S-1

EMISSION PERFORMANCE TESTING
OF
FOUR INTERNAL COMBUSTION ENGINES

SITE: SEMITROPIC WATER STORAGE DISTRICT
KERN COUNTY, CALIFORNIA

Application #0239007, 0239008, 0239009, 0239010

DATE: AUGUST 24 and 25, 1993

OCT 20 1993

N.S.
~~S.S.~~
~~S.S.~~ ENG 1 - 009 (1-0)
2 - 010-S-1755-2-0

Prepared For:

(S-1754-2-0)

TCC, INC.
5201 California Avenue, Suite 290
Bakersfield, California 93309

~~N.S.~~ S.S.
~~S.S.~~ ENG 1 - 007
2 - 008
(S-1754-1-0)

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WESTERN ENVIRONMENTAL SERVICES
1010 South Pacific Coast Highway
Redondo Beach, California 90277

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APCD—SOUTHERN REGION

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1.0 INTRODUCTION

At the request of TCC, INC., Bakersfield, California, Western Environmental Services (WES) conducted testing at the Semitropic Water Storage District, Kern County, California. The testing consisted of collecting samples from four internal combustion engines. Samples were collected from the inlet and outlet of each catalytic converter. The testing was performed on August 24 and 25, 1993 to provide compliance test data for the San Joaquin Valley Unified Air Pollution Control District. The application numbers are 0239007, 0239008, 0239009 and 0239010.

The sampling program consisted of collecting oxides of nitrogen, oxygen, hydrocarbons, carbon monoxide, carbon dioxide, flow, and moisture from each stack exhaust, outlet of the converter. Samples were collected at the converter inlet for oxides of nitrogen, carbon monoxide, oxygen, and carbon dioxide. In addition, four samples (one per engine) were collected and analyzed for sulfur compounds.

The facility provides electricity for electric water pumps used in the Semitropic Water District. Each generator consisted of a Waukesha L7042, rich burn, natural gas fired internal combustion engine. The units were equipped with fuel air controllers and Allied Signal catalytic converters. Each unit operated approximately 995 KW.

The following sections will be presented in this report: Summary of Results, Site Description, Sampling and Analytical Procedures, Quality Assurance, and Appendices. The appendices contain the Field and Laboratory data sheets, Gas Calibration Information, Sample Calculations, Process Data and the Authority to Construct.

2.0 SUMMARY OF RESULTS

2.1 Discussion of Results

Tables 2.1 through 2.10 present the results collected from the testing program. Tables 2.1 and 2.2 show the emissions from Engine #1, North Site. Tables 2.3 and 2.4 present the emissions from Engine #2, North Site. Tables 2.5 and 2.6 show the emissions from Engine #1, South Site. Tables 2.7 and 2.8 present the emissions from Engine #2, South Site. Tables 2.9 and 2.10 show the sulfur analysis from the fuel gas.

The test results are listed below.

Location/Test	Test #1	Test #2	Test #3	Average
North Site, Engine #1 009				
Electrical Output, KW	995	995	995	995
Fuel Gas Rate, cfm	215	215	215	215
Sulfur Compounds				
Sulfate, ppm	0.137			0.137
Sulfur Dioxide, ppm	2.021			2.021
Total Sulfur, #/Hr	0.0023			0.0023
Inlet to Converter				
Oxides of Nitrogen, ppm	3,053	2,916	3,240	3,070
Oxides of Nitrogen at 15% Oxygen, ppm	867	828	920	872
Carbon Monoxide, ppm	3,594	3,547	3,558	3,566
Oxygen, %	0.01	0.01	0.01	0.01
Carbon Dioxide, %	11.59	11.78	11.81	11.73

Location/Test	Test #1	Test #2	Test #3	Average
North Site Engine #1 009				
Outlet of the Converter				
Volumetric Flow Rate, DSCFM	1,802			1,802
Oxides of Nitrogen, ppm	81.36	103.06	101.14	95.19
Oxides of Nitrogen at 15% Oxygen, ppm	23.11	29.27	28.73	27.04
Oxides of Nitrogen, #/Hr	1.068	1.352	1.327	1.249
Carbon Monoxide, ppm	611.93	611.32	599.07	607.44
Carbon Monoxide, #/Hr	4.889	4.883	4.785	4.852
Oxygen, %	0.01	0.01	0.01	0.01
Carbon Dioxide, %	11.70	11.72	11.35	11.59
Hydrocarbons				
Methane, ppm	30	5	34	23
Non-Methane Hydrocarbons				
ppm	1	1	1	1
#/Hr	0.005	0.005	0.005	0.005
North Site, Engine #2 010				
Electrical Output, KW	990	990	990	990
Fuel Gas Rate, cfm	205	205	205	205
Sulfur Compounds				
Sulfate, ppm	0.000			0.000
Sulfur Dioxide, ppm	1.384			1.384
Total Sulfur, #/Hr	0.0014			0.0014
Inlet to Converter				
Oxides of Nitrogen, ppm	3,206	2,936	3,001	3,048
Oxides of Nitrogen at 15% Oxygen, ppm	911	834	852	866
Carbon Monoxide, ppm	3,897	3,869	3,863	3,876
Oxygen, %	0.01	0.01	0.01	0.01
Carbon Dioxide, %	11.95	11.93	12.25	12.04

Location/Test	Test #1	Test #2	Test #3	Average
North Site Engine #2 010				
Outlet of the Converter				
Volumetric Flow Rate, DSCFM	1,834			1,834
Oxides of Nitrogen, ppm	79.83	78.36	80.39	79.53
Oxides of Nitrogen at 15% Oxygen, ppm	22.76	22.33	22.93	22.67
Oxides of Nitrogen, #/Hr	1.066	1.047	1.074	1.062
Carbon Monoxide, ppm	602.12	605.71	592.52	600.12
Carbon Monoxide, #/Hr	4.894	4.924	4.817	4.878
Oxygen, %	0.09	0.08	0.10	0.09
Carbon Dioxide, %	12.03	12.28	12.42	12.24
Hydrocarbons				
Methane, ppm	6	18	4	9
Non-Methane Hydrocarbons				
ppm	1	1	1	1
#/Hr	0.005	0.005	0.005	0.005
South Site, Engine #1 001				
Electrical Output, KW	997	997	997	997
Fuel Gas Rate, cfm	198	198	198	198
Sulfur Compounds				
Sulfate, ppm	0.000			0.000
Sulfur Dioxide, ppm	1.793			1.793
Total Sulfur, #/Hr	0.0018			0.0018
Inlet to Converter				
Oxides of Nitrogen, ppm	2,957	2,904	2,928	2,930
Oxides of Nitrogen at 15% Oxygen, ppm	848	833	840	840
Carbon Monoxide, ppm	4,174	4,218	4,422	4,271
Oxygen, %	0.21	0.22	0.23	0.22
Carbon Dioxide, %	11.49	12.15	12.07	11.90

Location/Test	Test #1	Test #2	Test #3	Average
South Site Engine #1 007				
Outlet of the Converter				
Volumetric Flow Rate, DSCFM	1,770			1,770
Oxides of Nitrogen, ppm	79.07	79.83	68.94	75.95
Oxides of Nitrogen at 15% Oxygen, ppm	22.50	22.70	19.58	21.59
Oxides of Nitrogen, #/Hr	1.019	1.029	0.889	0.979
Carbon Monoxide, ppm	803.34	671.97	595.59	690.30
Carbon Monoxide, #/Hr	6.303	5.272	4.673	5.416
Oxygen, %	0.05	0.03	0.01	0.03
Carbon Dioxide, %	12.06	12.30	12.08	12.15
Hydrocarbons				
Methane, ppm	10	20	390	140
Non-Methane Hydrocarbons				
ppm	1	1	2	1
#/Hr	0.004	0.004	0.009	0.006
South Site, Engine #2 008				
Electrical Output, KW	990	990	990	990
Fuel Gas Rate, cfm	203	203	203	203
Sulfur Compounds				
Sulfate, ppm	0.153			0.153
Sulfur Dioxide, ppm	2.262			1.262
Total Sulfur, #/Hr	0.0024			0.0024
Inlet to Converter				
Oxides of Nitrogen, ppm	2,991	2,956	2,934	2,960
Oxides of Nitrogen at 15% Oxygen, ppm	856	847	840	848
Carbon Monoxide, ppm	3,985	3,986	4,000	3,990
Oxygen, %	0.17	0.18	0.17	0.17
Carbon Dioxide, %	12.21	12.15	12.20	12.19

Location/Test	Test #1	Test #2	Test #3	Average
South Site Engine #2 008				
Outlet of the Converter				
Volumetric Flow Rate, DSCFM	1,797			1,797
Oxides of Nitrogen, ppm	35.83	38.53	36.83	37.06
Oxides of Nitrogen at 15% Oxygen, ppm	10.18	10.97	10.48	10.54
Oxides of Nitrogen, #/Hr	0.469	0.504	0.482	0.485
Carbon Monoxide, ppm	747.29	717.31	720.23	728.28
Carbon Monoxide, #/Hr	5.951	5.714	5.737	5.80
Oxygen, %	0.02	0.06	0.05	0.04
Carbon Dioxide, %	11.95	11.96	11.89	11.93
Hydrocarbons				
Methane, ppm	148	233	17	133
Non-Methane Hydrocarbons				
ppm	6	9	1	5
#/Hr	0.027	0.041	0.005	0.024

The test results are summarized below.

Engine Pollutant	Reduction %	Emission Rates #/Hr	Emission Rates g/BHP/Hr	Limits #/Hr	Limits g/BHP/Hr
009 North Site					
Engine #1					
NOx	96.9	1.249	0.43	3.1	1.0 (1.25)
CO	84.5	4.852	1.67	9.3	
ROG		0.005	0.002	1.9	0.6
Fuel Gas					
SO_2		0.002		0.003	
SO_4		0.00015		0.003	
010 Engine #2					(1.062)
NOx	97.4	1.062	0.37	3.1	1.0
CO	84.5	4.878	1.68	9.3	
ROG		0.005	0.002	1.9	0.6
Fuel Gas					
SO_2		0.0014		0.003	
SO_4		0.0000		0.003	
South Site					(0.979)
007 Engine #1					
NOx	97.4	0.979	0.34	3.1	1.0
CO	83.8	5.416	1.86	9.3	
ROG		0.006	0.002	1.9	0.6
Fuel Gas					
SO_2		0.002		0.003	
SO_4		0.000		0.003	(0.485)
008 Engine #2					
NOX	98.8	0.485	0.17	3.1	1.0
CO	83.2	5.800	2.00	9.3	
ROG		0.024	0.008	1.9	0.6
Fuel Gas					
SO_2		0.002		0.003	
SO_4		0.00015		0.003	

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2.2 Quality Assurance

During the testing program, the instruments were zeroed and spanned periodically to insure the accuracy of the test data. The sampling system was checked for leaks by inserting a known span gas into the probe and determining the readings at the analyzer. The system bias checks were within 5% of the span gas values. During the testing program, a converter efficiency test was conducted on each NOx analyzer. The NOx converter efficiency tests showed greater than 90% conversion. The calibration data is located in Appendix A. Section 5 lists the quality assurance procedures.

The instruments were operated on the following ranges:

	Inlet	Outlet
Analyzer	Range	Range
North Engine #1		
NOx	5,000 ppm	250 ppm
CO	10,000 ppm	1,000 ppm
O(2)	15 %	15 %
CO(2)	15 %	15 %
North Engine #2		
NOx	5,000 ppm	100 ppm
CO	10,000 ppm	1,000 ppm
O(2)	15 %	10 %
CO(2)	15 %	15 %
South Engine #1		
NOx	10,000 ppm	250 ppm
CO	10,000 ppm	1,000 ppm
O(2)	15 %	15 %
CO(2)	15 %	15 %
South Engine #2		
NOx	10,000 ppm	250 ppm
CO	10,000 ppm	1,000 ppm
O(2)	15 %	15 %
CO(2)	15 %	15 %

TABLE 2.1 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (North - Inlet)
DATE: August 24, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
844	System NO	2026					
1146	Calibration Zero	-39	0.02	-11	0.12		
	Calibration Mid	2112	9.61	1826	4.20		
1152	Calibration High	4212	13.43	5110	7.09		
1211	Test #1						
1226	Average 15 min	2875	0.01	3500	11.40	817	994
1227	Calibration Zero	-19	-0.05	6	0.14		
	Calibration Mid	1999	9.51	1847	4.19		
	Calibration High	4046	13.17	5076	7.11		
	Calibration Zero	-19	-0.05	6	0.14		
	Calibration Mid	1999	9.51	1847	4.19		
1233	Calibration High	4046	13.17	5076	7.11		
1237	Test #2						
1258	Average 15 min	2950	0.01	3500	11.55	838	994
1259	Calibration Zero	-26	-0.02	0	0.15		
	Calibration Mid	2141	9.58	1857	4.21		
	Calibration High	4156	13.39	5130	7.10		
	Calibration Zero	-26	-0.02	0	0.15		
	Calibration Mid	2141	9.58	1857	4.21		
1306	Calibration High	4156	13.39	5130	7.10		
1307	Test #3						
1322	Average 15 min	3100	0.01	3500	11.55	880	994
1322	Calibration Zero	-16	0.04	-13	0.19		
	Calibration Mid	1989	9.7	1867	4.20		
1330	Calibration High	4049	13.44	5165	7.10		
1334	System NO	1985					

	High Span Gas	Full Scale	System	Start	End
NOx, ppm	4190	5000	NO, ppm	2039	2039
CO, ppm	5160	10000	Other- CO-1850, 0(2)-9.55		
O(2), %	13.43	15	C0(2)- 4.38		
CO(2), %	7.08	15			

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.1a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (North - Inlet)
DATE: August 24, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	20	-0.07	17	0.02		
Span Drift	-166	-0.26	-34	0.02		
Drift Full Scale	-4	-1.27	-1	0.00		
Drift Corrected	3003	0.01	3535	11.40		
System Corrected	3053	0.01	3594	11.59	867	1021
Test #2						
Zero Drift	-7	0.03	-6	0.01		
Span Drift	110	0.22	10	-0.01		
Drift Full Scale	2	1.27	0	-0.13		
Drift Corrected	2868	0.01	3489	11.58		
System Corrected	2916	0.01	3547	11.78	828	1008
Test #3						
Zero Drift	10	0.06	-13	0.04		
Span Drift	-107	0.05	-13	0.00		
Drift Full Scale	-2	-0.07	0	-0.27		
Drift Corrected	3187	0.01	3500	11.62		
System Corrected	3240	0.01	3558	11.81	920	1011

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.2 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (North - Outlet)
DATE: August 24, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
1403	System NO	221					
1400	Calibration Zero	-1	-0.01	0	0.07		
	Calibration Mid	84	5.09		6.98		
1401	Calibration High	229	9.56	937	12.44		
1407	Test #1						
1447	Average 40 min	81	0.01	601	11.60	23.00	170.69
1448	Calibration Zero	-6	-0.02	-4	0.05		
	Calibration Mid	91	4.97		6.78		
	Calibration High	223	9.44	916	12.31		
	Calibration Zero	-6	-0.02	-4	0.05		
	Calibration Mid	91	4.97		6.78		
1453	Calibration High	223	9.44	916	12.31		
1501	Test #2						
1541	Average 40 min	104	0.01	624	11.52	29.54	177.22
1542	Calibration Zero	-7	-0.01	5	0.02		
	Calibration Mid	86	5.02	466	6.77		
	Calibration High	224	9.43	944	12.06		
	Calibration Zero	-7	-0.01	5	0.02		
	Calibration Mid	86	5.02	466	6.77		
1549	Calibration High	224	9.43	944	12.06		
1550	Test #3						
1630	Average 40 min	103	0.01	601	11.54	29.25	170.69
1632	Calibration Zero	-7	-0.02	-2	0.00		
	Calibration Mid	88	4.95	470	6.88		
1639	Calibration High	228	9.44	940	12.25		
1642	System NO	223					

	High Span Gas	Full Scale	System	Start	End
NOx, ppm	222	250	NO, ppm	222	222
CO, ppm	935	1000	Other- CO-466, O(2)-5.02		
O(2), %	9.55	15	NO- 91, CO(2)- 7.05		
CO(2), %	12.49	15			

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.2a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (North – Outlet)
DATE: August 24, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	-5.00	-0.01	-4.00	-0.02		
Span Drift	-6.00	-0.12	-21.00	-0.13		
Drift Full Scale	-0.40	-0.73	-1.70	-0.73		
Drift Corrected	81.36	0.01	611.93	11.70		
System Corrected	81.36	0.01	611.93	11.70	23.11	173.79
Test #2						
Zero Drift	-1.00	0.01	9.00	-0.03		
Span Drift	1.00	-0.01	28.00	-0.25		
Drift Full Scale	0.80	-0.13	1.90	-1.47		
Drift Corrected	103.06	0.01	611.32	11.72		
System Corrected	103.06	0.01	611.32	11.72	29.27	173.62
Test #3						
Zero Drift	0.00	-0.01	-7.00	-0.02		
Span Drift	4.00	0.01	-4.00	0.19		
Drift Full Scale	1.60	0.13	0.30	1.40		
Drift Corrected	101.14	0.01	599.07	11.35		
System Corrected	101.14	0.01	599.07	11.35	28.73	170.14

* NOx (1) and CO (1) – values corrected to 15% oxygen

TABLE 2.2b O2 TRAVERSE

SITE: Semi-Tropic Water Storage
UNIT: Engine #1 - North
DATE: August 24, 1993

LOCATION POINT	TIME	NOx ppm	O(2) %	CO ppm	CO(2) %
Bottom					
1	1140	96.64	0.08	641.7	12.12
2	1142	96.28	0.05	592.8	12.13
3	1144	97.55	0.04	610.7	12.11
4	1145	79.17	0.04	693.0	12.13
5	1147	72.99	0.04	547.0	12.13
6	1148	70.69	0.07	595.0	12.09
Side					
1	1151	99.08	0.08	694.1	12.15
2	1152	100.42	0.07	590.0	12.16
3	1154	98.42	0.07	609.8	12.20
4	1155	96.24	0.05	663.4	12.18
5	1157	91.79	0.05	688.0	12.16
6	1158	89.00	0.04	613.8	12.17
AVERAGE		90.69	0.06	628.3	12.14

Span Gases	
NOx, ppm	44, 91
CO, ppm	466, 935
O(2), %	5.02, 9.35
CO(2), %	5.93, 12.49

TABLE 2.2c HYDROCARBON TEST RESULTS

SITE: Semi- Tropic Water District
UNIT: Engine #1 North
DATE: August 24, 1993

PARAMETER	TEST 1	2	3	AVERAGE
Methane, ppm	30	5	34	23
Non-Methane Volatile, ppm	1	1	1	1
Total, ppm	1	1	1	1
Flow Rate, DSCFM	1802	1802	1802	1802
Brake Horsepower=	1320	1320	1320	1320
Emission Rates - Non-Methane Hydrocarbons				
#/Hr	0.005	0.005	0.005	0.005
#/Day	0.110	0.110	0.110	0.110
g/bhp/hr	0.002	0.002	0.002	0.002

TABLE 2.3 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (North - Inlet)
DATE: August 24, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
844	System NO	2026					
818	Calibration Zero	-38	-0.03	-5	0.18		
	Calibration Mid	2091	9.58	1903	4.30		
830	Calibration High	4265	13.41	5198	7.22		
847	Test #1						
907	Average 20 min	3000	0.01	3800	11.70	852	1079
908	Calibration Zero	-24	-0.03	6	0.26		
	Calibration Mid	2010	9.34	1869	436.00		
	Calibration High	4065	13.10	5236	7.27		
	Calibration Zero	-24	-0.03	6	0.26		
	Calibration Mid	2010	9.34	1869	436.00		
914	Calibration High	4065	13.10	5236	7.27		
915	Test #2						
930	Average 15 min	2950	0.01	3800	11.85	838	1079
933	Calibration Zero	-25	-0.05	5	0.27		
	Calibration Mid	2039	9.7	1860	4.42		
	Calibration High	4152	13.54	5151	7.35		
	Calibration Zero	-25	-0.05	5	0.27		
	Calibration Mid	2039	9.7	1860	4.42		
938	Calibration High	4152	13.54	5151	7.35		
940	Test #3						
955	Average 15 min	2980	0.01	3800	11.85	846	1079
956	Calibration Zero	-8	-0.04	-7	0.12		
	Calibration Mid	2096	9.66	1900	4.18		
1001	Calibration High	4274	13.48	5099	7.08		
1334	System NO	1985					

	High Span Gas	Full Scale	System	Start	End
NOx, ppm	4190	5000	NO, ppm	2039	2039
CO, ppm	5160	10000	Other- CO-1850, O(2)-9.55		
O(2), %	13.43	15	CO(2)- 4.38		
CO(2), %	7.08	15			

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.3a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (North - Inlet)
DATE: August 24, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	14	0.00	11	0.08		
Span Drift	-200	-0.31	-34	0.05		
Drift Full Scale	-4	-2.07	0	-0.20		
Drift Corrected	3153	0.01	3833	11.75		
System Corrected	3206	0.01	3897	11.95	911	1107
Test #2						
Zero Drift	-1	-0.02	-1	0.01		
Span Drift	87	0.44	-9	0.08		
Drift Full Scale	2	3.07	0	0.47		
Drift Corrected	2888	0.01	3806	11.73		
System Corrected	2936	0.01	3869	11.93	834	1099
Test #3						
Zero Drift	17	0.01	-12	-0.15		
Span Drift	57	-0.06	-12	-0.27		
Drift Full Scale	1	-0.47	0	-0.80		
Drift Corrected	2952	0.01	3800	12.05		
System Corrected	3001	0.01	3863	12.25	852	1097

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.4 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (North – Outlet)
DATE: August 24, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
835	System NO	42.40					
825	Calibration Zero	0.32	0.04	0.1	0.09		
	Calibration Mid	44.17	5.04	466.7	5.90		
831	Calibration High	91.11	9.24	934.6	12.60		
841	Test #1						
921	Average 40 min	75.49	0.09	589.1	12.05	21.52	167.95
923	Calibration Zero	0.40	0.04	0.0	0.17		
	Calibration Mid	42.51	5.06	466.5	6.00		
	Calibration High	87.31	9.13	927.3	12.88		
	Calibration Zero	0.40	0.04	0.0	0.17		
	Calibration Mid	42.51	5.06	466.5	6.00		
929	Calibration High	90.76	9.13	927.3	12.88		
930	Test #2						
1010	Average 40 min	78.40	0.08	608.3	12.17	22.34	173.34
1012	Calibration Zero	0.18	0.02	-1.2	0.18		
	Calibration Mid	44.89	5.04	466.4	6.10		
	Calibration High	91.87	9.38	943.2	12.95		
	Calibration Zero	0.18	0.02	-1.2	0.18		
	Calibration Mid	44.89	5.04	466.4	6.10		
1017	Calibration High	91.87	9.38	943.2	12.95		
1019	Test #3						
1059	Average 40 min	77.81	0.10	583.3	12.22	22.19	166.38
1101	Calibration Zero	1.66	0.03	-2.1	0.19		
	Calibration Mid	45.37	5.12	469.6	6.07		
1106	Calibration High	91.66	9.35	940.9	12.93		
1335	System NO	44.36					

	High Span Gas	Full Scale	System	Start	End
NOx, ppm	91	100	NO, ppm	44	44
CO, ppm	935	1000	Other- CO-466, O(2)-5.02		
O(2), %	9.35	10	C0(2)- 5.95		
CO(2), %	12.49	15			

* NOx (1) and CO (1) – values corrected to 15% oxygen

TABLE 2.4a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (North - Outlet)
DATE: August 24, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	0.08	0.00	-0.10	0.08		
Span Drift	-3.80	-0.11	-7.30	0.28		
Drift Full Scale	-3.88	-1.10	-0.72	1.33		
Drift Corrected	78.71	0.09	593.64	11.86		
System Corrected	79.83	0.09	602.12	12.03	22.76	171.68
Test #2						
Zero Drift	-0.22	-0.02	-1.20	0.01		
Span Drift	1.11	0.25	15.90	0.07		
Drift Full Scale	1.33	2.70	1.71	0.40		
Drift Corrected	77.25	0.08	597.17	12.11		
System Corrected	78.36	0.08	605.71	12.28	22.33	172.59
Test #3						
Zero Drift	1.48	0.01	-0.90	0.01		
Span Drift	-0.21	-0.03	-2.30	-0.02		
Drift Full Scale	-1.69	-0.40	-0.14	-0.20		
Drift Corrected	79.26	0.10	584.17	12.25		
System Corrected	80.39	0.10	592.52	12.42	22.93	169.02

* NOx (1) and CO (1) – values corrected to 15% oxygen

TABLE 2.4b O2 TRAVERSE

SITE: Semi-Tropic Water Storage
UNIT: Engine #2 - North
DATE: August 24, 1993

LOCATION POINT	TIME	NOx ppm	O(2) %	CO ppm	CO(2) %
Bottom					
1	1115	88.94	0.09	545.4	12.14
2	1116	88.49	0.04	587.8	12.15
3	1118	90.01	0.03	528.4	12.15
4	1119	76.22	0.03	503.7	12.12
5	1121	73.34	0.03	545.4	12.13
6	1122	72.74	0.03	466.5	12.11
Side					
1	1125	87.45	0.19	572.1	12.01
2	1127	88.20	0.21	605.9	11.97
3	1128	85.28	0.20	610.7	12.04
4	1130	81.74	0.05	502.8	12.12
5	1131	78.59	0.03	520.5	12.13
6	1133	77.72	0.02	555.0	12.14
AVERAGE		82.39	0.08	545.4	12.10

Span Gases	
NOx, ppm	44, 91
CO, ppm	466, 935
O(2), %	5.02, 9.35
CO(2), %	5.95, 12.49

TABLE 2.4c HYDROCARBON TEST RESULTS

SITE: Semi- Tropic Water District
UNIT: Engine #2 North
DATE: August 24, 1993

PARAMETER	TEST 1	2	3	AVERAGE
Methane, ppm	6	18	4	9
Non-Methane Volatile, ppm	1	1	1	1
Total, ppm	1	1	1	1
Flow Rate, DSCFM	1834	1834	1834	1834
Brake Horsepower=	1320	1320	1320	1320
Emission Rates - Non-Methane Hydrocarbons				
#/Hr	0.005	0.005	0.005	0.005
#/Day	0.111	0.111	0.111	0.111
g/bhp/hr	0.002	0.002	0.002	0.002

TABLE 2.5 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (South – Inlet)
DATE: August 25, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
836	System NO	4169					
816	Calibration Zero	6	0.09	2	0.03		
	Calibration Mid	2037	9.37	1887	4.10		
825	Calibration High	4193	13.28	5161	5.69		
841	Test #1						
856	Average 15 min	2885	0.21	4344	11.83	827	1246
858	Calibration Zero	13	0.04	1	0.11		
	Calibration Mid	2004	9.47	1815	4.19		
	Calibration High	4168	13.25	5446	6.04		
	Calibration Zero	6	0.04	1	0.11		
	Calibration Mid	2004	9.49	1815	4.19		
905	Calibration High	4168	13.25	5149	6.04		
907	Test #2						
922	Average 15 min	2878	0.22	4121	11.92	826	1182
924	Calibration Zero	6	0.03	1	0.12		
	Calibration Mid	2027	9.47	1766	4.21		
	Calibration High	4202	13.52	5117	6.04		
	Calibration Zero	4	0.03	1	0.12		
	Calibration Mid	2027	9.47	1846	4.21		
931	Calibration High	4202	13.52	5117	6.04		
934	Test #3						
949	Average 15 min	2878	0.22	4436	11.93	826	1273
951	Calibration Zero	9	0.04	1	0.13		
	Calibration Mid	2017	9.48	1836	4.22		
956	Calibration High	4206	13.34	5220	6.08		
1118	System NO	4069					

	High Span Gas	Full Scale	System	Start	End
NOx, ppm	4190	10000	NO, ppm	4190	4190
CO, ppm	5160	10000	Other– CO–1850, O(2)–9.35		
O(2), %	13.43	15	NO– 2039, CO(2)– 4.22		
CO(2), %	5.95	15			

* NOx (1) and CO (1) – values corrected to 15% oxygen

TABLE 2.5a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (South - Inlet)
DATE: August 25, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	7	-0.05	-1	0.08		
Span Drift	-25	-0.03	285	0.35		
Drift Full Scale	-0.32	0.13	2.86	1.80		
Drift Corrected	2907	0.21	4103	11.29		
System Corrected	2957	0.21	4174	11.49	848	1197
Test #2						
Zero Drift	0	-0.01	0	0.01		
Span Drift	34	0.27	-32	0.00		
Drift Full Scale	0.34	1.87	-0.32	-0.07		
Drift Corrected	2855	0.22	4147	11.94		
System Corrected	2904	0.22	4218	12.15	833	1210
Test #3						
Zero Drift	5	0.01	0	0.01		
Span Drift	4	-0.18	103	0.04		
Drift Full Scale	-0.01	-1.27	1.03	0.20		
Drift Corrected	2879	0.22	4347	11.87		
System Corrected	2928	0.23	4422	12.07	840	1269

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.6 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (South - Outlet)
DATE: August 25, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
825	System NO	217					
810	Calibration Zero	2	0.00	2	0.06		
	Calibration Mid	94	5.06	457	6.98		
819	Calibration High	226	9.58	934	12.52		
843	Test #1						
923	Average 40 min	78	0.05	783	11.97	22.20	222.80
924	Calibration Zero	0	-0.01	-1	0.07		
	Calibration Mid		5.03	467	7.17		
	Calibration High	225	9.49	924	12.66		
	Calibration Zero	0	-0.01	-1	0.07		
	Calibration Mid		5.03	467	7.17		
928	Calibration High	225	9.49	924	12.66		
929	Test #2						
1010	Average 41 min	76	0.03	667	11.88	21.61	189.61
1010	Calibration Zero	-1	0.01	2	0.08		
	Calibration Mid	87	4.98	452	6.98		
	Calibration High	217	9.46	937	12.46		
	Calibration Zero	-1	0.01	2	0.08		
	Calibration Mid	87	4.98	452	6.98		
1017	Calibration High	217	9.46	937	12.46		
1018	Test #3						
1058	Average 40 min	68	0.01	588	11.77	19.31	167.00
1059	Calibration Zero	-1	0.03	-1	0.06		
	Calibration Mid	88	5.15	462	6.93		
1107	Calibration High	218	9.07	939	12.34		
1420	System NO	219					

	High Span Gas	Full Scale
NOx, ppm	222	250
CO, ppm	935	1000
O(2), %	9.55	15
CO(2), %	12.49	15

System	Start	End
NO, ppm	222	222

Other- CO-466, O(2)-5.02
NO- 91, CO(2)- 7.08

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.6a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #1 (South - Outlet)
DATE: August 25, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	-2.00	-0.01	-3.00	0.01		
Span Drift	-1.00	-0.09	-10.00	0.14		
Drift Full Scale	0.40	-0.53	-0.70	0.87		
Drift Corrected	77.65	0.05	788.86	11.85		
System Corrected	79.07	0.05	803.34	12.06	22.50	228.61
Test #2						
Zero Drift	-1.00	0.02	3.00	0.01		
Span Drift	-8.00	-0.03	13.00	-0.20		
Drift Full Scale	-2.80	-0.33	1.00	-1.40		
Drift Corrected	78.40	0.03	659.87	12.08		
System Corrected	79.83	0.03	671.97	12.30	22.70	191.04
Test #3						
Zero Drift	0.00	0.02	-3.00	-0.02		
Span Drift	1.00	-0.39	2.00	-0.12		
Drift Full Scale	0.40	-2.73	0.50	-0.67		
Drift Corrected	67.69	0.01	584.86	11.86		
System Corrected	68.94	0.01	595.59	12.08	19.58	169.16

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.6b O2 TRAVERSE

SITE: Semi-Tropic Water Storage
UNIT: Engine #1 – South
DATE: August 25, 1993

LOCATION POINT	TIME	NOx ppm	O(2) %	CO ppm	CO(2) %
Bottom					
1	1348	36	0.14	735	11.67
2	1348	36	0.13	711	11.68
3	1350	36	0.14	720	11.67
4	1351	34	0.23	724	11.67
5	1352	34	0.08	753	11.71
6	1353	34	0.06	725	11.72
Side					
1	1354	41	0.26	720	11.57
2	1355	47	0.17	721	11.73
3	1356	44	0.03	724	11.71
4	1357	36	0.09	747	11.70
5	1358	33	0.07	711	11.72
6	1359	32	0.05	687	11.74
AVERAGE		37	0.12	723	11.69

Span Gases	
NOx, ppm	91, 222
CO, ppm	466, 935
O(2), %	5.02, 9.55
CO(2), %	7.08, 12.49

TABLE 2.6c HYDROCARBON TEST RESULTS

SITE: Semi- Tropic Water District
UNIT: Engine #1 South
DATE: August 25, 1993

PARAMETER	TEST 1	2	3	AVERAGE
Methane, ppm	10	20	390	140
Non-Methane Volatile, ppm	1	1	2	1
Total, ppm	1	1	2	1
Flow Rate, DSCFM	1770	1770	1770	1770
Brake Horsepower=	1320	1320	1320	1320
Emission Rates - Non-Methane Hydrocarbons				
#/Hr	0.004	0.004	0.009	0.006
#/Day	0.108	0.108	0.215	0.143
g/bhp/hr	0.002	0.002	0.003	0.002

TABLE 2.7 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (South - Inlet)
DATE: August 25, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
836	System NO	4169					
951	Calibration Zero	5	0.04	1	0.13		
	Calibration Mid	2017	9.48	1836	4.22		
957	Calibration High	4206	13.34	5194	6.08		
1000	Test #1						
1015	Average 15 min	2916	0.17	3889	12.02	835	1113
1017	Calibration Zero	9	0.03	1	0.12		
	Calibration Mid	2017	9.38	1766	4.23		
	Calibration High	4175	13.53	5156	6.08		
	Calibration Zero	5	0.03	1	0.12		
	Calibration Mid	2017	9.38	1766	4.23		
1023	Calibration High	4175	13.53	5194	6.08		
1025	Test #2						
1041	Average 15 min	2898	0.18	4079	11.98	830	1168
1043	Calibration Zero	12	0.03	-11	0.11		
	Calibration Mid	2004	9.48	1805	4.27		
	Calibration High	4171	13.41	5385	6.09		
	Calibration Zero	8	0.03	-11	0.11		
	Calibration Mid	2004	9.48	1805	4.27		
1050	Calibration High	4171	13.41	5156	6.09		
1052	Test #3						
1107	Average 15 min	2884	0.17	3925	12.01	825	1123
1109	Calibration Zero	7	0.03	-11	0.12		
	Calibration Mid	2003	9.39	1766	4.22		
1115	Calibration High	4141	13.53	5147	6.11		
1118	System NO	4069					

	High Span Gas	Full Scale
NOx, ppm	4190	10000
CO, ppm	5160	10000
O(2), %	13.43	15
CO(2), %	5.95	15

System	Start	End
NO, ppm	4190	4190

Other- CO-1850, O(2)-4.22
NO- 2039, CO(2)- 4.22

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.7a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (South - Inlet)
DATE: August 25, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	4	-0.01	0	-0.01		
Span Drift	-31	0.19	-38	0.00		
Drift Full Scale	-0.35	1.33	-0.38	0.07		
Drift Corrected	2940	0.17	3918	12.00		
System Corrected	2991	0.17	3985	12.21	856	1141
Test #2						
Zero Drift	7	0.00	-12	-0.01		
Span Drift	-4	-0.12	191	0.01		
Drift Full Scale	-0.11	-0.80	2.03	0.13		
Drift Corrected	2906	0.18	3919	11.94		
System Corrected	2956	0.18	3986	12.15	847	1142
Test #3						
Zero Drift	-1	0.00	0	0.01		
Span Drift	-1	0.12	-9	0.02		
Drift Full Scale	0.00	0.80	-0.09	0.07		
Drift Corrected	2884	0.17	3932	11.99		
System Corrected	2934	0.17	4000	12.20	840	1145

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.8 CONTINUOUS MONITORING DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (South - Outlet)
DATE: August 25, 1993

TIME	FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
825	System NO	217					
1059	Calibration Zero	-1	0.03	-1	0.06		
	Calibration Mid	88	5.01	462	6.93		
1107	Calibration High	218	9.54	939	12.34		
1118	Test #1						
1158	Average 40 min	36	0.02	723	11.71	10.23	205.44
1158	Calibration Zero	-1	0.00	1	0.06		
	Calibration Mid	90	5.09	450	6.87		
	Calibration High	223	9.63	927	12.31		
	Calibration Zero	-1	0.00	1	0.06		
	Calibration Mid	90	5.09	450	6.87		
1206	Calibration High	223	9.63	927	12.31		
1207	Test #2						
1247	Average 40 min	37	0.06	712	11.66	10.53	202.70
1248	Calibration Zero	-1	0.01	-1	0.05		
	Calibration Mid	88	5.10	456	6.86		
	Calibration High	218	9.65	935	12.21		
	Calibration Zero	-1	0.01	-1	0.05		
	Calibration Mid	88	5.10	456	6.86		
1253	Calibration High	218	9.65	935	12.21		
1254	Test #3						
1334	Average 40 min	36	0.05	702	11.75	10.24	199.76
1334	Calibration Zero	-1	0.02	-1	0.06		
	Calibration Mid	88	5.05	456	6.90		
1340	Calibration High	217	9.44	928	12.30		
1420	System NO	219					

	High Span Gas	Full Scale
NOx, ppm	222	250
CO, ppm	935	1000
O(2), %	9.55	15
CO(2), %	12.49	15

System	Start	End
NO, ppm	222	222

Other- CO-466, O(2)-5.02
NO- 91, CO(2)- 7.08

(1) NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.8a CEM CORRECTED DATA

SITE: Semi-Tropic Water District
UNIT: Engine #2 (South - Outlet)
DATE: August 25, 1993

FUNCTION	NOx ppm	O(2) %	CO ppm	CO(2) %	NOx (1) ppm	CO (1) ppm
Test #1						
Zero Drift	0.00	-0.03	2.00	0.00		
Span Drift	5.00	0.09	-12.00	-0.03		
Drift Full Scale	2.00	0.80	-1.40	-0.20		
Drift Corrected	35.19	0.02	733.83	11.74		
System Corrected	35.83	0.02	747.29	11.95	10.18	212.34
Test #2						
Zero Drift	0.00	0.01	-2.00	-0.01		
Span Drift	-5.00	0.02	8.00	-0.10		
Drift Full Scale	-2.00	0.07	1.00	-0.60		
Drift Corrected	37.83	0.06	704.39	11.74		
System Corrected	38.53	0.06	717.31	11.96	10.97	204.22
Test #3						
Zero Drift	0.00	0.01	0.00	0.01		
Span Drift	-1.00	-0.21	-7.00	0.09		
Drift Full Scale	-0.40	-1.47	-0.70	0.53		
Drift Corrected	36.16	0.05	707.26	11.67		
System Corrected	36.83	0.05	720.23	11.89	10.48	204.96

* NOx (1) and CO (1) - values corrected to 15% oxygen

TABLE 2.8b O2 TRAVERSE

SITE: Semi-Tropic Water Storage
UNIT: Engine #2 - South
DATE: August 25, 1993

LOCATION POINT	TIME	NOx ppm	O(2) %	CO ppm	CO(2) %
Bottom					
1	1404	120	0.23	283	11.70
2	1405	102	0.12	282	11.71
3	1406	95	0.32	359	11.58
4	1407	91	0.11	286	11.72
5	1408	78	0.05	262	11.74
6	1409	77	0.04	278	11.76
Side					
1	1410	163	0.22	296	11.61
2	1411	189	0.14	353	11.67
3	1412	157	0.09	308	11.72
4	1413	171	0.10	243	11.73
5	1414	87	0.08	290	11.73
6	1415	81	0.11	276	11.67
AVERAGE		118	0.13	293	11.70

Span Gases	
NOx, ppm	91, 222
CO, ppm	466, 935
O(2), %	5.02, 9.55
CO(2), %	7.08, 12.49

TABLE 2.8c HYDROCARBON TEST RESULTS

SITE: Semi- Tropic Water District
UNIT: Engine #2 South
DATE: August 25, 1993

PARAMETER	TEST 1	2	3	AVERAGE
Methane, ppm	148	233	17	133
Non-Methane Volatile, ppm	6	9	1	5
Total, ppm	6	9	1	5
Flow Rate, DSCFM	1797	1797	1797	1797
Brake Horsepower=	1320	1320	1320	1320
Emission Rates - Non-Methane Hydrocarbons				
#/Hr	0.027	0.041	0.005	0.024
#/Day	0.655	0.983	0.109	0.583
g/bhp/hr	0.009	0.014	0.002	0.008

TABLE 2.9 SULFUR COMPOUNDS

SITE: Semitropic – North
DATE: August 24, 1993

PARAMETER	ENGINE 1	ENGINE 2	AVERAGE
Vmstd (M3)	0.329	0.574	0.451
Vm Vsoln (mls)	130	240	185
Va aliquot mls	20	20	20
N Barium prechlorate, meg/ml	0.01	0.01	0.01
Vt mls of titrant	0.9	0.6	0.8
Vtb mls of titrant blank	0.05	0.05	0.05
K2 constant	32.03	32.03	32.03
CSO2, mg/DSCM	5.385	3.686	4.598
SO2, ppm	2.021	1.384	1.726
Vmstd (M3)	0.329	0.574	0.451
Vm Vsoln (mls)	150	100	125
Va aliquot mls	20	20	20
N Barium prechlorate, meg/ml	0.01	0.01	0.01
Vt mls of titrant	0.1	0.05	0.1
Vtb mls of titrant blank	0.05	0.05	0.05
K2 constant	48	48	48
CSO4, mg/DSCM	0.548	0.000	0.274
SO4, ppm	0.137	0.000	0.069

TABLE 2.10 SULFUR COMPOUNDS

SITE: Semitropic – South
DATE: August 25, 1993

PARAMETER	ENGINE 1	ENGINE 2	AVERAGE
Vmstd (M3)	0.378	0.314	0.346
Vm Vsoln (mls)	205	215	210
Va aliquot mls	20	20	20
N Barium prechlorate, meg/ml	0.01	0.01	0.01
Vt mls of titrant	0.6	0.6	0.6
Vtb mls of titrant blank	0.05	0.05	0.05
K2 constant	32.03	32.03	32.03
CSO2, mg/DSCM	4.776	6.026	5.343
SO2, ppm	1.793	2.262	2.006
Vmstd (M3)	0.378	0.314	0.346
Vm Vsoln (mls)	180	160	170
Va aliquot mls	20	20	20
N Barium prechlorate, meg/ml	0.01	0.01	0.01
Vt mls of titrant	0.05	0.1	0.1
Vtb mls of titrant blank	0.05	0.05	0.05
K2 constant	48	48	48
CSO4, mg/DSCM	0.000	0.611	0.305
SO4, ppm	0.000	0.153	0.076

3.0 SITE DESCRIPTION

3.1 Engine Exhaust

Samples were collected from a 13.5" diameter horizontal duct located approximately 10 feet above the ground. Figure 3.1 shows the site diagram.

3.2 Stack Outlet

Samples were collected from a 13.5" diameter horizontal duct located after the catalytic converter. Figure 3.1 shows the site diagram while Figure 3.2 presents the traverse point location.

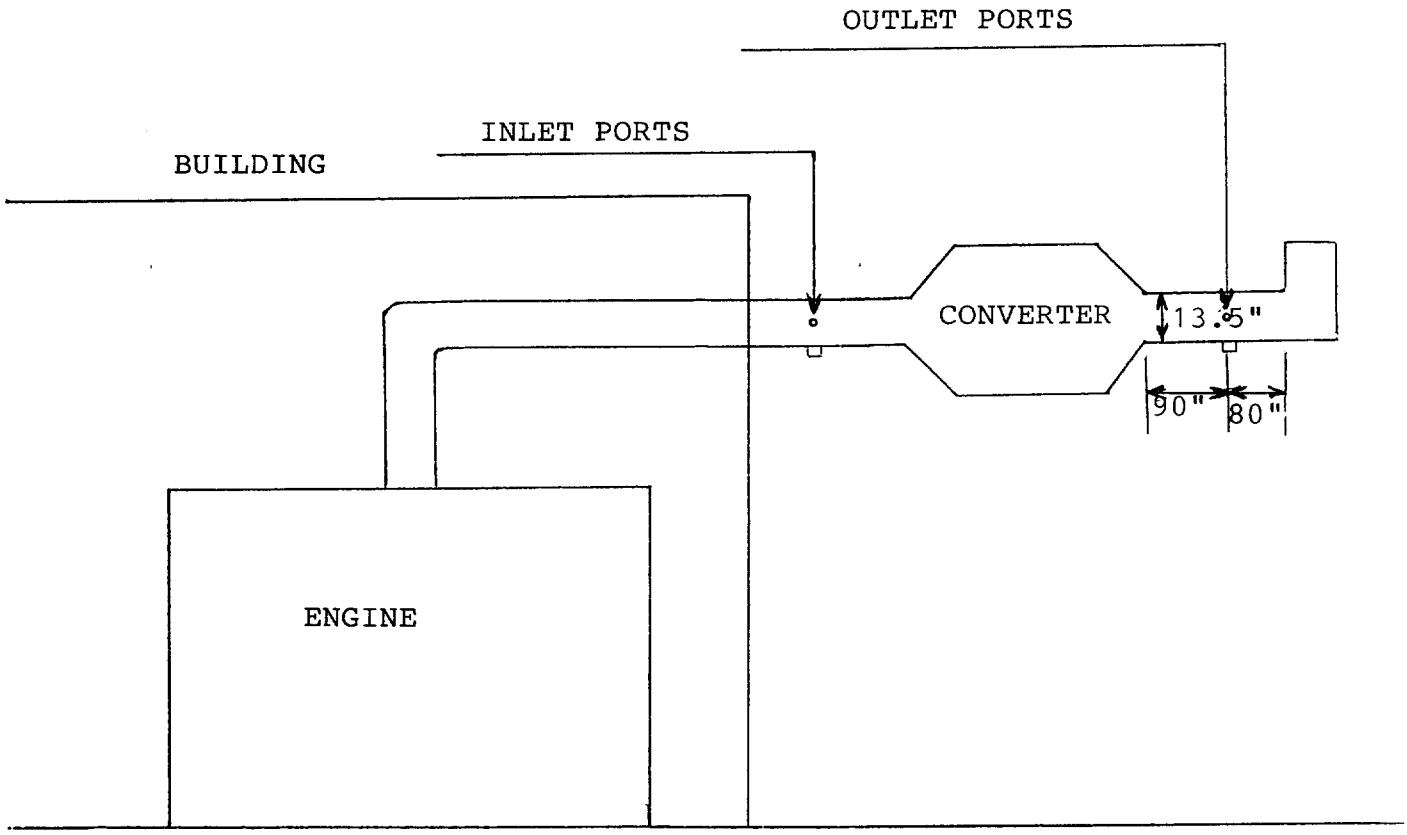
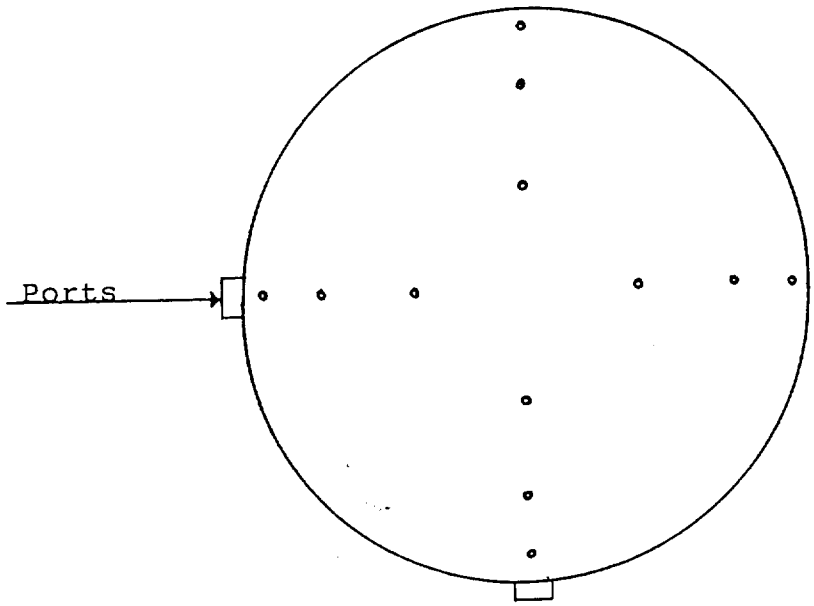


FIGURE 3.1 SITE DIAGRAM



TRAVERSE POINT LOCATION STACK EXHAUST
FIGURE 3.2

Stack Diameter = 13.5

TRAVERSE POINT	POINT LOCATION
1	2.59
2	3.97
3	6.00
4	11.50
5	13.53
6	14.91

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Traverse Point Location

Traverse point locations were determined by utilizing CARB Method 1, "Sample and Velocity Traverses for Stationary Sources."

4.2 Gas Flow Rate and Temperature Measurements

The stack gas volumetric flow rate and oxygen profile were measured. The gas velocity was measured by utilizing a calibrated type "S" pitot tube which was connected to an inclined manometer. The stack temperature was measured simultaneously with the velocity pressures at individual traverse points determined in Section 4.1. The Stack temperature was determined by using Type K chromel-alumel thermocouple wire attached to a digital readout.

Oxygen was measured at individual traverse points by flowing a gas sample through a heat trace line to a gas conditioning system and into a Teledyne electrochemical oxygen analyzer. Oxygen measurements at each traverse were measured for a minimum of one minute plus the average system response time.

4.3 Stack Gas Moisture

The stack gas moisture was measured by utilizing a probe, impingers, pump, and a dry gas meter. The gas sample was drawn through a set of pre-measured impingers containing water. Before and after the sampling, the system was checked for leaks to insure a good sample. After completion of the sampling, the impingers were re-measured and the weight gain was used to calculate the stack gas moisture. The test procedures followed CARB Method 4.

4.4 Stack Gas Molecular Weight Determination

The stack gas molecular weight was calculated by determining the major gas constituents in the gas stream. During the continuous monitoring, carbon dioxide measurements were made for determination of stack gas molecular weight.

4.5 Continuous Monitoring

Gas samples from the inlet and outlet of the converter were analyzed by using CARB Method 100. Two sets of instruments were used for the testing. One set of instruments conducted the inlet testing while a second set of equipment tested the outlet. Each outlet test consisted of three tests. A total of two hours of testing was conducted at each outlet. For each inlet, three tests, 15 minutes each, were conducted.

Samples were collected by drawing gaseous samples through a stainless steel probe, water-knockout system, teflon line, 7 micron filter, and pump before entering the instrumentation. The instruments consisted of a Thermo Electron Model 10 NOx analyzer, Thermo Electron Model 48H infrared carbon monoxide analyzer, Horiba PIR 2000 infrared carbon dioxide analyzer, and a Teledyne electrochemical oxygen analyzer. The data was recorded with a Westronics Series 3000 Data Logger. Figure 4.1 illustrates the sampling schematic.

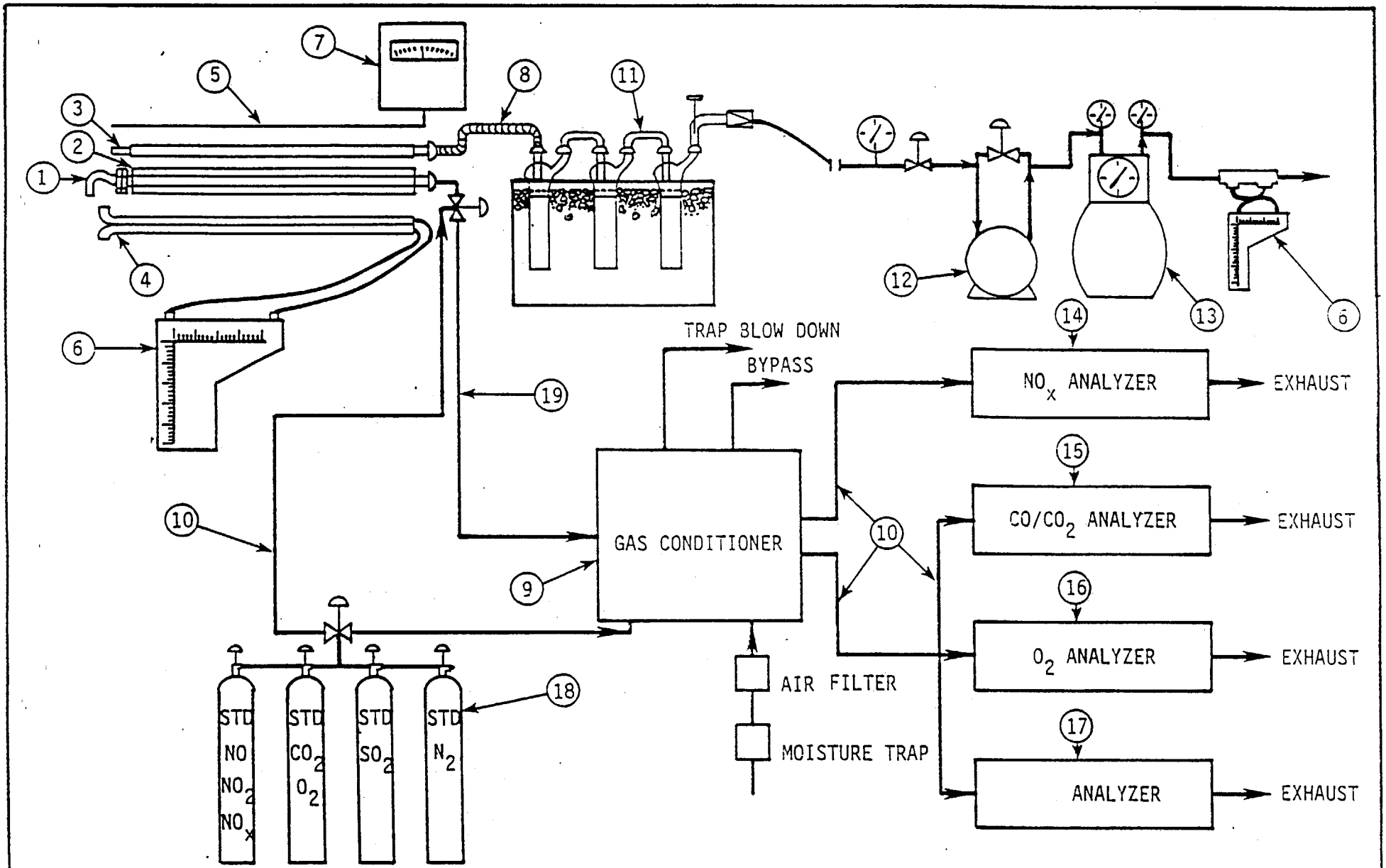


FIGURE 4.1

SAMPLING SYSTEM SCHEMATIC

WESTERN ENVIRONMENTAL SERVICES

SAMPLING TRAIN

1. Calibrated Nozzle
2. Heated Probe
3. Quarter-inch Inconel Tubing
4. Reverse Type-S Pitot Tube
5. Thermocouple Wire
6. Manometer
7. Digital Temperature Readout
8. Heated Teflon Flex Line
9. Gas Conditioner
10. Quarter-inch Teflon Tubing
11. Ice Bath with Three Impingers
12. Air Tight Pump
13. Dry Test Meter
14. NOx Continuous Analyzer
15. CO/CO_2 Continuous Analyzer
16. O_2 Continuous Analyzer
17. Continuous Analyzer
18. Certified Span Gases for Calibration Purposes
19. One-half Inch Heated Teflon Line

Before and after each test period, the instruments were zeroed and spanned with known EPA Protocol #1 span gases. A linearity check was performed prior to the testing by using a zero, mid, and high range gas. Before and after each sampling period, a system check was performed by injecting a known span gas into the probe and determining the percent recovery. During the testing the NOx converter was checked by injecting a known concentration of nitrogen dioxide span gas into the analyzer and determining the percent recovery.

4.6 Hydrocarbons

Samples were collected by drawing gaseous samples into tedlar bags. The bags were purged prior to use. The samples were analyzed by a FID gas chromatograph equipped with a poropak q column. The samples were injected by using a gas sampling valve. The samples were compared with a known standard made by Scott- Marin.

4.7 Sulfur Dioxide Testing

WES collected the samples by utilizing CARB Method 6. The sampling was conducted by drawing a fuel gas sample through a set of impingers. The first impinger contained 80% Isopropanol alcohol while the second and third impingers contained 6% hydrogen peroxide solution. The fourth impinger contained silica gel. The sampling train consisted of a probe, impingers, pump, and calibrated dry gas meter. The sampling system was checked for leaks prior to and after the testing.

After the testing, ambient air was drawn through the sampling train for 5 minutes. The first impinger was recovered into a separate bottle. The second and third impingers were measured and recovered into a 950 milliliter bottle. The silica gel was recovered and saved. The laboratory analysis consisted of measuring the total volume. An aliquot was placed into a clean 250 milliliter flask with 80 milliliters of IPA and thorin indicator. The solution was titrated with standardized barium perchlorate until a faint pink color appeared.

The calculations followed CARB Method 6.

5.0 QUALITY ASSURANCE

5.1 Instrument Calibration Gases

The instrument calibration gases were certified by an independent laboratory and copies of the certifications are included in the appendix of this report.

5.2 System Quality Assurance

The system calibration was performed before and after each test by injecting a calibration gas into the probe and determine the percent recovery at the instrument. Linearity checks were performed on the analyzers during the testing program.

5.3 Test Calibration

Before and after each test period, the continuous monitors were zeroed and spanned with EPA Protocol #1 span gases. The test calibration data is located in Appendix A.

5.4 Field Equipment Quality Assurance

The calibration of the pitot tube, dry gas meter, digital thermometers, and manometers were performed by utilizing standard EPA Methodology, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods (EPA-600/4-77-0278).

WESTERN ENVIRONMENTAL SERVICES

APPENDIX A

WESTERN ENVIRONMENTAL SERVICES

CONTINUOUS MONITORING TEST DATA

SITE:	Semi-Tropic Water District
DATE:	August 24, 1993
UNIT:	North Cogen #2
OPERATOR:	John Clarke

INSTRUMENT	SERIAL NUMBER	RANGE
WESTRONICS DATA LOGGER	SERIES 3000	-
NOX - THERMOELECTRON & CONV.	MODELS 10 & 300	0 - 100ppm
O(2) - TELEDYNE	326A	0 - 10%
CO - THERMOELECTRON	MODEL 48H	0 - 1000ppm
CO(2) - HORIBA	PIR 2000	0 - 15%

CALIBRATION GASES

GASES	CONCENTRATION	CYLINDER NUMBER
NO	44.1	JJ20284
NO	91	JJ16886
CO	466	JJ14169
CO	935	MM9915
O(2) & CO(2)	5.02, 12.49	JJ14738
O(2) & CO(2)	9.35, 5.93	JJ23019

WESTERN ENVIRONMENTAL SERVICES

CONTINUOUS MONITORING TEST DATA

SITE: Semtropic Water Dist

DATE: 8-

OPERATOR: Powers

Inlet	KW
#1	980
#2	980 - 998

INSTRUMENT	SERIAL #	RANGE
NOX	Thermo Electron 10	0-5000
O2	Teledyne	0-15
CO	Thermo Electron 48H	0-1000
CO2	Horiba PIR 2000	0-15%

CALIBRATION GASES

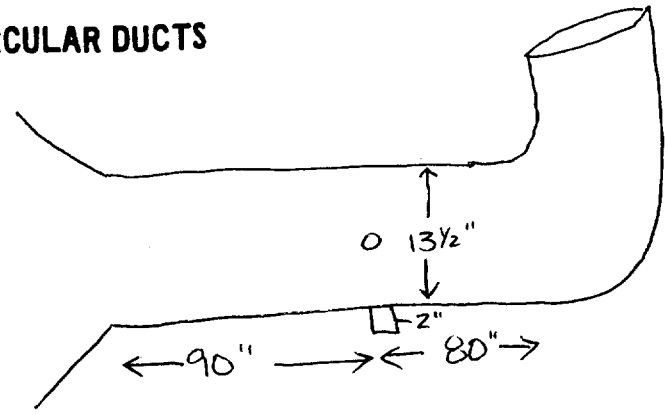
GASES	CONCENTRATION	CYLINDER #
NO	4190	CC119806
NO	2039	JJ14192
CO	5150	JJ14705
CO	1850	MM11503
O2/CO2	9.55 / 7.08	CC105454
O2/CO2	13.43 / 4.38	CC114743
NO2	88.	

A00002

WESTERN ENVRIONMENTAL SERVICES

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Semitropic Water - North
DATE 8-24-93
SAMPLING LOCATION Units #1 + #2
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 15½"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 2"
STACK I.D., (DISTANCE A - DISTANCE B) 13½"
NEAREST UPSTREAM DISTURBANCE 80" or 5.93 dd
NEAREST DOWNSTREAM DISTURBANCE 90" or 6.67 dd
CALCULATOR



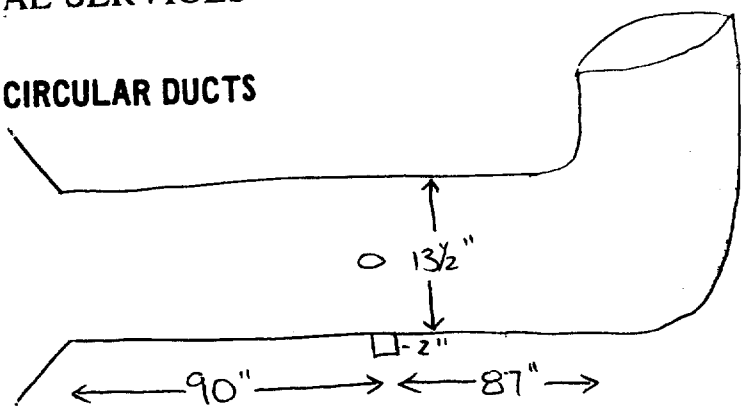
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.044	13.50"	0.59"	2"	2.59"
2	.146	↓	1.97"	↓	3.97"
3	.296		4.00"		6.00"
4	.704		9.50"		11.50"
5	.854		11.53"		13.53
6	.956	↓	12.91"	↓	14.91"

WESTERN ENVRIONMENTAL SERVICES

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Semitropic Water - South
DATE 8-25-93
SAMPLING LOCATION Units 1 + 2
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 15½"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 2"
STACK I.D., (DISTANCE A - DISTANCE B) 13½"
NEAREST UPSTREAM DISTURBANCE 87" or 6.44 dd
NEAREST DOWNSTREAM DISTURBANCE 90" or 6.67 dd
CALCULATOR



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.044	13.50	0.59	2"	2.59"
2	.146	↓	1.97	↓	3.97"
3	.296		4.00		6.00"
4	.704		9.50		11.50"
5	.854		11.53		13.53"
6	.956		12.91		14.91"

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

SITE: Semitropic Water Dist

DATE: 8-24-93

NORTH ENG #1 Inlet

TIME	NOx	O2	CO	CO2	# OF AVG
L	-39	0.02	-11	0.12	
M	2112	9.61	1826	4.20	
H	4212	13.43	5110	7.09	
Inlet #1					
1211 - 1226	2875	.01	3500	11.40	
L	-19	-.05	0	0.14	
M	1999	9.51	1847	4.19	
H	4046	13.17	5076	7.11	
Inlet #2					
1237 - 1258	2950	.01	3500	11.55	
L	-26	-.02	0	0.15	
M	2141	9.58	1857	4.21	
H	4156	13.39	5130	7.10	
Inlet #3					
1307 - 1322	3,100	.01	3500	11.55	
L	-16	.04	-13	0.19	
M	1989	9.70	1867	4.20	
H	~~4056~~ 4049	13.44	5165	7.10	
NOS45	1985				

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

SITE: SEMITROPIC WATER DST

DATE: 8-24-93

Inlet of ENGINE #2

TIME	NOx	O2	CO	CO2	# OF AVG
L	-38	-.03	-5	0.18	
M	2091	9.58	1903	4.30	
H	4265	13.41	5198	9.22	
2039 SYSTEM NO	2026				
Test #1					
847-907	3000	.01	3800	11.70	
L	-24	-.03	6	0.26	
M	2010	9.34	1869	4.36	
H	4065	~~9.34~~	5236	727	
Test #2					
915-930	2950	.01	3800	11.85	
L	-25	-.05	5	0.27	
M	~~2039~~ 2039	9.70	1860	4.42	
H	4152	13.54	5151	7.35	
Test #3					
940-955	2950	~~.01~~ .01	3800	11.85	
L	-8	-.04	-7	0.12	
M	2096	9.66	1900	4.18	
H	4274	13.48	5099	7.08	

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

SITE: Unit 1 H2O Storage

DATE: 8-24-93

Page 1 of 2

TIME		NOx	O2	CO	CO2	# OF AVG
1	1140	96.64	.08	641.7	12.12	
2	1142	96.28	.05	592.8	12.13	
3	1144	97.55	.04	610.7	12.11	
4	1145	79.17 ~~72.99~~	.04	693 ~~547.4~~	12.13	
5	1147	72.99 70.6	.04 ~~.07~~	547 ~~[illegible]~~	~~[illegible]~~ 12.13	
6	1148	70.6 ~~99.08~~	.07 ~~.08~~	595 ~~[illegible]~~	~~[illegible]~~ 1209	
1	1151	99.08	.08	694.1	12.15	
2	1152	100.42	.07	590	12.16	
3	1154	98.42	.07	609.8	12.2	
4	1155	96.24	.05	663.4	12.18	
5	1157	91.79	.05	688	12.16	
6	1158	89	.04	613.8	12.17	
c	1200	.10	5.10	471.5	13.02	
c	1203	91.11	.02	-.2	.08	
c	1205	44.28	.02	-.2	.07	
c	1207	.06	9.34	942.	5.89	
c	1209	44.16	.04	1	.07	
		Begin	Test	1 Unit 1		at 1210
~~END~~	~~1250~~					
~~corrected~~ c	1246	.23	9.34	943.6	5.93	
c	1248	43.96	.03	-.3	.10	
c	1249	89.92	.02	.9	.08	
c	1251	.10	5.08	466.7	12.71	
c	1253	91.41	.03	1	.10	

Bottom port

Side port

~~1254~~

NOsys ✓ 44.36 Time 1335

A00007

4

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA Unit 2 2851

SITE: Semitropic H2O Storage District

DATE: 8-24-93

TIME	NOx	O2	CO	CO2	# OF AVG
825	.32	5.04	466.7	12.6	
827	91.11	.04	.1	.09	
828	44.17	.04	.1	.09	
831	-.08	9.24	934.6	5.90	
NO sys ✓ 835	42.4				
	Begin	Test #1	Unit	#2 841	
END 921	75.49	.09	589.1	12.05	
corrected	21.52		168		
c 923	.74	9.13	927.3	6.00	
c 925	42.51	.05	-1.2	.17	
c 926	87.31	.04	0	.17	
c 927	.40	5.06	466.5	12.88	
Adj. 928	-.13	5.07	468.4	12.89	
Adj 929	90.76				
	Begin	Test 2	Unit	2 at	930
END 1010					
corrected					
012	1.13	5.04	466.4	12.95	
1013	91.87	.03	-1.2	.20	
1015	44.89	.02	-1.2	.18	
1017	.18	9.38	943.2	6.10	
	Begin	Test 3	Unit	2 at	1019
END 1059	77.81	.10	583.3	12.22	
Corrected	22.2		166		

2852

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA Unit 2

Page 2 of 2

SITE: ~~[illegible]~~ Hco Storage

DATE: 8-24-93

TIME		NOx	O2	CO	CO2	# OF AVG
C	1101	2.94	9.35	940.9	6.07	
C	1103	45.37	.04	-2.1	.19	
C	1104	91.66	.03	-2.1	.19	
C	1106	1.66	5.12	469.6	12.93	
Adj.	1107	.06	5.12	468.4	12.97	
Adj.	1109	90.96	.03	-.1	.18	
	O2 Traverse Unit #2					
1	1115	89.94	.09	545.4	12.14	
2	1116	88.49	.04	587.8	12.15	
3	1118	90.01	.03	528.4	12.15	
4	1119	76.22	.03	503.7	12.12	
5	1121	73.34	.03	545.4	12.13	
6	1122	72.74	.03	466.5	12.11	
1	1125	87.45	.19	572.1	12.01	
2	1127	88.2	.21	605.9	11.97	
3	1128	85.28	.20	610.7	12.04	
4	1130	81.74	.05	502.8	12.12	
5	1131	78.59	.03	520.5	12.13	
6	1133	77.72	.02	555	12.14	
Sys ✓	1335	44.36				

Bottom port

Side port

A00009

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

SITE: Semitropic Water D.S.

DATE: 8-24-98

ENG #1 North Outlet

TIME	NOx	O2	CO	CO2	# OF AVG
L	0	-.01	-4	.07	
M	84	5.09	937	6.98	
H	229	9.56	1847	12.44	
SYS	221				
Outlet #1					
1407-1447	80	0.00	610	11.70	
L	-6	-.02	-4	.09	
M		4.97	916	6.78	
H	223	9.44	1829	12.31	
Outlet #2					
1501-1541	100	0.00	640	11.55	
L	-7	-.01	-6	0.02	
M	86	5.02	944	6.77	
H	224	9.43	1857	12.06	
Outlet #3					
1550-1630	102	0.01	630	11.55	
L	-7	-.03	-4	.01	
M	88	4.95	940	6.88	
H	228	9.44	1848	12.25	
NO SYS	223				

A00010

FIELD DATA

PLANT Semitropic Water
DATE 8-24-93
SAMPLING LOCATION UNIT #1
SAMPLE TYPE Velocity / Moisture
RUN NUMBER #1
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 100
BAROMETRIC PRESSURE 30.00
STATIC PRESSURE, (P_s) +0.42
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3' - ST
NOZZLE I.D.
ASSUMED MOISTURE, % 15%
SAMPLE BOX NUMBER
METER BOX NUMBER WOOD #83
METER $\Delta H_@$ #2 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp # (0-2")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .008 cfm at 21"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Postleak ✓ < .006 cfm at 21"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	1211	419.600									
1	13	1224	426.305	1.30		0.75	1006	100	100	6	N/A	
2	33	1244	436.610	1.55		0.76	1060	108	102	6		
3	43	1254	441.737	1.75		0.78	1093	112	104	6		
4				1.50			1090					
5				1.25			1079					
6				1.15			1063					
SIDE												
1				1.15			1028					
2				1.35			1067					
3				1.55			1093					
4				1.50			1089					
5				1.15			1078					
6				0.95			1035					
BOTTOM												

A0001

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA

PLANT Semitropk Water
DATE 8-24-93
SAMPLING LOCATION Unit #2
SAMPLE TYPE Velocity/moisture
RUN NUMBER #1
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 84
BAROMETRIC PRESSURE 30.00
STATIC PRESSURE, (P_s) ±0.40
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3'- #71
NOZZLE I.D.
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER WOOD # 83
METER $\Delta H_@$ # 21 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp # (0-2")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ≤ .007 cfm at 20" READ AND RECORD ALL DATA EVERY 15 MINUTES Postleak ≤ .006 cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 825	361.900									
1	15 / 840	368.960	1.20		0.75	1060	84	84	5	N/A	
2	31 / 856	377.170	1.30		0.75	1073	92	86	5	↓	
3	43 / 908	383.313	1.55		0.78	1119	98	90	5		
4			1.60			1129					
5		21.413	1.35		0.76	1108		89			
6			1.20			1073					
		m/s									
1		grams	1.25			1090					
2		V/c	1.50			1095					
3			1.70			1121					
4			1.55			1125					
5			1.20			1110					
6			1.05			1092					
						1110					

SIDE

Bottom

A00012

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA REDUCTION

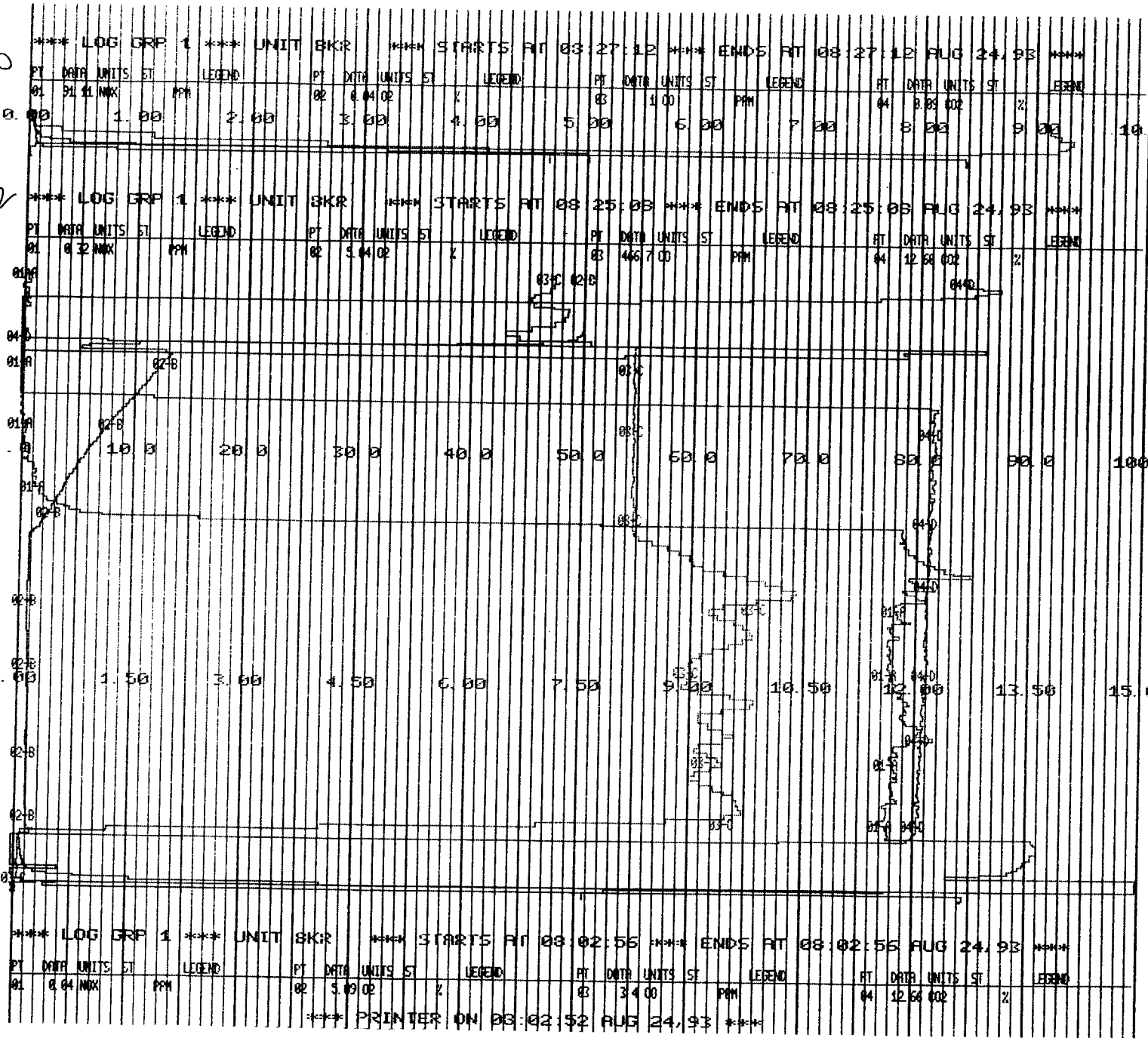
SITE: Semi-Tropic Water Storage
DATE: August 24, 1993
UNIT: North Cogen #1 - Outlet
TEST: Velocity/Moisture

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Side Port	419.600	1.30	1.140175	0.75	1006	100	100
	441.737	1.55	1.244989	0.76	1060	108	102
	---	1.75	1.322875	0.78	1093	112	104
	22.137	1.50	1.224744		1090		
	=========	1.25	1.118033		1079		
	(DIFFERENCE)	1.15	1.072380		1063		
Bottom Port		1.15	1.072381		1028		
		1.35	1.161895		1067		
		1.55	1.244990		1093		
		1.50	1.224745		1089		
		1.15	1.072381		1078		
		0.95	0.974679		1035		
			--- AVERAGE SQUARED				
		AVERAGES	1.156189 1.337	0.76	1065		104
			========= =======	==========	=========		=========

UNIT: North Cogen #2 - Outlet
TEST: Velocity/Moisture

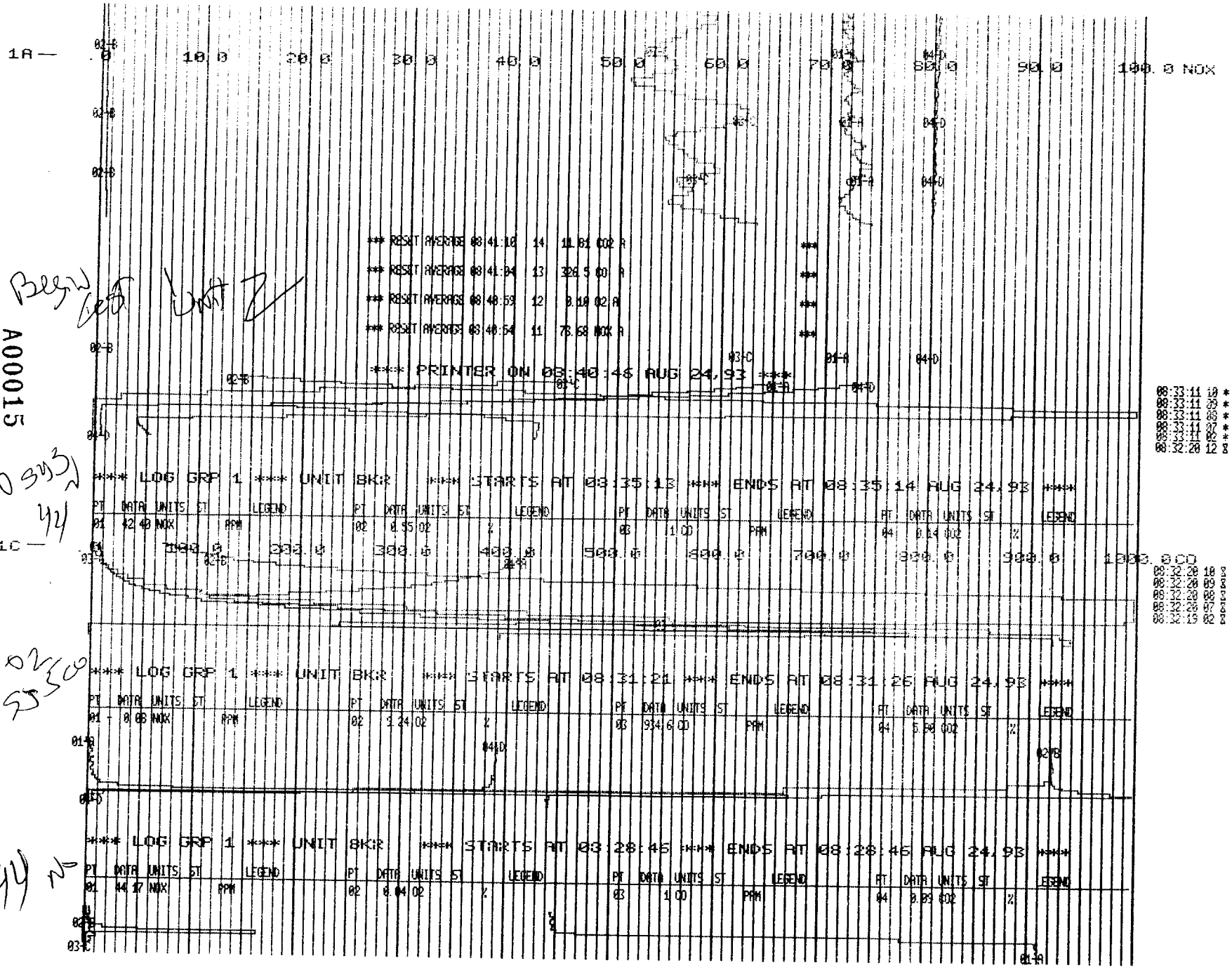
	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Side Port	361.900	1.20	1.095445	0.75	1060	84	84
	383.313	1.30	1.140175	0.75	1073	92	86
	---	1.55	1.244989	0.78	1119	98	90
	21.413	1.60	1.264911		1129		
	=========	1.35	1.161895		1108		
	(DIFFERENCE)	1.20	1.095445		1073		
Bottom Port		1.25	1.118034		1090		
		1.50	1.224745		1095		
		1.70	1.303840		1121		
		1.55	1.244990		1125		
		1.20	1.095445		1110		
		1.05	1.024695		1092		
			--- AVERAGE SQUARED				
		AVERAGES	1.167884 1.364	0.76	1100		89
			========= =======	==========	=========		=========

A00013


*** LOG GRP 1 *** UNIT 8K:R *** STARTS AT 03:27:12 *** ENDS AT 08:27:12 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 91.11 NOX PPM
02 0.04 02 %
03 1.00 PPM
04 8.89 C02 %
1B — 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 02
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 08:25:08 *** ENDS AT 08:25:08 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 0.32 NOX PPM
02 5.04 02 %
03 466.70 PPM
04 12.58 C02 %
1A — 0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 NOX
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
08:03:47 11 *
08:03:47 39 *
08:03:44 31 *
08:03:21 11 8
08:03:21 09 8
08:03:21 01 8
*** LOG GRP 1 *** UNIT 8K:R *** STARTS AT 08:02:56 *** ENDS AT 08:02:56 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 0.04 NOX PPM
02 5.09 02 %
03 34.00 PPM
04 12.66 C02 %
*** PRINTER ON 08:02:52 AUG 24,93 ***

A00014

A00015

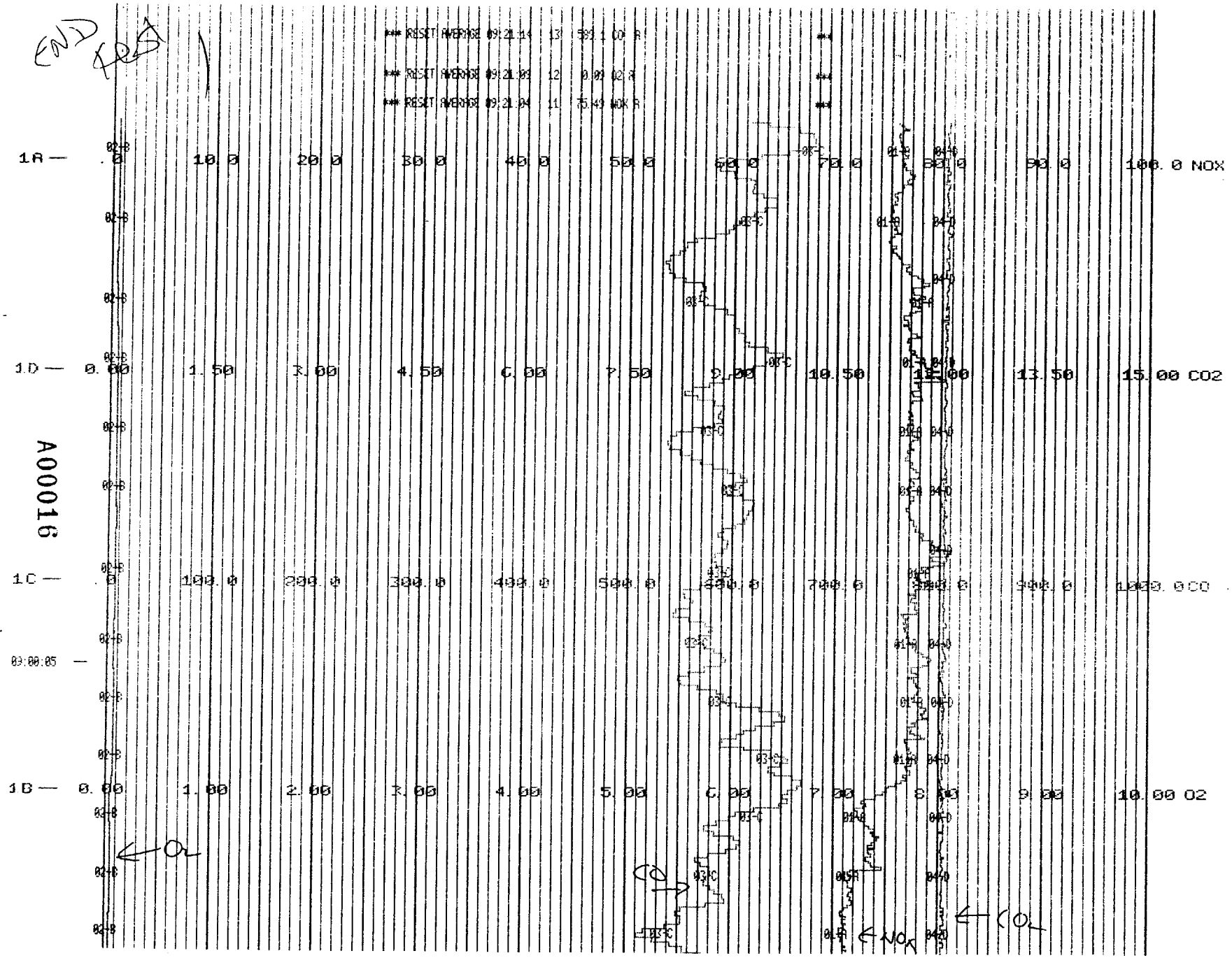


Begin test Unit 2

NO 593 44

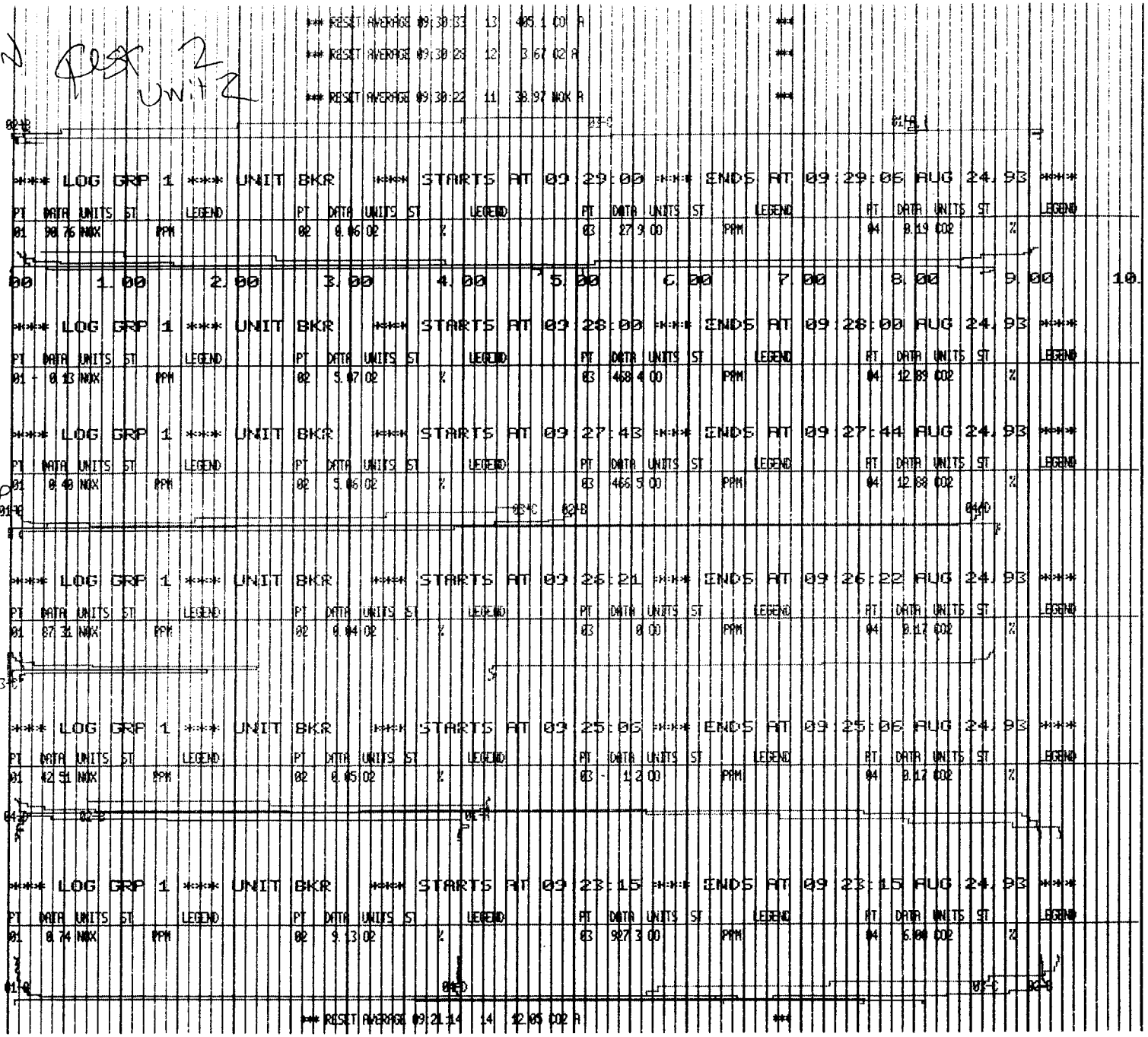
9.02 55.50

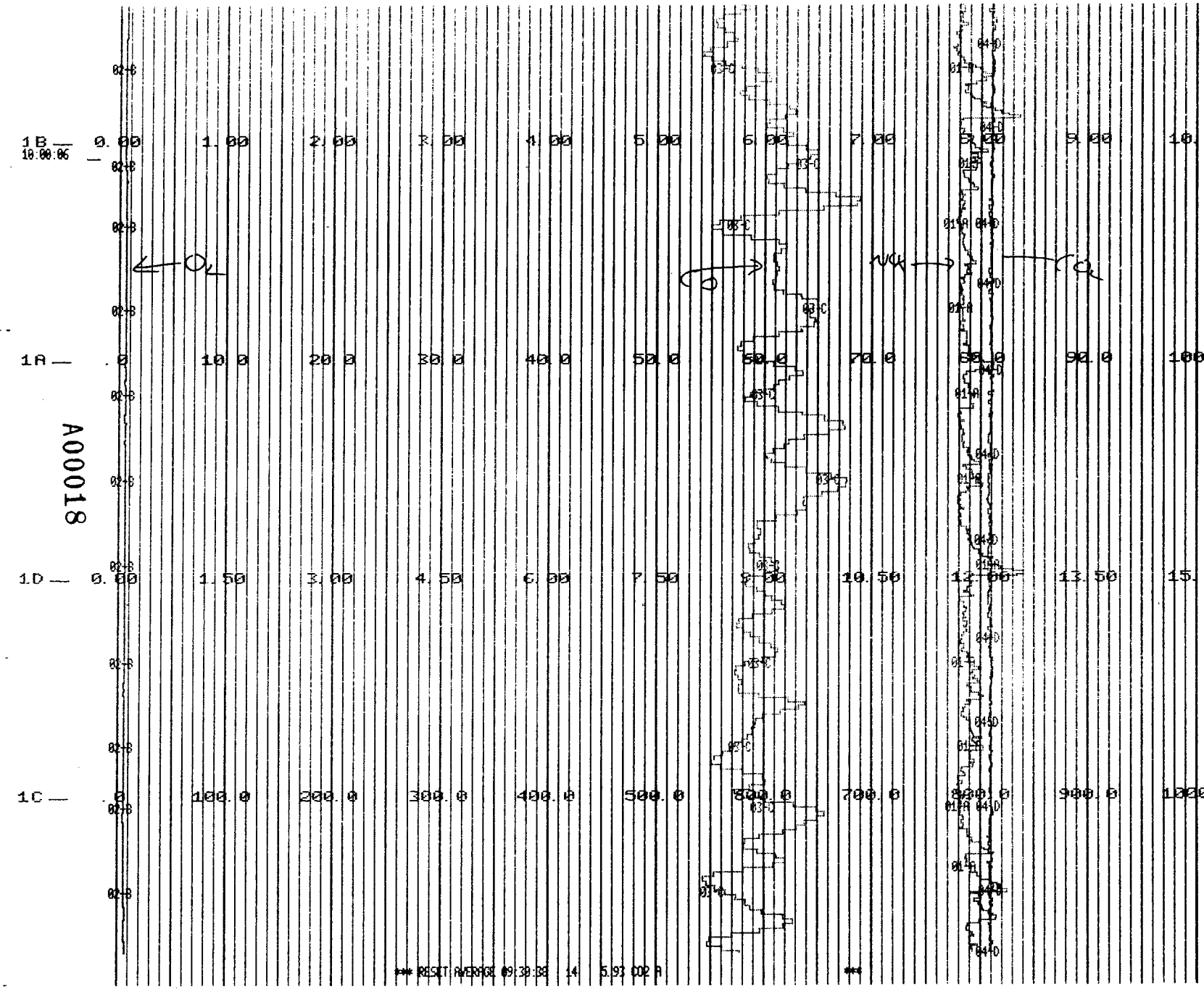
44 No

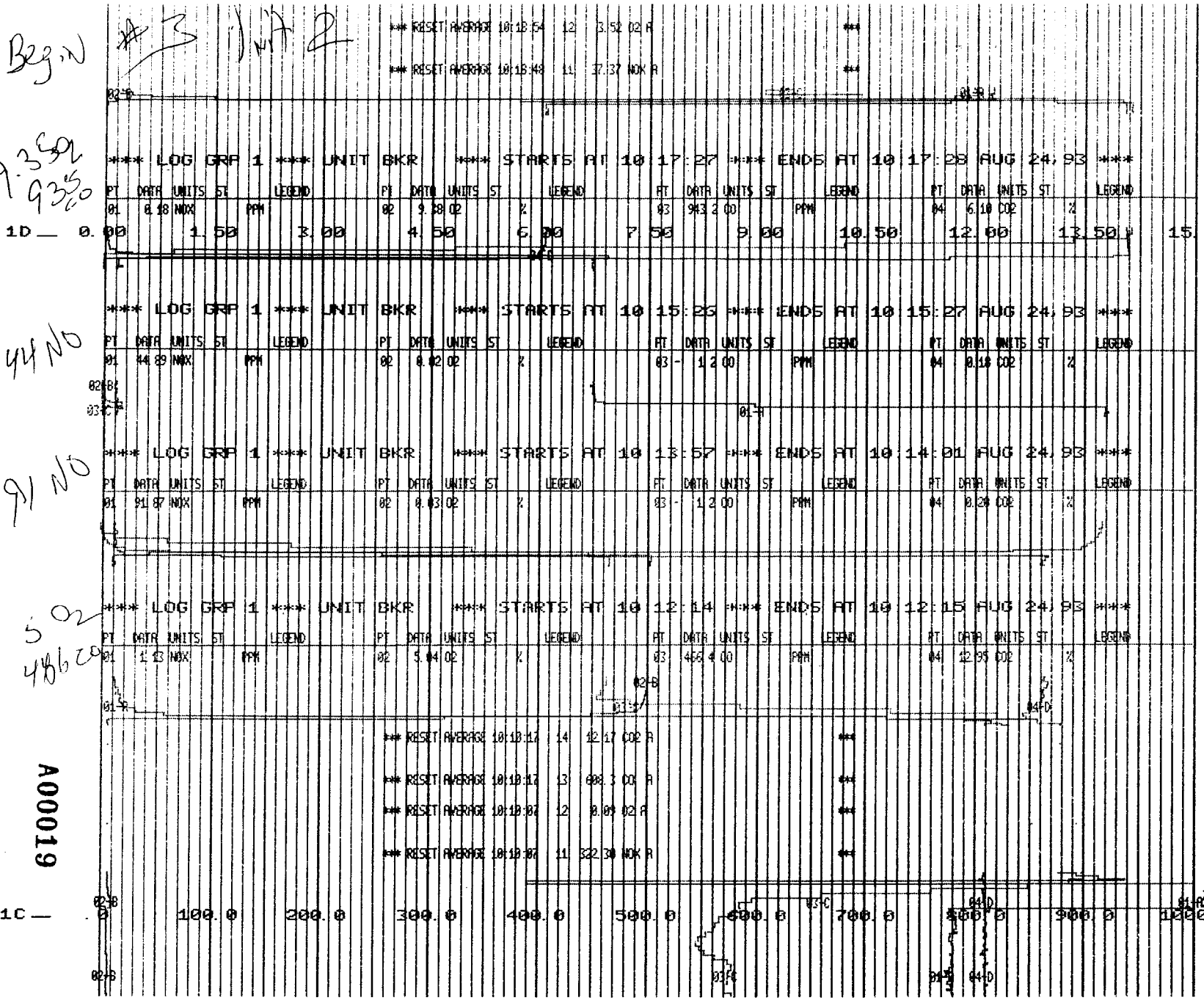


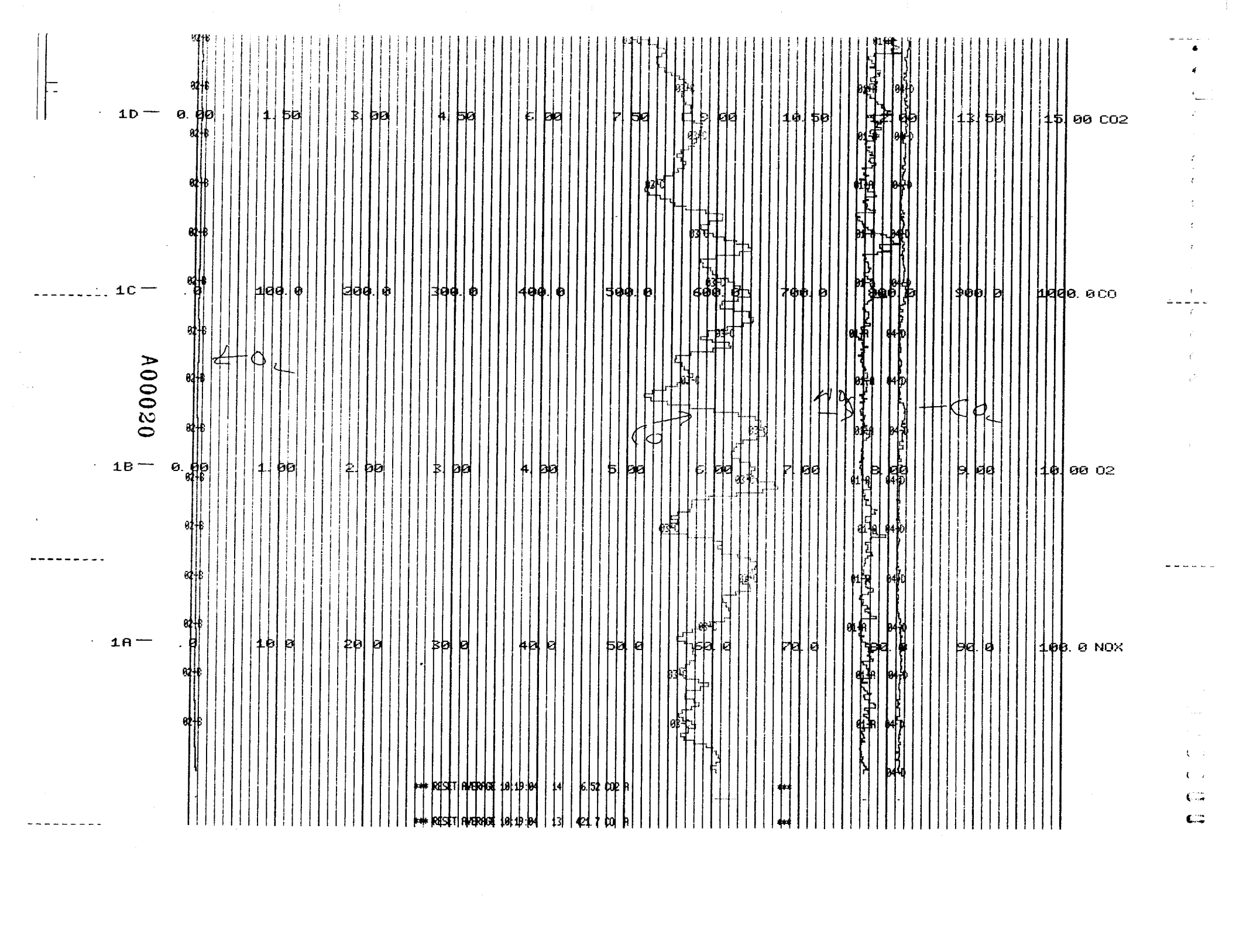
END Test
*** RESET AVERAGE 09:21:14 13 589.1 CO A ***
*** RESET AVERAGE 09:21:09 12 0.09 O2 A ***
*** RESET AVERAGE 09:21:04 11 75.49 NOX A ***
1A — .0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 NOX
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
1C — .0 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0 CO
09:00:05
1B — 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 O2
← O2
CO →
← NOx
← CO2

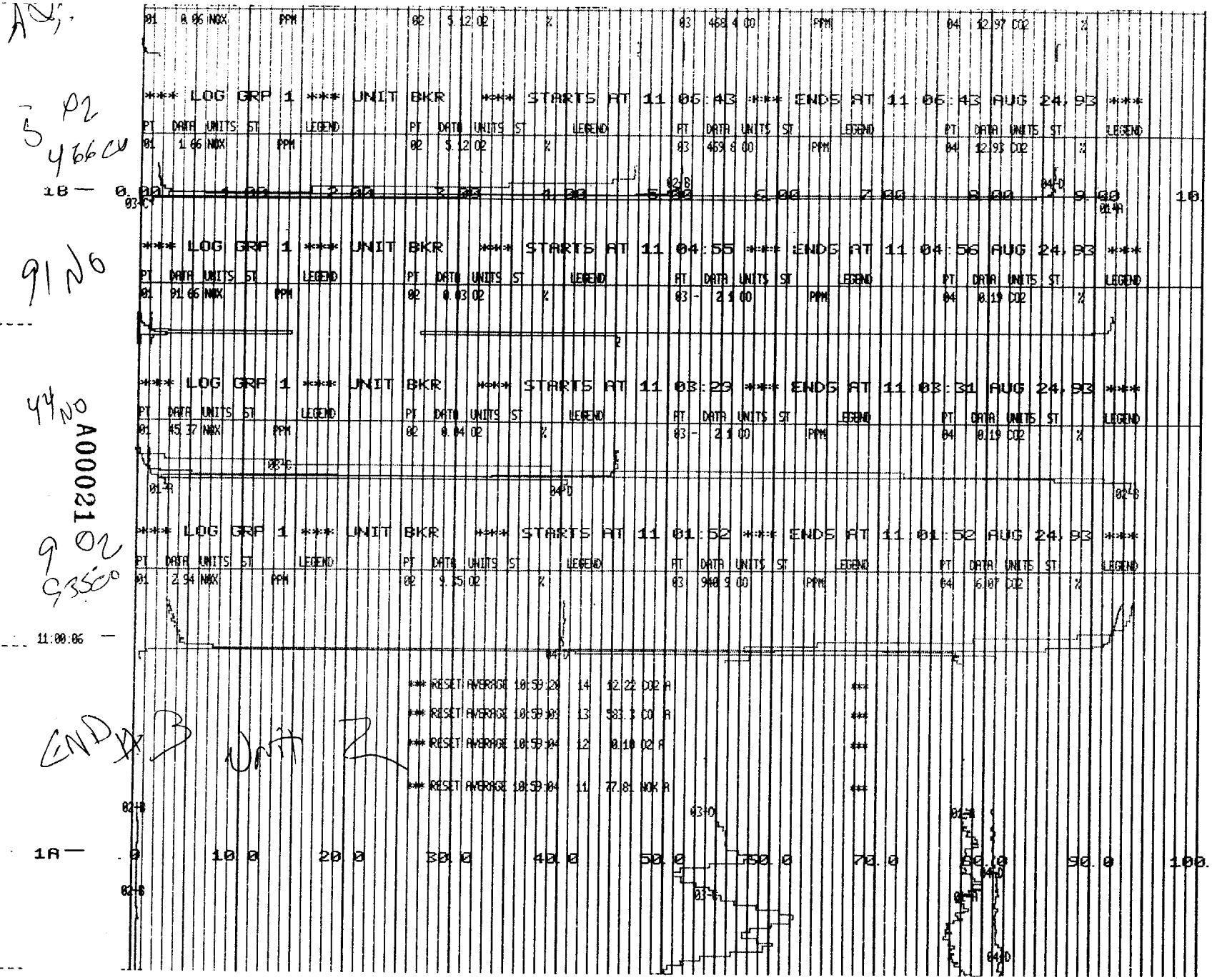
A00016

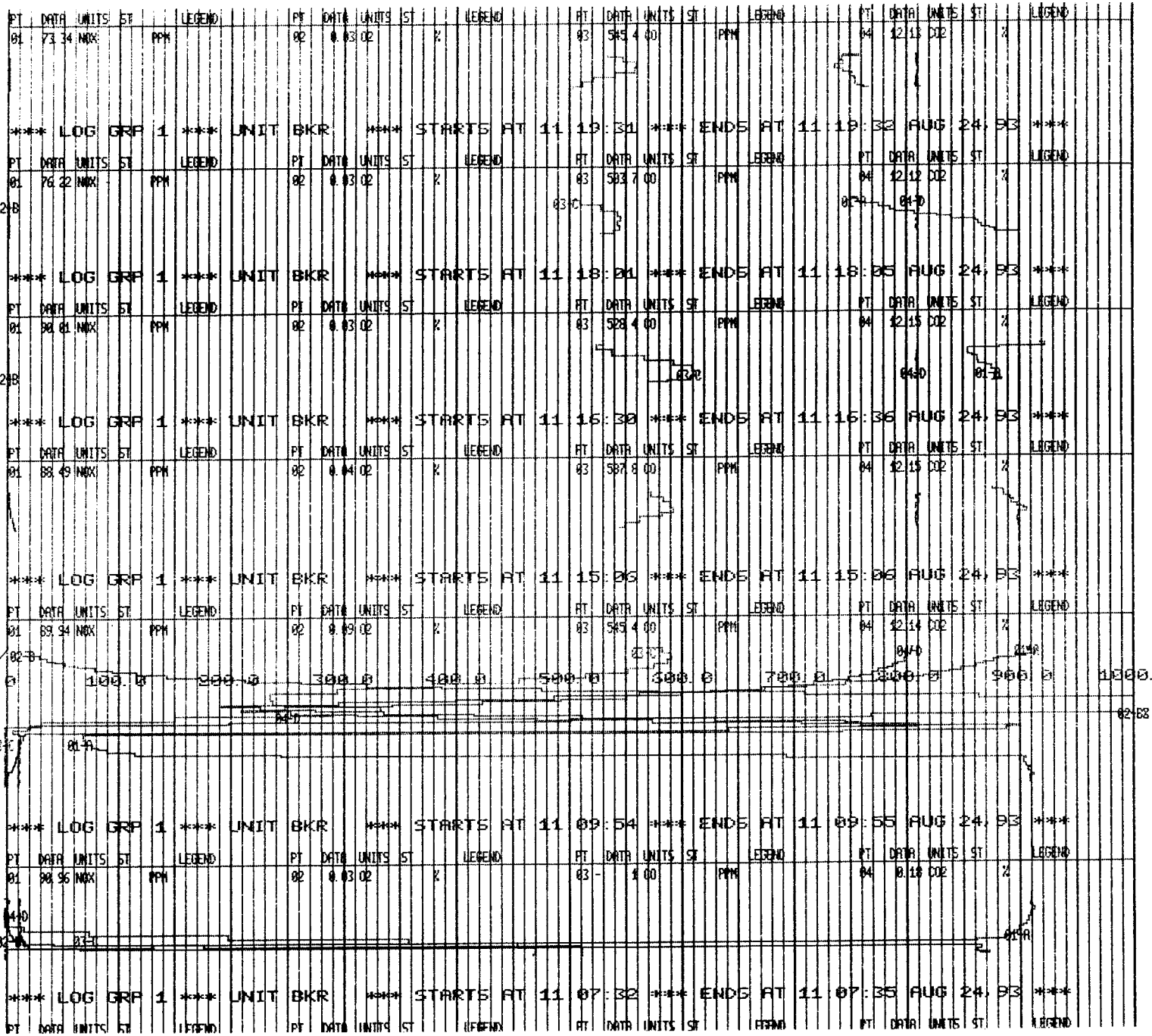

Begin Test Unit 2
*** RESET AVERAGE 09:30:33 13 405.1 CO A
*** RESET AVERAGE 09:30:28 12 3.67 O2 A
*** RESET AVERAGE 09:30:22 11 38.97 NOX A
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:29:00 *** ENDS AT 09:29:06 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 98.76 NOX PPM 02 0.06 O2 % 03 27.9 00 PPM 04 8.19 CO2 %
1B 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 02
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:28:00 *** ENDS AT 09:28:00 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 0.13 NOX PPM 02 5.67 O2 % 03 468.4 00 PPM 04 12.89 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:27:43 *** ENDS AT 09:27:44 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 0.40 NOX PPM 02 5.06 O2 % 03 466.5 00 PPM 04 12.68 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:26:21 *** ENDS AT 09:26:22 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 87.31 NOX PPM 02 0.04 O2 % 03 0.00 PPM 04 0.17 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:25:06 *** ENDS AT 09:25:06 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 42.51 NOX PPM 02 0.05 O2 % 03 1.2 00 PPM 04 0.17 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:23:15 *** ENDS AT 09:23:15 AUG 24,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 0.74 NOX PPM 02 9.13 O2 % 03 927.3 00 PPM 04 6.00 CO2 %
*** RESET AVERAGE 09:21:14 14 12.85 CO2 A

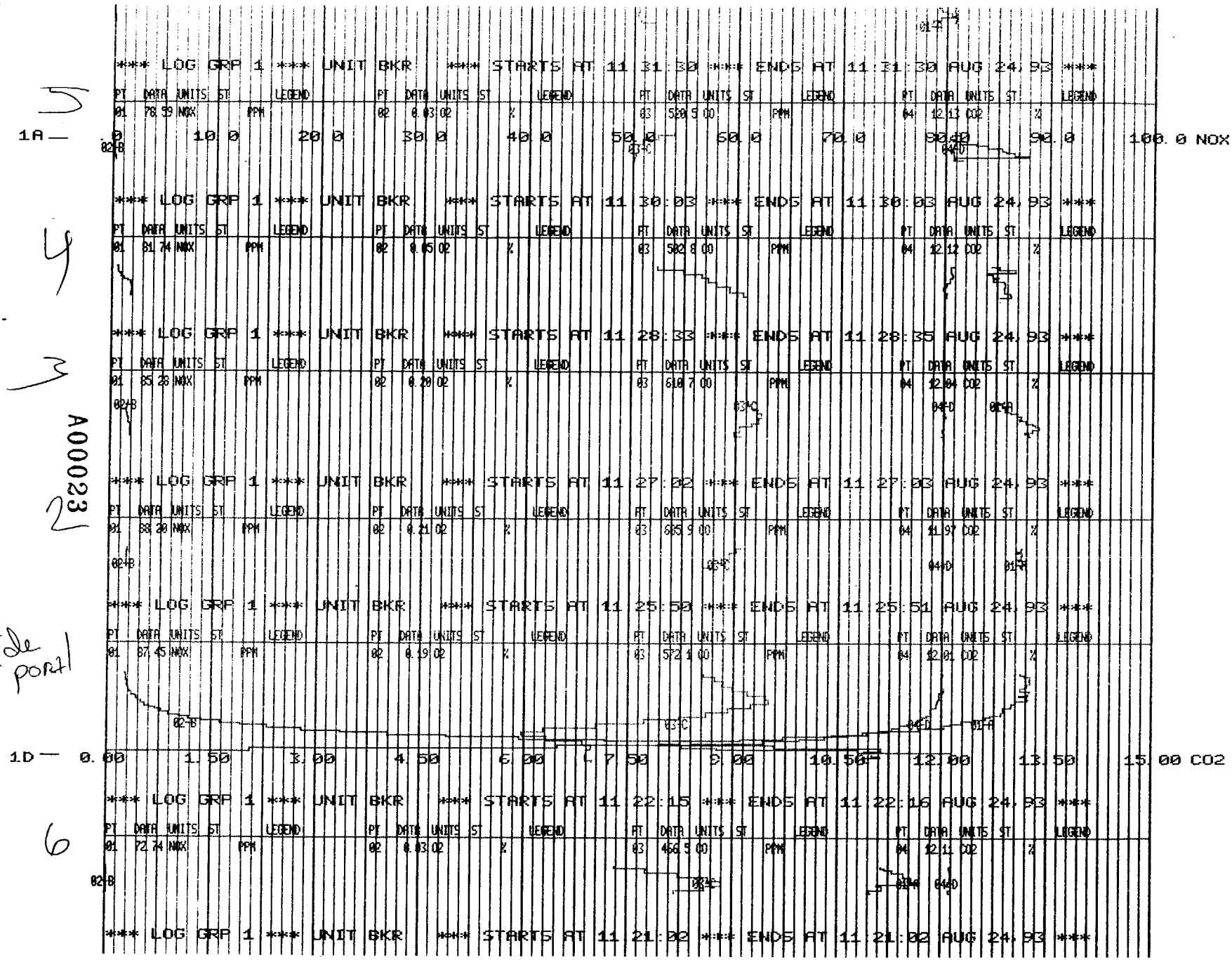

1B — 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 O2
10:00:06
1A — 0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 NOX
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
1C — 0 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0 CO
A00018


*** RESET AVERAGE 10:12:54 12 3.52 O2 A
*** RESET AVERAGE 10:15:43 11 37.37 NOX A
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 17:27 *** ENDS AT 10 17:28 AUG 24, 93 ***
PT DATA UNITS ST LEGEND
01 6.18 NOX PPM
02 9.38 O2 %
03 943.2 00 PPM
04 6.10 CO2 %
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 15:26 *** ENDS AT 10 15:27 AUG 24, 93 ***
01 44.89 NOX PPM
02 0.02 O2 %
03 1.2 00 PPM
04 0.18 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 13:57 *** ENDS AT 10 14:01 AUG 24, 93 ***
01 91.87 NOX PPM
02 0.03 O2 %
03 1.2 00 PPM
04 0.29 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 12:14 *** ENDS AT 10 12:15 AUG 24, 93 ***
01 1.43 NOX PPM
02 5.84 O2 %
03 466.4 00 PPM
04 12.95 CO2 %
*** RESET AVERAGE 10:10:17 14 12.17 CO2 A
*** RESET AVERAGE 10:10:17 13 888.3 00 A
*** RESET AVERAGE 10:10:07 12 0.09 O2 A
*** RESET AVERAGE 10:10:07 11 332.30 NOX A
10:09:15 01 *
10:09:15 03 *
10:09:15 04 *
10:08:38 11 *
10:08:38 09 *
10:08:38 01 *
1C — 0 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0 CO
A00019


1D
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 CO2
1C
.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1000.0 CO
1B
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 O2
1A
.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0 NOX
A00020
*** RESET AVERAGE 10:19:04 14 6.52 CO2 A
*** RESET AVERAGE 10:19:04 13 421.7 CO A


*** LOG GRP 1 *** UNIT BKR **** STARTS AT 11 06:43 *** ENDS AT 11 06:43 AUG 24,93 ***
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 11 04:55 *** ENDS AT 11 04:56 AUG 24,93 ***
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 11 03:23 *** ENDS AT 11 03:31 AUG 24,93 ***
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 11 01:52 *** ENDS AT 11 01:52 AUG 24,93 ***
11:00:06
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0 NOX
10.00 O2


PT DATA UNITS ST LEGEND
01 73.34 NOX PPM
02 0.03 O2 %
03 545.4 00 PPM
04 12.13 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 19:31 *** ENDS AT 11 19:32 AUG 24, 93 ***
01 76.22 NOX PPM
02 0.03 O2 %
03 503.7 00 PPM
04 12.12 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 18:01 *** ENDS AT 11 18:05 AUG 24, 93 ***
01 90.01 NOX PPM
02 0.03 O2 %
03 528.4 00 PPM
04 12.15 CO2 %
11:12:54 12 *
11:12:54 10 *
11:12:54 09 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 16:30 *** ENDS AT 11 16:36 AUG 24, 93 ***
01 88.49 NOX PPM
02 0.04 O2 %
03 587.8 00 PPM
04 12.15 CO2 %
11:12:54 08 *
11:12:54 07 *
11:12:53 02 *
11:12:23 12 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 15:06 *** ENDS AT 11 15:08 AUG 24, 93 ***
01 83.34 NOX PPM
02 0.09 O2 %
03 545.4 00 PPM
04 12.14 CO2 %
11:12:23 10 *
11:12:23 09 *
0. 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000. 0CO
11:12:23 08 *
11:12:23 07 *
11:12:22 02 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 09:54 *** ENDS AT 11 09:55 AUG 24, 93 ***
01 90.96 NOX PPM
02 0.03 O2 %
03 1.00 PPM
04 0.16 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 07:32 *** ENDS AT 11 07:35 AUG 24, 93 ***
PT DATA UNITS ST LEGEND



5

4

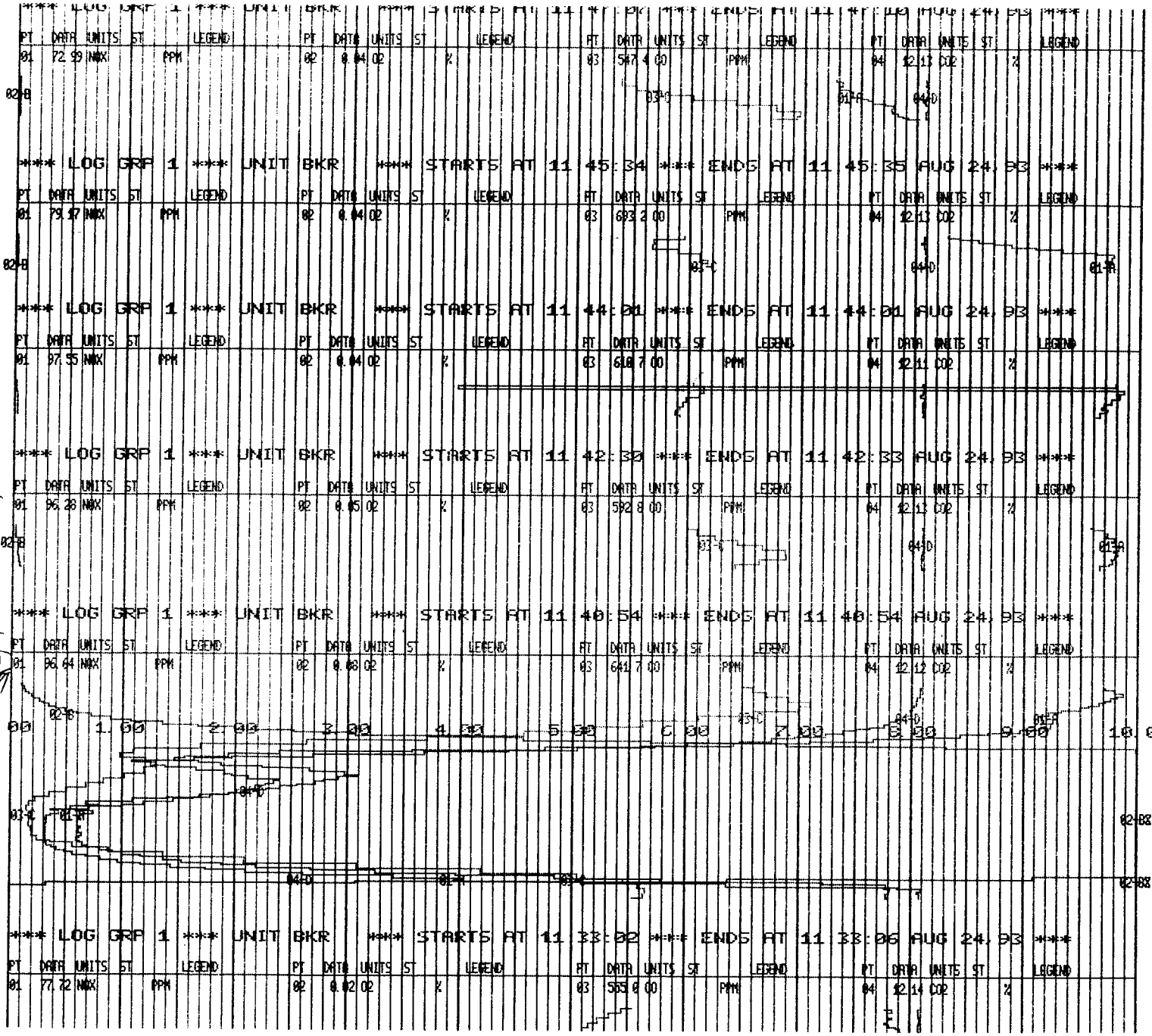
3

2

side port

6

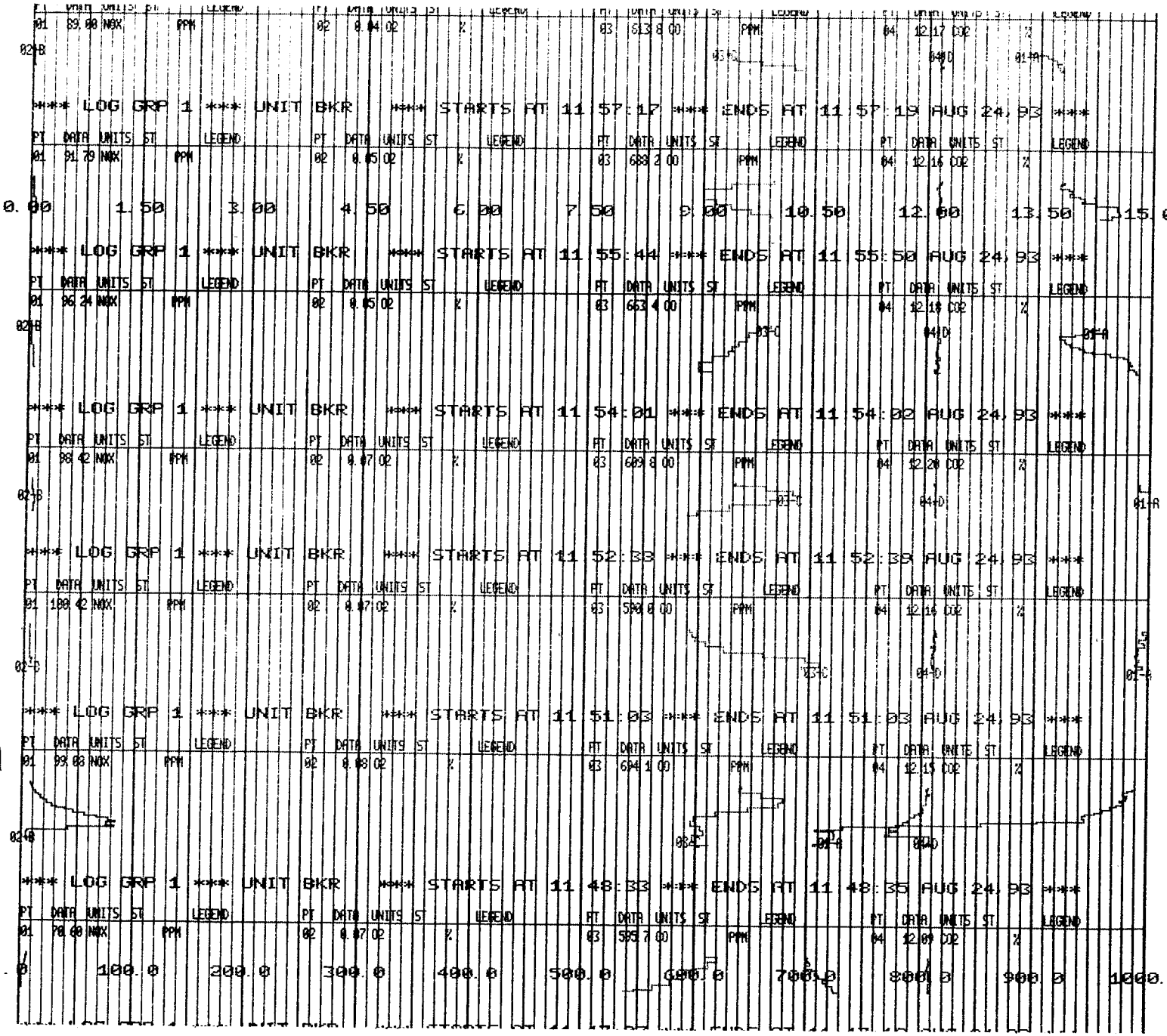
A00023

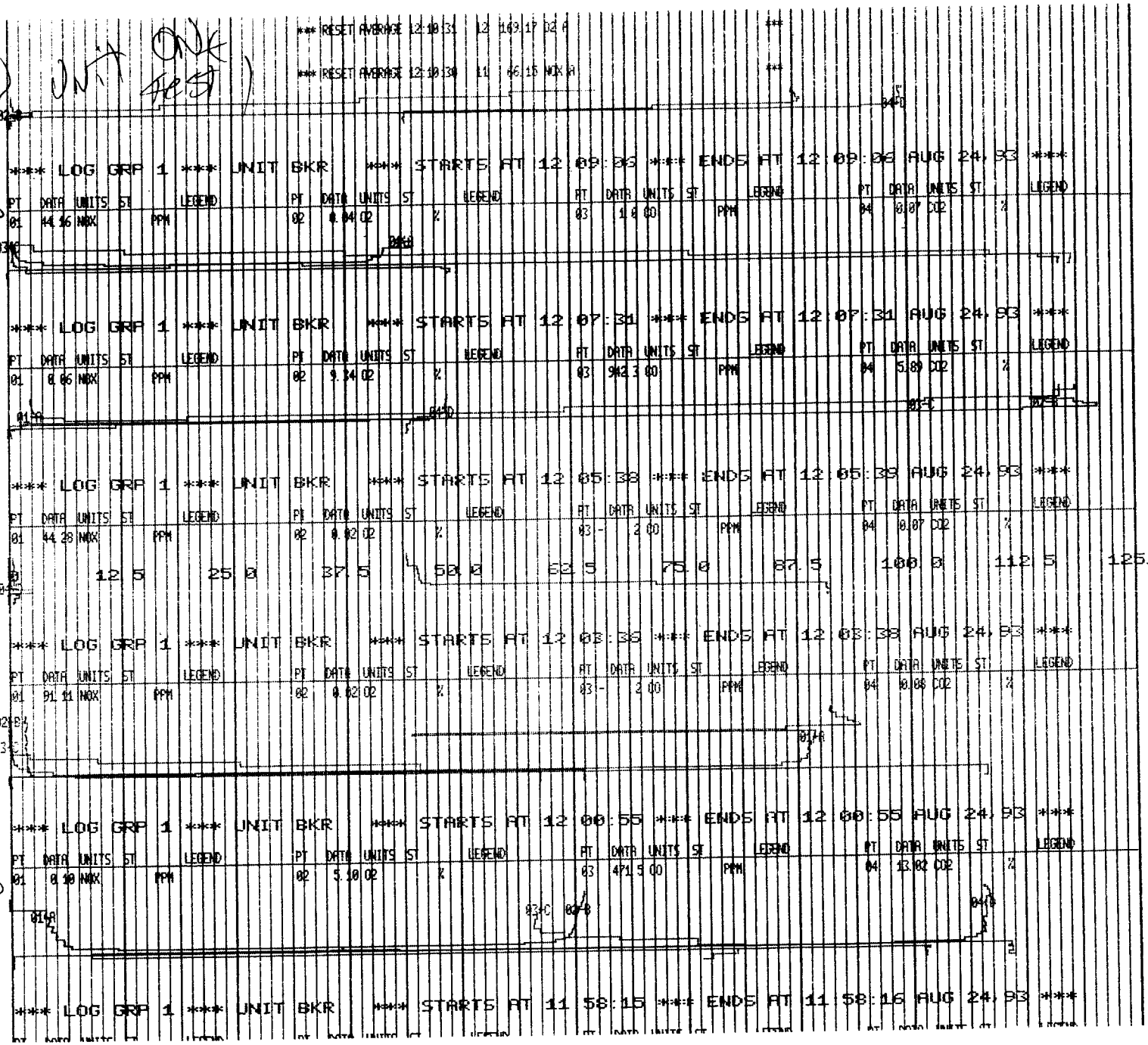


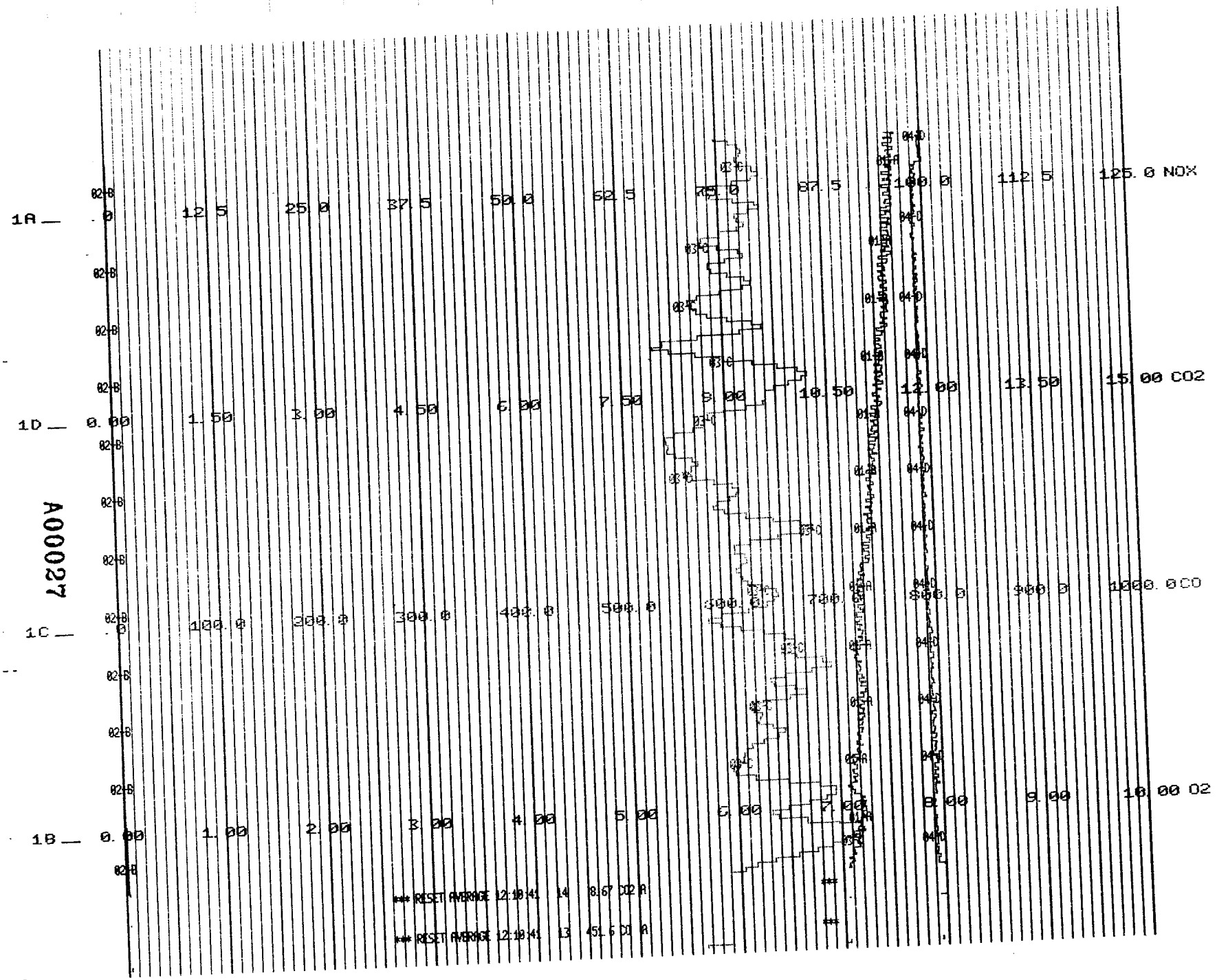
A000242

UNIT ONE
BOTTOM PORT

1B — 1


*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 57:17 *** ENDS AT 11 57:19 AUG 24, 93 ***
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 55:44 *** ENDS AT 11 55:50 AUG 24, 93 ***
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 54:01 *** ENDS AT 11 54:02 AUG 24, 93 ***
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 52:33 *** ENDS AT 11 52:35 AUG 24, 93 ***
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 51:03 *** ENDS AT 11 51:03 AUG 24, 93 ***
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 48:33 *** ENDS AT 11 48:35 AUG 24, 93 ***
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
0.0 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0 CO


*** RESET AVERAGE 12:10:31 12 169.17 02 A
*** RESET AVERAGE 12:10:30 11 46.15 NOX A
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:09:06 *** ENDS AT 12:09:06 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 44.16 NOX PPM
02 0.04 02 %
03 1.0 CO PPM
04 0.07 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:07:31 *** ENDS AT 12:07:31 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 0.06 NOX PPM
02 9.24 02 %
03 942.3 CO PPM
04 5.89 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:05:38 *** ENDS AT 12:05:38 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 44.28 NOX PPM
02 0.02 02 %
03 2.0 CO PPM
04 0.07 CO2 %
12.5 25.0 37.5 50.0 62.5 75.0 87.5 100.0 112.5 125.0 NOX
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:03:38 *** ENDS AT 12:03:38 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 91.11 NOX PPM
02 0.02 02 %
03 2.0 CO PPM
04 0.08 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:00:55 *** ENDS AT 12:00:55 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 0.10 NOX PPM
02 5.10 02 %
03 471.5 CO PPM
04 13.02 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11:58:15 *** ENDS AT 11:58:16 AUG 24,93 ***

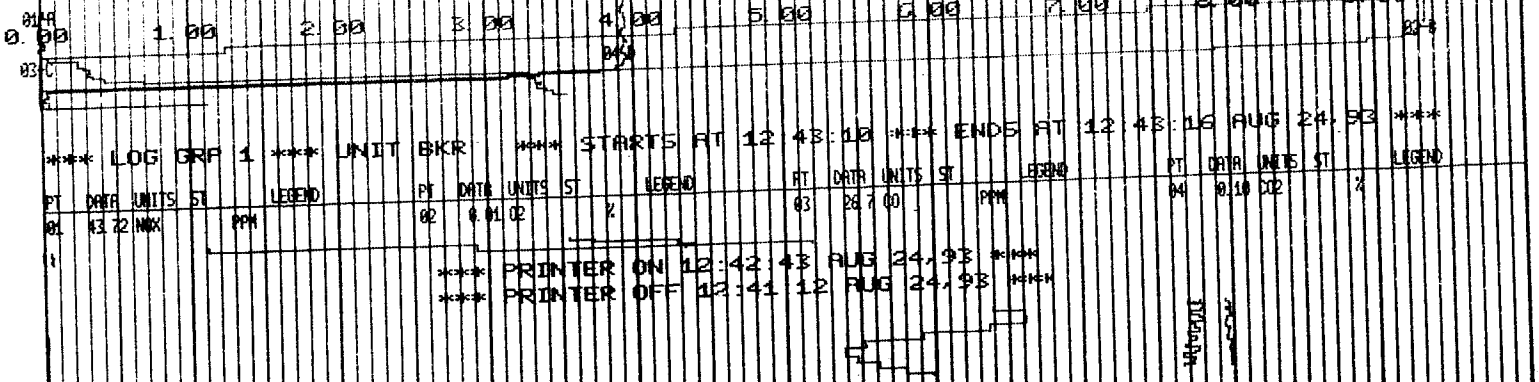

1A
1D
1C
1B
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 CO2
0
12.5
25.0
37.5
50.0
62.5
75.0
87.5
100.0
112.5
125.0 NOX
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1000.0 CO
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 O2
*** RESET AVERAGE 12:10:41 14 8.67 O2 A
*** RESET AVERAGE 12:10:41 13 451.6 CO A

A000027

9.3

18 — 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 02

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	0.23	NOX		PPM	02	9.34	O2		%	03	943.8	CO		PPM	04	5.98	CO2		%



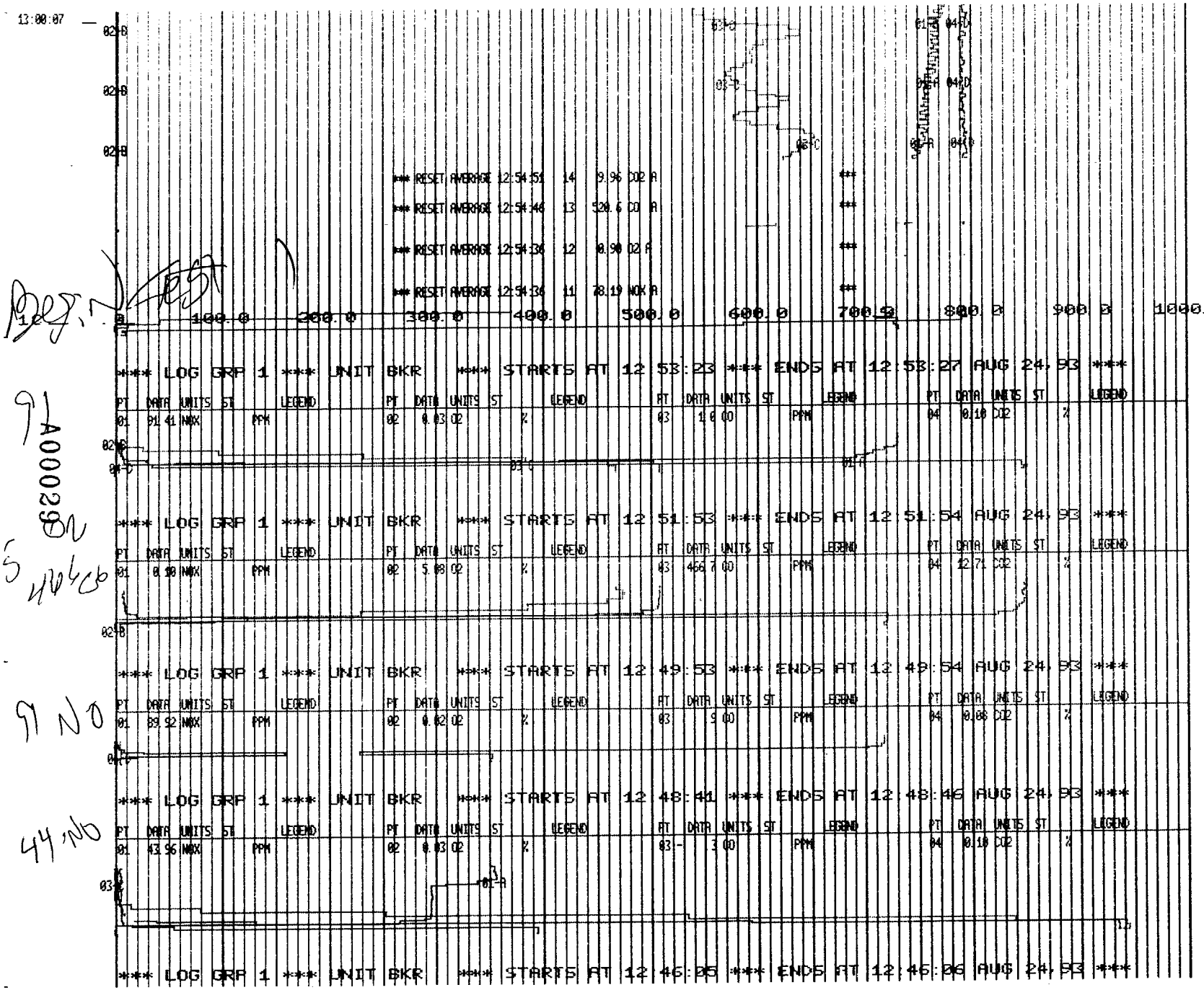
**** LOG GRP 1 **** UNIT BKR **** STARTS AT 12:43:10 **** ENDS AT 12:43:16 AUG 24,93 ****

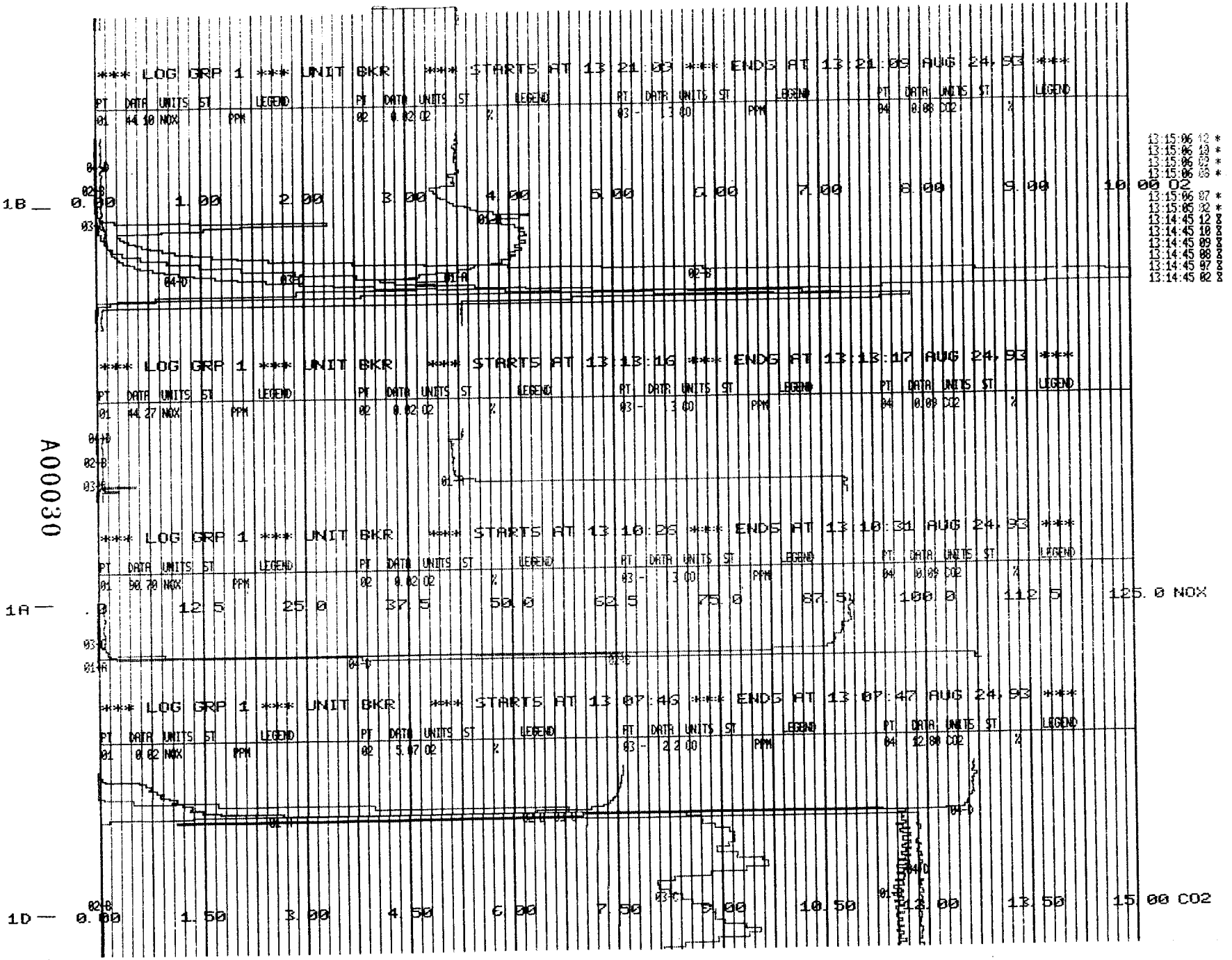
PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	43.72	NOX		PPM	02	0.01	O2		%	03	26.7	CO		PPM	04	0.10	CO2		%

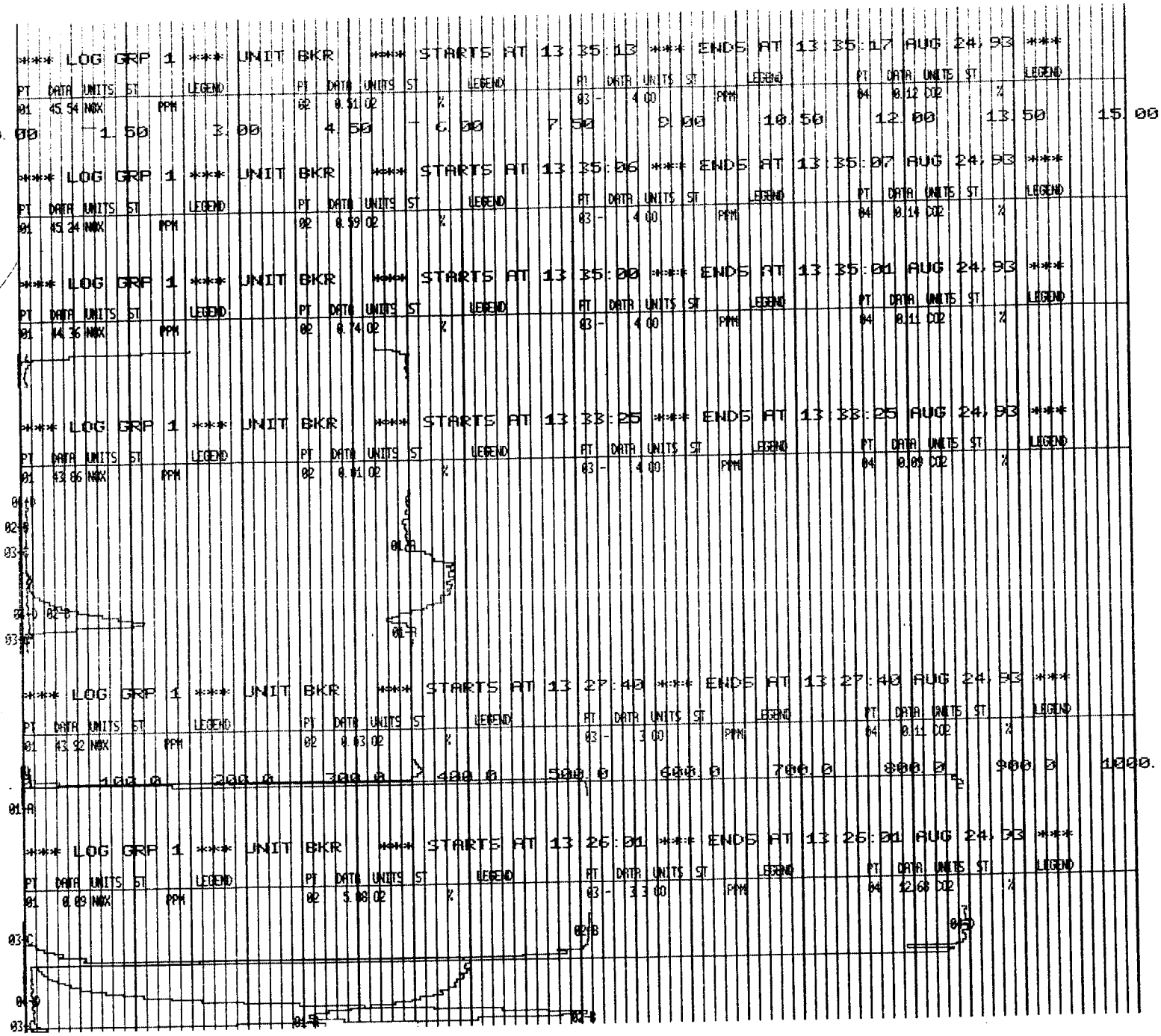
**** PRINTER ON 12:42:43 AUG 24,93 ****
**** PRINTER OFF 12:41:12 AUG 24,93 ****

NO44

A00028


13:00:07
*** RESET AVERAGE 12:54:51 14 9.96 CO2 A
*** RESET AVERAGE 12:54:46 13 520.6 CO A
*** RESET AVERAGE 12:54:36 12 0.90 O2 A
*** RESET AVERAGE 12:54:36 11 28.19 NOX A
100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0CO
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:53:23 *** ENDS AT 12:53:27 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 91.41 NOX PPM
02 0.03 O2 %
03 1.00 PPM
04 0.10 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:51:53 *** ENDS AT 12:51:54 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 0.00 NOX PPM
02 5.00 O2 %
03 466.7 PPM
04 12.71 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:49:53 *** ENDS AT 12:49:54 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 89.92 NOX PPM
02 0.02 O2 %
03 9.00 PPM
04 0.08 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:48:41 *** ENDS AT 12:48:46 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 43.96 NOX PPM
02 0.03 O2 %
03 3.00 PPM
04 0.10 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 12:46:06 *** ENDS AT 12:46:06 AUG 24,93 ***

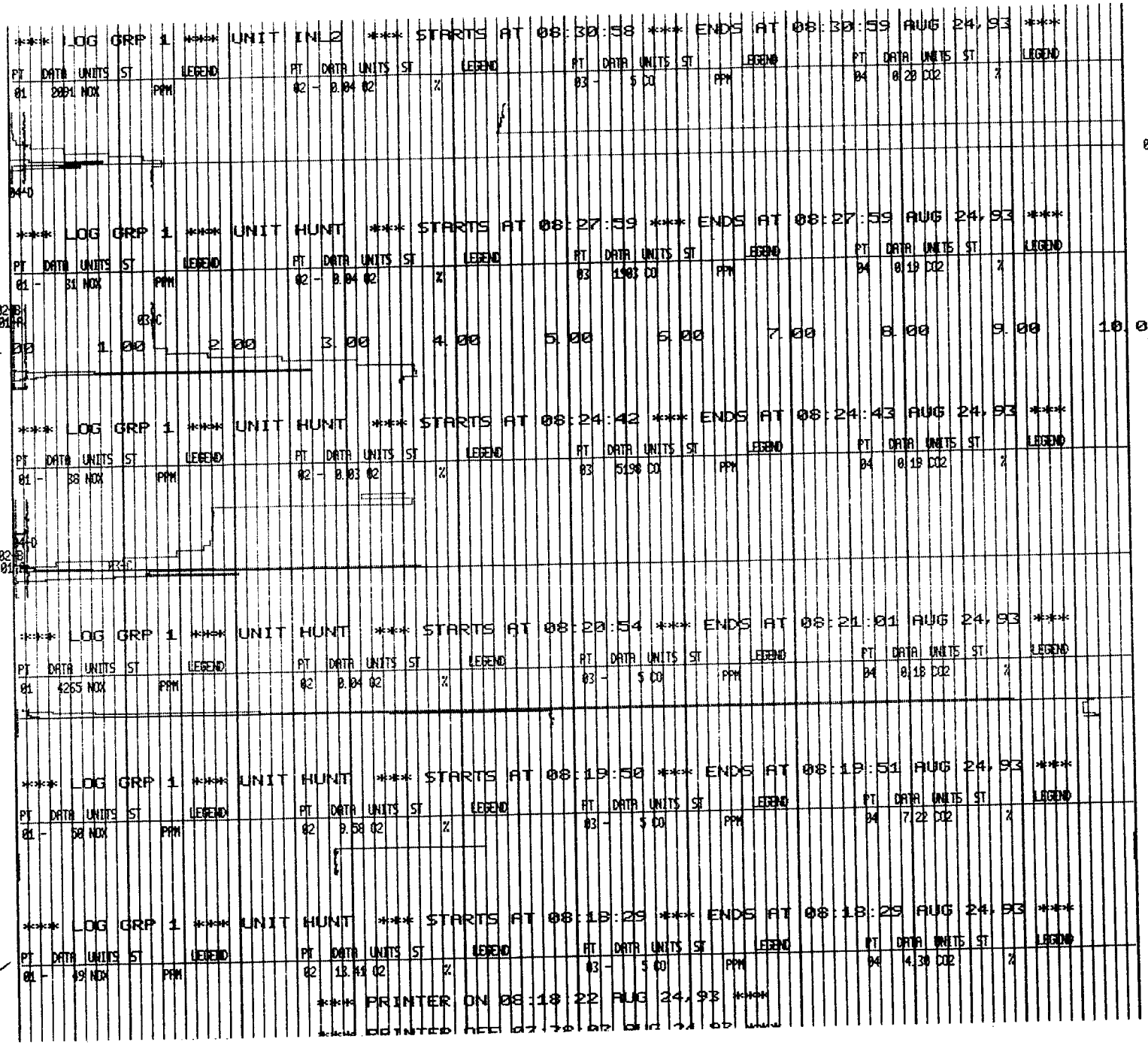

*** LOG GRP 1 *** UNIT BKR *** STARTS AT 13:21:03 *** ENDS AT 13:21:09 AUG 24, 93 ***
PT DATA UNITS ST LEGEND
01 44.10 NOX PPM
02 0.02 O2 %
03 - 3.00 PPM
04 0.08 CO2 %
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 O2
13:15:06 12 *
13:15:06 11 *
13:15:06 02 *
13:15:06 03 *
13:15:06 07 *
13:15:06 02 *
13:14:45 12 *
13:14:45 10 *
13:14:45 09 *
13:14:45 08 *
13:14:45 07 *
13:14:45 02 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 13:13:16 *** ENDS AT 13:13:17 AUG 24, 93 ***
PT DATA UNITS ST LEGEND
01 44.27 NOX PPM
02 0.02 O2 %
03 - 3.00 PPM
04 0.09 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 13:10:26 *** ENDS AT 13:10:31 AUG 24, 93 ***
PT DATA UNITS ST LEGEND
01 90.70 NOX PPM
02 0.02 O2 %
03 - 3.00 PPM
04 0.09 CO2 %
0 12.5 25.0 37.5 50.0 62.5 75.0 87.5 100.0 112.5 125.0 NOX
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 13:07:46 *** ENDS AT 13:07:47 AUG 24, 93 ***
PT DATA UNITS ST LEGEND
01 0.02 NOX PPM
02 5.07 O2 %
03 - 2.20 PPM
04 12.80 CO2 %
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
1B
1A
1D
A00030


*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:35:13 *** ENDS AT 13:35:17 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 45.54 NOX PPM
02 0.51 O2 %
03 - 4.00 PPM
04 0.12 CO2 %
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:35:06 *** ENDS AT 13:35:07 AUG 24,93 ***
01 45.24 NOX PPM
02 0.59 O2 %
03 - 4.00 PPM
04 0.14 CO2 %
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:35:00 *** ENDS AT 13:35:01 AUG 24,93 ***
01 44.36 NOX PPM
02 0.74 O2 %
03 - 4.00 PPM
04 0.11 CO2 %
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:33:25 *** ENDS AT 13:33:25 AUG 24,93 ***
01 43.86 NOX PPM
02 0.81 O2 %
03 - 4.00 PPM
04 0.09 CO2 %
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:27:40 *** ENDS AT 13:27:40 AUG 24,93 ***
01 43.92 NOX PPM
02 0.63 O2 %
03 - 3.00 PPM
04 0.11 CO2 %
100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0 CO
*** LOG GRP 1 *** UNIT BKR **** STARTS AT 13:26:01 *** ENDS AT 13:26:01 AUG 24,93 ***
01 0.09 NOX PPM
02 5.08 O2 %
03 - 33.00 PPM
04 12.68 CO2 %

1D

1C

A00031



NO 2039

CO 1850

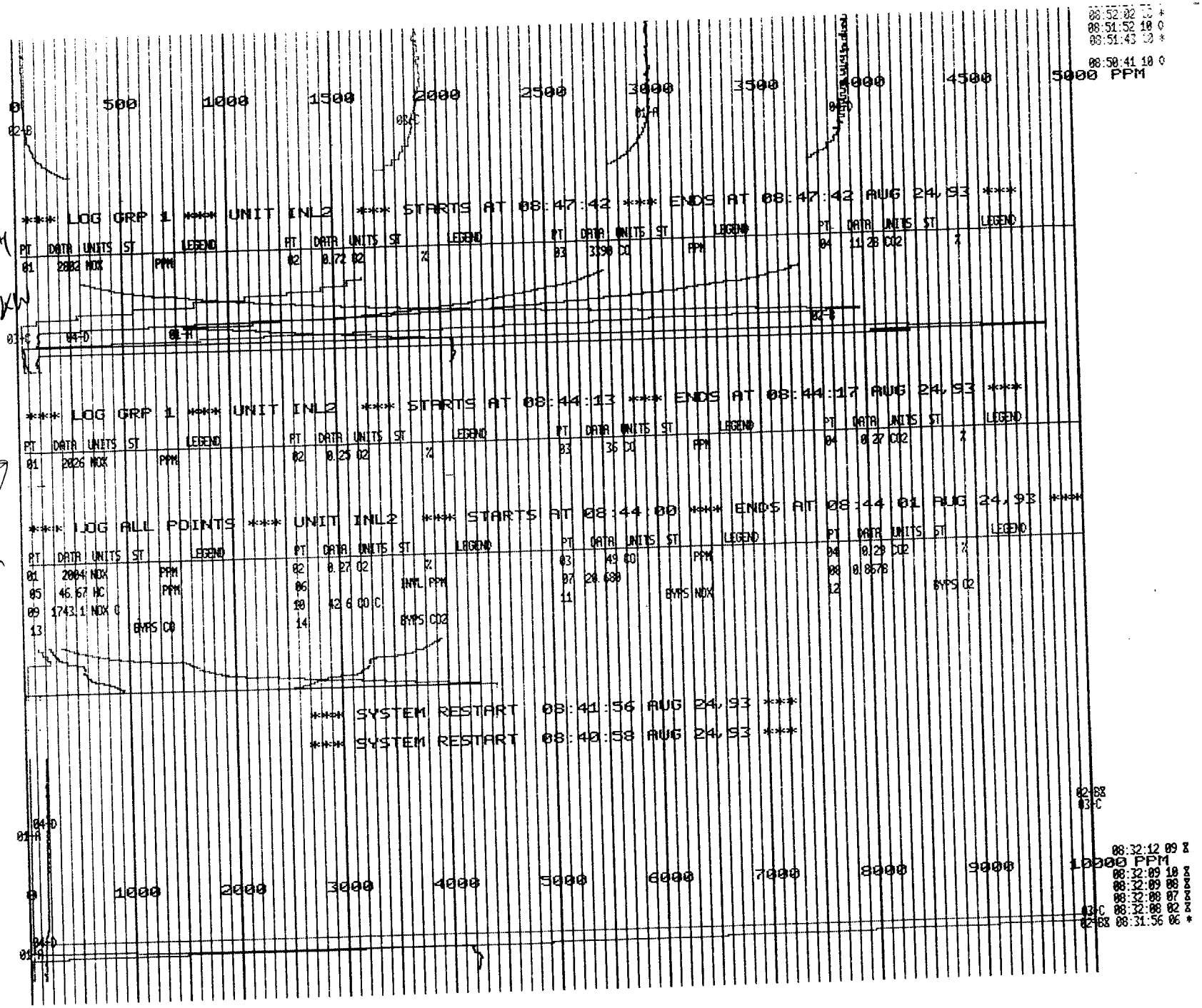
CO 5150

A000332

NO 4190

O_2 9.51
CO_2 7.08

O_2 13.43
CO_2 4.22


1A
1C
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000 PPM
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000 PPM
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 08:47:42 *** ENDS AT 08:47:42 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 2002 NOX PPM
02 0.72 02 %
03 3190 CO PPM
04 11.28 CO2 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 08:44:13 *** ENDS AT 08:44:17 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 2026 NOX PPM
02 0.25 02 %
03 35 CO PPM
04 0.27 CO2 %
*** LOG ALL POINTS *** UNIT INL2 *** STARTS AT 08:44:00 *** ENDS AT 08:44:01 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 2004 NOX PPM
02 0.27 02 %
03 49 CO PPM
04 0.29 CO2 %
05 46.67 HC PPM
06 INVL PPM
07 20,680
08 0.8678
09 1743.1 NOX C
10 42.6 CO C
11 BYPS NOX
12 BYPS O2
13 BYPS CO
14 BYPS CO2
*** SYSTEM RESTART 08:41:56 AUG 24,93 ***
*** SYSTEM RESTART 08:40:58 AUG 24,93 ***
ENG #2 Start both Inlet 953 KW
A000333
NO SYSTem 2023

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:11:33 *** ENDS AT 09:11:33 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01 -	37	NOX		PPM	02 -	0.04	02		%	03	5236	CO		PPM	04	0.26	CO2		%

CO 5150

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:09:55 *** ENDS AT 09:09:56 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	2010	NOX		PPM	02	0.31	02		%	03 -	7	CO		PPM	04	0.29	CO2		%

2037

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:09:14 *** ENDS AT 09:09:14 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01 -	33	NOX		PPM	02	13.10	02		%	03	6	CO		PPM	04	4.36	CO2		%

O2 13.43

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:08:11 *** ENDS AT 09:08:14 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01 -	24	NOX		PPM	02	9.34	02		%	03	835	CO		PPM	04	7.27	CO2		%

O2 9.5

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:07:01 *** ENDS AT 09:07:01 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	3029	NOX		PPM	02	8.09	02		%	03	3415	CO		PPM	04	11.88	CO2		%

End 1 Test #1

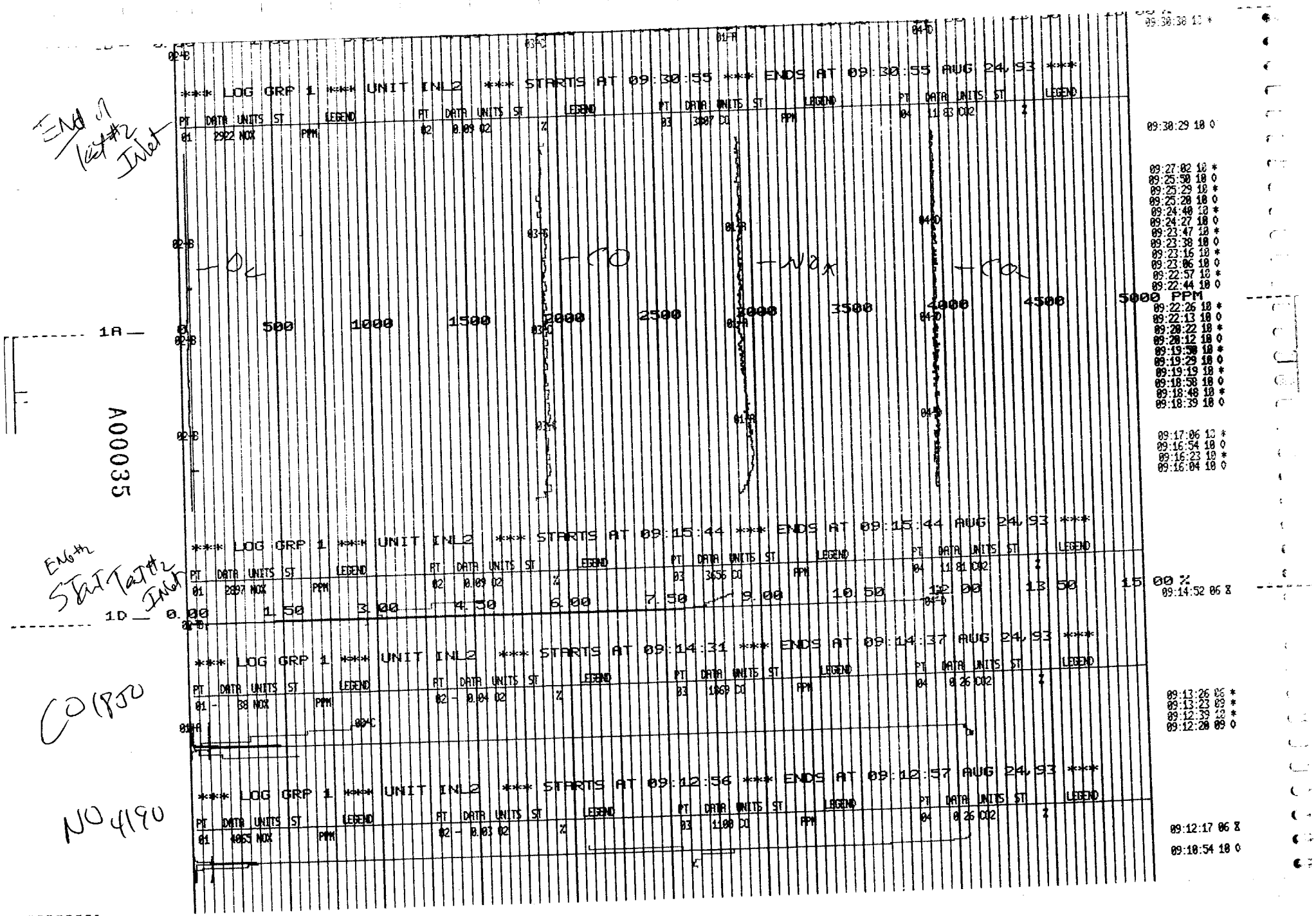
09:10:24 06 *
09:09:49 05 *
09:09:43 09 0
09:09:40 06 &

09:08:01 10 *

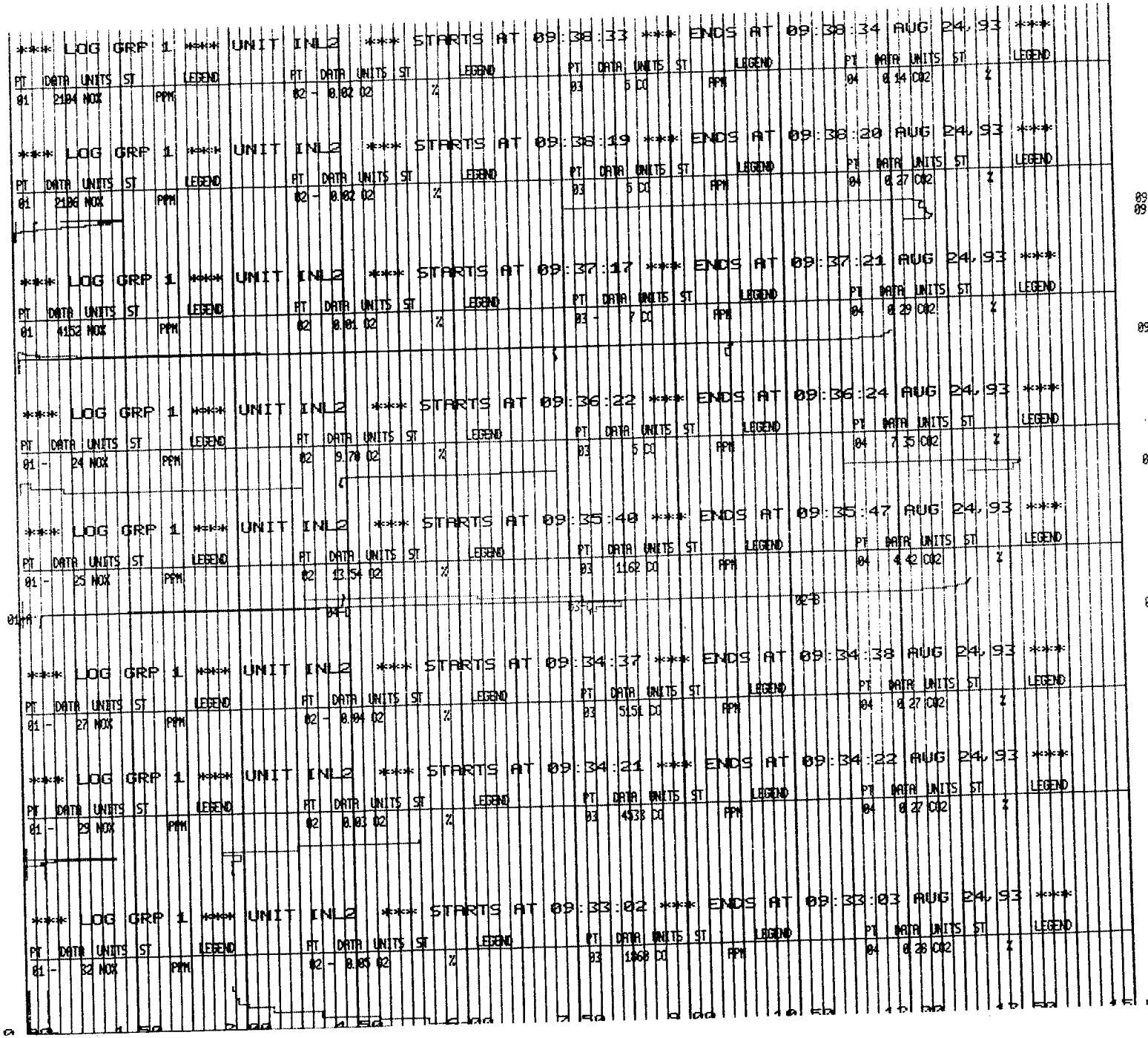
09:07:43 06 *
09:07:30 10 0

08:54:15 10 *
08:54:06 10 0
08:53:26 10 *
08:53:13 10 0
08:52:23 10 *
08:52:14 10 0

A00034



End of Test #2 Inlet
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:30:55 *** ENDS AT 09:30:55 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 2922 NOX PPM
02 0.09 O2 %
03 3807 CO PPM
04 11.83 CO2 %
09:30:38 10 *
09:30:29 10 0
09:27:02 10 *
09:25:50 10 0
09:25:29 10 *
09:25:20 10 0
09:24:40 10 *
09:24:27 10 0
09:23:47 10 *
09:23:38 10 0
09:23:16 10 *
09:23:06 10 0
09:22:57 10 *
09:22:44 10 0
09:22:26 10 *
09:22:13 10 0
09:20:22 10 *
09:20:12 10 0
09:19:50 10 *
09:19:29 10 0
09:19:19 10 *
09:18:58 10 0
09:18:48 10 *
09:18:39 10 0
09:17:06 10 *
09:16:54 10 0
09:16:23 10 *
09:16:04 10 0
- O2
- CO
- NOx
- CO2
1A
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 PPM
A00035
End of Start Test #2 Inlet
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:15:44 *** ENDS AT 09:15:44 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 2897 NOX PPM
02 0.09 O2 %
03 3656 CO PPM
04 11.81 CO2 %
09:14:52 06 %
1D
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
CO 1850
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:14:31 *** ENDS AT 09:14:37 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 - 38 NOX PPM
02 - 0.04 O2 %
03 1869 CO PPM
04 0.26 CO2 %
09:13:26 06 *
09:13:23 09 *
09:12:39 10 *
09:12:20 09 0
NO 4190
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:12:56 *** ENDS AT 09:12:57 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 4065 NOX PPM
02 - 0.03 O2 %
03 1100 CO PPM
04 0.26 CO2 %
09:12:17 06 %
09:10:54 10 0



NO 4190

O2 9.55
COV 7.08

O2 13.46

CO 5150

CO 1850

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:38:33 *** ENDS AT 09:38:34 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	2104	NOX		PPM	02	- 0.02	O2		%	03	5	CO		PPM	04	0.14	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:38:19 *** ENDS AT 09:38:20 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	2106	NOX		PPM	02	- 0.02	O2		%	03	5	CO		PPM	04	0.27	CO2		%

09:38:04 03 *
09:36:52 09 0

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:37:17 *** ENDS AT 09:37:21 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	4152	NOX		PPM	02	0.01	O2		%	03	- 7	CO		PPM	04	0.29	CO2		%

09:36:49 06 X

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:36:22 *** ENDS AT 09:36:24 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 24	NOX		PPM	02	9.70	O2		%	03	5	CO		PPM	04	7.35	CO2		%

09:35:39 10 *

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:35:40 *** ENDS AT 09:35:47 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 25	NOX		PPM	02	13.54	O2		%	03	1162	CO		PPM	04	4.42	CO2		%

01-A 04-D 03-C 02-B

09:34:16 10 0

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:34:37 *** ENDS AT 09:34:38 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 27	NOX		PPM	02	- 0.04	O2		%	03	5151	CO		PPM	04	0.27	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:34:21 *** ENDS AT 09:34:22 AUG 24,93 ***

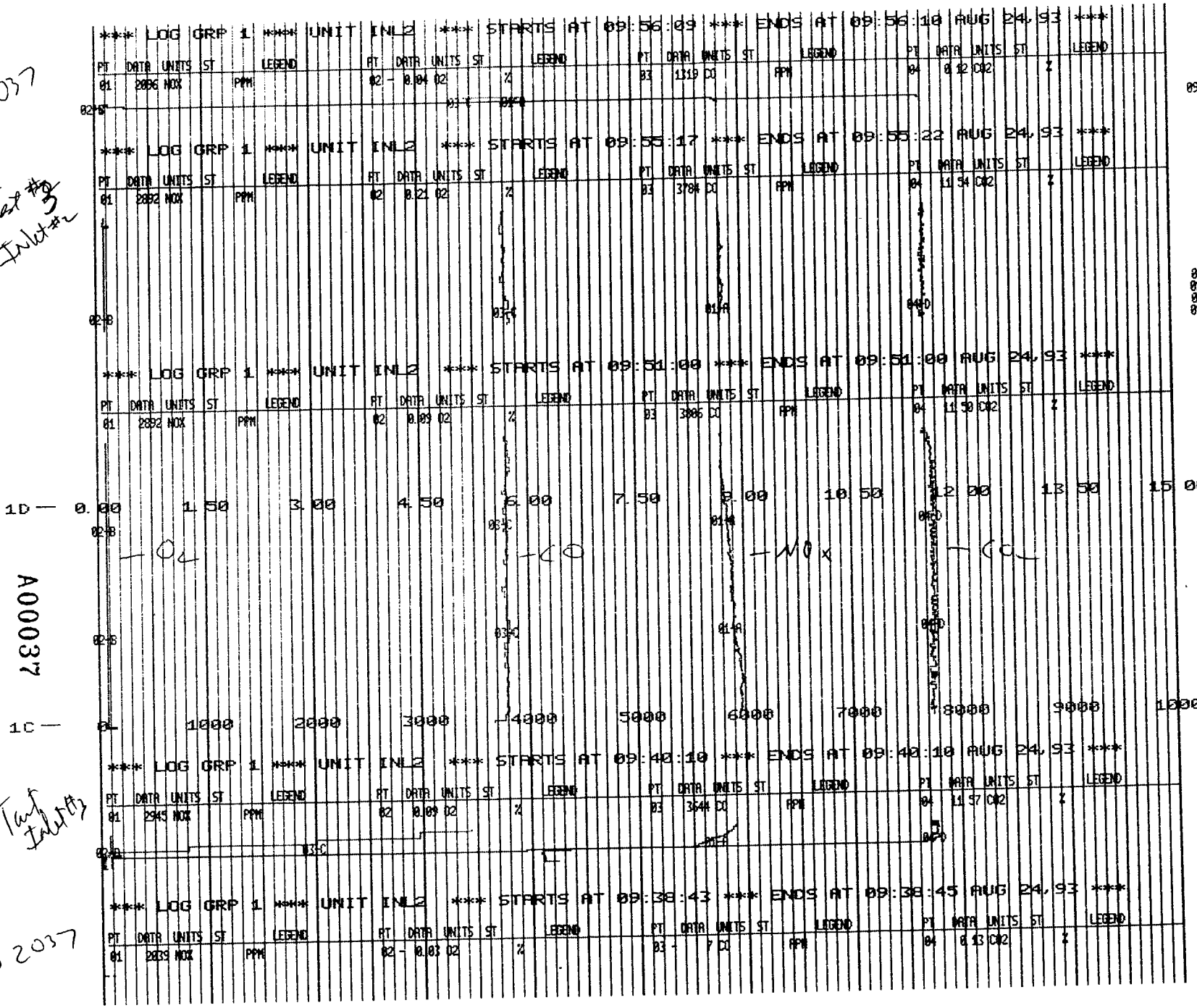
PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 29	NOX		PPM	02	0.03	O2		%	03	4533	CO		PPM	04	0.27	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:33:02 *** ENDS AT 09:33:03 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 32	NOX		PPM	02	- 0.05	O2		%	03	1868	CO		PPM	04	0.28	CO2		%

09:31:19 10 *
09:31:16 05 *
09:31:09 10 0

A00036



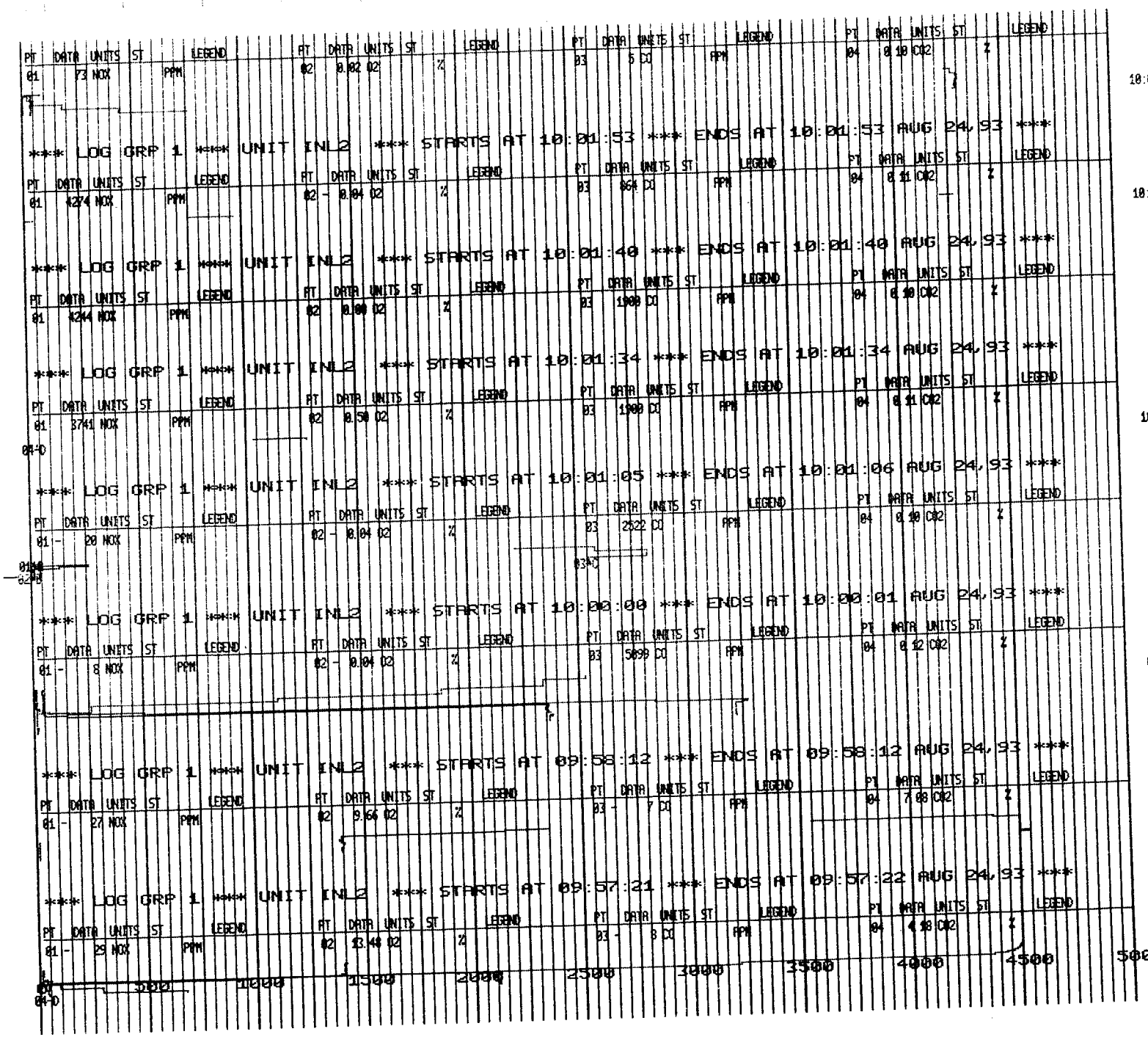
NO 2037

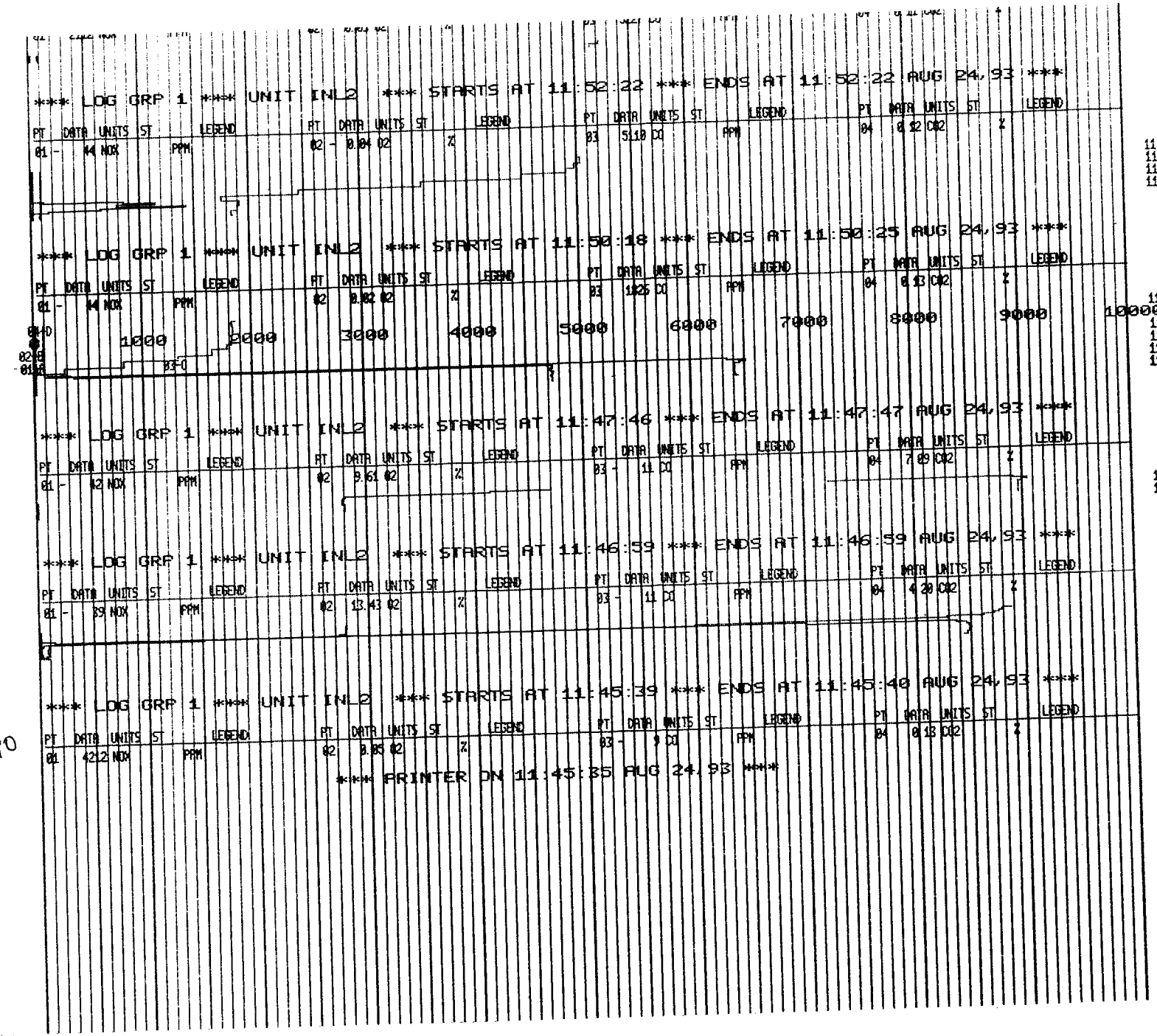
Endy ENG Test #3 Inlet #2

A000037

Start Inlet #3

NO 2037


PT DATA UNITS ST LEGEND
01 73 NOX PPM
02 0.02 O2 %
03 5 CO PPM
04 0.10 CO2 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 10:01:53 *** ENDS AT 10:01:53 AUG 24,93 ***
01 4274 NOX PPM
02 0.04 O2 %
03 864 CO PPM
04 0.11 CO2 %
10:01:36 09 0
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 10:01:40 *** ENDS AT 10:01:40 AUG 24,93 ***
01 4244 NOX PPM
02 0.00 O2 %
03 1900 CO PPM
04 0.10 CO2 %
10:01:33 06 8
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 10:01:34 *** ENDS AT 10:01:34 AUG 24,93 ***
01 3741 NOX PPM
02 0.50 O2 %
03 1900 CO PPM
04 0.11 CO2 %
10:00:50 10 *
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 10:01:05 *** ENDS AT 10:01:06 AUG 24,93 ***
01 20 NOX PPM
02 0.04 O2 %
03 2622 CO PPM
04 0.10 CO2 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 10:00:00 *** ENDS AT 10:00:01 AUG 24,93 ***
01 8 NOX PPM
02 0.04 O2 %
03 5099 CO PPM
04 0.12 CO2 %
09:59:27 10 0
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:58:12 *** ENDS AT 09:58:12 AUG 24,93 ***
01 27 NOX PPM
02 9.64 O2 %
03 7 CO PPM
04 7.08 CO2 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 09:57:21 *** ENDS AT 09:57:22 AUG 24,93 ***
01 29 NOX PPM
02 13.48 O2 %
03 8 CO PPM
04 4.08 CO2 %
09:56:36 06 *
5000 PPM
09:55:43 10 *
0 1000 1500 2000 2500 3000 3500 4000 4500



CO 3150

CO 1850

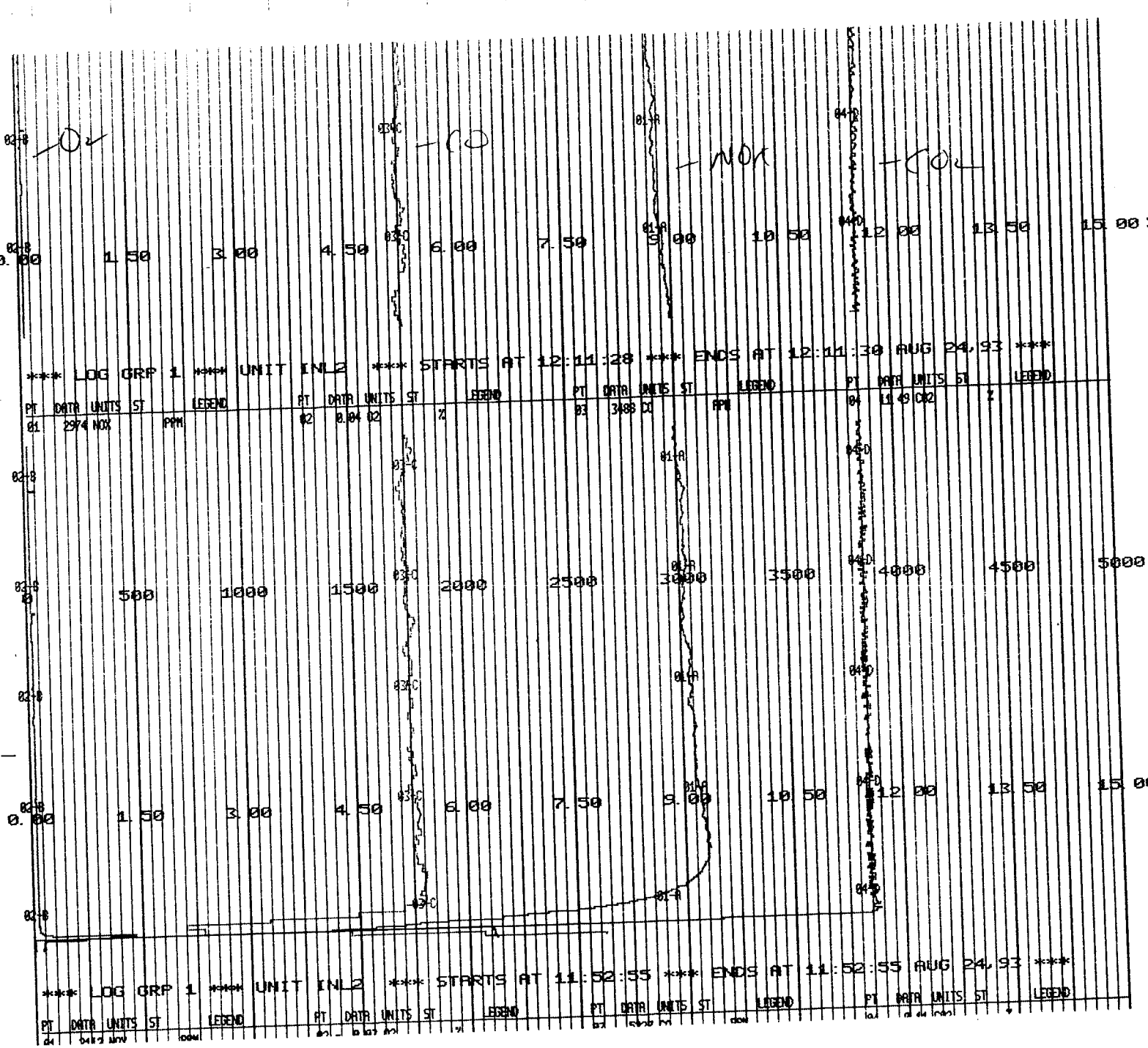
1C —

O2 9.55

O2 13.43

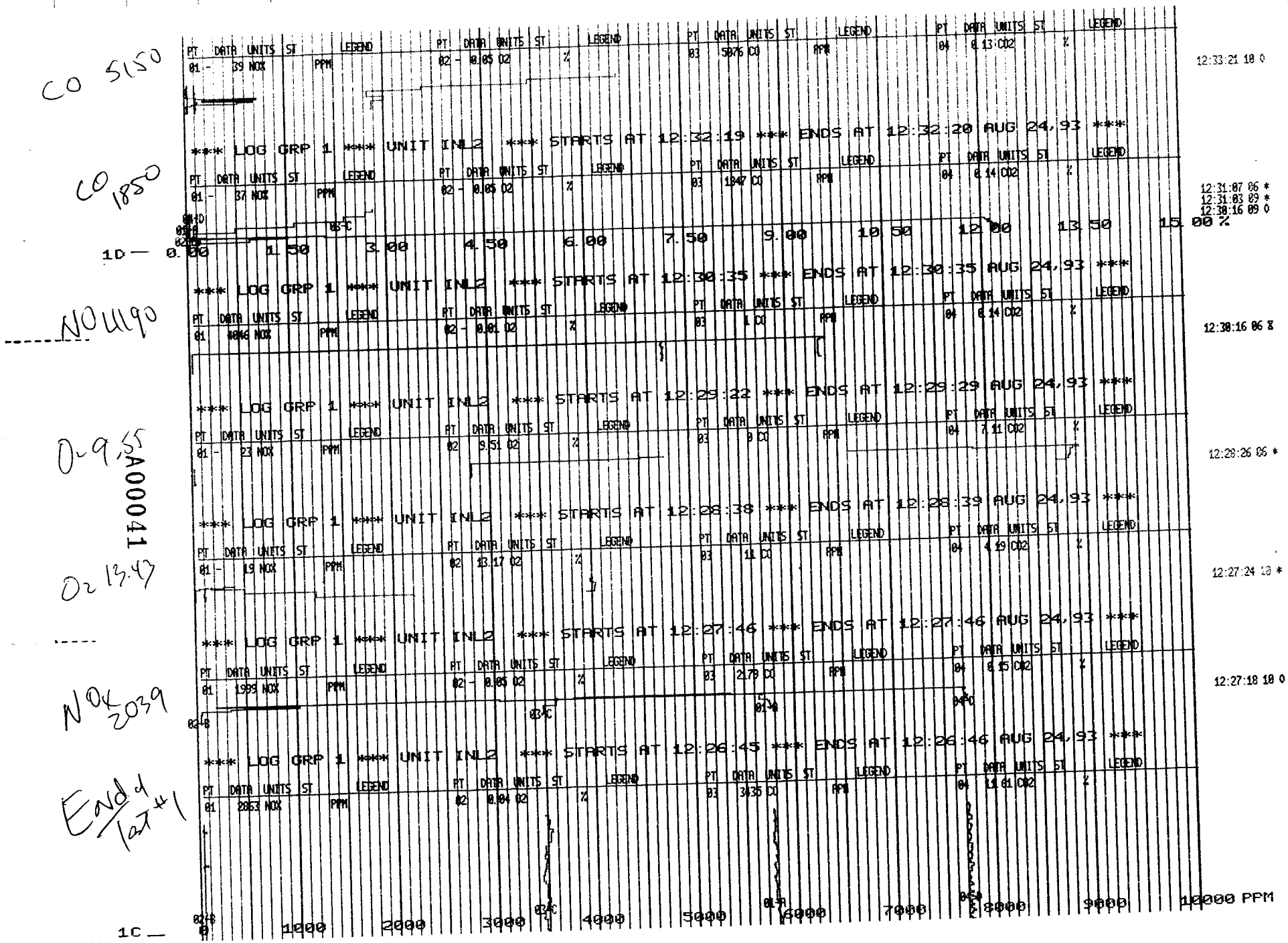
NO 4190

A00039



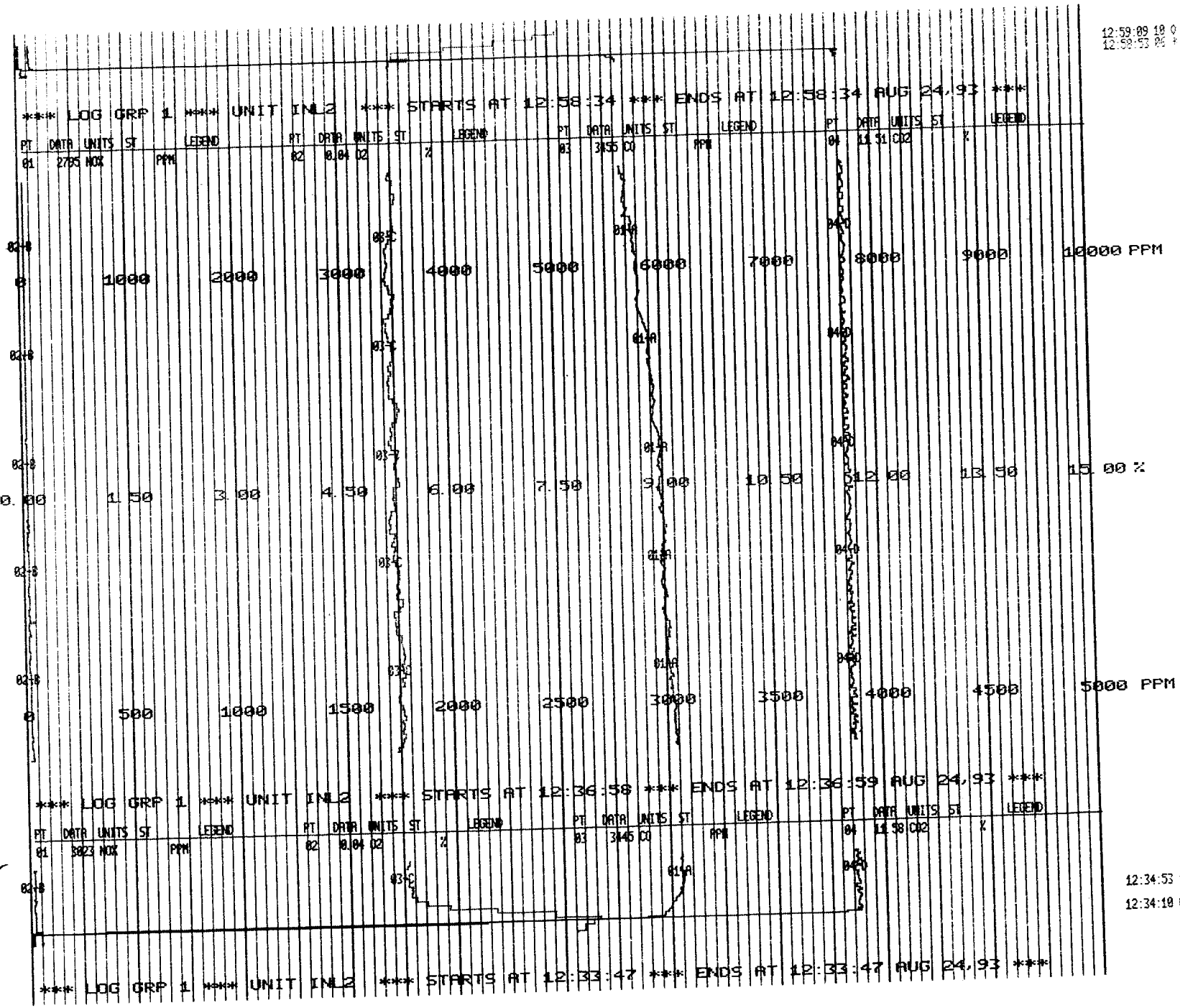
ENG#1 Start 1st ENG#1

A00040


CO 5150
PT DATA UNITS ST LEGEND
01 - 39 NOX PPM
02 - 0.05 O2 %
03 5076 CO PPM
04 0.13 CO2 %
12:33:21 10 0
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:32:19 *** ENDS AT 12:32:20 AUG 24,93 ***
CO 1850
01 - 37 NOX PPM
02 - 0.05 O2 %
03 1847 CO PPM
04 0.14 CO2 %
12:31:07 06 *
12:31:03 09 *
12:30:16 09 0
1D
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:30:35 *** ENDS AT 12:30:35 AUG 24,93 ***
NO 4190
01 4046 NOX PPM
02 - 0.01 O2 %
03 1 CO PPM
04 0.14 CO2 %
12:30:16 06 %
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:29:22 *** ENDS AT 12:29:29 AUG 24,93 ***
O2 9.55
01 - 23 NOX PPM
02 9.51 O2 %
03 0 CO PPM
04 7.11 CO2 %
12:28:26 06 *
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:28:38 *** ENDS AT 12:28:39 AUG 24,93 ***
O2 13.47
01 - 19 NOX PPM
02 13.17 O2 %
03 11 CO PPM
04 4.19 CO2 %
12:27:24 10 *
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:27:46 *** ENDS AT 12:27:46 AUG 24,93 ***
NOx 2039
01 1999 NOX PPM
02 - 0.05 O2 %
03 2.79 CO PPM
04 0.15 CO2 %
12:27:18 10 0
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:26:45 *** ENDS AT 12:26:46 AUG 24,93 ***
End of last #1
01 2863 NOX PPM
02 0.04 O2 %
03 3435 CO PPM
04 11.61 CO2 %
1C
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 PPM

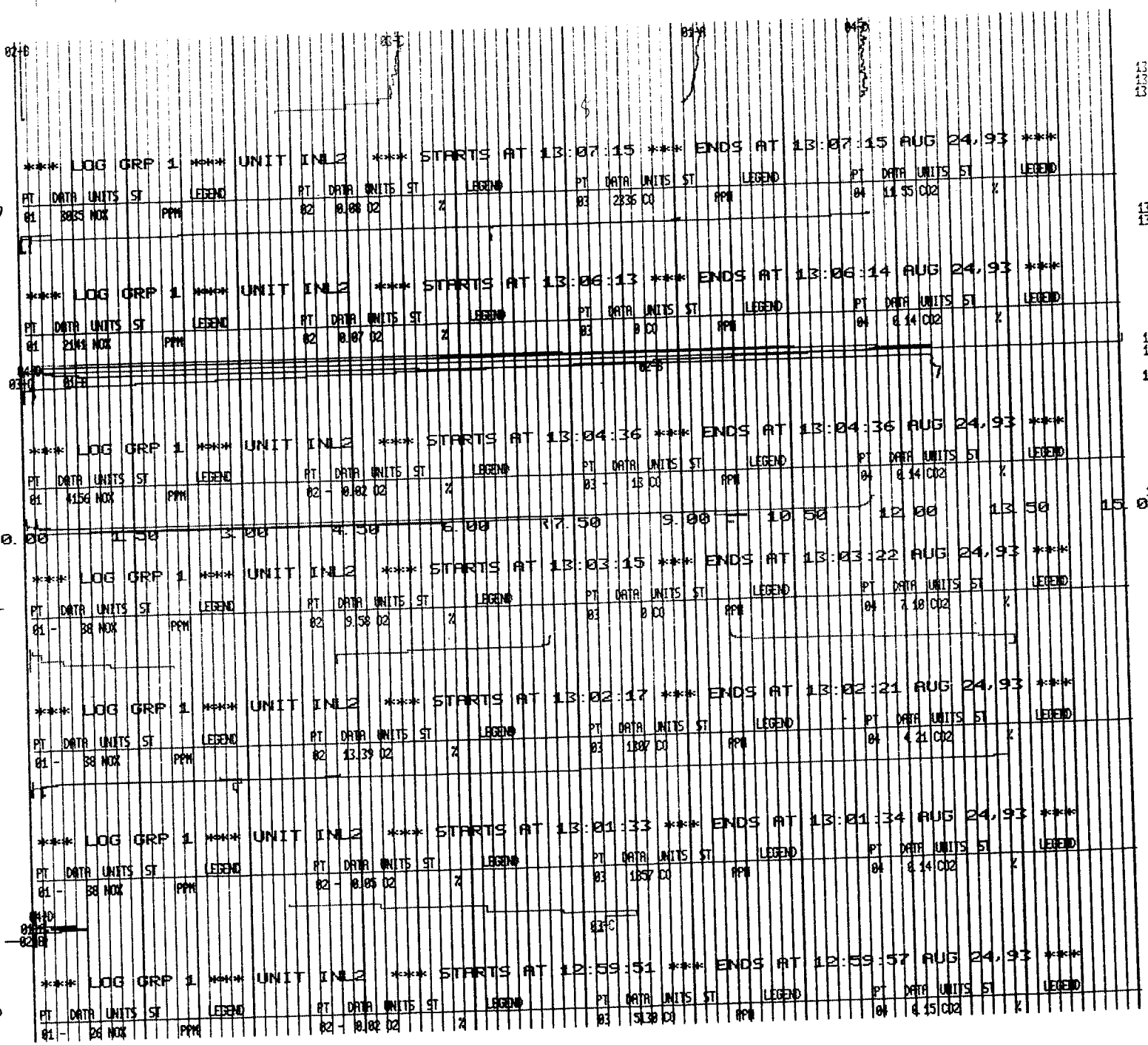
A00041

Ends Test 2



Start Test 2

A00042



ENG # 1 Start 1st 3

NO 2037

NO 4190

O2 9.55

O2 13.43

CO 1850

CO 5150

A000043

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:07:15 *** ENDS AT 13:07:15 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	3035	NOX		PPM	02	0.08	O2		%	03	2336	CO		PPM	04	11.55	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:06:13 *** ENDS AT 13:06:14 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	2141	NOX		PPM	02	0.07	O2		%	03	0	CO		PPM	04	0.14	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:04:36 *** ENDS AT 13:04:36 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	4156	NOX		PPM	02	- 0.02	O2		%	03	- 13	CO		PPM	04	0.14	CO2		%

1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:03:15 *** ENDS AT 13:03:22 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 38	NOX		PPM	02	9.58	O2		%	03	0	CO		PPM	04	7.10	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:02:17 *** ENDS AT 13:02:21 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 38	NOX		PPM	02	13.39	O2		%	03	1307	CO		PPM	04	4.21	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:01:33 *** ENDS AT 13:01:34 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 38	NOX		PPM	02	- 0.05	O2		%	03	1857	CO		PPM	04	0.14	CO2		%

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 12:59:51 *** ENDS AT 12:59:57 AUG 24,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	- 26	NOX		PPM	02	- 0.02	O2		%	03	5130	CO		PPM	04	0.15	CO2		%

13:06:01 10 *
13:05:52 09 *
13:05:49 09 0

13:05:46 06 %
13:05:40 10 0

13:05:40 06 *
13:05:27 09 *

13:03:44 09 0

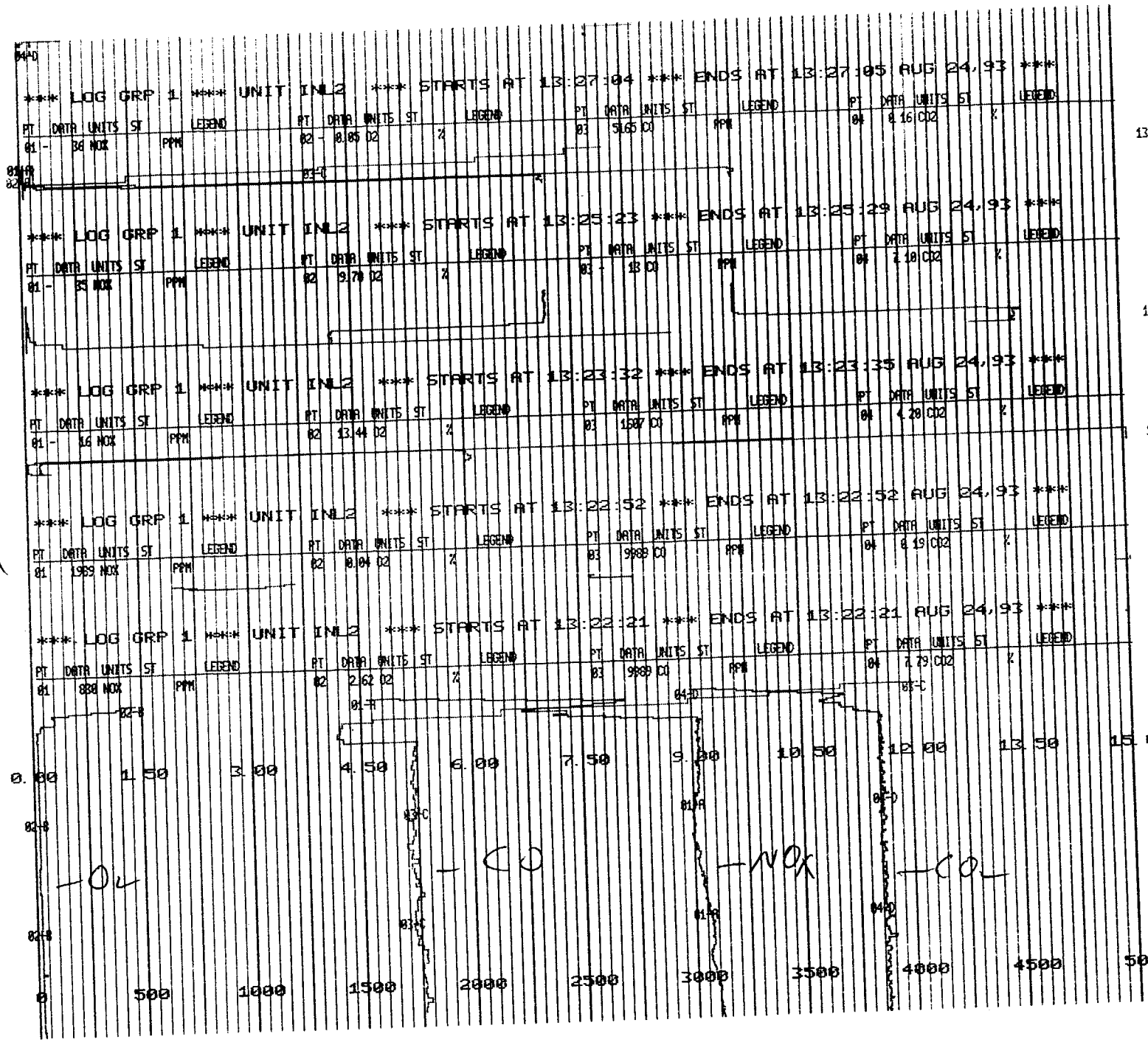
13:03:41 06 %

13:02:12 10 *

13:02:03 10 0

13:01:02 10 *

13:00:07



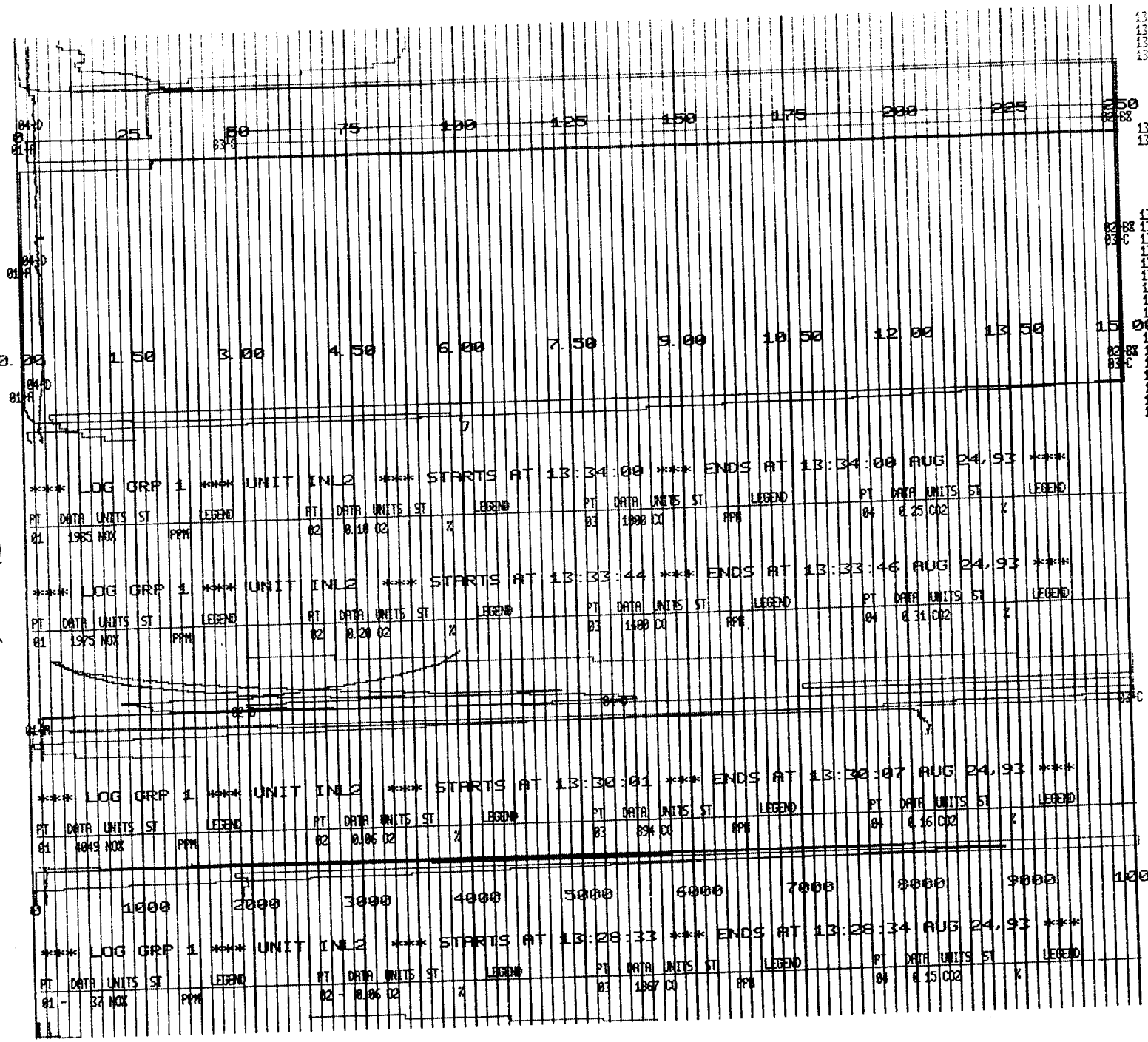
CO 5150

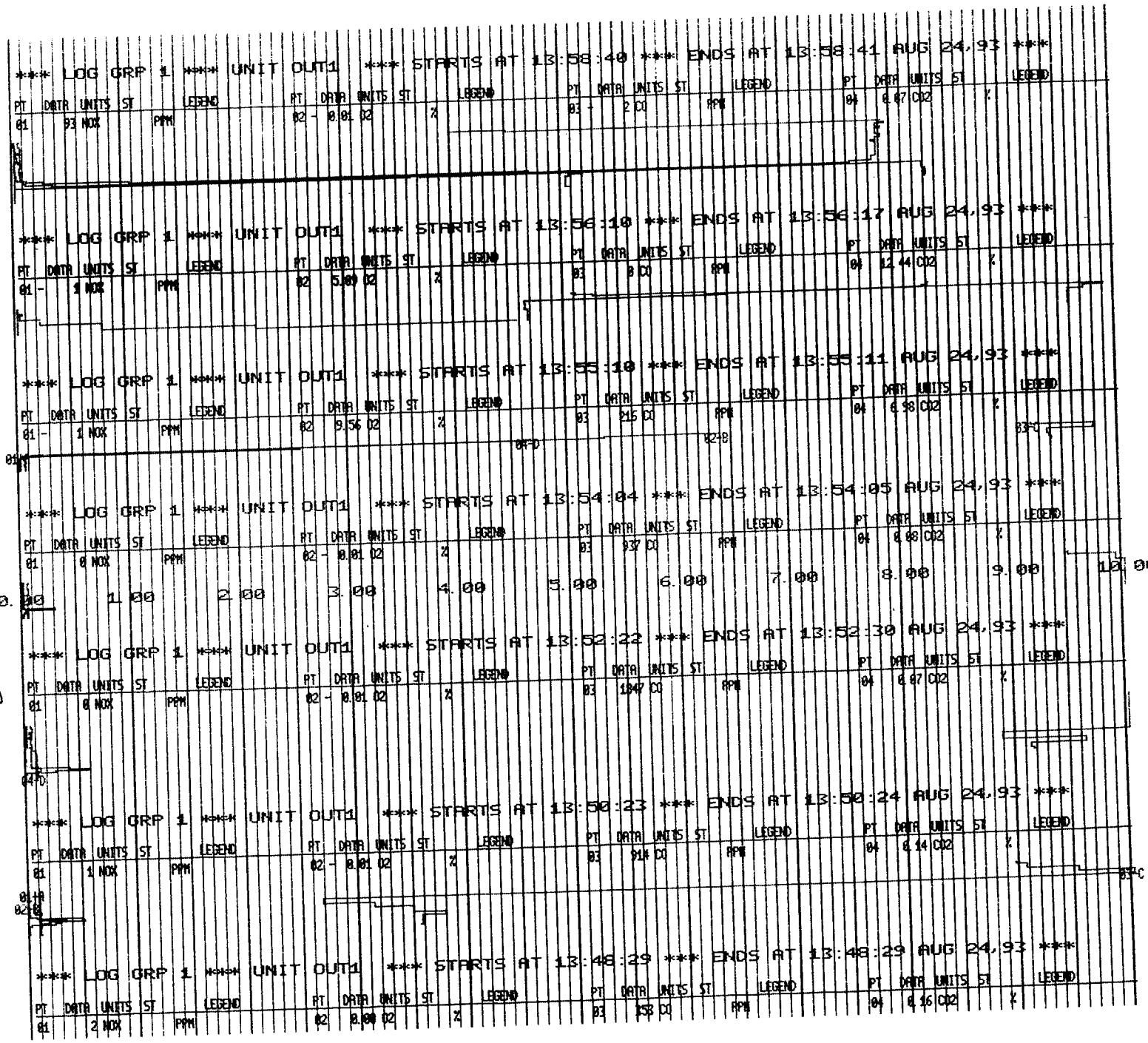
O2 9.55

O2 13.46

NO 2039

A00044


1A
1D
1C
A00045
2039
NO SYSTEM
NO 4190
CO 1850
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:34:00 *** ENDS AT 13:34:00 AUG 24,93 ***
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:33:44 *** ENDS AT 13:33:46 AUG 24,93 ***
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:30:01 *** ENDS AT 13:30:07 AUG 24,93 ***
*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 13:28:33 *** ENDS AT 13:28:34 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 1985 NOX PPM
02 0.10 O2 %
03 1000 CO PPM
04 0.25 CO2 %
01 1975 NOX PPM
02 0.20 O2 %
03 1400 CO PPM
04 0.31 CO2 %
01 4049 NOX PPM
02 0.06 O2 %
03 894 CO PPM
04 0.16 CO2 %
01 37 NOX PPM
02 0.06 O2 %
03 1307 CO PPM
04 0.15 CO2 %
0 25 50 75 100 125 150 175 200 225 250 PPM
0 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 PPM



O_2 5.02

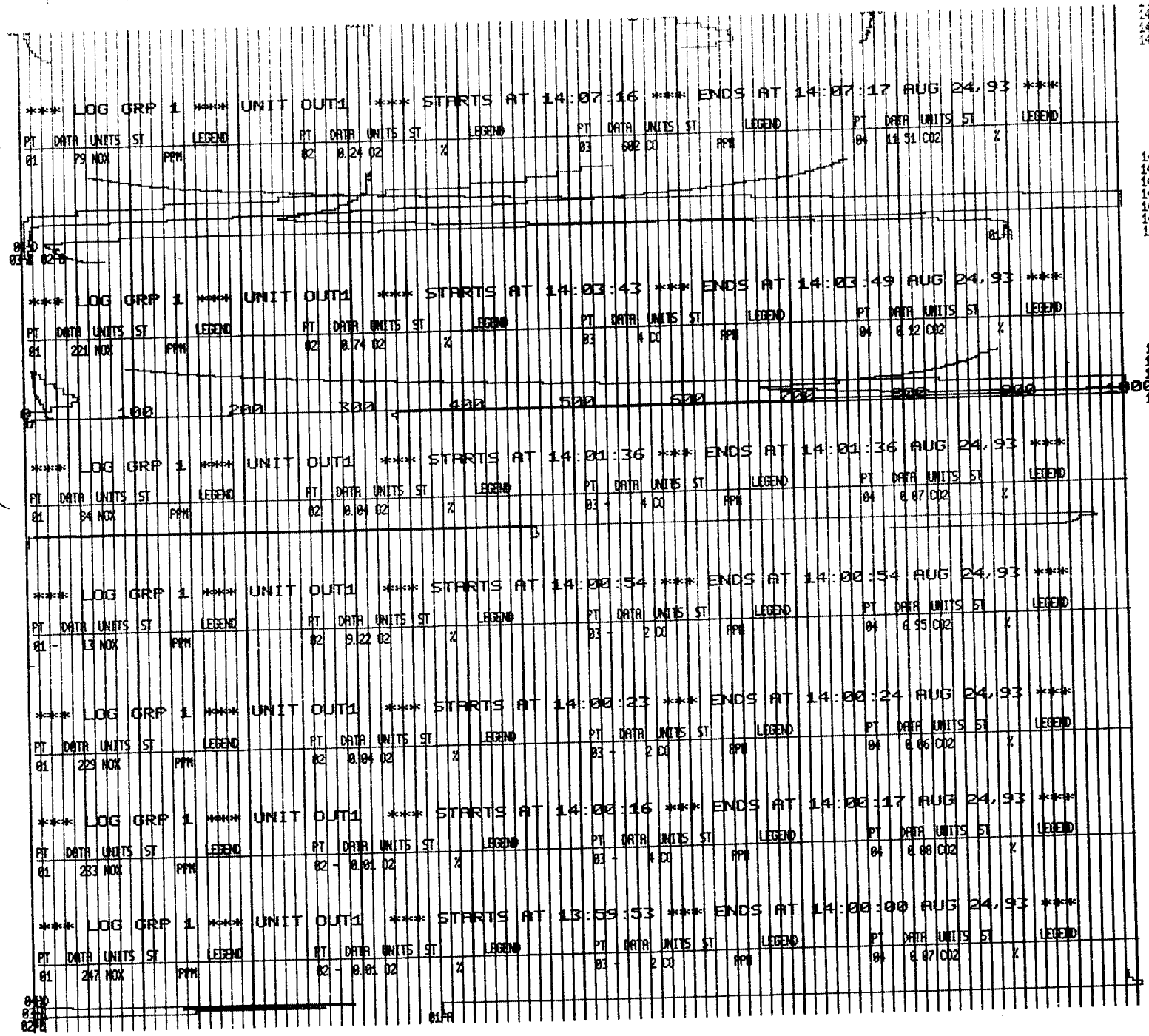
O_2 9.55

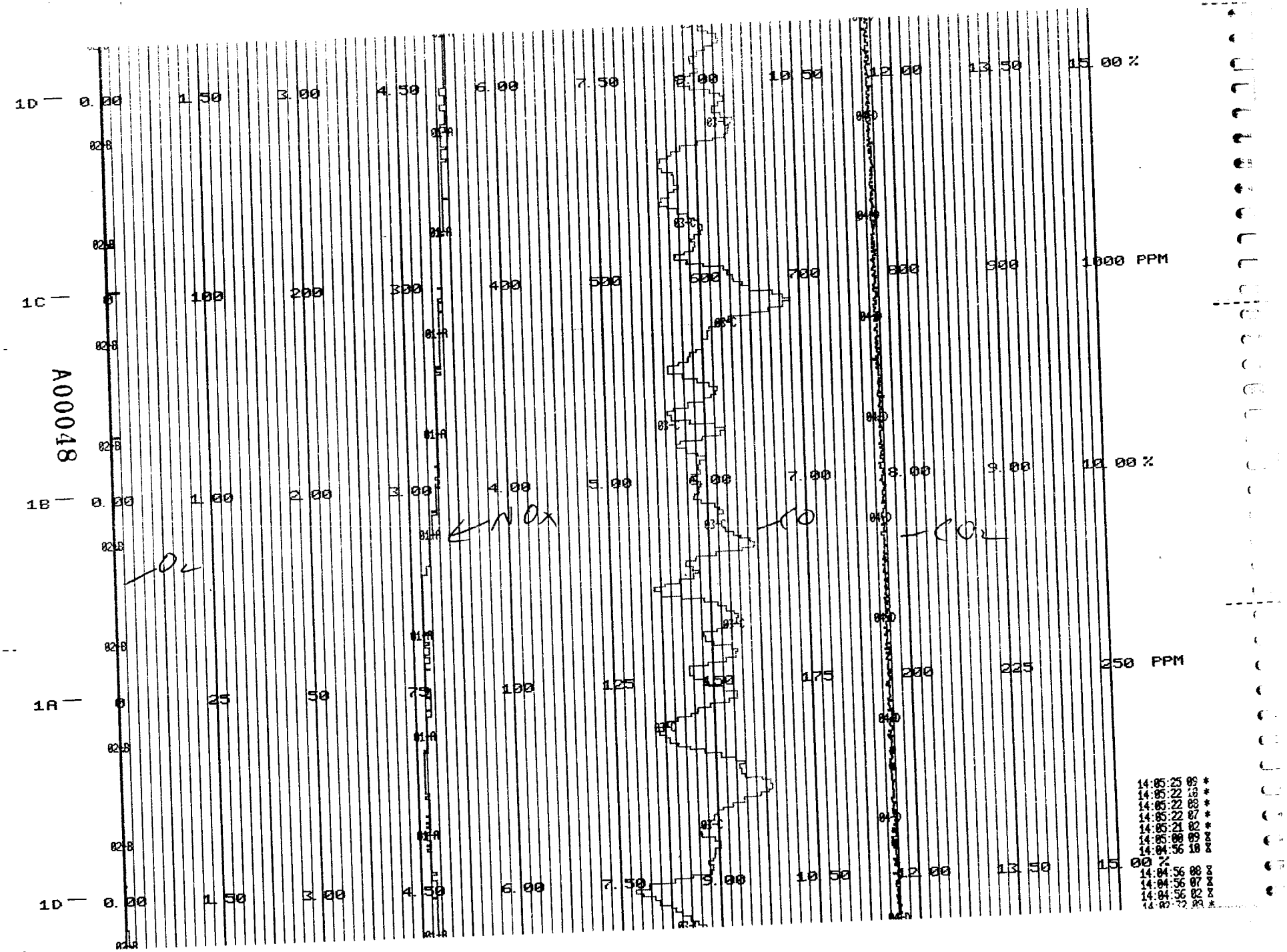
CO 935

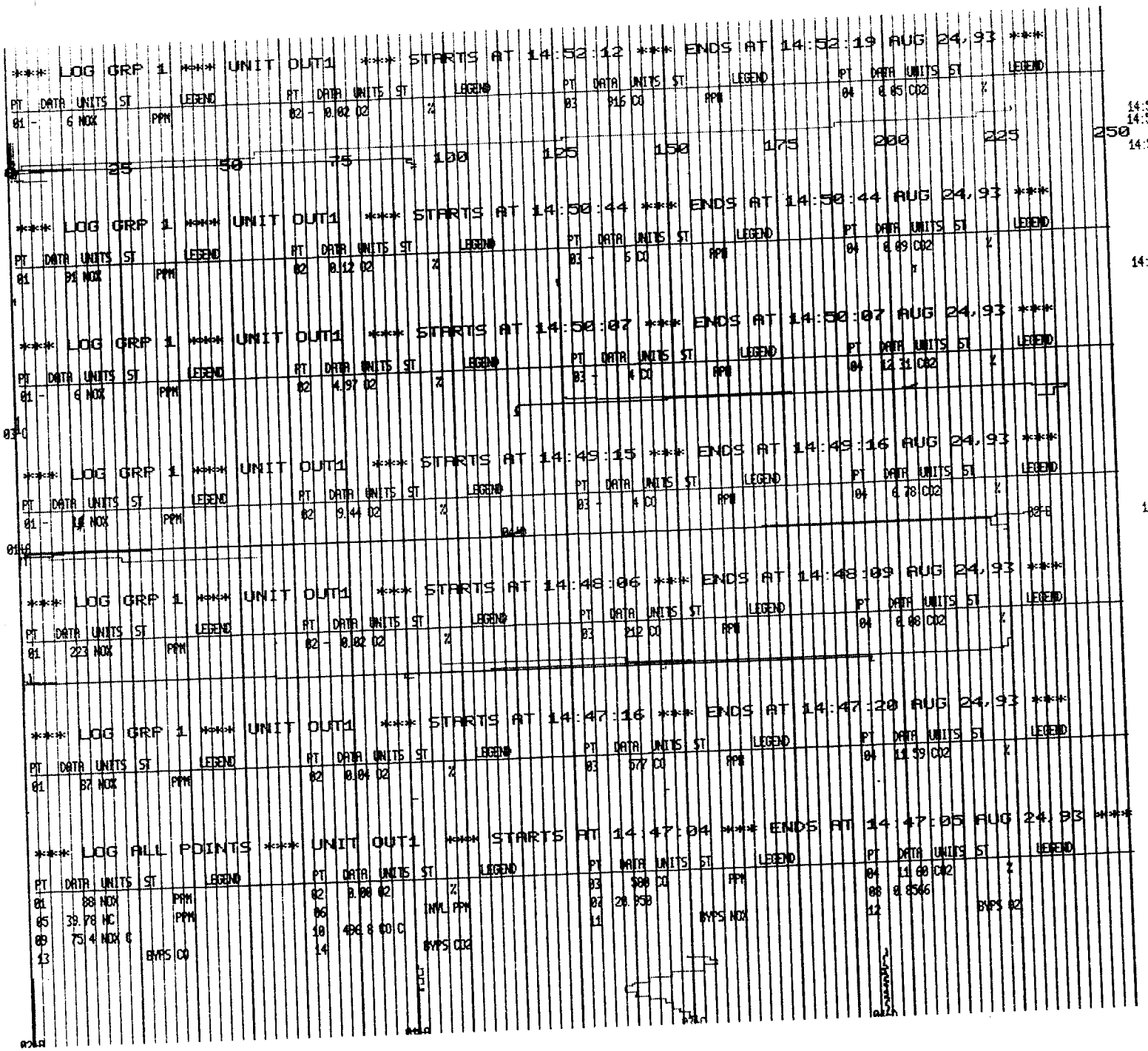
CO 1850

CO 935

A00046


*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:07:16 *** ENDS AT 14:07:17 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 79 NOX PPM
02 0.24 O2 %
03 602 CO PPM
04 11.31 CO2 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:03:43 *** ENDS AT 14:03:49 AUG 24,93 ***
01 221 NOX PPM
02 0.74 O2 %
03 4 CO PPM
04 8.12 CO2 %
100
200
300
400
500
600
700
800
900
1000 PPM
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:01:36 *** ENDS AT 14:01:36 AUG 24,93 ***
01 84 NOX PPM
02 0.04 O2 %
03 4 CO PPM
04 8.07 CO2 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:00:54 *** ENDS AT 14:00:54 AUG 24,93 ***
01 13 NOX PPM
02 9.22 O2 %
03 2 CO PPM
04 6.35 CO2 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:00:23 *** ENDS AT 14:00:24 AUG 24,93 ***
01 229 NOX PPM
02 0.04 O2 %
03 2 CO PPM
04 8.06 CO2 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:00:16 *** ENDS AT 14:00:17 AUG 24,93 ***
01 283 NOX PPM
02 0.01 O2 %
03 4 CO PPM
04 8.08 CO2 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 13:59:53 *** ENDS AT 14:00:00 AUG 24,93 ***
01 247 NOX PPM
02 0.01 O2 %
03 2 CO PPM
04 8.07 CO2 %


1D
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 %
1C
0
100
200
300
400
500
600
700
800
900
1000 PPM
A00048
1B
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 %
NOx
CO
O2
1A
0
25
50
75
100
125
150
175
200
225
250 PPM
1D
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 %



CO 93<

1A —

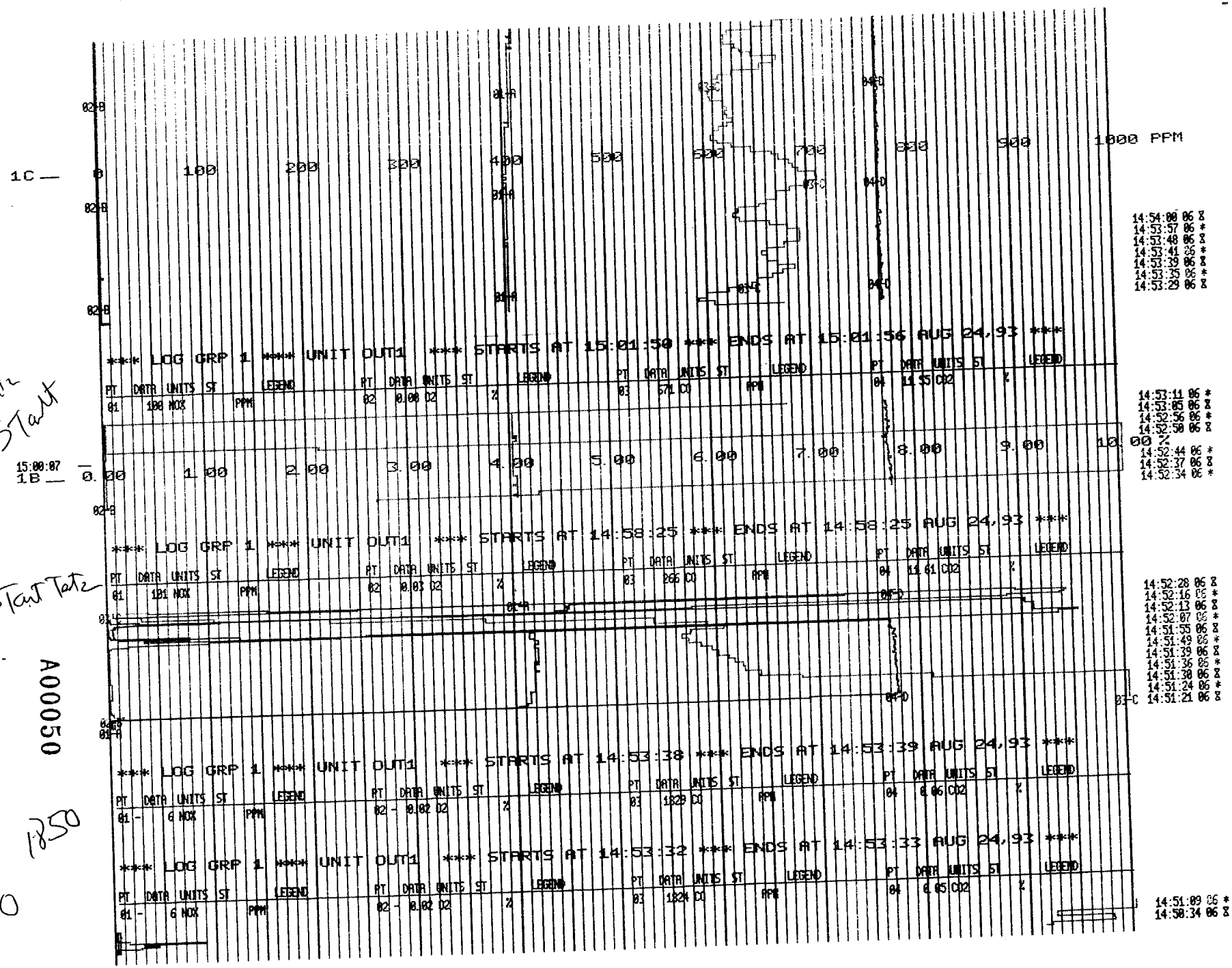
NO 91

O2 5.0<

29.5<

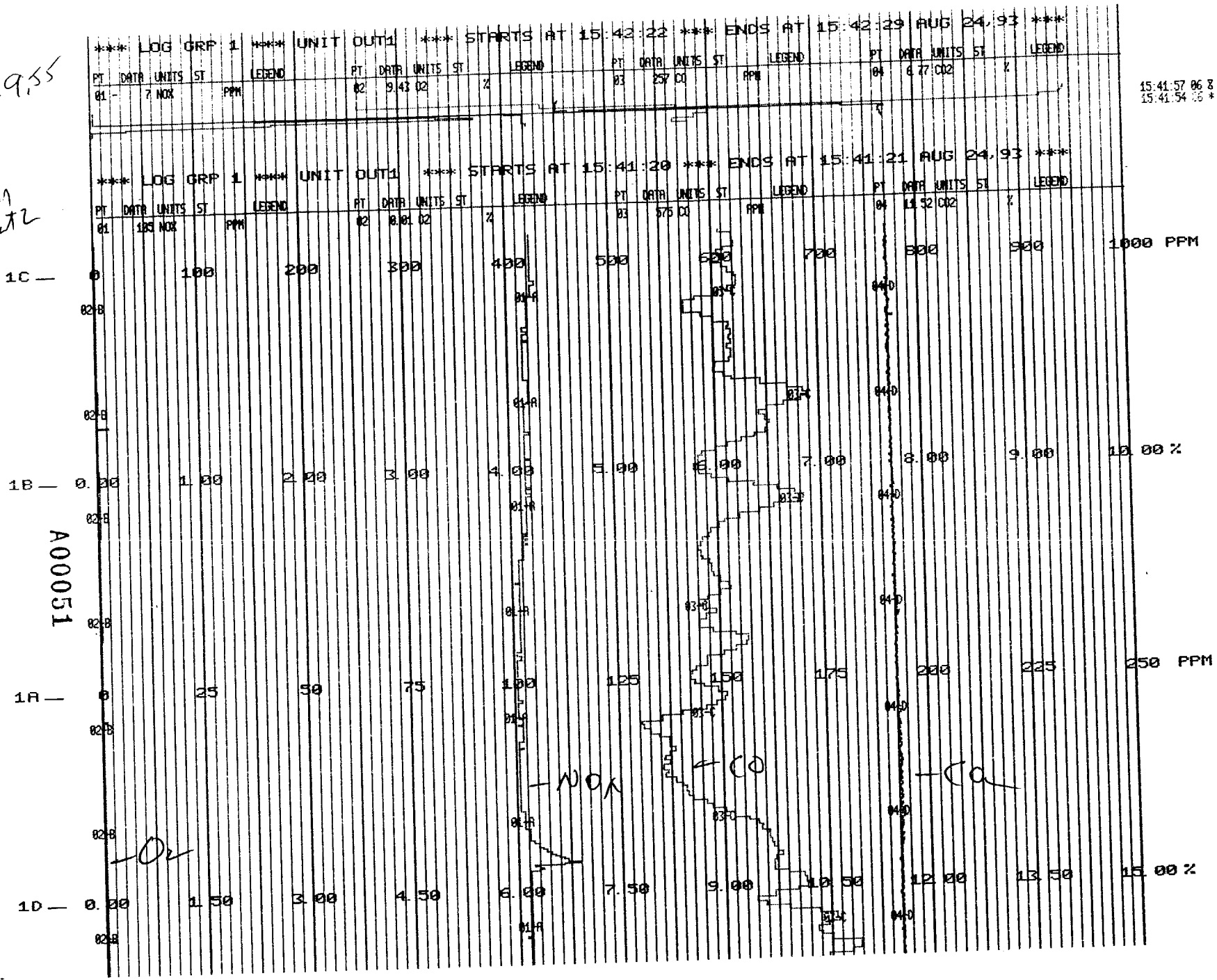
NO 22

A00049

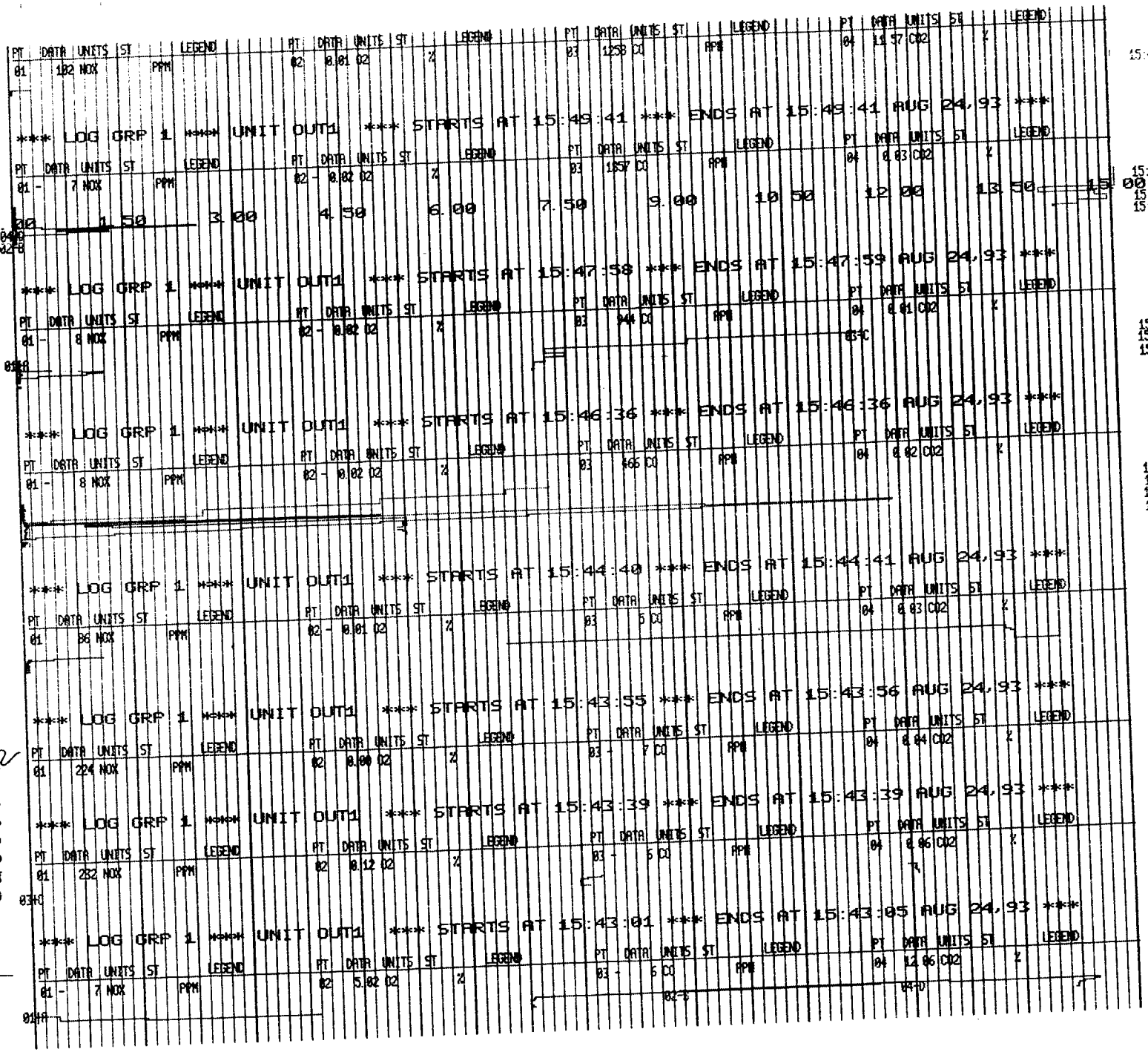


1C
0 100 200 300 400 500 600 700 800 900 1000 PPM
14:54:00 06 X
14:53:57 06 *
14:53:48 06 X
14:53:41 06 *
14:53:39 06 X
14:53:35 06 *
14:53:29 06 X
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 15:01:50 *** ENDS AT 15:01:56 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 100 NOX PPM
02 0.00 O2 %
03 671 CO PPM
04 11.55 CO2 %
Test #2 Start
14:53:11 06 *
14:53:05 06 X
14:52:56 06 *
14:52:50 06 X
14:52:44 06 *
14:52:37 06 X
14:52:34 06 *
15:00:07
1B
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 %
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:58:25 *** ENDS AT 14:58:25 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 101 NOX PPM
02 0.03 O2 %
03 266 CO PPM
04 11.61 CO2 %
Start Test 2
14:52:28 06 X
14:52:16 06 *
14:52:13 06 X
14:52:07 06 *
14:51:55 06 X
14:51:49 06 *
14:51:39 06 X
14:51:36 06 *
14:51:30 06 X
14:51:24 06 *
14:51:21 06 X
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:53:38 *** ENDS AT 14:53:39 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 - 6 NOX PPM
02 - 0.02 O2 %
03 1829 CO PPM
04 0.06 CO2 %
1850
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 14:53:32 *** ENDS AT 14:53:33 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 - 6 NOX PPM
02 - 0.02 O2 %
03 1824 CO PPM
04 0.05 CO2 %
CO
14:51:09 06 *
14:50:34 06 X

A00050


*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 15:42:22 *** ENDS AT 15:42:29 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 7 NOX PPM
02 9.41 O2 %
03 257 CO PPM
04 6.77 CO2 %
15:41:57 06 8
15:41:54 06 *
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 15:41:20 *** ENDS AT 15:41:21 AUG 24,93 ***
01 185 NOX PPM
02 8.01 O2 %
03 575 CO PPM
04 11.52 CO2 %
1C 0 100 200 300 400 500 600 700 800 900 1000 PPM
1B 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 %
1A 0 25 50 75 100 125 150 175 200 225 250 PPM
1D 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
NOx
CO
CO2
O2

A00051



CO 1850

10 — 0.00

CO 946

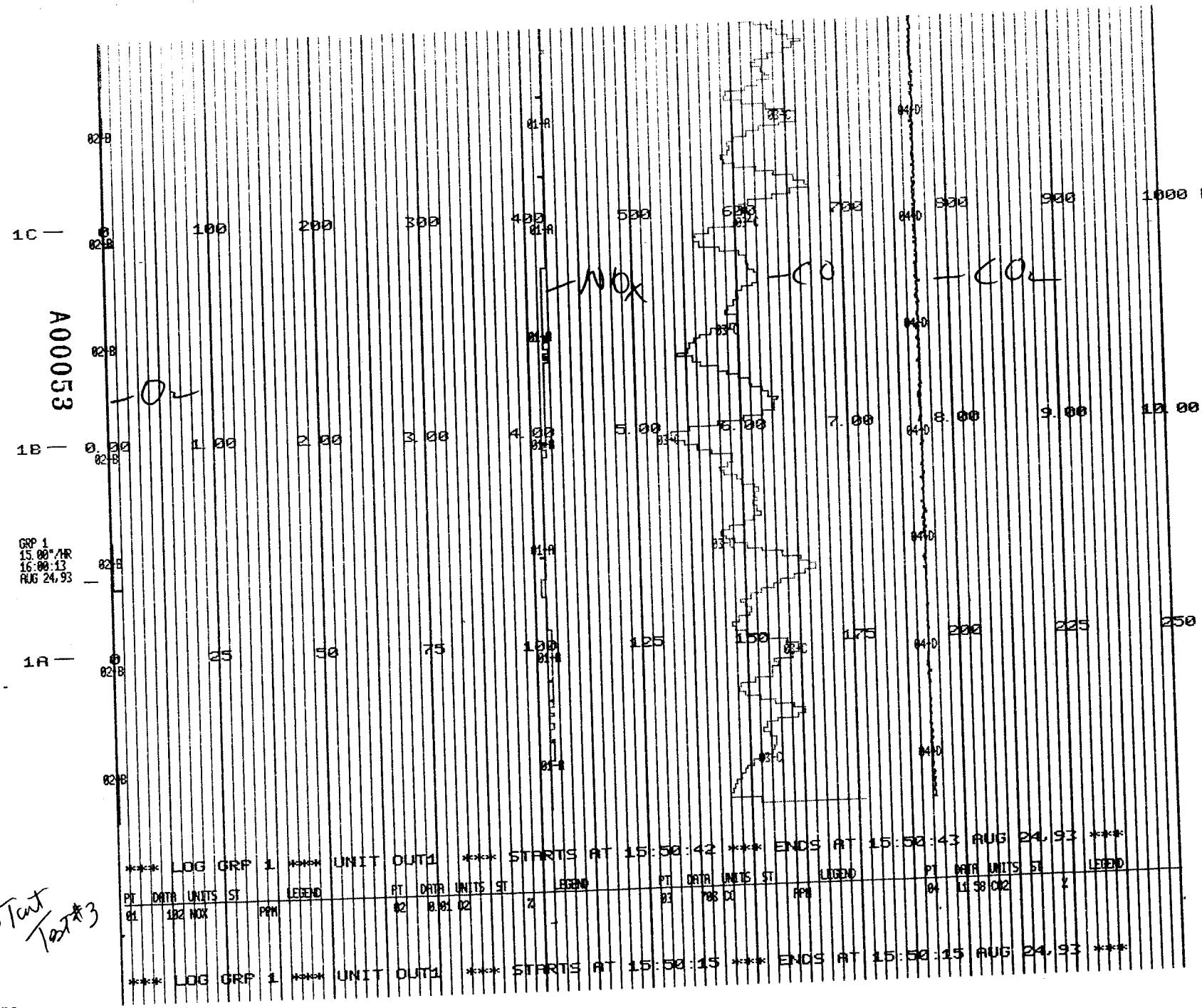
CO 466

NO 91

NO 222

O2 5.0

A00052

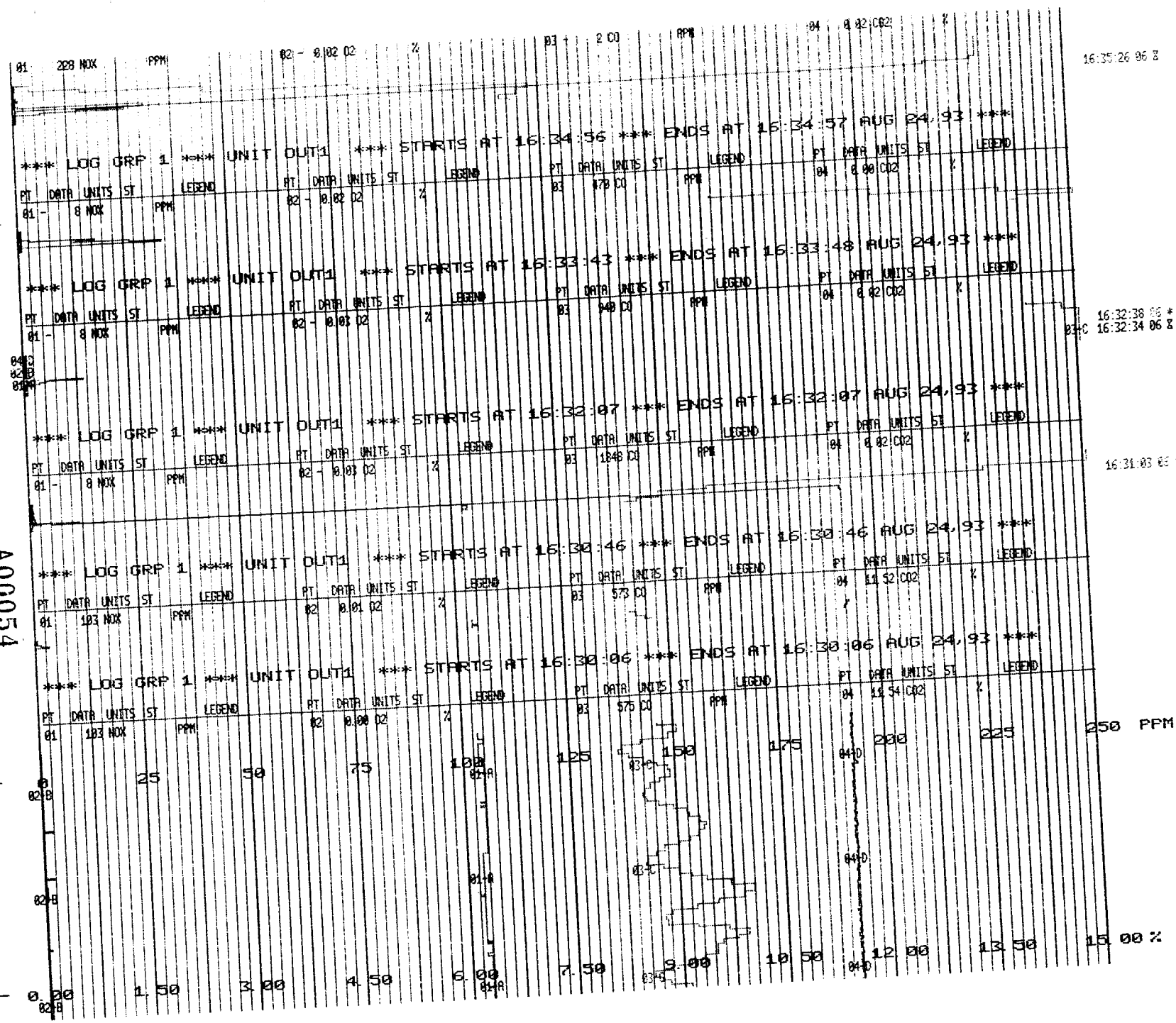

A00053
1C
1B
1A
100
200
300
400
500
600
700
800
900
1000 PPM
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 %
25
50
75
100
125
150
175
200
225
250 PPM
NOx
CO
CO2
O2
GRP 1
15.00"/HR
16:00:13
AUG 24,93
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 15:50:42 *** ENDS AT 15:50:43 AUG 24,93 ***
PT DATA UNITS ST LEGEND
01 102 NOX PPM
02 0.01 02 %
03 708 CO PPM
04 11.58 CO2 %
15:49:53 06 8
*** LOG GRP 1 *** UNIT OUT1 *** STARTS AT 15:50:15 *** ENDS AT 15:50:15 AUG 24,93 ***
Start Test #3

NU 222

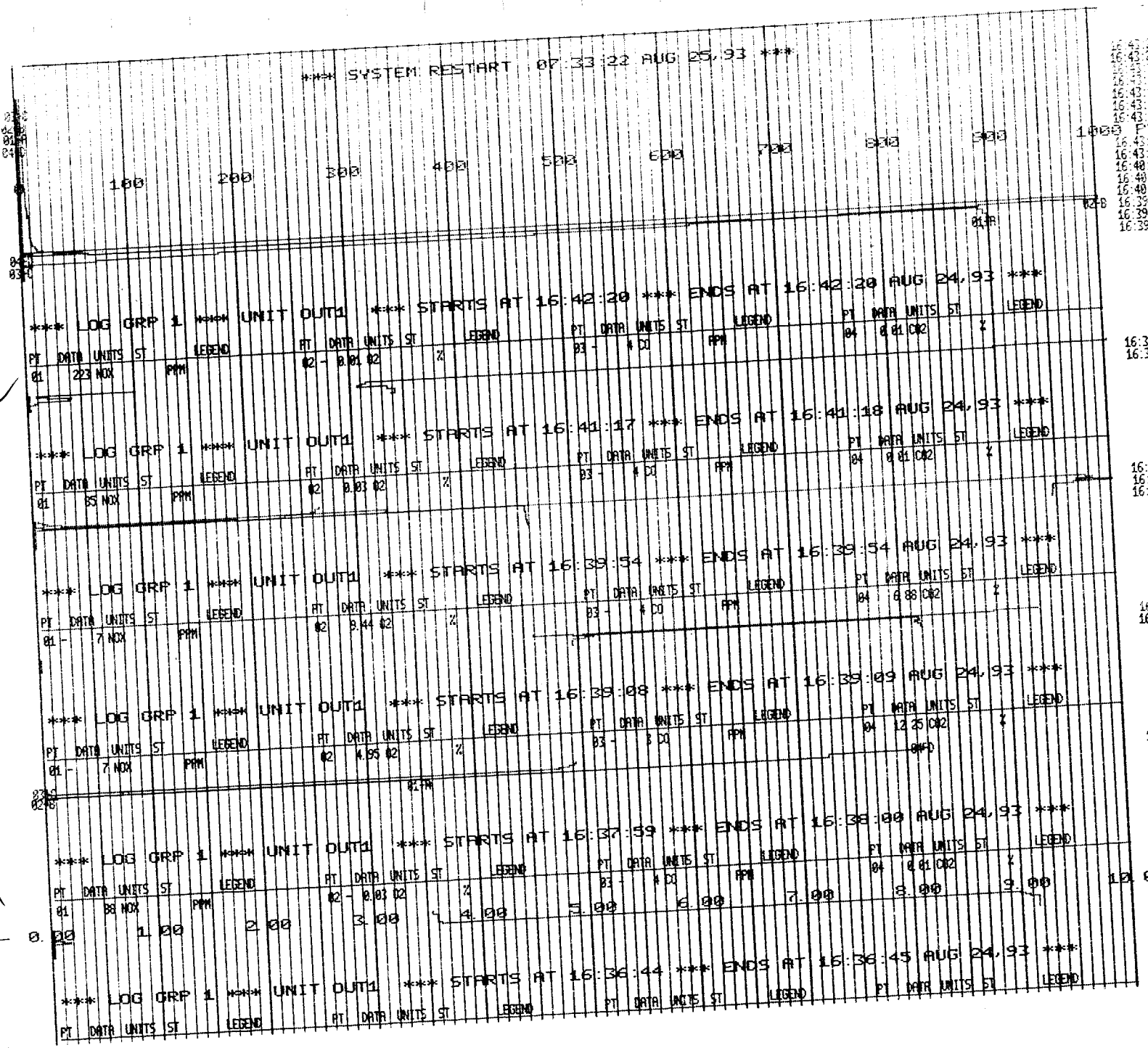
CO 466

CO 935

CO 1850



A00054



NO SYS 22

O2 9.55

O2 5.06

NO 91

A00055

WESTERN ENVIRONMENTAL SERVICES

CONTINUOUS MONITORING TEST DATA

SITE: H2O (Bakersfield)
DATE: 8-25-93
UNIT: Inlet
OPERATOR:

INSTRUMENT	SERIAL NUMBER	RANGE
WESTRONICS DATA LOGGER	SERIES 3000	—
NOX - THERMOELECTRON & CONV.	MODELS 10 & 300	0-10,000
O(2) - TELEDYNE	326A	0-15%
CO - THERMOELECTRON	MODEL 48H	0-10,000
CO(2) - HORIBA	PIR 2000	0-15%

CALIBRATION GASES

GASES	CONCENTRATION	CYLINDER NUMBER
NO	2039	JJ14192
NO	4190	CC119806
~~NO(2)~~	—	—
CO	5160	JJ14705
CO	1850	MM11503
O(2) & CO(2)	9.35, 5.95	JJ23019
O(2) & CO(2)	13.43, 4.22	CC114743

WESTERN ENVIRONMENTAL SERVICES

CONTINUOUS MONITORING TEST DATA

South

#1 985 kW

SITE: Semitropic Water Dist

DATE: 8-25-93

OPERATOR: Rooney

#1 Outlet

INSTRUMENT	SERIAL #	RANGE
NO	Thermo Electron	250 ppm
CO	Thermo Electron	2000 ppm
CO_2	Horiba PIR 2000	15 %
O_2	Teledyne	10 %

CALIBRATION GASES

GASES	CONCENTRATION	CYLINDER #
NO	222	JJ 773
NO	91	JJ 16886
CO	1850	MM 11503
CO	935	MM 915
O_2 / CO_2	9.5% / 7.0%	CC 105456
O_2	5.0% / 12.4%	JJ 14738
CO	461	CC 102922
CO	466	JJ 14169

A00057

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

SITE: H2O (Bakersfield) Page 1 of 2

DATE: 8-25-93

INLET

TIME	NOx	O2	CO	CO2	# OF AVG
C 816	6	9.37	5161	5.69	
C 820	2037	.09	2	.03	
C 822	4193	.09	2	.04	
C 825	16	13.28	1887	4.10	
NOsys 836	4169				
Begin Test		1 at	841	Unit 1	
END 856	2885	.21	4344	11.83	
C 858	22	13.25	1815	4.19	
C 900	2004	.05	1	.11	
C 902	4168	.04	1	.11	
C 904	13	9.47	5446	6.04	
Adj 905	6	9.49	5149	6.03	
Begin Test		2 at	907	Unit 1	
END 922	2878	.22	4121	11.92	
C 924	10	9.47	1	.12	
C 927	4202	.04	5117	6.04	
C 928	2027	.03	1	.12	
C 930	6	13.52	1766	4.21	
Adj CO 931	4	13.54	1846	4.21	
Begin Test		3 at	934	Unit 1	
END 949	2878	.22	4436	11.93	
C 951	18	13.34	1836	4.22	
C 953	2017	.04	1	.13	
C 954	4206	.04	1	.13	

WESTERN ENVIRONMENTAL SERVICES

FIELD DATA

Page 2 of 2

SITE: H2O (Bakersfield)

DATE: 8-25-93

TIME	NOx	O2	CO	CO2	# OF AVG
C 956	9	9.48	5520	6.08	
Adj. 957	5	9.49	5194	6.10	
Begin Test 1 Unit 2 at 1000					
END 1015	2916	.17	3889	12.02	
C 1017	15	9.38	5156	6.08	
C 1019	4175	.04	1	.12	
C 1021	2017	.03	-11	.13	
C 1023	5	13.53	1766	4.23	
Adj. to 1023	4	13.54	1805	4.24	
Begin Test 2 Unit 2 at 1026					
END 1040	2898	.18	4079	11.98	
C 1043	15	13.41	1805	4.27	
C 1045	2004	.04	-11	.13	
C 1047	4171	.03	-11	.11	
C 1049	12	9.48	5385	6.09	
Adj 1050	8	9.49	5156	6.11	
Begin Test 3 Unit 2 at 1052					
END 1107	2884	.17	3925	12.01	
1109	15	9.39	5147	6.11	
1111	4141	.05	-11	.14	
1113	2003	.03	-11	.12	
1115	7	13.53	1766	4.22	
NOx/SO2 1118	4069	.05			

FIELD DATA

PLANT Semitropic Water
DATE 8-25-93
SAMPLING LOCATION Unit # 1
SAMPLE TYPE Velocity / moisture
RUN NUMBER #1
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 83
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_s) +.30
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3'-#71
NOZZLE I.D.
ASSUMED MOISTURE, % 15%
SAMPLE BOX NUMBER
METER BOX NUMBER Wood #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp # 13 (0-2")

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

Preleak ✓ < .006 cfm at 20"

Postleak ✓ < .004 cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 814	441.900									
1	17 / 831	450.120	1.60		0.74	1122	82	84	7	N/A	61
2	28 / 842	455.360	1.65		0.70	1105	90	86	7	↓	60
3	44 / 858	462.972	1.63		0.70	1103	92	86	7	↓	60
4			1.35			1145					
5			1.15			1129					
6			1.00			1064					
		95 mls									
1		grams	1.35			1037					
2		v/c	1.60			1117					
3			1.65			1137					
4			1.30			1122					
5			1.00			1100					
6			0.90			1064					

SIDE

Bottom

A00060

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA

PLANT Semitropic Water
DATE 8-25-93
SAMPLING LOCATION Unit #2
SAMPLE TYPE Velocity / Moisture
RUN NUMBER #1
OPERATOR Ty Hastyter
AMBIENT TEMPERATURE 95
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_s) +0.30
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3'-#71
NOZZLE I.D.
ASSUMED MOISTURE, % 15%
SAMPLE BOX NUMBER
METER BOX NUMBER WOOD #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp #13 (0-2")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak v< .010 cfm at 20" READ AND RECORD ALL DATA EVERY _____ MINUTES Postleak v< cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	1121	496.900									
1	10	1131	501.920	1.30		0.75	1015	96	94	7	N/A	66
2	34	1155	513.870	1.55		0.75	1101	102	96	7		60
3	47	1208	520.358	1.70		0.75	1112	104	100	7	↓	62
4				1.35			1112					
5				1.15			1099					
6				1.00			1093					
SIDE			102 m/s									
			grams	1.30			1017					
1			vlc	1.43			1064					
2				1.60			1091					
3				1.60			1096					
4				1.35			1096					
5				0.95			1098					
6												
Bottom												

COMMENTS:

EPA (Dur) 235
4/72

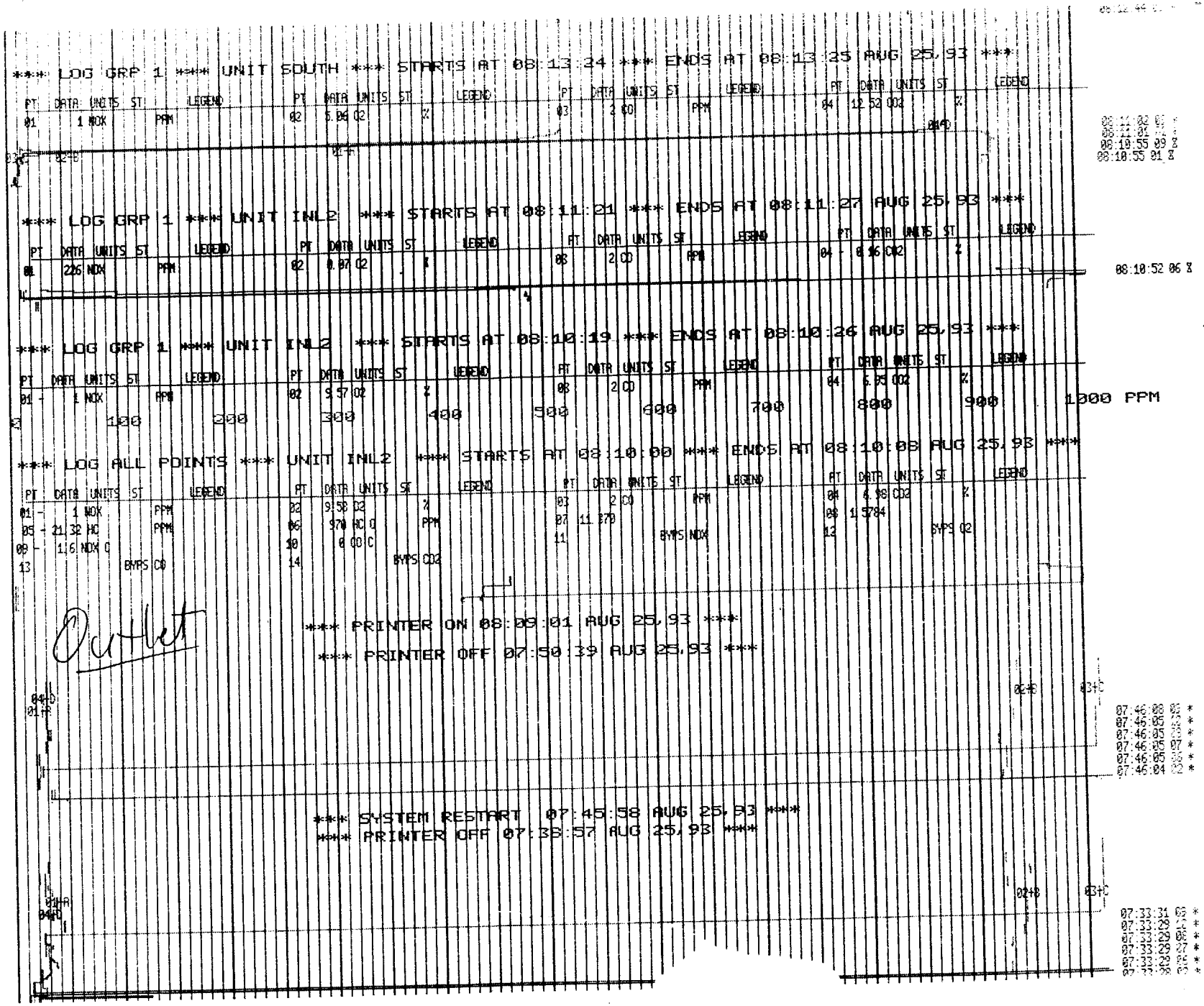
FIELD DATA REDUCTION

SITE: Semi-Tropic Water Storage
DATE: August 25, 1993
UNIT: South Cogen #1 - Outlet
TEST: Velocity/Moisture

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Side Port	441.900	1.60	1.264911	0.74	1122	82	84
	462.972	1.65	1.284523	0.70	1105	90	86
	---	1.63	1.276714	0.70	1103	92	86
	21.072	1.35	1.161895		1145		
	=========	1.15	1.072380		1129		
	(DIFFERENCE)	1.00	1.000000		1064		
Bottom Port		1.35	1.161895		1037		
		1.60	1.264911		1117		
		1.65	1.284523		1137		
		1.30	1.140175		1122		
		1.00	1.000000		1100		
		0.90	0.948683		1064		
			---	AVERAGE SQUARED			
		AVERAGES	1.155051	1.334	0.71	1104	87
			=========	=======	==========	=========	=========

UNIT: South Cogen #2 - Outlet
TEST: Velocity/Moisture

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Side Port	496.900	1.30	1.140175	0.75	1015	96	94
	520.358	1.55	1.244989	0.75	1101	102	96
	---	1.70	1.303840	0.75	1112	104	100
	23.458	1.35	1.161895		1112		
	=========	1.15	1.072380		1099		
	(DIFFERENCE)	1.00	1.000000		1096		
Bottom Port		1.30	1.140175		1017		
		1.43	1.195826		1064		
		1.60	1.264911		1091		
		1.60	1.264911		1096		
		1.35	1.161895		1096		
		0.95	0.974679		1098		
			---	AVERAGE SQUARED			
		AVERAGES	1.160473	1.347	0.75	1083	99
			=========	=======	==========	=========	=========



O2 5.02

NO 226

1C

O2 9.55
CO2 7.08

Outlet

A00063

*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 08:13:24 *** ENDS AT 08:13:25 AUG 25,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	1	NOX		PPM	02	5.06	O2		%	03	2	CO		PPM	04	12.52	CO2		%

08:11:02 [illegible]
08:11:01 [illegible]
08:10:55 09 Z
08:10:55 01 Z

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 08:11:21 *** ENDS AT 08:11:27 AUG 25,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	226	NOX		PPM	02	0.07	O2		%	03	2	CO		PPM	04	0.16	CO2		%

08:10:52 06 Z

*** LOG GRP 1 *** UNIT INL2 *** STARTS AT 08:10:19 *** ENDS AT 08:10:26 AUG 25,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	1	NOX		PPM	02	9.57	O2		%	03	2	CO		PPM	04	6.05	CO2		%

0 100 200 300 400 500 600 700 800 900 1000 PPM

*** LOG ALL POINTS *** UNIT INL2 *** STARTS AT 08:10:00 *** ENDS AT 08:10:08 AUG 25,93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	1	NOX		PPM	02	9.58	O2		%	03	2	CO		PPM	04	6.98	CO2		%
05	21.32	HC		PPM	06	970	HC C		PPM	07	11.370				08	1.5784			
09	1.6	NOX C			10	0	CO C			11			BYPS NOX		12			BYPS O2	
13			BYPS CO		14			BYPS CO2											

*** PRINTER ON 08:09:01 AUG 25,93 ***
*** PRINTER OFF 07:50:39 AUG 25,93 ***

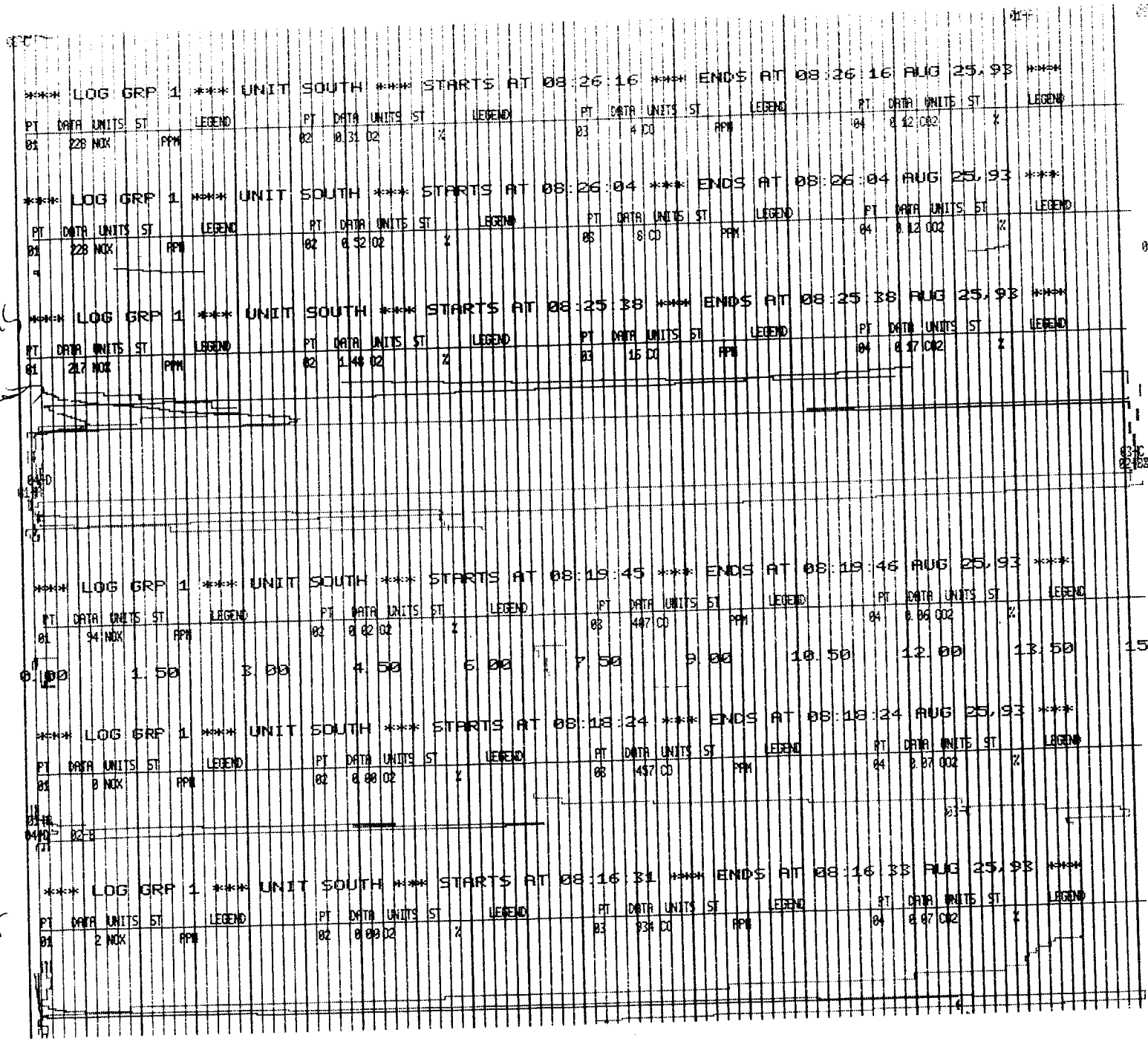
04+D
01+A
02+B
03+C

07:46:08 [illegible] *
07:46:05 [illegible] *
07:46:05 [illegible] *
07:46:05 07 *
07:46:05 [illegible] *
07:46:04 [illegible] *

*** SYSTEM RESTART 07:45:58 AUG 25,93 ***
*** PRINTER OFF 07:38:57 AUG 25,93 ***

01+A
04+D
02+B
03+C

07:33:31 [illegible] *
07:33:29 [illegible] *
07:33:29 [illegible] *
07:33:29 27 *
07:33:29 [illegible] *
07:33:28 [illegible] *



NO 545

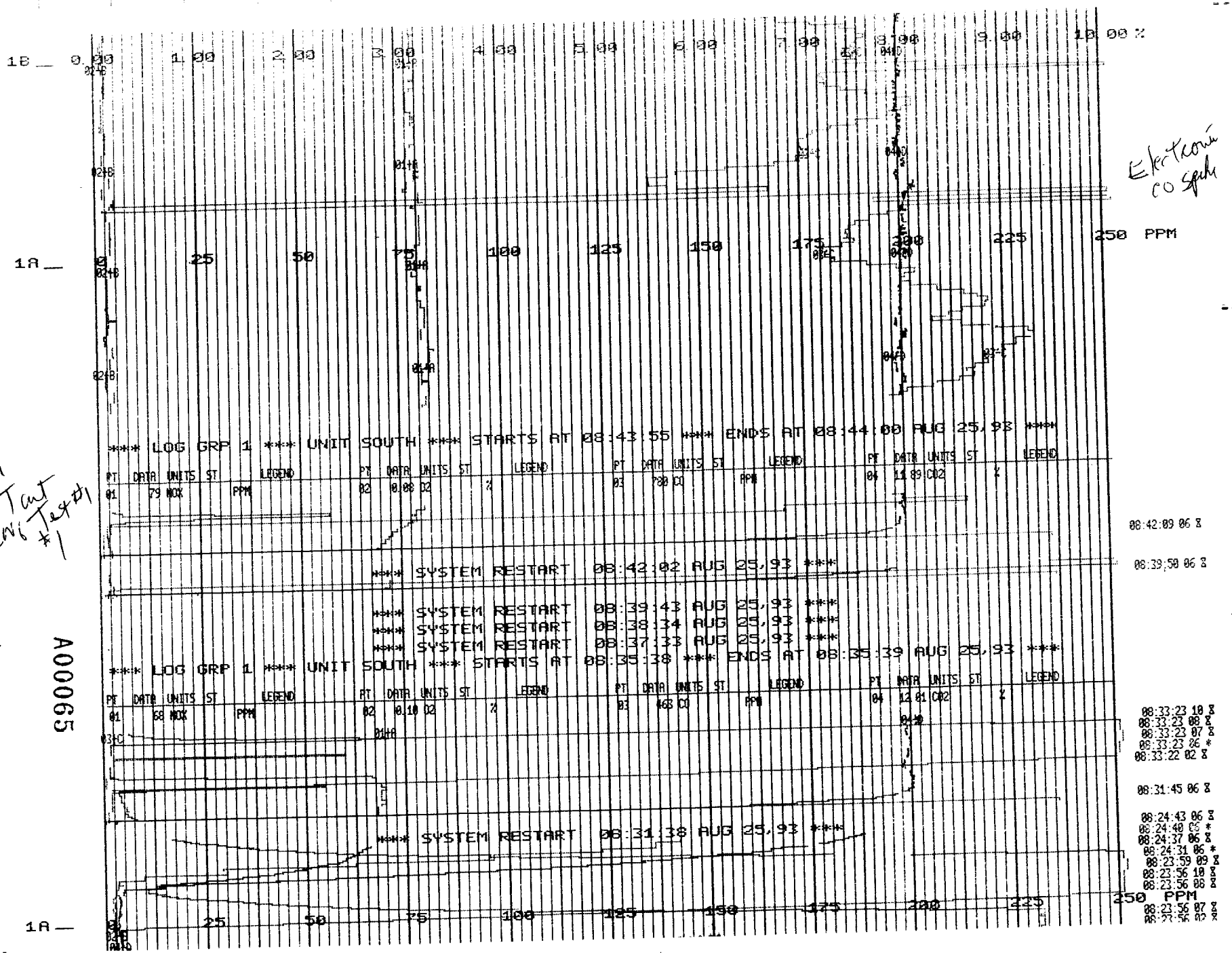
NO 221

NO 91

CO 461

CO 935

A00064

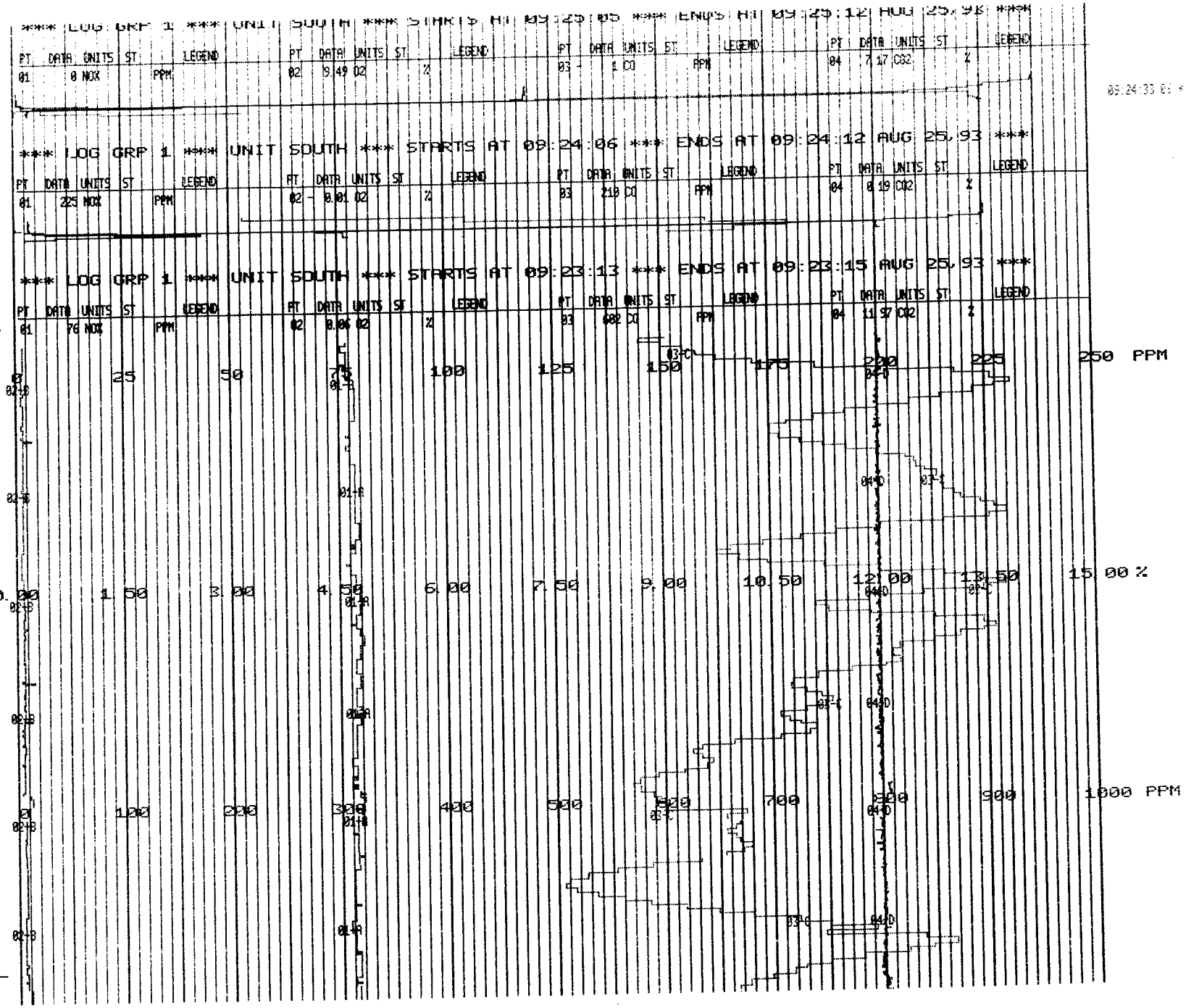

1B
1A
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 %
25
50
75
100
125
150
175
200
225
250 PPM
Electronic CO Spike
**** LOG GRP 1 **** UNIT SOUTH **** STARTS AT 08:43:55 **** ENDS AT 08:44:00 AUG 25,93 ****
PT DATA UNITS ST LEGEND
01 79 NOX PPM
02 0.08 O2 %
03 780 CO PPM
04 11.89 CO2 %
South ST cal Env. Test #1
**** SYSTEM RESTART 08:42:02 AUG 25,93 ****
08:42:09 06 %
08:39:50 06 %
**** SYSTEM RESTART 08:39:43 AUG 25,93 ****
**** SYSTEM RESTART 08:38:34 AUG 25,93 ****
**** SYSTEM RESTART 08:37:33 AUG 25,93 ****
**** LOG GRP 1 **** UNIT SOUTH **** STARTS AT 08:35:38 **** ENDS AT 08:35:39 AUG 25,93 ****
PT DATA UNITS ST LEGEND
01 68 NOX PPM
02 0.10 O2 %
03 468 CO PPM
04 12.01 CO2 %
08:33:23 10 %
08:33:23 08 %
08:33:23 07 %
08:33:23 06 *
08:33:22 02 %
08:31:45 06 %
**** SYSTEM RESTART 08:31:38 AUG 25,93 ****
08:24:43 06 %
08:24:40 06 *
08:24:37 06 %
08:24:31 06 *
08:23:59 09 %
08:23:56 10 %
08:23:56 08 %
08:23:56 07 %
PPM

A00065

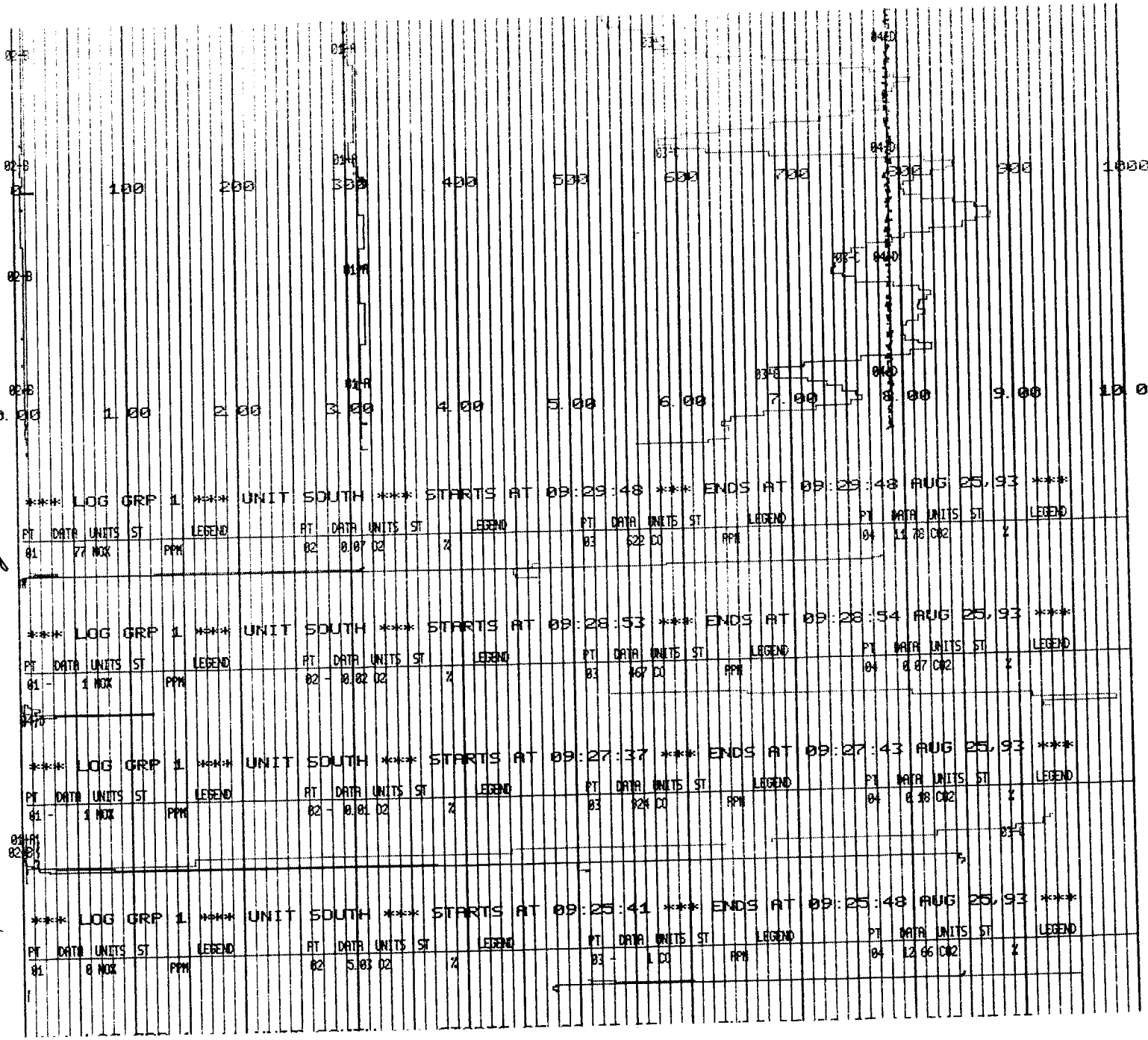
O2 9.55
CO2 7.08

NOx 222

ENP 9 Test



A00066



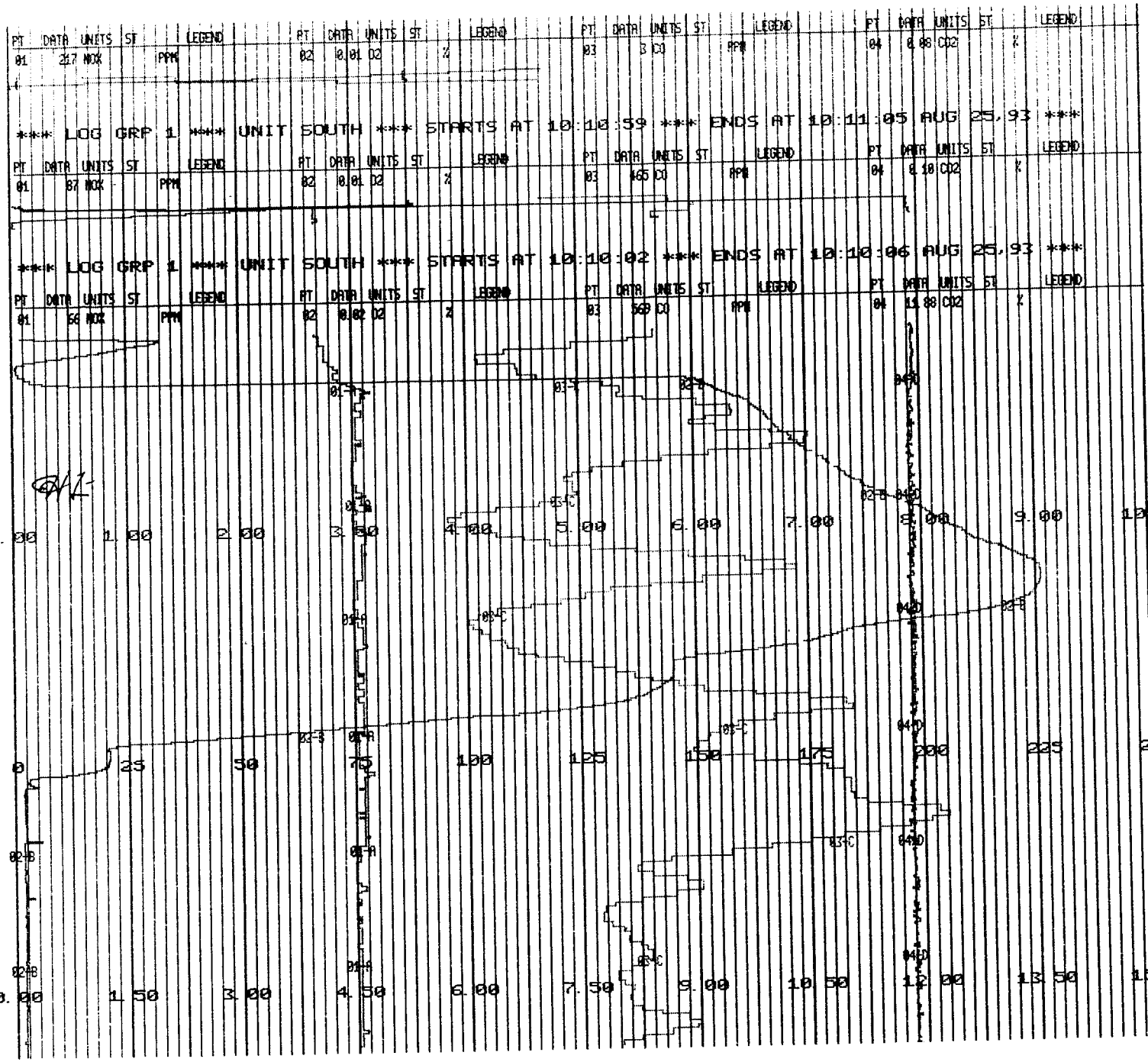
A00067

South Stack 1st #2 ENG

CO 461

CO 935

O2 5.02



NO 222

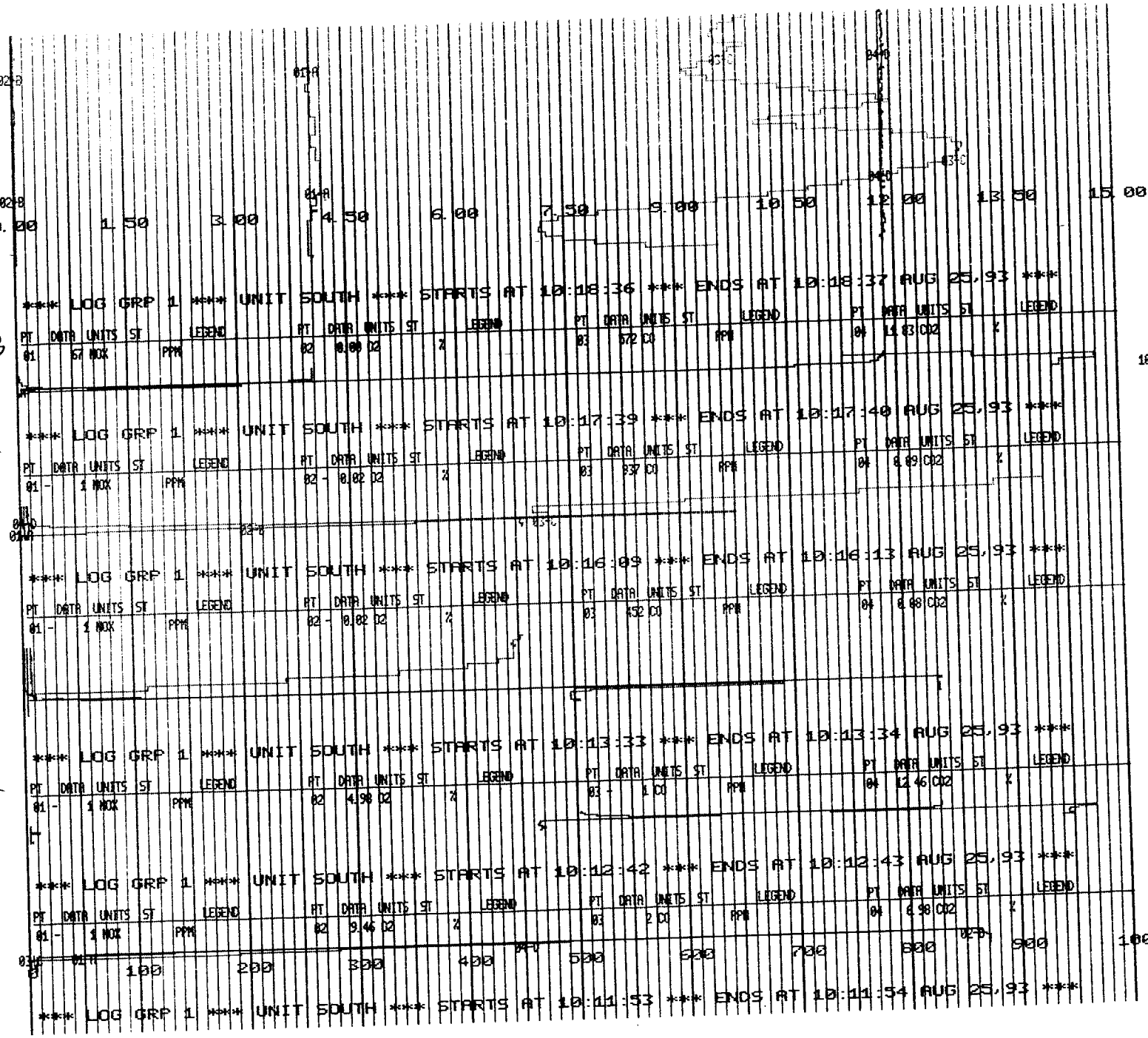
NO 91

EMP 7 Test2

4

O2 Flow Meter Stack

A00068



1D

1C

START TEST #3

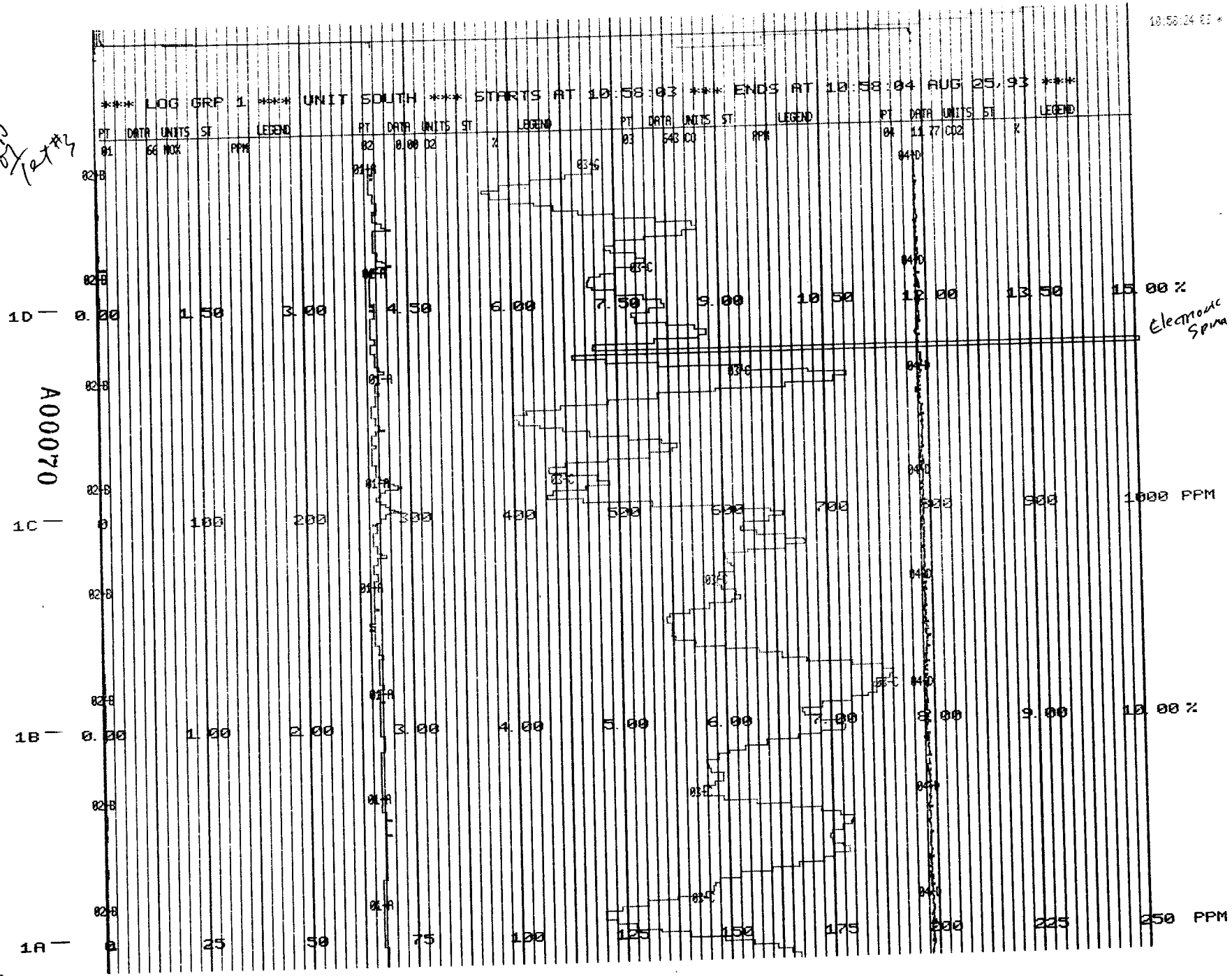
CO 935

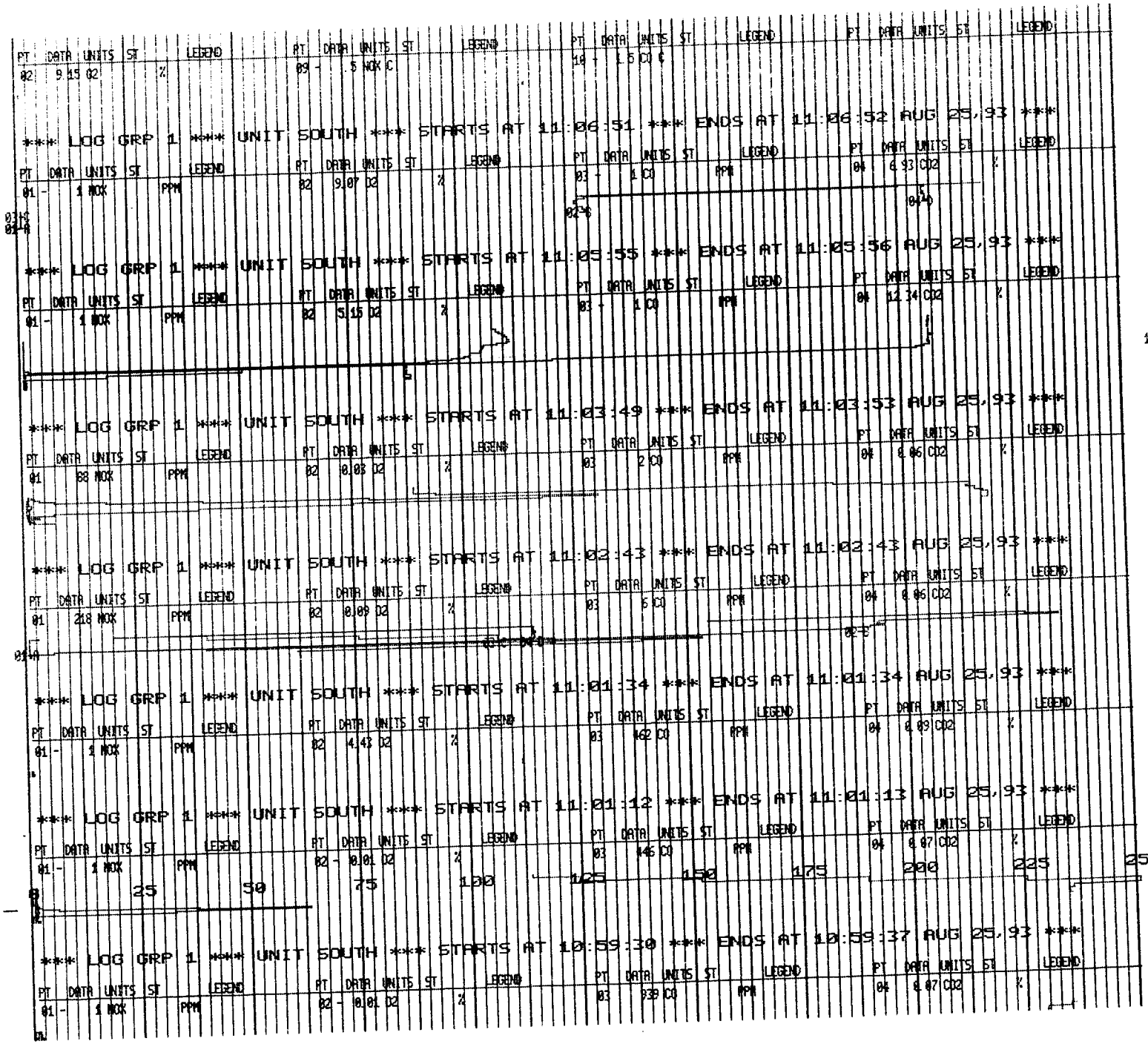
CO 461

O2 5.0%

O2 9.5%

A0006900


**** LOG GRP 1 **** UNIT SOUTH *** STARTS AT 10:58:03 *** ENDS AT 10:58:04 AUG 05,93 ***
PT DATA UNITS ST LEGEND
01 66 NOX PPM
02 0.00 O2 %
03 543 CO PPM
04 11.77 CO2 %
1D 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
1C 0 100 200 300 400 500 600 700 800 900 1000 PPM
1B 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 %
1A 0 25 50 75 100 125 150 175 200 225 250 PPM
Electronic Spina
A00070



0.95

Q 5.0

NO 91

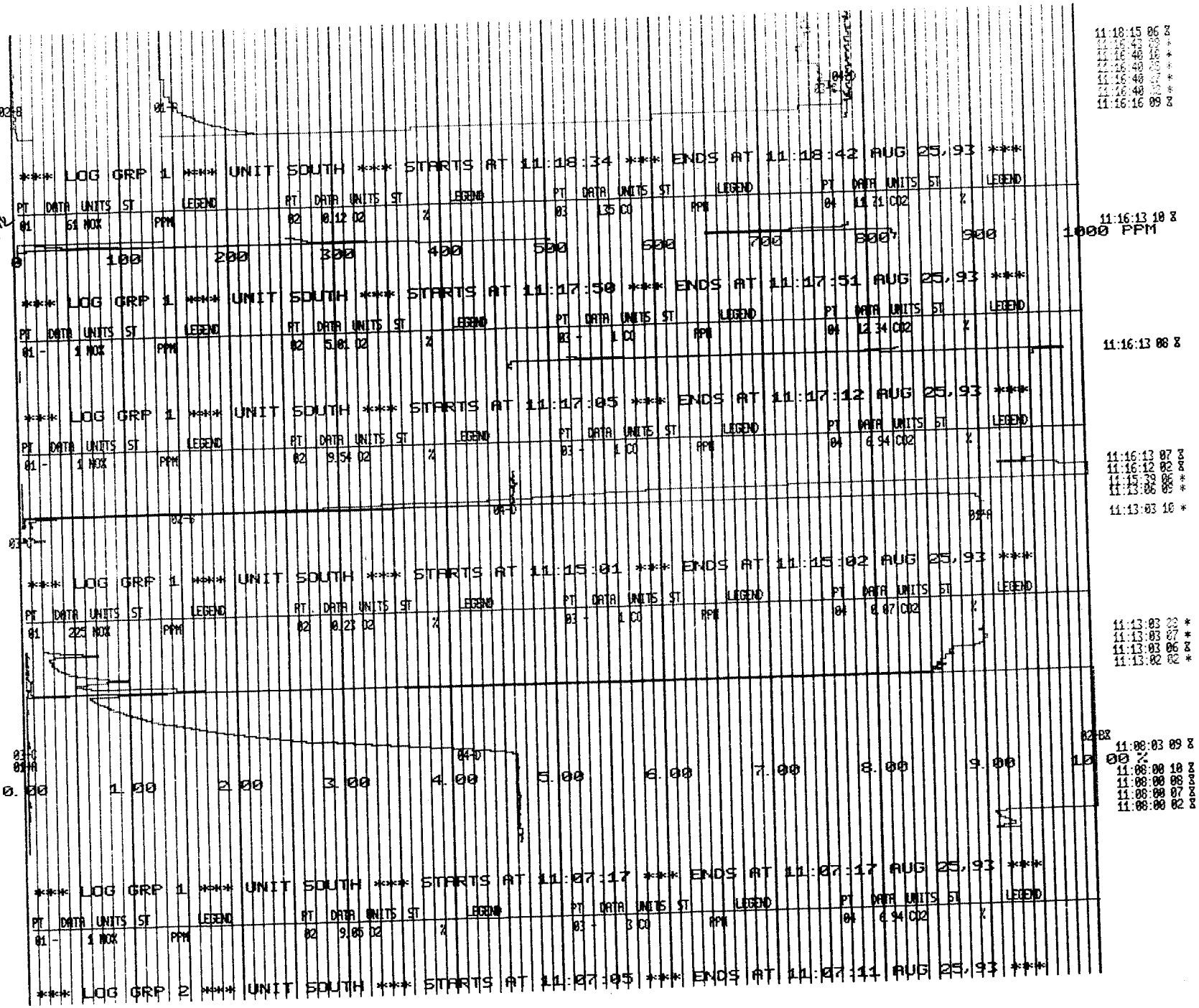
NO 223

A00071

CO 461

1A 11:00:03

CO 935



Start South Tat #1 ENG #2

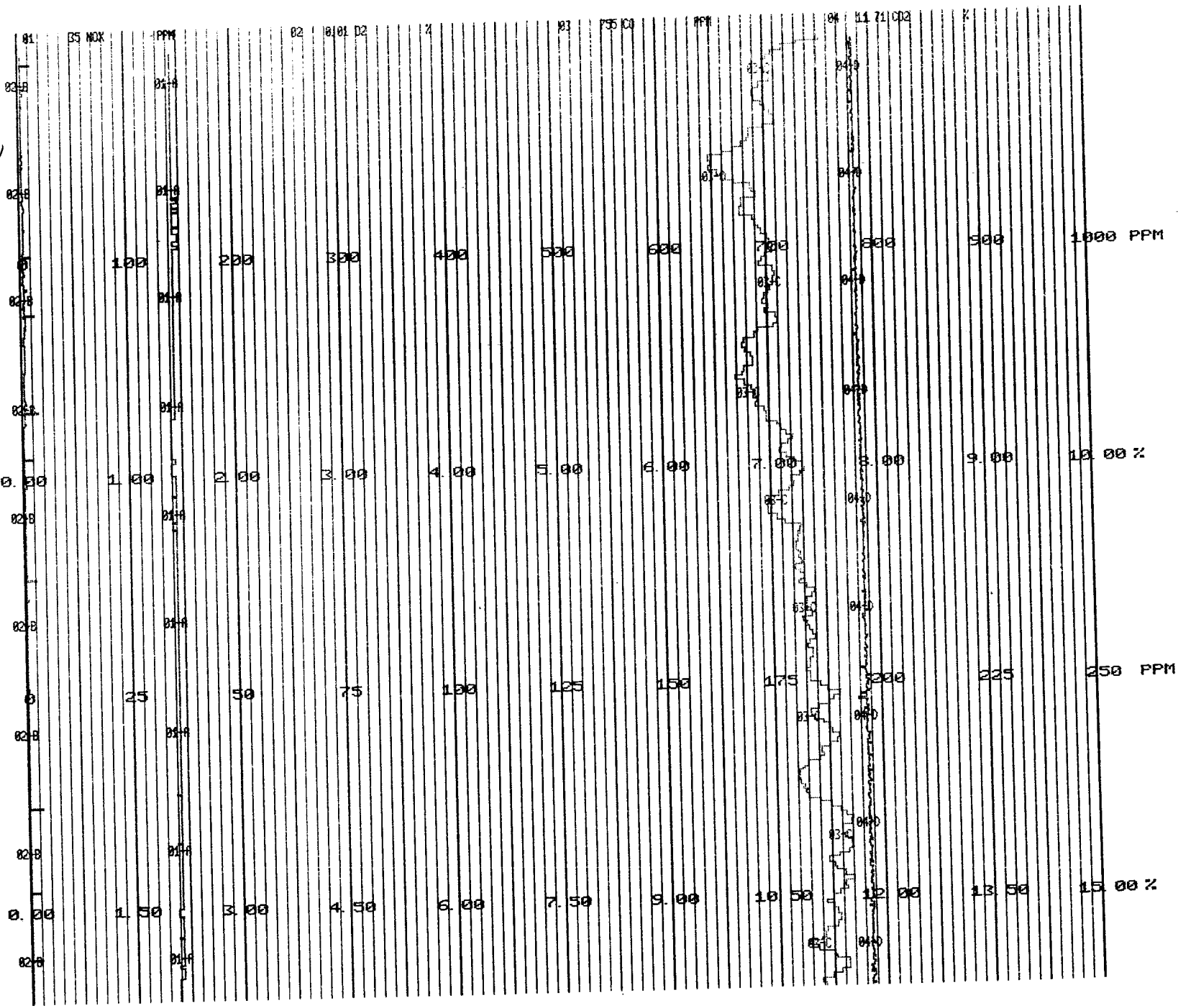
1C

O2 5.02

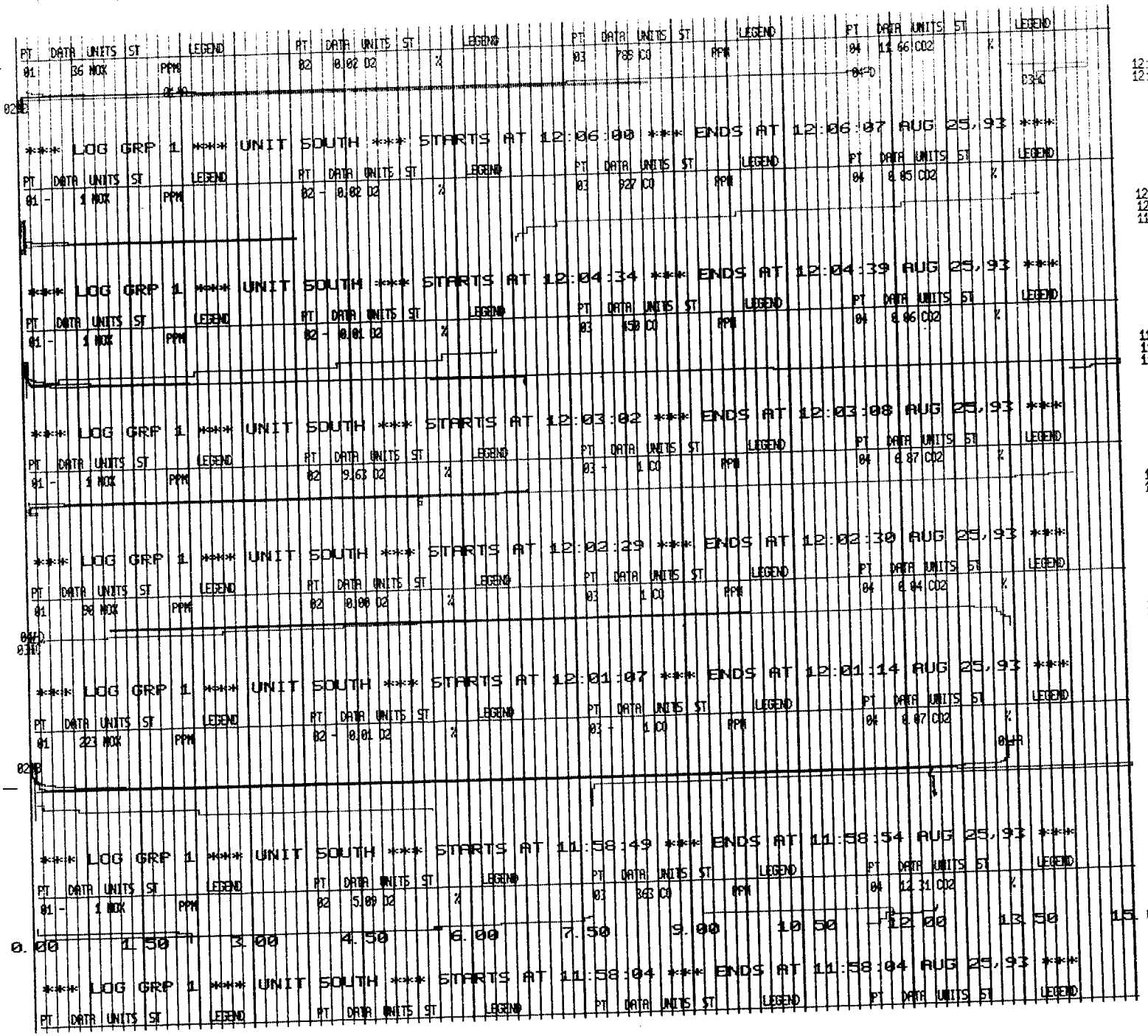
O2 9.55

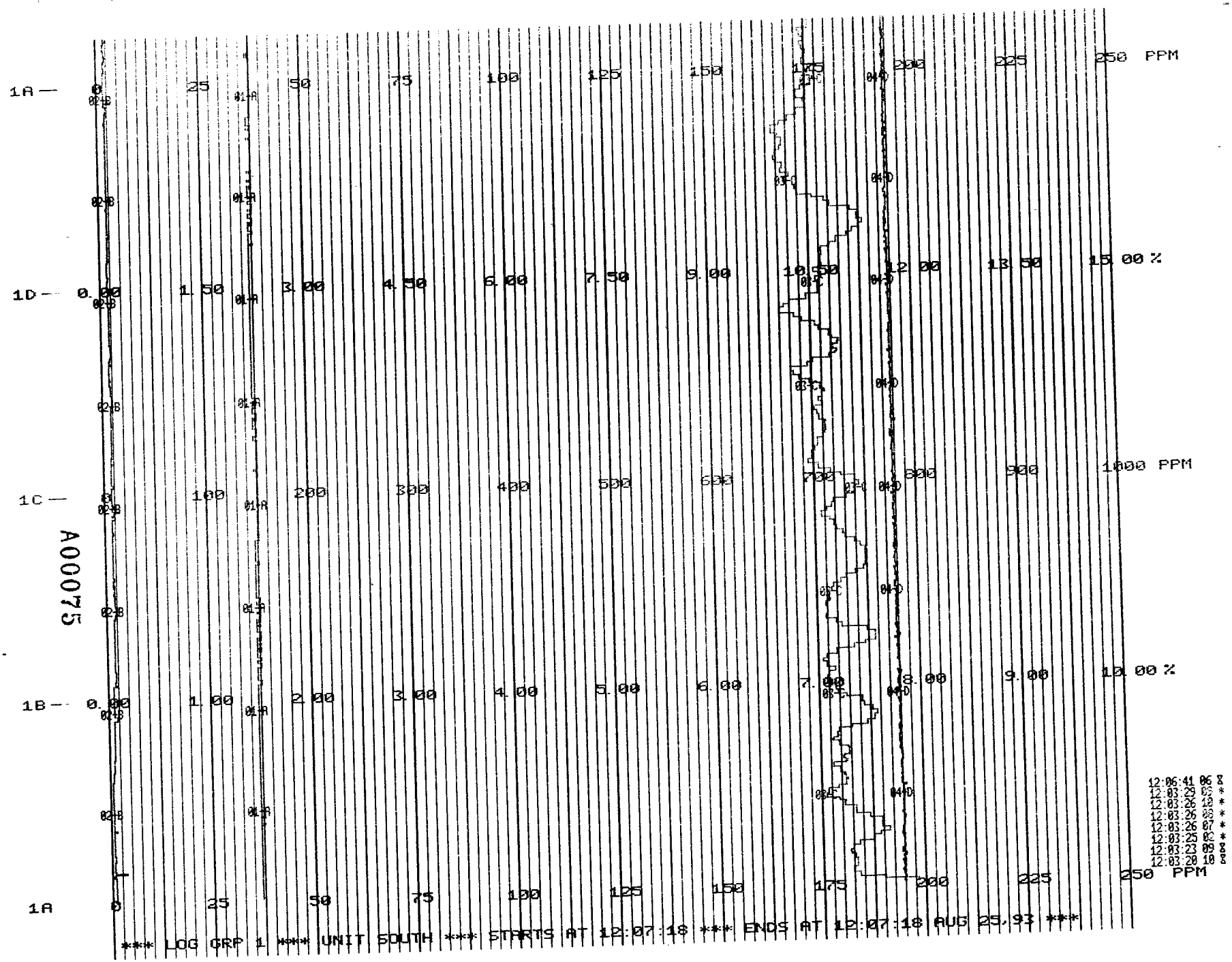
O2 9.50

A00072

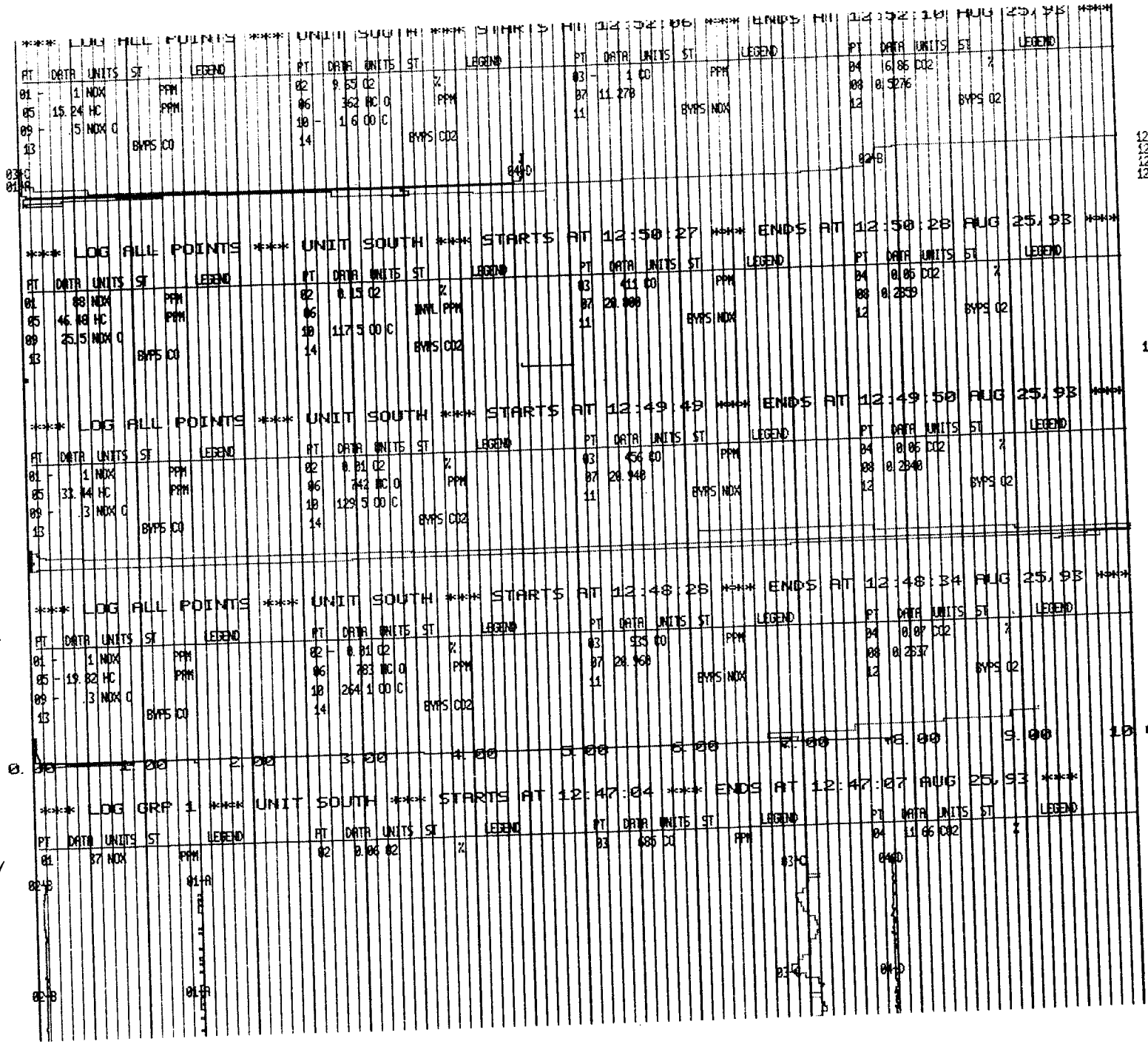

01 35 NOX PPM
02 0101 02 %
03 735 CO PPM
04 11 71 CO2 %
1C
1B
1A
1D
100
200
300
400
500
600
700
800
900
1000 PPM
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 %
0
25
50
75
100
125
150
175
200
225
250 PPM
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 %

A00073


PT DATA UNITS ST LEGEND
01 36 NOX PPM
02 0.02 O2 %
03 785 CO PPM
04 11.66 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:06:00 *** ENDS AT 12:06:07 AUG 25,93 ***
01 1 NOX PPM
02 0.02 O2 %
03 927 CO PPM
04 8.85 CO2 %
12:03:20 00 %
12:03:20 07 %
12:03:19 02 %
12:02:52 06 *
11:59:59 03 *
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:04:34 *** ENDS AT 12:04:39 AUG 25,93 ***
01 1 NOX PPM
02 0.01 O2 %
03 450 CO PPM
04 8.86 CO2 %
11:59:59 06 %
11:59:56 10 *
11:59:56 08 *
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:03:02 *** ENDS AT 12:03:08 AUG 25,93 ***
01 1 NOX PPM
02 9.63 O2 %
03 1 CO PPM
04 8.87 CO2 %
11:59:56 07 *
11:59:55 02 *
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:02:29 *** ENDS AT 12:02:30 AUG 25,93 ***
01 80 NOX PPM
02 0.00 O2 %
03 1 CO PPM
04 8.84 CO2 %
11:59:53 09 %
11:59:50 10 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:01:07 *** ENDS AT 12:01:14 AUG 25,93 ***
01 223 NOX PPM
02 0.01 O2 %
03 1 CO PPM
04 8.87 CO2 %
11:59:50 08 %
11:59:50 07 %
11:59:49 02 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 11:58:49 *** ENDS AT 11:58:54 AUG 25,93 ***
01 1 NOX PPM
02 5.09 O2 %
03 363 CO PPM
04 12.31 CO2 %
11:58:27 06 *
1D 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 11:58:04 *** ENDS AT 11:58:04 AUG 25,93 ***
12:00:04


1A
1D
1C
1B
1A
0
25
50
75
100
125
150
175
200
225
250 PPM
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 %
100
200
300
400
500
600
700
800
900
1000 PPM
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00 %
A000725
12:06:41 06
12:03:29 03
12:03:26 15
12:03:26 03
12:03:26 07
12:03:25 02
12:03:23 09
12:03:20 10
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 12:07:18 *** ENDS AT 12:07:18 AUG 25,93 ***

Q 9.55

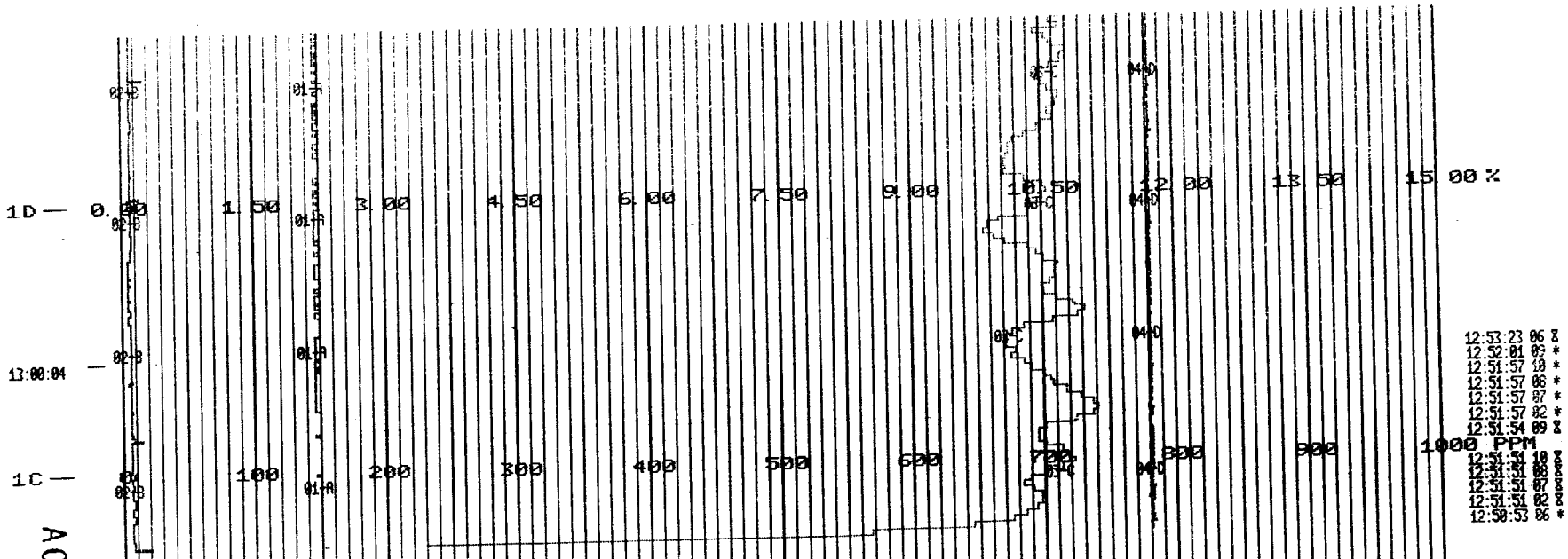


CO 461

CO 935

End 1 Tat 2

A00076



A00077

Start 1st #3

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 12:54:28 *** ENDS AT 12:54:29 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	37	NOX		PPM	02	0.14	O2		%	03	419	CO		PPM	04	11.68	CO2		%
05	39.65	HC		PPM	06			INVL	PPM	07	20.880				08	0.2848			
09	10.8	NOX	C		10	119.3	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

12:50:19 06 %
12:49:00 09 *

NOx 222

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 12:53:35 *** ENDS AT 12:53:37 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	218	NOX		PPM	02	0.08	O2		%	03 -	1	CO		PPM	04	0.07	CO2		%
05	49.44	HC		PPM	06			INVL	PPM	07	20.870				08	0.2849			
09	62.3	NOX	C		10 -	3	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

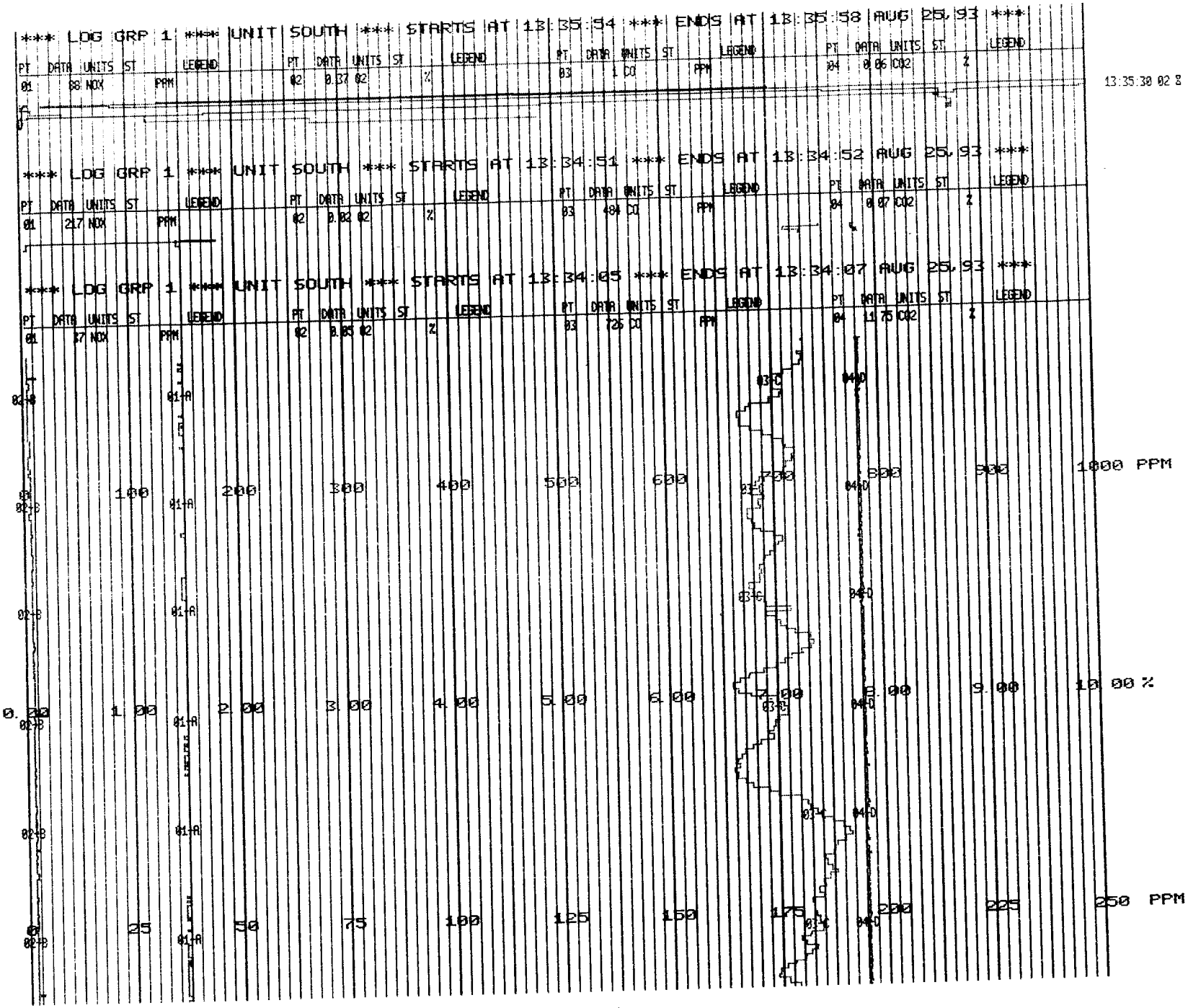
12:48:57 10 *

Ov 5.02

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 12:52:46 *** ENDS AT 12:52:50 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01 -	1	NOX		PPM	02	5.10	O2		%	03 -	3	CO		PPM	04	12.21	CO2		%
05	9.26	HC		PPM	06	442	HC	O	PPM	07	15.920				08	0.3735			
09 -	.4	NOX	C		10 -	1.1	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

12:48:57 08 *



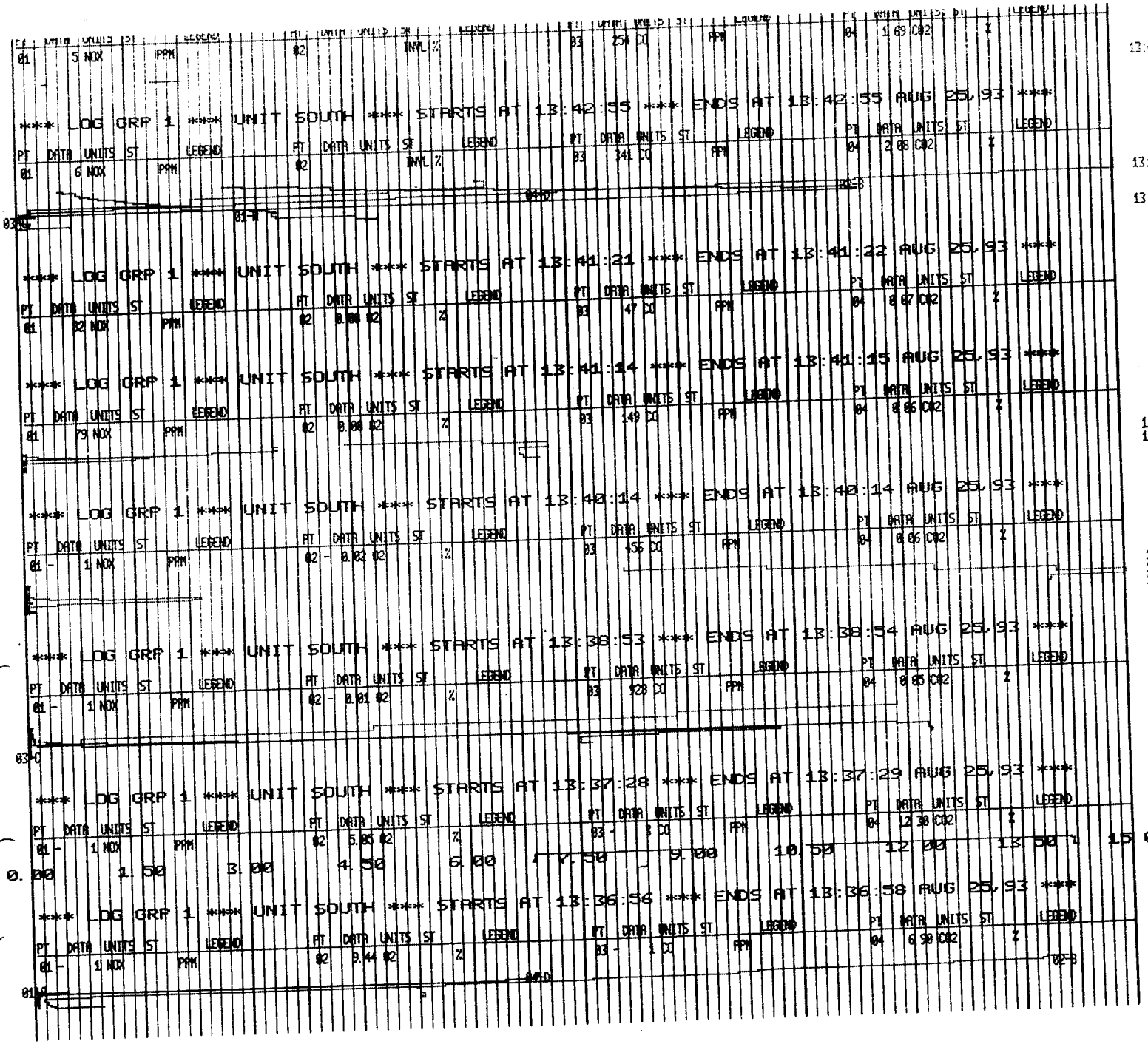
NO 91

NOx 222

End of Test

#2 South

A00078



NO2 CONN

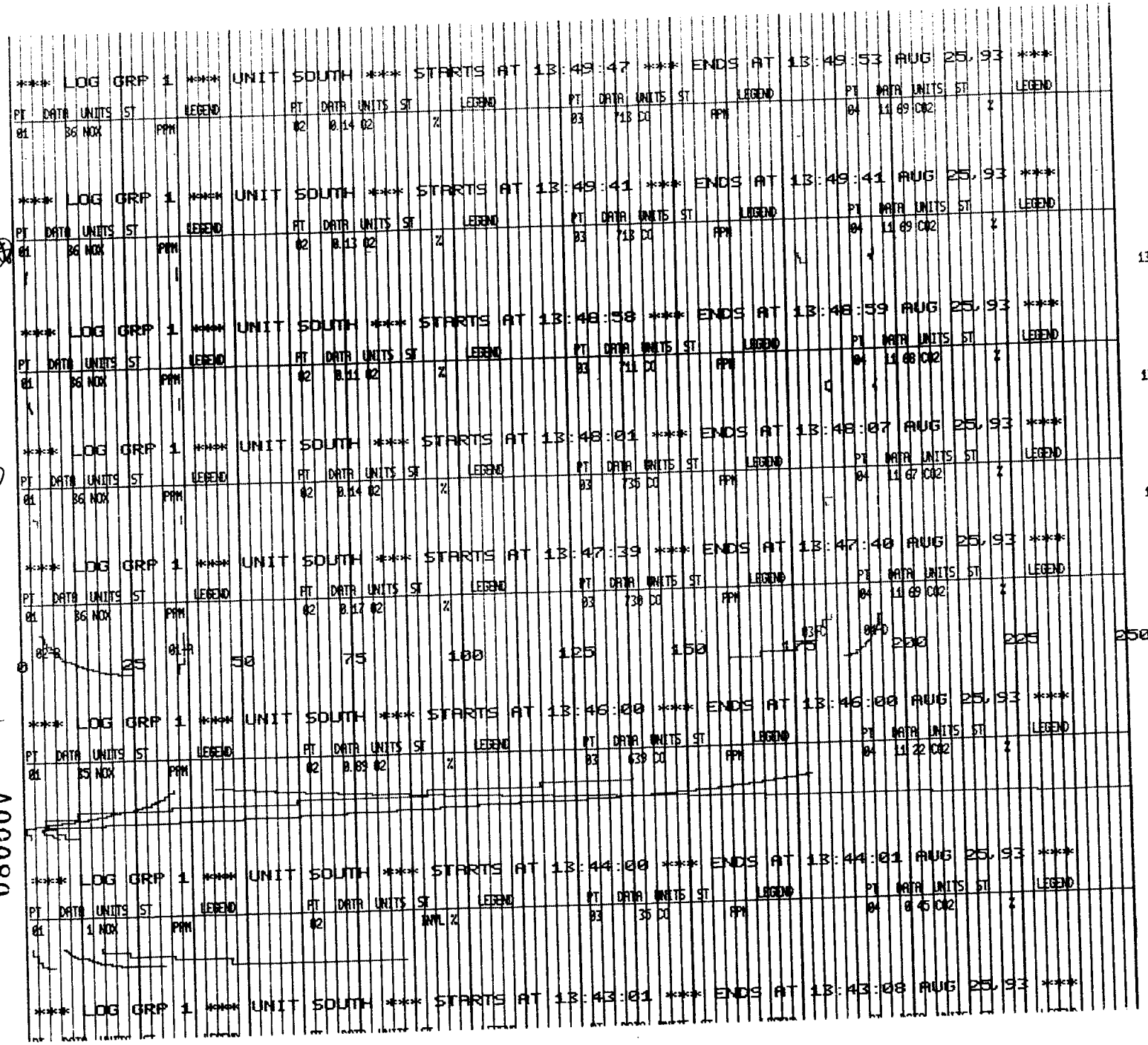
CO 961

CO 935

O2 5.02

O2 9.55

A00079



#2

#1

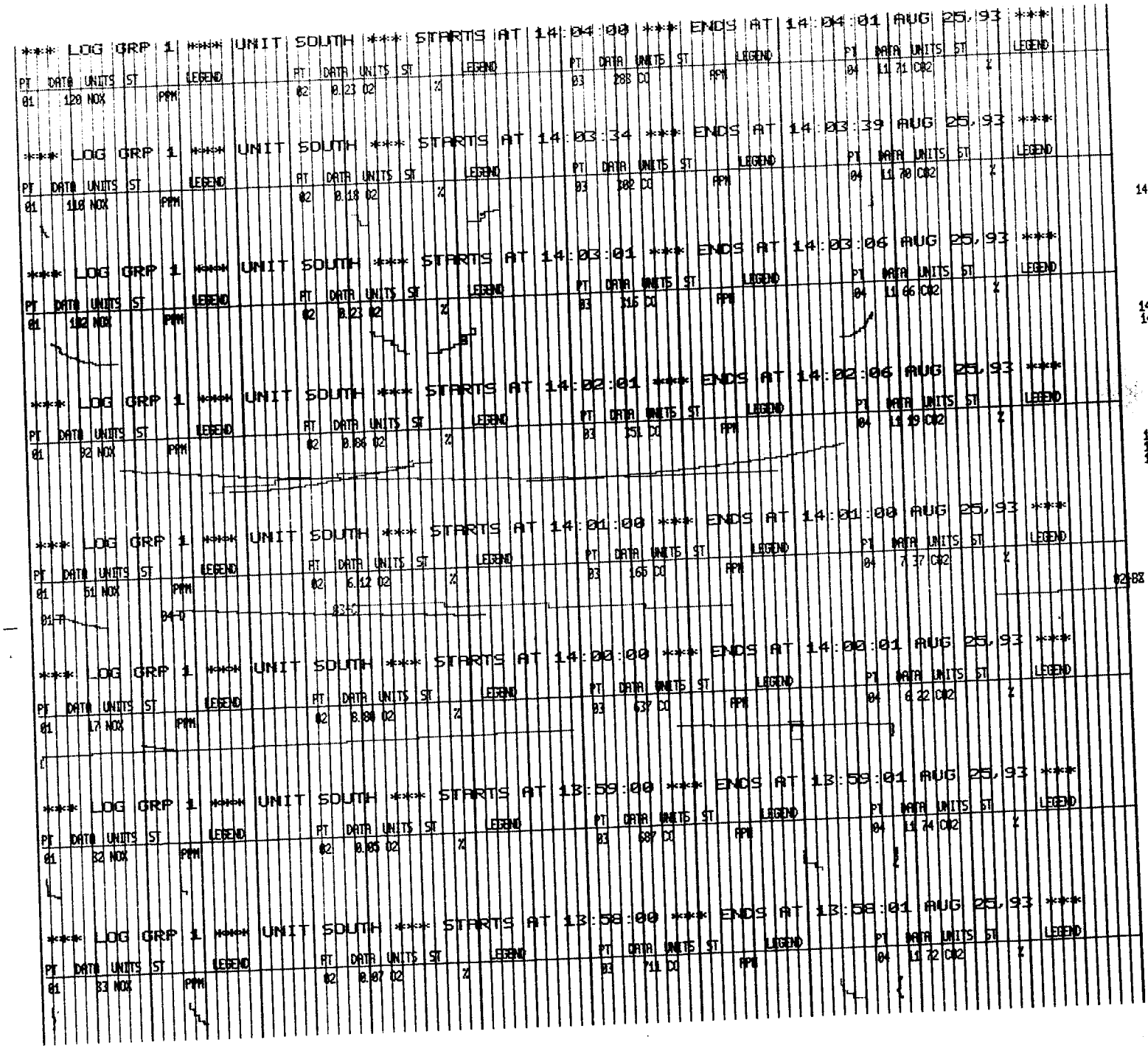
#1

1A

#1

A00080

A00081



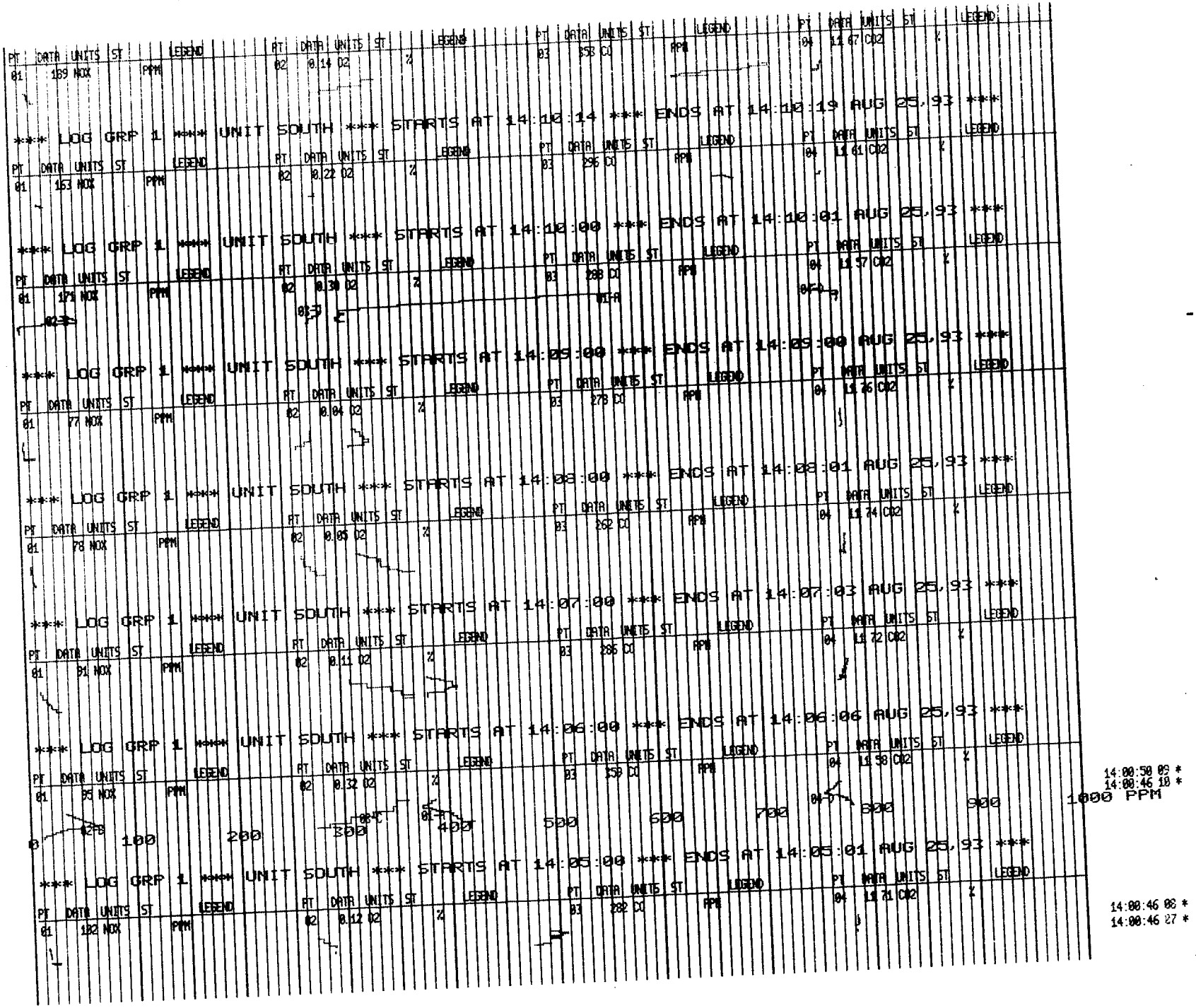
#1

#4

#5

14:00:05

A00082

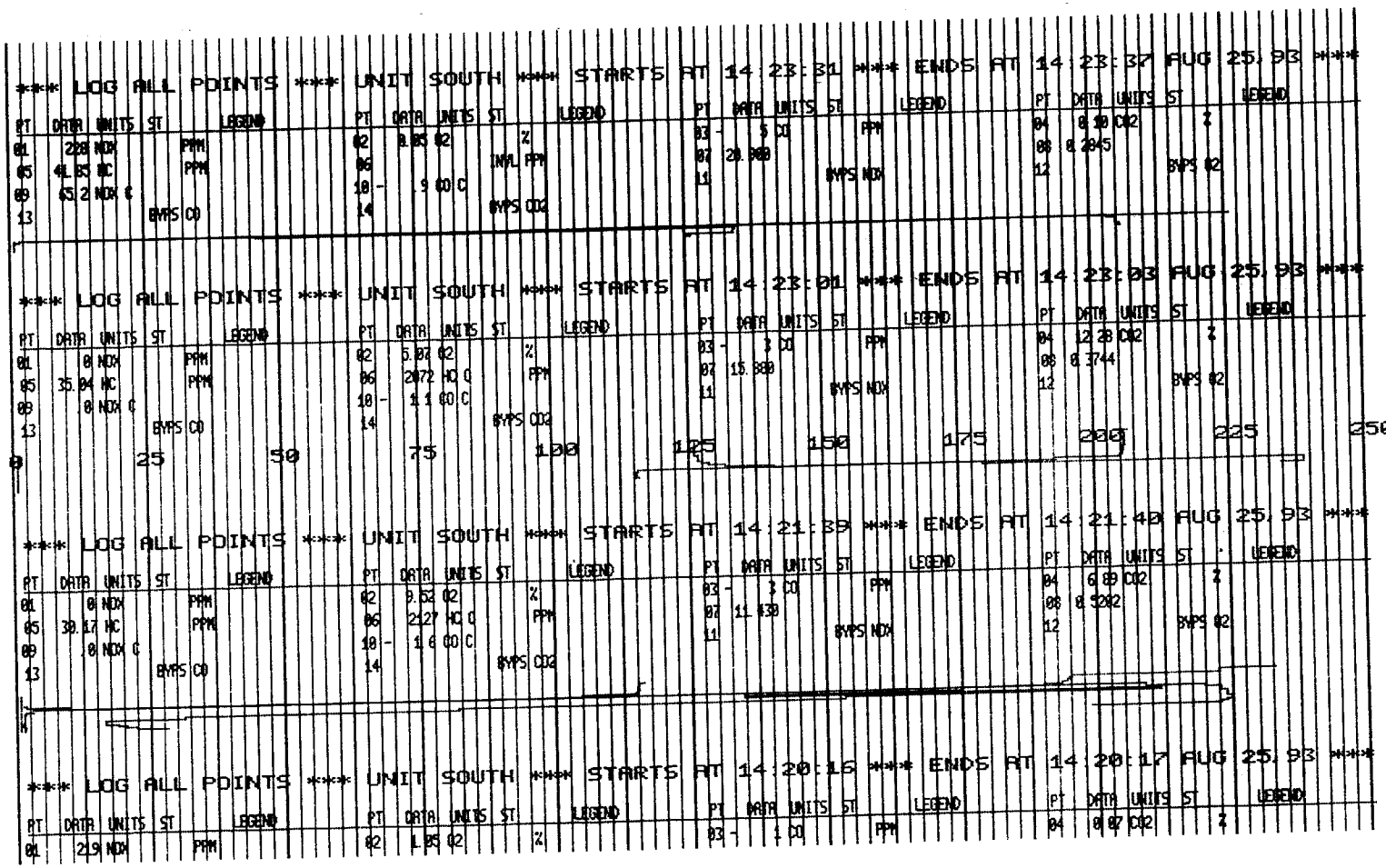


#2
PT DATA UNITS ST LEGEND
01 189 NOX PPM
02 0.14 O2 %
03 353 CO PPM
04 11.67 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:10:14 *** ENDS AT 14:10:19 AUG 25,93 ***
#1
01 163 NOX PPM
02 0.22 O2 %
03 296 CO PPM
04 11.61 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:10:00 *** ENDS AT 14:10:01 AUG 25,93 ***
01 171 NOX PPM
02 0.30 O2 %
03 288 CO PPM
04 11.57 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:09:00 *** ENDS AT 14:09:00 AUG 25,93 ***
#6
01 77 NOX PPM
02 0.04 O2 %
03 278 CO PPM
04 11.76 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:08:00 *** ENDS AT 14:08:01 AUG 25,93 ***
#5
01 78 NOX PPM
02 0.05 O2 %
03 262 CO PPM
04 11.74 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:07:00 *** ENDS AT 14:07:03 AUG 25,93 ***
#4
01 91 NOX PPM
02 0.11 O2 %
03 286 CO PPM
04 11.72 CO2 %
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:06:00 *** ENDS AT 14:06:06 AUG 25,93 ***
#3
01 95 NOX PPM
02 0.32 O2 %
03 359 CO PPM
04 11.58 CO2 %
14:00:50 09 *
14:00:46 10 *
0 100 200 300 400 500 600 700 800 900 1000 PPM
1C
*** LOG GRP 1 *** UNIT SOUTH *** STARTS AT 14:05:00 *** ENDS AT 14:05:01 AUG 25,93 ***
#2
01 102 NOX PPM
02 0.12 O2 %
03 282 CO PPM
04 11.71 CO2 %
14:00:46 08 *
14:00:46 07 *

A000083

UNIT SOUTH **** STARTS AT 14:17:01 *** ENDS AT 14:17:01 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:16:00 *** ENDS AT 14:16:02 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:15:00 *** ENDS AT 14:15:03 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:14:00 *** ENDS AT 14:14:05 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:13:00 *** ENDS AT 14:13:00 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:12:00 *** ENDS AT 14:12:01 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST
UNIT SOUTH **** STARTS AT 14:11:00 *** ENDS AT 14:11:01 AUG 25,93 ***
LOG GRP 1 **** LEGEND
PT DATA UNITS ST

A00084



NO 222

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 14:23:31 *** ENDS AT 14:23:37 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	228	NOX		PPM	02	0.05	O2		%	03 -	5	CO		PPM	04	0.10	CO2		%
05	41.85	HC		PPM	06			INVL	PPM	07	20.900				08	0.2845			
09	65.2	NOX	C		10 -	9	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

14:17:50 09 *

O2 5.0

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 14:23:01 *** ENDS AT 14:23:03 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	0	NOX		PPM	02	5.07	O2		%	03 -	3	CO		PPM	04	12.28	CO2		%
05	35.04	HC		PPM	06	2072	HC	C	PPM	07	15.880				08	0.3744			
09	0	NOX	C		10 -	1.1	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

1A 0 25 50 75 100 125 150 175 200 225 250 PPM

14:17:47 10 *
14:17:47 09 *

A00085

O2 9.5

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 14:21:39 *** ENDS AT 14:21:40 AUG 25, 93 ***

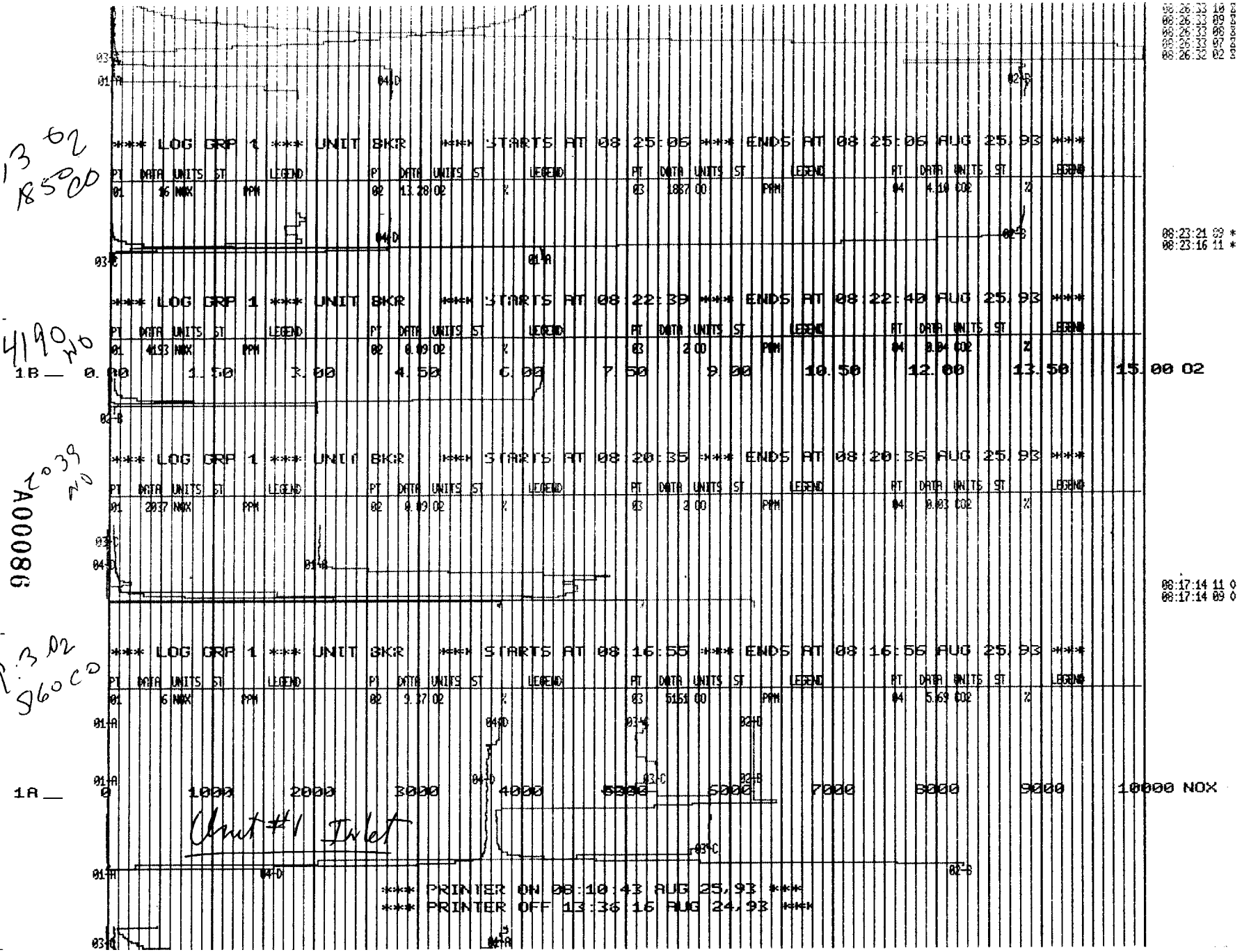
PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	0	NOX		PPM	02	9.52	O2		%	03 -	3	CO		PPM	04	6.89	CO2		%
05	30.17	HC		PPM	06	2127	HC	C	PPM	07	11.430				08	0.5202			
09	0	NOX	C		10 -	1.6	CO	C		11			BYPS	NOX	12			BYPS	O2
13			BYPS	CO	14			BYPS	CO2										

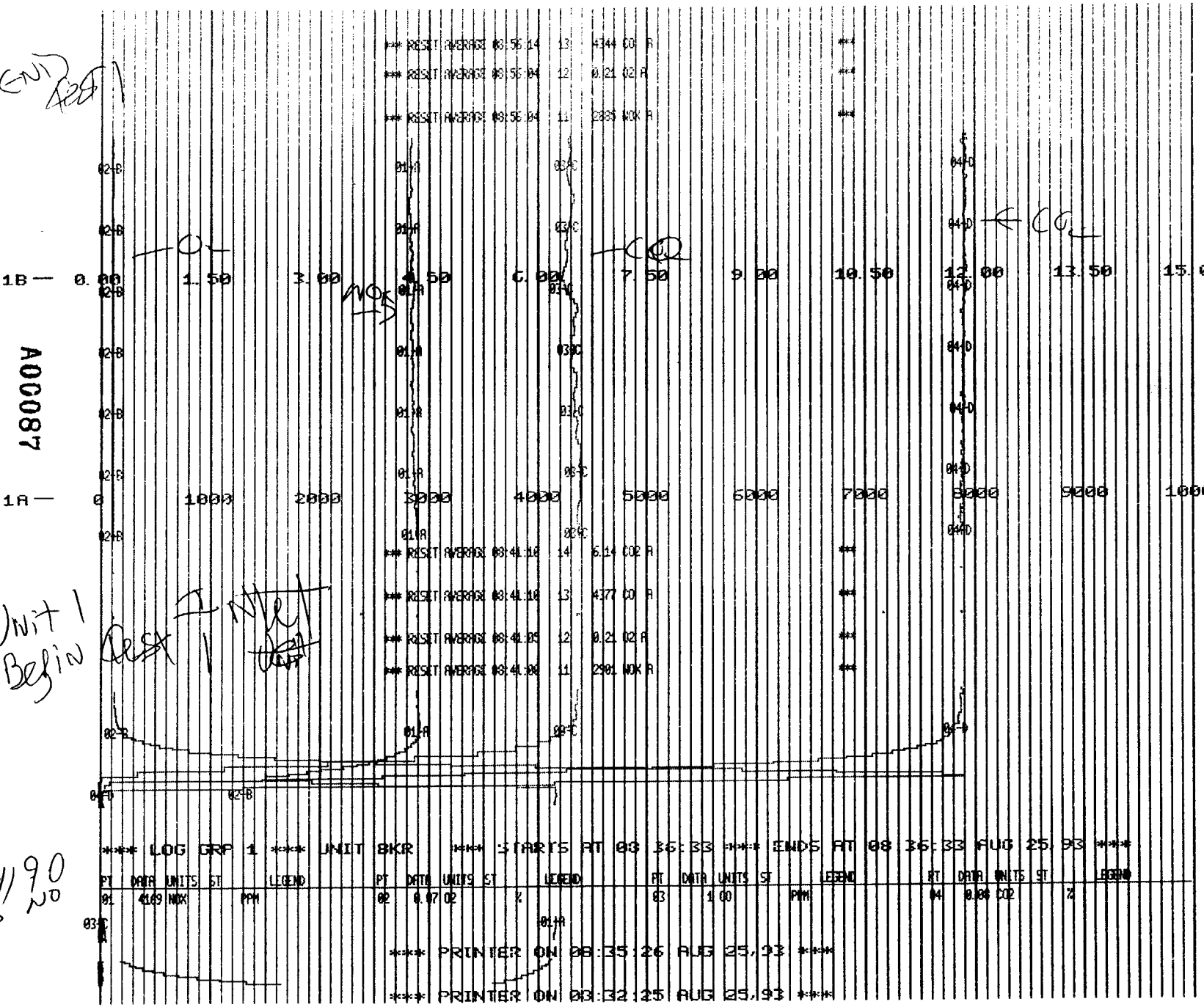
14:17:47 07 *
14:17:47 02 *
14:17:44 06 %

*** LOG ALL POINTS *** UNIT SOUTH *** STARTS AT 14:20:16 *** ENDS AT 14:20:17 AUG 25, 93 ***

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	219	NOX		PPM	02	1.05	O2		%	03 -	1	CO		PPM	04	0.07	CO2		%

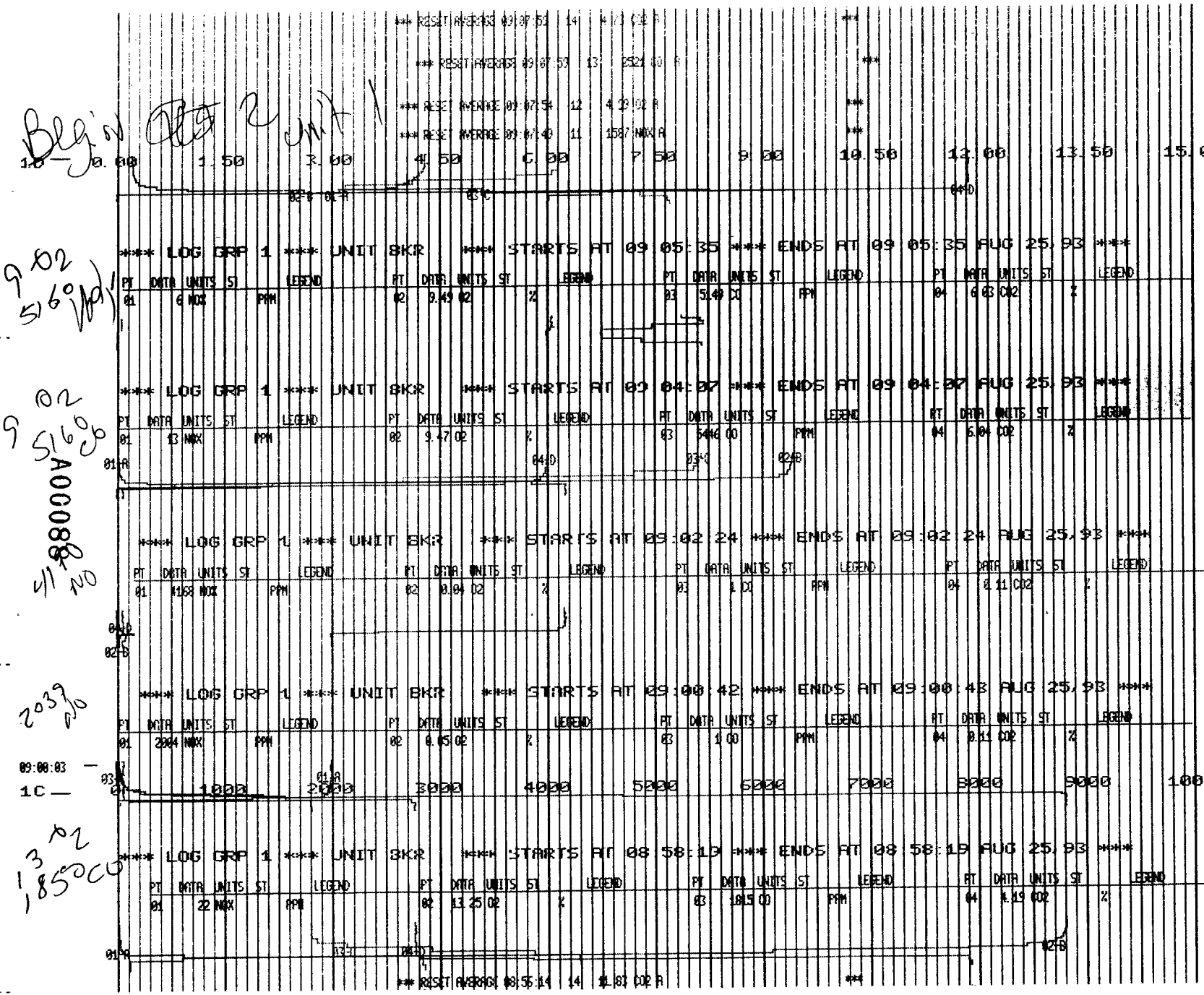
NOx 222


*** LOG GRP 1 *** UNIT BKR *** STARTS AT 08 25:06 *** ENDS AT 08 25:06 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 16 NOX PPM
02 13.28 02 %
03 1887 00 PPM
04 4.10 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 08 22:39 *** ENDS AT 08 22:40 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 4193 NOX PPM
02 0.09 02 %
03 2.00 PPM
04 0.04 CO2 %
1B 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 02
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 08 20:35 *** ENDS AT 08 20:36 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 2037 NOX PPM
02 0.09 02 %
03 2.00 PPM
04 0.03 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 08 16:55 *** ENDS AT 08 16:56 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 6 NOX PPM
02 2.37 02 %
03 5151 00 PPM
04 5.69 CO2 %
1A 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 NOX
Chart #1 Inlet
*** PRINTER ON 08:10:43 AUG 25,93 ***
*** PRINTER OFF 13:36 16 AUG 24,93 ***



*** RESET AVERAGE 08:56:14 13 4344 CO A ***
*** RESET AVERAGE 08:56:04 12 0.21 O2 A ***
*** RESET AVERAGE 08:56:04 11 2885 NOX A ***
1B — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 O2
1A — 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 NOX
*** RESET AVERAGE 08:41:10 14 6.14 CO2 A ***
*** RESET AVERAGE 08:41:10 13 4377 CO A ***
*** RESET AVERAGE 08:41:05 12 0.21 O2 A ***
*** RESET AVERAGE 08:41:00 11 2901 NOX A ***
08:37:21 11 0
08:37:16 11 *
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 08 36:33 *** ENDS AT 08 36:33 AUG 25,93 ***
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 4169 NOX PPM 02 0.07 O2 % 03 1 CO PPM 04 0.06 CO2 %
*** PRINTER ON 08:35:26 AUG 25,93 ***
*** PRINTER ON 08:32:25 AUG 25,93 ***

A00087



Begin Test 2 unit 1

*** RESET AVERAGE 09:07:51 14 4.73 CO2 A ***

*** RESET AVERAGE 09:07:53 13 2521 CO A ***

*** RESET AVERAGE 09:07:54 12 4.19 O2 A ***

*** RESET AVERAGE 09:07:40 11 1587 NOX A ***

1.0 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2

09:06:07 09 0

*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09 05:35 *** ENDS AT 09 05:35 AUG 25,93 ***

9 O2 5160 CO

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	6	NOX		PPM	02	9.49	O2		%	03	5149	CO		PPM	04	6.03	CO2		%

*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09 04:07 *** ENDS AT 09 04:07 AUG 25,93 ***

9 O2 5160 CO

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	13	NOX		PPM	02	9.47	O2		%	03	5446	CO		PPM	04	6.04	CO2		%

09:03:00 09 *

A00088

*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:02:24 *** ENDS AT 09:02:24 AUG 25,93 ***

4/1 NO

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	4168	NOX		PPM	02	0.04	O2		%	03	1	CO		PPM	04	0.11	CO2		%

*** LOG GRP 1 *** UNIT BKR *** STARTS AT 09:00:42 *** ENDS AT 09:00:43 AUG 25,93 ***

2039 NO

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	2004	NOX		PPM	02	0.05	O2		%	03	1	CO		PPM	04	0.11	CO2		%

09:00:03

1C 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 CO

08:58:47 09 0

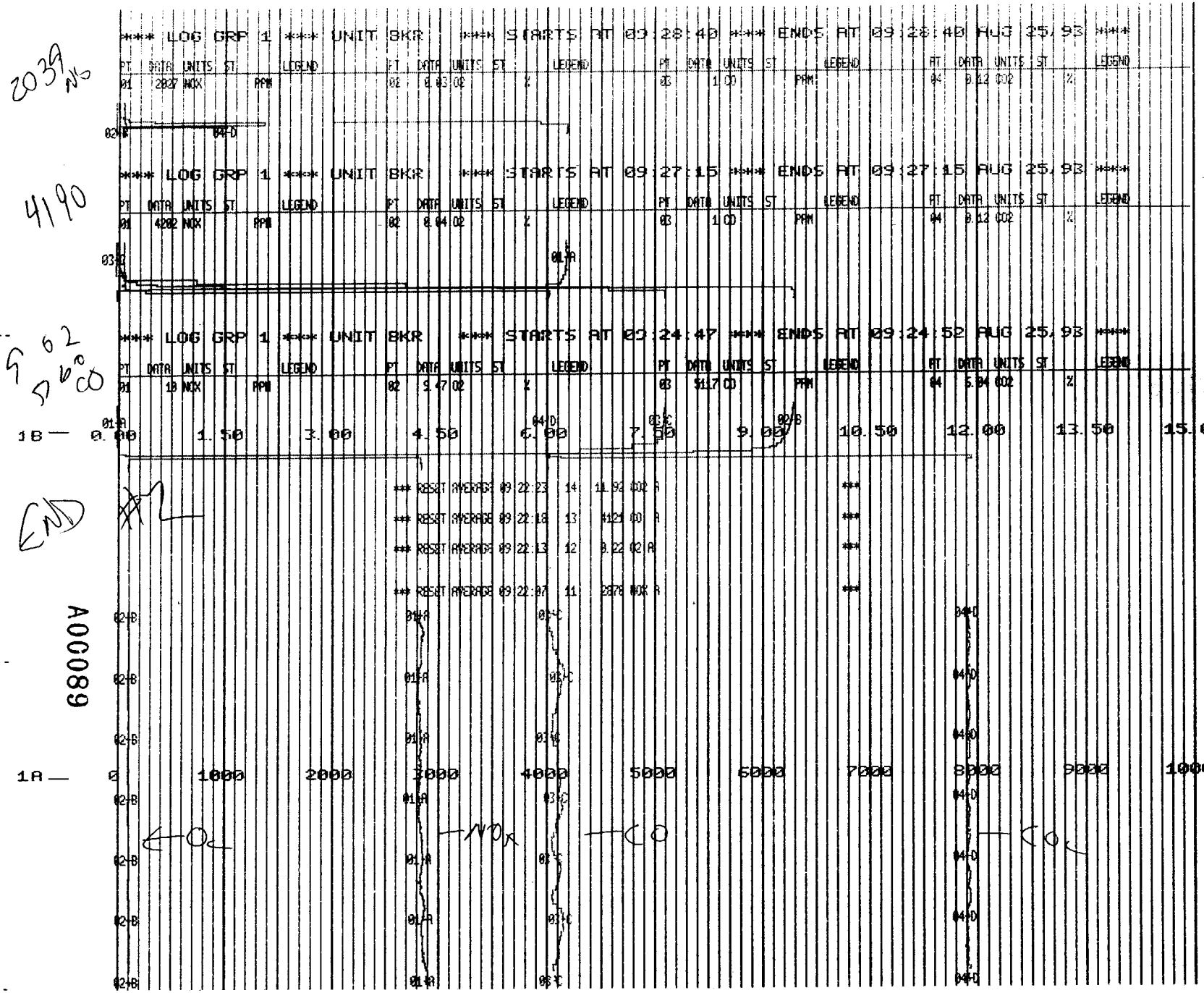
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 08 58:19 *** ENDS AT 08 58:19 AUG 25,93 ***

13 O2 1,850 CO

PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND	PT	DATA	UNITS	ST	LEGEND
01	22	NOX		PPM	02	13.25	O2		%	03	1815	CO		PPM	04	4.19	CO2		%

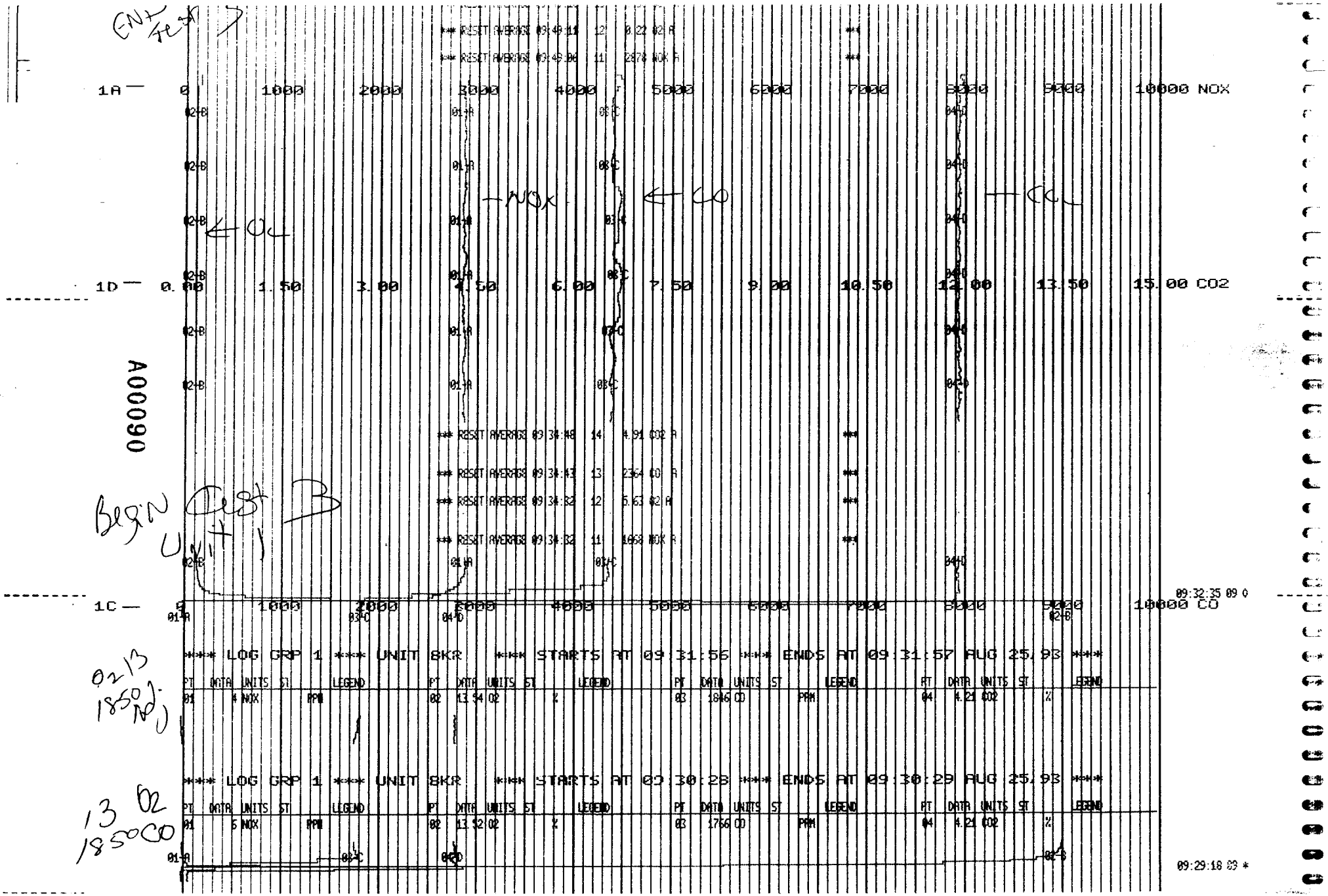
08:56:50 09 *

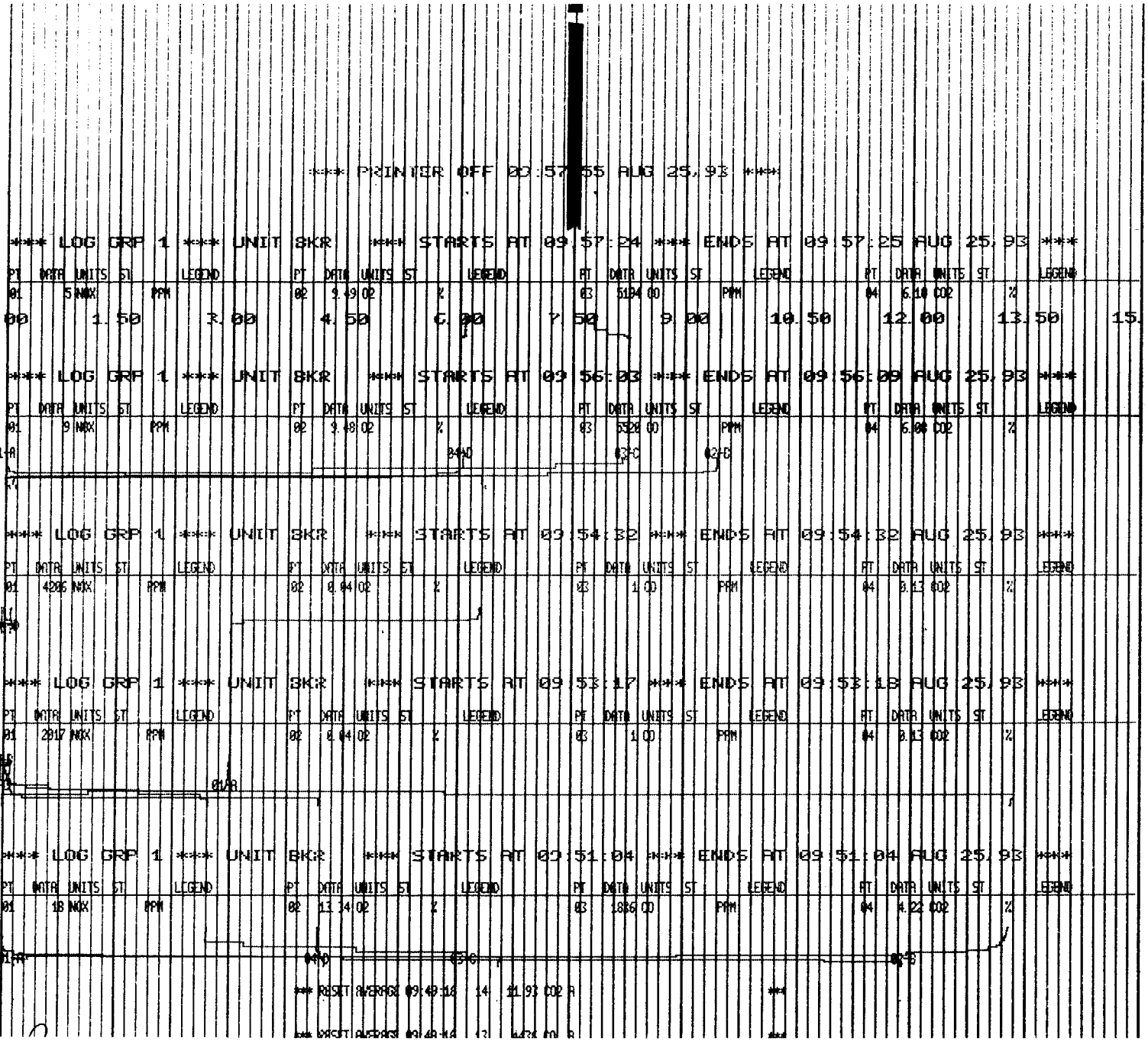
*** RESET AVERAGE 08:56:14 14 11.83 CO2 A ***

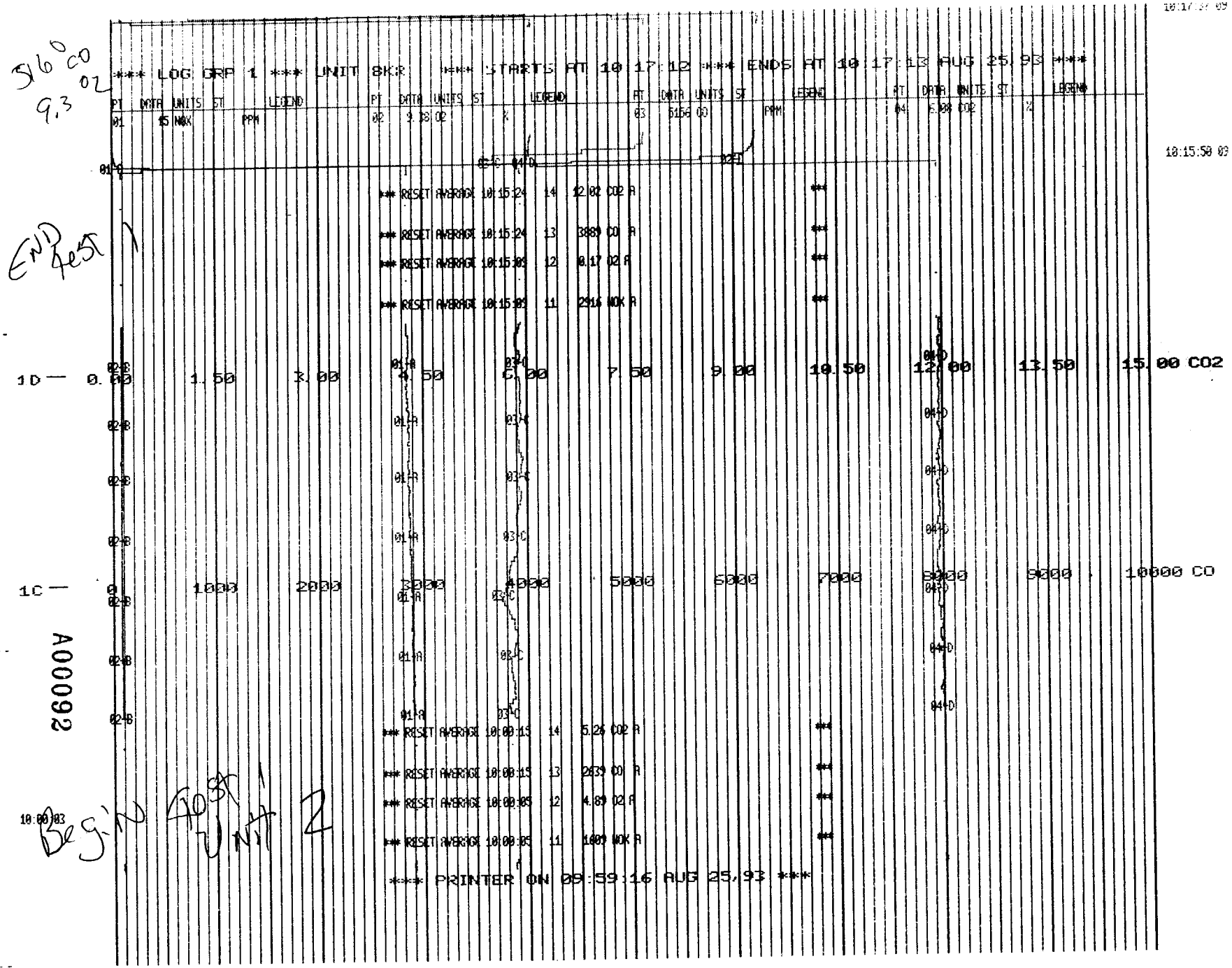


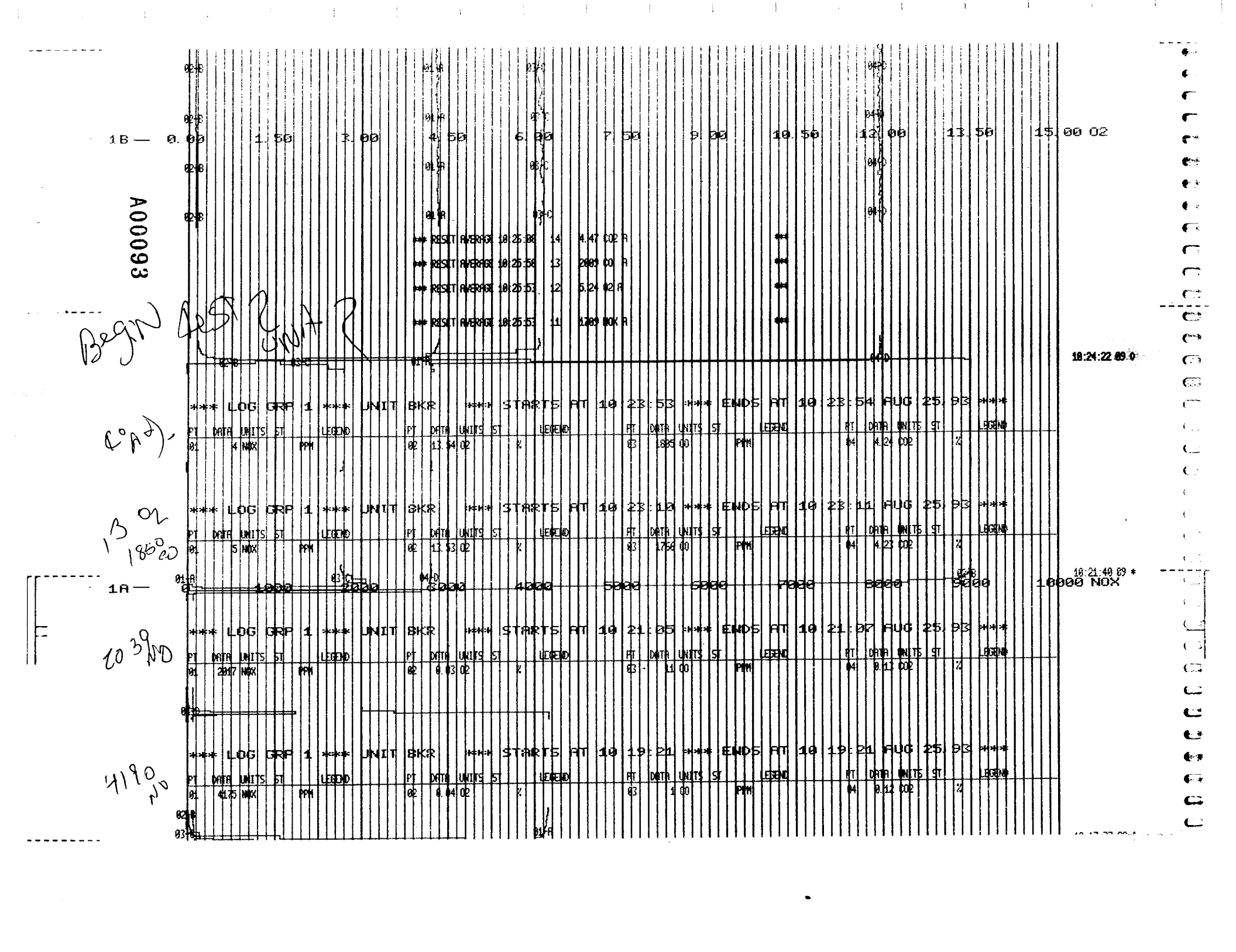
**** LOG GRP 1 **** UNIT BKR **** STARTS AT 09:28:40 **** ENDS AT 09:28:40 AUG 25,93 ****
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 2037 NOX PPM 02 8.03 O2 % 03 1 CO PPM 04 0.12 CO2 %
2039 NO
**** LOG GRP 1 **** UNIT BKR **** STARTS AT 09:27:15 **** ENDS AT 09:27:15 AUG 25,93 ****
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 4202 NOX PPM 02 8.04 O2 % 03 1 CO PPM 04 0.12 CO2 %
4190
09:25:15 09 0
**** LOG GRP 1 **** UNIT BKR **** STARTS AT 09:24:47 **** ENDS AT 09:24:52 AUG 25,93 ****
PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND PT DATA UNITS ST LEGEND
01 18 NOX PPM 02 9.47 O2 % 03 511.7 CO PPM 04 5.04 CO2 %
9.62
5.60 CO
1B — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 O2
09:22:53 09 *
*** RESET AVERAGE 09:22:23 14 11.92 CO2 A ***
*** RESET AVERAGE 09:22:18 13 4121 CO A ***
*** RESET AVERAGE 09:22:13 12 0.22 O2 A ***
*** RESET AVERAGE 09:22:07 11 2878 NOX A ***
END #2
1A — 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 NOX
← O2
— NOx
— CO
— CO2

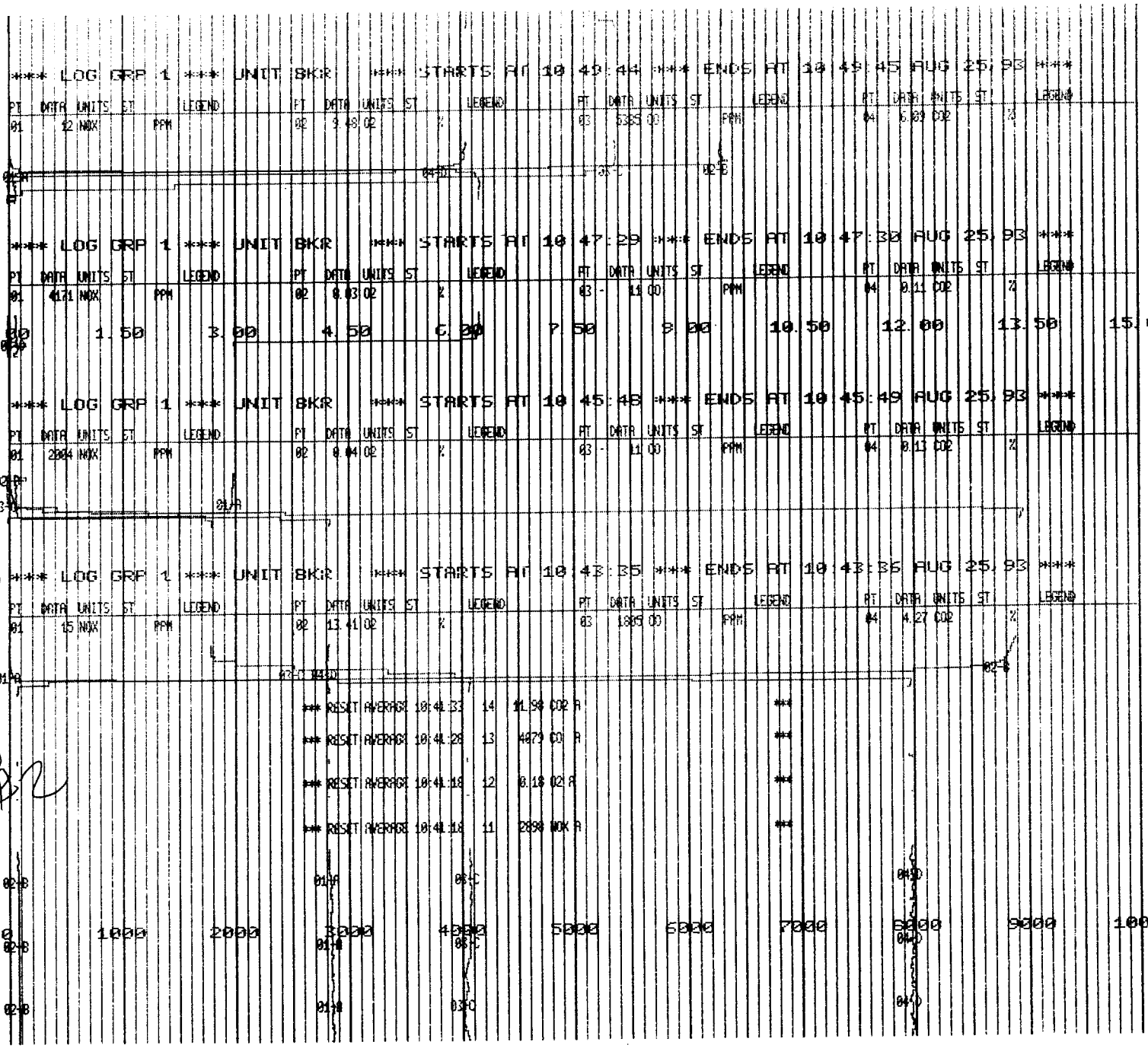
A00089

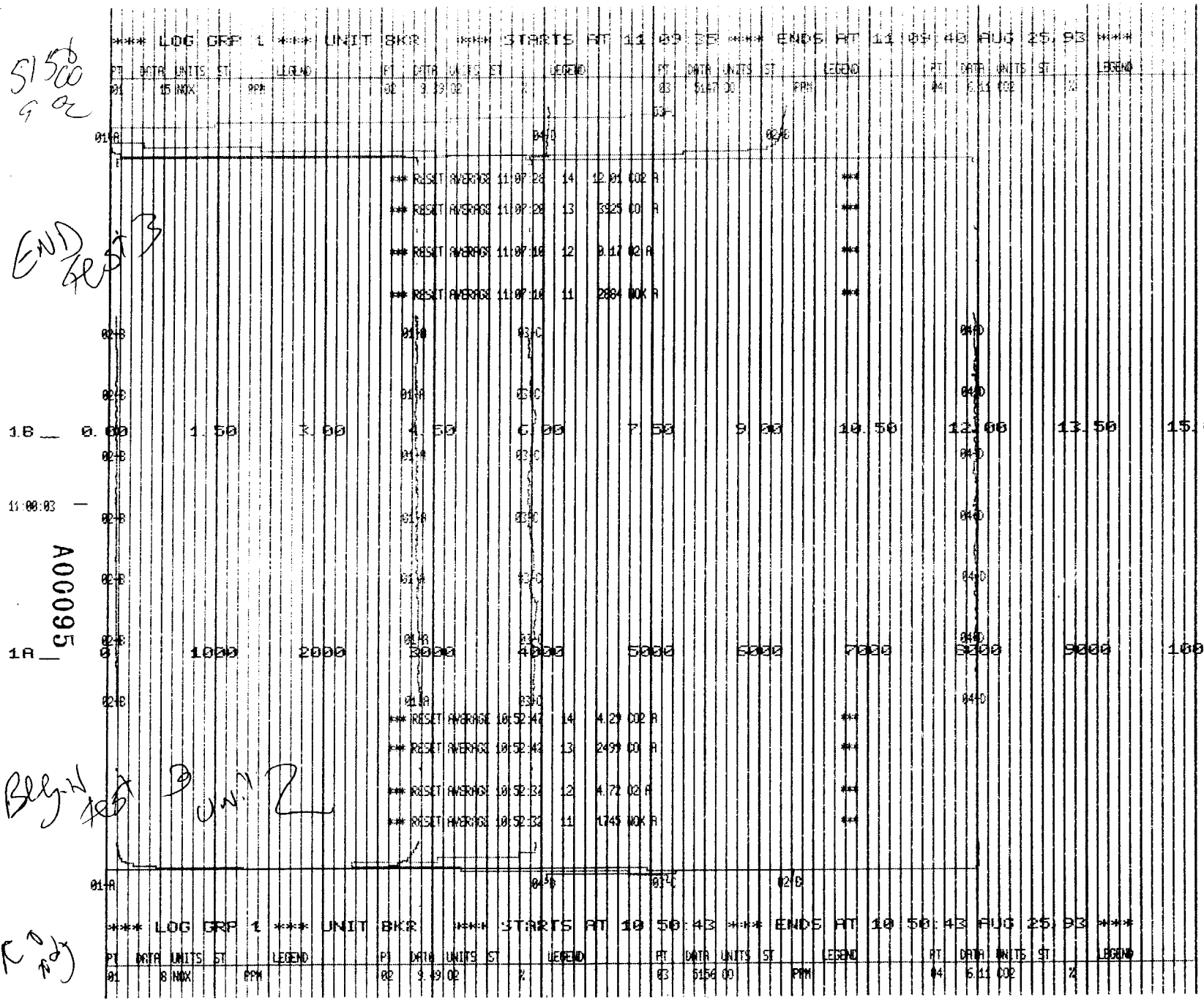

1A
1D
1C
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000 NOX
0.00
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 CO2
10000 CO
09:32:35 09 0
09:29:18 09 *
A00090
NOX
CO
CO2
**** LOG GRP 1 **** UNIT 8KR **** STARTS AT 09:31:56 **** ENDS AT 09:31:57 AUG 25,93 ****
PT DATA UNITS ST LEGEND
01 4 NOX PPM
02 13.34 O2 %
03 1846 CO PPM
04 4.21 CO2 %
**** LOG GRP 1 **** UNIT 8KR **** STARTS AT 09:30:28 **** ENDS AT 09:30:29 AUG 25,93 ****
01 5 NOX PPM
02 11.52 O2 %
03 1766 CO PPM
04 4.21 CO2 %


*** PRINTER OFF 09:57:55 AUG 25,93 ***
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 09:57:24 *** ENDS AT 09:57:25 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 5 MAX PPM
02 3.49 02 %
03 5104 CO PPM
04 6.10 CO2 %
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 02
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 09:56:03 *** ENDS AT 09:56:09 AUG 25,93 ***
01 9 MAX PPM
02 3.48 02 %
03 5320 CO PPM
04 6.08 CO2 %
09:55:06 09 *
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 09:54:32 *** ENDS AT 09:54:32 AUG 25,93 ***
01 4206 MAX PPM
02 0.04 02 %
03 1 CO PPM
04 0.13 CO2 %
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 09:53:17 *** ENDS AT 09:53:18 AUG 25,93 ***
01 2017 MAX PPM
02 0.04 02 %
03 1 CO PPM
04 0.13 CO2 %
09:51:28 09 0
*** LOG GRP 1 *** UNIT 8KR *** STARTS AT 09:51:04 *** ENDS AT 09:51:04 AUG 25,93 ***
01 18 MAX PPM
02 13.14 02 %
03 1886 CO PPM
04 4.22 CO2 %
09:49:42 09 *
*** RESET ALARMS 09:49:18 14 11.93 CO2 A ***

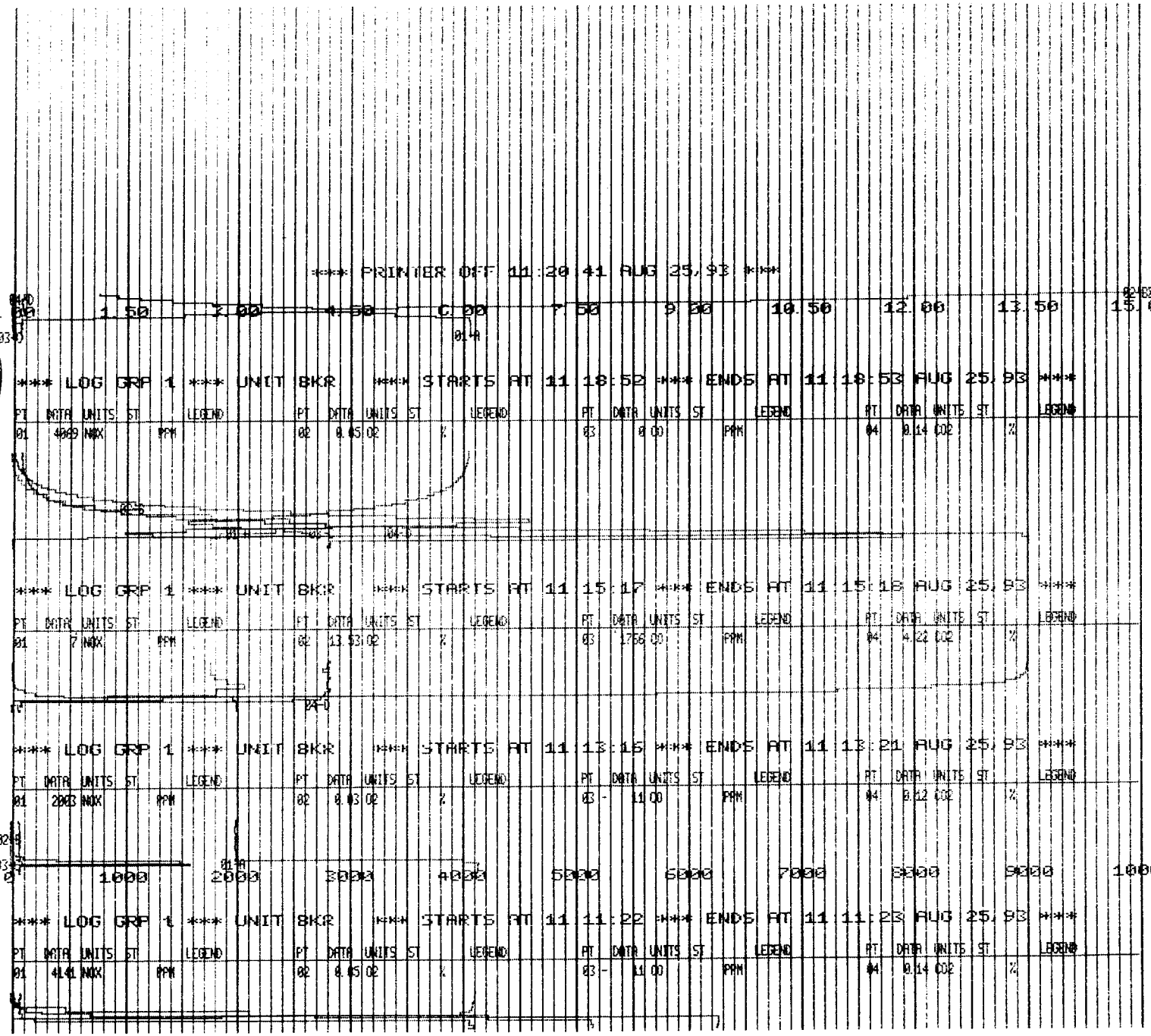

*** LOG GRP 1 *** UNIT 8K:R *** STARTS AT 10:17:12 *** ENDS AT 10:17:13 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 15 NOX PPM
02 9.38 O2 %
03 6156 CO PPM
04 5.08 CO2 %
*** RESET AVERAGE 10:15:24 14 12.02 CO2 A
*** RESET AVERAGE 10:15:24 13 3889 CO A
*** RESET AVERAGE 10:15:09 12 8.17 O2 A
*** RESET AVERAGE 10:15:09 11 2916 NOX A
*** RESET AVERAGE 10:00:15 14 5.26 CO2 A
*** RESET AVERAGE 10:00:15 13 2839 CO A
*** RESET AVERAGE 10:00:05 12 4.89 O2 A
*** RESET AVERAGE 10:00:05 11 1401 NOX A
*** PRINTER ON 09:59:16 AUG 25,93 ***
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
1C — 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 CO
10:00:03
10:15:58 03 *
A00092


A00093
1B — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 02
10:24:22 09 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 23:53 *** ENDS AT 10 23:54 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 4 NOX PPM
02 13.54 02 %
03 1885.00 PPM
04 4.24 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 23:10 *** ENDS AT 10 23:11 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 5 NOX PPM
02 13.53 02 %
03 1756.00 PPM
04 4.23 CO2 %
10:21:40 09 *
1A — 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 NOX
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 21:05 *** ENDS AT 10 21:07 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 2847 NOX PPM
02 0.03 02 %
03 11.00 PPM
04 0.11 CO2 %
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 19:21 *** ENDS AT 10 19:21 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 4175 NOX PPM
02 0.04 02 %
03 1.00 PPM
04 0.12 CO2 %
** RESET AVERAGE 10:25:00 14 4.47 CO2 A
** RESET AVERAGE 10:25:58 13 2000 CO A
** RESET AVERAGE 10:25:51 12 5.24 02 A
** RESET AVERAGE 10:25:53 11 1200 NOX A
Begin Test Unit A
Cond.
13 02
1850 CO
2039 NO
4190 NO


*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10:49:44 *** ENDS AT 10:49:45 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 12 NOX PPM
02 3.48 02 %
03 535 CO PPM
04 6.09 CO2 %
10:48:38 03 *
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10:47:29 *** ENDS AT 10:47:30 AUG 25,93 ***
01 411 NOX PPM
02 8.03 02 %
03 11 CO PPM
04 0.11 CO2 %
1D — 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 CO2
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10:45:48 *** ENDS AT 10:45:49 AUG 25,93 ***
01 2804 NOX PPM
02 8.04 02 %
03 11 CO PPM
04 0.11 CO2 %
10:44:00 03 0
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10:43:35 *** ENDS AT 10:43:36 AUG 25,93 ***
01 15 NOX PPM
02 13.41 02 %
03 1805 CO PPM
04 4.27 CO2 %
10:42:03 03 *
*** RESET AVERAGE 10:41:33 14 11.98 CO2 A
*** RESET AVERAGE 10:41:28 13 4479 CO A
*** RESET AVERAGE 10:41:18 12 8.18 02 A
*** RESET AVERAGE 10:41:18 11 2898 NOX A
1C — 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 CO
A0009400


*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11 09 28 *** ENDS AT 11 09 48 AUG 25, 93 ***
PT DATA UNITS ST LEGEND
01 15 NOX PPM
02 9.49 02 %
03 5157 00 PPM
04 5.11 CO2 %
*** RESET AVERAGE 11:09:28 14 12.01 CO2 A
*** RESET AVERAGE 11:09:28 13 3925 CO A
*** RESET AVERAGE 11:09:10 12 9.17 02 A
*** RESET AVERAGE 11:09:10 11 2884 NOX A
1B 0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50 12.00 13.50 15.00 02
11:09:03
1A 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 NOX
*** RESET AVERAGE 10:52:42 14 4.29 CO2 A
*** RESET AVERAGE 10:52:42 13 2499 CO A
*** RESET AVERAGE 10:52:32 12 4.72 02 A
*** RESET AVERAGE 10:52:32 11 1745 NOX A
10:51:15 09 0
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 10 50 43 *** ENDS AT 10 50 43 AUG 25, 93 ***
PT DATA UNITS ST LEGEND
01 8 NOX PPM
02 9.49 02 %
03 5156 00 PPM
04 5.11 CO2 %

A00095


*** PRINTER OFF 11:20:41 AUG 25,93 ***
1.50
3.00
4.50
6.00
7.50
9.00
10.50
12.00
13.50
15.00 CO2
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11:18:52 *** ENDS AT 11:18:53 AUG 25,93 ***
PT DATA UNITS ST LEGEND
01 4609 NOX PPM
02 0.65 O2 %
03 0.00 PPM
04 0.14 CO2 %
11:15:38 09 0
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11:15:17 *** ENDS AT 11:15:18 AUG 25,93 ***
01 7 NOX PPM
02 13.53 O2 %
03 1766.00 PPM
04 4.22 CO2 %
11:14:01 09 0
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11:13:16 *** ENDS AT 11:13:21 AUG 25,93 ***
01 2003 NOX PPM
02 0.03 O2 %
03 11.00 PPM
04 0.12 CO2 %
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000 CO
*** LOG GRP 1 *** UNIT BKR *** STARTS AT 11:11:22 *** ENDS AT 11:11:23 AUG 25,93 ***
01 414 NOX PPM
02 0.65 O2 %
03 11.00 PPM
04 0.14 CO2 %
11:10:03 09 0

NORTH

SPAN GASES STD JJ26243

	CONC	RT	AREA
C_1	20.87	.403	65926
C_2	20.47	.444	59458
C_3	19.75	.527	83096
C_4	20.01	.705	96454
C_5	20.12	1.09	113488
C_6	19.97		

NORTH

UNIT#1 TEST#1

C_1 $\frac{65926}{20.87} = \frac{97776}{x}$ = 30ppm

C_2^+ = <1

UNIT#1 TEST#2 107508 = 34ppm

C_1 $\frac{65926}{20.87} = \frac{18303}{x}$ = 5

C_2^+ = <1

UNIT#1 TEST#3 19417 = 6ppm

C_1 $\frac{65926}{20.87} = \frac{107508}{x}$ = 34 ppm

C_2 = <1

A00097

NORTH

UNIT #2 BAG #1 $\frac{14045}{} = 4.44$

C_1 $\frac{65926}{20.87} * \frac{19417}{X} = 6.15$

C_2^+ $= < 1$

UNIT #2 BAG #2 $\frac{18303}{} = 5$

C_1 $\frac{65926}{20.87} = \frac{56146}{X} = 17.77$

C_2^+ $= < 1$

UNIT #2 BAG #3 $\frac{56146}{} = 18$

C_1 $\frac{65926}{20.87} = \frac{14045}{X} = 4.44$

C_2^+ $= < 1$

PUP UNIT #2 BAG #1 $\frac{14045}{} = 4$

C_1 $\frac{65926}{20.87} = \frac{22691}{X} = 7,18$

C_2^+ $= < 1$ ppm

BLANK

C_1 $\frac{65926}{20.87} = \frac{100}{X} = .03$ ppm

SOUTH

	CONC	RT	AREA
C_1	20.87	.441	14139
C_2	20.47	.484	14103
C_3	19.75	.590	19066
C_4	20.01	.829	23028
C_5	20.12	1.37	27643
C_6	19.97		

UNIT #1 BAG #1

C_1 $\frac{14139}{20.87} = \frac{6635}{x}$ $= 9.8$

C_2 + $= 21$

UNIT #1 BAG #2

C_1 $\frac{14139}{20.87} = \frac{13675}{x}$ $= 20.18$

C_2 + $= 21$

UNIT #1 BAG #3

C_1 $= \frac{14139}{20.87} = \frac{264774}{x}$ $= 390$

C_2 $\frac{23028}{20.01} = \frac{418}{x}$ $= .37 \times 4 = 1.51$

A00099

SOUTH

UNIT #2 BAG #1

C_1 $\frac{14139}{20.87} = \frac{100497}{x}$ $= 148$

C_2+ $\frac{14103}{20.47} = \frac{1904}{x}$ $= 2.76 \times 2 = 5.52$

UNIT #2 BAG #2

C_1 $\frac{14139}{20.87} = \frac{157533}{x}$ $= 233$

C_2 $\frac{14103}{20.47} = \frac{2947}{x}$ $= 4.27 \times 2 = 8.55$

UNIT #2 BAG #3

C_1 $\frac{14139}{20.87} = 11625$ $= 17$

C_2+ $= 21$

A00100

```
*
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*
*QA

INVALID SYSTEM COMMAND

*


    ** LOOP DOWN: TIMEOUT **

 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUUWXYZ[\]^_'abcde
fghijklmnopqrstuuwxyz{|}~#:;<=>?@ABCDEFGHIJKLMNOPQRSTUUWXYZ[\]^_'abcde
```
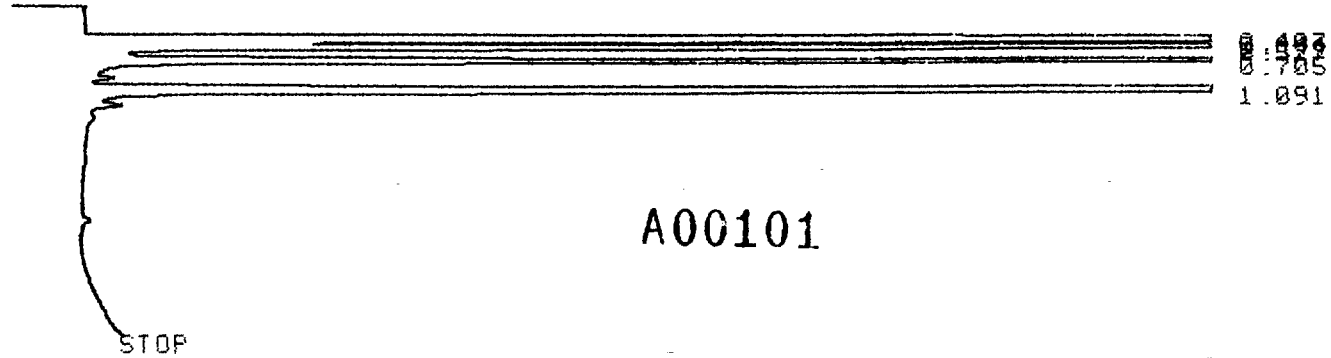

```
   Performing self test; unit will
  accept commands when KEYBD led is ON

    Model 3396B              Rev B.01.00  7/6/90
      Z80/HOST/INET/PP Rev = H/B/K/I w/ GC_02B


 Configuring, Wait for "LOOP UP" message

  **************( LOOP UP )**************


*  RUN #    1      JAN  1, 1901  00:20:24
START
```

JJ 26243

STD / SCC




```
RUN#      1           JAN  1, 1901  00:20:24
```

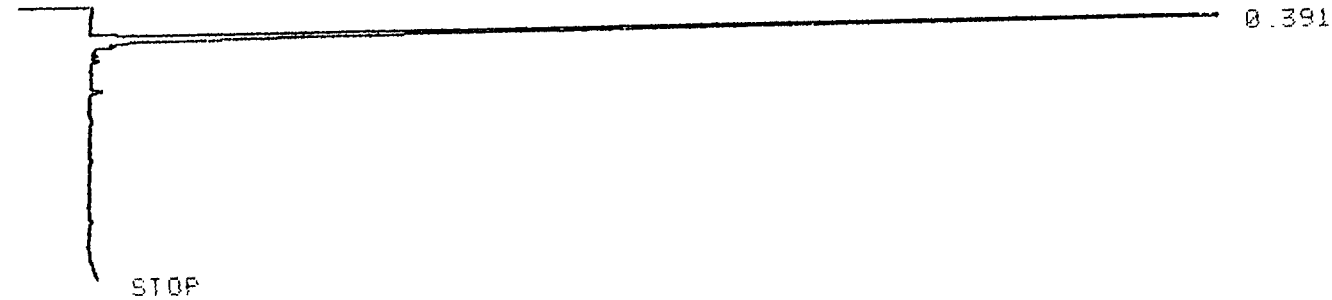
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.403	65926	PU	.042	15.75587
.444	59458	UU	.031	14.21006
.527	83096	UB	.036	19.85938
.705	96454	UB	.042	23.05185
1.091	113488	PB	.056	27.12286

TOTAL AREA= 418422
MUL FACTOR=1.0000E+00

.5cc
Unit #1
HC #1

* RUN # 2 JAN 1, 1901 00:26:05
START



RUN# 2 JAN 1, 1901 00:26:05

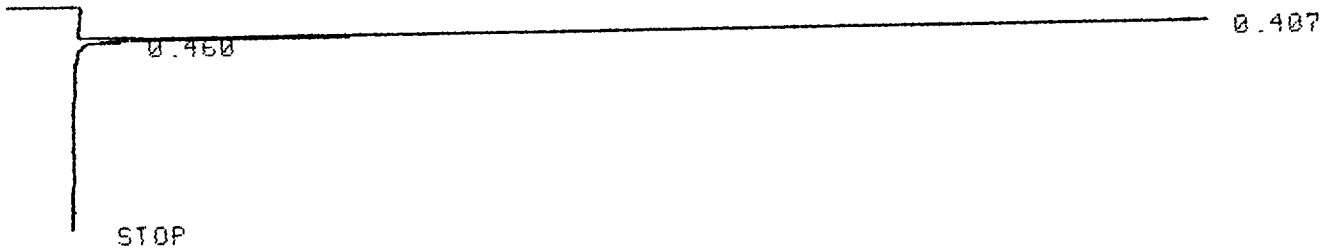
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.391	97776	PB	.017	100.00000

TOTAL AREA= 97776
MUL FACTOR=1.0000E+00

.5cc
Unit #2
HC #1

* RUN # 3 JAN 1, 1901 00:30:08
START



RUN# 3 JAN 1, 1901 00:30:08

AREA%

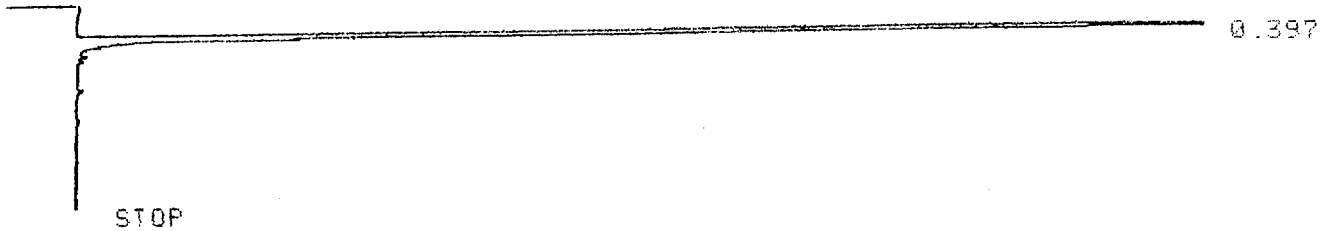
RT	AREA	TYPE	WIDTH	AREA%
.407	19417	PB	.011	100.00000

TOTAL AREA= 19417
MUL FACTOR=1.0000E+00

.5cc
Unit #1
HC #3

A00102

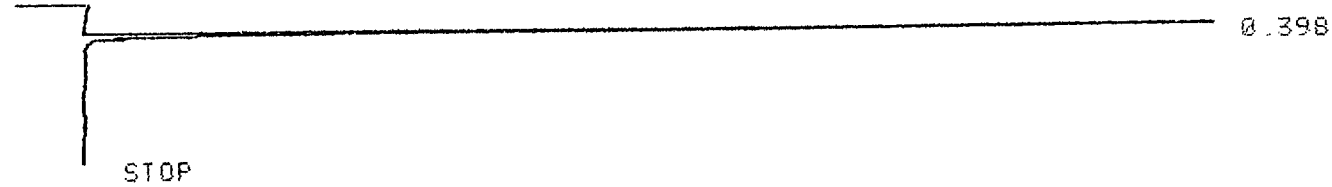
```
*  RUN #     4      JAN  1, 1901   00:33:39
START
```




```
RUN#      4           JAN  1, 1901   00:33:39

AREA%
       RT       AREA TYPE  WIDTH       AREA%
     .397     107508   BB    .015   100.00000

TOTAL AREA= 107508
MUL FACTOR=1.0000E+00
```

.15cc
Unit #1
Box #2

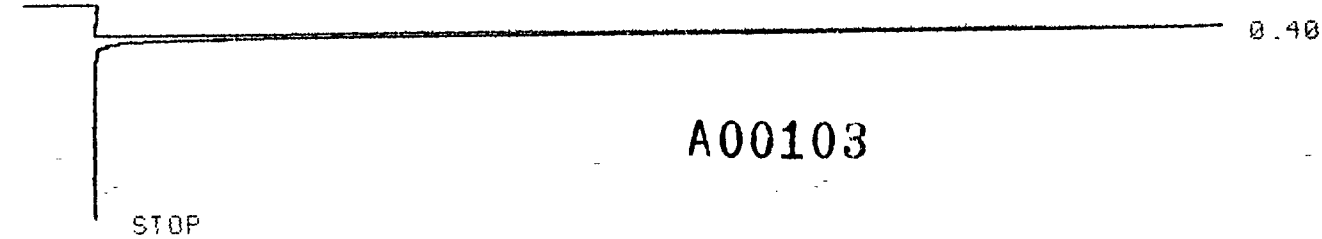
```
*  RUN #     5      JAN  1, 1901   00:36:41
START
```




```
RUN#      5           JAN  1, 1901   00:36:41

AREA%
       RT       AREA TYPE  WIDTH       AREA%
     .398      18303   BB    .011   100.00000

TOTAL AREA=  18303
MUL FACTOR=1.0000E+00
```

.5cc
Unit #2
Box #3

```
*  RUN #     6      JAN  1, 1901   00:39:19
START
```



RUN# 6 JAN 1, 1901 00:35:19

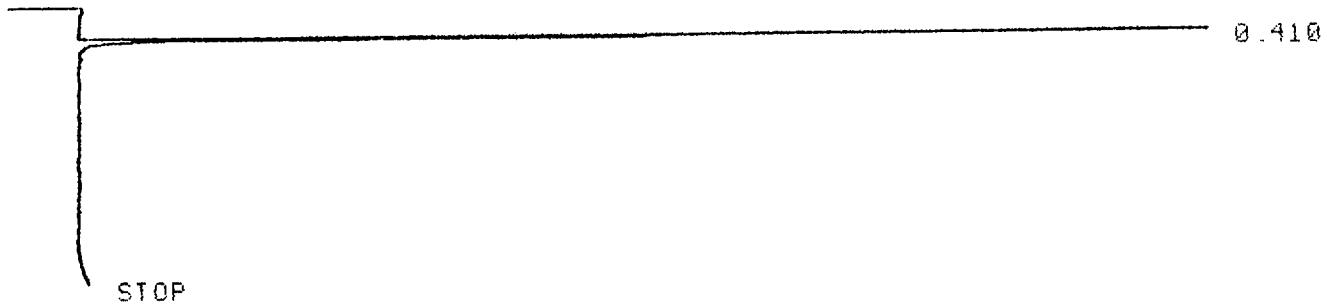
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.407	56146	PB	.014	100.00000

TOTAL AREA= 56146
MUL FACTOR=1.0000E+00

Chut #2
By #3

* RUN # 7 JAN 1, 1901 00:42:56
START



RUN# 7 JAN 1, 1901 00:42:56

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.410	14045	PB	.015	100.00000

TOTAL AREA= 14045
MUL FACTOR=1.0000E+00

Dup Chut #2
By 1

* RUN # 8 JAN 1, 1901 00:47:00
START

RUN# 8 JAN 1, 1901 00:47:00

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.403	22691	PB	.013	100.00000

TOTAL AREA= 22691
MUL FACTOR=1.0000E+00

Dup Chut

RUN# 9 JAN 1, 1901 00:48:56

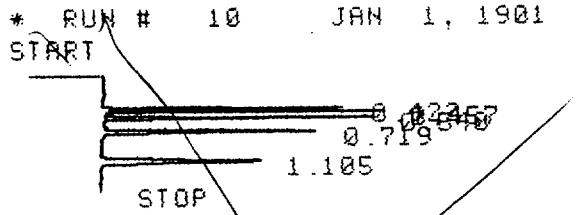
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.395	94844	PB	.017	100.00000

TOTAL AREA= 94844
MUL FACTOR=1.0000E+00

Std JJ26243

* RUN # 10 JAN 1, 1901 00:50:12



RUN# 10 JAN 1, 1901 00:50:12

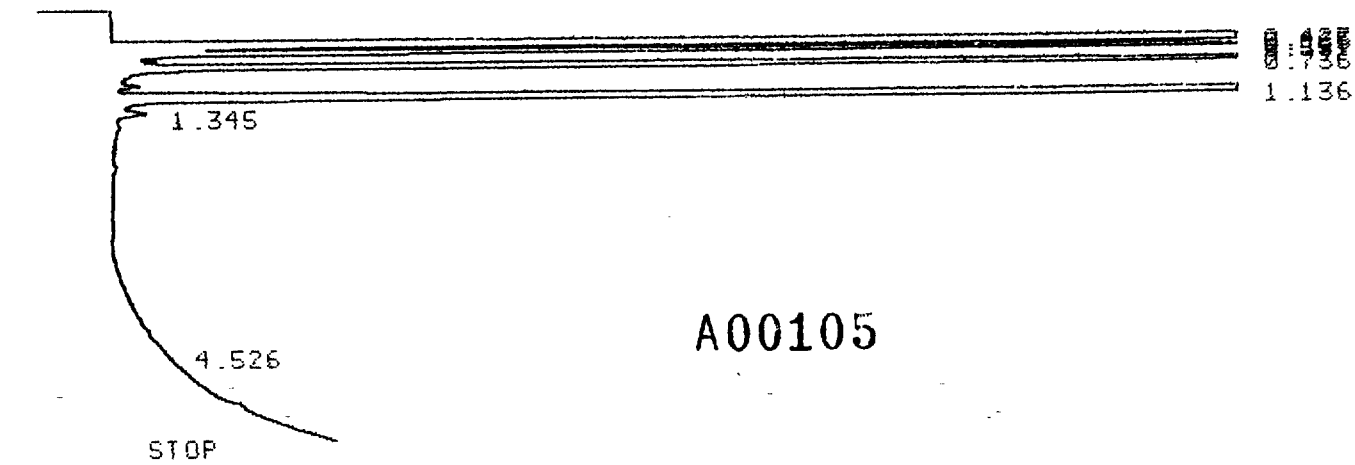
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.422	1580	BV	.015	14.02450
.457	1595	VB	.013	14.15765
.840	2233	BB	.019	19.82070
.719	2675	VB	.029	23.74401
1.105	3183	PP	.046	28.25314

TOTAL AREA= 11266
MUL FACTOR=1.0000E+00

Std JJ26243

* RUN # 11 JAN 1, 1901 00:52:05



A00105

RUN# 11 JAN 1, 1901 00:52:35

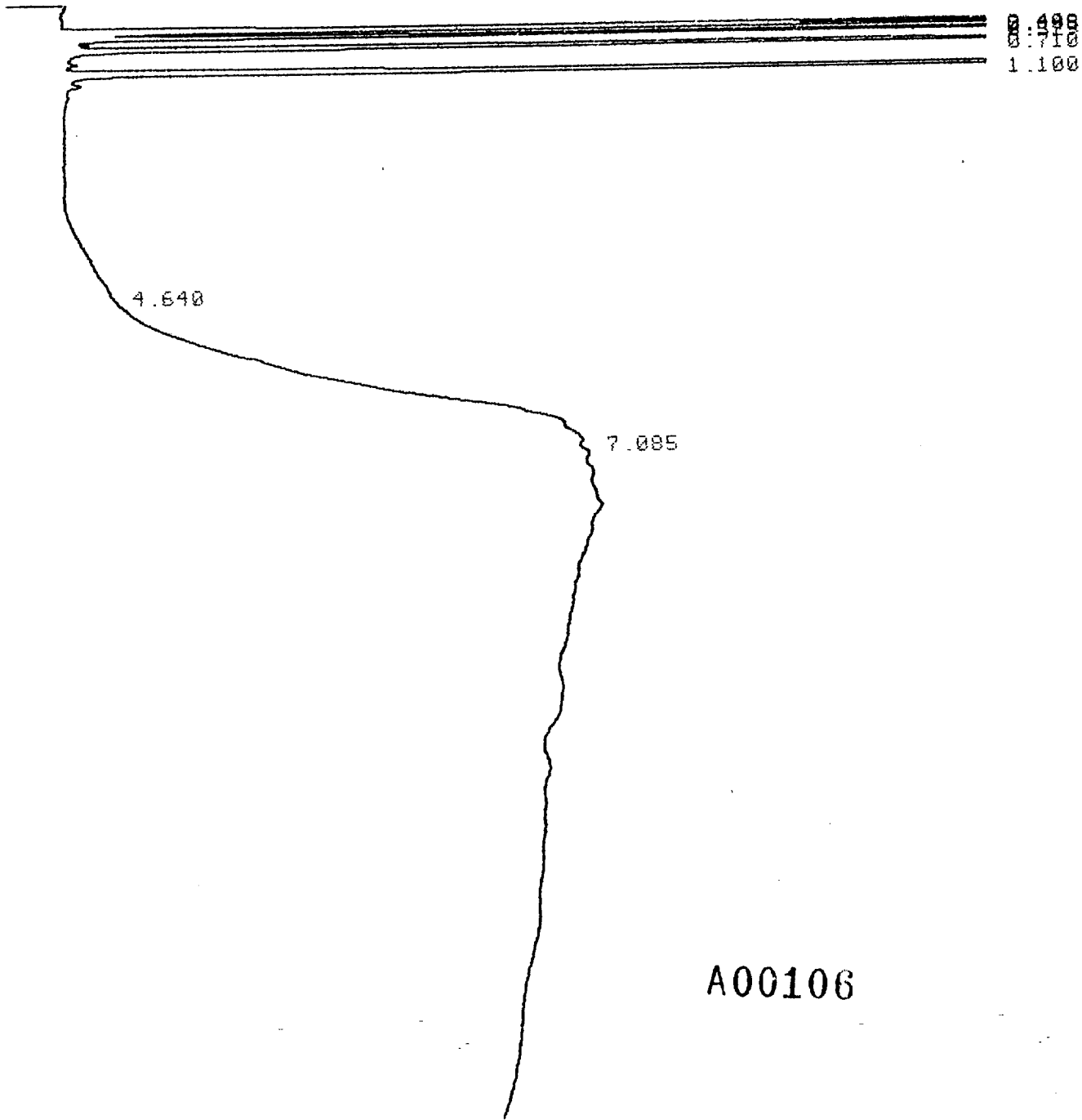
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.423	58065	PU	.036	14.57499
.465	58784	UU	.029	14.75547
.551	76552	UB	.031	19.21544
.736	89524	UB	.038	22.47156
1.136	104971	PB	.052	26.34894
1.345	556	BP	.055	.13956
4.526	9936	UU	.425	2.49405

TOTAL AREA= 398388
MUL FACTOR=1.0000E+00

57

* RUN # 12 JAN 1, 1901 00:58:51
START



A00106

STOP

RUN# 12 JAN 1, 1901 00:58:51

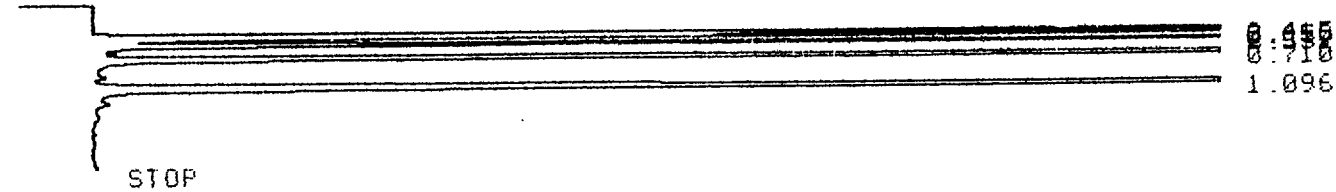
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.409	33934	PU	.032	10.69474
.445	34246	UU	.024	10.79308
.529	45387	UB	.028	14.30431
.710	53996	PB	.035	17.01754
1.100	64783	PB	.050	20.41722
4.640	423	PP	.470	.13331
7.085	84527	PU	.922	26.63980

TOTAL AREA= 317296
MUL FACTOR=1.0000E+00

STD
JS 26243

* RUN # 13 JAN 2, 1901 10:17:17
START



STOP

RUN# 13 JAN 2, 1901 10:17:17

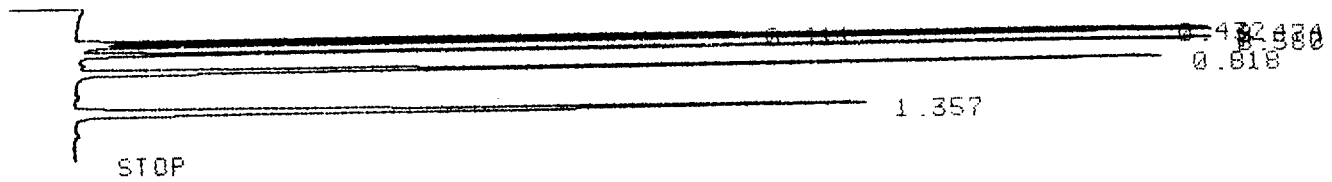
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.415	25234	PU	.032	14.57214
.450	25708	UU	.025	14.84587
.532	33975	UB	.027	19.61990
.710	40270	PB	.035	23.25514
1.096	47979	BB	.051	27.70694

TOTAL AREA= 173166
MUL FACTOR=1.0000E+00

A00107

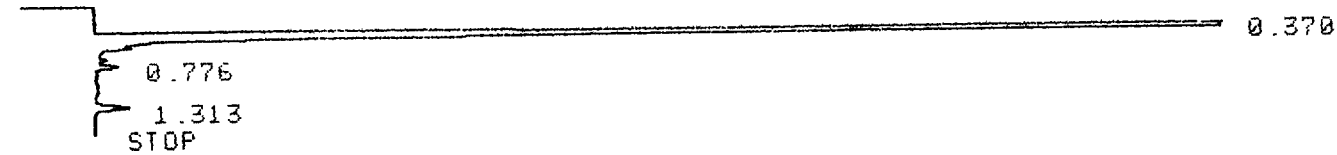
```
*  RUN #    14      JAN  2, 1901  10:19:48
START
```




```
RUN#    14           JAN  2, 1901  10:19:48

AREA%
      RT       AREA TYPE  WIDTH      AREA%
    .411       3326   PU   .012    4.73587
    .432       6942   UU   .013    9.88467
    .474      10041   UB   .016   14.29731
    .580      13702   PB   .023   19.51018
    .818      16511   PB   .036   23.50990
   1.357      19708   PB   .058   28.06209

TOTAL AREA=  70230
MUL FACTOR=1.0000E+00
```

South #1 Bar #3

```
*  RUN #    15      JAN  2, 1901  10:22:34
START
```

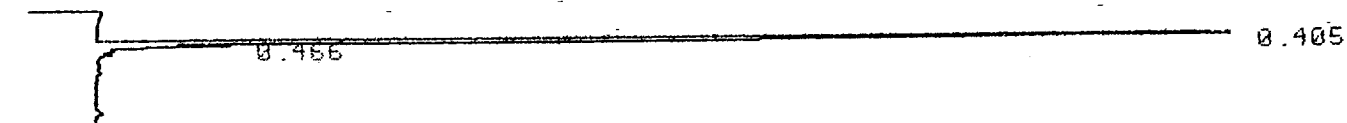



```
RUN#    15           JAN  2, 1901  10:22:34

AREA%
      RT       AREA TYPE  WIDTH      AREA%
    .370     264774   PB   .032   99.47552
    .776        418   PP   .046     .15704
   1.313        978   BP   .067     .36743

TOTAL AREA= 266170
MUL FACTOR=1.0000E+00
```

South Unit #2 Bar #1

A00108

```
*  RUN #    16      JAN  2, 1901  10:24:43
START
```



RUN# 16 JAN 2, 1901 10:24:43

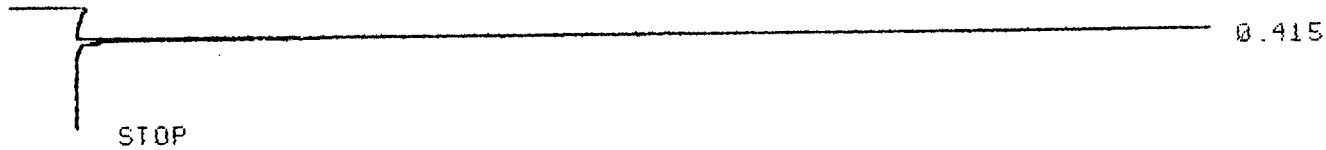
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.405	100497	PU	.017	98.14064
.466	1904	UU	.033	1.85936

TOTAL AREA= 102401
MUL FACTOR=1.0000E+00

South Unit #1 Box #2

* RUN # 17 JAN 2, 1901 10:26:58
START



RUN# 17 JAN 2, 1901 10:26:58

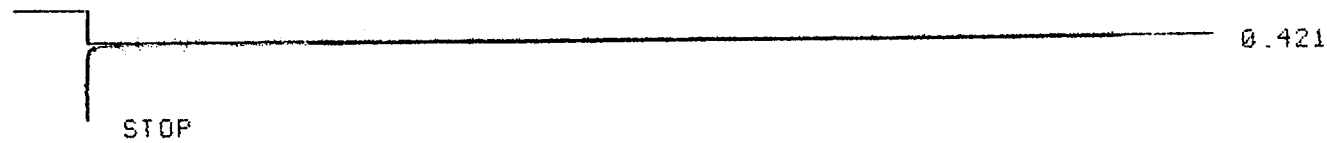
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.415	13675	PB	.011	100.00000

TOTAL AREA= 13675
MUL FACTOR=1.0000E+00

South Unit #1 Box #1

* RUN # 18 JAN 2, 1901 10:28:57
START



RUN# 18 JAN 2, 1901 10:28:57

AREA%

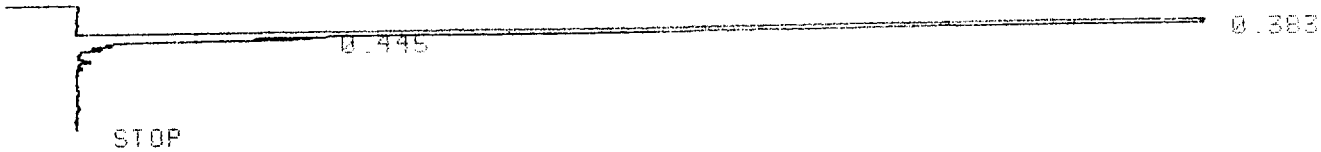
RT	AREA	TYPE	WIDTH	AREA%
.421	6635	PB	.012	100.00000

TOTAL AREA= 6635
MUL FACTOR=1.0000E+00

A00109

South Unit #2 Box #2

* RUN # 19 JAN 2, 1901 10:30:36



RUN# 19 JAN 2, 1901 10:30:36

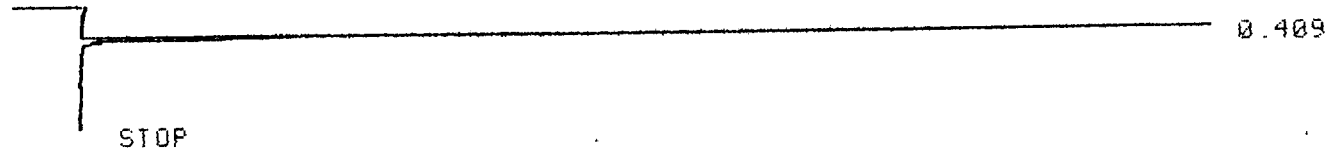
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.383	157533	PU	.019	98.16365
.445	2947	UU	.029	1.83637

TOTAL AREA= 160480
MUL FACTOR=1.0000E+00

South Unit #2 Bus #3

* RUN # 20 JAN 2, 1901 10:32:43
START



RUN# 20 JAN 2, 1901 10:32:43

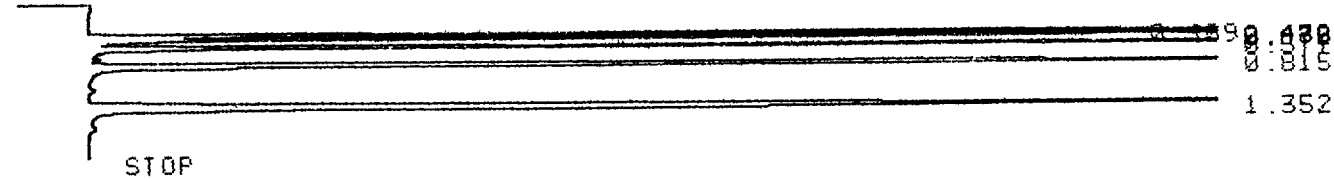
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.409	11625	PB	.011	100.00000

TOTAL AREA= 11625
MUL FACTOR=1.0000E+00

Std 0.5cc

* RUN # 21 JAN 2, 1901 10:34:40
START



RUN# 21 JAN 2, 1901 10:34:40

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.409	5850	PU	.013	4.66162
.430	12416	UU	.015	9.89378
.472	18112	UB	.018	14.43268
.577	24546	PB	.025	19.55966
.815	29524	PB	.037	23.52642
1.352	35045	PB	.060	27.92586

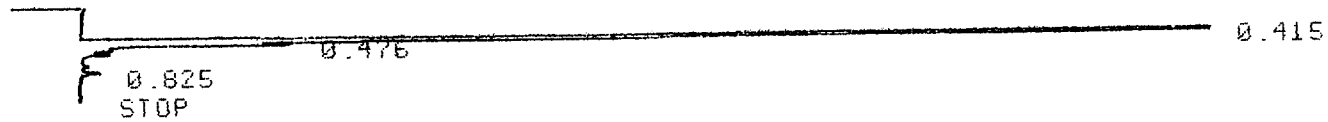
A00110

th Pup

TOTAL AREA= 125493
MUL FACTOR=1.0000E+00

Unit #1
Box #2

* RUN # 22 JAN 2, 1901 10:37:05
START



RUN# 22 JAN 2, 1901 10:37:05

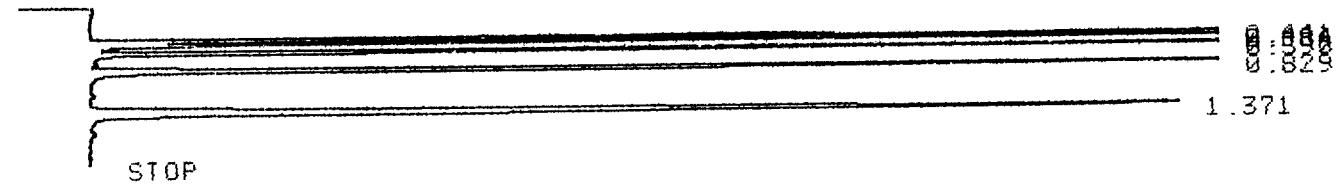
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.415	154235	PU	.021	98.05962
.476	2685	VU	.029	1.70707
.825	367	VP	.041	.23333

TOTAL AREA= 157287
MUL FACTOR=1.0000E+00

Std 0.5cc

* RUN # 23 JAN 2, 1901 10:38:42
START



RUN# 23 JAN 2, 1901 10:38:42

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.441	14139	PU	.023	14.43065
.484	14103	VB	.019	14.39390
.590	19066	BB	.025	19.45927
.829	23028	BB	.037	23.50300
1.371	27643	PB	.060	28.21319

TOTAL AREA= 97979
MUL FACTOR=1.0000E+00

A00111

*
*
*
*
*

FIELD DATA

PLANT Semitropic Water
DATE 8-24-93
SAMPLING LOCATION Unit #1
SAMPLE TYPE SO2
RUN NUMBER #1 - 30 min. run
OPERATOR Ty Hostetter
AMBIENT TEMPERATURE 102 inside
BAROMETRIC PRESSURE ~~30.00~~ 29.52
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

PROBE LENGTH AND TYPE
NOZZLE I.D.
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER Wood #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .010 cfm at 21" READ AND RECORD ALL DATA EVERY 15 MINUTES Post leak ✓ < .006 cfm at 21"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	~~1038~~	406.605									
	15	1053	413.010			0.45		98	106			
	30	1108	419.320			0.35		98	106			
			12.715			0.40			102			
			11.600									

A0011112

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA

PLANT Semi trophic Water
DATE 8-24-93
SAMPLING LOCATION Unit 2 Gas Inlet
SAMPLE TYPE SOz
RUN NUMBER #1 - 30 mid. run
OPERATOR Ty Hastnter
AMBIENT TEMPERATURE 102 (inside)
BAROMETRIC PRESSURE ~~30.00~~ 29.82
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

PROBE LENGTH AND TYPE
NOZZLE I.D.
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER Wool #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .006 cfm at 20" READ AND RECORD ALL DATA EVERY _____ MINUTES Postleak ✓ < .006 cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 ~~951~~	383.900									
	15 1006	394.830			1.00		102	102	1	NA	
	30 1021	406.100			0.90		104	104	1		
		22.200			0.95			103			
		20.245									

COMMENTS:

AOC112

EPA (Dur) 235
4-72

FIELD DATA REDUCTION

SITE: Semi-Tropic Water Storage
DATE: August 24, 1993
UNIT: North Cogen #1 - Gas Line
TEST: SO2

GAS METER READING	ORIFICE PRESSURE DELTA H	DRY GAS METER TEMPERATURE	
406.605	0.45	98	106
419.320	0.35	98	106
12.715			
(DIFFERENCE)	0.40		102

SITE: Semi-Tropic Water Storage
DATE: August 24, 1993
UNIT: North Cogen #2 - Gas Line
TEST: SO2

GAS METER READING	ORIFICE PRESSURE DELTA H	DRY GAS METER TEMPERATURE	
383.900	1.00	102	102
406.100	0.90	104	104
22.200			
(DIFFERENCE)	0.95		103

FIELD DATA

PLANT Semitropic Water
DATE 8-25-93
SAMPLING LOCATION Unit #1 Gas Line
SAMPLE TYPE SO2
RUN NUMBER #1 - 30 min run
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 88
BAROMETRIC PRESSURE ~~30.01~~ 29.90
STATIC PRESSURE, (P_s) ———
FILTER NUMBER (s) ———

Imp. Train
1 - IPA
2 - Blank
3 - H_2O_2 (3%)
4 - Silica Gel

10 min purge at end of test!

PROBE LENGTH AND TYPE ———
NOZZLE I.D. ———
ASSUMED MOISTURE, % ———
SAMPLE BOX NUMBER ———
METER BOX NUMBER Wood #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR ———
PROBE HEATER SETTING ———
HEATER BOX SETTING ———
REFERENCE Δp ———

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak < .006 cfm at 20" READ AND RECORD ALL DATA EVERY ——— MINUTES Postleak < .005 cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 935	463.200									
	11 946	468.725			0.70		87	89		NA	64
	30 1005	478.010			0.45		88	90			62
		14.285			.57			89			
		V_{mSTP} 13.346									

AOC110

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA

PLANT Semitropic Water
DATE 8-25-93
SAMPLING LOCATION Unit #2
SAMPLE TYPE SO2
RUN NUMBER #1 - 30 min run
OPERATOR Ty Nostriter
AMBIENT TEMPERATURE 94 inside
BAROMETRIC PRESSURE ~~30.01~~ 29.50
STATIC PRESSURE, (P_s) ——
FILTER NUMBER (s) ——

Same imp. train set up as before

✓10 min posttest purge

PROBE LENGTH AND TYPE ——
NOZZLE I.D. ——
ASSUMED MOISTURE, % ——
SAMPLE BOX NUMBER ——
METER BOX NUMBER WOOD #83
METER $\Delta H_@$ #21 (0-2")
C FACTOR ——
PROBE HEATER SETTING ——
HEATER BOX SETTING ——
REFERENCE Δp ——

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ <.005 cfm at 20"

READ AND RECORD ALL DATA EVERY _____ MINUTES

Postleak ✓ <.006 cfm at 20"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1032	483.400									
	15	1047	489.415			0.30		94	94		N/A	62
	30	1102	495.390			0.30		92	94		↓	62
			11.990			0.30		94				
			$V_{m\,std}$ 11.094									

A00116

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA REDUCTION

SITE: Semi-Tropic Water Storage
DATE: August 25, 1993
UNIT: South Cogen #1 - Gas Line
TEST: SO2

GAS METER READING	ORIFICE PRESSURE DELTA H	DRY GAS METER TEMPERATURE	
463.725	0.70	87	89
478.010	0.43	88	90
14.285			
(DIFFERENCE)	0.57		89

SITE: Semi-Tropic Water Storage
DATE: August 25, 1993
UNIT: South Cogen #2 - Gas Line
TEST: SO2

GAS METER READING	ORIFICE PRESSURE DELTA H	DRY GAS METER TEMPERATURE	
483.400	0.30	94	94
495.390	0.30	92	94
11.990			
(DIFFERENCE)	0.30		94

Semitool: Wafer Post

Std = 2ml .490 mg/ml H_2SO_4
Vt = 23 ml

North #1
IPA
Vm 100ml
Va - 20ml
Vt = 0.05

H_2O_2
Vm 240
Va 20
Vt - .6

North #2
IPA
Vm = 150
Va = 20
Vt = 0.10

H_2O_2 Dup
Vm = 130
Va = 20 20
Vt = .9 0.85

South #1
IPA
Vm 180
Va 20 20
Vt .05 .05

H_2O_2 Dup
Vm 205
Va 20 20
Vt 0.60 0.60

Blank
20ml DI H_2O
Vt = 0.05

South #2
IPA
Vm 160
Va 20
Vt 0.10

H_2O_2
Vm 215
Va 20
Vt 0.6

A00118

WESTERN ENVIRONMENTAL SERVICES

APPENDIX B

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE: 01/27/93

CUSTOMER ORDER NUMBER: 92-10-31-E

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC119785	Nitrogen Dioxide	44.6 ± 0.9 ppm	SRM 2627
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: Steve Kozy
S.B. Kozy

Approved:
J.T. Marrin

B00001

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE: 06/03/93

CUSTOMER ORDER NUMBER: 22532

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC108754	Nitrogen Dioxide Nitrogen	20.32 ± 0.41 ppm Balance	SRM 1685b

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: B.E. Gross

Approved: J.T. Marrin

B00002

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

SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

WEESØ1

TO:

TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1Ø1Ø S PACIFIC COAST HWY
REDONDO BEACH, CA 9Ø277-

DATE: Ø6/Ø3/93

CUSTOMER ORDER NUMBER: 16884

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CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
JJ31292	Nitrogen Dioxide Nitrogen	18.55 ± Ø.37 ppm Balance	SRM 1685b

ppm = umole/mole   % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.Ø9/2Ø2491.

Analyst: B.E. Gross

Approved: J.T. Marrin

B00003

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

SCOTT - MARRIN, INC. 6531 BOX SPRINGS BLVD. RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: 10197

CYLINDER NUMBER CC114743

COMPONENT	CONCENTRATION (v/v)
Oxygen	13.43 ± 0.13 Mole-%
Carbon Dioxide	4.22 ± 0.04 Mole-%
Nitrogen	Balance

Cylinder Pressure: 2000 psig

Replicate	07/17/92	13.42 Mole-%
Analysis		13.44 Mole-%
Data On		13.44 Mole-%
O_2:	Mean	13.43 Mole-%

Expiration Date O_2: 01/17/94

Replicate	07/14/92	4.20 Mole-%
Analysis		4.23 Mole-%
Data On		4.22 Mole-%
CO_2:	Mean	4.22 Mole-%

Expiration Date CO_2: 01/14/94

(The Oxygen analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC12233 at 23.88 Mole-% Oxygen in Nitrogen. The analysis was performed using a Varian Model 1860 gas chromatograph with thermal conductivity detection. The last multipoint calibration was performed 07/21/92.)

(The Carbon Dioxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC88828 at 3.99 Mole-% Carbon Dioxide in Nitrogen. The analysis was performed using a Varian Model 1860 gas chromatograph with thermal conductivity detection. The last multipoint calibration was performed 06/18/92.)

SCOTT-MARRIN, INC.
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TELEPHONE (909) 653-6780 • FAX (909) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 05/10/93

CUSTOMER ORDER NUMBER: 16883

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	LL2343					
			Carle Insts Model 8000		04/15/93	04/28/93
Carbon Monoxide	45.9 ± 0.5 ppm	GMIS	S/N 8249	04/28/96	45.9 ppm	45.9 ppm
		Cylinder #	Methanation/FID		45.8 ppm	45.8 ppm
Nitrogen	Balance	CC12564	Gas Chromatography		45.9 ppm	45.9 ppm
Cylinder Pressure: 2000 psig		@ 42.2 ppm	Last Cal Date: 03/09/93		Mean: 45.9 ppm	45.9 ppm
CYLINDER NO.:	CC105456					
			Varian Model 1860		04/26/93	
Oxygen	9.55 ± 0.10 %	GMIS	S/N None	04/26/96	9.54 %	
		Cylinder #	Thermal Conductivity		9.56 %	
		CC62350	Gas Chromatography		9.54 %	
		@ 9.63 %	Last Cal Date: 03/15/93		Mean: 9.55 %	
			Varian Model 1860		04/28/93	
Carbon Dioxide	7.08 ± 0.07 %	GMIS	S/N None	04/28/96	7.08 %	
		Cylinder #	Thermal Conductivity		7.07 %	
Nitrogen	Balance	CC28297	Gas Chromatography		7.09 %	
Cylinder Pressure: 2000 psig		@ 7.40 %	Last Cal Date: 04/06/93		Mean: 7.08 %	

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: _____ Approved: _____

M.S. Calhoun B00005 J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 06/24/93

CUSTOMER ORDER NUMBER: 16887

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	JJ14738				
Oxygen	5.02 ± 0.05 %	GMIS	Varian Model 1860		06/23/93
		Cylinder #	S/N None	06/23/96	5.00 %
		CC81219	Thermal Conductivity		5.01 %
		@ 5.15 %	Gas Chromatography		5.04 %
			Last Cal Date: 07/09/93		Mean: 5.02 %
Carbon Dioxide	12.49 ± 0.12 %	GMIS	Varian Model 1860		06/15/93
		Cylinder #	S/N None	06/15/96	12.48 %
Nitrogen	Balance	CC42667	Thermal Conductivity		12.50 %
Cylinder Pressure: 2000 psig		@ 17.60 %	Gas Chromatography		12.50 %
			Last Cal Date: 04/08/93		Mean: 12.49 %

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: M.S. Calhoun

Approved: J.T. Marrin

B00006

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 08/18/93

CUSTOMER ORDER NUMBER: 16892

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC116736				
Oxygen	8.92 ± 0.09 %	GMIS Cylinder # CC62350 @ 9.63 %	Varian Model 1860 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 07/01/93	07/29/96	07/29/93 _____ 8.97 % 8.90 % 8.89 % Mean: 8.92 %
Carbon Dioxide	10.37 ± 0.10 %	GMIS Cylinder # CC42667 @ 17.62 %	Varian Model 1860 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 08/10/93	08/02/96	08/02/93 _____ 10.37 % 10.37 % 10.36 % Mean: 10.37 %
Nitrogen	Balance				
Cylinder Pressure: 2000 psig					
CYLINDER NO.:	JJ23019				
Oxygen	9.34 ± 0.09 %	GMIS Cylinder # CC62350 @ 9.63 %	Varian Model 1860 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 07/01/93	07/29/96	07/29/93 _____ 9.37 % 9.39 % 9.26 % Mean: 9.34 %
Carbon Dioxide	5.95 ± 0.06 %	GMIS Cylinder # CC28297 @ 7.41 %	Varian Model 1860 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 08/10/93	08/02/96	08/02/93 _____ 5.95 % 5.95 % 5.95 % Mean: 5.95 %
Nitrogen	Balance				
Cylinder Pressure: 2000 psig					

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: _____
M.S. Calhoun

Approved: _____
J.T. Marrin

B00007

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

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 03/26/93

CUSTOMER ORDER NUMBER: 16880

PAGE 1

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	JJ14705					
			Varian Model 1200		03/16/93	03/25/93
Carbon Monoxide	5160 ± 52 ppm	GMIS	S/N None	03/25/96	5170 ppm	5180 ppm
		Cylinder #	Methanation/FID		5190 ppm	5150 ppm
Nitrogen,O2-Free Balance		CC7245	Gas Chromatography		5110 ppm	5140 ppm
Cylinder Pressure: 2000 psig		@ 5050 ppm	Last Cal Date: 03/02/93		Mean: 5160 ppm	5160 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Steve Kozy
S.B. Kozy

Approved:
B00008 J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 PACIFIC COAST HWY SO
REDONDO BEACH, CA 90277-

DATE : 01/11/92

CUSTOMER ORDER NUMBER: 22524

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: MM11503						
			Varian Model 1200		12/23/92	01/06/93
Carbon Monoxide	1850 ± 19 ppm	GMIS	S/N None	01/06/96	1845 ppm	1855 ppm
		Cylinder #	Methanation/FID		1844 ppm	1851 ppm
Nitrogen	Balance	CC91344	Gas Chromatography		1853 ppm	1851 ppm
Cylinder Pressure: 2000 psig		@ 2521 ppm	Last Cal Date: 11/17/92		Mean: 1847 ppm	1852 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Steve Kozy
S.B. Kozy

Approved: B00009
J.T. Marrin

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

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS

TO: WEESØ1
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH CA 90277

DATE: 5 February 1993

CUSTOMER ORDER NUMBER: 16880/Reanalysis

CYLINDER NUMBER MM9915

COMPONENT	CONCENTRATION (v/v)
Carbon Monoxide	935 ± 9 ppm
Nitrogen	Balance

Cylinder Pressure: 1200 psig

Replicate	02/05/93	943 ppm
Analysis		938 ppm
Data On		943 ppm
CO:	Mean	941 ppm

Expiration Date CO: 02/05/96

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparion with GMIS, cylinder number CC67219 at 1089 ppm Carbon Monoxide in Nitrogen. The analysis was performed using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization detection. The last multipoint calibration was performed 11/17/92.)

ANALYST Mark Monson
M.J. Monson

APPROVED
J.T. Marrin

B00010

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:

DATE : 01/11/93

TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 PACIFIC COAST HWY SO
REDONDO BEACH, CA 90277-

CUSTOMER ORDER NUMBER: 22518

PAGE 1

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: JJ14169						
			Carle Insts Model 8000		12/08/92	12/23/92
Carbon Monoxide	466 ± 5 ppm	GMIS	S/N 8249	12/23/95	464 ppm	465 ppm
		Cylinder #	Methanation/FID		470 ppm	464 ppm
Nitrogen	Balance	CC28362	Gas Chromatography		467 ppm	463 ppm
Cylinder Pressure: 2000 psig		@ 495 ppm	Last Cal Date: 11/27/92		Mean: 467 ppm	464 ppm
CYLINDER NO.: JJ14679						
			Carle Insts Model 8000		12/01/92	12/08/92
Carbon Monoxide	229.1 ± 2.3 ppm	GMIS	S/N 8249	12/08/95	229.1 ppm	229.4 ppm
		Cylinder #	Methanation/FID		228.8 ppm	229.6 ppm
Nitrogen	Balance	CC87840	Gas Chromatography		229.9 ppm	228.7 ppm
Cylinder Pressure: 2000 psig		@ 276.8 ppm	Last Cal Date: 11/27/92		Mean: 229.0 ppm	229.2 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Mark Monson
M.J. Monson

B00011

Approved:
J.T. Marrin

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

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:

TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 08/18/93

CUSTOMER ORDER NUMBER: 16890

PAGE 1

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: JJ773						
			Monitor Labs Model 8440		06/23/93	06/30/93
Nitric Oxide	222.0 ± 2.2 ppm	GMIS	S/N 136	06/30/95	221.8 ppm	222.2 ppm
		Cylinder #	Continuous		222.0 ppm	223.0 ppm
Nitrogen,O2-Free Balance		CC28709	Chemiluminescence		221.4 ppm	221.8 ppm
Cylinder Pressure: 2000 psig		@ 249.2 ppm	Last Cal Date: 04/22/93	Mean:	221.7 ppm	222.3 ppm
CYLINDER NO.: JJ12476						
			Monitor Labs Model 8440		06/21/93	06/29/93
Nitric Oxide	45.3 ± 0.5 ppm	GMIS	S/N 136	06/29/95	45.2 ppm	45.3 ppm
		Cylinder #	Continuous		45.3 ppm	45.1 ppm
Nitrogen,O2-Free Balance		CC42633	Chemiluminescence		45.3 ppm	45.3 ppm
Cylinder Pressure: 2000 psig		@ 48.7 ppm	Last Cal Date: 04/21/93	Mean:	45.3 ppm	45.2 ppm

ppm = umole/mole   % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: B.E. Gross

Approved: J.T. Marrin

B00012

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS

WEESØ1
TO: Tom Rooney
Western Environmental Services
1010 S. Pacific Coast Hwy.
Redondo Beach, CA 90277

DATE: 29 May 1992

CUSTOMER ORDER NUMBER: 10187

CYLINDER NUMBER JJ14192

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	2039 ± 21 ppm
Nitrogen*	Balance

Cylinder Pressure: 2000 psig

*Oxygen-free

Replicate	04/20/92	2066 ppm		05/06/92	2042 ppm
Analysis		2042 ppm			2025 ppm
Data On		2041 ppm			2018 ppm
NO:	Mean	2050 ppm			2028 ppm

Expiration Date NO: 11/06/93

(The Nitric Oxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC83870 at 3700 ppm Nitric Oxide in Oxygen-free Nitrogen. The analysis was performed using a Monitor Labs Model 8440, S/N 136 analyzer with continuous chemiluminescence detection. The last multipoint calibration was performed 05/06/92.)

ANALYST B.E. Gross

APPROVED J.T. Marrin

B00013

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

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS

WEESØ1
TO: Tom Rooney
Western Environmental Services
1010 S. Pacific Coast Hwy
Redondo Beach, CA 90277

DATE: 12 December 1991

CUSTOMER ORDER NUMBER: 10177/Reanalysis

CYLINDER NUMBER MM11478

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	937 ± 9 ppm
Nitrogen*	Balance

Cylinder pressure: 1250 psig

*Oxygen-free

Replicate	12/05/91	939 ppm
Analysis		939 ppm
Data On		938 ppm
NO:	Mean	939 ppm

Expiration Date NO: 06/05/93

(The Nitric Oxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, Cylinder number CC78162 at 1025 ppm Nitric Oxide in Oxygen-free Nitrogen. The analysis was performed using a Monitor Labs Model 8440, S/N 136 analyzer with continuous chemiluminescence detection. The last multipoint calibration was performed 10/10/91.)

ANALYST _____ APPROVED _____

B.E. Gross

B00014

J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

WEES01

TO:

DATE: 01/11/93

TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

CUSTOMER ORDER NUMBER: 92-10-31-E

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC199806	Nitric Oxide	4190 ± 42 ppm	SRM 2631
	Nitrogen,O2-Free	Balance	

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: Steve Kozy Approved:

S.B. Kozy B00015 J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMETNAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE: 01/29/93

CUSTOMER ORDER NUMBER: 93-0101C/Reanalysis

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
JJ21658	Nitric Oxide	4150 ± 42 ppm	SRM 2631
	Nitrogen,O2-Free	Balance	
	CYLINDER PRESSURE: 125 PSIG		

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: _____ Approved: _____

B.E. Gross

B00016

J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 06/24/93

CUSTOMER ORDER NUMBER: 16888

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: JJ20284						
			Monitor Labs Model 8440		06/08/93	06/21/93
Nitric Oxide	44.1 ± 0.4 ppm	GMIS	S/N 136	06/21/95	44.1 ppm	44.3 ppm
		Cylinder #	Continuous		44.2 ppm	44.1 ppm
Nitrogen,O2-Free Balance		CC42633	Chemiluminescence		44.1 ppm	43.9 ppm
Cylinder Pressure: 2000 psig		@ 48.7 ppm	Last Cal Date: 04/21/93		Mean: 44.1 ppm	44.1 ppm
CYLINDER NO.: MM11425						
			Monitor Labs Model 8440		06/15/93	06/22/93
Nitric Oxide	221.0 ± 2.2 ppm	GMIS	S/N 136	06/22/95	221.4 ppm	221.1 ppm
		Cylinder #	Continuous		219.9 ppm	220.8 ppm
Nitrogen,O2-Free Balance		CC28709	Chemiluminescence		221.2 ppm	221.4 ppm
Cylinder Pressure: 2000 psig		@ 249.2 ppm	Last Cal Date: 04/22/93		Mean: 220.8 ppm	221.1 ppm
CYLINDER NO.: JJ24602						
			Monitor Labs Model 8440		06/15/93	06/22/93
Nitric Oxide	224.1 ± 2.2 ppm	GMIS	S/N 136	06/22/95	223.6 ppm	224.4 ppm
		Cylinder #	Continuous		223.4 ppm	224.5 ppm
Nitrogen,O2-Free Balance		CC28709	Chemiluminescence		223.8 ppm	224.7 ppm
Cylinder Pressure: 2000 psig		@ 249.2 ppm	Last Cal Date: 04/22/93		Mean: 223.6 ppm	224.5 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: _____ Approved: _____

B.E. Gross B00017 J.T. Marrin

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

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

WEES01

TO:
TOM ROONEY
WESTERN ENVIRONMENTAL SERVICES
1010 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277-

DATE : 03/26/93

CUSTOMER ORDER NUMBER: 16878

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: JJ16886						
			Monitor Labs Model 8440		03/02/93	03/13/93
Nitric Oxide	91.0 ± 0.9 ppm	GMIS	S/N 136	03/13/95	91.0 ppm	91.2 ppm
		Cylinder #	Continuous		90.8 ppm	91.0 ppm
Nitrogen,O2-Free Balance		CC106651	Chemiluminescence		91.0 ppm	91.0 ppm
Cylinder Pressure: 2000 psig		@ 98.9 ppm	Last Cal Date: 01/12/93		Mean: 90.9 ppm	91.1 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: _____ Approved: _____

B.E. Gross B00018 J.T. Marrin

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

WESTERN ENVIRONMENTAL SERVICES

PITOT TUBE CALIBRATION

Date: June 8, 1993
By: Ty H.
Number: 3' – #71
Source: STD (0–2")

Delta P std	Delta P leg 1	Delta P leg 2	Cp leg 1	Cp leg 2
0.34	0.55	0.50	0.79	0.82
0.57	0.89	0.85	0.80	0.82
1.17	1.70	1.67	0.83	0.84
		Averages	0.81	0.83
		Average	0.82	

B00019

WESTERN ENVIRONMENTAL SERVICES

GAS METER CALIBRATION

Meter #: Wood #83
Pb: 29.99
Date: September 1, 1993
Calibrator: Ty Hastriter

Orifice	Standard Start	Standard Finish	Temp F	Field Meter Start	Field Meter Finish	Temp F	Time Min	V	Delta H
0.50	578.882	582.757	74	527.702	531.692	82	10	0.985	1.85
0.50	582.757	586.614	74	531.692	535.667	83	10	0.985	1.87
1.00	586.838	592.612	74	535.900	541.780	84	10	0.998	1.66
1.00	592.612	598.364	74	541.780	547.637	85	10	1.000	1.67
2.00	598.759	607.153	74	548.042	556.454	85	10	1.013	1.57
2.00	607.153	615.559	74	556.454	564.901	87	10	1.014	1.56
						Average		0.999	1.70
								=======	=======

B00020

WESTERN ENVIRONMENTAL SERVICES

APPENDIX C

NOMENCLATURE

%CO	Percent CO by volume, dry
$\%CO_2$	Percent CO_2 by volume, dry
%EA	Percent excess air in stack gas
%I	Percent Isokinetic
%M	Percent Moisture in Stack Gas, by Volume
$\%N_2$	Percent N_2 by volume, dry
$\%O_2$	Percent O_2 by volume, dry
A_s	Stack Area, ft^2
C_p	Pitot Tube Coefficient
C_{sf}	Particulate concentrations at standard conditions (1), dry, based on probe, cyclone and filter catch, GRS/SDCF
C_{st}	Particulate concentration at standard conditions (1), dry, based on total catch, GRS/SDCF
D_n	Sampling nozzle diameter, in.
E_f	Particulate emission rate, based on probe, cyclone and filter catch, lbs/hr
E_t	Particulate emission rates based on total particulate catch, lbs/hr
I_c	Percent of particulate caught in impingers
M_d	Mole Fraction Dry Stack Gas
M_f	Particulate collected in probe, cyclone and filter, mg.
M_t	Total particulate collected mg.
MW	Molecular Weight of Wet Stack Gas, gm/gm-mole
MW_c	Molecular Weight of Chemical
MW_d	Molecular Weight of Dry Stack Gas, gm/gm-mole
P	Velocity head, in. H_2O
P_b	Barometric Pressure, in. Hg.
PE_f	Particulate emission rate on a process basis, probe, cyclone and filter catch
PE_t	Particulate emission rate on a process basis, Total catch
P_m	Average Orifice Pressure Drop, in. Hg.

NOMENCLATURE
(CONT)

PPM	Parts per million
P_s	Stack Gas Pressure, in. Hg., absolute
P_u	Unit process rate
Q_a	Stack Gas Flow Rate at Stack Conditions, ft^3/min
Q_s	Stack Gas Flow Rate at Standard Conditions (1), dry ft^3/min
T_m	Average Dry Gas Meter Temperature, ^0F.
T_s	Stack Gas Temperature, ^0F
T_s	Average Stack Gas Temperature, ^0F
T_{std}	Standard Temperature, ^0F
T_t	Net time of test min.
V_m	Volume of Dry Gas Sampled at Meter Conditions, ft^3
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions (1), ft^3
V_s	Average Stack Gas Velocity, Stack Conditions, ft/sec
V_w	Total H_2O Collected in Impingers and Silica Gel, ml
$V_{w_{std}}$	Volume of Water Vapor Collected at Standard Conditions (1), ft^3
Bwo	%M/100
Vlc	Volume of liquid collected, mls
Pst	Static Pressure, "H_2O
Mc	Meter Calibration Factor

CALCULATIONS

1. Volume of water vapor at standard conditions [1]

$$V_{W_{std}} = .00267 * \frac{460 + T_{std}}{29.92} * Vlc$$

2. Volume of dry gas sampled at standard conditions [1]

$$V_{m_{std}} = 17.38 * \frac{V_m (P_b + P_m)}{(T_m + 460)}$$

3. Percent moisture in stack gas by volume.

$$\%M = \frac{100 * V_{W_{std}}}{V_{W_{std}} + V_{m_{std}}}$$

4. Mole fraction dry stack gas.

$$M_s = \frac{100 - \%M}{100}$$

5. Molecular weight of dry stack gas (gm/gm - Mole)

$$MW_d = [(\% CO_2 * .44) + (\% O_2 * .32) + (\% N_2 * .28) + (\% CO * .28) + (\% \text{ Additional Gas} * \text{MW of Additional Gas})]$$

6. Molecular weight of wet stack gas (gm/gm - Mole)

$$MW = (18 * Bwo) + [(1-Bwo) * MW_d]$$

7. Stack gas velocity at stack conditions [2], (ft/sec)

$$V_s = 85.49 * CP * \sqrt{\Delta P} * \sqrt{\frac{(T_s + 460)}{Mw * P_s}}$$

8. Stack gas volumetric flow rate at stack conditions.

$$Q_a = V_s * A_s * 60$$

CALCULATIONS

9. Stack gas volumetric flow rate at standard conditions [1]

$$Q_s = Q_a * \frac{520}{460 + T_s} * \frac{P_s}{29.92} * (1.00 - Bwo)$$

10. Percent isokinetic

$$\%I = \left[\frac{(T_s + 460) * V_{m\,std}}{P_s * V_s * AN * T_t} * (1 - Bwo) \right] * .0945$$

11. Particulate Concentrations at standard conditions [1], dry, based on probe, cyclone and filter catch.

$$C_{sf} = \frac{M_f * 15.43}{V_{m\,std} * 1000}$$

12. Particulate concentration at standard conditions [1], dry, based on total catch.

$$C_{st} = \frac{M_t * 15.43}{V_{m\,std} * 1000}$$

13. Particulate emission rate, based on probe, cyclone, and filter catch.

$$E_f = \frac{M_f * 60 * Q_s}{454{,}000 * V_{m\,std}}$$

14. Particulate emission rate, based on total catch.

$$E_t = \frac{M_t * 60 * Q_s}{454{,}000 * V_{m\,std}}$$

CALCULATIONS

15. Particulate emission rate on a process basis, probe, cyclone, and filter catch.

$$PE_f = \frac{E_f}{P_u}$$

16. Particulate emission rate on a process basis, total catch.

$$PE_t = \frac{E_f}{P_u}$$

17. Particulate emission rate, part per million.

$$ppm = \frac{M_t}{V_{m_{std}}} * \frac{863.3}{MW_c}$$

(1) Standard conditions: 60^0 29.92 "Hg

(2) $\sqrt{\Delta P * (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (P_s) and the absolute stack temperature (T_s + 460) for each individual point

WESTERN ENVIRONMENTAL SERVICES

SEMI-TROPIC WATER DISTRICT
UNIT #1 - NORTH - OUTLET
AUGUST 24, 1993
SAMPLE CALCULATIONS- NON-PARTICULATES

Pb=	29.52	Ts=	1065
Delta H	0.76	Tstd=	60.00
Pm=	0.06	P=	1.337
Tm	104.00	Stac Dia, In=	13.50
Vm=	22.137	As=	0.99
Vlc=	102.00		
cp=	0.82	Pst=	0.420
%O2=	0.01	Ps	29.55
%CO2=	11.70		
%N2=	88.29		
Meter corr	0.999		

Water Vapor at Std Conditions
Vwstd=.00267*((460+Tstd)/29.92)*Vlc
Vwstd= 4.73

Gas Sampled Std=(17.38*Vm*Mc*((Pb+Pm)/(Tm+460)))
Vmstd= 20.155

Percent Moisture
%M=(100*(Vwstd/(Vwstd+Vmstd)))
%M= 19.02

Molecular Weight of Dry Stack Gas
MWd=(%CO2*.44)+(%O2*.32)+((%N2+%CO)*.28)
MWd= 29.87

Molecular Weight of Wet Stack Gas
Mw=MWd*(1-(%M/100))+(18*(%M/100))
Mw= 27.61

Stack Gas Velocity
Vs=85.49*cp*(p^.5)*((460+Ts)/(Ps*Mw))^.5
Vs= 110.81

Volumetric Flow Rate, ACFM
ACFM= Vs * As * 60
ACFM= 6609

Volumetric Flow Rate DSCFM
DSCFM= ACFM*(520/(460+Ts))*(Ps/29.92)*(1.00-(%M/100))
DSCFM= 1802

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #1 - North - Outlet
Test #1

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	81.36
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.068	lbs/day=	25.62999	lbs/yr=	9354.947
g/bhp/hr=	0.367298			tons/yr=	4.677473

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	611.93
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.889	lbs/day=	117.3382	lbs/yr=	42828.45
g/bhp/hr=	1.681551			tons/yr=	21.41422

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #1 - North - Outlet
Test #2

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	103.06
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr= 1.352 lbs/day= 32.45832 lbs/yr= 11847.28

g/bhp/hr= 0.465153 tons/yr= 5.923643

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	611.32
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr= 4.883 lbs/day= 117.1938 lbs/yr= 42775.74

g/bhp/hr= 1.679482 tons/yr= 21.38787

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #1 - North - Outlet
Test #3

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	101.14
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.327	lbs/day=	31.85362	lbs/yr=	11626.57
g/bhp/hr=	0.456488			tons/yr=	5.813286

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	599.07
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1802
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.785	lbs/day=	114.8454	lbs/yr=	41918.57
g/bhp/hr=	1.645827			tons/yr=	20.95928

WESTERN ENVIRONMENTAL SERVICES

SEMI-TROPIC WATER DISTRICT
UNIT #2 - NORTH - OUTLET
AUGUST 24, 1993
SAMPLE CALCULATIONS- NON-PARTICULATES

Pb=	29.52	Ts=	1100
Delta H	0.76	Tstd=	60.00
Pm=	0.06	P=	1.364
Tm	89.00	Stac Dia, In=	13.50
Vm=	21.413	As=	0.99
Vlc=	89.00		
cp=	0.82	Pst=	0.400
%O2=	0.09	Ps	29.55
%CO2=	12.03		
%N2=	87.88		
Meter corr	0.999		

Water Vapor at Std Conditions
Vwstd=.00267*((460+Tstd)/29.92)*Vlc
Vwstd= 4.13

Gas Sampled Std=(17.38*Vm*Mc*((Pb+Pm)/(Tm+460)))
Vmstd= 20.029

Percent Moisture
%M=(100*(Vwstd/(Vwstd+Vmstd)))
%M= 17.09

Molecular Weight of Dry Stack Gas
MWd=(%CO2*.44)+(%O2*.32)+((%N2+%CO)*.28)
MWd= 29.93

Molecular Weight of Wet Stack Gas
Mw=MWd*(1-(%M/100))+(18*(%M/100))
Mw= 27.89

Stack Gas Velocity
Vs=85.49*cp*(p^.5)*((460+Ts)/(Ps*Mw))^.5
Vs= 112.64

Volumetric Flow Rate, ACFM
ACFM= Vs * As * 60
ACFM= 6718

Volumetric Flow Rate DSCFM
DSCFM= ACFM*(520/(460+Ts))*(Ps/29.92)*(1.00-(%M/100))
DSCFM= 1834

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #2 - North - Outlet
Test #1
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	79.83
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.066	lbs/day=	25.58276	lbs/yr=	9337.710
g/bhp/hr=	0.366621			tons/yr=	4.668855

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	602.12
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.894	lbs/day=	117.4531	lbs/yr=	42870.39
g/bhp/hr=	1.683198			tons/yr=	21.43519

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #2 - North - Outlet
Test #2

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	78.36
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.047	lbs/day=	25.11741	lbs/yr=	9167.855
g/bhp/hr=	0.359952			tons/yr=	4.583927

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	605.71
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.924	lbs/day=	118.1803	lbs/yr=	43135.83
g/bhp/hr=	1.693620			tons/yr=	21.56791

SEMI-TROPIC WATER DISTRICT
AUGUST 24, 1993
Engine #2 - North - Outlet
Test #3
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	80.39
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.074	lbs/day=	25.76810	lbs/yr=	9405.358
g/bhp/hr=	0.369277			tons/yr=	4.702679

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	592.52
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1834
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.817	lbs/day=	115.6068	lbs/yr=	42196.50
g/bhp/hr=	1.656739			tons/yr=	21.09825

WESTERN ENVIRONMENTAL SERVICES

SEMI-TROPIC WATER DISTRICT
UNIT #1 - SOUTH - OUTLET
AUGUST 25, 1993
SAMPLE CALCULATIONS- NON-PARTICULATES

Pb=	29.50	Ts=	1104
Delta H	0.71	Tstd=	60.00
Pm=	0.05	P=	1.334
Tm	87.00	Stac Dia, In=	13.50
Vm=	21.072	As=	0.99
Vlc=	102.00		
cp=	0.82	Pst=	0.300
%O2=	0.05	Ps	29.52
%CO2=	12.06		
%N2=	87.89		
Meter corr	0.999		

Water Vapor at Std Conditions
Vwstd=.00267*((460+Tstd)/29.92)*Vlc
Vwstd= 4.73

Gas Sampled Std=(17.38*Vm*Mc*((Pb+Pm)/(Tm+460)))
Vmstd= 19.766

Percent Moisture
%M=(100*(Vwstd/(Vwstd+Vmstd)))
%M= 19.32

Molecular Weight of Dry Stack Gas
MWd=(%CO2*.44)+(%O2*.32)+((%N2+%CO)*.28)
MWd= 29.93

Molecular Weight of Wet Stack Gas
Mw=MWd*(1-(%M/100))+(18*(%M/100))
Mw= 27.63

Stack Gas Velocity
Vs=85.49*cp*(p^.5)*((460+Ts)/(Ps*Mw))^.5
Vs= 112.12

Volumetric Flow Rate, ACFM
ACFM= Vs * As * 60
ACFM= 6687

Volumetric Flow Rate DSCFM
DSCFM= ACFM*(520/(460+Ts))*(Ps/29.92)*(1.00-(%M/100))
DSCFM= 1770

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #1 - South - Outlet
Test #1
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	79.07
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.019	lbs/day=	24.45959	lbs/yr=	8927.753
g/bhp/hr=	0.350525			tons/yr=	4.463876

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	803.34
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	6.303	lbs/day=	151.2645	lbs/yr=	55211.56
g/bhp/hr=	2.167743			tons/yr=	27.60578

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #1 - South - Outlet
Test #2
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	79.83
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	1.029	lbs/day=	24.69565	lbs/yr=	9013.913
g/bhp/hr=	0.353908			tons/yr=	4.506956

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	671.97
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	5.272	lbs/day=	126.5331	lbs/yr=	46184.61
g/bhp/hr=	1.813322			tons/yr=	23.09230

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #1 - South - Outlet
Test #3
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	68.94
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	0.889	lbs/day=	21.32679	lbs/yr=	7784.281
g/bhp/hr=	0.305630			tons/yr=	3.892140

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	595.59
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1770
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	4.673	lbs/day=	112.1506	lbs/yr=	40935.00
g/bhp/hr=	1.607210			tons/yr=	20.46750

WESTERN ENVIRONMENTAL SERVICES

SEMI-TROPIC WATER DISTRICT
UNIT #2 - SOUTH - OUTLET
AUGUST 25, 1993
SAMPLE CALCULATIONS- NON-PARTICULATES

Pb=	29.50	Ts=	1083
Delta H	0.75	Tstd=	60.00
Pm=	0.06	P=	1.347
Tm	99.00	Stac Dia, In=	13.50
Vm=	23.458	As=	0.99
Vlc=	109.00		
cp=	0.82	Pst=	0.300
%O2=	0.02	Ps	29.52
%CO2=	11.95		
%N2=	88.03		
Meter corr	0.999		

Water Vapor at Std Conditions
Vwstd=.00267*((460+Tstd)/29.92)*Vlc
Vwstd= 5.06

Gas Sampled Std=(17.38*Vm*Mc*((Pb+Pm)/(Tm+460)))
Vmstd= 21.534

Percent Moisture
%M=(100*(Vwstd/(Vwstd+Vmstd)))
%M= 19.02

Molecular Weight of Dry Stack Gas
MWd=(%CO2*.44)+(%O2*.32)+((%N2+%CO)*.28)
MWd= 29.91

Molecular Weight of Wet Stack Gas
Mw=MWd*(1-(%M/100))+(18*(%M/100))
Mw= 27.65

Stack Gas Velocity
Vs=85.49*cp*(p^.5)*((460+Ts)/(Ps*Mw))^.5
Vs= 111.87

Volumetric Flow Rate, ACFM
ACFM= Vs * As * 60
ACFM= 6672

Volumetric Flow Rate DSCFM
DSCFM= ACFM*(520/(460+Ts))*(Ps/29.92)*(1.00-(%M/100))
DSCFM= 1797

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #2 - South - Outlet
Test #1

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	35.83
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	0.469	lbs/day=	11.25048	lbs/yr=	4106.425
g/bhp/hr=	0.161228			tons/yr=	2.053212

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	747.29
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	5.951	lbs/day=	142.8280	lbs/yr=	52132.25
g/bhp/hr=	2.046841			tons/yr=	26.06612

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #2 - South - Outlet
Test #2
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	38.53
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	0.504	lbs/day=	12.10119	lbs/yr=	4416.935
g/bhp/hr=	0.173419			tons/yr=	2.208467

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	717.31
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	5.714	lbs/day=	137.1311	lbs/yr=	50052.88
g/bhp/hr=	1.965200			tons/yr=	25.02644

SEMI-TROPIC WATER DISTRICT
AUGUST 25, 1993
Engine #2 – South – Outlet
Test #3
SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
NOx

Gas Concentration (ppm)	36.83
Gas Molecular Weight (MW)	46
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	0.482	lbs/day=	11.56727	lbs/yr=	4222.053
g/bhp/hr=	0.165768			tons/yr=	2.111026

SAMPLE CALCULATIONS- GASEOUS CONSTITUENTS
CO

Gas Concentration (ppm)	720.23
Gas Molecular Weight (MW)	28
Volumetric Flow Rate (DSCFM)	1797
Hp=	1320

Lbs/Hr=((ppm*DSCFM)/(379*10^6))*MW*60

Lbs/Hr=	5.737	lbs/day=	137.6894	lbs/yr=	50256.64
g/bhp/hr=	1.973200			tons/yr=	25.12832

FUEL GAS EMISSION RATE CALCULATION

SITE: Semitropic Water District
DATE: August 24, 1993
SIE: North Site

Parameter	Engine #1	Engine #2
Sulfate, ppm	0.137	0.00
Sulfur Dioxide, ppm	2.021	1.384
Fuel Gas Rate, cfm	215	204.8
Sulfur, #/Hr from SO(4)	0.000146	0.000000
Sulfur, #/Hr from SO(2)	0.002166	0.001413
Total Sulfur, #/Hr	0.002313	0.001413
Total Sulfur, grs/100SDCF	0.13	0.08

FUEL GAS EMISSION RATE CALCULATION

SITE: Semitropic Water District
DATE: August 25, 1993
SIE: South Site

Parameter	Engine #1	Engine #2
Sulfate, ppm	0.000	0.15
Sulfur Dioxide, ppm	1.793	2.262
Fuel Gas Rate, cfm	197.66	203.33
Sulfur, #/Hr from SO(4)	0	0.000155
Sulfur, #/Hr from SO(2)	0.001767	0.002293
Total Sulfur, #/Hr	0.001767	0.002448
Total Sulfur, grs/100SDCF	0.10	0.13

WESTERN ENVIRONMENTAL SERVICES

APPENDIX D

KERN COUNTY AIR POLLUTION CONTROL DISTRICT

AUTHORITY TO CONSTRUCT

2700 "M" Street, Suite 275
Bakersfield, CA 93301
(805) 861-3682

William J. Roddy
Air Pollution Control Officer

ISSUE DATE:	December 13, 1991	APPLICATION NO.	0239007
EXPIRATION DATE:	December 13, 1993	DATE:	May 6, 1991

AUTHORITY TO CONSTRUCT IS HEREBY GRANTED TO:

SEMITROPIC WATER STORAGE DISTRICT

In the event an AUTHORITY TO CONSTRUCT is reissued to a new owner, any emissions increase assigned to this equipment during initial New Source Review Process remains with the initial bearer of this document.

AUTHORITY TO CONSTRUCT IS HEREBY GRANTED FOR:

Natural Gas Fueled IC Engine With 1000 KW Generator

(See attached sheets for equipment description and conditions)

S	T	R	Location:	Start-up Inspection Date:
13	27S	22E	Wedel & Jackson	

Upon completion of construction and/or installation, please telephone the Manager of Engineering. This document serves as a TEMPORARY Permit to Operate only as provided by Rule 201 of the District's Rules and Regulations. For issuance of a Permit to Operate, Rule 208 requires that the equipment authorized by this AUTHORITY TO CONSTRUCT be installed and operated in accordance with the conditions of approval. Changes to these conditions must be made by application and must be approved before such changes are made. This document does not authorize the emission of air contaminants in excess of New Source Review limits (Rule 2101) or Regulation IV emission limits. Emission testing requirements set forth in this document must be satisfied before a Permit to Operate can be granted.

Validation Signature:

For Manager of Engineering

0239007
Continued

EQUIPMENT DESCRIPTION: Natural Gas Fueled IC Engine With 1000 KW Generator, including the following equipment and design specifications:

A. Waukesha Model L7042 GSI Rich-Burn reciprocating I.C. Engine, equipped with either a Houston Industrial or Allied Signal Catalytic Converter.
B. 1000 KW generator.

CONDITIONAL APPROVAL:

Pursuant to Rule 209, "conditional approval" is hereby granted. Please be aware that all conditions of approval remain in effect for life of project unless modifications are approved by District.

DESIGN CONDITIONS:

1. Engine shall be equipped with fuel gas flow meter/recorder. (Rule 209)
2. Engine shall be equipped to burn PUC quality natural gas only. (Rule 209)
3. Engine shall be equipped with high catalyst temperature automatic engine shutdown control. (Rule 209)
4. Catalyst volume, operating temperature, and exhaust O_2 content shall be selected to effect compliance with operational conditions. (Rule 210.1)
5. Exhaust stack before and after catalyst shall be equipped with adequate provisions facilitating the collection of samples consistent with EPA test methods. (Rule 108.1)
6. Engine shall be equipped with automatic air/fuel ratio controller. (Rule 210.1)

OPERATIONAL CONDITIONS:

a. Fuel gas sulfur content shall not exceed 0.10 grains/100 scf. (Rule 210.1)
b. Natural gas combusted shall not exceed 280.584 scf in any day without prior District approval. (Rule 210.1)
c. Air/fuel ratio shall be selected and maintained to effect compliance with emission sampling limits. (Rule 210.1)
d. High catalyst temperature shall shut down engine when catalyst temperature exceeds manufacturer's specification. (Rule 209)
e. Engine and catalyst shall be maintained according to manufacturer's specifications. (Rule 209)
f. Engine shall be operated as to not cause a nuisance. (Rule 419)

EMISSION SAMPLING LIMITS:

Particulates (PM-10):	0.21 lbm/hr	(Rule 210.1)
Sulfur Compounds:	0.003 lbm/hr (of SO_2)	(Rule 210.1)
	0.003 lbm/hr (of SO_4)	(Rule 210.1)
Oxides of Nitrogen:	3.1 lbm/hr (as NO_2)	(Rule 210.1)
	1.0 gm/bhp hr (as NO_2)	(Rule 210.1 BACT Req.)
Hydrocarbons:	1.9 lbm/hr	(Rule 210.1)
	0.6 gm/bhp hr	(Rule 210.1 BACT Req.)
Carbon Monoxide:	9.3 lbm/hr	(Rule 210.1)

0239007
Continued

COMPLIANCE TESTING REQUIREMENTS:

Compliance with emission sampling limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days after start-up and 60 days prior to permit anniversary date and official test results and field data submitted within 30 days after collection. Oxides of nitrogen, hydrocarbons, and carbon monoxide shall be tested at the inlet and outlet of the oxidation catalyst. Particulates shall be tested at the outlet of the oxidation catalyst.

Compliance with sulfur compound emission limits shall be demonstrated by fuel gas analysis at time of annual compliance testing. (Rule 108.1)

SPECIAL CONDITIONS:

aa. Semitropic Water Storage District shall maintain accurate records of daily fuel use for this emissions unit, and shall make such records available for District inspection upon request. (Rule 107)

STATE OF CALIFORNIA AIR TOXICS HOT SPOTS REQUIREMENTS:

Facility shall comply with California Health and Safety Code Sections 44300 through 44384. (Rule 208.1)

STATIONARY SOURCE CURTAILMENT PLANS AND TRAFFIC ABATEMENT PLANS:

Facilities expected to emit 100 tons per year or more of carbon monoxide, hydrocarbons, PM-10 or oxides of nitrogen shall comply with KCAPCD Regulation 613.

RULE 210.1 (NSR) ANALYSIS VALIDATION:

Maximum daily emission rate of each air contaminant from this emissions unit shall not exceed the following Daily Emissions Limitation:

Particulate Matter (PM-10):	5.04 lbm/day (Rule 210.1)
Sulfur Compounds:	0.07 lbm/day (of SO_2) (Rule 210.1) 0.07 lbm/day (of SO_4) (Rule 210.1)
Oxides of Nitrogen:	74.4 lbm/day (as NO_2) (Rule 210.1)
Hydrocarbons:	45.6 lbm/day (Rule 210.1)
Carbon Monoxide:	223.2 lbm/day (Rule 210.1)

Compliance with Daily Emissions Limitations shall be verified by source operator (with fuel consumption data, operational data, etc.) on daily basis and written documentation made readily available to District for period of three years.

RULE 210.1 (NSR) DAILY EMISSION LIMITATIONS: (See attached)