SOURCE TEST REPORT
LANDFILL GAS FIRED FLARE
BROWNING-FERRIS INDUSTRIES
CHESTNUT AVENUE LANDFILL
FRESNO, CALIFORNIA 93792

Prepared for

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Project No. 71-4107-22.001

April 03, 1992

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4/3/92
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1 EXECUTIVE SUMMARY

Browning-Ferris Industries (BFI) retained Kleinfelder, Inc. to perform the annual source emissions test of the landfill gas fired flaring system located at the Chestnut Avenue Landfill site in Fresno, California. The flaring system is operated under Fresno County Air Pollution Control District (FCAPCD) Authority to Construct No. 3070010201. The tests were conducted on January 21 to 24, 1992. The sampling and analytical procedures conformed to the Source Test Protocol submitted to the Fresno County Air Pollution Control District on June 3, 1991 and amended by their response letter dated June 10, 1991.

The tests included measurements of the flare exhaust emissions of non-methane organics (total), nitrogen oxides, sulfur dioxide, carbon monoxide, particulate matter, and PM-10 (particulate matter less than 10 microns in diameter). Samples were taken from the landfill gas inlet to the flare to determine the concentrations of methane and non-methane organics, carbon dioxide and nitrogen. The flow rate of landfill gas to the flare was monitored using the existing process instrumentation.

During the testing period, the flare was operated under normal conditions with a landfill gas flow rate of approximately 907,200 standard cubic feet per day (scfd), assuming 24-hour continuous operation, and the flare combustion temperature controller set to 1600°F. Results of the tests are summarized in Table 1-1.

TABLE 1-1

COMPLIANCE SOURCE TEST RESULTS
BROWNING-FERRIS INDUSTRIES
CHESTNUT AVENUE LANDFILL
FRESNO, CALIFORNIA
LFG FIRED FLARE SYSTEM
JANUARY 21 to 24, 1992

PARAMETER	UNITS	PERMIT LIMIT	RUN 1	RUN 2	RUN 3
		Results at test conditions			
LFG FLOW	SCFM		613	637	640
NO_x as NO_2	lb/mmBtu	0.08	0.060	0.077	0.077
	lb/hr		0.70	0.92	0.87
	lb/day		16.9	22.0	20.9
SO_2	lb/hr		0.20	0.25	0.31
	lb/day		4.8	6.1	7.3
CO	lb/mmBtu	0.40	<0.004	<0.022	<0.057
	lb/hr		<0.05	<0.26	<0.64
	lb/day		<1.3	<6.4	<15.3
NMHC[a]	lb/hr		0.11	0.12	0.10
	lb/day		2.7	2.8	2.5
PM10	lb/hr		0.60[b]	0.47	0.38
	lb/day		14.4[b]	11.3	9.1
		Results pro-rated to regulatory limit of 1219 SCFM LFG			
NO_x as NO_2	lb/hr	3.54	1.39	1.76	1.66
	lb/day	84.96	33.4	42.3	39.8
SO_2	lb/hr	0.71	0.40	0.48	0.59
	lb/day	17.04	9.5	11.5	14.2
CO	lb/hr	17.68	<0.10	<0.50	<1.22
	lb/day	424.32	<2.4	<11.9	<29.3
NMHC[a]	lb/hr	0.48	0.22	0.23	0.19
	lb/day	9.84	5.3	5.5	4.6
PM10	lb/hr	3.33	1.19[b]	0.90	0.72
	lb/day	80.0	28.6[b]	21.6	17.4

[a] - non-methane hydrocarbons (as methane)
[b] - PM-10 sample was contaminated. Results presented are from the total particulate sampling run, (assuming all particulate was PM-10).

2 INTRODUCTION

BROWNING-FERRIS INDUSTRIES (BFI) retained **KLEINFELDER, INC.** to perform a source emission test on the landfill gas fired flare station located at the Chestnut Avenue Landfill in Fresno, California. The tests were performed on January 21 to 24, 1992 in the sequence presented in Table 2-1.

2.1 Purpose and Objectives

The source tests were performed to determine the emission characteristics of the flare station for comparison with the emission limits specified by Fresno County Air Pollution Control District (FCAPCD) Authority to Construct No. 3070010101.

2.2 Procedures

The testing program was coordinated by Mr. Ron Valles of BFI and Mr. Mike Bell of Kleinfelder. The test procedures were outlined in the Source Test Protocol submitted to the FCAPCD on June 3, 1991 and amended by a FCAPCD letter dated June 10, 1991. The following field testing methods were employed in the test program.

- Sample traverse points were located, and the verification of the absence of cyclonic flow was performed by CARB Method 1.
- Measurements of the stack gas velocity, temperature and pressure were made by CARB Method 2, as included in Method 5.
- The dry-basis concentrations of the stack gases (carbon dioxide, oxygen, carbon monoxide, and nitrogen) were determined using continuous monitors operated according to CARB Method 100.
- The stack gas moisture content was measured using CARB Method 4, as included in CARB Method 5.
- The particulate matter concentration and emission rate were determined using CARB Method 5. The Method 5 samples were taken concurrently with the Method 100 gas concentration monitoring.
- The PM-10 fraction of the particulate matter was determined using an Andersen Mark III Inertial Impactor and operated according to the procedures specified by the manufacturer and CARB Method 501.

- The concentration of total non-methane hydrocarbons was determined by collection of stack gas into Tedlar bags as described in CARB Method 422. The bags were analyzed by Gas Chromatography within 48 hours of sampling.
- The concentrations of oxides of nitrogen (NO_X), sulfur oxides (SO_X), carbon monoxide (CO), carbon dioxide (CO_2), and oxygen (O_2) were continuously monitored with the Kleinfelder Mobile Emissions Laboratory according to CARB Method 100. The monitoring was performed concurrently with the sampling of particulate matter.

Landfill Gas Inlet to Flare Station:

- Samples of landfill gas were taken into Tedlar bags as described in CARB Method 422, for analysis of the primary constituents (carbon dioxide, oxygen, nitrogen, and methane). The Tedlar bag samples were delivered to the laboratory and analyzed within 48 hours of sampling. The analyses were performed as specified in the test protocol.
- The flow of the landfill gas to the flare was measured by the on-site process instrumentation. The digital flow rate output was visually averaged by Kleinfelder personnel several times during the test program to document the fuel rate.

The chronological log in Table 2-1 presents the sequence of field sampling events.

Detailed descriptions of the sampling procedures are presented in Section 5, and field data sheets can be found in Appendix A.

The particulate matter samples were analyzed at the Kleinfelder Air Quality Laboratory in Diamond Bar, California. Tedlar bag samples were analyzed by Atmospheric Assessment Associates at their Chatsworth, California facility. The analytical procedures are described in Section 6, and the laboratory data are presented in Appendix B.

The results were calculated from the sampling and analysis data using the appropriate equations from the applicable methods, as presented in Appendix C. Sample calculations are included in Appendix D of the report. Most of the calculations were performed using computer spreadsheet programs.

The equipment used during the field testing program was calibrated as required by the reference methods to assure accurate measurements. Calibrations were performed on meter boxes, nozzles, pitot tubes and thermocouples, and on the continuous monitoring instrumentation. Calibration data are included as Appendix E of this report.

TABLE 2-1
CHRONOLOGICAL SAMPLING LOG
BROWNING-FERRIS INDUSTRIES
CHESTNUT AVENUE LANDFILL
FRESNO, CALIFORNIA
LFG FIRED FLARE SYSTEM

TYPE	RUN NO.	DATE	TIME ON	TIME OFF
CARB 5	1	21 Jan 92	1334	1538
CARB 100	1	21 Jan 92	1335	1535
CARB 501	1	22 Jan 92	1003	1403
CARB 5	2	22 Jan 92	1542	1745
CARB 100	2	22 Jan 92	1530	1745
CARB 422	1-IN	22 Jan 92	1600	1630
CARB 422	1-OUT	22 Jan 92	1600	1630
CARB 501	2	23 Jan 92	0911	1311
CARB 100	3	23 Jan 92	1455	1725
CARB 422	2-IN	23 Jan 92	1500	1530
CARB 422	2-OUT	23 Jan 92	1500	1530
CARB 422	3-IN	23 Jan 92	1530	1600
CARB 422	3-OUT	23 Jan 92	1530	1600
CARB 5	5	24 Jan 92	1102	1302
CARB 501	3	24 Jan 92	1329	1729

3 SUMMARY OF RESULTS

The results of the source emissions test are summarized in Tables 3-1 and 3-2. These tables include source process data (stack gas flow rate, temperature, etc.), along with the emissions test results and sample analysis results.

TABLE 3-1

SUMMARY OF RESULTS - PERMIT CONDITIONS
Browning Ferris Industries
Chestnut Avenue Landfill
Fresno, California
January 21 to 24, 1992

Parameter	Units	Permit Limit	Result[a]	Result[b]
NMHC[d]	lb/hr	0.48	0.11	0.21
	lb/day	9.84	2.7	5.1
NOx (as NO_2)	lb/hr	3.54	0.83	1.6
	lb/mmBtu	0.08	0.07	NA[c]
	lb/day	84.96	19.9	38.5
SOx (as SO_2)	lb/hr	0.71	0.25	0.49
	lb/day	17.04	6.1	11.7
CO	lb/hr	17.68	<0.32	<0.61
	lb/mmBtu	0.40	<0.03	NA[c]
	lb/day	424.32	<7.7	<14.5
PM-10	lb/hr	3.33	0.48	0.94
	lb/day	80.00	11.6	22.5

[a] - average of results from three test runs at actual LFG flow conditions.

[b] - average of results from three test runs pro-rated to the permit maximum LFG flow rate.

[c] - not applicable to pro-rating to higher LFG flow rate.

[d] - Non Methane Hydrocarbon (as Methane).

TABLE 3-2

SUMMARY OF RESULTS - EMISSIONS TESTS
Browning Ferris Industries
Chestnut Avenue Landfill
Fresno, California
January 21 to 24 1992

Parameter	Units	Run 1	Run 2	Run 3
STACK GAS CONDITIONS				
Stack Temperature	°F	1386	1358	1441
Moisture	% vol	8.5	8.8	9.0
Dry Gas Meter Volume	DSCF	52.608	52.293	49.448
Gas Velocity	ft/sec	16.9	16.8	16.4
Gas Volume	ACFM	47,895	47,467	46,326
Gas Volume	DSCFM	12,393	12,469	11,602
% Isokinetic Rate	%	97.9	96.7	98.3
Oxygen	% vol	12.8	12.7	11.8
Carbon Dioxide	% vol	7.2	7.4	8.8
STACK EMISSIONS				
NMHC[a]				
Concentration	ppmv	3.54	3.73	3.50
Emission Rate	lb/hr	0.11	0.12	0.10
Carbon Monoxide				
Concentration	ppmv	<1.0	<4.8	<12.4
Emission Rate	lb/hr	<0.05	<0.26	<0.64
Sulfur Dioxide				
Concentration	ppmv	1.6	2.0	2.6
Emission Rate	lb/hr	0.20	0.25	0.31
Nitrogen Oxides				
Concentration	ppmv	7.8	10.1	10.3
Emission Rate	lb/hr	0.70	0.92	0.87
PM-10				
Concentration	gr/DSCF	0.006[b]	0.004	0.004
Emission Rate	lb/hr	0.60[b]	0.47	0.38
LANDFILL GAS ANALYSIS				
Carbon Dioxide	% vol	35	34.2	32.4
Oxygen	% vol	0.64	0.80	1.97
Nitrogen	% vol	33.9	34.4	36.8
Methane	% vol	31.2	30.8	29.1
NMHC	ppmv	6,080	6,640	6,780
FLARE DESTRUCTION EFFICIENCY				
NMHC	%	98.8	98.9	99.1

[a] - Non Methane Hydrocarbon
[b] - PM-10 sample was contaminated. Results presented are from the total particulate sampling run, (assuming all particulate was PM-10).

4 DISCUSSION OF RESULTS

The emission tests were performed in accordance with the approved Source Test Plan. All calculated isokinetic rate percentages were within the acceptable range of 90% to 110% for the sample runs.

Particulate sample Runs 3 and 4 were not representative due to excessive leakage which occured during the sampling run. In both cases a glass connector in the sample system broke allowing ambient air into the system. These samples were discarded.

Particle size sample Run 1 also was not representative due to contamination with metal particulate. The observed particulate was of a larger size than could have been drawn through the impactor plates. Thus, it is believed that this particulate came from the impactor casing. This sample was also discarded.

The PM-10 results for sample Run 1, contained in the summary tables, are the total particulate results without correction for the percentage of PM-10. However, this result, even without correction for PM-10, was less than the permit condition. The results for particulate sample Runs 2 and 5 were corrected for PM-10 and these results are also below the permit condition.

5 PROCESS DESCRIPTION

The landfill gas fired flare station is used to eliminate excess landfill gas produced at BFI's Chestnut Avenue Landfill site. The gas is combusted with air at a temperature in excess of 1400°F.

The flare is a state of the art system. The landfill gas is collected from the existing landfill field and is pulled by an air moving device for delivery under pressure to the flare system. The landfill gas passes through a condensate collection system to remove most of the entrained moisture before combustion. The combustion air and cooling air flows are controlled by a temperature sensor in the flare stack with a feedback loop to the automatic air control louvers. A temperature sensor also provides a signal for control of the landfill gas flow in case of combustion failure.

6 FIELD SAMPLING PROCEDURES

6.1 Introduction

The field sampling procedures that were used during the performance of this project are described in this section. The published reference Methods provide more detailed descriptions, and we have not sought to provide that level of detail here. However, these descriptions do include details regarding the choices of apparatus or procedures in those cases where the Methods allow a choice to be made.

6.2 Location and Number of Traverse Points

The sampling traverse points were located according to CARB Method 1. The Method includes a check for cyclonic flow in the stack, which was performed as documented on the field data sheets.

6.3 Gas Flow and Temperature Measurements

The stack gas volumetric flow rate was measured by CARB Method 2. Gas velocity heads were measured with a calibrated "S" type pitot tube connected to an inclined manometer. A Chromel-Alumel (K type) thermocouple, attached to a digital indicator, was used to measure the gas temperature at each of the traverse points.

The static pressure of the gas stream was measured using the same pitot tube and manometer. The pitot tube was rotated so that the tube openings were perpendicular to the gas stream, and one leg of the manometer was vented to atmosphere to provide a measure of the static pressure. The absolute stack gas pressure was determined by adding the static pressure to the absolute atmospheric pressure as measured on site with a calibrated aneroid barometer.

6.4 Particulate Matter Emissions

The emissions of Particulate Matter were measured by CARB Method 5. Figure 6-1 provides a diagram of the sampling apparatus. The components were assembled and operated as a sampling system as described in the Method.

The sampling probe was constructed of a single piece of quartz glass tubing, and included the isokinetic sampling nozzle. The heated filter holder was mounted on the end of the probe, and was connected to the impinger train with an umbilical of Teflon tubing. An umbilical connected the pitot tube, thermocouples, heaters and impinger train to the manometer, temperature readout, heater controls and pump and meter assemblies.

A gas sampling probe of stainless steel tubing was attached to the particulate probe and pitot tube assembly so that sample could be drawn for the continuous monitoring instruments at the same time and locations as the particulate sample was taken (see the Continuous Emission Monitors section).

A probe was chosen of sufficient length to provide a traverse of the sampling points in each quadrant of the stack. That is, four sampling ports were used to complete a traverse of the cylindrical stack. In this way, softening and "drooping" of the probe components in the hot stack gases was minimized.

At the completion of sampling from all traverse points, the sampling apparatus was leak checked according to the Method, disassembled and sealed for sample recovery. The sample was recovered from the probe, filter, umbilical and impinger train as specified by the Method. See the field data sheets for details.

6.5 Continuous Emission Monitors

On-line continuous analyzers were used to monitor the concentrations of carbon dioxide (CO_2), oxygen (O_2), carbon monoxide (CO), nitrogen oxides (NO_x), and sulfur dioxide (SO_2) in the stack gas. The monitoring was performed according to CARB Method 100. Figure 6-2 presents a schematic diagram of the monitoring system.

The instrument output signals were continuously recorded on a multi-channel strip chart recorder. The analyzers were calibrated, and the sampling system was checked for bias and

leaks, as described in the Method. The instrument calibrations were performed using EPA Protocol 1 gas mixtures, where applicable, and certified 1 % gases in the other cases. The monitoring instruments that were used are listed in Table 6-1, along with the method of detection and the applicable operating range for each.

The sampling probe was constructed of stainless steel tubing, and was mounted onto the particulate sampling probe assembly. Sample was drawn from all the traverse points during the particulate sampling run. A two-way stainless steel valve was attached to the outer end of the probe, for introduction of calibration gases for the system bias checks. A particulate filter assembly was attached to the calibration valve to complete the probe assembly.

The probe was attached to a moisture condensing system with a length of heated Teflon tubing. The moisture condensing system included at least two glass impingers with short inlet stems connected in series and immersed in an ice bath. The condensing system was connected to the Mobile Emissions Laboratory (MEL) with a length of Teflon tubing.

Inside the MEL, the sampling tube led through a secondary moisture knockout to the sampling pump. From the pump, pressurized sample was directed into a manifold system for distribution to the various analyzers. The manifold system included a series of valves for introduction of calibration gases through the manifold to the analyzers.

6.6 Tedlar Bag Samples

Tedlar bags were filled with sample gas from the flare stack according to CARB Method 422. Duplicate bags were filled from the MEL manifold and each was integrated from the stack traverse points.

Duplicate bags were also filled with samples of the landfill gas inlet to the flare. Each bag was connected to the sampling port with a short length of Teflon tubing, and filled slowly with sample from the pressurized inlet pipe. The bags were sent by courier to the analytical laboratory for next-day analysis.

6.7 Particle Size Distribution and PM-10

The particle size distribution was determined utilizing an Andersen Samplers Mark III Inertial Impactor. The results were used to calculate the PM-10 fraction of the total Particulate Matter emissions. Appendix C and D include a more detailed description of the data analysis and calculation methods.

The sampling apparatus included the Andersen Mark III Impactor with a straight sampling nozzle mounted on a probe of stainless steel tubing. The probe was bent to provide orientation of the sampling nozzle into the stack gas flow. The sampling probe was connected to a standard CARB Method 5 sampling train with a connecting line of Teflon tubing.

A single sampling point of average velocity was chosen from the results of the initial velocity traverse. Sample was drawn isokinetically from that traverse point through the Impactor to provide measurement of the distribution of the particle sizes. The particles were collected directly onto the impaction plates, as the stack gas temperature was too high for use of substrate materials.

The Andersen Mark III Impactor includes a series of impaction plates for separation of the sampled particles into size groups. Each impactor plate is perforated with a series of precision drilled orifices arranged in concentric circles which are offset on each succeeding plate. The orifice diameters on each plate are equal, but diameters decrease in size on each subsequent downstream plate. As the sample is drawn through the Andersen head, air jets flowing through a particular plate direct the suspended particulate matter toward the collection area on the next plate directly below the orifices of the plate above. The decrease in jet diameter from plate to plate results in an increase in gas jet velocity. A sufficiently large increase in velocity increases the inertial forces acting on a subject particle enough to overcome the aerodynamic drag of the turning airstream. The particles then impact onto the collection surface. An insufficient increase in gas velocity allows the particle to remain in the gas stream and to undergo another velocity increase as it passes through the jet on the next downstream plate. Therefore, particles of smaller diameters are impacted out on each successive downstream plate. The last plate supports a filter for collection of the particles not impacted out on any of the plates.

Upon completion of the sampling period, extreme care was exercised while handling the Andersen head. It was not jarred upon removal from the gas stream and was always handled face up. This was done to prevent displacement of fractionated particulate matter from one plate to another.

The plates were carefully removed from the head. Each plate was carefully removed from the stack and washed with water into a separate sealed sample bottle for subsequent analysis.

TABLE 6-1
CONTINUOUS EMISSION MONITORING EQUIPMENT

Parameter	Manufacturer	Model	Full Scale	Principle
SO_2	Western Research	721AT2	200 ppm	Ultra-violet
NO_x	TECO	10A	100 ppm	Chemilum.
O_2	Teledyne	320A	25%	Fuel Cell
CO_2	ACS	3300	20%	NDIR
CO	TECO	48	100 ppm	GFC NDIR

Figure 6-1 Method 5 Schematic

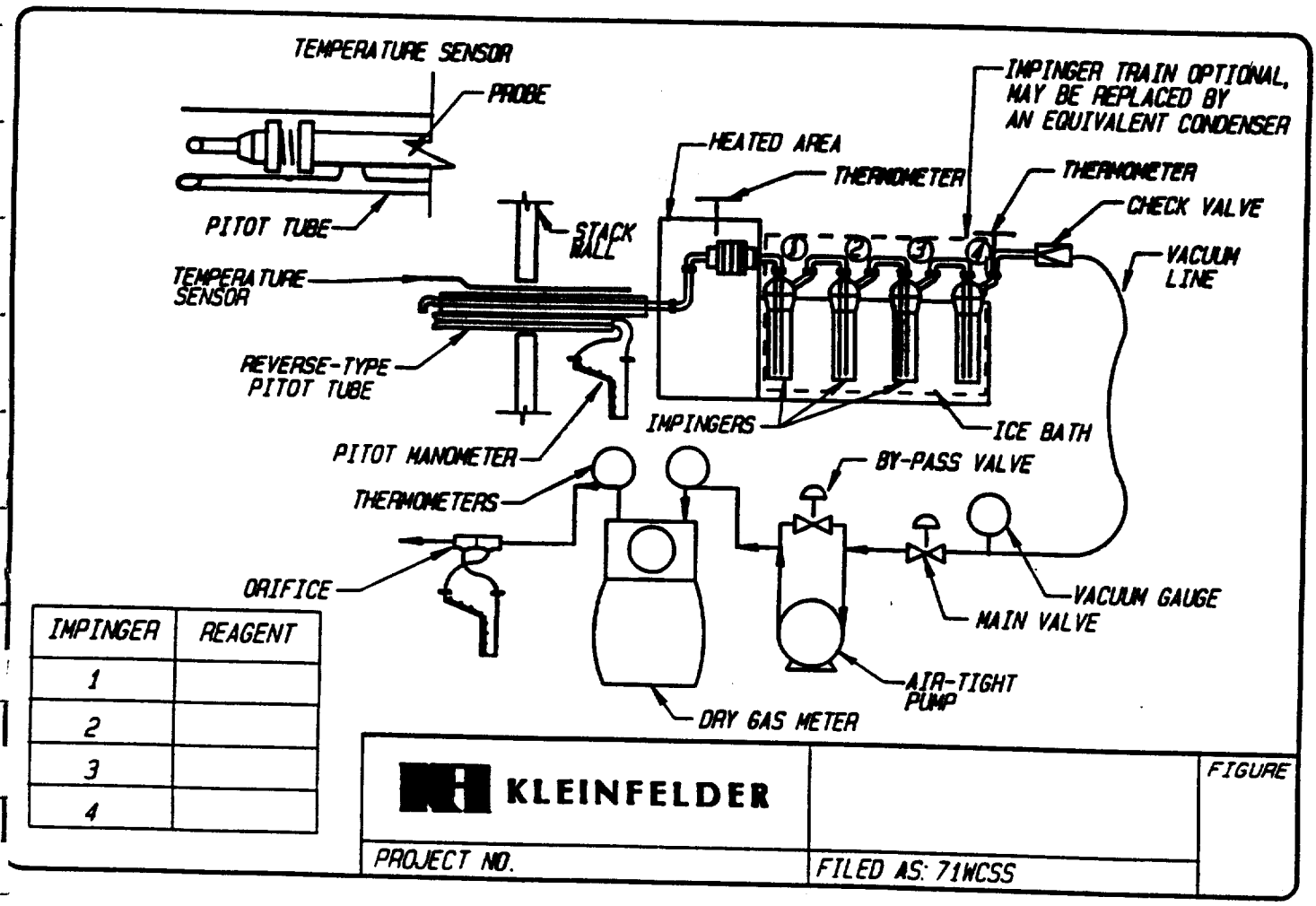
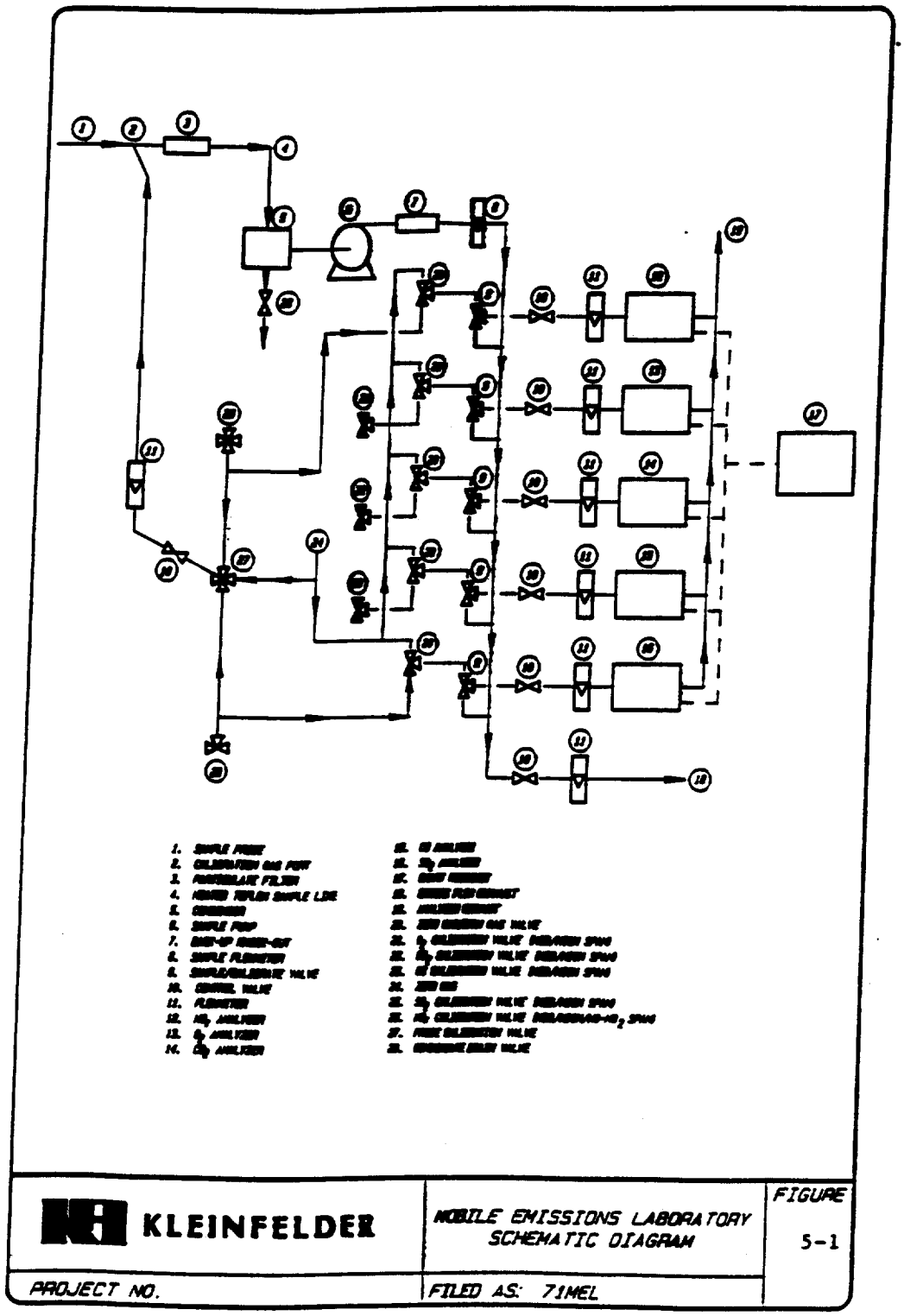


Figure 6-2 MEL Schematic



7 ANALYTICAL PROCEDURES

7.1 Introduction

The procedures described in this section were used for the analysis of the samples generated during the tests on the landfill gas fired flare station at Chestnut Avenue Landfill.

Samples of the landfill gas were collected at the flare inlet. Flare exhaust samples were collected in the stack above the flame zone. The samples were submitted to appropriate laboratories for the analysis of the various constituents that have been previously described. The following procedures were utilized:

7.2 Moisture Content

The principles of CARB Method 4 were used to determine the moisture content of the stack gas. The impingers from Method 5 particulate samples were used for the moisture analysis. The difference between the final impinger weight before the sample recovery and the initial weight was measured in the field to the nearest 0.1 gram.

7.3 Particulate Analysis

The analysis for particulate matter was conducted using CARB Method 5 procedures. Samples were recovered into three containers for each sampling run: 1) the probe, nozzle, filter holder front half, 2) the filter, and 3) the impinger contents, connecting glassware, Teflon sample line connecting the filter to the first impinger, and their associated washes.

The filters, including blanks, were desiccated for a minimum of 24 hours and weighed to constant weight. This was defined as a difference of no more than 0.5 milligrams or 1% of the resultant net weight, whichever was greater, between two consecutive weighings, with no less than 2 hours of desiccation time between weighings.

All liquid samples were evaporated to dryness at 105^{o}C in a tared beakers, desiccated and weighed to constant weight.

7.4 Particle Size Analysis

The analysis of the individual plate wash samples was conducted in similar fashion as the particulate matter washes. Each sample was dried and weighed to a constant weight as defined in CARB Method 5.

7.5 Tedlar Bag Analysis

Integrated Tedlar bag samples were taken at the inlet and the outlet of the flare station. The methane and total gaseous non-methane organics concentrations were analyzed by Gas Chromatography. The organic content of the sample was measured using a gas chromatographic column which separated the non-methane organics from carbon monoxide, carbon dioxide, and methane. The non-methane organics were oxidized to carbon dioxide, reduced to methane and measured using a flame ionization detector. This procedure eliminated the variable response of the flame ionization detector that is associated with different types of organics. All results were reported as parts per million of methane.

8 QUALITY ASSURANCE

8.1 Introduction

The quality of the data and results was assured by the use of proper equipment and procedures by qualified personnel. Each member of the test team had a minimum of one year source testing experience. The equipment was calibrated as documented in Appendix E, and operated as documented on the field data sheets presented in Appendix A. The data were validated during input to the computer spreadsheets used for the calculations, as shown in Appendix D.

8.2 General Quality Assurance Procedures and Calibrations

Each reference method for sampling and analysis includes quality assurance procedures as an integral part of the method. Those intrinsic quality assurance checks (leak-checks, continuous monitoring instrument calibrations, etc.) have been documented on the field data sheets.

Other required calibrations of sampling apparatus components have been performed according to the following procedures, which are documented on calibration sheets included in Appendix E.

a. Pitot tube: Compared to the measurement specifications of the reference test methods (see EPA Method 2).

b. Thermocouple/potentiometer systems: Compared to reference thermometer in ice, boiling water and hot oil, as described in the EPA Quality Assurance Handbook, Section 3.1.2.

c. Dry gas meter: Compared to a standard wet test meter as described in EPA Method 5.

d. Dry Gas Meter Orifice: Calibrated by the procedure described in EPA Method 5.

e. Aneroid Barometer: Compared to a mercurial barometer, as described in the EPA Quality Assurance Handbook, Section 3.1.2.

f. Trip and analytical balances: Compared to Class S standard weights as described in the EPA Quality Assurance Handbook, Section 3.4.2.

g. Probe nozzles: Measured in the field with a micrometer as described in EPA Method 5.

8.3 Participation in Audits

Kleinfelder regularly participates in audits from and of several different agencies. EPA audit materials for some phases of some of the reference methods are generally available, and we participate in both known and blind audits from time to time. Meter calibrations and Orsat analysis are the most common EPA audits. Some local agencies also provide audit materials to check the accuracy of the sampling and analysis methods. Kleinfelder participates in the CARB certification program, and continues to gain annual re-certification.

Specific audit materials were not included in the analysis of the samples for this project, but have been included on other similar and recent projects. Records of the periodic audit results from EPA audit samples, and from internal audit materials, are kept in the laboratory log book in the Kleinfelder laboratory.

8.4 Data Validation Procedures

Data validation and editing has been governed by a philosophy of assuring the representativeness of each piece of data to the tested process and to the body of data in the final report. The variation of a piece of data from the average for the replicate tests or from the norm for a particular process would have prompted an investigation of the production of that data. The variability of the process and of the test method would be considered when deciding the validity of data.

Validation information has been taken from several sources. First, the field data sheets, field computer printouts and any field strip charts will act as a source for validation of the input data and detection of any chart analysis or typographical errors. The calibration data sheets can also assist this process in some cases. Next, the laboratory data and results will assure that the proper samples were logged in and were properly analyzed, and that each result is matched with the correct sample. The replicate analysis results have been checked for statistical precision where applicable. Much of the data have been entered into

computer spreadsheet programs for calculation of the results and for verification of the field calculations. The experience of the plant process engineers or of the Kleinfelder staff has been used to assure reasonable comparison with typical process conditions. Previous report data from the same or a similar site have been used in some cases to compare results. Finally, the report has been reviewed by the Project Manager and checked for suspect data or results.

8.5 Chain of Custody Procedures

The Chain of Custody procedures used for this project included:

- Train component identification.
- Sample container identification.
- Sample labels.
- Documentation.
- Chain of custody forms.

The Chain of Custody activities were performed in sequence, and included:

- Preparation of the sampling train components in the laboratory including filter holders, impingers, and other sampling equipment identified by tags and codes.
- Sampling trains assembled in the field by the test team and component numbers recorded on the field data sheets.
- Sampling trains returned to the recovery area as valid samples were obtained, and accompanied by the field data sheets.
- Recovery of the samples into appropriate containers labeled with the sample number. The sample numbers were then recorded on the Chain of Custody form.
- Transport of samples to the Kleinfelder or other laboratory with the Chain of Custody form, and recording of the custody changes.
- Samples examined at each transfer point for integrity (broken containers, loss in liquid, or seal integrity).

Upon completion of the required analysis, the analyst returned the Chain of Custody form with the analytical results. Each sample was accounted for by a Kleinfelder project staff

member. Each laboratory identified samples in its own laboratory notebooks by the field I.D. number as well as any internal identification.

9 LIMITATIONS

This report was prepared in general accordance with the accepted standard of care that existed in Southern California at the time the report was written. It should be recognized that estimating possible emission scenarios and chemicals is difficult. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the facility. Kleinfelder should be notified for additional consultation if the client wishes to reduce the uncertainties beyond the level associated with this report. No warranty, expressed or implied, is made.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land or facility use, on and off-site conditions or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

FIELD DATA

Plant BFI CHESTNUT
Date 11/22/92
Test Site Flare Exhaust
Run Number P-T-10 @ T
Operator JK, PH

Ambient Temp 41
Barometer 30.14
Stack Pressure
Stack H2O %
Stack Dia

Meter ^H@ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.5"
Probe Length 4

Probe Mat'l
Filter Number
Samp Box #
PRE LEAK 0 cfm @ 15" Hg
POST LEAK 0 cfm @ 15" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O) Desired	ORIFICE PRESSURE (delta H, "H2O) Actual	TEMPERATURES STACK (Ts) 1	TEMPERATURES METER INLET 4	TEMPERATURES METER OUT 5	TEMPERATURES IMP # 3	TEMPERATURES FILTER	TEMPERATURES ~~PROBE~~	PUMP VAC. T°F "Hg SP @ Tbar
												SCFM	
N/A	0	10:03	62.752	N/A		0.1	1675	39	39	39	N/A	640	
	15	10:18				0.1	~~1223~~	39	39	38		638	
	30	10:33	68.185			0.1	1729	41	42	41		641	
	45	10:48	70.883			0.1	1705	41	42	41		635	
	60	11:03	73.555			0.1	1698	41	41	41		640	
	75	11:18	76.272			0.1	1655	40	42	40		634	
	90	11:33	78.961			0.1	1672	40	42	40		634	1599
	105	11:48	81.640			0.1	1673	40	42	40		636	1497
	120	12:03	84.352			0.1	1643	43	44	44		634	1605
	135	12:18	87.065			0.1	1671	43	44	44		634	1602
	150	12:33	89.732			0.1	1683	44	~~44~~ 45	45		641	1591
	165	12:48	92.415			0.1	1651	42	43	43		634	1549
	180	1:03	95.100			0.1	1666	42	43	43		641	1602
	195	1:18	97.768			0.1	1719	44	45	46		638	1603
AVERAGE /SUM			43.063										

from control room

FIELD DATA

Plant BFI CHESTNUT
Date 1-22-92
Test Site Flare exhaust
Run Number PM-10 #1
Operator

Ambient Temp
Barometer
Stack Pressure
Stack H2O %
Stack Dia

Meter ^H@
Meter Gamma
Meter Box #
Nozzle Diameter
Probe Length

Probe Mat'l
Filter Number
Samp Box #
PRE LEAK
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		TEMPERATURES						~~PUMP VAC.~~
					Desired	Actual	STACK (Ts) 1	METER INLET 4	METER OUT 5	IMP 3	FILTER	~~PROBE~~ SCFM	~~"Hg~~ T °F
N/A	210	1:38	100.264	N/A			~~42~~ 1760	42	43	44	N/A	641	1575
	225	1:48	103.115				1655	42	43	44		638	1603
	240	2:03	105.815				1710	42	43	44		641	1563
AVERAGE /SUM	240		43.063			0.1	1684	42		42			

KLEINFELDER, INC.

TRAIN RECOVERY SHEET

DATE 1/22/92

RUN# PM-10 #1 METHOD Part. Size

FACILITY BFI CHESTNUT

TYPE Sed.

TECHNICIAN JK

IMP. SOLUTION DI H_2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL(g)	NET(g)
IMPINGER # 1	100ml	631.5	524.3	107.2
IMPINGER # 2	100ml	556.6	556.3	0.3
IMPINGER # 3	Empty	469.8	469.6	0.2
IMPINGER # 4	Silica	719.8	710.9	8.9
DESCRIPTION				
IMPINGER RINSE				

	CONDITION	FINAL (g)	INITIAL(g)	NET (g)
SILICA GEL				

	NUMBER	DESCRIPTION
FILTER		

TOTAL MOISTURE (g) 116.60

FIELD BLANKS

DISPOSITION/COMMENTS

FIELD DATA

Plant BFI Chestnut
Date 1/23/92
Test Site Flare Exhaust
Run Number PM-10 #2
Operator JK, PH

Ambient Temp 38 °F
Barometer 30.14
Stack Pressure
Stack H20 % 10
Stack Dia 93

Meter ^H@ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.5
Probe Length 4

Probe Mat'l
Filter Number
Samp Box #
PRE LEAK 0 cfm @ 15" Hg
POST LEAK 0 cfm @ 15" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		TEMPERATURES					~~PUMP VAC.~~
					Desired	Actual	STACK (Ts)	METER INLET	METER OUT	IMP	FILTER	~~PROBE~~ scfm
N/A	0	0911	169.150		0.1	0.1	1450	60	61	44	N/A	647
	15	0926	171.825			0.1		60	61	44		642
	30	41	174.400			0.1		60	61	44		637
	45	56	176.895			0.1		60	61	44		642
	60	1011	179.415			0.1		61	62	45		641
	75	26	181.924			0.1		62	62	46		641
	90	41	184.825			0.1		64	64	43		641
	105	56	187.425			0.1		64	65	43		641
	120	1111	189.583			0.1		66	66	41		645
	135	26	191.740			0.1		66	66	40		636
	150	41	195.135			0.1		67	67	39		641
	165	56	198.535			0.1		68	69	39		641
	180	1211	201.924			0.1		68	69	39		641
	195	26	204.868					70	71	41		640
AVERAGE /SUM												

~~PUMP VAC.~~ T °F ~~Hg~~ SP @ 15.00
1597
1595
1595
1599
1600
1598
1570
1570
1603
1604
1603
1603
1604
1602

FIELD DATA

Plant: BFI Chestnut
Date: 2/23/92
Test Site: Flare Exhaust
Run Number: PM-10 #2
Operator: JK, PH

Ambient Temp:
Barometer:
Stack Pressure:
Stack H2O %:
Stack Dia:

Meter ^H@:
Meter Gamma:
Meter Box #:
Nozzle Diameter:
Probe Length:

Probe Mat'l:
Filter Number:
Samp Box #:
PRE LEAK:
POST LEAK:

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O) Desired	ORIFICE PRESSURE (delta H, "H2O) Actual	TEMPERATURES STACK (Ts)	TEMPERATURES METER INLET	TEMPERATURES METER OUT	TEMPERATURES IMP	TEMPERATURES FILTER	TEMPERATURES ~~PROBE~~ SCFM	~~PUMP~~ VAC. T °F "Hg
	210	1241	207.770					70	71	42	N/A	634	1603
	225	'56	210.665					71	71	42	↓	636	1601
	240	1311	213.705					71	71	42	↓	634	1602
													1597
AVERAGE /SUM	240		44.555			0.1		65		42		640	

KLEINFELDER, INC.

TRAIN RECOVERY SHEET #2

DATE 1/23/92 RUN# PM-10 METHOD Part Size

FACILITY BFI Chestnut TYPE PM-10

TECHNICIAN _____ IMP. SOLUTION H_2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL(g)	NET(g)
IMPINGER # 1	H_2O	743.0	631.5	111.5
IMPINGER # 2	H_2O	556.6	556.6	0
IMPINGER # 3	MT	469.8	469.8	0
IMPINGER # 4	S.l.ca	727.8	719.8	8
DESCRIPTION				
IMPINGER RINSE				

SILICA GEL	CONDITION	FINAL (g)	INITIAL(g)	NET (g)

FILTER	NUMBER	DESCRIPTION

TOTAL MOISTURE (g) 119.5

FIELD BLANKS _____

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DISPOSITION/COMMENTS

_____

_____

_____

FIELD DATA

Plant BFI Chestnut
Date 1/24/92
Test Site Flare Exhaust
Run Number PM-10 #3
Operator BH

Ambient Temp 41
Barometer 30.12
Stack Pressure
Stack H2O % 10
Stack Dia 93"

Meter ^H@ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.5
Probe Length 6'

Probe Mat'l
Filter Number
Samp Box #
PRE LEAK 0.005 cfm@12"
POST LEAK 0.005 cfm@15"

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (Ts)	METER INLET	METER OUT	IMP	~~FILTER~~ BFI Flow	~~PROBE~~ BFI Temp	
	0	1329	372.375		0.085			69	64	39	6		1
	15	1344	374.920		0.09			73	73	46	648	1598	1
	30	1359	377.345		0.09			77	76	46	651	1604	1
	45	1414	379.915		0.09			76	75	47	645	1604	1
	60	1429	382.465		0.09			76	76	46	644	1598	1
	75	1444	385.025		0.09			74	73	46	641	1603	1
	90	1459	387.535		09			75	73	43	648	1597	1
	105	1514	390.130		09			77	77	44	643	1598	1
	120	29	392.665		09			78	77	41	647	1601	1
	135	44	395.220		09			78	74	43	641	1603	1
	150	59	397.755		09			80	77	43	641	1604	1
	165	1614	400.290		09			79	78	43	642	1605	
	180	29	402.790		09			80	78	42	638	1594	
	195	44	405.320		09			82	77	44			
AVERAGE /SUM													

Plant BFI Chestnut
Date 1/24/92
POST LEAK RATE

Page 2 of 2
Run Number PM-10 #3
Operator PH

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V_m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H_2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (T_s)	PROBE Flow	FILTER Tem	IMP	METER INLET	METER OUTLET	
	210	1659	407.875		09			649	1597	42	83	78	1
	225	1714	410.610		09			645	1599	41	75	73	1
	240	29	413.365										
AVERAGE /SUM	240		40.990			09			1601	41	76		

KLEINFELDER, INC.

TRAIN RECOVERY SHEET PM-10

DATE 24 Jan 92 RUN# 3 METHOD Particle Size

FACILITY BFI Chestnut TYPE PM-10

TECHNICIAN _____ IMP. SOLUTION H_2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL(g)	NET(g)
IMPINGER # 1	H_2O	696.0	591.2	104.8
IMPINGER # 2	H_2O	549.3	556.6	-7.3
IMPINGER # 3	MT	469.8	469.8	0.0
IMPINGER # 4	Silica	733.7	727.8	5.9
DESCRIPTION				
IMPINGER RINSE				

SILICA GEL	CONDITION	FINAL (g)	INITIAL(g)	NET (g)

FILTER	NUMBER	DESCRIPTION

TOTAL MOISTURE (g) 103.4

FIELD BLANKS _____

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DISPOSITION/COMMENTS

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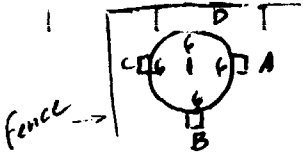
FIELD DATA



Plant SIFI CHESTNUT
Date 1/21/92
Test Site Flare Exhaust
Run Number Part #1
Operator JK, PH

Ambient Temp 37 °F
Barometer 30.06
Stack Pressure
Stack H_2O % 10
Stack Dia 93"

Meter $\Delta H_@$ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.625
Probe Length 6

Probe Mat'l
Filter Number
Samp Box #0204 TARE-0.406 kg
PRE LEAK 0 cfm @ 15" Hg
POST LEAK

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V_m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H_2O)		TEMPERATURES						PUMP VAC. "Hg	
					Desired	Actual	STACK (T_s)	PROBE	FILTER	IMP	METER INLET	METER OUTLET		
A 1	0	1334	013.035	0.02	0.71	0.71	1373	250	275	44	45	43	2	
2	4	38	15,015	0.03	1.1	1.1	1482	250	287	44	44	43	4	
3	8	42	17.055	0.02	0.73	0.73	1420	250	275	43	44	43	2	61 150
4	12	46	18.860	0.02	0.74	0.74	1408	250	275	40	43	42	3	62 14
5	16	50	20.700	0.02	0.77	0.77	1316	250	296	41	44	43	3	61 15
6	20	54	22,555	0.02	.82	.82	1206	250	284	42	46	46	3	61 149
	24	58	24.475	—	—	—	—	—	—	—	—	—	—	
B 1	24	1407	24.475	0.03	1.1	1.1	1566	250	200	43	48	40	4	614 149
2	28	11	26.565	0.02	0.72	0.72	1546	250	214	43	43	42	3	61 150
3	32	15	28.370	0.02	0.75	0.75	1375	250	246	42	44	43	3	
4	36	19	30.195	0.02	0.79	0.79	1383	250	254	42	44	43	3	614 150
5	40	23	32.100	02	0.90	.90	1072	250	271	42	44	43	3	61 14
6	44	27	34.100.	02	1.0	1.0	1092	250	242	44	44	44	3	
	48	31	36.185	—	—	—	—	—	—	—	—	—	—	
AVERAGE /SUM														

Plant BFI CHESTNUT
Date 1/21/92
POST LEAK RATE 0.0 cfm @ 15"

Page 2 of 2
Run Number Test #1
Operator JK, PH

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V_m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H_2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (T_s)	PROBE	FILTER	IMP	METER INLET	METER OUTLET	
C 1	48	1438	36.185	0.05	1.1	1.1	1490	250	282	[illegible]	41	41	4
2	52	42	38.295	0.04	1.5	1.5	1478	250	293	44	44	42	5
3	56	46	40.785	0.02	0.76	0.76	1351	250	290	45	45	45	3
4	60	50	42.640	0.02	0.75	0.75	1367	250	285	45	45	46	3
5	64	54	44.495	0.03	1.2	1.2	1280	250	285	44	44	44	4
6	68	58	46.455	0.03	1.3	1.3	1216	250	282	44	44	44	4
	72	1502	48.990	—	—	—	—	—	—	—	—	—	—
D 1	74	1504	48.990	0.04	1.4	1.4	1529	250	200	42	43	41	5
2	78	19	51.455	0.03	1.0	1.0	1508	250	203	41	44	43	4
3	80	22	53.545	0.03	1.0	1.0	1526	250	210	41	45	43	4
4	84	26	55.615	0.04	1.5	1.5	1452	250	211	4	43	43	5
5	88	30	58.045	0.03	1.2	1.2	1368	250	206	41	44	44	5
6	92	34	60.310	0.03	1.3	1.3	1171	250	204	43	44	45	4
	96	38	62.620	—	—	—	—	—	—	—	—	—	—
AVERAGE /SUM	96		49.585	0.1607		1.006	1386.5				43.5		

Ave = 613/1494

KLEINFELDER, INC.

TRAIN RECOVERY SHEET

DATE 21 Jan 92 RUN# 1 METHOD CARB 5

FACILITY BFI - Chestnut TYPE Particulate

TECHNICIAN _____ IMP. SOLUTION DI H_2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL (g)	NET (g)
IMPINGER # 1	DI H_2O	646.2	551.1	95.1
IMPINGER # 2	" "	563.4	562.3	1.1
IMPINGER # 3	MT	433.3	433.2	0.1
IMPINGER # 4	Silica	755.5	746.0	9.5
DESCRIPTION				
IMPINGER RINSE				

SILICA GEL	CONDITION	FINAL (g)	INITIAL (g)	NET (g)

FILTER	NUMBER	DESCRIPTION
	0204	Tare = 0.4069 g

TOTAL MOISTURE (g) 105.8

FIELD BLANKS _____

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DISPOSITION/COMMENTS

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_____

FIELD DATA

Plant BFI CHESTNUT
Date 11/22/92
Test Site Flare Enhancer
Run Number Run # 2
Operator JK, PH

Ambient Temp 40
Barometer 30.14
Stack Pressure
Stack H20 % 10
Stack Dia 93

Meter ^H@ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.625
Probe Length 6'

Probe Mat'l
Filter Number #6249 TARE 0.4
Samp Box #
PRE LEAK 0.015 cfm @ 15" Hg
POST LEAK 0.005 cfm @ 15" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (Ts)	METER INLET	METER OUT	IMP	FILTER	PROBE	
A 1	0	1542	105.920	0.04	1.3	1.3	1650	43	42	41	219	250	5
2	4	46	108.350	03	0.98	0.98	1647	43	43	41	241	250	4 627/1545
3	8	50	110.405	03	1.0	1.0	1540	43	44	40	247	250	4
4	12	54	112.520	03	1.2	1.2	1321	44	45	41	258	250	4 630/1586
5	16	58	114.675	03	1.2	1.2	1247	45	44	41	265	250	4
6	20	1602	116.895	03	1.4	1.4	1048	45	43	40	264	250	5 629/1549
—	24	06	119.250	—	—	—	—	—	—	—	—	—	—
B 1	28	1614	119.250	03	0.98	0.98	1633	45	44	41	237	250	4
2	28	18	121.375	02	0.69	0.69	1522	45	44	42	228	250	3 641/1608
3	32	22	123.145	02	0.69	0.69	1545	45	44	41	225	250	3
4	36	26	124.905	02	0.74	0.74	1285	44	44	42	236	250	3 640/1594
5	40	30	126.725	02	0.80	0.80	1250	44	43	41	239	250	3
6	44	34	128.625	02	0.98	0.98	940	45	44	41	241	250	4 634/1602
	48	38	130.695	—	—	—	—	—	—	—	—	—	—
AVERAGE /SUM													

TC #C

Plant BFI CHESTNUT
Date 1/22/92
POST LEAK RATE

Run Number PART. #2
Operator JR, PH

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V_m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H_2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (T_s)	PROBE	FILTER	IMP	METER INLET	METER OUTLET	
B1	48	1648	130.695	.62	.77	.77	1328	250	287	44	42	42	3
2	52	52	132.650	0.02	0.77	0.77	1335	250	290	44	43	42	3 634/1605
3	56	56	134.500	0.02	.79	0.79	1272	250	285	42	44	42	3
4	60	1700	136.395	03	1.2	1.2	1263	250	272	41	44	41	4 640/1600
5	64	04	138.650	03	1.3	1.3	1150	250	260	42	45	43	5
6	68	08	140.930	03	1.4	1.4	1034	250	264	42	45	43	5 641/1601
	72	12	143.280	—	—	—	—	—	—	—	—	—	—
A1	72	1721	143.280	0.03	1.1	1.1	1145	250	200	41	41	40	4
2	76	25	145.015	0.03	1.1	1.1	1454	250	207	41	41	41	4 644/1598
3	80	29	147.155	03	1.1	1.1	1430	250	212	40	42	41	4
4	84	33	149.285	03	1.1	1.1	1402	250	225	40	42	41	4 640/1597
5	88	37	151.415	02	.74	.74	1375	250	245	40	43	41	3
6	92	41	153.270	02	.74	.74	1396	250	250	40	42	41	3 643/1594
	96	45	155.030	—	—	—	—	—	—	—	—	—	—
AVERAGE /SUM	96		49.110	0.161		1.00	1358	250			43		

Ave = 631/1597

KLEINFELDER, INC.

TRAIN RECOVERY SHEET

DATE 1/22/92

RUN# ~~MRT.~~ #2 METHOD CARB 5

FACILITY BFI CHESTNUT

TYPE Sed.

TECHNICIAN JK

IMP. SOLUTION DI H_2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL (g)	NET (g)
IMPINGER # 1	100 ml	637.1	536.9	100.2
IMPINGER # 2	100 ml	553.9	553.7	0.2
IMPINGER # 3	Empty	433.8	433.3	0.5
IMPINGER # 4	Silica	763.6	755.5	8.1
DESCRIPTION				
IMPINGER RINSE				

SILICA GEL	CONDITION	FINAL (g)	INITIAL (g)	NET (g)

FILTER	NUMBER	DESCRIPTION
	0249	TARE-0.4041

TOTAL MOISTURE (g) 109.0

FIELD BLANKS

DISPOSITION/COMMENTS

FIELD DATA

Plant BFI Chestnut
Date 1/24/92
Test Site Flare Exhaust
Run Number PART. #5
Operator JE, PH

Ambient Temp 37
Barometer 30.12
Stack Pressure
Stack H20 % 10 %
Stack Dia 93

Meter ^H@ 1.80
Meter Gamma 1.020
Meter Box #
Nozzle Diameter 0.625
Probe Length 6'

Probe Mat'l
Filter Number
Samp Box #
PRE LEAK 0 cfm @ 15" Hg
POST LEAK 0 cfm @ 15" Hg

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (Vm)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (Ts)	METER INLET	METER OUT	IMP	FILTER	PROBE	
1 P	0	1102	321.655	04	1.2	1.2	2000	71	71	48	202	250	10
2	4	06	323.065	03	1.1	1.1	1582	73	71	47	209	250	9 (641/1404)
3	8	10	326.270	03	1.0	1.0	1619	66	65	42	224	250	8
4	12	14	328.400	03	1.1	1.1	1598	66	65	46	257	250	9 (644/1597)
5	16	18	330.535	03	.96	.96	1800	69	67	46	262	250	8
6	20	22	332.640	03	1.3	1.3	823 / 1497	64	63	43	251	250	14 (634/1594)
	24	26	335.175	—	—	—	—	—	—	—	—	—	—
1 C	24	1134	335.175	03	1.1	1.1	1523	66	66	42	230	250	8
2	28	38	337.200	02	.71	.71	1559	65	64	43	208	250	6 (641/1402)
3	32	42	339.050	03	1.1	1.1	1516	67	68	44	216	250	7
4	36	46	341.225	02	.77	.77	1404	66	66	41	249	250	6 (638/1401)
5	40	50	343.055	02	0.86	.86	1214	66	66	40	270	250	7
6	44	54	345.060	02	.91	.91	1123	66	67	43	274	250	7 (641/1402)
	48	58	347.100	—	—	—	—	—	—	—	—	—	—
AVERAGE /SUM													

Plant BFI Chestnut
Date 1/24/92
POST LEAK RATE

Page 2 of 2
Run Number PART. #5
Operator JE, PH

TRAVERSE POINT NUMBER	ELAPSED TIME (mins)	CLOCK TIME	GAS METER READING (V_m)	VELOCITY HEAD (delta p)	ORIFICE PRESSURE (delta H, "H_2O)		TEMPERATURES						PUMP VAC. "Hg
					Desired	Actual	STACK (T_s)	PROBE	FILTER	IMP	METER INLET	METER OUTLET	
1 B	48	1206	347.100	02	.74	.74	1502	250	290	42	70	70	6
2	52	10	349.035	02	.73	.73	1524	250	297	42	71	71	6 641/1602
3	54	14	350.895	02	.76	.76	1437	250	287	39	70	70	6 643/1601
4	56	18	352.790	02	.77	.77	1411	250	280	39	70	69	6
5	62	22	354.700	02	.81	.81	1325	250	288	38	70	70	7 646/1598
6	68	26	356.665	02	.96	.96	1046	250	289	42	73	73	7
	70	30	358.770	—	—	—	—	—	—	—	—	—	—
1 A	72	1238	358.770	0.02	.71	.71	1571	250	253	39	75	74	6
2	76	42	360.641	02	.74	.74	1495	250	250	38	74	74	6 640/1604
3	80	46	362.525	03	1.1	1.1	1438	250	258	38	72	71	9
4	84	50	364.750	02	.77	.77	1411	250	237	42	73	71	7 641/1603
5	88	54	366.655	02	.78	.78	1395	250	231	42	73	73	7
6	92	58	368.585	02	0.83	.83	1275	250	224	42	73	72	7 641/1597
	96	1302	370.535	—	—	—	—	—	—	—	—	—	—
AVERAGE /SUM	96		48.880	0.154		0.925	1441	250			69		

KLEINFELDER, INC.

TRAIN RECOVERY SHEET

DATE 1/24/92 RUN# ~~PM~~ 5 METHOD CARB 5

FACILITY BFI Chestnut TYPE Sed

TECHNICIAN JK IMP. SOLUTION DI H2O

	SOLUTION	VOL. (ml)	DESCRIPTION
NOZZLE-PROBE RINSE			
UMBILICAL RINSE			

	SOLUTION	FINAL (g)	INITIAL(g)	NET(g)
IMPINGER # 1	100 ml	637.6	542.8	94.8
IMPINGER # 2	100 ml	550.3	549.2	1.1
IMPINGER # 3	Empty	433.0	432.4	0.6
IMPINGER # 4	Silica	705.3	695.9	9.4
DESCRIPTION				
IMPINGER RINSE				

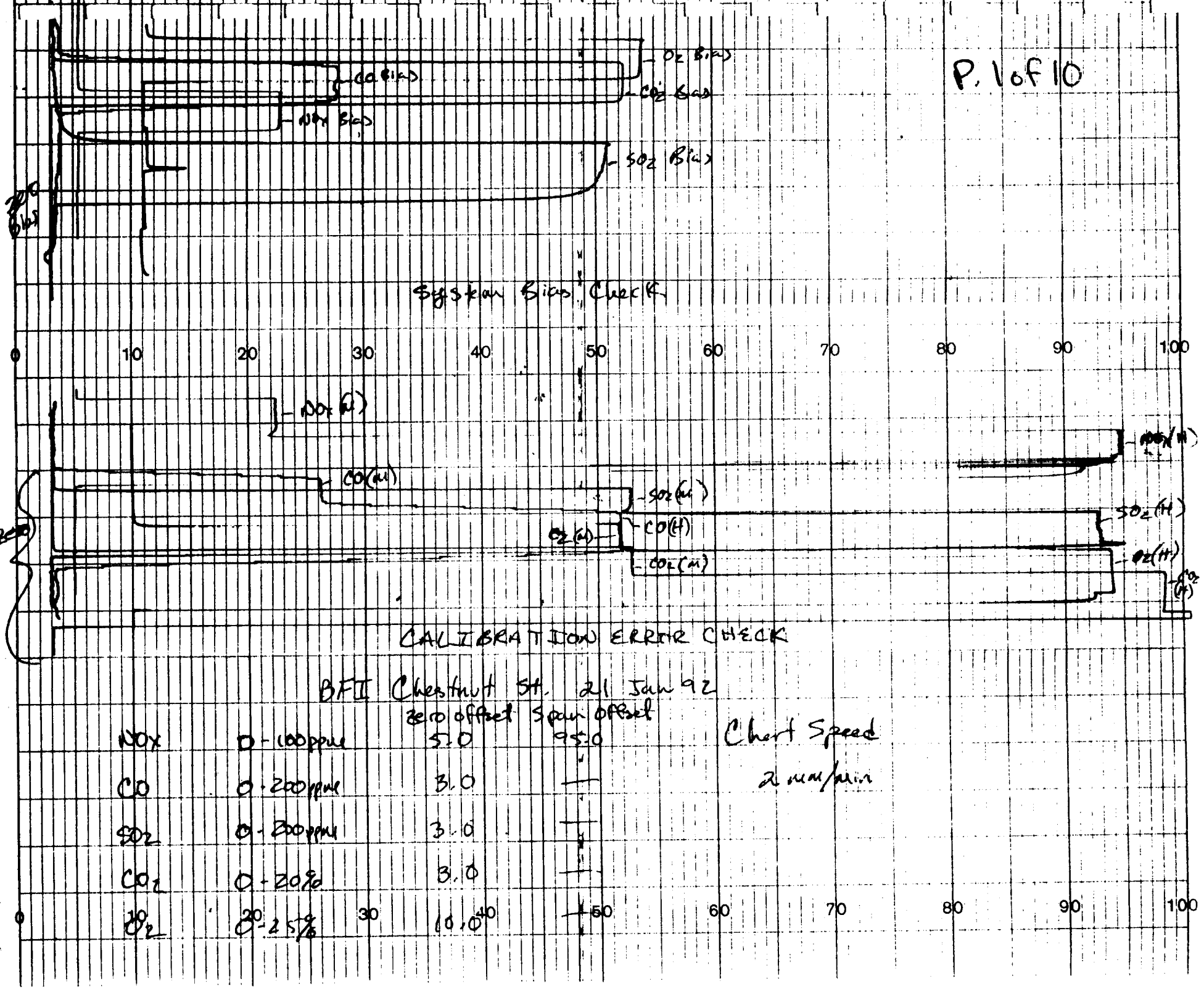
SILICA GEL	CONDITION	FINAL (g)	INITIAL(g)	NET (g)

FILTER	NUMBER	DESCRIPTION
	# 0205	TARE - 0.4048g

TOTAL MOISTURE (g) 105.9

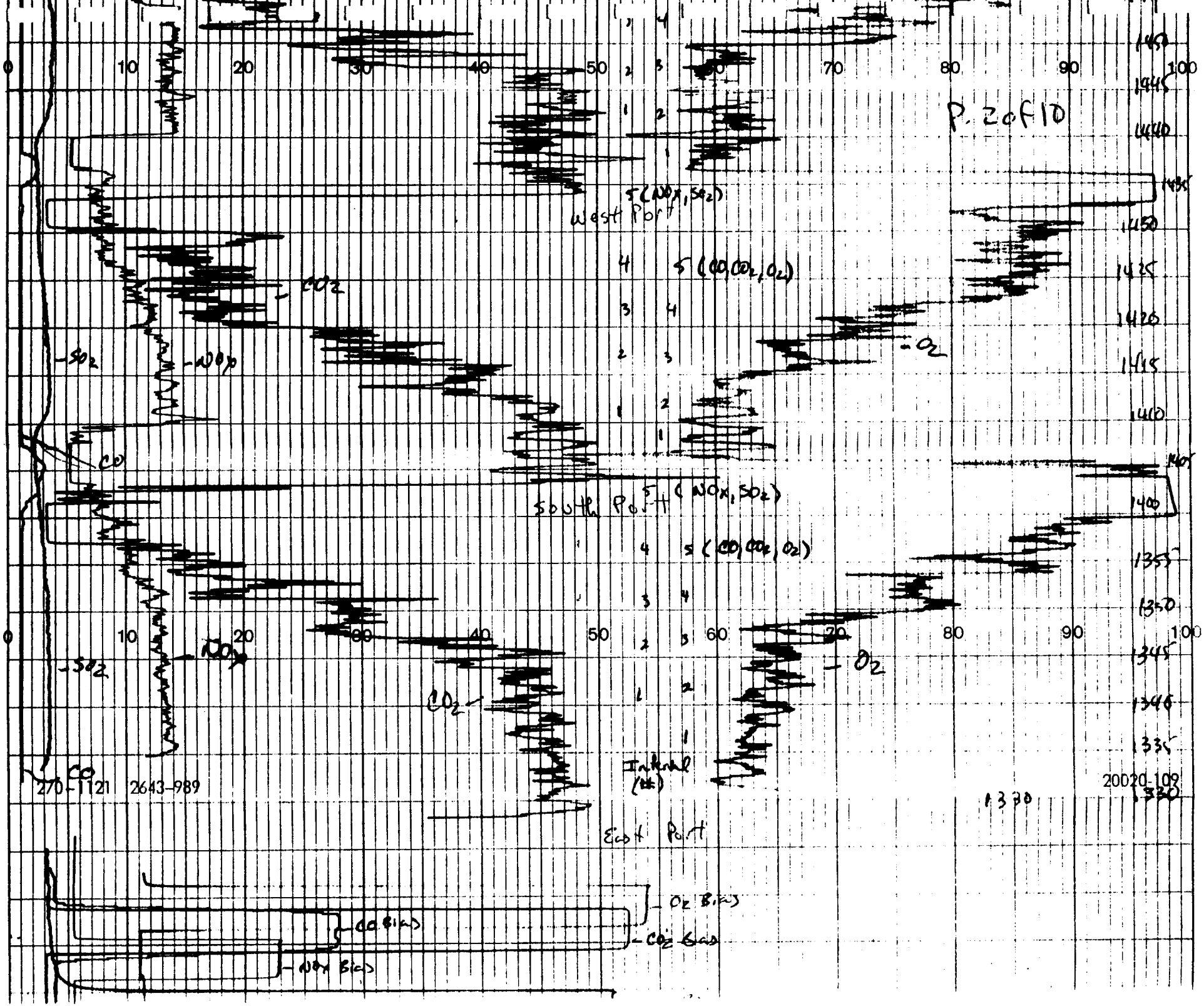
FIELD BLANKS

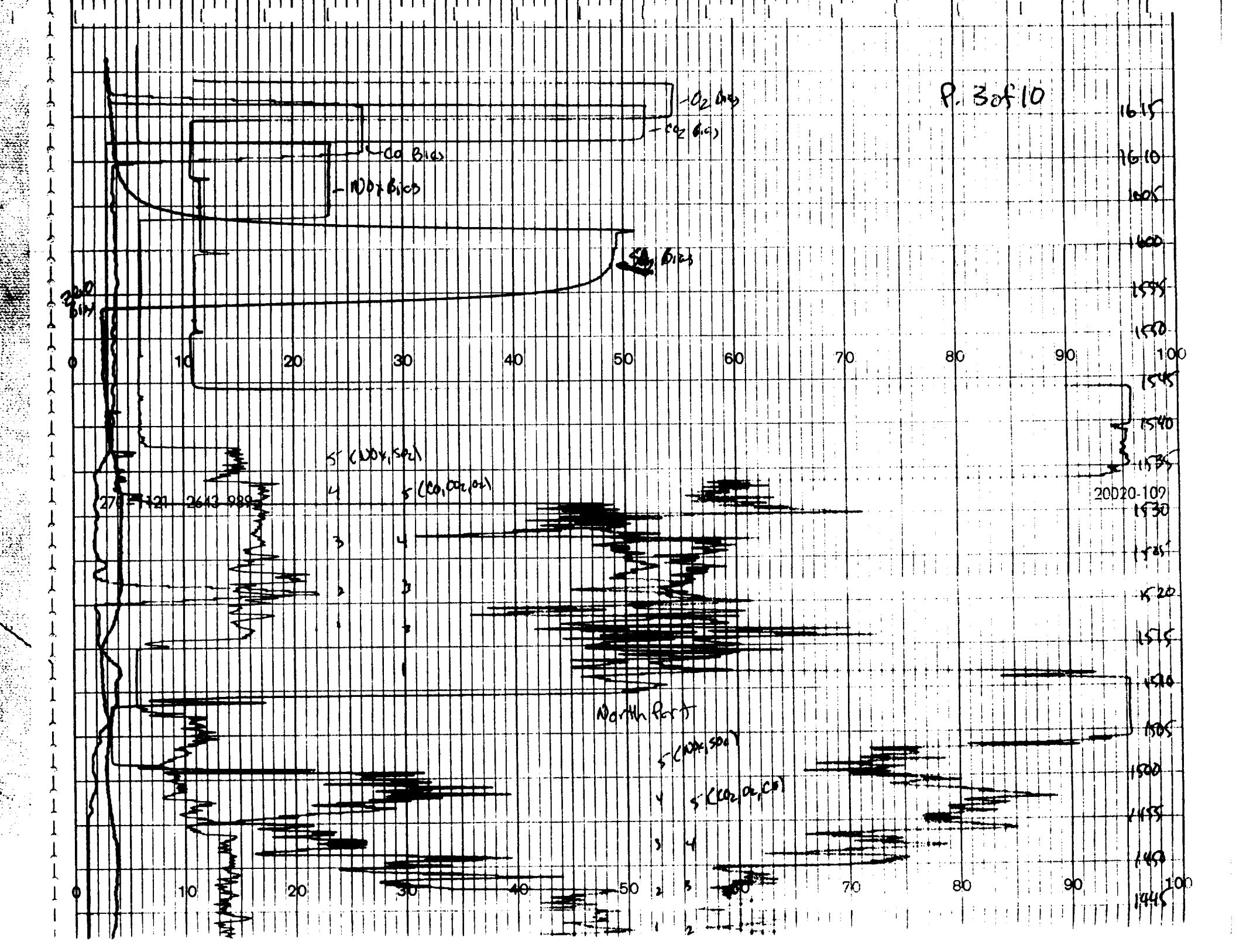
DISPOSITION/COMMENTS



BFII Chestnut St. 21 Jan 92

		Zero offset	Span offset	Chart Speed
NOx	0 - 100ppm	5.0	95.0	2 mm/min
CO	0 - 200ppm	3.0		
SO_2	0 - 200ppm	3.0		
CO_2	0 - 20%	3.0		
O_2	0 - 25%	10.0		


P. 2 of 10
West Port
S (NOx, SO2)
S (CO, CO2, O2)
- CO2
- SO2
- NOx
- O2
CO
South Port
S (NOx, SO2)
S (CO, CO2, O2)
- SO2
- NOx
- CO2
- O2
Interval (ft)
East Port
- O2 Bias
- CO2 Bias
- CO Bias
- NOx Bias
270-1121 2643-989
20020-109


O2 Bias
CO2 Bias
CO Bias
NOx Bias
SO2 Bias
2000 Bias
0
10
20
30
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60
70
80
90
100
1615
1610
1605
1600
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1500
1495
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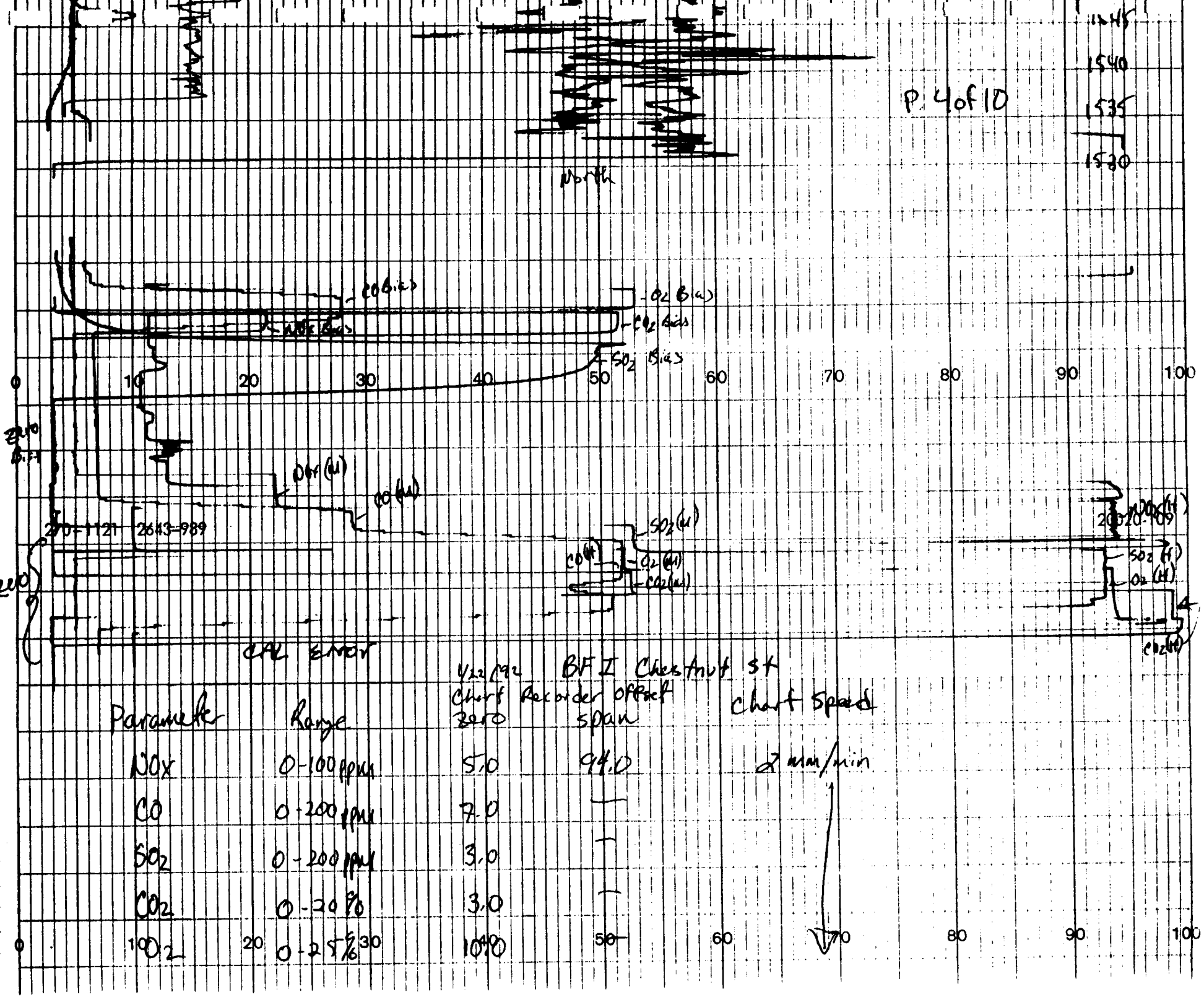
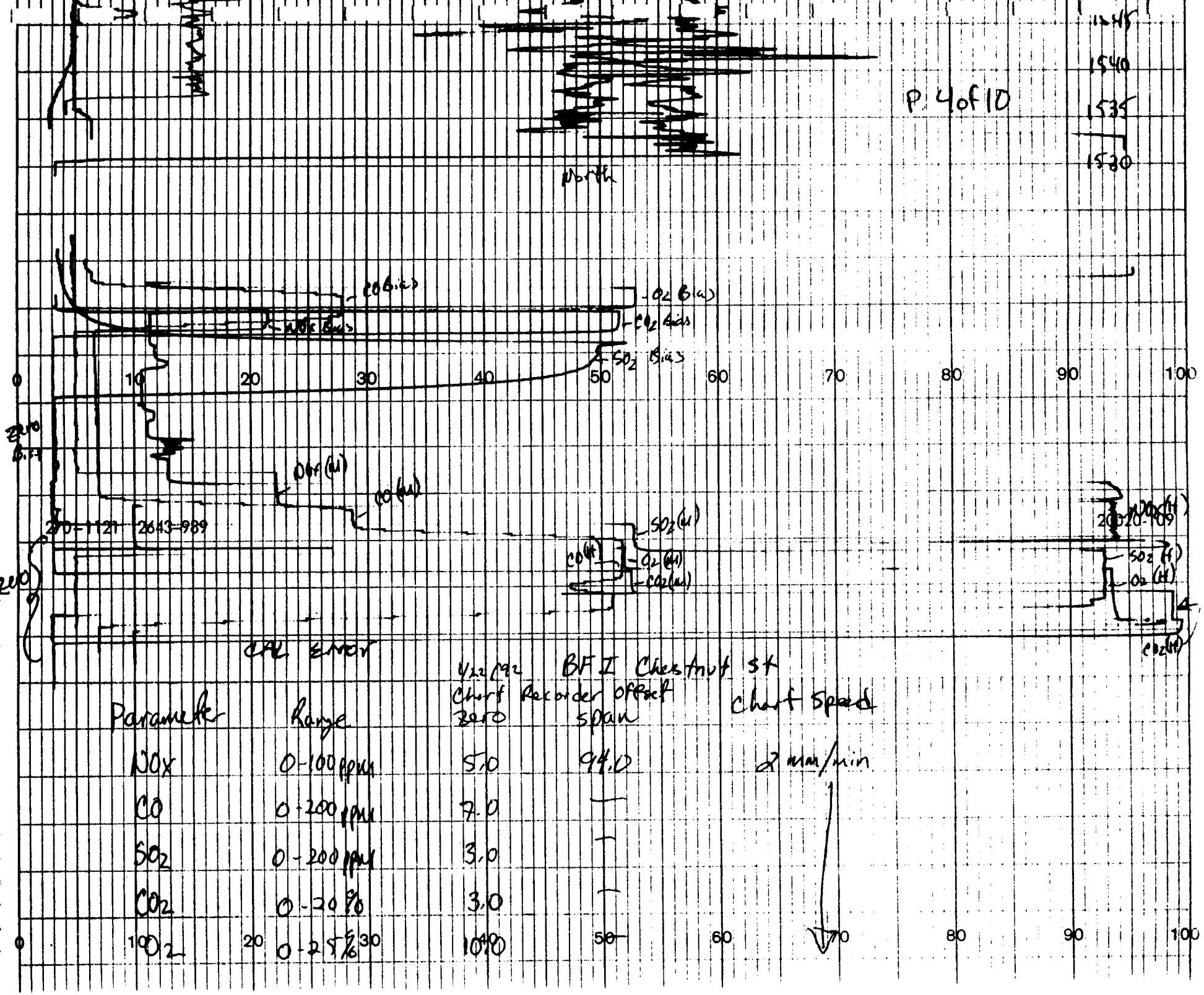
1485
1480
1445
20020-102
North Port
5 (NOx, SO2)
4 (CO, CO2, O2)
5 (NOx, SO2)
4 (CO2, O2, CO)



Parameter	Range	Chart Zero	Recorder offset span	Chart Speed
NOx	0-100 ppm	5.0	94.0	2 mm/min
CO	0-200 ppm	7.0	—	
SO_2	0-200 ppm	3.0	—	
CO_2	0-20 %	3.0	—	
O_2	0-25 %	10.0	—	

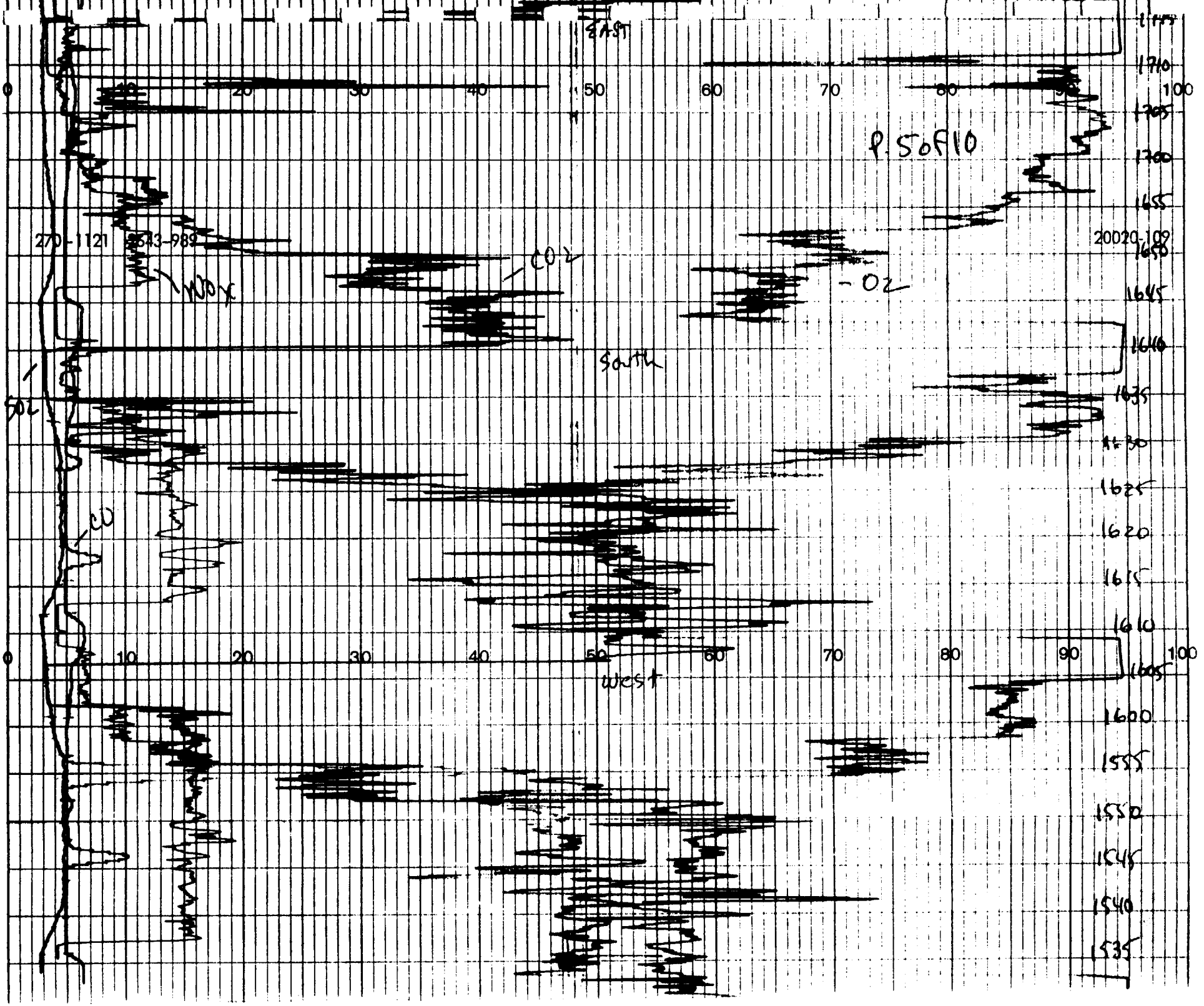
1/22/92
BFI Chestnut St



1/22/92 BFII Chestnut St

Parameter	Range	Chart Recorder Zero	Chart Recorder Span
NOx	0-100 ppm	5.0	94.0
CO	0-200 ppm	7.0	
SO_2	0-200 ppm	3.0	
CO_2	0-20 %	3.0	
O_2	0-25 %	10.0	

Chart Speed: 2 mm/min


EAST
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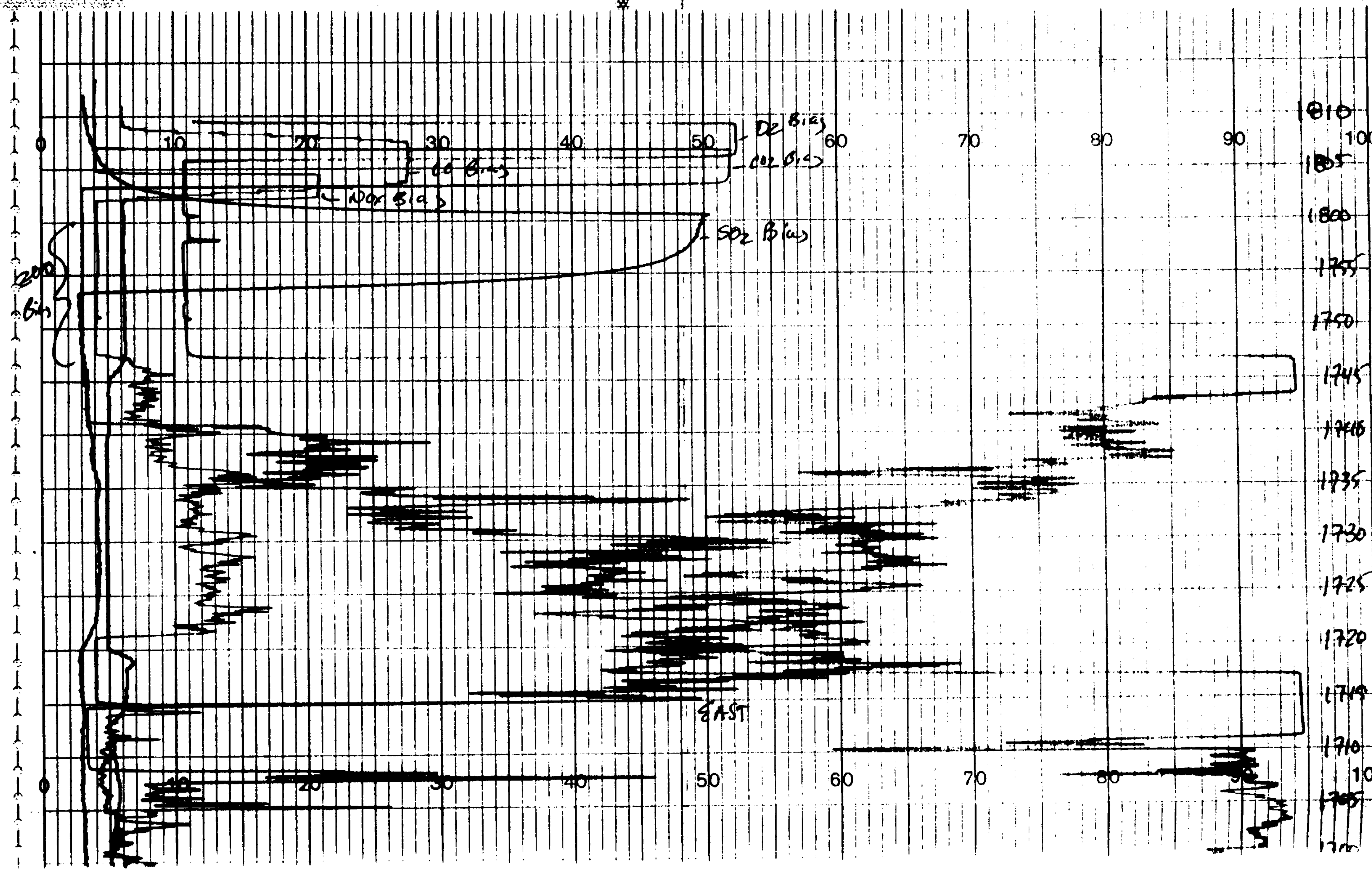
P.5 of 10
270-1121
20020-109
NOx
CO2
O2
SO2
CO
South
West

P. 6 of 10



O2 Bias
CO2 Bias
CO Bias
NOx Bias
SO2 Bias
ZERO Bias
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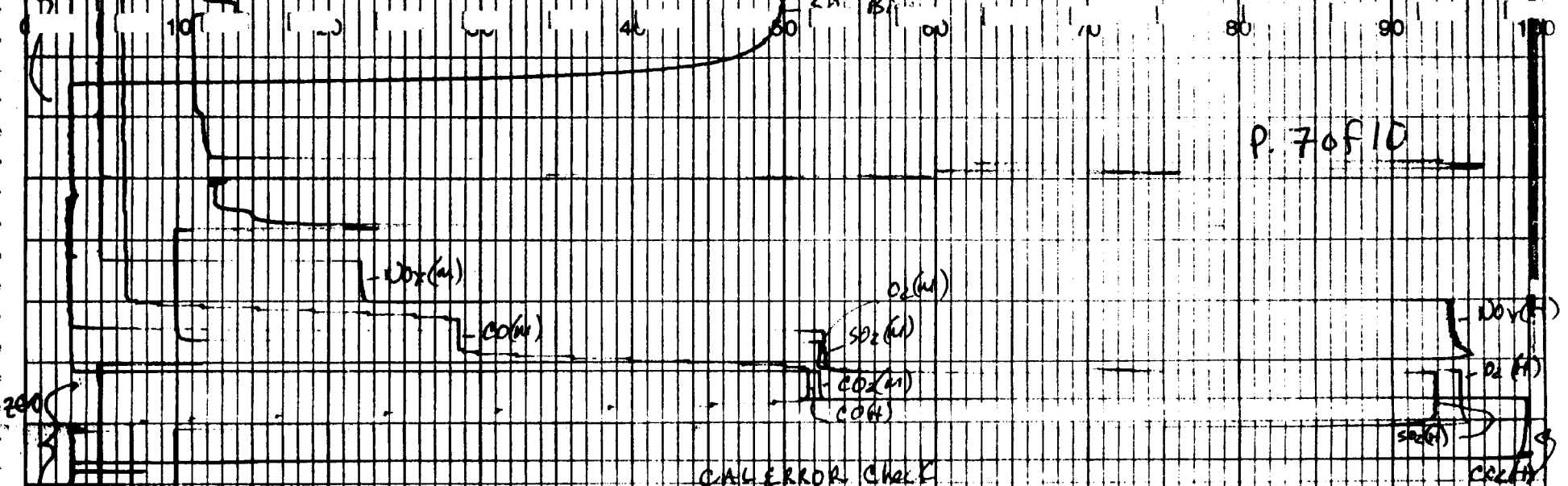
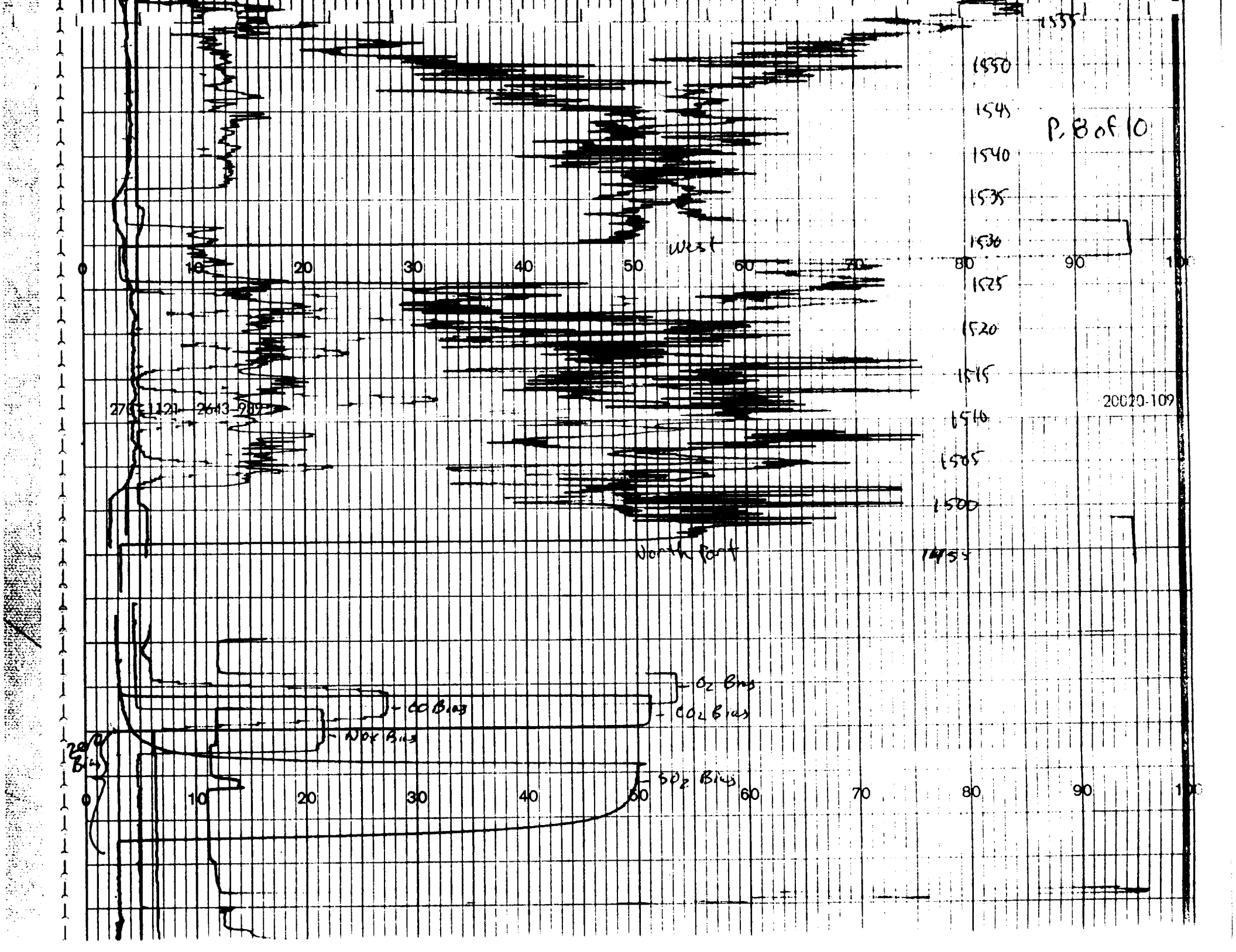


CAL ERROR Check

23 Jan 92 BFI Chestnut St.

Parameter	Range	Chart Recorder Offset Zero	Span	Chart Speed
NOx	0-100 ppm	5.0	94.0	2 mm/min
CO	0-200 ppm	6.5	—	
SO_2	0-200 ppm	8.0	—	
CO_2	0-20%	3.0	—	
O_2	0-25%	10.0	—	


P. 8 of 10
West
North Face
20020-109
O2 Brg
CO2 Brg
CO Brg
NOx Brg
SO2 Brg
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P 9 of 10
20020-109
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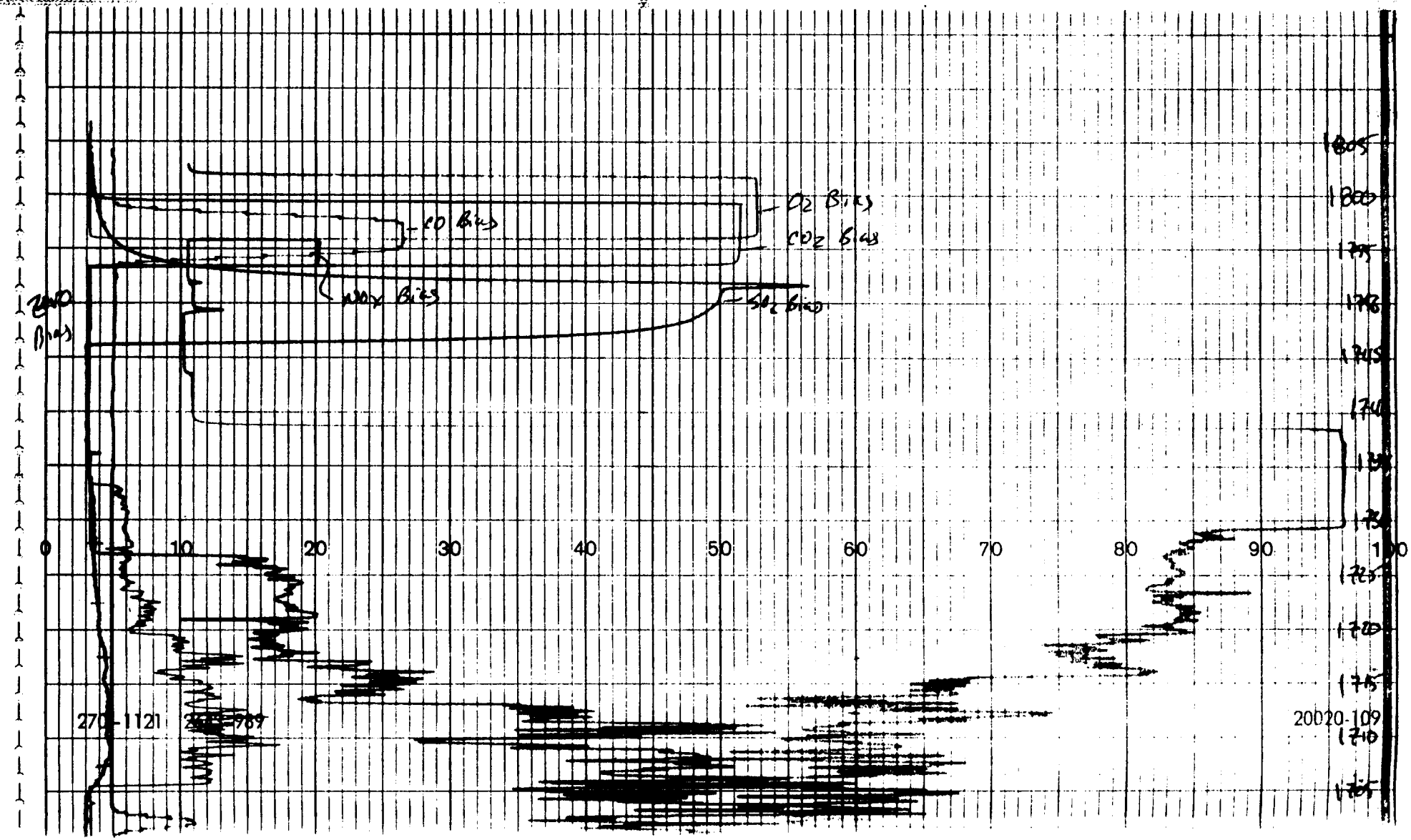
0
Aux b (from manifold exhaust)
Earth


CO Bias
O2 Bias
CO2 Bias
NOx Bias
SO2 Bias
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20020-109

KLEINFELDER, INC.
Diamond Bar, California

LABORATORY DATA
PARTICULATE DRYDOWNS

DATE ANALYZED _____

DATE FINISHED _____

ANALYST Jon R

TEST DATE 1/23-24/92

FACILITY BF1 Chestnut

BOOK PAGE	FRACTION	BEAKER/ FILTER NO.	ALIQUOT FACTOR	GROSS WT (gm)	TARE WT (gm)	(NET WT * AF) - BLANK = FINAL
	RUN NO. PM-10 #2 LABORATORY CONTROL NO.					
5	Plate #1	B11	1	109.9479	109.9474	0.0005
7	#2	B04	1	111.3652	111.3627	0.0025
7	#3	B06	1	109.8647	109.8609	0.0038
7	#4	B05	1	109.7371	109.7358	0.0013
7	#5	B08	1	110.1673	110.1668	0.0005
7	#6	B10	1	109.6780	109.6749	0.0031
9	#7	F08	1	111.9139	111.9087	0.0052
9	#8	F06	1	114.8294	114.8246	0.0048
	RUN NO. PM-10 #3 LABORATORY CONTROL NO.					
9	Plate #1	A10	1	103.1024	103.0892	0.0132
9	#2	F03	1	116.9462	116.9386	0.0076
9	#3	F05	1	115.4618	115.4525	0.0093
10	#4	F07	1	113.3728	113.3675	0.0053
10	#5	F04	1	114.1383	114.1310	0.0073
10	#6	F01	1	113.3602	113.3483	0.0119
10	#7	F02	1	117.6260	117.6086	0.0174
5	#8	B12	1	109.6737	109.6720	0.0017
	RUN NO. LABORATORY CONTROL NO.					

FRACTIONS:
A = FILTER CATCH
B = PROBE CATCH
C = IMPINGER CATACH
F = SOLVENT CATCH
AF = TOTAL VOLUME / ALIQUOT VOLUME

KLEINFELDER, INC.
Diamond Bar, California

LABORATORY DATA
PARTICULATE DRYDOWNS

DATE ANALYZED _____

DATE FINISHED _____

ANALYST Jon D

TEST DATE 1/21/92

FACILITY BFI Chestnut

BOOK PAGE	FRACTION	BEAKER/ FILTER NO.	ALIQUOT FACTOR	GROSS WT (gm)	TARE WT (gm)	(NET WT * AF) - BLANK = FINAL
	RUN NO. Part #1 1/21/92 LABORATORY CONTROL NO.					
11	Filter	020d	1	0.4117	0.4069	0.0048g = 4.8mg
2	Front	D05	1	116.4550	116.4538	0.0012g = 1.2mg
2	Back	D04	1	119.4247	119.4185	0.0062g = 6.2mg
3	Back	D09	1	117.0585	117.0515	0.0070g = 7.0mg
						Total = 19.2mg
	RUN NO. Part #2 2/22/92 LABORATORY CONTROL NO.					
11	Filter	0249	1	0.4068	0.4041	0.0027g = 2.7mg
3	Front	D06	1	113.4847	113.4835	0.0012g = 1.2mg
3	Back	D02	1	116.8324	116.8285	0.0039g = 3.9mg
3	Back	D10	1	116.1426	116.1310	0.0116g = 11.6mg
						Total = 19.4mg
	RUN NO. Part #5 2/24/92 LABORATORY CONTROL NO.					
11	Filter	0205	1	0.4140	0.4018	0.0122g = 12.2mg
4	Front	C11	1	89.3234	89.3234	0.0005g = 0.5mg
6	Back	A02	1	110.6994	110.6953	0.0041g = 4.1mg
5	Back	A03	1	110.9022	110.8963	0.0059g = 5.9mg
						Total = 22.7mg

FRACTIONS:
A = FILTER CATCH
B = PROBE CATCH
C = IMPINGER CATCH
F = SOLVENT CATCH
AF = TOTAL VOLUME / ALIQUOT VOLUME

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

January 23, 1992

LTR/036/92
238

Kevin Crosby
Kleinfelder, Inc.
1370 Valley Vista Drive
Suite 150
Diamond Bar, CA 91765

re: Project: BFI Chestnut

Dear Kevin:

Please find enclosed the laboratory analysis report, quality assurance summary, and the original chain-of-custody form for two Tedlar bag samples received on January 22, 1992.

The samples were analyzed for methane, total gaseous non-methane organics TGNMO), carbon monxoide, and permanent gases.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/kp

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Methane, TGNMO, Carbon Monoxide, & Permanent Gases Analysis in Tedlar Bag Samples

Report Date:	January 23, 1992
Project No.:	70-4107-22
Site:	BFI Chestnut
Date Received:	January 22, 1992
Date Analyzed:	January 22, 1992

ANALYSIS DESCRIPTION

Methane, total gaseous non-methane organics (TGNMO), and carbon monoxide were analyzed by flame ionization detection/total combustion analysis, SCAQMD Method 25, analysis portion. Nitrogen, oxygen, and carbon dioxide were analyzed by thermal conductivity detection/gas chromatography (TCD/GC).

AtmAA Lab No.:	90222-1	90222-2
Sample I.D.:	Inlet 1	Outlet 1
	LFG	Flare Exhst.
	(Concentration in ppm, v/v)	
Components:		
Methane		<1
TGNMO	6080	3.54
Carbon Monoxide	16.0	16.4
	(Concentration in %, v/v)	
Nitrogen	38.9	80.1
Oxygen	0.64	11.2
Methane	31.2	
Carbon Dioxide	35.0	10.3

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analysis)

Project No.: 70-4107-22
AtmAA No.: 238
Site: BFI Chestnut

Component:	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppm, v/v)			
TGNMO	Inlet 1	5900	6250	6080	2.9
Carbon Monoxide	Outlet 1	16.5	16.2	16.4	0.92
		(Concentration in %, v/v)			
Nitrogen	Outlet 1	79.9	80.3	80.1	0.25
Oxygen	Outlet 1	11.3	11.0	11.20	1.3
Methane	Inlet 1	31.2	31.3	31.2	0.16
Carbon Dioxide	Inlet 1	34.9	35.1	35.0	0.28

A set of 2 Tedlar bag samples, laboratory numbers 90222-(1 & 2) was analyzed for methane, TGNMO, carbon monoxide, and permanent gases. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean." Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 6 repeat measurements from the sample set of 2 Tedlar bag samples is 0.97%.

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	SENT TO:
	BFI-Chestnut	K. Crosby	Atm AA
Samples Collected By: Kleinfelder		Phone: 396 0335	SHIPPED VIA: Fed EX
			SHIPPED BY: Kleinfelder

Lab No.	Test Date	Sample Description (Container, Media, Volume, etc.)	ANALYSIS REQUIRED: TGNMO	C1-4	Fixed* Gases		AtmAA Lab#				Remarks
Inlet-1	1/21/92	Inlet LFG Sample (1600)	X	X	X		90022-1				* O_2, CO_2, N_2, CO
Outlet-1	1/21/92	Outlet Flare Exhaust (1530)	X	X			-2				

Relinquished by:	Date/Time	Received by:	Reason for Exchange:	Comments:
M. Bell Phone: 396 0335	1/21/91 1730	[signature] Of: AtmAA, Inc.	1/22/92	
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

January 24, 1992

LTR/039/92
238

Kevin Crosby
Kleinfelder, Inc.
1370 Valley Vista Drive
Suite 150
Diamond Bar, CA 91765

re: Project: BFI Chestnut

Dear Kevin:

Please find enclosed the laboratory analysis report, quality assurance summary, and the original chain-of-custody form for four Tedlar bag samples received on January 24, 1992.

The samples were analyzed for methane, total gaseous non-methane organics (TGNMO), carbon monoxide, and permanent gases.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/kp

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Methane, TGNMO, Carbon Monoxide, & Permanent Gases Analysis in Tedlar Bag Samples

Report Date: January 24, 1992
Project No.: 70-4107-22
Site: BFI Chestnut
Date Received: January 24, 1992
Date Analyzed: January 24, 1992

ANALYSIS DESCRIPTION

Methane, total gaseous non-methane organics (TGNMO), and carbon monoxide were analyzed by flame ionization detection/total combustion analysis, SCAQMD Method 25, analysis portion. Nitrogen, oxygen, and carbon dioxide were analyzed by thermal conductivity detection/gas chromatography (TCD/GC).

AtmAA Lab No.:	90242-1	90242-2	90242-3	90242-4
Sample I.D.:	Inlet #2	Inlet #3	Exhaust #2	Exhaust #3
	(Concentration in ppm, v/v)			
Components:				
Methane			<1	<1
TGNMO	6640	6780	3.73	3.50
Carbon Monoxide	19.2	16.0	NR	NR
	(Concentration in %, v/v)			
Nitrogen	34.4	36.8	NR	NR
Oxygen	0.80	1.97	NR	NR
Methane	30.8	29.1		
Carbon Dioxide	34.2	32.4	NR	NR

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

NR - analysis not requsted

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analysis)

Project No.: 70-4107-22
AtmAA No.: 238
Site: BFI Chestnut

Component:	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppm, v/v)			
TGNMO	Inlet #2	6840	6440	6640	3.0
Carbon Monoxide	Inlet #2	19.4	19.0	19.2	1.0
		(Concentration in %, v/v)			
Nitrogen	Inlet #2	34.1	34.6	34.4	0.73
Oxygen	Inlet #2	0.86	0.75	0.80	6.8
Methane	Inlet #2	30.8	30.8	30.8	0.0
Carbon Dioxide	Inlet #2	34.2	34.2	34.2	0.0

A set of 4 Tedlar bag samples, laboratory numbers 90242-(1-4) was analyzed for methane, TGNMO, carbon monoxide, and permanent gases. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean." Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 6 repeat measurements from the sample set of 4 Tedlar bag samples is 1.9%.

KLEINFELDER, INC.
1370 Valley Vista Dr., Suite 150
Diamond Bar, California
(714)396-0335

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	ANALYSIS REQUIRED								SENT TO: Atm AA
	BFI Chestnut	KJC	Fixed * Gases	CH4	TGNMO						SHIPPED VIA: Fed. Ex
Samples Collected By: M. Bell		Phone: 3960335									SHIPPED BY: Kleinfelder

Lab No.	Test Date	Sample Description (Container, Media, Volume, etc.)								Remarks
							Atm AA lab #			
In-2	1/23/92	Inlet #2	X	X	X		902142-1			* Fixed Gases
In-3		Inlet #3	X	X	X		-2			O_2, CO_2, N_2, CO
Out-2		Exhaust #2		X	X		-3			
Out-3	↓	Exhaust #3		X	X		-4			

Relinquished by:	Date/Time	Received by:	Reason for Exchange:	Comments:
M. W. Bell Phone: 3960335	1/23/92 1630	Of:		
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:
Relinquished by: Phone:	Date/Time	Received by: Of:	Reason for Exchange:	Comments:

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

Project:	BFI Chestnut Avenue Landfill		Date:	21 Jan. 1992
Source:	LFG FIRED FLARE EXHAUST		Operator:	MWB
Location:	Chestnut Avenue Landfill		Time:	1335-1430

Run No. 1	NOx		CO		SO2		CO2		O2	
Units:	ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:	100		200		200		20		25	
Cylinder No.:	ALM-4266		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:	20.13		45.74		100.2		10.05		10.01	
Data:	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias	5.5	----	3.5	----	3.0	----	3.2	----	11.0	----
Initial Span Bias	22.9	----	27.8	----	51.0	----	52.4	----	54.0	----
1335-1340 East	13.2	8.6	<3.5	<1.0	3.5	1.7	45.5	8.7	63.5	12.2
1340-1345	12.6	7.9	<3.5	<1.0	3.4	1.5	44.0	8.4	65.5	12.6
1345-1350	11.5	6.7	<3.5	<1.0	3.3	1.3	35.0	6.5	68.0	13.2
1350-1355	9.5	4.4	<3.5	<1.0	3.0	0.6	22.5	4.0	80.0	16.0
1355-1400	7.5	2.0	<3.5	<1.0	2.8	0.2	15.0	2.4	87.5	17.7
1405-1410 South	13.5	9.0	<3.5	<1.0	3.5	1.7	46.0	8.8	61.0	11.6
1410-1415	13.0	8.4	<3.5	<1.0	3.4	1.5	41.0	7.8	61.0	11.6
1415-1420	11.3	6.4	<3.5	<1.0	3.2	1.1	33.0	6.1	70.0	13.7
1420-1425	8.5	3.2	<3.5	<1.0	2.8	0.2	17.5	2.9	79.0	15.7
1425-1430	7.8	2.4	<3.5	<1.0	2.8	0.2	16.5	2.7	86.0	17.4
Final Zero Bias	6.0	----	3.8	----	2.4	----	3.0	----	11.0	----
Final Span Bias	23.3	----	26.4	----	49.5	----	52.0	----	54.5	----
AVERAGE (E and S)	10.8	5.9	<3.5	<1.0	3.2	1.0	31.6	5.8	72.2	14.2
Zero Drift	0.5	----	0.3	----	-0.6	----	-0.2	----	0.0	----
Span Drift	-0.1	----	-1.7	----	-0.9	----	-0.2	----	0.5	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

	Project:	BFI Chestnut Avenue Landfill				Date:	21 Jan. 1992			
	Source:	LFG FIRED FLARE EXHAUST				Operator:	MWB			
	Location:	Chestnut Avenue Landfill				Time:	1435-1535			
Run No. 1		NOx		CO		SO2		CO2		O2	
Units:		ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:		100		200		200		20		25	
Cylinder No.:		ALM-7687		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:		20.13		45.74		100.2		10.05		10.01	
Data:		% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias		5.5	----	3.5	----	3.0	----	3.2	----	11.0	----
Initial Span Bias		22.9	----	27.8	----	51.0	----	52.4	----	54.0	----
1435-1440 West		13.8	9.3	<3.5	<1.0	3.7	2.1	45.5	8.7	61.0	11.6
1440-1445		13.8	9.3	<3.5	<1.0	3.8	2.3	45.5	8.7	62.0	11.8
1445-1450		13.3	8.8	<3.5	<1.0	3.7	2.1	40.0	7.6	60.5	11.5
1450-1455		10.2	5.2	<3.5	<1.0	3.2	1.1	27.0	4.9	73.0	14.3
1455-1500		9.8	4.7	<3.5	<1.0	3.0	0.6	30.0	5.5	82.0	16.4
1510-1515 North		15.3	11.1	<3.5	<1.0	3.8	2.3	53.0	10.2	55.0	10.2
1515-1520		17.0	13.1	<3.5	<1.0	4.2	3.2	55.0	10.6	51.0	9.3
1520-1525		16.7	12.7	<3.5	<1.0	4.2	3.2	55.5	10.7	52.0	9.5
1525-1530		16.0	11.9	<3.5	<1.0	4.2	3.2	48.0	9.2	50.0	9.0
1530-1535		14.8	10.5	<3.5	<1.0	3.5	1.7	46.0	8.8	60.0	11.3
AVERAGE (W and N)		14.1	9.7	<3.5	<1.0	3.7	2.2	44.6	8.5	60.7	11.5
Final Zero Bias		6.0	----	3.8	----	2.4	----	3.0	----	11.0	----
Final Span Bias		23.3	----	26.4	----	49.5	----	52.0	----	54.5	----
AVERAGE (All Ports)		12.5	7.8	<3.5	<1.0	3.5	1.6	38.1	7.2	66.4	12.8
Zero Drift		0.5	----	0.3	----	-0.6	----	-0.2	----	0.0	----
Span Drift		-0.1	----	-1.7	----	-0.9	----	-0.2	----	0.5	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Project:	BFI Chestnut Avenue Landfill		Date:	21 Jan. 1992			
	Source:	LFG FIRED FLARE EXHAUST		Operator:	MWB			
	Location:	Chestnut Avenue Landfill		Time:	1335-1535			
			Analyzer	Initial Values		Final Values		
Run No. 1	Specie	Full	Cal. Error	System	System Cal.	System	System Cal.	Cal.
		Scale	Reading	Response	Bias	Response	Bias	Drift
			(% Chart)	(% Chart)	(% Span)	(% Chart)	(% Span)	(% Span)
Zero	NOx	100.00	5.00	5.50	0.50	6.00	1.00	0.5
Upscale		ppm	22.20	22.90	0.70	23.30	1.10	-0.1
Zero	CO	200.00	3.00	3.50	0.50	3.80	0.80	0.3
Upscale		ppm	26.20	27.80	1.60	26.40	0.20	-1.7
Zero	SO2	200.00	3.00	3.00	0.00	2.40	-0.60	-0.6
Upscale		ppm	52.90	51.00	-1.90	49.50	-3.40	-0.9
Zero	CO2	20.00	3.00	3.20	0.20	3.00	0.00	-0.2
Upscale		%	53.00	52.40	-0.60	52.00	-1.00	-0.2
Zero	O2	25.00	10.00	11.00	1.00	11.00	1.00	0.0
Upscale		%	52.00	54.00	2.00	54.50	2.50	0.5

KLEINFELDER INC.

Diamond Bar, California

ANALYZER CALIBRATION ERROR

	Project:	BFI Chestnut Avenue Landfill		Date:		21 Jan. 1992
	Source:	LFG FIRED FLARE EXHAUST		Operator:		MWB
	Location:	Chestnut Avenue Landfill		Time:		1335-1535
Day No. 1	Specie	Full Scale	Cylinder Value (ppm, %)	Analyzer Reading (% Chart)	Analyzer Reading (ppm, %)	Difference (% Span)
Zero		100.00	0.00	5.00	0.00	0.00
Midscale	NOx		20.13	22.20	19.02	1.11
Upscale		ppm	99.50	95.00	99.50	0.00
Zero		200.00	0.00	3.00	0.00	0.00
Midscale	CO		45.74	26.20	45.74	0.00
Upscale		ppm	96.60	52.00	96.60	0.00
Zero		200.00	0.00	3.00	0.00	0.00
Midscale	SO2		100.20	52.90	99.80	0.20
Upscale		ppm	180.00	93.00	180.00	0.00
Zero		20.00	0.00	3.00	0.00	0.00
Midscale	CO2		10.05	53.00	9.97	0.41
Upscale		%	19.04	98.50	19.04	0.00
Zero		25.00	0.00	10.00	0.00	0.00
Midscale	O2		10.01	52.00	10.45	-1.76
Upscale		%	20.90	94.00	20.90	0.00

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

Project:	BFI Chestnut Avenue Landfill	Date:	22 Jan. 1992
Source:	LFG FIRED FLARE EXHAUST	Operator:	MWB
Location:	Chestnut Avenue Landfill	Time:	1530-1635

Run No. 2	NOx		CO		SO2		CO2		O2	
Units:	ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:	100		200		200		20		25	
Cylinder No.:	ALM-4266		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:	20.13		45.74		100.2		10.05		10.01	
Data:	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias	5.0	----	7.0	----	3.0	----	3.0	----	10.0	----
Initial Span Bias	21.5	----	28.0	----	50.0	----	51.5	----	53.0	----
1530-1535 North	15.2	12.8	< 7.0	< 1.0	3.2	0.4	56.5	11.0	47.0	8.6
1535-1540	15.0	12.6	< 7.0	< 1.0	4.0	2.1	56.5	11.0	48.0	8.9
1540-1545	16.0	13.8	8.0	3.0	5.0	4.3	60.0	11.8	49.0	9.1
1545-1550	15.5	13.2	< 7.0	< 1.0	4.8	3.8	60.0	11.8	47.0	8.6
1550-1555	16.0	13.8	40.0	71.7	4.0	2.1	45.0	8.7	49.0	9.1
1610-1615 West	15.0	12.6	< 7.0	< 1.0	3.8	1.7	58.0	11.3	50.0	9.4
1615-1620	16.0	13.8	8.0	3.0	4.8	3.8	53.0	10.3	48.0	8.9
1620-1625	14.5	12.0	< 7.0	< 1.0	4.8	3.8	58.0	11.3	54.0	10.3
1625-1630	14.0	11.4	< 7.0	< 1.0	4.7	3.6	35.0	6.6	65.0	12.9
1630-1635	15.0	12.6	< 7.0	< 1.0	4.2	2.6	15.0	2.5	90.0	18.8
Final Zero Bias	4.1	----	6.2	----	3.0	----	3.0	----	10.9	----
Final Span Bias	21.0	----	27.8	----	50.0	----	52.0	----	52.5	----
AVERAGE (N and W)	15.2	12.9	< 10.5	< 8.5	4.3	2.8	49.7	9.6	54.7	10.5
Zero Drift	-0.9	----	-0.8	----	0.0	----	0.0	----	0.9	----
Span Drift	0.4	----	0.6	----	0.0	----	0.5	----	-1.4	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

Project:	BFI Chestnut Avenue Landfill	Date:	22 Jan. 1992	
Source:	LFG FIRED FLARE EXHAUST	Operator:	MWB	
Location:	Chestnut Avenue Landfill	Time:	1645-1745	

Run No. 2	NOx		CO		SO2		CO2		O2	
Units:	ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:	100		200		200		20		25	
Cylinder No.:	ALM-7687		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:	20.13		45.74		100.2		10.05		10.01	
Data:	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias	5.0	----	7.0	----	3.0	----	3.0	----	10.0	----
Initial Span Bias	21.5	----	28.0	----	50.0	----	51.5	----	53.0	----
1645-1650 South	11.0	7.8	< 7.0	< 1.0	3.9	1.9	37.0	7.0	64.0	12.7
1650-1655	10.9	7.7	< 7.0	< 1.0	3.5	1.1	15.0	2.5	75.0	15.3
1655-1700	10.0	6.6	< 7.0	< 1.0	3.1	0.2	12.0	1.9	85.0	17.6
1700-1705	6.5	2.4	< 7.0	< 1.0	3.0	0.0	7.0	0.8	89.0	18.6
1705-1710	5.5	1.1	< 7.0	< 1.0	3.0	0.0	18.0	3.1	92.0	19.3
1720-1725 East	13.0	10.2	< 7.0	< 1.0	4.2	2.6	48.0	9.3	58.0	11.3
1725-1730	13.0	10.2	< 7.0	< 1.0	4.1	2.3	48.0	9.3	58.0	11.3
1730-1735	13.0	10.2	< 7.0	< 1.0	4.0	2.1	45.0	8.7	60.0	11.7
1735-1740	11.0	7.8	< 7.0	< 1.0	3.5	1.1	35.0	6.6	73.0	14.8
1740-1745	12.0	9.0	< 7.0	< 1.0	3.0	0.0	20.0	3.5	79.0	16.2
AVERAGE (S and E)	10.6	7.3	< 7.0	< 1.0	3.5	1.1	28.5	5.3	73.3	14.9
Final Zero Bias	4.1	----	6.2	----	3.0	----	3.0	----	10.9	----
Final Span Bias	21.0	----	27.8	----	50.0	----	52.0	----	52.5	----
AVERAGE (All Ports)	12.9	10.1	< 8.8	< 4.8	3.9	2.0	39.1	7.4	64.0	12.7
Zero Drift	-0.9	----	-0.8	----	0.0	----	0.0	----	0.9	----
Span Drift	0.4	----	0.6	----	0.0	----	0.5	----	-1.4	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

ANALYZER CALIBRATION ERROR

	Project:	BFI Chestnut Avenue Landfill		Date:		22 Jan. 1992
	Source:	LFG FIRED FLARE EXHAUST		Operator:		MWB
	Location:	Chestnut Avenue Landfill		Time:		1530-1745
Day No. 1	Specie	Full Scale	Cylinder Value (ppm, %)	Analyzer Reading (% Chart)	Analyzer Reading (ppm, %)	Difference (% Span)
Zero		100.00	0.00	3.00	0.00	0.00
Midscale	NOx		20.13	22.00	20.77	-0.64
Upscale		ppm	99.50	94.00	99.50	0.00
Zero		200.00	0.00	7.00	0.00	0.00
Midscale	CO		45.74	28.80	47.01	-0.63
Upscale		ppm	96.60	51.80	96.60	0.00
Zero		200.00	0.00	3.00	0.00	0.00
Midscale	SO2		100.20	52.80	99.60	0.30
Upscale		ppm	180.00	93.00	180.00	0.00
Zero		20.00	0.00	3.00	0.00	0.00
Midscale	CO2		10.05	52.50	9.85	1.01
Upscale		%	19.04	98.70	19.04	0.00
Zero		25.00	0.00	10.00	0.00	0.00
Midscale	O2		10.01	52.00	10.51	-2.01
Upscale		%	20.90	93.50	20.90	0.00

KLEINFELDER INC.

Diamond Bar, California

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Project:	BFI Chestnut Avenue Landfill		Date:	22 Jan. 1992			
	Source:	LFG FIRED FLARE EXHAUST		Operator:	MWB			
	Location:	Chestnut Avenue Landfill		Time:	1530-1635			
			Analyzer	Initial Values		Final Values		
Run No. 2	Specie	Full	Cal. Error	System	System Cal.	System	System Cal.	Cal.
		Scale	Reading	Response	Bias	Response	Bias	Drift
			(% Chart)	(% Chart)	(% Span)	(% Chart)	(% Span)	(% Span)
Zero	NOx	100.00	3.00	5.00	2.00	4.10	1.10	-0.9
Upscale		ppm	22.00	21.50	-0.50	21.00	-1.00	0.4
Zero	CO	200.00	7.00	7.00	0.00	6.20	-0.80	-0.8
Upscale		ppm	28.80	28.00	-0.80	27.80	-1.00	0.6
Zero	SO2	200.00	3.00	3.00	0.00	3.00	0.00	0.0
Upscale		ppm	52.80	50.00	-2.80	50.00	-2.80	0.0
Zero	CO2	20.00	3.00	3.00	0.00	3.00	0.00	0.0
Upscale		%	52.50	51.50	-1.00	52.00	-0.50	0.5
Zero	O2	25.00	10.00	10.00	0.00	10.90	0.90	0.9
Upscale		%	52.00	53.00	1.00	52.50	0.50	-1.4

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

Project:	BFI Chestnut Avenue Landfill	Date:	23 Jan. 1992
Source:	LFG FIRED FLARE EXHAUST	Operator:	MWB
Location:	Chestnut Avenue Landfill	Time:	1455-1600

Run No. 3	NOx		CO		SO2		CO2		O2	
Units:	ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:	100		200		200		20		25	
Cylinder No.:	ALM-4266		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:	20.13		45.74		100.2		10.05		10.01	
Data:	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias	5.0	----	6.5	----	3.0	----	3.0	----	10.0	----
Initial Span Bias	21.5	----	27.5	----	50.0	----	51.0	----	53.5	----
1455-1500 North	15.5	13.8	20.0	30.7	4.5	3.2	57.0	11.2	47.0	8.6
1500-1505	16.5	15.0	7.0	2.7	4.5	3.2	57.0	11.2	48.0	8.8
1505-1510	16.0	14.4	30.0	52.2	4.5	3.2	63.0	12.5	47.0	8.6
1510-1515	16.0	14.4	40.0	73.7	4.5	3.2	60.0	11.9	48.0	8.8
1515-1520	17.0	15.6	40.0	73.7	4.5	3.2	60.0	11.9	50.0	9.3
1535-1540 West	13.0	10.8	<6.5	<1.0	4.3	2.8	50.0	9.8	55.0	10.4
1540-1545	13.5	11.4	<6.5	<1.0	4.3	2.8	52.0	10.2	55.0	10.4
1545-1550	13.0	10.8	<6.5	<1.0	4.3	2.8	49.0	9.6	55.0	10.4
1550-1555	12.0	9.6	<6.5	<1.0	4.0	2.1	43.0	8.3	60.0	11.6
1555-1600	12.0	9.6	<6.5	<1.0	3.5	1.1	30.0	5.6	70.0	13.9
Final Zero Bias	3.0	----	5.0	----	3.0	----	3.0	----	10.2	----
Final Span Bias	20.1	----	26.5	----	50.0	----	51.5	----	52.8	----
AVERAGE (N and W)	14.5	12.5	< 17.0	< 23.8	4.3	2.8	52.1	10.2	53.5	10.1
Zero Drift	-2.0	----	-1.5	----	0.0	----	0.0	----	0.2	----
Span Drift	0.6	----	0.5	----	0.0	----	0.5	----	-0.9	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF CEM DATA

Project:	BFI Chestnut Avenue Landfill	Date:	23 Jan. 1992	
Source:	LFG FIRED FLARE EXHAUST	Operator:	MWB	
Location:	Chestnut Avenue Landfill	Time:	1610-1725	

Run No. 3	NOx		CO		SO2		CO2		O2	
Units:	ppm, v/v dry		ppm, v/v dry		ppm, v/v dry		%, v/v dry		%, v/v dry	
Full Scale:	100		200		200		20		25	
Cylinder No.:	ALM-7687		ALM-8304		AAL-1072		ALM005351		ALM005351	
Cylinder Value:	20.13		45.74		100.2		10.05		10.01	
Data:	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.	% Chart	Conc.
Initial Zero Bias	5.0	----	6.5	----	3.0	----	3.0	----	10.0	----
Initial Span Bias	21.5	----	27.5	----	50.0	----	51.0	----	53.5	----
1610-1615 South	13.0	10.8	<6.5	<1.0	3.5	1.1	48.0	9.4	56.0	10.7
1615-1620	14.0	12.0	<6.5	<1.0	4.5	3.2	52.0	10.2	54.0	10.2
1620-1625	15.0	13.2	<6.5	<1.0	4.8	3.8	52.0	10.2	55.0	10.4
1625-1630	10.5	7.8	<6.5	<1.0	4.5	3.2	35.0	6.7	69.0	13.7
1630-1635	8.5	5.4	<6.5	<1.0	3.7	1.5	25.0	4.6	85.0	17.4
1700-1705 East	11.0	8.4	<6.5	<1.0	4.0	2.1	48.0	9.4	60.0	11.6
1705-1710	12.0	9.6	<6.5	<1.0	4.8	3.8	45.0	8.7	63.0	12.3
1710-1715	10.5	7.8	<6.5	<1.0	4.5	3.2	40.0	7.7	73.0	14.6
1715-1720	7.5	4.2	<6.5	<1.0	3.7	1.5	23.0	4.2	81.0	16.5
1720-1725	6.0	2.4	<6.5	<1.0	3.5	1.1	18.0	3.1	84.0	17.2
AVERAGE (S and E)	10.8	8.1	<6.5	<1.0	4.2	2.5	38.6	7.4	68.0	13.5
Final Zero Bias	3.0	----	5.0	----	3.0	----	3.0	----	10.2	----
Final Span Bias	20.1	----	26.5	----	50.0	----	51.5	----	52.8	----
AVERAGE (All Ports)	12.6	10.3	< 11.7	< 12.4	4.2	2.6	45.4	8.8	60.8	11.8
Zero Drift	-2.0	----	-1.5	----	0.0	----	0.0	----	0.2	----
Span Drift	0.6	----	0.5	----	0.0	----	0.5	----	-0.9	----

Note: Conc. = Drift Corrected Concentration

KLEINFELDER INC.

Diamond Bar, California

ANALYZER CALIBRATION ERROR

	Project:	BFI Chestnut Avenue Landfill		Date:		23 Jan. 1992
	Source:	LFG FIRED FLARE EXHAUST		Operator:		MWB
	Location:	Chestnut Avenue Landfill		Time:		1455-1725
Day No. 1	Specie	Full Scale	Cylinder Value (ppm, %)	Analyzer Reading (% Chart)	Analyzer Reading (ppm, %)	Difference (% Span)
Zero		100.00	0.00	5.00	0.00	0.00
Midscale	NOx		20.13	22.00	19.01	1.12
Upscale		ppm	99.50	94.00	99.50	0.00
Zero		200.00	0.00	7.00	0.00	0.00
Midscale	CO		45.74	28.50	46.67	-0.47
Upscale		ppm	96.60	51.50	96.60	0.00
Zero		200.00	0.00	3.00	0.00	0.00
Midscale	SO2		100.20	52.80	99.71	0.24
Upscale		ppm	180.00	92.90	180.00	0.00
Zero		20.00	0.00	3.00	0.00	0.00
Midscale	CO2		10.05	52.20	9.78	1.36
Upscale		%	19.04	98.80	19.04	0.00
Zero		25.00	0.00	10.00	0.00	0.00
Midscale	O2		10.01	52.20	10.44	-1.71
Upscale		%	20.90	94.50	20.90	0.00

KLEINFELDER INC.

Diamond Bar, California

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Project:	BFI Chestnut Avenue Landfill	Date:	23 Jan. 1992		
Source:	LFG FIRED FLARE EXHAUST	Operator:	MWB		
Location:	Chestnut Avenue Landfill	Time:	1455-1725		

			Analyzer	Initial Values		Final Values		
Run No. 3	Specie	Full Scale	Cal. Error Reading (% Chart)	System Response (% Chart)	System Cal. Bias (% Span)	System Response (% Chart)	System Cal. Bias (% Span)	Cal. Drift (% Span)
Zero	NOx	100.00	5.00	5.00	0.00	3.00	-2.00	-2.0
Upscale		ppm	22.00	21.50	-0.50	20.10	-1.90	0.6
Zero	CO	200.00	7.00	6.50	-0.50	5.00	-2.00	-1.5
Upscale		ppm	28.50	27.50	-1.00	26.50	-2.00	0.5
Zero	SO2	200.00	3.00	3.00	0.00	3.00	0.00	0.0
Upscale		ppm	52.80	50.00	-2.80	50.00	-2.80	0.0
Zero	CO2	20.00	3.00	3.00	0.00	3.00	0.00	0.0
Upscale		%	52.20	51.00	-1.20	51.50	-0.70	0.5
Zero	O2	25.00	10.00	10.00	0.00	10.20	0.20	0.2
Upscale		%	52.20	53.50	1.30	52.80	0.60	-0.9

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF EMISSIONS

	Project:	BFI CHESTNUT AVE. LANDFILL			Date:		21-24, JAN. 1992		
	Source:	LFG FIRED FLARE EXHAUST			Operator:		MWB		
	Location:	FLARE EXHAUST							
					Std. Temp.:		60		
	Run 1			Run 2			Run 3		
Vol. Flow (SDCFM)	12,398			12,469			11,602		
Units:	ppm, v/v	lb/hr	lb/day	ppm, v/v	lb/hr	lb/day	ppm, v/v	lb/hr	lb/day
Parameters:									
NOx as NO2	7.8	0.70	16.9	10.1	0.92	22.0	10.3	0.87	20.9
CO	<1.0	<0.05	<1.3	<4.8	<0.26	<6.4	<12.4	<0.64	<15.3
SO2	1.6	0.20	4.8	2.0	0.25	6.1	2.6	0.31	7.3
TGNMO as CH4	3.5	0.11	2.7	3.7	0.12	2.8	3.5	0.10	2.5

KLEINFELDER INC.

Diamond Bar, California

TGNMO Flare Efficiency

Client: BFI CHESTNUT AVE LANDFILL
Unit: LFG Fired Flare

Run No.	Inlet Conc. (ppm)	Inlet Flow (SCFM)	Inlet E.R. (lb/hr)	Outlet Conc. (ppm)	Outlet Flow (SCFM)	Outlet E.R. (lb/hr)	Efficiency (%)
1	6,080	613	9.43	3.54	12,398	0.11	98.82
2	6,640	637	10.70	3.73	12,469	0.12	98.90
3	6,780	640	10.98	3.50	11,602	0.10	99.06
Avg.	6,500	630	10.37	3.59	12,156	0.11	98.93

KLEINFELDER, INC.
Diamond Bar, CA

Client : BFI Chestnut Avenue Landfill
Source : Landfill Gas Flare Exhaust
Test Date: 01/21/92
Run No. : Part. #1
Standard Temp.: 60 deg.F Standard Press.: 29.92 in. Hg

PLANT GAS FLOW DATA

Stack Diameter (inches)	93.00
Stack Cross-Sectional Area (sq.ft.)	47.172
Barometric Pressure (inches Hg.)	30.06
Oxygen Content (%)	12.80
Carbon Dioxide Content (%)	7.20
Moisture Content (%)	8.536
Stack Temperature (deg.F)	1386.50
Stack Static Pressure (inches water)	-0.05
Stack Gas Dry Molecular Weight	29.67
Velocity Pressure (sq.rt. inches water)	0.16
Pitot Tube Correction Factor	0.84
Velocity (ft. per sec.)	16.92
Exhaust Gas Flow Rate (ACFM)	47895.00
Exhaust Gas Flow Rate (DSCFM)	12392.82

FIELD SAMPLING DATA

Dry Gas Volume Metered (DCF)	49.585
Dry Gas Volume Sampled (DSCF)	52.608
Dry Gas Meter Temperature (deg.F)	43.50
Dry Gas Meter Gamma	1.020
Average Orifice Pressure (inches water)	1.01
Total Run Time (min.)	96.00
Nozzle Diameter (inches)	0.6250
Isokinetic (%)	97.91

ANALYTICAL DATA

Moisture Recovered (mls)	105.8
Nozzle,Probe & Washes (mg)	1.20E+00
Filter (mg)	4.80E+00
Impingers (mg)	1.32E+01

EMISSION DATA

Front Half (gr/DSCF)	1.76E-03
(lb/hr)	1.87E-01
Back Half (gr/DSCF)	3.87E-03
(lb/hr)	4.11E-01
Total (gr/DSCF)	5.63E-03
(lb/hr)	5.98E-01

KLEINFELDER, INC.
Diamond Bar, CA

Client : BFI Chestnut Avenue Landfill
Source : Landfill Gas Flare Exhaust
Test Date: 01/22/92
Run No. : Part. #2
Standard Temp.: 60 deg.F Standard Press.: 29.92 in. Hg

PLANT GAS FLOW DATA

Stack Diameter (inches)	93.00
Stack Cross-Sectional Area (sq.ft.)	47.172
Barometric Pressure (inches Hg.)	30.14
Oxygen Content (%)	12.70
Carbon Dioxide Content (%)	7.40
Moisture Content (%)	8.819
Stack Temperature (deg.F)	1358.00
Stack Static Pressure (inches water)	-0.05
Stack Gas Dry Molecular Weight	29.70
Velocity Pressure (sq.rt. inches water)	0.16
Pitot Tube Correction Factor	0.84
Velocity (ft. per sec.)	16.77
Exhaust Gas Flow Rate (ACFM)	47467.06
Exhaust Gas Flow Rate (DSCFM)	12469.04

FIELD SAMPLING DATA

Dry Gas Volume Metered (DCF)	49.110
Dry Gas Volume Sampled (DSCF)	52.293
Dry Gas Meter Temperature (deg.F)	43.00
Dry Gas Meter Gamma	1.020
Average Orifice Pressure (inches water)	1.00
Total Run Time (min.)	96.00
Nozzle Diameter (inches)	0.6250
Isokinetic (%)	96.73

ANALYTICAL DATA

Moisture Recovered (mls)	109.0
Nozzle,Probe & Washes (mg)	1.20E+00
Filter (mg)	2.70E+00
Impingers (mg)	1.55E+01

EMISSION DATA

Front Half (gr/DSCF)	1.15E-03
(lb/hr)	1.23E-01
Back Half (gr/DSCF)	4.57E-03
(lb/hr)	4.89E-01
Total (gr/DSCF)	5.72E-03
(lb/hr)	6.12E-01

KLEINFELDER, INC.
Diamond Bar, CA

Client : BFI Chestnut Avenue Landfill
Source : Landfill Gas Flare Exhaust
Test Date: 01/24/92
Run No. : Part. #5
Standard Temp.: 60 deg.F Standard Press.: 29.92 in. Hg

PLANT GAS FLOW DATA

Stack Diameter (inches)	93.00
Stack Cross-Sectional Area (sq.ft.)	47.172
Barometric Pressure (inches Hg.)	30.12
Oxygen Content (%)	11.80
Carbon Dioxide Content (%)	8.80
Moisture Content (%)	9.040
Stack Temperature (deg.F)	1441.00
Stack Static Pressure (inches water)	-0.05
Stack Gas Dry Molecular Weight	29.89
Velocity Pressure (sq.rt. inches water)	0.15
Pitot Tube Correction Factor	0.84
Velocity (ft. per sec.)	16.37
Exhaust Gas Flow Rate (ACFM)	46326.26
Exhaust Gas Flow Rate (DSCFM)	11602.22

FIELD SAMPLING DATA

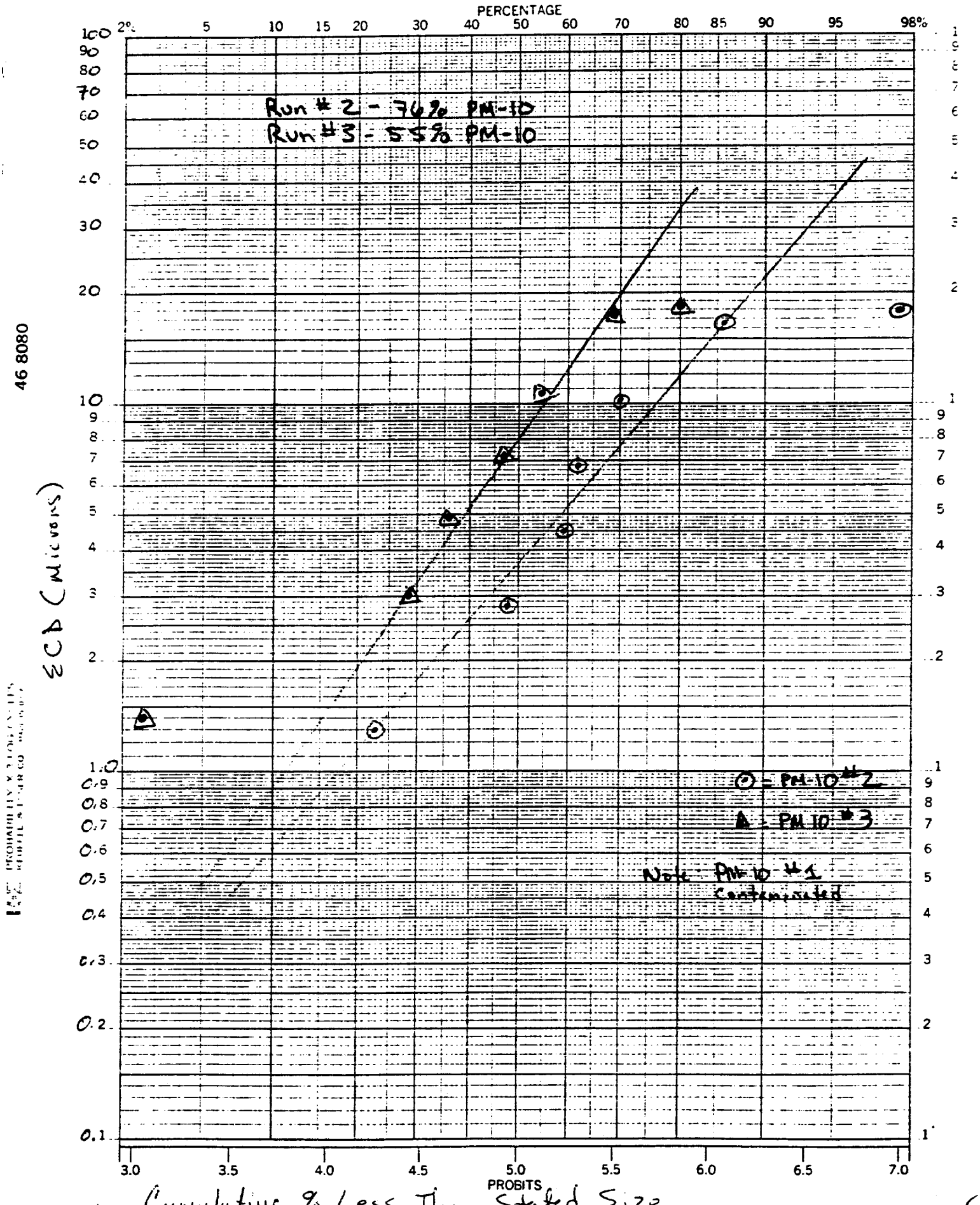
Dry Gas Volume Metered (DCF)	48.880
Dry Gas Volume Sampled (DSCF)	49.448
Dry Gas Meter Temperature (deg.F)	69.00
Dry Gas Meter Gamma	1.020
Average Orifice Pressure (inches water)	0.93
Total Run Time (min.)	96.00
Nozzle Diameter (inches)	0.6250
Isokinetic (%)	98.30

ANALYTICAL DATA

Moisture Recovered (mls)	105.9
Nozzle,Probe & Washes (mg)	5.00E-02
Filter (mg)	1.22E+01
Impingers (mg)	1.00E+01

EMISSION DATA

Front Half (gr/DSCF)	3.82E-03
(lb/hr)	3.80E-01
Back Half (gr/DSCF)	3.12E-03
(lb/hr)	3.10E-01
Total (gr/DSCF)	6.94E-03
(lb/hr)	6.91E-01


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
100 90 80 70 60 50 40 30 20 10 9 8 7 6 5 4 3 2 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1
ECD (Microns)
Run # 2 - 76% PM-10
Run #3 - 55% PM-10
⊙ = PM-10 #2
▲ = PM 10 #3
Note: PM-10 #1 Contaminated
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
Cumulative % Less Than Stated Size
46 8080

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF PARTICLE SIZE DATA

	Project:	BFI Chestnut St.			Date:	24 January 1992	
	Source:	LFG Fired Flare			Operator:	J.K.	
	Location:	Flare Exhaust			Time:	1329-1729 (Run 3)	
Flow Rate (ACFM)	Stage	Tare (g)	Final (g)	Net (mg)	%	CUM % Less Than	ECD (microns)
0.75	0	103.0892	103.1024	13.20	19.9	80.1	18.3 and above
0.75	1	116.9386	116.9462	7.60	11.4	68.7	17.5
0.75	2	115.4525	115.4618	9.30	14.0	54.7	10.8
0.75	3	113.3675	113.3728	5.30	8.0	46.7	7.2
0.75	4	114.131	114.1383	7.30	11.0	35.7	4.8
0.75	5	113.3483	113.3602	11.90	17.9	28.8	3
0.75	6	117.6086	117.626	17.40	26.2	2.6	1.4
0.75	7	109.672	109.6737	1.70	2.6	0.0	0.8
	Bkup fil.			0.00	0.0	100.0	0.5
			Total	66.40	100.0		

KLEINFELDER INC.

Diamond Bar, California

SUMMARY OF PARTICLE SIZE DATA

Project:	BFI Chestnut St.	Date:	23 January 1992		
Source:	LFG Fired Flare	Operator:	J.K.		
Location:	Flare Exhaust	Time:	0911-1311	(Run 2)	

Flow Rate (ACFM)	Stage	Tare (g)	Final (g)	Net (mg)	%	CUM % Less Than	ECD (microns)
0.83	0	109.9474	109.9479	0.50	2.4	97.6	18.3 and above
0.83	1	111.3627	111.3652	2.50	11.8	85.8	16.6
0.83	2	109.8609	109.8647	3.80	17.9	67.9	10.2
0.83	3	109.7358	109.7371	1.30	6.1	61.8	6.8
0.83	4	110.1668	110.1673	0.50	2.4	59.4	4.5
0.83	5	109.6749	109.678	3.10	14.6	47.2	2.8
0.83	6	111.9087	111.9139	5.20	24.5	22.6	1.3
0.83	7	114.8246	114.8294	4.80	22.6	0.0	0.7
	Bkup fil.			0.00	0.0	100.0	0.5
			Total	21.20	100.0		

KLEINFELDER, INC.

EXAMPLE CALCULATIONS

METHODS 1 THROUGH 4

Plant: BFI Chestnut Ave Landfill Date: 21 Jan 92

Location: Flare Exhaust Run No: Part #1

STANDARD CONDITIONS

Temperature T_{std} 68 °F Pressure P_{std} 29.92 "Hg

METER VOLUME CORRECTED FOR LEAK

$Vm = (Vm) - (Li - La)(Ti)$

$Vm = (49.585) - (0 -)(\ )$

$Vm = 49.585 ft^3$

STANDARD METER VOLUME, DRY

$$Vm_{std} = (Vm)(Y)\frac{Tstd}{Tm}\frac{(Pb + H/13.6)}{Pstd}$$

$$Vm_{std} = (49.585)(1.02)\frac{(520)}{(503.5)}\frac{(30.06 + 1.01/13.6)}{(29.92)}$$

$Vm_{std} = 52.608 ft^3$

WATER CONTENT OF GAS

Water in Sample

$Vw_{std} = (0.0000894)(Tstd)(Vlc)$

$Vw_{std} = (0.0000894)(520)(105.8)$

$Vw_{std} = 4.9184 ft^3$

Water in Stack Gas

$Bwo = 100\ (Vw_{std}) / (Vw_{std} + Vm_{std})$

$Bwo = (100)(4.9184) / (4.9184 + 52.608)$

Bwo = 8.55 %vol

Saturation Water Volume

$V_{sat} = \exp(3.725253 + 0.006364(T_s) - (2078115/T_s^2))$ Not @ Saturation

$V_{sat} = \exp(3.725253 + 0.006364(\quad) - 2078115/(\quad)^2)$

$V_{sat} =$ _____ "Hg

$B_{sat} = V_{sat}(100)/P_b$

$B_{sat} = (\quad)(100)/(\quad)$

$B_{sat} =$ _____ %vol

Use smaller value of Bwo or Bsat in all calculations asking for Bwo.

DRY GAS MOLECULAR WEIGHT

$MW_d = 0.32(\%O_2) + 0.44(\%CO_2) + 0.28(\%CO + \%N_2)$

$MW_d = 0.32(12.6) + 0.44(7.2) + 0.28(<1.0 + 80.0)$

$MW_d =$ 29.6004 lb/mole

WET GAS MOLECULARE WEIGHT

$MW_w = MW_d(1 - Bwo/100) + 18(Bwo/100)$

$MW_w = (29.664)(1 - 8.55/100) + 18(8.55/100)$

$MW_w =$ 28.6067 lb/mole

STACK GAS VELOCITY

$V_s = 85.48(Cp)(P)(T_s/(MW_w)(P_b + P_s/13.6))^{0.5}$

$V_s = 85.48(0.84)(0.1007)(1846.9/(28.467)(30.06 + -0.05/13.6))^{0.5}$

$V_s =$ 16.892 ft/sec

STACK CROSS-SECTIONAL AREA

Circular Stacks

As = (3.1416)(Ds^2)/576

As = 3.1416 (93)^2/576

As = 47.172 ft^2

Rectangular Stacks

As = (L)(W)/144

As = ( )( )/144

As = _____ ft^2

VOLUMETRIC FLOW AT STACK CONDITIONS

Qa = (Vs)(As)(60)

Qa = (16892)(47.172)(60) diff in rounding on computer for velocity calc.

Qa = 47,810 ACFM

VOLUMETRIC FLOW AT WET STANDARD CONDITIONS

$$Qsw = (Qa)\frac{(Tstd)}{Ts}\frac{(Pb + Ps/13.6)}{Pstd}$$

$$Qsw = (47,810)\frac{(520)}{(1646.5)}\frac{(30.06+-0.05/13.6)}{(2992)}$$

Qsw = 13,525 SCFM,W

VOLUMETRIC FLOW AT DRY STANDARD CONDITIONS

Qsd = Qsw (1 -Bwo/100)

Qsd = (13525)(1 - 8.55/100)

Qsd = 12,369 SCFM,D

NOMENCLATURE

		Units
An	cross-sectional area of nozzle	ft^2
As	cross-sectional area of stack	ft^2
Bsat	saturation volume of water at stack temperature	%vol
Bwo	moisture content of stack gas	%vol
Cp	pitot tube calibration coefficient	
Ds	stack diameter	inch
L	length of rectangular duct	inch
La	maximum allowable leak rate	CFM
Li	observed leak rate	CFM
MWd	dry molecular weight of stack gas	lb/mole
MWw	wet molecular weight of stack gas	lb/mole
Pb	barometric pressure	"Hg
Ps	static pressure of stack gas	"H_2O
Pstd	standard pressure	"Hg
Qa	stack gas volumetric flow, stack conditions	CFM
Qsd	stack gas volumetric flow, dry standard condition	CFM
Qsw	stack gas volumetric flow, wet standard condition	CFM
Ti	total test time	min
Tm	dry gas meter temperature	^oR
Ts	stack temperature	^oR
Tstd	standard temperature	^oR
Vlc	volume of liquid collected	mls
Vm	gas volume at meter condition	ft^3
Vm_{std}	gas volume at dry standard condition	ft^3
Vs	stack gas velocity	fps
Vsat	saturated vapor pressure of water	"Hg
Vw_{std}	water volume at standard conditions	ft^3
W	width of rectangular duct	inch
Y	accuracy of dry gas meter	
H	orifice differential pressure	"H_2O
P	velocity pressure head(average of square roots)	"$H_2O^{0.5}$
%CO	carbon monoxide content of stack gas	%vol
$\%CO_2$	carbon dioxide content of stack gas	%vol
$\%N_2$	nitrogen content of stack gas	%vol
$\%O_2$	oxygen content of stack gas	%vol

KLEINFELDER, INC.

EXAMPLE CALCULATIONS

METHOD 5

Plant: BFI Chestnut Ave Landfill Date: 1/21/92

Location: Flare Exhaust Run No.: Part 1

STANDARD CONDITIONS

Temperature T_{std} 60 °F Pressure P_{std} 29.92 "Hg

ISOKINETIC VARIATION

$$I = \frac{49.8667\ (Vmstd)\ (Ts)}{(Ti)(Pb + Ps/13.6)(Vs)(An)(1-Bwo/100)(Tstd)}$$

$$I = \frac{49.8667(52.608)(1646.5)}{(96)(30.06 + -0.5/13.6)(16.892)(0.0021)(1-8.55/100)(520)}$$

I = 99.52 % (diff in rounding)

LABORATORY RESULTS(mg)

	Actual	Water	Acetone	MeCl
Front Half				
Filter				
Back Half				

PARTICULATE CONCENTRATION Total Part (Front & Back)

Dry Standard Conditions

$Csd = 0.01543\ (Wp) / (Vm_{std})$

$Csd = 0.01543\ (19.2)/(52.608)$

Csd = 0.005631 gr/DSCF

Wet Standard Conditions

Csw = Csd (1 - Bwo/100)

Csw = (0.0056)(1 - 8.55/100)

Csw = 0.00515 gr/WSCF

Actual Stack Conditions

$$Ca = (Csd)\ \frac{(Tstd)}{(Ts)}\ \frac{(Pb + Ps/13.6)}{(Pstd)}\ (1 - Bwo/100)$$

$$Ca = (0.00563)\ \frac{(520)}{(1846.5)}\ \frac{(30.04 - 0.05/13.6)}{(29.92)}\ (1 - 8.55/100)$$

Ca = 0.0015 gr/ACF

PARTICULATE EMISSION RATE

Ep = (Csd) (60) (Qsd) / 7000

Ep = (0.0563)(60)(12,369)/7000

Ep = 0.597 lb/hr

NOMENCLATURE

		Units
An	cross-sectional area of nozzle	ft^2
Bwo	moisture content of stack gas	%vol
Ca	particulate concentration at stack condition	gr/ft^3
Csd	concentration at dry standard condition	gr/ft^3
Csw	concentration at wet standard condtion	gr/ft^3
Ep	particulate emission rate	lb/hr
I	isokinetic variation	%
Pb	barometric pressure	"Hg
Ps	static presuure of stack gas	"H_2O
Pstd	standard pressure	"Hg
Qsd	stack gas volumetric flow, dry std condition	CFM
Ti	total test time	min
Ts	stack temperature	°R
Tstd	standard temperature	°R
Vm_{std}	gas volume at dry standard condition	ft^3
Vs	stack gas velocity	fps
Wp	weight of particulate matter collected	mg

Example Calculation of PM-10

From graph in Appendix D:

% < 10 μM = 76% for PM-10 Run #2

Total Particulate Run #2:

lb/hr = 0.612 * 0,76 = ~~0.004~~ 0,47 = PM-10 Emission

gr/SDCF = 0.0057 * 0,76 = 0.004 = PM-10 Concentrat.

Example Calc for gaseous emissions (NO_x, CO, SO_2, NMHC)

lb/hr = ppm (v/v, dry) * MW * 1.581×10^{-7} * SDCFM

Run 1 NOx as NO_2 = 7.8 * 46.01 * 1.581×10^{-7} * 12,398^3 = 0.703 lb/

BFI Chestnut St Flare Exhaust

NOx lb/MMBtu Example Calculation

$$\#/MMBtu = \frac{\#/hr\ (NOx)}{MMBtu/hr}$$

$$\frac{MMBtu}{hr} = \frac{\%\ CH_4 * 1012\ Btu/CF * SCFM_{(LFG)} * 60\ min/hr}{1 \times 10^6 \frac{Btu}{MMBtu}}$$

For Run # 1 $\%\ CH_4 = 31.2\%$, $SCFM = 613$, $NOx\ lb/hr = 0.7$

$$MMBtu/hr = \frac{0.312 * 1012 * 613 \times 60}{1 \times 10^6} = 11.61$$

$$\#/MMBtu = 0.70/11.61 = 0.06$$

Example Calc Flare efficiency

$$Efficiency = \frac{Inlet\ NMHC\ (lb/hr) - Exhaust\ NMHC\ (lb/hr) \times 100}{Inlet\ NMHC\ (lb/hr)}$$

$$\text{For Run 1 Eff \%} = \frac{9.43 - 0.11}{9.43} \times 100 = 98.82\%$$

KLEINFELDER, INC.
City of Industry, California

POST TEST METER BOX CALIBRATION FORM

Meter Box No. 398523 Date 12-3-91 Calibrated by P. Harrity

Barometric Pressure 29.45 Ambient Temp 73 Pre Test Y_i _____

Project Name BFI AZUSA / BKK LANDFILL Project No. 304022-77 / 304120-11 Hrun _____ Vac _____

Orifice Manometer (in. H_2O) H	Gas Volume: Wet Test Meter (ft^3) V_w	Gas Volume: Dry Gas Meter (ft^3) V_d	Temperatures: Wet Test Meter (° F) T_w	Temperatures: Dry Gas Meter (° F) T_d	Time (min) T_i	Y_i	$H@_i$
0.9	5.501	5.420	73.5	80	10	1.025	1.687
0.9	5.554	5.480	73.0	81	10	1.026	1.649
0.9	5.461	5.415	73.0	82	10	1.023	1.703
						Y_i AVG	1.025

$\overline{H@_i}$ = 1.680

METER BOX CALIBRATION HISTORY

Last Calibration Date _____ Calibrated by P. Harrity

$H_@$ of Calibration _____ Y_i of Calibration _____

KLEINFELDER, INC.
City of Industry, California

POST TEST METER BOX CALIBRATION FORM

Meter Box No. 398523 Date 1-27-92 Calibrated by RH

Barometric Pressure 29.41 Ambient Temp 74 Pre Test Y_i _____

Project Name _____ Project No. _____ Hrun _____ Vac _____

Orifice Manometer (in. H_2O) H	Gas Volume: Wet Test Meter (ft^3) V_w	Gas Volume: Dry Gas Meter (ft^3) V_d	Temperatures: Wet Test Meter (° F) T_w	Temperatures: Dry Gas Meter (° F) T_d	Time (min) T_i	Y_i	$H@_i$
0.9	5.639	5.565	73.5	76	10	1.017	1.617
0.9	5.452	5.374	73.5	78	10	1.021	1.727
0.9	5.419	5.358	73.0	80	10	1.022	1.738
						Y_i AVG	1.020

$\overline{H@_i}$ = 1.694

METER BOX CALIBRATION HISTORY

Last Calibration Date _____ Calibrated by _____

$H_@$ of Calibration _____ Y_i of Calibration _____

Dick Munns Company

LIQUID AND GAS - FLOWMETER CALIBRATION SERVICE

Phone (213) 596-1559 • FAX (714) 827-0823 • 10571 Calle Lee—133 • Los Alamitos, CA 90720

Certificate

CUSTOMER		TYPE OF INSTRUMENT:	
KLEINFELDER, INC.		Wet Test Meter	
		FLUID: Air @ 14.7 PSIA & 70°F.	
DATE: 5-23-91	CALIBRATION INTERVAL: 12 months	BAROMETER:	HUMIDITY: 48%
SERIAL NO.: 14AX-5	ASSET NO.:	MODEL: 63111	MANUFACTURER: P.S.
RATED ACCURACY: ± 1%	TEST UNITS: A-3	N.I.S.T.: M-0122	TEST RESULTS: ☒ AS RECEIVED ☐ ADJUSTED

INDICATED	ACTUAL		
S.C.F.M.	S.C.F.M.		
.02	.0200		
.05	.0516		
.08	.0803		
.10	.1004		
.15	.1510		
.20	.2009		

ALL TEST UNITS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY AS PER MIL-STD-45662A.

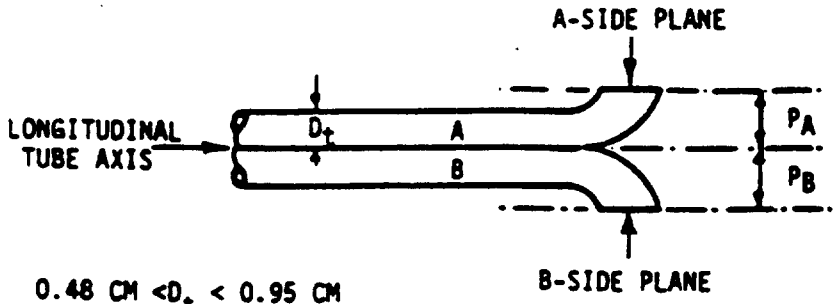
TECHNICIAN	APPROVED BY
RM	

KLEINFELDER, INC.

Diamond Bar, California

PITOT TUBE CALIBRATION

Tube ID: PW1 Date: 2-25-92 Calibrated By: Pat Hannity



NOTE:

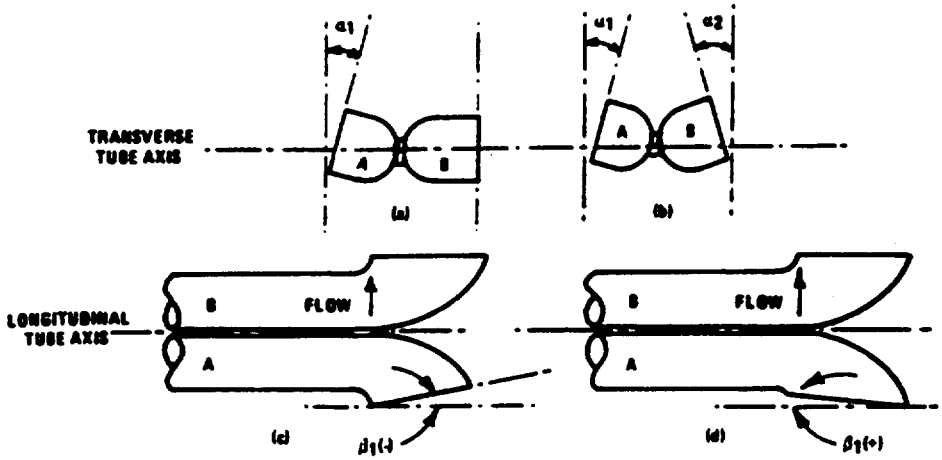
$\begin{cases} 1.05\ D_t < P < 1.50\ D_t \\ P_A = P_B \end{cases}$

0.48 CM $\leq D_t \leq$ 0.95 CM
(3/16 IN.) (3/8 IN.)

D_t = 3/8 "

P_a = 1.50

P_b = 1.50

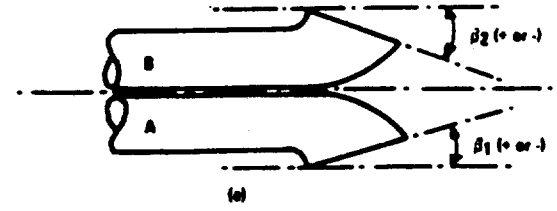


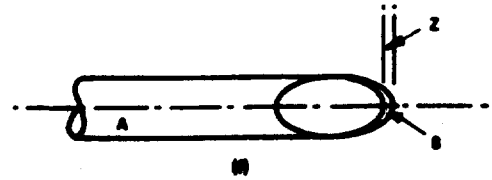
a_1 = 0.5

a_2 = 1.0

B_1 = +1.5

B_2 = +0.5





Z = 0.03

W = 0

KLEINFELDER, INC.

Diamond Bar, California

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 1-27-92 KJC

Thermocouple No. Probe 15

Barometric Pressure 29.25 in. Hg

Ambient Temperature _____ °F

Calibrated by K. Cuzby

Reference: Mercury in glass A137

Other _____

Reference Point Number	Source (Specify)	Reference Thermometer Temperature (deg F)	Thermocouple Potentiometer Temperature (deg F)	Difference %
1	Ice bath	31.8	30.8	
2	Oven oil bath	247	253.5	
	"	241	245.7	

$$\text{Diff.} = \frac{(\text{Ref. Temp} + 460) - (\text{Test Temp} + 460)}{(\text{Ref. Temp.} + 460} \times 100$$

Scott Specialty Gases, Inc.

RECEIVED AUG 2 7 1991

2600 CAJON BLVD., SAN BERNARDINO, CA 92411-0000
PHONE: 714-887-2571 FAX:714-887-0549

8/21/91

KLEINFELDER
1370 VALLEY VISTA DRIVE
SUITE 150
DIAMOND BAR CA 91765-0000

PROJECT #: 02-15483
PO #: 70-1621-111

CYLINDER #: ALM011781

ANALYTICAL ACCURACY: +/-1%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES)	U/M
SULFUR DIOXIDE	180.0	PPM	180.0	PPM
NITROGEN	BALANCE			N/A

DATE OF ANALYSIS: 8/21/91

ANALYST: _____
MAYNARD JOHNSON

APPROVED BY: _____
ROBERT SHEALY

RECEIVED SEP

Scott Specialty Gases, Inc.

2600 CAJON BLVD., SAN BERNARDINO, CA 92411-0000
PHONE: 714-887-2571 FAX:714-887-0549

8/23/91

KLEINFELDER
1370 VALLEY VISTA DRIVE
SUITE 150
DIAMOND BAR CA 91765-0000
ATTN: ROLAND HEBERT

PROJECT #: 02-15454
PO #: 70-1621-111

CYLINDER #: AAL1072

ANALYTICAL ACCURACY: +/-1%

COMPONENT	REQUESTED CONCENTRATION	ANALYSIS 1 (MOLES) U/M
SULFUR DIOXIDE	100.0 PPM	100.2 PPM
NITROGEN	BALANCE	N/A

NOTES: GRAVIMETRIC MASTER GAS- CERTIFIED TO HAVE BEEN BLENDED AGAINST NIST CERTIFIED WEIGHTS AND VERIFIED TO BE CORRECT BY INDEPENDENT LABORATORY ANALYSIS. CYLINDER PRESSURE = 1915 PSI

DATE OF ANALYSIS: 8/23/91

ANALYST: _____
MAYNARD JOHNSON

APPROVED BY: _____
ROBERT SHEALY

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

KLEINFELDER

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4842
Your P.O. No: 71Y10001-001
Page 1 of 1
Expiration Date: 8/91

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. ALM-11729 Cylinder Pressure 1900 psig Certified Accuracy ±1% % NBS Traceable

	REFERENCE STD				GAS ANALYZER		
COMPONENTS	CERTIFIED CONC	SRM/CRM NO.	CYL. NO.	CONC.	MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	99.52 ppm	CRM 1684B	ALM-3640	97.28 ppm	THERMO-ELECTRON 10 AR 14853-150	11/10/89	CHEMI-LUMINENSCENT
NOX	99.65 ppm						

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component NITRIC OXIDE
First Analysis Date 1/25/90 Units ppm

Z 0.00	R 97.29	T 99.50
R 97.20	Z 0.04	T 99.40
Z 0.00	T 99.50	R 97.28

Mean Test Assay 99.49 ppm

Second Analysis Date 2/1/90 Units ppm

Z 0.00	R 97.30	T 99.50
R 97.26	Z 0.06	T 99.49
Z 0.06	T 99.50	R 97.20

Mean Test Assay 99.52 ppm

Component _____
Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Component _____
Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Date _____ Units _____

Z _____	R _____	T _____
R _____	Z _____	T _____
Z _____	T _____	R _____

Mean Test Assay _____

Chronology: Date _____
Assay _____

Analyst LEE OLDHAM

Approved By: R. Sheehy

Scott Specialty Gases, Inc.

FAX 714-887-0549
PHONE: 714-887-2571

2600 CAJON BLVD., SAN BERNARDINO, CA 92411

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 01/15/92
Our Project No: 17513
Your P.O. No: 70-1621-159
Page 1 of 1
Expiration Date: 07/93

KLEINFELDER
ATTN: PAT HARRITY
1370 VALLEY VISTA DRIVE
SUITE 150
DIAMOND BAR CA 91765

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. ALM005351 Cylinder Pressure 1950 PSIG Certified Accuracy ±1% % NIST Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	REFERENCE STD CYL. NO.	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	GAS ANALYZER LAST CAL. DATE	GAS ANALYZER ANALYTICAL PRINCIPLE
CARBON DIOXIDE	10.05 %	CRM1675	ALM001136	14.08 %	HORIBA PRI2000 406004	10/23/91	INFRA-RED
OXYGEN	10.01 %	CRM2658	AAL18594	10.08 %	BECKMAN 755 100410	10/23/91	PARAMAGNETIC

BALANCE GAS NITROGEN
ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component CARBON DIOXIDE
First Analysis Date 01/07/92 Units mv

Z 00.00	R 93.5	T 76.2
R 93.5	Z 00.04	T 76.2
Z 00.04	T 76.2	R 93.5

Mean Test Assay 10.05 %

Second Analysis Date _____ Units mv

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Component OXYGEN
Date 01/07/92 Units mv

Z 00.0	R 40.4	T 40.1
R 40.4	Z 00.0	T 40.1
Z 00.0	T 40.1	R 40.4

Mean Test Assay 10.01 %

Date _____ Units mv

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Component _____
Date _____ Units mv

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Date _____ Units mv

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Chronology: Date _____
Assay _____

Analyst M. JOHNSON

Approved By: _____
A.F. LANGE, Ph.D., MANAGER, QA

TELEX: 510-100-6831 (ScottGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

Date: 2/14/90
Our Project No.: 4842
Your P.O. No.: 71Y10001-001

KLEINFELDER
526 HOFGAARDEN
CITY OF INDUSTRY, CA 91744

Gentlemen:

Thank you for choosing Scott for your Specialty Gas needs. The analyses for the gases ordered, as reported by our laboratory, are listed below. Results are in volume percent, unless otherwise indicated.

ANALYTICAL REPORT

Cyl. No. AAL-3328 — Analytical Accuracy ±1%

Component	Concentration
CARBON DIOXIDE	19.08%
NIST TRACEABLE TO CRM1675	
NITROGEN	BALANCE

Cyl. No. ALM-11662 — Analytical Accuracy ±1%

Component	Concentration
NITRIC OXIDE	507.3 ppm
NOX	507.9 ppm
*GRAVIMETRIC MASTER GAS	
NITROGEN	BALANCE

Cyl. No. ALM-3487 — Analytical Accuracy ±1%

Component	Concentration
SULFUR DIXOIDE	100.0 ppm
NITROGEN	BALANCE
*GRAVIMETRIC MASTER GAS	

Cyl. No. ALM-5695 — Analytical Accuracy ±1%

Component	Concentration
NITROGEN DIOXIDE	235 ppm
NITRIC OXIDE	189.6 ppm
NOX	424.6 ppm
NITROGEN	BALANCE
NO2 ±5% ANALYSIS	

CERTIFIED

Analyst _____ Approved By _____

*CERTIFIED TO HAVE BEEN BLENDED AGAINST NIST CERTIFIED WEIGHTS AND VERIFIED TO BE CORRECT BY INDEPENDENT ANALYSIS.

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of

Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

KLEINFELDER

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4842
Your PO. No: 71Y10001-001
Page 1 of 1
Expiration Date: 8/91

CERTIFICATE OF ANALYSIS—EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. ALM-6149 Cylinder Pressure 1900 psig Certified Accuracy ±1% % NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	REFERENCE STD CYL. NO.	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	GAS ANALYZER LAST CAL. DATE	GAS ANALYZER ANALYTICAL PRINCIPLE
CARBON MONOXIDE	96.64 ppm	GMIS TRACEABLE TO CRM2636	AAL-1081	253.3 ppm	HORIBA AIA 24 4564403	1/29/90	INFRA-RED

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component CARBON MONOXIDE
First Analysis Date 1/29/90 Units ppm

Z 00.0	R 95.0	T 39.7
R 95.0	Z 00.0	T 39.6
Z 00.0	T 39.6	R 95.0

Mean Test Assay 96.72 ppm

Second Analysis Date 2/5/90 Units ppm

Z 00.0	R 95.0	T 39.6
R 95.0	Z 00.0	T 39.6
Z 00.0	T 39.6	R 95.0

Mean Test Assay 96.64 ppm

Component _____
Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Component _____
Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Date _____ Units _____

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay _____

Chronology: Date _____
Assay _____

Analyst D. BUTTERFIELD

Approved By: R. Sheedy

ANALYTICAL REPORT – cont'd

Date: 2/14/90

KLEINFELDER

Our Project No.: 4842

Your P.O. No.: 71Y10001-001

Cyl. No. ALM-3484	Analytical Accuracy ±1%
Component	Concentration
SULFUR DIXOIDE	1010 ppm
*GRAVIMETRIC MASTER GAS	
NITROGEN	BALANCE

Cyl. No.	Analytical Accuracy
Component	Concentration

Cyl. No. ALM-8304	Analytical Accuracy ±1%
Component	Concentration
CARBON MONOXIDE	45.74 ppm
* GRAVIMETRIC MASTER GAS	
NITROGEN	BALANCE

Cyl. No.	Analytical Accuracy
Component	Concentration

Cyl. No.	Analytical Accuracy
Component	Concentration

Cyl. No.	Analytical Accuracy
Component	Concentration

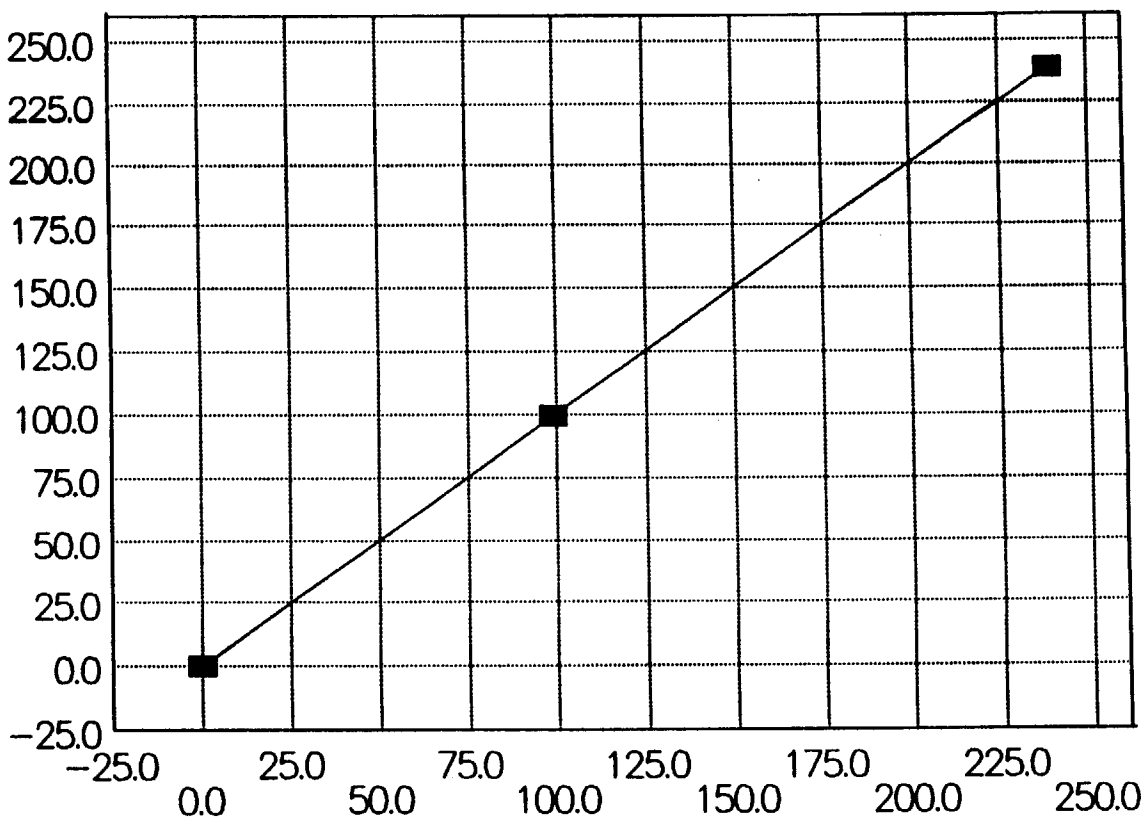
* CERTIFIED TO HAVE BEEN BLENDED AGAINST NIST CERTIFIED WEIGHTS AND VERIFIED TO BE CORRECT BY INDEPENDENT ANALYSIS.

Analyst _____

Approved By _____

TECO 10 AR NOX CALIBRATION

250 PPM FULL SCALE

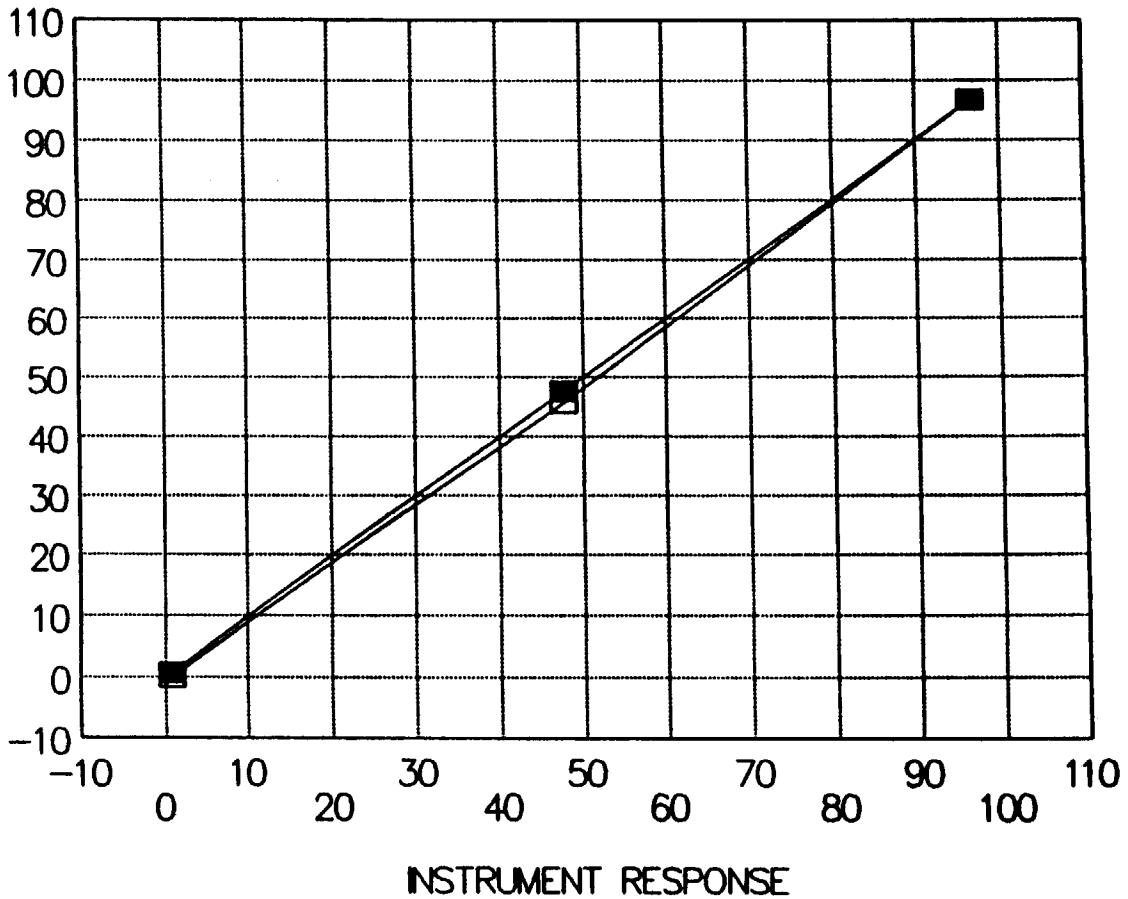


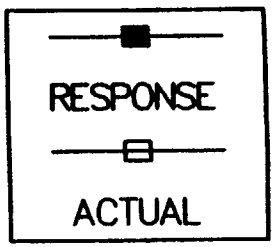
CALIBRATION DATA

RESPONSE	ACTUAL
0.0	0.0
99.0	99.6
239.0	239.0

TECO 48H CO CALIBRATION

100 PPM FULL SCALE



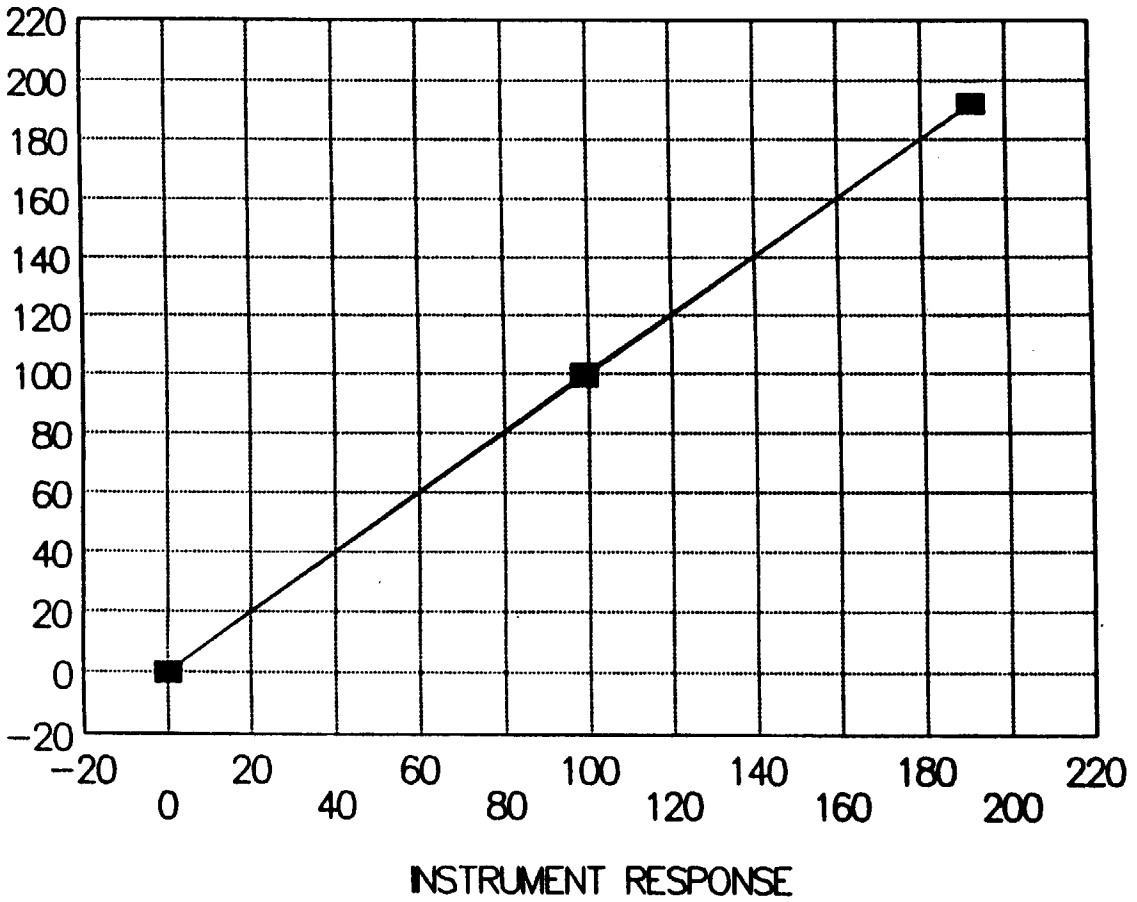


CALIBRATION DATA

RESPONSE	ACTUAL
.8	0.0
47.7	45.7
96.7	96.6

WR 721AT2 SO2 CALIBRATION

200 PPM FULL SCALE

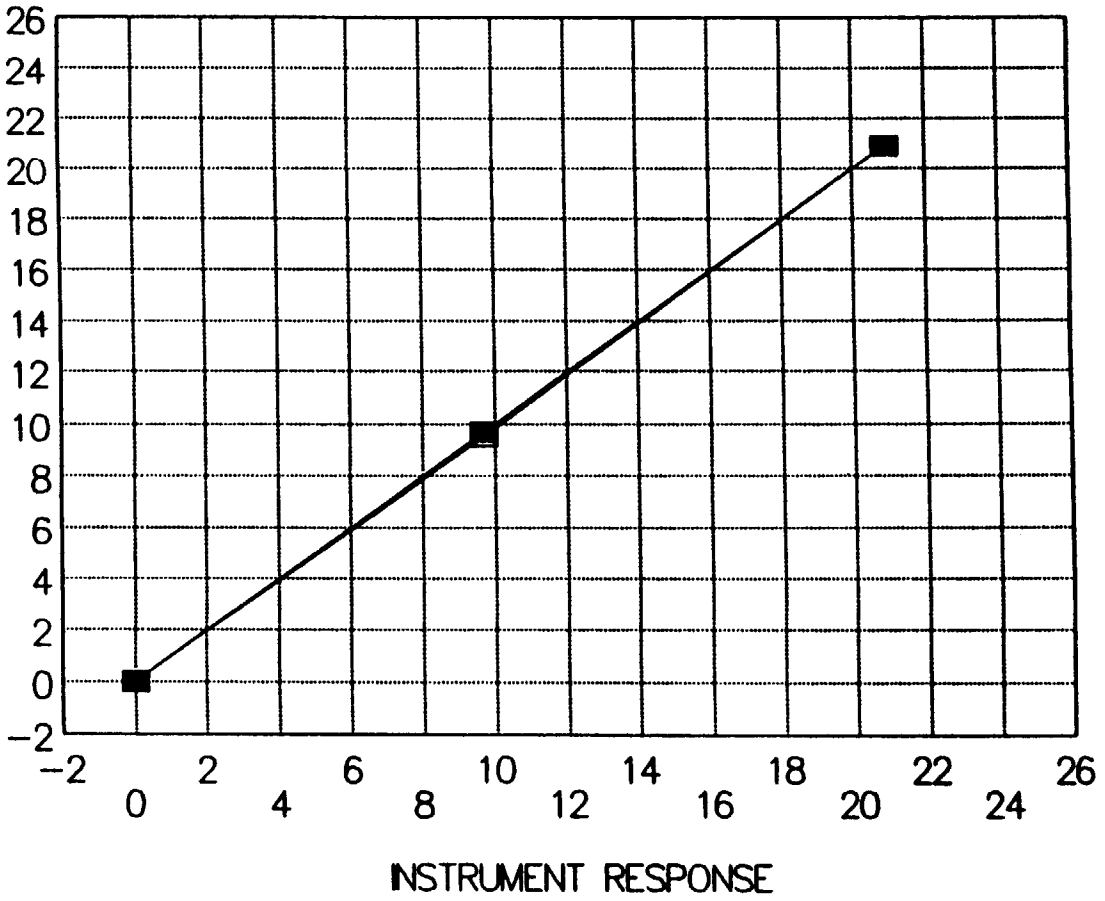


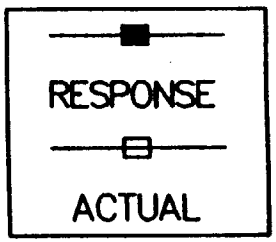
CALIBRATION DATA

RESPONSE	ACTUAL
0.0	0.0
99.0	100.0
192.0	192.0

TELEDYNE 320AX 02 CALIBRATION

25% VOLUME FULL SCALE



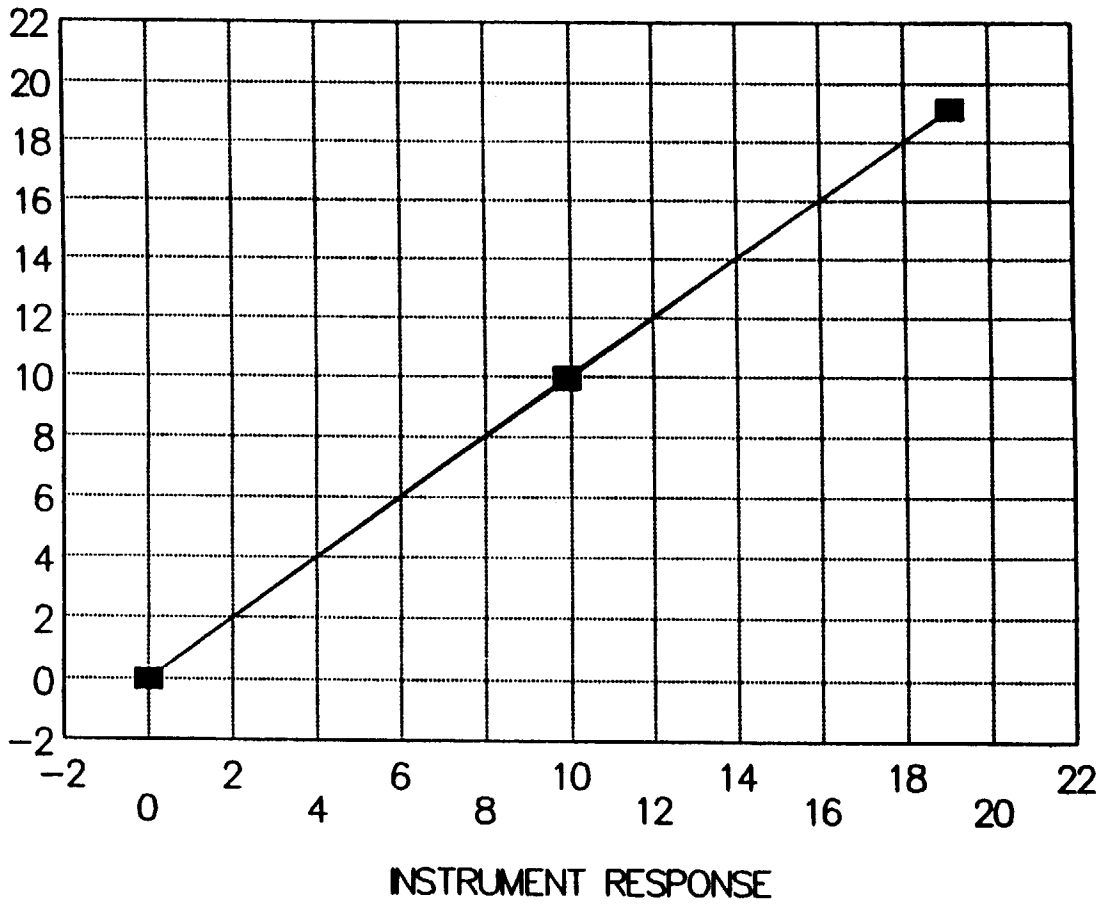


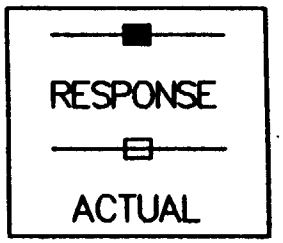
CALIBRATION DATA

RESPONSE	ACTUAL
0.0	0.0
9.7	9.5
20.9	20.9

ACS 3300 CO2 CALIBRATION

20% VOLUME FULL SCALE





CALIBRATION DATA

RESPONSE	ACTUAL
0.0	0.0
9.9	10.0
19.1	19.1

APPLICATION FOR AUTHORIZATION

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_____
(Document and Date)

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_____
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