-4
 Run Number: 3
 Sample Bag Number: BL
 Clean-up Man: _____
 Job Number: _____
 Comments: _____

PLUGS DATA

Plug Number: _____
 Description of Plug: _____

ANALYSIS

Impurities

Petrol Volume:	<u>233</u>	ml	_____	ml	_____	ml
Industrial Volume:	<u>100</u>	ml	<u>100</u>	ml	<u>MT</u>	ml
Hot Volume:	_____	ml	_____	ml	_____	ml
Total H ₂ O:	<u>33</u>	_____	_____	_____	_____	_____

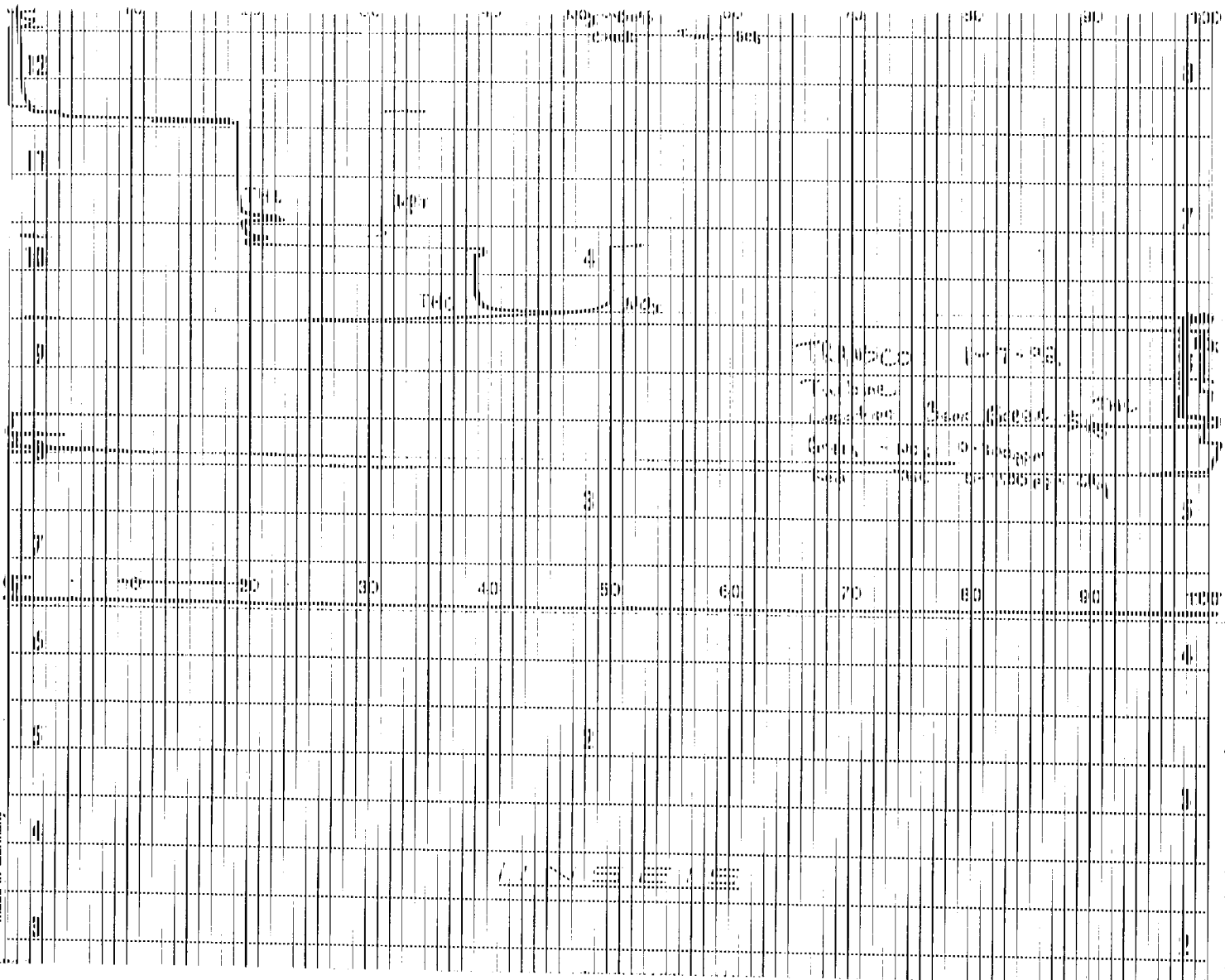
Solids Cont.

Petrol Volume:	<u>233.2</u>	g	_____	g	_____	g
Industrial Volume:	<u>218.8</u>	g	_____	g	_____	g
Hot Volume:	_____	g	_____	g	_____	g
Total Solids Cont.	<u>451</u>	_____	_____	_____	_____	_____

Description of Impurity Contake: _____

APPENDIX G

APPENDIX G STRIP CHART DATA (1-7, 1-8, 92)



TREC MPC

TREC MPC

TREC MPC

TREC MPC

TREC MPC

TREC MPC

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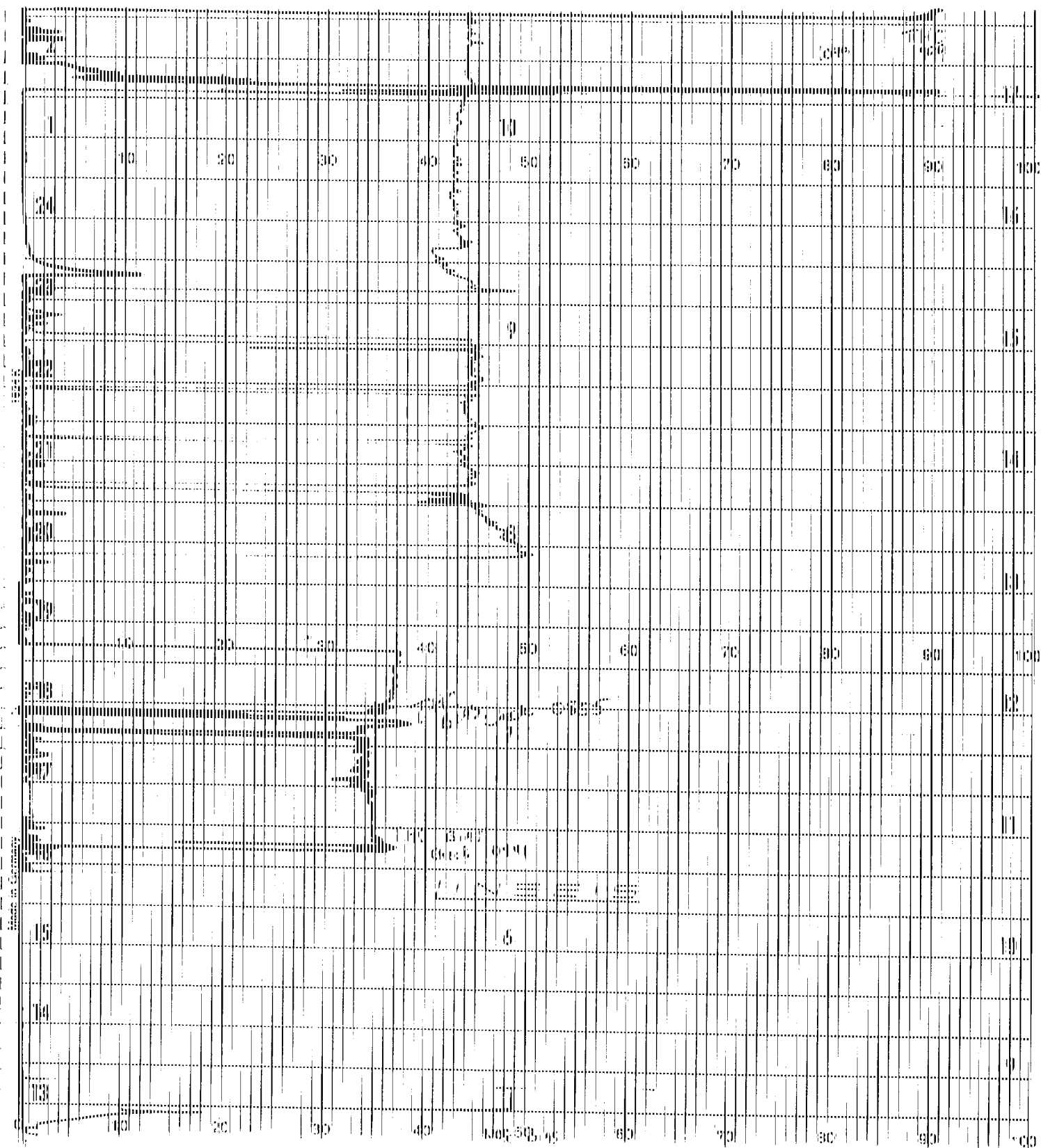
TREC MPC

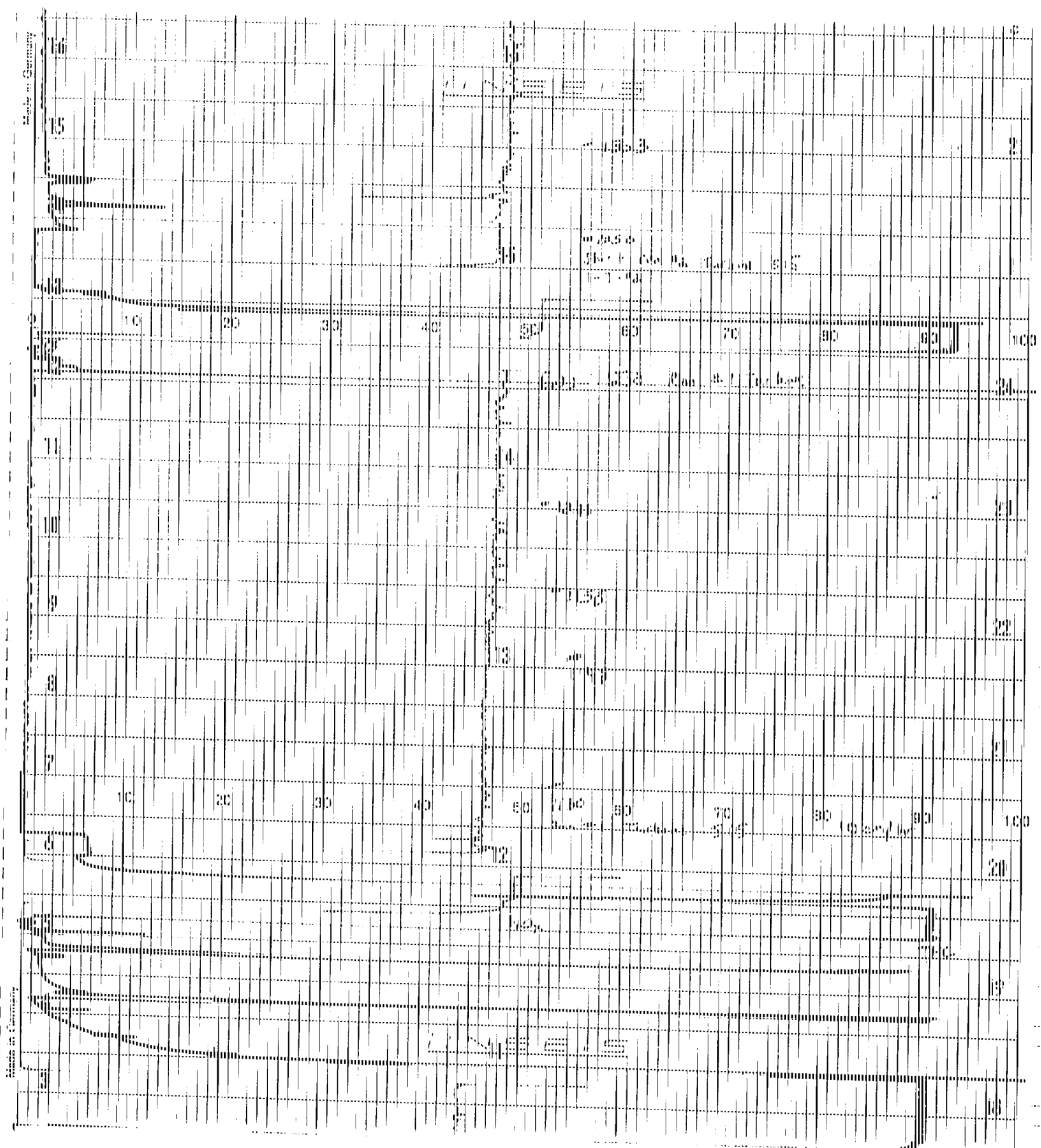
TREC MPC

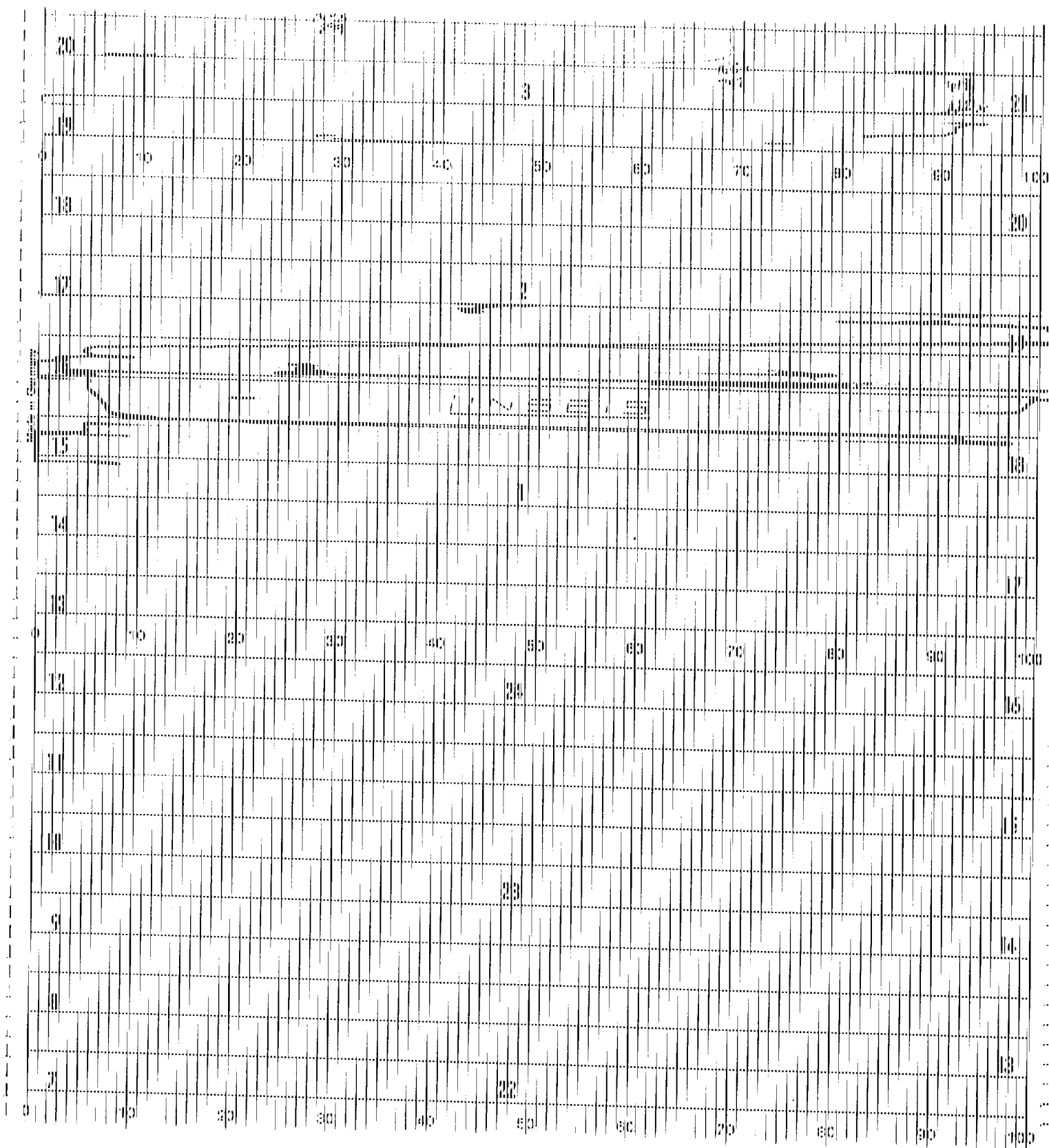
TREC MPC

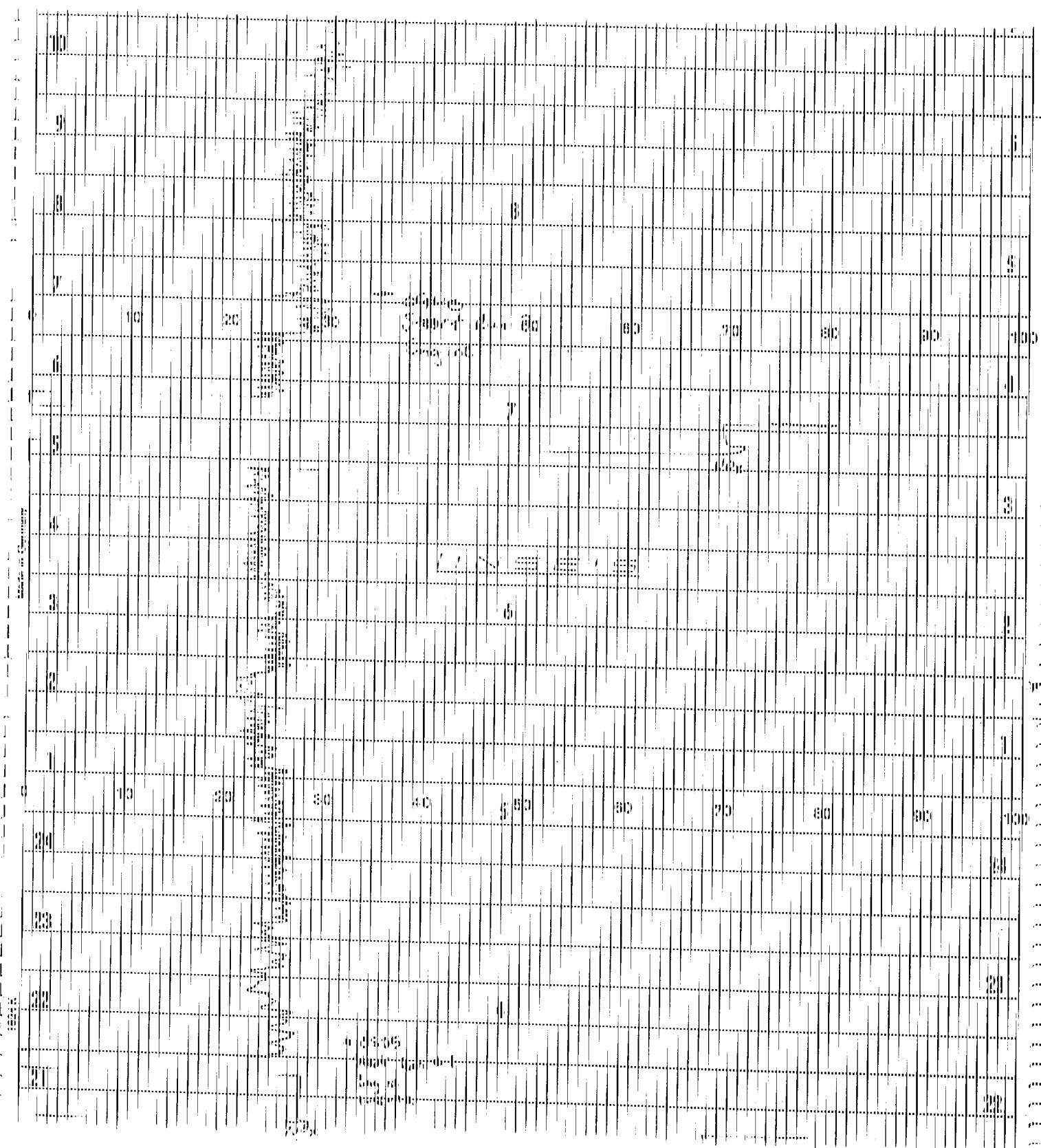
TREC MPC

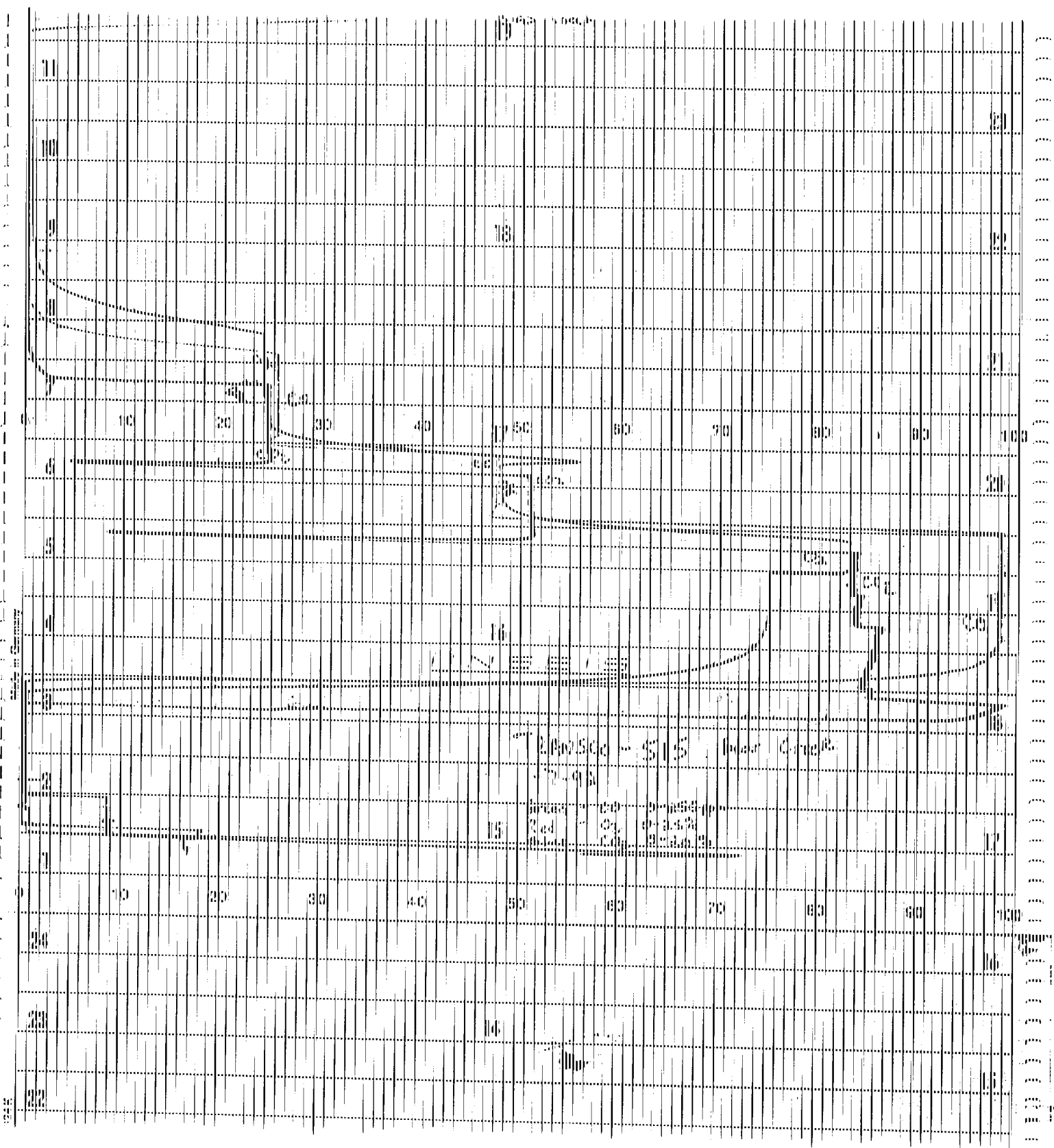
TREC MPC

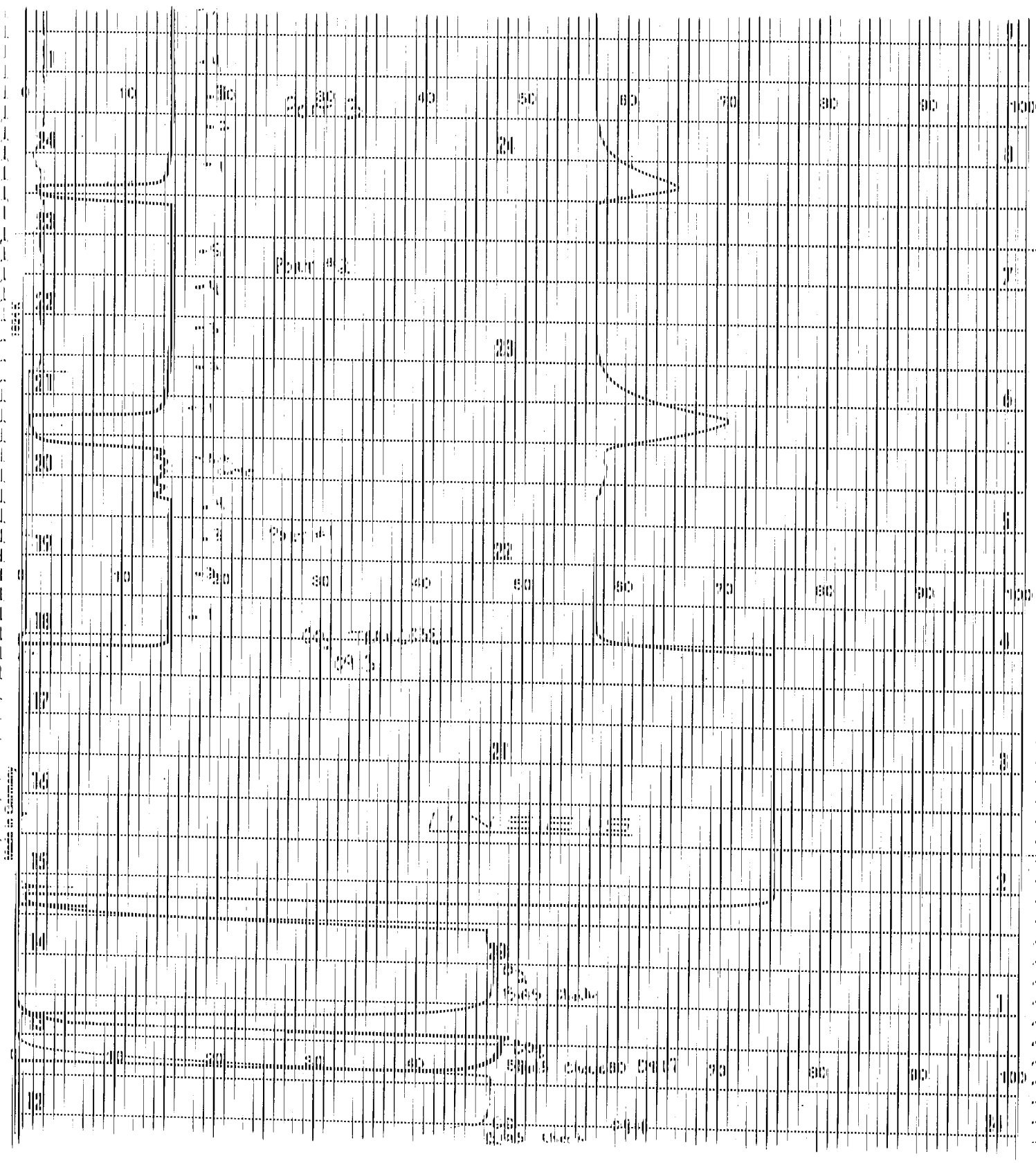


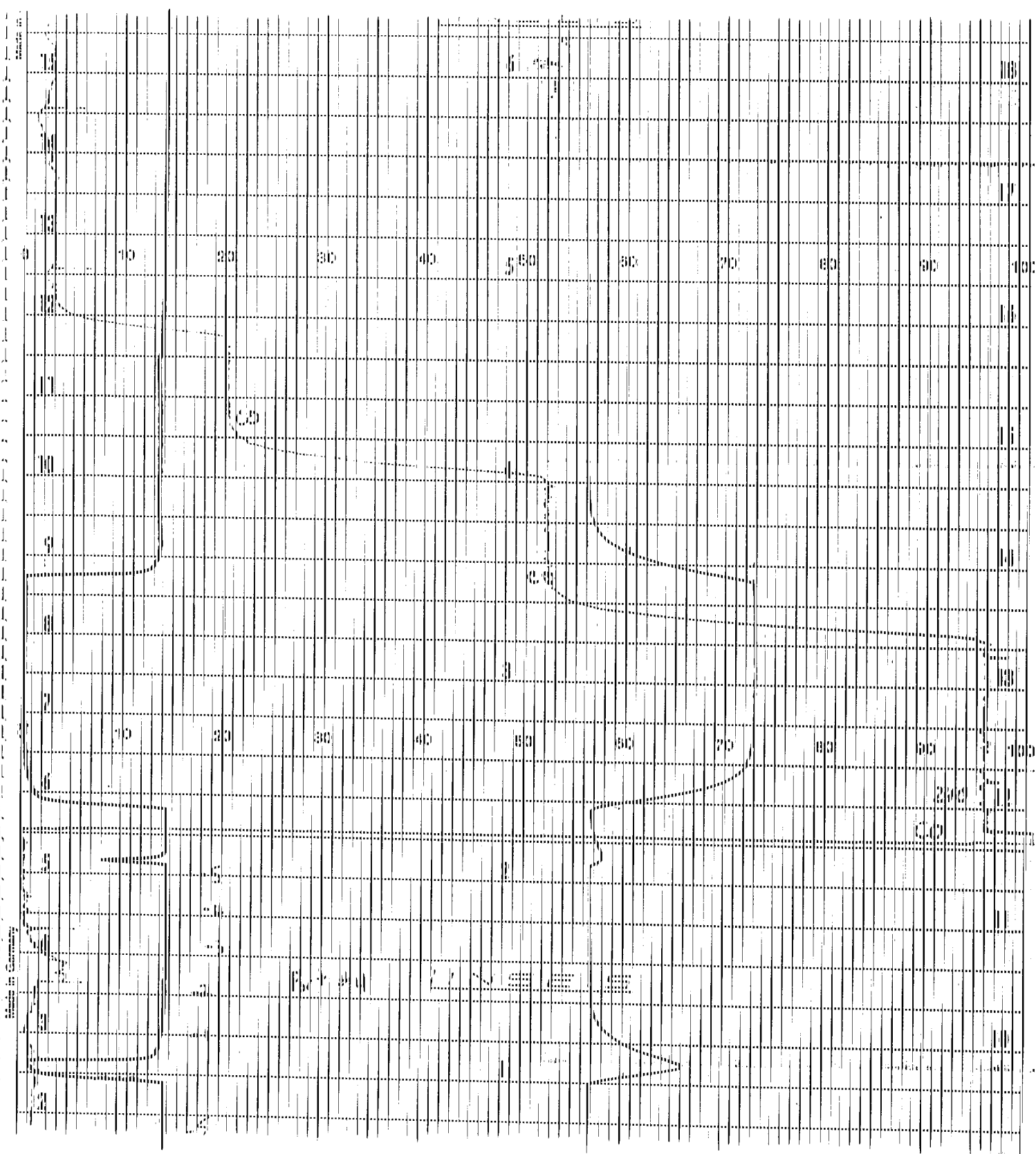


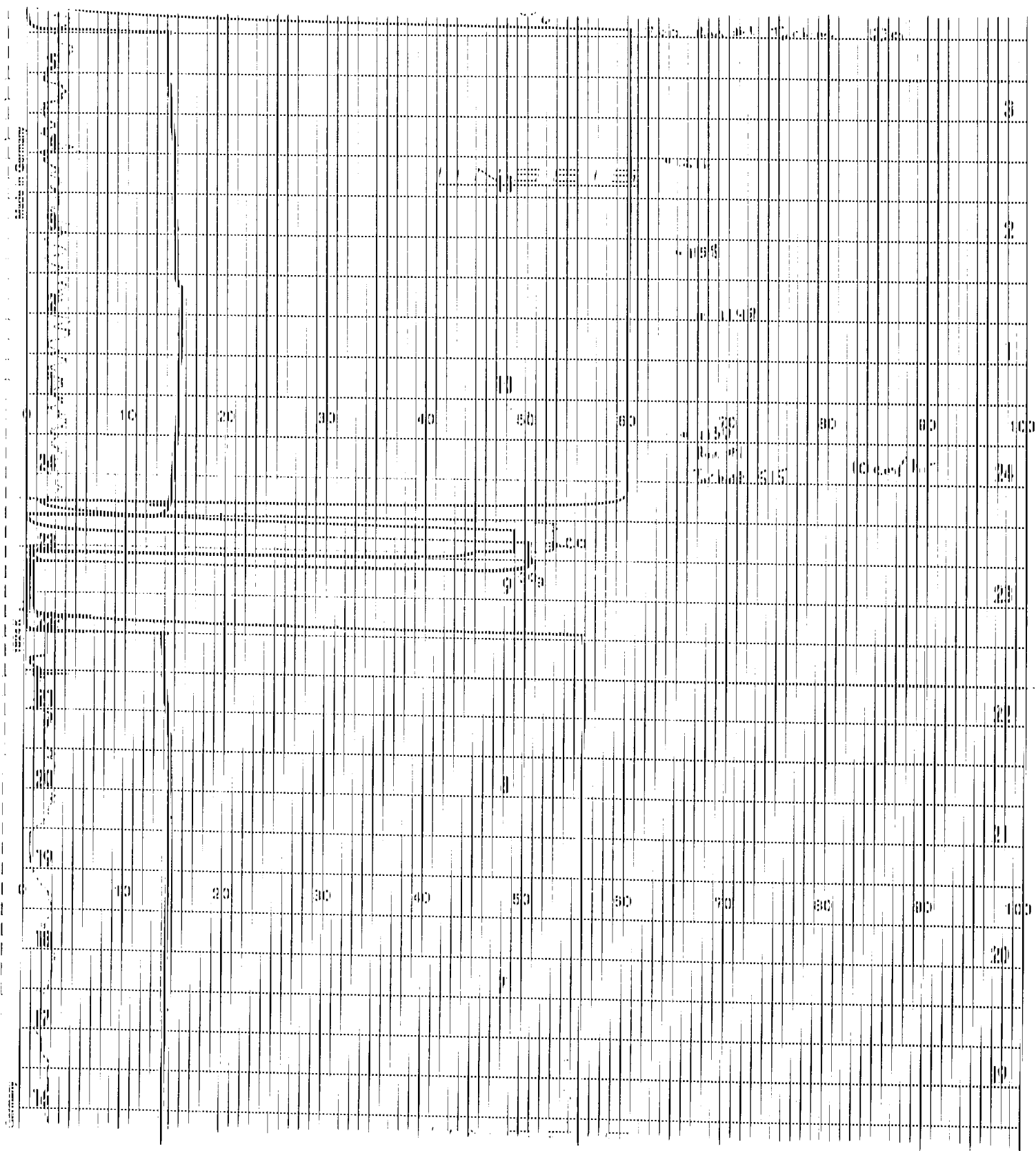


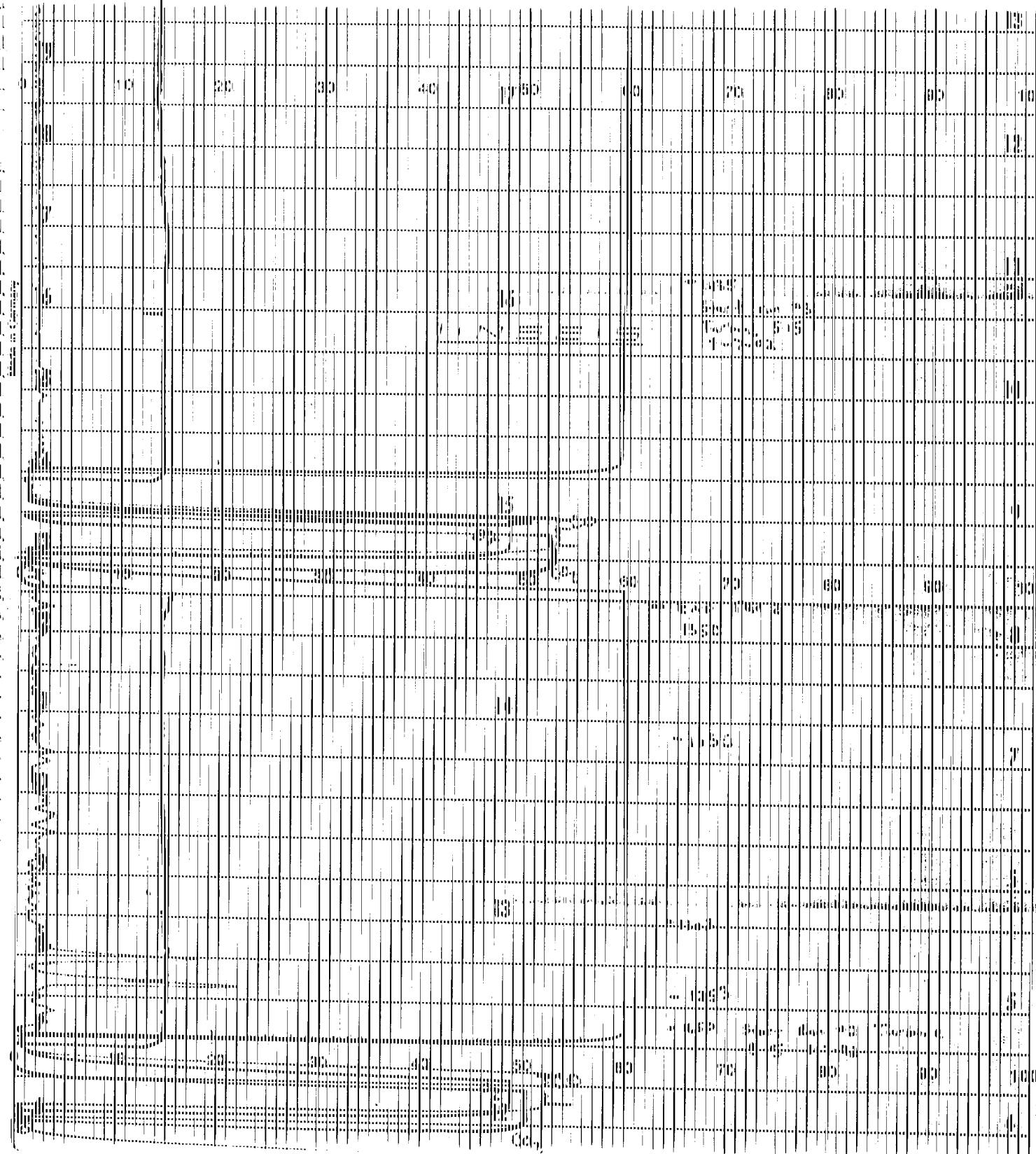












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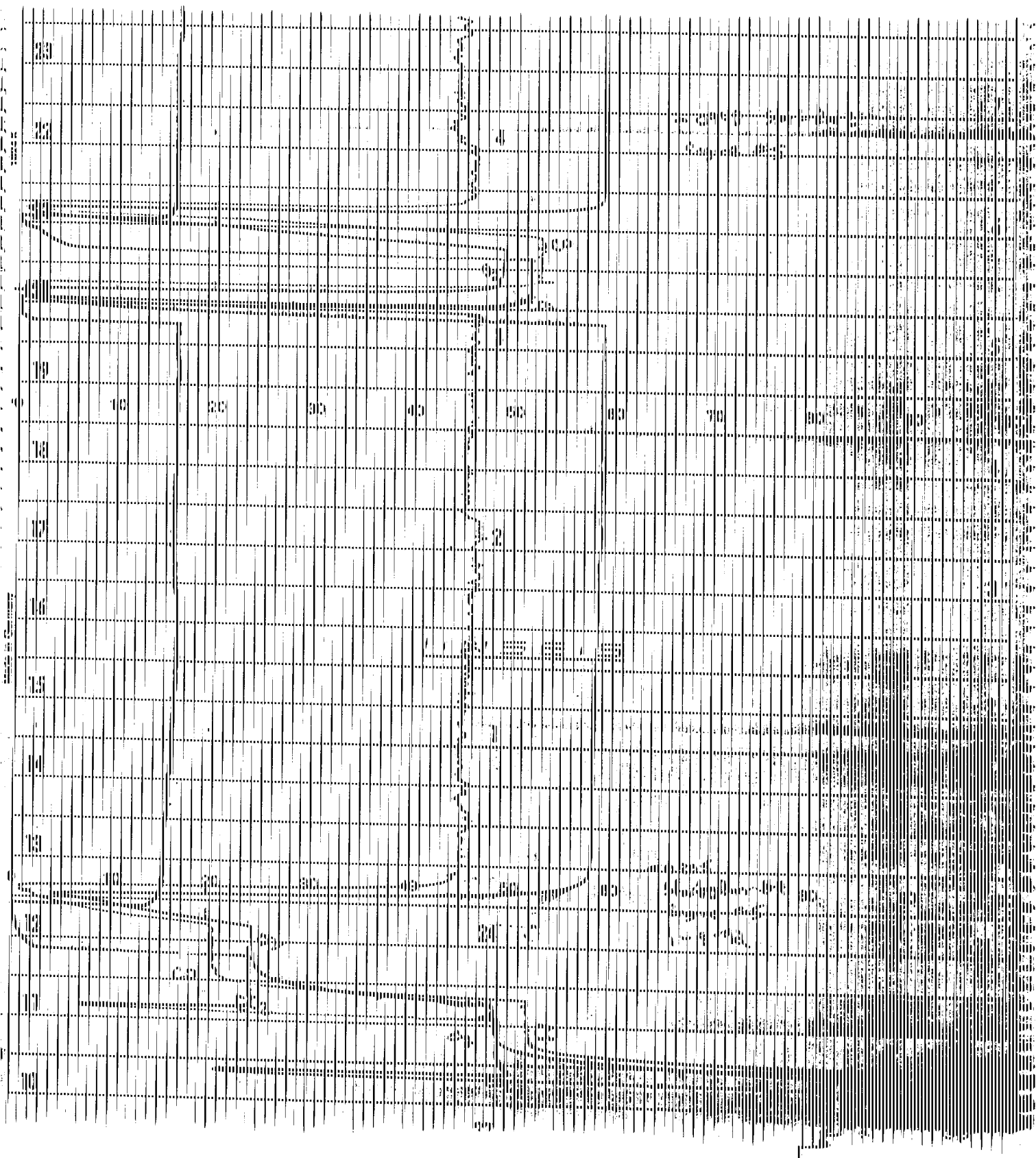
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7749500 or 51650

1-7-79 / 3-3-81

Eng. or 15 of Tuckhouse

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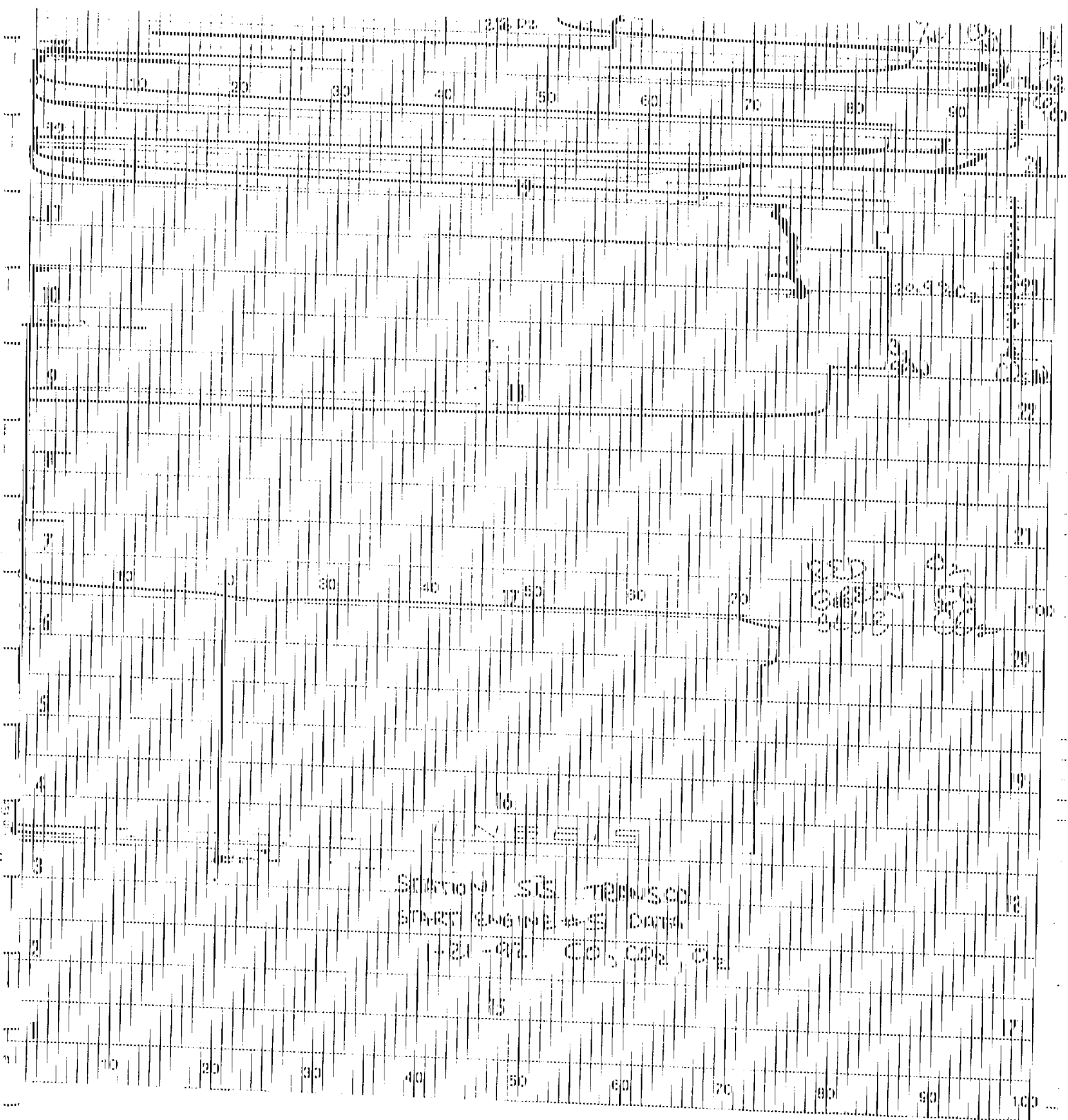
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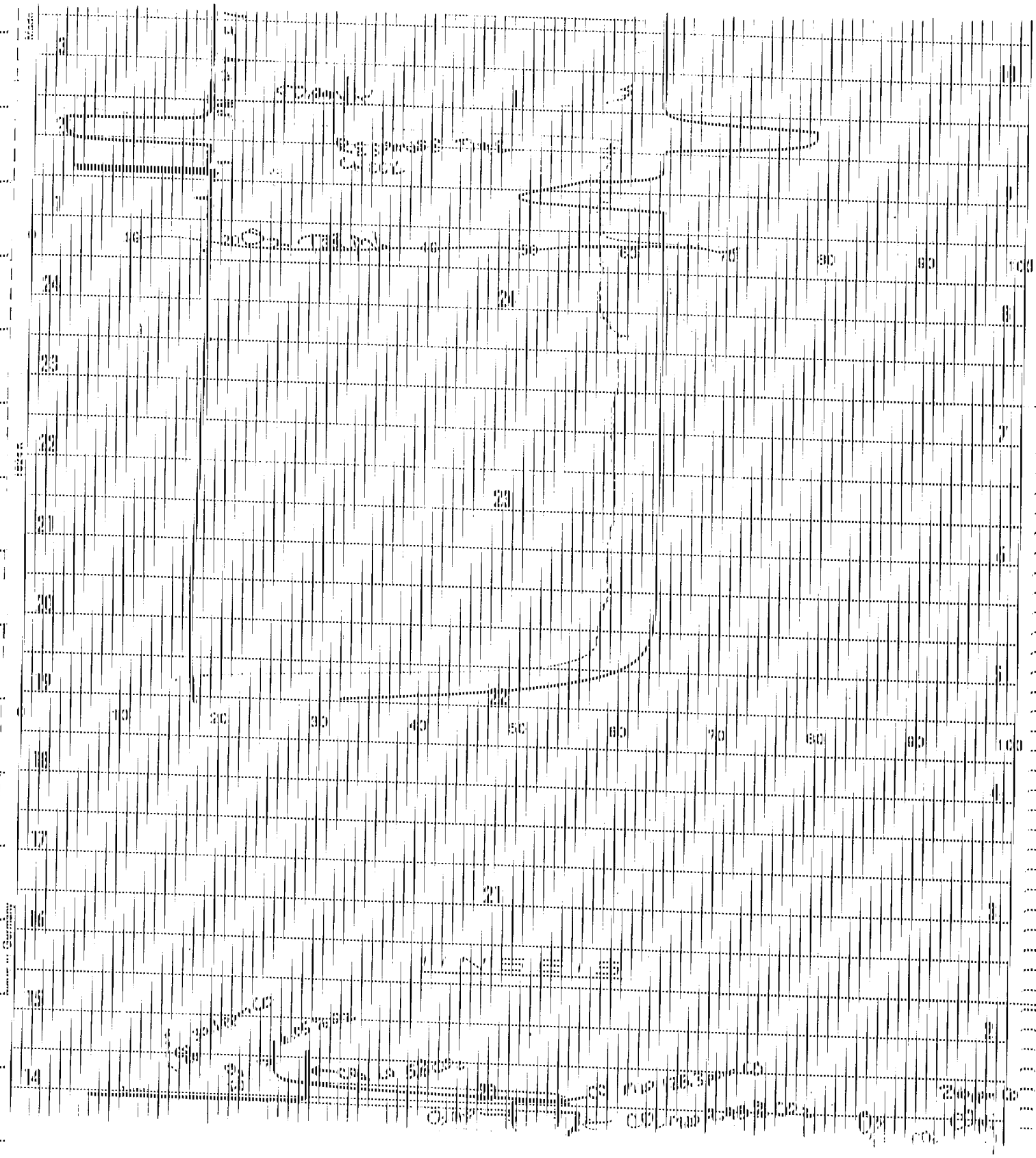
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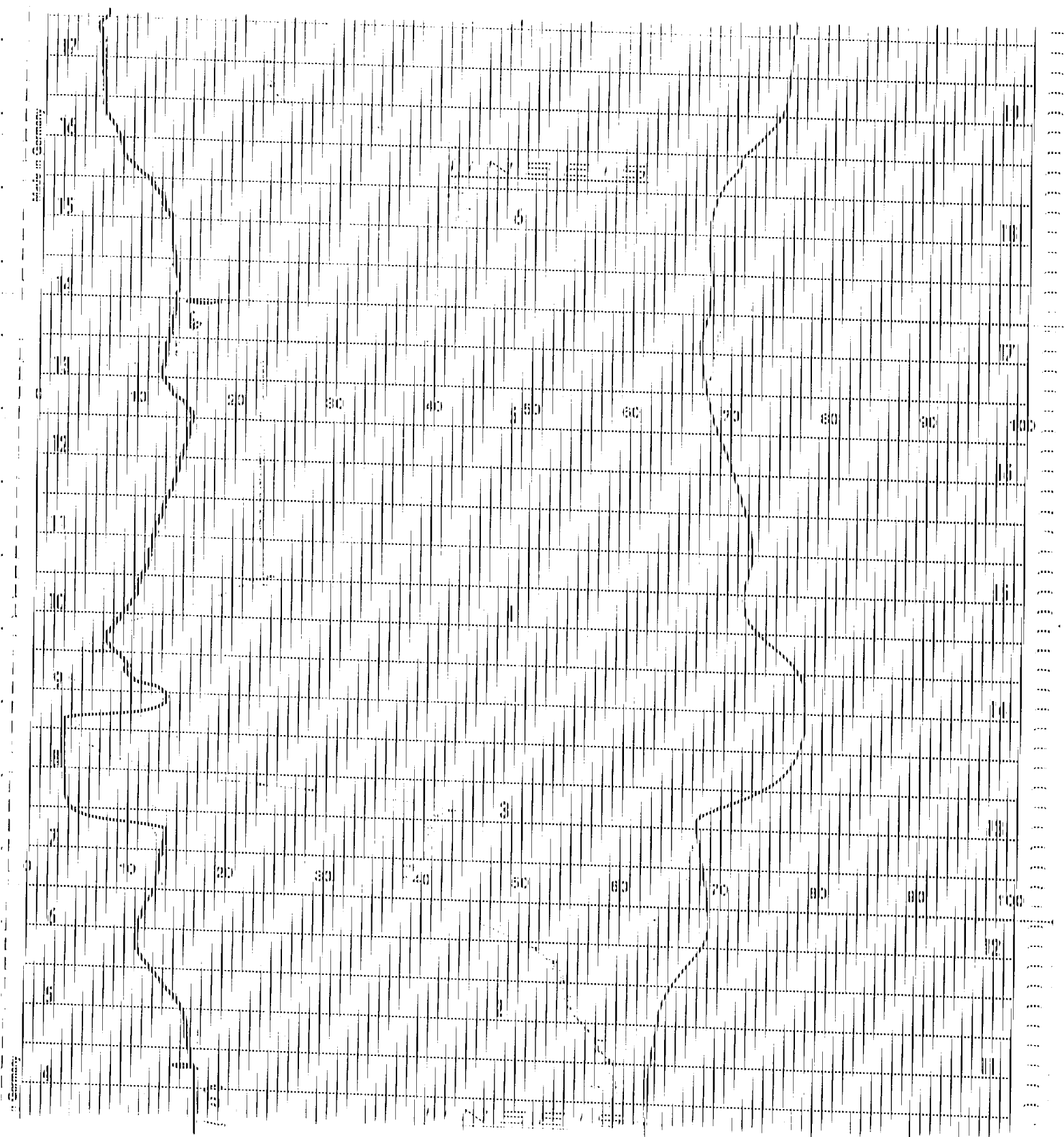
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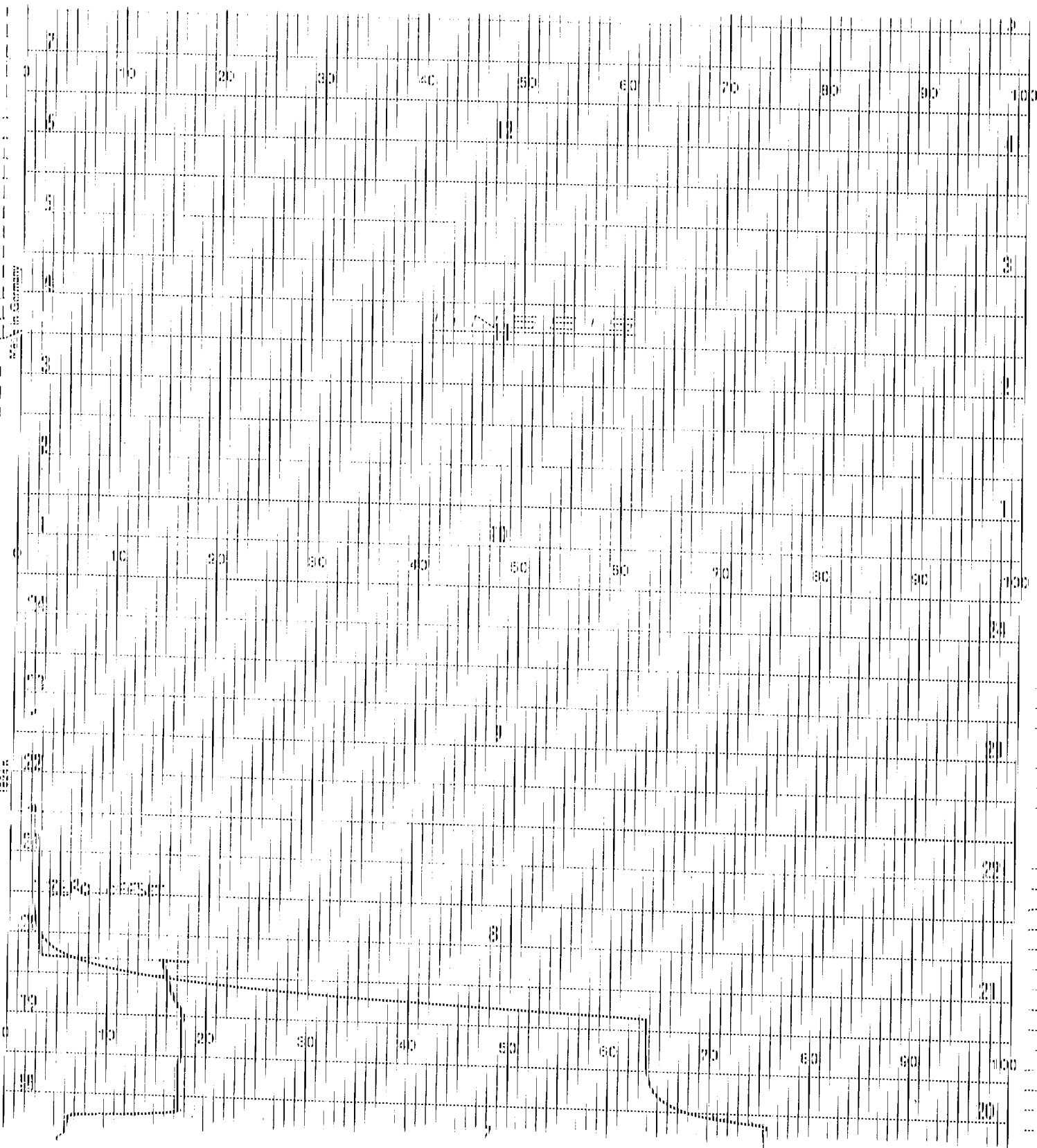
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APPENDIX III
STEEL CHART DATA (1-21-92)





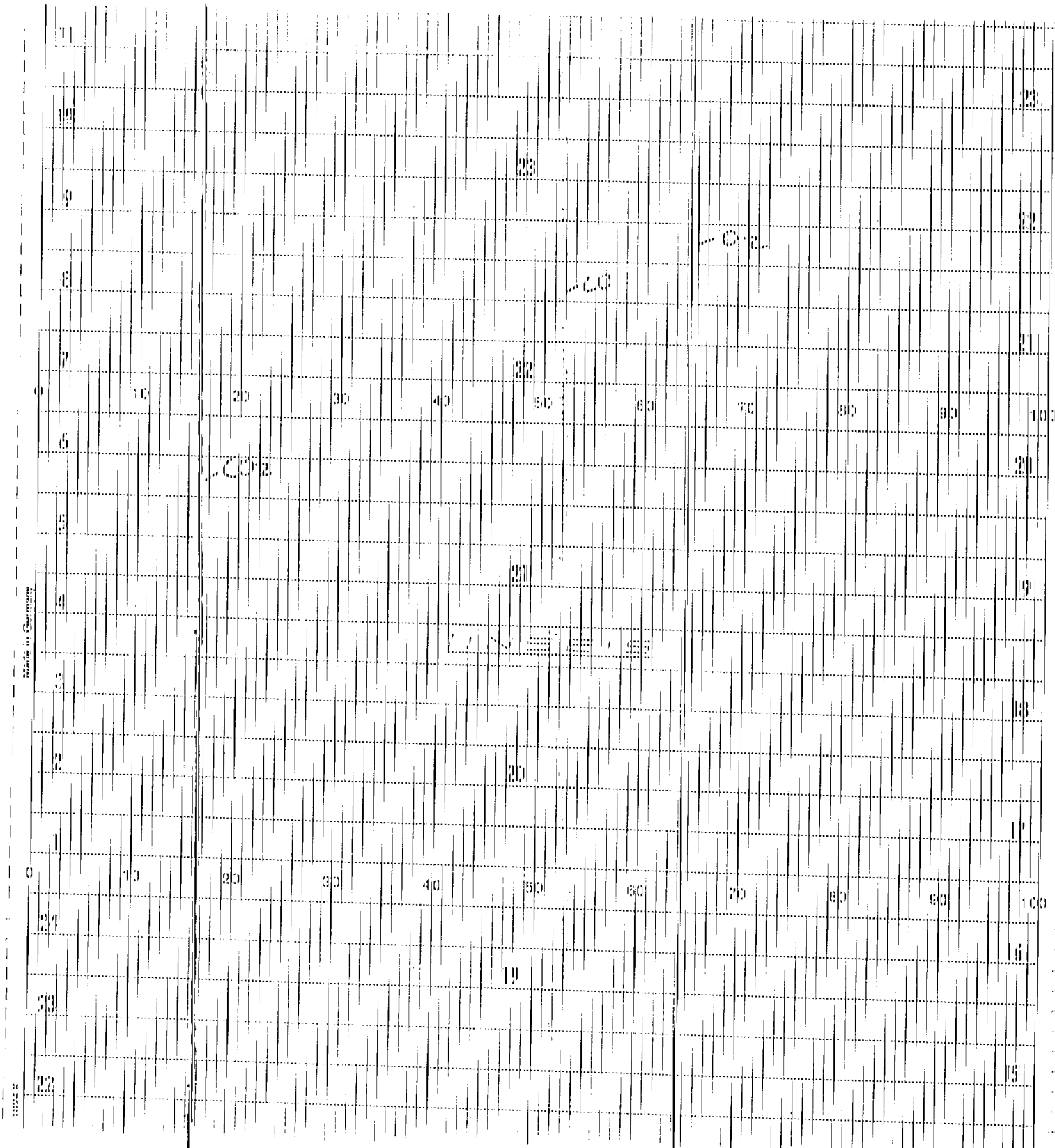


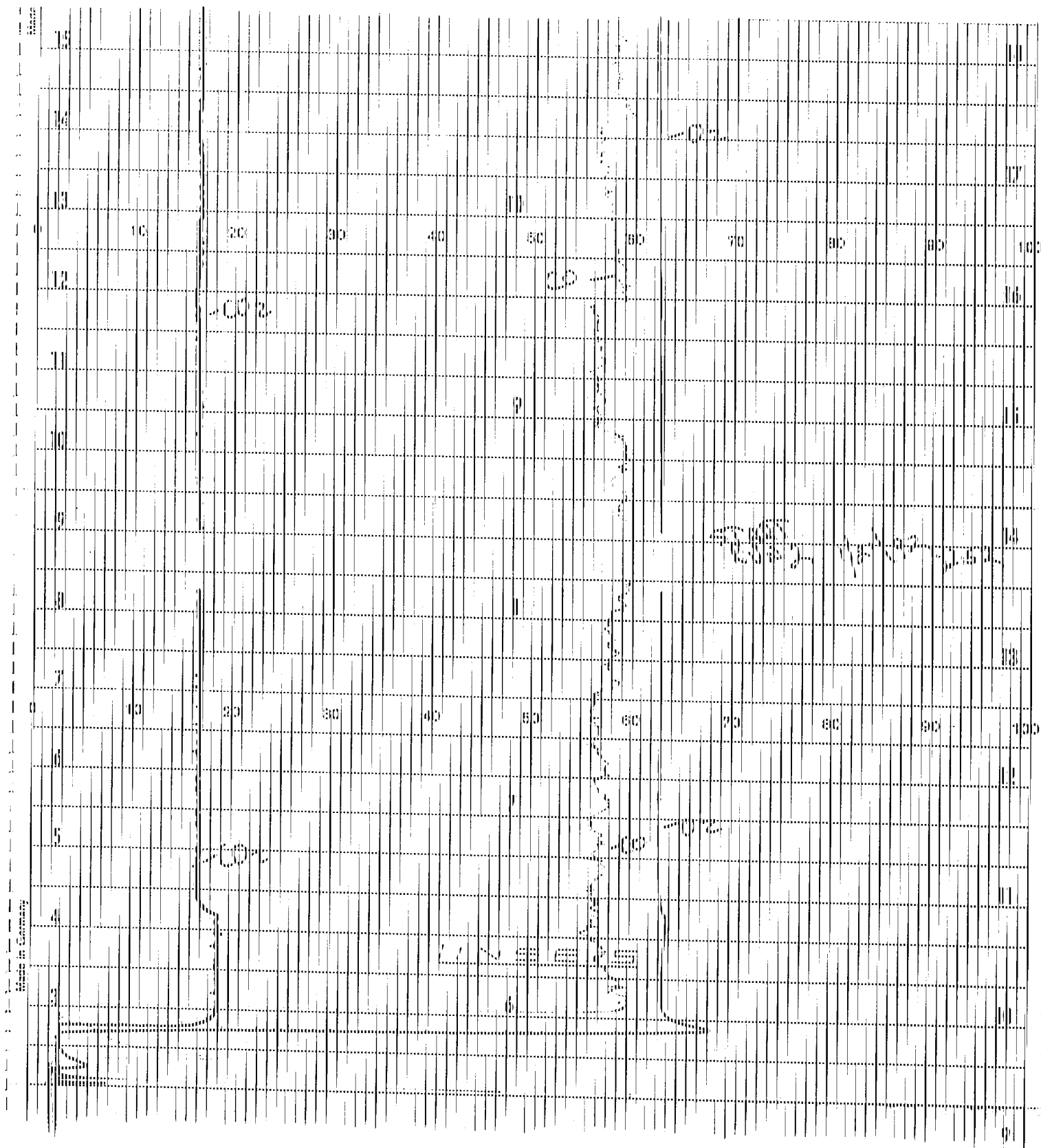


Made in Germany

CO SCALE 24.2 mm
CO SCALE 30.2
O₂ SCALE 25.7
N₂ SCALE 20.0 mm

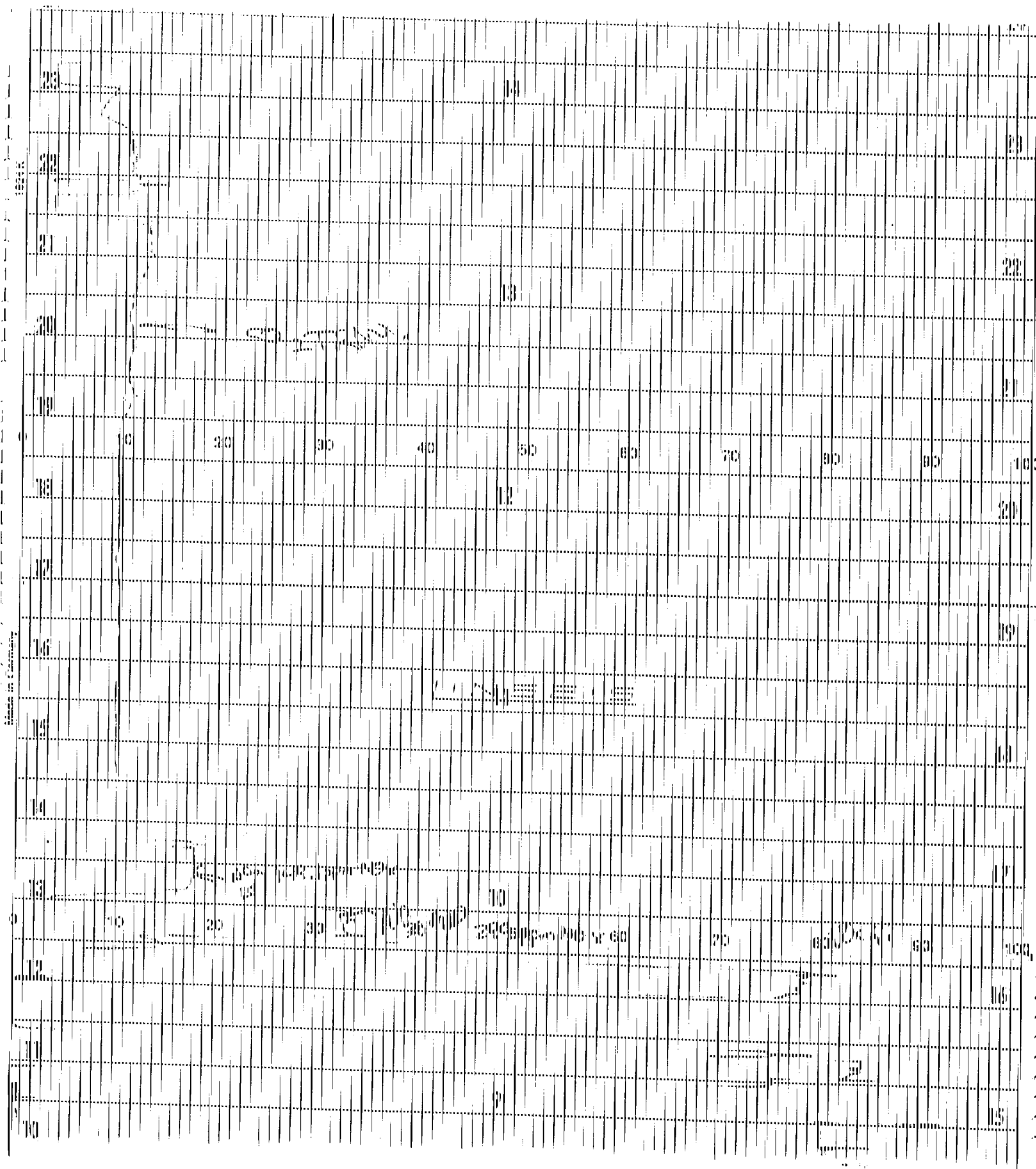
20.5 mm
25.7 mm
30.2 mm





19

100



STARS 2000 11/21/82 30171/10

13 0 10 20 30 40 50 60 70 80 90 100

12 10 20 30 40 50 60 70 80 90 100

11 10 20 30 40 50 60 70 80 90 100

10 10 20 30 40 50 60 70 80 90 100

9 10 20 30 40 50 60 70 80 90 100

8 10 20 30 40 50 60 70 80 90 100

7 10 20 30 40 50 60 70 80 90 100

6 10 20 30 40 50 60 70 80 90 100

5 10 20 30 40 50 60 70 80 90 100

4 10 20 30 40 50 60 70 80 90 100

3 10 20 30 40 50 60 70 80 90 100

2 10 20 30 40 50 60 70 80 90 100

1 10 20 30 40 50 60 70 80 90 100

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LINE 15

15.10

RNN3 1/31/92

POST TEST CALC

LINE 15

20 15 10

APPENDIX I
GC-FID METHANE DATA

FB = 0.

DIALOG

FI= 1. FE= 1. MN= 0.
PRESS ENTER TO SKIP ENTRY
CAPTURE DATA? Y/N (N)
CAPTURE REPORT? Y/N (N)
FILE NAME=" TRANSCO 515

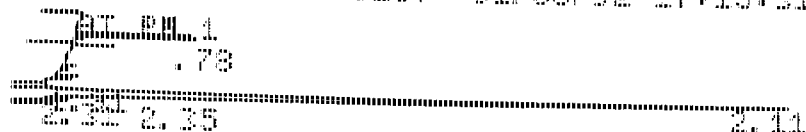
TIME FUNCTION VALUE
IT= .01 TF=" AZ TV= 1
IT= .02 TF=" PM TV= 1
IT= .03 TF=" AT TV= 16
IT= 4 TF=" ER TV= 1
IT=

METHOD NUMBER:MN=

END OF DIALOG

IS= 0.5
PT EVAL:
PT= 170.
PT EVAL:
PT= 24.

CHANNEL A INJECT 01/06/92 17:15:31



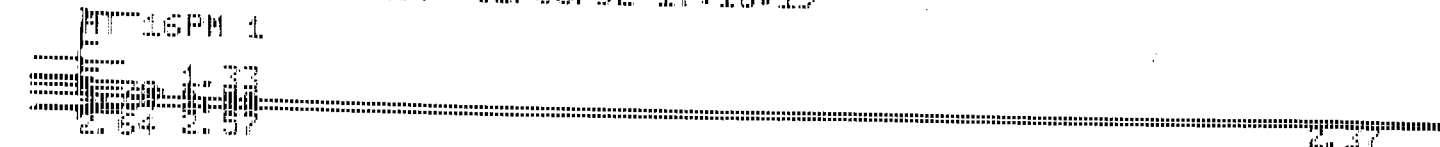
TRANSCO 515 01/06/92 17:15:31 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 1 INDEX 1

PEAK#	AREA%	RT	AREA BC
1	0.081	0.78	80 01
2	0.859	1.91	853 02
3	98.807	2.11	98097 02
4	0.228	2.31	226 02
5	0.025	2.35	25 03

TOTAL 100. 99281

CHANNEL A INJECT 01/06/92 17:18:19



TRANSCO 515 01/06/92 17:18:19 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 2 INDEX 2

PEAK#	AREA%	RT	AREA BC
1	0.006	1.33	40 01
2	0.006	1.78	45 02

4	0.006	1.97	40	02
5	0.012	2.	84	03
6	99.86	2.37	725614	02
7	0.067	2.57	484	02
8	0.027	2.64	198	03
TOTAL 100. 726630				

CHANNEL A INJECT 01/06/92 17:21:58

RT	16PM 1
0.82	
1.72	
2.40	

TRANSCO 515 01/06/92 17:21:58 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 3 INDEX 3

PEAK#	AREA%	RT	AREA	BC
1	0.256	0.82	1868	01
2	0.073	1.58	529	01
3	0.005	1.72	33	02
4	0.012	1.75	86	03
5	99.609	2.4	725846	08
6	0.009	2.69	68	05
7	0.018	2.8	133	07
8	0.018	3.08	130	01

TOTAL 100. 728693

CHANNEL A INJECT 01/06/92 17:26:13

RT	16PM 1
0.82	
1.58	
1.72	
2.40	

TRANSCO 515 01/06/92 17:26:13 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 4 INDEX 4

PEAK#	AREA%	RT	AREA	BC
1	0.013	0.02	95	02
2	0.003	0.1	22	03
3	0.004	0.5	26	01
4	0.007	1.06	49	02
5	0.	1.08	3	02
6	0.009	1.1	68	03
7	0.068	1.33	494	01
8	0.064	1.95	464	02
9	0.029	1.98	212	02
10	0.019	2.04	136	03
11	0.023	2.14	166	01
12	99.596	2.4	722082	02

14	0.072	2.62	324 02
15	0.005	2.71	38 03

TOTAL 100. 725009

CHANNEL A INJECT 01/06/92 17:30:43

16.00	1
1.35	
1.06	
1.11	
2.90	
2.39	

TRANSCO 515 01/06/92 17:30:43 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 5 INDEX 5

PEAK#	AREA%	RT	AREA	BC
1	0.022	0.09	150	02
2	0.075	0.17	544	03
3	0.01	0.35	73	02
4	0.006	0.39	43	03
5	0.009	1.06	63	01
6	0.011	1.35	78	01
7	0.015	2.17	107	02
8	99.812	2.39	723050	03
9	0.041	2.9	297	01

TOTAL 100. 724415

CHANNEL A INJECT 01/06/92 17:34:04

15.00	1
1.35	
1.06	
1.11	
2.73	
2.40	
3.33	
3.4	

TRANSCO 515 01/06/92 17:34:04 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 6 INDEX 6

PEAK#	AREA%	RT	AREA	BC
1	0.045	0.39	325	01
2	0.006	0.98	45	02
3	0.014	0.99	105	03
4	0.018	1.6	134	01
5	99.851	2.4	723259	02
6	0.033	2.64	236	02
7	0.018	2.73	134	03
8	0.006	3.33	47	02
9	0.008	3.4	56	03

TOTAL 100. 724341

CHANNEL A INJECT 01/06/92 17:42:25

RT 16M 1

ER 8

2.40

TRANSCO 515

01/06/92 17:42:25

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 7 INDEX 7

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	725011 01
TOTAL	100.		725011

CHANNEL A INJECT 01/07/92 08:02:53

RT 16M 1

ER 8

3.30

2.40

TRANSCO 515

01/07/92 08:02:53

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 8 INDEX 8

PEAK#	AREA%	RT	AREA BC
1	99.855	2.4	730241 02
2	0.126	2.56	925 03
3	0.019	3.3	138 01

5020 ppm CHY Std

145.466

TOTAL 100. 731304

CHANNEL A INJECT 01/07/92 08:14:30

RT 16M 1

2.40

TRANSCO 515

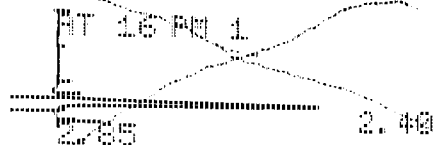
01/07/92 08:14:30

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 9 INDEX 9

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	728586 01
TOTAL	100.		728586

CHANNEL A INJECT 01/07/92 08:20:46



TRANSCO 515 01/07/92 08:20:46 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 10 INDEX 10

PEAK#	AREA%	RT	AREA BC
-------	-------	----	---------

1	99.668	2.4	33931 02
---	--------	-----	----------

2	0.332	2.85	113 03
---	-------	------	--------

TOTAL	100.		34044
-------	------	--	-------

CHANNEL A INJECT 01/07/92 08:24:02

RT 16 PM 1

2.40

TRANSCO 515 01/07/92 08:24:02 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 11 INDEX 11

PEAK#	AREA%	RT	AREA BC
-------	-------	----	---------

1	100.	2.4	293702 01
---	------	-----	-----------

TOTAL	100.		293702
-------	------	--	--------

1980 1980 ppm CH
Std

CHANNEL A INJECT 01/07/92 08:27:56

RT 16 PM 1

2.40

TRANSCO 515 01/07/92 08:27:56 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 12 INDEX 12

PEAK#	AREA%	RT	AREA BC
-------	-------	----	---------

1	100.	2.4	295066 01
---	------	-----	-----------

TOTAL	100.		295066
-------	------	--	--------

1980 ppm
Dup

CHANNEL A INJECT 01/07/92 08:35:03

ER 0

2.40

999 ppm CH4
Std

TRANSCO 515

01/07/92 08:35:03

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 13 INDEX 13

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	146724 01
TOTAL	100.		146724

CHANNEL A INJECT 01/07/92 08:39:19

AT 10M 1

2.40

TRANSCO 515

01/07/92 08:39:19

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 14 INDEX 14

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	146119 01
TOTAL	100.		146119

CHANNEL A INJECT 01/07/92 08:46:24

AT 15 PM 1

2.37

ER 0

TRANSCO 515

01/07/92 08:46:24

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 15 INDEX 15

PEAK#	AREA%	RT	AREA BC
1	100.	2.37	4495 01
TOTAL	100.		4495

Amber Air

CHANNEL A INJECT 01/07/92 09:08:04

AT 16PM 1

2.39

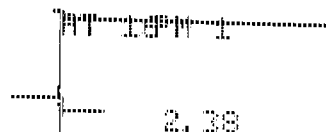
TRANSCO 515 01/07/92 09:08:04 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 16 INDEX 16

PEAK#	AREA%	RT	AREA BC
1	100.	2.39	2354 01
TOTAL	100.		2354

CHANNEL A INJECT 01/07/92 09:25:00

10² x 8



TRANSCO 515 01/07/92 09:25:00 CH= "A" PS= 1.

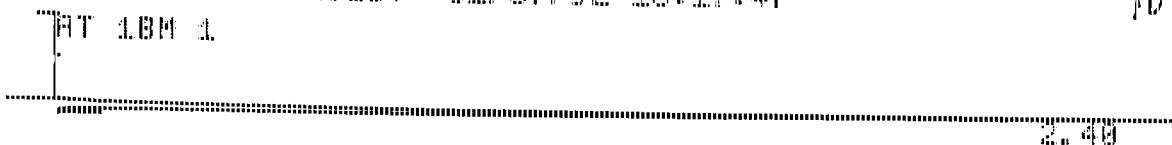
FILE 1. METHOD 0. RUN 17 INDEX 17

PEAK#	AREA%	RT	AREA BC
1	100.	2.38	551 01
TOTAL	100.		551

CHANNEL A INJECT 01/07/92 10:17:47

10² x 4

AT 10M 1



TRANSCO 515 01/07/92 10:17:47 CH= "A" PS= 1.

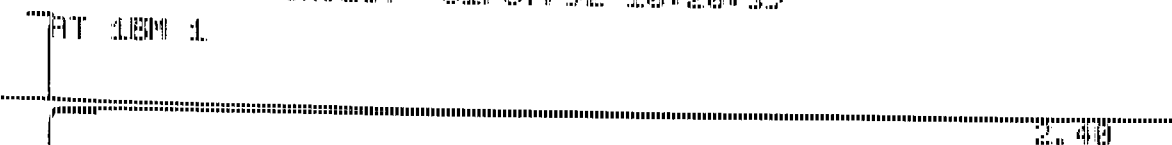
FILE 1. METHOD 0. RUN 18 INDEX 18

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	144246 01
TOTAL	100.		144246

CHANNEL A INJECT 01/07/92 10:20:39

999 ppm CHA
std

AT 10M 1



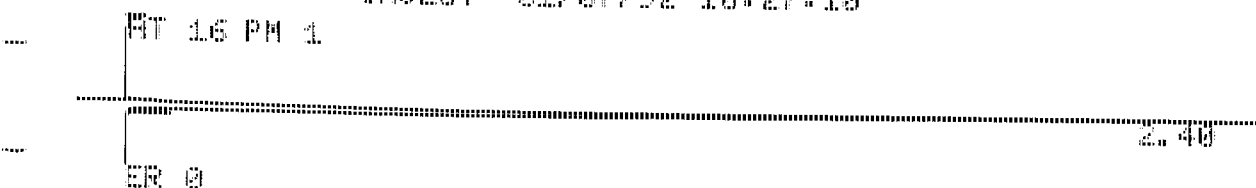
ER 0

TRANSCO 515 01/07/92 10:20:39 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 19 INDEX 19

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	145186 01
TOTAL	100.		145186

CHANNEL A INJECT 01/07/92 10:27:10

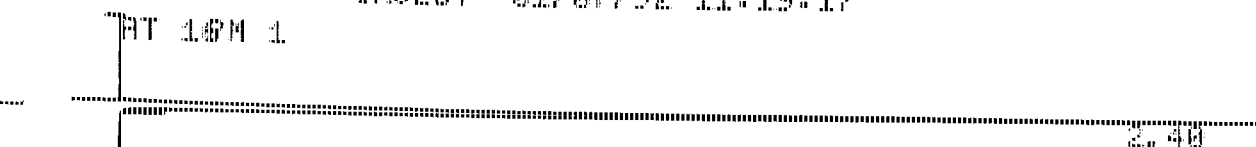


TRANSCO 515 01/07/92 10:27:10 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 20 INDEX 20

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	145965 01
TOTAL	100.		145965

CHANNEL A INJECT 01/07/92 11:19:17



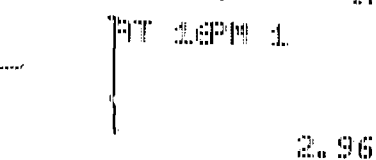
TRANSCO 515 01/07/92 11:19:17 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 21 INDEX 21

PEAK#	AREA%	RT	AREA BC
1	100.	2.4	146149 01
TOTAL	100.		146149

Run #1
Inj #1

CHANNEL A INJECT 01/07/92 11:27:02



CHANNEL A INJECT 01/07/92 11:30:22
RT 16M 1

INJ #2

2.96

NO DATA CHANNEL A

CHANNEL A INJECT 01/07/92 11:36:23
RT 16PM 1

INJ #3

ER40

TRANSCO 515 01/07/92 11:36:23 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 24 INDEX 24

PEAK#	AREA%	RT	AREA BC
1	100.	3.45	1911 01
TOTAL	100.		1911

CHANNEL A INJECT 01/07/92 11:43:57

INJ #4

RT 16PM 1
1.80
ER 0

TRANSCO 515 01/07/92 11:43:57 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 25 INDEX 25

PEAK#	AREA%	RT	AREA BC
1	100.	1.8	2506 01
TOTAL	100.		2506

CHANNEL A INJECT 01/07/92 11:48:17

INJ #5

RT 16M 1

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 11:53:00

RT 16 PM 1

0.43

TRANSCO 515

01/07/92 11:53:00

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 27 INDEX 27

PEAK# AREA% RT AREA BC

1 100. 0.43 1258 01

TOTAL 100. 1258

CHANNEL A INJECT 01/07/92 11:57:12

RT 16 PM 1

0.54

2.75

TRANSCO 515

01/07/92 11:57:12

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 28 INDEX 28

PEAK# AREA% RT AREA BC

1 100. 0.54 1161 01

TOTAL 100. 1161

CHANNEL A INJECT 01/07/92 12:00:34

RT 16 PM 1

1.84

3.48

TRANSCO 515

01/07/92 12:00:34

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 29 INDEX 29

PEAK# AREA% RT AREA BC

1 100. 1.84 2471 01

CHANNEL A INJECT 01/07/92 12:04:22

INJ 9



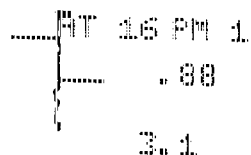
TRANSCO 515 01/07/92 12:04:22 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 30 INDEX 30

PEAK#	AREA%	RT	AREA BC
1	100.	1.84	2875 01
TOTAL	100.		2875

CHANNEL A INJECT 01/07/92 12:09:02

INJ 10



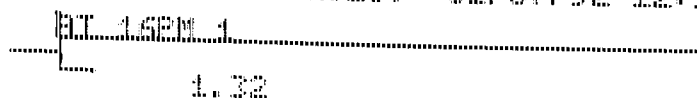
TRANSCO 515 01/07/92 12:09:02 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 31 INDEX 31

PEAK#	AREA%	RT	AREA BC
1	100.	0.88	1841 01
TOTAL	100.		1841

CHANNEL A INJECT 01/07/92 12:12:34

ABX 10



TRANSCO 515 01/07/92 12:12:34 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 32 INDEX 32

PEAK#	AREA%	RT	AREA BC
1	100.	1.32	1090 01
TOTAL	100.		1090

RT 16PM 1

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 12:26:29

INJ #12

RT 16PM 1

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 12:39:38

999 ppm CH₄ std

RT 16PM 1

2.41

TRANSCO 515

01/07/92 12:39:38

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 35 INDEX 35

PEAK# AREA% RT AREA BC

1 100. 2.41 145404 01

TOTAL 100. 145404

CHANNEL A INJECT 01/07/92 12:45:13

RT 16PM 1

ABORT

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 12:46:06

RT 16PM 1

1.42

2.94

INJ # GAS

TRANSCO 515

01/07/92 12:46:06

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 37 INDEX 37

PEAK#	AREA%	RT	AREA BC
1	100.	1.42	18729 01
TOTAL	100.		18729

CHANNEL A INJECT 01/07/92 12:49:18

AT 16 PM 1

ER 0

NO DATA, CHANNEL A

Turbine Run #2

CHANNEL A INJECT 01/07/92 12:56:04

AT 16PM 1

2.34

Imp #1

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 12:59:36

AT 16PM 1

Imp #2

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:09:35

AT 16 PM 1

ER 0

Imp #3

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:30:39

AT 16PM 1

3.09 #4

3.09

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:33:54

AT 16

3.44 #5

PM 1

3.44

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:37:34

AT 16PM 1

ER 0 #6

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:46:26

AT 16 PM 1

ER 0 #7

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 13:49:36

AT 16PM 1

ER 0 #8

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 14:04:52

RT 16PM 1

NO DATA. CHANNEL A

CHANNEL A INJECT 01/07/92 14:06:50

297 225 CH 560

RT 16PM 1

2.40

ER 0

TRANSCO 515

01/07/92 14:06:50

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 40 INDEX 40

PEAK# AREA% RT AREA BC

1 100. 2.4 146240 01

TOTAL 100. 146240

2.40 3.00 3.00

CHANNEL A INJECT 01/07/92 14:37:20

297 225

RT 16PM 1

ER 0

NO DATA. CHANNEL A

CHANNEL A INJECT 01/07/92 14:45:19

297 225

RT 16PM 1

ER 0

NO DATA. CHANNEL A

CHANNEL A INJECT 01/07/92 14:52:47

297 225

RT 16PM 1

ER 0

TRANSCO 515

01/07/92 14:52:47

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 51 INDEX 51

PEAK# AREA% RT AREA BC

1 100. 1.92 543 01

TOTAL 100. 543

CHANNEL A INJECT 01/07/92 14:58:25

1.92 1.92

RT 1.92 PM 1

3.16
ER 0 3.96

TRANSCO 515

01/07/92 14:58:25

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 52 INDEX 52

PEAK# AREA% RT AREA BC

1 61.555 3.16 578 01

2 38.445 3.96 361 01

TOTAL 100. 939

CHANNEL A INJECT 01/07/92 15:02:38

3.16 3.16

RT 3.16 PM 1

3.16

3.19

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 15:05:57

1.78 1.78

RT 1.78 PM 1

1.78

ER 0

TRANSCO 515

01/07/92 15:05:57

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 53 INDEX 53

PEAK#	AREA%	RT	AREA BC
1	100.	1.70	2246 01
TOTAL	100.		2246

CHANNEL A INJECT 01/07/92 15:16:05

2.7

RT 1.6PM 1

3.60

TRANSCO 515

01/07/92 15:16:05

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 55 INDEX 55

PEAK#	AREA%	RT	AREA BC
-------	-------	----	---------

1	100.	3.6	413 01
---	------	-----	--------

TOTAL	100.		413
-------	------	--	-----

CHANNEL A INJECT 01/07/92 15:21:15

2.7 #8

RT 1.6PM 1

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 15:26:06

2.7 #9

RT 1.6PM 1

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 15:30:20

2.7 #10

RT 1.6PM 1

ER 0

NO DATA, CHANNEL A

CHANNEL A INJECT 01/07/92 15:41:11

999 ppm

CH4

Std

FT 16PM 1

ER 0

2.40

TRANSCO 515

01/07/92 15:41:11

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 59 INDEX 59

PEAK# AREA% RT AREA BC

1 100. 2.4 145617 01

TOTAL 100. 145617

CHANNEL A INJECT 01/08/92 06:21:39

999 ppm

CH4

Std

FT 16PM 1

2.39

TRANSCO 515

01/08/92 06:21:39

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 60 INDEX 60

PEAK# AREA% RT AREA BC

1 100. 2.39 146677 01

TOTAL 100. 146677

1000 62.77

CHANNEL A INJECT 01/08/92 06:25:05

999 ppm

CH4

Std (0.002)

FT 16 PM 1

ER 0

2.39

TRANSCO 515

01/08/92 06:25:05

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 61 INDEX 61

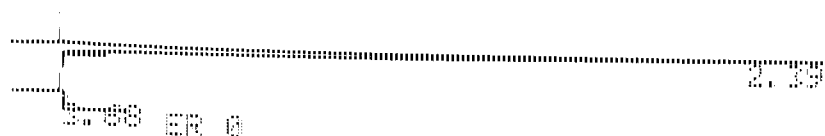
PEAK# AREA% RT AREA BC

1 100. 2.39 146037 01

CHANNEL A INJECT 01/08/92 08:04:42

RT 16PM 1

2.39 = 1



TRANSCD 515

01/08/92 08:04:42

CH= "A" PS= 1.

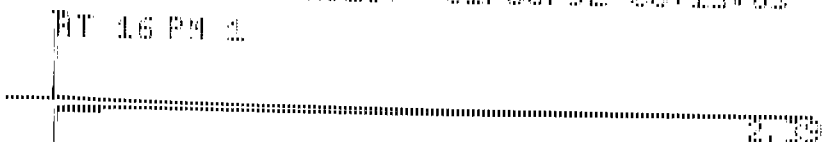
FILE 1. METHOD 0. RUN 62 INDEX 62

PEAK#	AREA%	RT	AREA	BC
1	98.547	2.39	95975	01
2	1.453	3.68	1430	01
TOTAL	100.		98405	

CHANNEL A INJECT 01/08/92 08:13:03

RT 16 PM 1

2.39 = 2



TRANSCD 515

01/08/92 08:13:03

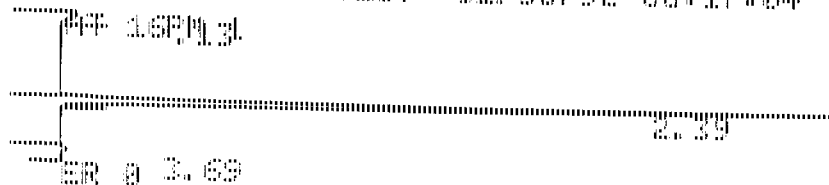
CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 63 INDEX 63

PEAK#	AREA%	RT	AREA	BC
1	100.	2.39	96121	01
TOTAL	100.		96121	

CHANNEL A INJECT 01/08/92 08:17:04

RT 16PM 1



TRANSCD 515

01/08/92 08:17:04

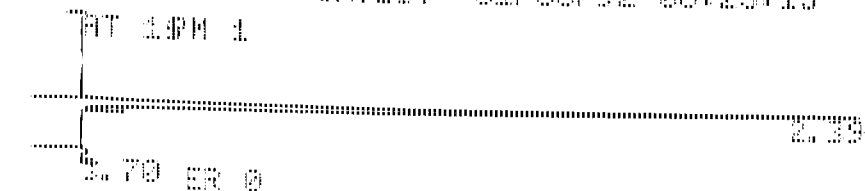
CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 64 INDEX 64

PEAK#	AREA%	RT	AREA	BC
1	2.62	0.13	2867	01
2	95.688	2.39	97493	01

TOTAL 100. 101674

CHANNEL A INJECT 01/08/92 08:25:15



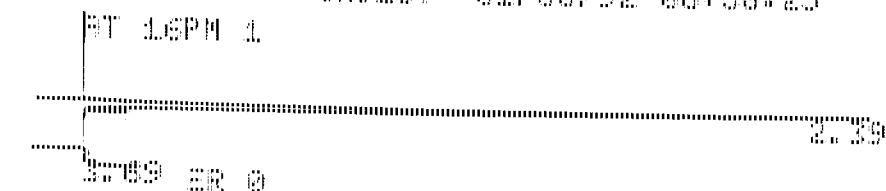
TRANSCO 515 01/08/92 08:25:15 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 65 INDEX 65

PEAK#	AREA%	RT	AREA	EC
1	98.654	2.39	98561	01
2	1.346	3.7	1345	01

TOTAL 100. 99906

CHANNEL A INJECT 01/08/92 08:58:25



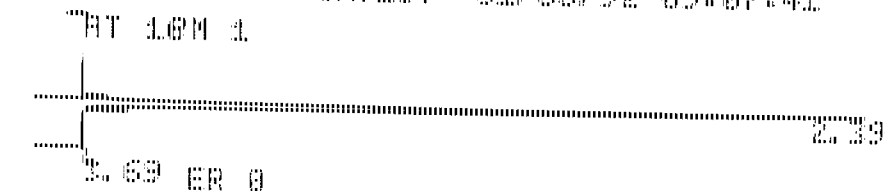
TRANSCO 515 01/08/92 08:58:25 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 66 INDEX 66

PEAK#	AREA%	RT	AREA	EC
1	98.523	2.39	99846	01
2	1.477	3.69	1497	01

TOTAL 100. 101343

CHANNEL A INJECT 01/08/92 09:07:41



TRANSCO 515 01/08/92 09:07:41 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 67 INDEX 67

PEAK#	AREA%	RT	AREA	EC
-------	-------	----	------	----

TOTAL 100. 100000

CHANNEL A INJECT 01/00/92 10:13:47

RT 16 PM 1

2.40

3.70 ER 0

TRANSO 515

01/00/92 10:13:47

CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 60 INDEX 60

PEAK# AREA% RT AREA BC

1 98.678 2.4 95600 01

2 1.322 3.7 1281 01

TOTAL 100. 96889

APPENDIX J
DRY GAS METER CALIBRATION DATA.

PROJECT: FOST CAL.
DATE: 2/14/92

BOX # 3

Orifice B
K' .000309

Delta H in. H2O	Meter T (F)	Meter O (F)	Ambient T (C)	Pb in Hg	Meter F Cubic ft.	Meter I Cubic ft.	Time min.
.83	127	110.5	25	29.98	756.002	749.249	15
.83	129	112	25	29.98	768.517	755.007	24
.83	129.5	114.5	25	29.98	776.818	768.517	12

Orifice Vol. (ccm)	Meter Vol. (ccm)	Yd	Delta H
.2043869	.3008448	1.01733	1.88047
.3270191	.3230999	1.01198	1.84431
.1638095	.1622413	1.00776	1.83928

CALCULATIONS

Orif. Vol. = (Orif. K' * Pbs * 25.4 * Time) / SQRT (Amb. Temp + 273) = ccm

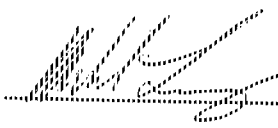
Meter Vol. = ((17.644 (Pbs + 13.5) * Vm) / (Meter Temp + 460)) / 35.31 = ccm

Yd = 1.00 - (ccm orifice - ccm meter) / ccm orifice

Delta H = (0.0319 * dh * (Meter temp + 460)) / (Pbs * (Time / Yd * Vm) * 2)

Orifice K'

A	.0001712
B	.0003092
C	.0004848
D	.0006692

CALIBRATED BY: 

PROJECT: POST CAL.
DATE: 2/10/92

BOX # 3

Orifice C
C' .000485

Delta H in. H ₂ O	Meter I (F)	Meter O (F)	Ambient T (C)	Pb in Hg	Meter F Cubic ft.	Meter I Cubic ft.	Time min.
2.00	127	104	18	29.95	289.721	271.851	22
2.00	129.5	105	18	29.95	299.549	289.722	12
2.00	132.5	108	18	29.95	314.361	299.550	18

Orifice Vol. (scm)	Meter Vol. (scm)	Yd	Delta H@
.4756301	.4668798	1.01840	1.79155
.2594346	.2559397	1.01347	1.78556
.3891819	.3837904	1.01378	1.77636

CALCULATIONS

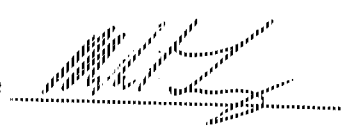
Drift Vol. = (Drift. K * Pb * 25.4 * Time) / SQRT (Amb. Temp + 273) = scm

Meter Vol. = ((17.54 * (Pb + dh / 13.6) * Vm) / (Meter Temp + 460)) / 33.31 = scm

Yd = 1.00 - (scm orifice - scm meter) / scm orifice

Delta H@ = (0.0319 * dh * (Meter temp + 460)) / (Pb * (Time / Yd * Vm) * 2)

Orifice	K'
A	.0001712
B	.0003092
C	.0004848
D	.0006692

CALIBRATED BY: 

PROJECT: TRANSCO POST CAL.
DATE: 1/27/92

BOX # 1

Orifice B
K' .000309

Delta H in. H2O	Meter I (F)	Meter O (F)	Ambient T (C)	Po in Hg	Meter F Cubic ft.	Meter I Cubic ft.	Time min.
.83	113	98	19	29.81	115.487	108.614	13
.83	113	98.5	19	29.81	124.01	115.487	16
.84	116.5	101.5	20	29.81	134.215	124.010	19

Orifice Vol. (scm)	Meter Vol. (scm)	Yd	Delta Hg
.1781098	.1818521	.978987	1.85993
.2192117	.2244151	.976253	1.85131
.2598593	.2676471	.970070	1.88405

CALCULATIONS

Drift Vol. = (Drift K' * P * 25.4 * Time) / SQRT(Amb. Temp + 273) = scm

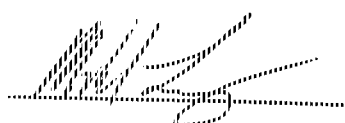
Meter Vol. = ((17.64 * (Pb - dh / 13.6) * Vm) / (Meter Temp + 460)) / 35.31 = scm

Yd = 1.00 - (scm orifice - scm meter) / scm orifice

Delta Hg = (0.0319 * dh * (Meter temp + 460)) / (P * (Time / Yd * Vm) * 2)

Orifice	K'
A	.0001712
B	.0003092
C	.0004848
D	.0006592

CALIBRATED BY:



PROJECT: TRANSD POST CAL.
DATE: 1/24/92

BOX # 1

Orifice C
K' .000485

Delta H in. H2O	Meter I (F)	Meter O (F)	Ambient T (C)	Pb in. Hg	Meter F Cubic ft.	Meter I Cubic ft.	Time min.
2.10	123	104	21	29.81	149.166	134.836	17
2.10	126	105	21	29.81	166.087	149.166	20
2.10	128.5	108.5	20	29.81	178.685	166.087	18

Orifice Vol. (ccm)	Meter Vol. (ccm)	Yd	Delta H@
.3639432	.3740412	.972254	1.91879
.4281684	.4393561	.973871	1.91179
.3216738	.3284701	.978872	1.90438

CALCULATIONS

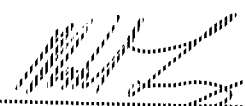
Orif. Vol. = (Orif. K' * P * 25.4 * Time) / SQRT (Amb. Temp + 273) * ccm

Meter Vol. = ((17.64 * (Pb + dh / 13.6) * Vm) / (Meter Temp + 460)) / 35.31 * ccm

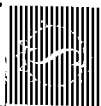
Yd = 1.00 - (ccm orifice - ccm meter) / ccm orifice

Delta H@ = (0.0319 * dh * (Meter temp + 460)) / (P * (Time / Yd * Vm) * 2)

Orifice	K'
A	.0001712
B	.0003092
C	.0004848
D	.0006692

CALIBRATED BY: 

APPENDIX E
CALIBRATION GAS CERTIFICATES



Scott Specialty Gases, Inc.

PLUMSTEADVILLE, PA 19340

PHONE: 215-766-6661

FAX: 215-766-0660

SCOTT ENVIRONMENTAL TECH

Date Shipped: 1-23-91

Our Project No: 25127

Your P.O. No: 68598

Page 3 of 7

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number: ALM - 016657
CP = 2000 psig

Certified Accuracy: $\pm 1\%$ % NBS Traceable

Analysis Dates: First: 1-7-91 Last: 1-16-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's		REPLICATE CONCENTRATIONS	
						FIRST	SECOND
NITRIC OXIDE	93.8 ppm	7-14-92	CHEMILUMINESCENCE	1684	93.39 ppm	94.07 ppm	
NOX	93.8 ppm				93.63 ppm	93.82 ppm	
OXYGEN FREE NITROGEN BALANCE					94.19 ppm	93.69 ppm	

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's		REPLICATE CONCENTRATIONS	
						FIRST	SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1

Analyst: *Walter Seltz*

Approved by: *Mark S. Birnides*

The only facility of this company for use which fails to comply with this analysis shall be held responsible by the company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACUSLEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

HOY, MICHIGAN / SAN BERNARDINO, CALIFORNIA / HOUSTON, TEXAS
SOUTH PLAINFIELD, NEW JERSEY / FLEMONT, CALIFORNIA / WAREFIELD, MASSACHUSETTS / LONGMONT, COLORADO

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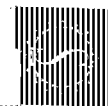
~~I hereby certify that the above information was obtained from the files of the FBI and is true and correct.~~

~~Approved by _____~~

The City Manager or City Controller for the County shall sign this certificate if the City Manager or City Controller has reviewed the information and found it to be true and correct.

CERTIFIED REFERENCE MATERIALS = LAW PROTECT CASES = ADULTERATED = CALIBRATION & SECURITY ORGANIZATIONS
TRUE CASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

TROY JOHNSON / SAN FRANCISCO CALIFORNIA / TELEPHONE 708-6666



Scott Specialty Gases, Inc.

PLUMSTEADVILLE, PA 19049

PHONE: 215-768-0861

FAX: 215-768-0820

SCOTT ENVIRONMENTAL TECH

Date Shipped: 1-25-91

Our Project No: 25127

Your P.O. No: 68598

Page 6 of 7

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES*
(Concentrations are in mole % or ppm)

Cylinder Number ALM - 16647
OP = 2000 psig

Certified Accuracy ± 1 % NBS Traceable

Analysis Dates: First 1-7-91 Last 1-14-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/CRM?	REPLICATE CONCENTRATIONS FIRST SECOND
NITRIC OXIDE	149.1 ppm	7-14-92	CHEMILUMINESCENCE	1684	147.5 ppm 149.6 ppm
NOX	149.1 ppm				148.5 ppm 150.1 ppm
OXYGEN FREE NITROGEN BALANCE					148.8 ppm 149.6 ppm

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/CRM?	REPLICATE CONCENTRATIONS FIRST SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1 Procedure of

Analyst Walt Selt

Approved by

Mark S. Sirinides

MARK S. SIRINIDES

The only liability of this company for gas which fails to comply with this analysis shall be replacement thereof by the company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACUBLENDO = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

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SOUTH PLAINFIELD, NEW JERSEY / FREMONT, CALIFORNIA / WAREFIELD, MASSACHUSETTS / LONGMONT, COLORADO



Scott Specialty Gases

a division of
Scott Environmental Technology, Inc.

PLUMSTEADVILLE, PA 15848

PHONE: (215) 768-8881

TWX: 510-605-8344

SCOTT ENVIRONMENTAL TECH

Date Shipped: 1-11-91

Our Project No.: 24993

Your P.O. No.: 68593

Page 4 of 9

RECERTIFICATION ANALYSIS - EPA PROTOCOL GASES[®]

(Concentrations are in mole % or ppm)

Cylinder Number	AAI 4347	Certified Accuracy	±1	% NBS Traceable	Analysis Dates: Last	1-3-90	New	1-10-91
COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS LAST	NEW		
NITRIC OXIDE	299 ppm	7-10-92	CHEMILUMINESCENCE	1686B	297.6 ppm	299.7 ppm		
NOX	299 ppm				298.8 ppm	299.3 ppm		
					300.6 ppm	299.9 ppm		
NITROGEN	BALANCE							

Cylinder Number		Certified Accuracy		% NBS Traceable	Analysis Dates: Last	New		
COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS LAST	NEW		

We hereby certify that the gas has been analyzed according to EPA Protocol No. 1

Analyst *[Signature]* Approved By *[Signature]* MARK S. SIRINIDES

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACULEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

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PLUMSTEADVILLE, PA 19349

PHONE: (215) 766-8888

FAX: 510-665-9344

SCOTT ENVIRONMENTAL TECH

Date Shipped: 1-11-91

Our Project No.: 24993

Your P.O. No.: 68593

Page 8 of 9

RECERTIFICATION ANALYSIS - EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

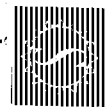
Cylinder Number ALN 003022 CP - 1900 psig Certified Accuracy 11 % NBS Traceable Analysis Dates: Last 6-13-89 New 1-3-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	NEW
NITRIC OXIDE	0.0746%	7-3-92	QUANTUM INTERFERENCE	1684	0.0746%	0.0748%
NOX	0.0746%				0.0745%	0.0748%
OXYGEN FREE NITROGEN BALANCE					0.0748%	0.0745%

Cylinder Number _____ Certified Accuracy _____ % NBS Traceable Analysis Dates: Last _____ New _____

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	NEW

We hereby certify that the analysis has been analyzed according to EPA Protocol No. 1 Procedure of 10/2/91
Analyst [Signature] Approved by [Signature]
The only liability of this Company for gas which fails to comply with this analysis shall be replacement of the Company without extra cost.
CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ADULEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES
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PLUMSTEADVILLE, PA 19388 PHONE: (215) 766-8881 FAX: 510-605-9344

SCOTT ENVIRONMENTAL TECH

Date Shipped: 1-11-91
Our Project No.: 24993
Your P.O. No.: 68593
Page 9 of 9

RECERTIFICATION ANALYSIS - EPA PROTOCOL GASES
(Concentrations are in mole % or ppm)

Cylinder Number	AAL 9027	Certified Accuracy	±1	% NBS Traceable	Analysis Dates: Last	6-15-89	New	1-3-91
CP	1600 psig							
COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	NEW		
NITRIC OXIDE	0.1001%	7-3-92	CHEMILUMINESCENCE	2630	0.1004%	0.0992%		
NOX	0.1019%				0.1002%	0.1003%		
					0.1005%	0.1001%		
OXYGEN FREE NITROGEN BALANCE								

Cylinder Number		Certified Accuracy		% NBS Traceable	Analysis Dates: Last	New		
COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	NEW		

We hereby certify that cylinder gas has been analyzed according to EPA Protocol No. 1
Analyst: *[Signature]* Procedure 92
Approved By: *[Signature]* MARK S. STERNBERG
The only facility of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.
CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACQULEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES
TROY, MICHIGAN / SAN BERNARDINO, CALIFORNIA / LINDSEY, TEXAS



Scott Specialty Gases

a division of
Scott Environmental Technology, Inc.

PLUMSTEADVILLE, PA 18949 PHONE: (215) 766-6661 TWX: 510-665-9344

SCOTT ENVIRONMENTAL TECH
BUILDING #A
ROUTE 611 NORTH
PLUMSTEADVILLE, PA 18944

ATTN: JEFF

Date Shipped: 1-11-91
Our Project No.: 24993
Your P.O. No.: 68593
Page 1 of 4

RECERTIFICATION ANALYSIS - EPA PROTOCOL GASES¹

(Concentrations are in mole % or ppm)

Cylinder Number AAL - 4395
CP = 2000 psi

Certified Accuracy ± 1 % NBS Traceable Analysis Dates: Last 1-3-91 New 1-10-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	REPLICATE CONCENTRATIONS NEW
CARBON MONOXIDE	20.0 ppm	7-10-92	RDIR	1677/2635	20.09 ppm	20.03 ppm
					20.04 ppm	20.00 ppm
NITROGEN	BALANCE				20.03 ppm	20.06 ppm

Cylinder Number _____ Certified Accuracy _____ % NBS Traceable Analysis Dates: Last _____ New _____

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM'S	REPLICATE CONCENTRATIONS LAST	REPLICATE CONCENTRATIONS NEW

We hereby certify the cylinder gas has been analyzed according to EPA Protocol No. 1

Analyst

Approved by

(Signature)
MARK S. SIRINIDES

The only facility of this Company for use which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ADULEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

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Scott Specialty Gases, Inc.

PLUMSTEADVILLE, PA 19349 PHONE: 215-769-8881 FAX: 215-769-0320

SCOTT ENVIRONMENTAL TECH

Date Shipped 1-25-91
Our Project No. 25127
Your P.O. No. 68598
Page 1 of 7

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES[®] (Concentrations are in mole % or ppm)

Cylinder Number ALM - 016645
CP = 2650 psig
Certified Accuracy ± 1 % NBS Traceable
Analysis Dates: First 1-7-91 Last 1-14-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM [®]	REPLICATE CONCENTRATIONS FIRST SECOND
CARBON MONOXIDE	128.4 ppm	7-14-92	NDIR	1678/7636	128.7 ppm 128.3 ppm
					128.4 ppm 128.1 ppm
NITROGEN	BALANCE				128.5 ppm 128.1 ppm

Cylinder Number	Certified Accuracy	% NBS Traceable	Analysis Dates: First	Last
COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM [®]

We hereby certify the cylinder gas has been analyzed according to EPA Protocol No. 1 Procedure S1

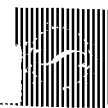
Analyst Walter S. S. S.

Approved By Walter S. S. S.

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACUBLEND[®] = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

TROY, MICHIGAN / SAN BERNARDINO, CALIFORNIA / HOUSTON, TEXAS
SOUTH PLAINFIELD, NEW JERSEY / FREMONT, CALIFORNIA / WAREFIELD, MASSACHUSETTS / LONGMONT, COLORADO



Scott Specialty Gases, Inc.

PLUMSTEADVILLE, PA 19349

PHONE: 215-769-9961

FAX: 215-769-0328

SCOTT ENVIRONMENTAL TECH

Date Shipped 1-25-91

Our Project No. 25177

Your P.O. No. 68598

Page 6 of 7

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES*
(Concentrations are in mole % or ppm)

Cylinder Number ALM - 016637
CP = 2000 psi/g

Certified Accuracy ± 1 % NBS Traceable

Analysis Dates: First 1-7-91 Last 1-14-91

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM#	REPLICATE CONCENTRATIONS FIRST SECOND
CARBON MONOXIDE	240 ppm	7-14-92	NDIR	1678/2636	240.1 ppm 240.2 ppm
					240.3 ppm 240.1 ppm
					239.9 ppm 240.0 ppm
NITROGEN	BALANCE				

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM#	REPLICATE CONCENTRATIONS FIRST SECOND

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No. 1 Procedure of

Analyst Walter Soltz

Approved by

Mark S. Sirinides

The only liability of this company for gas which fails to comply with this analysis shall be replacement thereof by the company without extra cost.

CERTIFIED REFERENCE MATERIALS = EPA PROTOCOL GASES = ACUBLEND® = CALIBRATION & SPECIALTY GAS MIXTURES
PURE GASES = ACCESSORY PRODUCTS = CUSTOM ANALYTICAL SERVICES

TRON, MICHIGAN / SAN BERNARDINO, CALIFORNIA / HOUSTON, TEXAS

SOUTH PLAINFIELD, NEW JERSEY / FREMONT, CALIFORNIA / WAREHOUSING, MASSACHUSETTS / LONGMONT, COLORADO



Scott Specialty Gases, Inc.

1. 2. 3. ANALYSIS CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 512
Plumsteadville, PA 18949
Purchase order:
18412

Shipped to:
SCOTT ENVIRONMENTAL TECH
ATTN: DEPT
DIVISION OF ENDA
DEPT. 13 - FIELD TESTING
PLUMSTEADVILLE, PA 18949
Project no. 25450

Certified per EPA Procedure 4
Certified accuracy +/- 1% High Precision

Section 4 1.0.1

Cylinder number: 40M-001934
Cylinder pressure: 1700 psig.
Date of assay: 7-3-91
Component: OXYGEN
Certified concentration: 8.05 %
Expiration date: 1-3-92
ANALYST: Balance

Standard Type: CRM-335A
Concentration: 10.00 %
Cylinder #1: 45L-15590
Analyzer Make: BECKMAN
Model: 755
Serial number: 2002571
Analytical principle: Paramagnetic
Date of calibration: 5-28-91

Raw data values	Wt	%	Concentration	Customer	Cylinder
Analyses	7-3-91				
21±0.0000	21±990.7	21±595.1	10.00	1	1
22±0.0000	22±991.0	22±594.9	10.00	1	1
23±0.0000	23±990.8	23±595.1	10.00	1	1

Analyst:

Approved by:
Paul S. Stetson



Scott Specialty Gases, Inc.

E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 611
Plumsteadville, PA 18949
Purchase order:
59112

Shipped to:
SCOTT ENVIRONMENTAL TECH
ATTN: JEFF
DIVISION OF ENR
DEPT. 13 - FIELD TESTING
PLUMSTEADVILLE, PA 18949
Project No. 19650

Certified per E.P.A. Protocol # 1 Procedure H31 Section B 3.0.6
Certified accuracy +/- 1.2 HET Traceable

Cylinder number	5AL-20755	Cylinder pressure	Date of assay
		1900 psig.	7-2-91
Component		Certified concentration	Expiration dates
OXYGEN		12.01 %	1-2-92
NITROGEN		Balance	

Standard		Analyzer	
Type	CRM-2650	Make	SECUMON
Concentration	10.00 %	Model	755
Cylinder #	5AL-10590	Serial number	2002571
		Analytical principle	Paramagnetic
		Date of calibration	5-22-92

Raw data units	VOLTS		Concentration
			of Customer
			Cylinder
Analysis	7-2-91		
Z1=0.0000	R1=0.3393	T1=0.4760	12.02 %
R2=0.3394	Z2=0.0000	T2=0.4760	12.01 %
Z3=0.0000	T3=0.4760	R3=0.3394	12.01 %

Analyst

Approved by

Mark S. Sirmides

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Case No.	Case Name	Case Type	Case Status	Case Date	Case Time	Case Location	Case Description	Case Notes	Case Comments
1	John Doe	Case 1	Open	2023-01-01	10:00	New York	Case 1 Description	Case 1 Notes	Case 1 Comments
2	Jane Smith	Case 2	Closed	2023-01-02	11:00	Los Angeles	Case 2 Description	Case 2 Notes	Case 2 Comments
3	Bob Johnson	Case 3	Pending	2023-01-03	12:00	Chicago	Case 3 Description	Case 3 Notes	Case 3 Comments
4	Alice Brown	Case 4	Open	2023-01-04	13:00	San Francisco	Case 4 Description	Case 4 Notes	Case 4 Comments
5	Charlie Davis	Case 5	Closed	2023-01-05	14:00	Seattle	Case 5 Description	Case 5 Notes	Case 5 Comments
6	Diana White	Case 6	Pending	2023-01-06	15:00	Portland	Case 6 Description	Case 6 Notes	Case 6 Comments
7	Frank Green	Case 7	Open	2023-01-07	16:00	San Diego	Case 7 Description	Case 7 Notes	Case 7 Comments
8	Grace Black	Case 8	Closed	2023-01-08	17:00	Phoenix	Case 8 Description	Case 8 Notes	Case 8 Comments
9	Henry Gold	Case 9	Pending	2023-01-09	18:00	San Jose	Case 9 Description	Case 9 Notes	Case 9 Comments
10	Ivy Silver	Case 10	Open	2023-01-10	19:00	San Antonio	Case 10 Description	Case 10 Notes	Case 10 Comments
11	Jack Copper	Case 11	Closed	2023-01-11	20:00	San Jose	Case 11 Description	Case 11 Notes	Case 11 Comments
12	Karen Zinc	Case 12	Pending	2023-01-12	21:00	San Jose	Case 12 Description	Case 12 Notes	Case 12 Comments
13	Leo Nickel	Case 13	Open	2023-01-13	22:00	San Jose	Case 13 Description	Case 13 Notes	Case 13 Comments
14	Mia Tin	Case 14	Closed	2023-01-14	23:00	San Jose	Case 14 Description	Case 14 Notes	Case 14 Comments
15	Noah Lead	Case 15	Pending	2023-01-15	00:00	San Jose	Case 15 Description	Case 15 Notes	Case 15 Comments
16	Olivia Iron	Case 16	Open	2023-01-16	01:00	San Jose	Case 16 Description	Case 16 Notes	Case 16 Comments
17	Peter Steel	Case 17	Closed	2023-01-17	02:00	San Jose	Case 17 Description	Case 17 Notes	Case 17 Comments
18	Quinn Aluminum	Case 18	Pending	2023-01-18	03:00	San Jose	Case 18 Description	Case 18 Notes	Case 18 Comments
19	Rachel Brass	Case 19	Open	2023-01-19	04:00	San Jose	Case 19 Description	Case 19 Notes	Case 19 Comments
20	Sam Silver	Case 20	Closed	2023-01-20	05:00	San Jose	Case 20 Description	Case 20 Notes	Case 20 Comments
21	Tina Gold	Case 21	Pending	2023-01-21	06:00	San Jose	Case 21 Description	Case 21 Notes	Case 21 Comments
22	Uma Copper	Case 22	Open	2023-01-22	07:00	San Jose	Case 22 Description	Case 22 Notes	Case 22 Comments
23	Victor Zinc	Case 23	Closed	2023-01-23	08:00	San Jose	Case 23 Description	Case 23 Notes	Case 23 Comments
24	Wendy Nickel	Case 24	Pending	2023-01-24	09:00	San Jose	Case 24 Description	Case 24 Notes	Case 24 Comments
25	Xavier Tin	Case 25	Open	2023-01-25	10:00	San Jose	Case 25 Description	Case 25 Notes	Case 25 Comments
26	Yara Lead	Case 26	Closed	2023-01-26	11:00	San Jose	Case 26 Description	Case 26 Notes	Case 26 Comments
27	Zoe Iron	Case 27	Pending	2023-01-27	12:00	San Jose	Case 27 Description	Case 27 Notes	Case 27 Comments
28	Adam Steel	Case 28	Open	2023-01-28	13:00	San Jose	Case 28 Description	Case 28 Notes	Case 28 Comments
29	Bella Aluminum	Case 29	Closed	2023-01-29	14:00	San Jose	Case 29 Description	Case 29 Notes	Case 29 Comments
30	Charlie Brass	Case 30	Pending	2023-01-30	15:00	San Jose	Case 30 Description	Case 30 Notes	Case 30 Comments
31	Diana Silver	Case 31	Open	2023-01-31	16:00	San Jose	Case 31 Description	Case 31 Notes	Case 31 Comments
32	Ethan Gold	Case 32	Closed	2023-02-01	17:00	San Jose	Case 32 Description	Case 32 Notes	Case 32 Comments
33	Fiona Copper	Case 33	Pending	2023-02-02	18:00	San Jose	Case 33 Description	Case 33 Notes	Case 33 Comments
34	George Zinc	Case 34	Open	2023-02-03	19:00	San Jose	Case 34 Description	Case 34 Notes	Case 34 Comments
35	Hannah Nickel	Case 35	Closed	2023-02-04	20:00	San Jose	Case 35 Description	Case 35 Notes	Case 35 Comments
36	Ian Tin	Case 36	Pending	2023-02-05	21:00	San Jose	Case 36 Description	Case 36 Notes	Case 36 Comments
37	Jessica Lead	Case 37	Open	2023-02-06	22:00	San Jose	Case 37 Description	Case 37 Notes	Case 37 Comments
38	Kyle Iron	Case 38	Closed	20					

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Company: TAC TAC CO INC

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Scott Specialty Gases, Inc.

E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 611
Plumsteadville, PA 18949
Purchase order:
60528

Shipped to:
SCOTT ENVIRONMENTAL TECH
ATTN: TOM KAZARER
DIVISION OF EUSA INC.
ROUTE 611
PLUMSTEADVILLE, PA 18949
Project No. 27300

Certified per E.P.A. Protocol B 1 Procedure B01 Section B 3.4.4
Certified accuracy +/- 1 % NIST Traceable

Cylinder number: ADP-619118 Cylinder pressure: 1900 psig Date of assay: 4-25-91
Component: OXYGEN Certified concentration: 20.9 % Expiration date: 04-25-91
NITROGEN Balance

Standard
Type: CRM-2655
Concentration: 20.97 %
Cylinder #: 89L-10600

Analyzer
Make: a BECKMAN
Model: a 755
Serial number: a 1002571
Analytical principle: a Paramagnetic
Date of calibration: a 2-20-91

Raw data units	NO	Concentration	of Customer	Cylinder
Analysis	4-25-91			
Z1=0.0000	R1=0.014	T1=0.2753	20.9 %	
R2=0.1537	Z2=0.0000	T2=0.2754	20.9 %	
Z3=0.0000	T3=0.2753	R3=0.1536	20.9 %	

Analyst

Approved by

Mark S. Strindes



Scott Specialty Gases, Inc.

L. P. G. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 521
Plumsteadville, PA 18949
Purchase order #
69112

Shipped to:
SCOTT ENVIRONMENTAL TECH
ATTN: JEFF
DIVISION OF ENGA
DEPT. 13 - FIELD TESTING
PLUMSTEADVILLE, PA 18949
Project No. 29450

Certified per L.P.G. Protocol # 1 Procedure 001 Section B 3.0.4
Certified accuracy +/- 1 % NIST Traceable

Cylinder number	ALP-001924	Cylinder pressure	Date of assay	7-3-91
		1500 psig.		
Component		Certified concentration	Expiration date	1-3-92
CARBON DIOXIDE		4.97 %		
NITROGEN		Balance		

Standard		Analyzer	
Type	CRM-1675	Make	: PERKIN-ELMER
Concentration	10.02 %	Model	: SIGMA 30
Cylinder #	ALP-001915	Serial number	: 0024907000023
		Analytical principle	: TCD
		Date of calibration	: 6-4-91

Raw data units:	AREA	:	Concentration	:
		:	of Customer	:
		:	Cylinder	:
Analysis	7-3-91	:		:
		:		:
Z1=0.0000	R1=53377	I1=13967	: 4.95 %	:
Z2=53555	Z1=0.0000	I2=13975	: 4.95 %	:
Z3=0.0000	Z2=10259	R3=53414	: 4.95 %	:
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Analysed

Approved by

 Phil S. Simonds



Scott Specialty Gases, Inc.

E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 611
Plumsteadville, PA 18949
Purchase order:
49122

Shipped to:
SCOTT ENVIRONMENTAL TECH-
NICS, DEPT.
DIVISION OF DASA
DEPT. 13 - FIELD TESTING
PLUMSTEADVILLE, PA 18949
Project No. 29450

Certified per E.P.A. Protocol B
Certified accuracy +/-

1 Procedure 861
1 % NIST Traceable

Section B 3.0.4

Cylinder number	AML-20705	Cylinder pressure	Date of assay
		1900 psig.	7-3-91
Component		Certified concentration	Expiration date:
CARBON DIOXIDE		9.93 %	1-3-92
NITROGEN		Balance	

Standard		Analyzer	
Type	CRM-1675	Make	: PERKIN-ELMER
Concentration	14.02 %	Model	: SIGMA 3B
Cylinder #	ALM-002315	Serial number	: 0024907000223
		Analytical principle	: TCD
		Date of calibration	: 5-4-91

Raw data units	AREA	:	:	Concentration	:
		:	:	of Customer	:
		:	:	Cylinder	:
Analysis	7-3-91	:	:		:
		:	:		:
21=0.0000	81=53342	21=37709	:	9.93 %	:
62=53003	22=0.0000	22=37367	:	9.93 %	:
23=0.0000	23=37777	83=53352	:	9.94 %	:
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Analyst

Approved by

Paul S. Strindberg



Scott Specialty Gases, Inc.

E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 611
Plumsteadville, PA 18949
Purchase order #
58626

Shipped to:
SCOTT ENVIRONMENTAL TECH
4TH FLOOR
DIVISION OF EUSA INC.
ROUTE 611
PLUMSTEADVILLE, PA 18949
Project No 27000

Certified per E.P.A. Protocol # 1 Procedure 801 Section 8 3.0.4
Certified accuracy +/- 1 % NIST Traceable

Cylinder number	6LP-001315	Cylinder pressure	Date of assay:
		1700 psig.	4-23-91
Component		Certified concentration	Expiration date:
CARBON DIOXIDE		17.15 %	10-23-91
NITROGEN		Balance	

Standard		Analyzer	
Type	CRP-5375	Make	: PERKIN-ELMER
Concentration	14.52 %	Model	: SIGMA 3B
Cylinder #	6LP-001315	Serial number	: 002090700023
		Analytical principle	: TCD
		Date of calibration	: 4-4-91

Raw data units:	nV			% Concentration	:
				% of Customer	:
				% Cylinder	:
Analysis	4-23-91				:
					:
T1=0.0000	R1=58156	T1=71155		% 17.15 %	:
R2=55375	T2=0.0000	T2=71155		% 17.15 %	:
Z3=0.0000	R3=71207	R3=58128		% 17.17 %	:
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Analyzed by

Approved by
Mark E. Straboles



Scott Specialty Gases

PLUMSTEADVILLE, PA. 16949

PHONE: (215) 766-8861

TWX: 610-665-9344

SCOTT SPECIALTY GASES, INC.

5/07/90

CERTIFICATE OF ANALYSIS

SCOTT ENVIRONMENTAL TECH
BUILDING #4
ROUTE 611 NORTH
PLUMSTEADVILLE
ATTN: JEFF POIRON

PROJECT #: 01-18487
PO #: 64306

PA 16949-0000

CYLINDER #: 1L1037

ANALYTICAL ACCURACY: +-1%

COMPONENT

REQUESTED
CONCENTRATION

ANALYSIS 1
(MOLES) U/M

METHANE
NITROGEN

500.0 PPM
BALANCE GAS

500.0 PPM
N/A

NOTES: GRAVIMETRIC MASTER GAS
NBS TRACEABLE

DATE OF ANALYSIS: 5/04/90

ANALYST:

J. P. DES
TO SASSAMAN

APPROVED BY:

MARK S. SIRINDES



Scott Specialty Gases

PLUMSTEADVILLE, PA. 18949

PHONE: (215) 766-8881

TWOC 610-866-9344

SCOTT SPECIALTY GASES, INC.

5/07/90

CERTIFICATE OF ANALYSIS

SCOTT ENVIRONMENTAL TECH
BUILDING #4
ROUTE 611 NORTH
PLUMSTEADVILLE
ATTN: JEFF POISON

PROJECT #: 01-18667
PO #: 54306

PA 18949-0000

CYLINDER #: ALM002463

ANALYTICAL ACCURACY: $\pm 1\%$ *MS*

COMPONENT

REQUESTED
CONCENTRATION

ANALYSIS 1
(MCLEB) D/M

METHANE
NITROGEN

.1 PC"
BALANCE GAS

.0999 PC"
N/A

NOTES: GRAVIMETRIC MASTER GAS
NBS TRACEABLE

DATE OF ANALYSIS: 5/04/90

ANALYST: *[Signature]*

TEK SAESAMAN

APPROVED BY: *[Signature]*

MARK S. GIRENIDES



Scott Specialty Gases, Inc.

6141 EASTON ROAD, PLUMSTEADVILLE, PA 18949-0010
PHONE: 215-766-8861 FAX: 215-766-0320

9/30/91

SCOTT ENVIRONMENTAL TECH
DIVISION OF ENSA, I
DEPT 13 - FIELD TESTING
PLUMSTEADVILLE

PA 18949-0000

PROJECT #: 01-31795
PO #: 69178

CYLINDER #: ALM011038

ANALYTICAL ACCURACY: $\pm 1-2\%$

COMPONENT

REQUESTED
CONCENTRATION

ANALYSIS 1
(MOLES) L/M

METHANE
NITROGEN

2000.0 PPM
BALANCE

1980. PPM
BALANCE

NOTES: CERTIFIED MASTER GAS

DATE OF ANALYSIS: 9/26/91

ANALYST:

Quinn Ryan

APPROVED BY:

Mark S. Sirinides
MARK S. SIRINIDES