...monwealth of Pennsylvania
...vironmental Resources
December 13, 1990

Subject: J. E. Baker Company
York, York County
No. 2 Rotary Kiln

To: Ron Davis
Bureau of Air Quality Control
Harrisburg Regional Office

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DIV. OF ABATEMENT & COMPLIANCE

From: Richard St. Louis, Chief
Source Testing Unit
Division of Technical Services and Monitoring

Through: Chief, Source Testing and Monitoring Section

The purpose of this memorandum is to confirm our telephone conversation of December 7, 1990 regarding the subject company's test program. Although difficulties were encountered and erroneous duct dimensions were utilized during the test program, I feel the results may very well be within a plus or minus 10% tolerance and thus are acceptable for purpose of establishing a baseline result. I would also consider the NO_x results acquired from the use of Method 7E as valid and not those of Method 7A because of the adverse sampling conditions and location.

Should you require any further information on this subject, please contact me.

cc: 67-309-082 thru Doug Lesher
Reading File

RSL:glf

TEST PROTOCOL

EMISSIONS TESTING

BAKER DOLOMITE
YORK, PENNSYLVANIA

1. SOURCE INFORMATION

1.1 SOURCE NAME

Baker Dolomite

1.2 SOURCE ADDRESS

York Plant: 320 North Baker Road, York, Pennsylvania 17405
DBCA Division: 225 North Emigs Road, York, Pennsylvania 17405

1.3 SOURCE PROCESS IDENTIFICATION

York Plant:
Nos. 1 and 2 Rotary Lime Kilns

DBCA Division:
Despatch Curing Oven, Exhaust Hoods (4),
Nos. 5 & 6 Tunnel Kiln (Common Stack), and No. 7 Periodic Kiln

1.4 SOURCE CONTACT

Mr. Ron Downey
Baker Dolomite
Telephone: (717) 792-4615
FAX: (717) 792-5103

2. TESTING FIRM INFORMATION

2.1 NAME

Entropy Environmentalists, Inc.

2.2 ADDRESS

P.O. Box 12291, Research Triangle Park, North Carolina 27709

2.3 COMPANY CONTACT

Kenneth R. Loder, Director, CEM Division
Telephone: (919) 781-3551
FAX: (919) 781-9555

3. SOURCE AND PROCESS DESCRIPTIONS

The Baker Dolomite facility of The J.E. Baker Company produces several types of dolomitic lime and dolomitic brick. Emissions testing will be conducted on the following processes.

The No. 1 Rotary Deadburned Lime Kiln (Operating Permit 67-309-015) is capable of producing two products: Magdolite and Brick Grain. This kiln is 300 feet in length and 10 feet in diameter. The kiln is installed on a slight angle with the high end being the feed end and the low end being the firing end. The kiln produces dolomitic lime which varies in density and levels of impurity. The Brick Grain is of a higher density and a lower level of impurity. The kiln is direct fired with bituminous coal and coke, and can be supplemented with natural gas and oxygen. The fuel sulfur is restricted in the permit to 1.75% sulfur.

The kiln exhaust is cooled with ambient air, goes through a heat exchanger, a baghouse dust collector, and is exhausted by an induced draft fan.

No. 2 Rotary Kiln (no permit Pre 1972) is similar to the No. 1 Kiln. The length is the same, but the diameter is 11 feet. This kiln produces the same products and is capable of burning the same fuels.

The kiln exhaust is cooled with ambient air, and is exhausted through two parallel induced draft fans. From these fans the exhaust goes into a baghouse dust collector.

Crushed dolomitic stone will be fed into the feed end of each of the rotary kilns to determine sulfur dioxide removal efficiency during additional testing.

The process data to be incorporated in the final test report for the two rotary kilns include the stone feed rate, the type product, flux addition rate, firing rate, type of fuel, sulfur, ash, nitrogen, heating value, the feed end temperature, and the kiln revolutions per hour.

The natural gas fired tunnel kilns (Operating Permit 67-309-042) fire dolomitic refractories that contain an organic binder. The binder is burned in the tunnel kilns. The No. 5 Kiln is a Bricesco kiln and the No. 6 Kiln is a Swindel Kiln. The organic binder contains a confidential binder system. The bricks are indexed and pushed one car at a time/brick at a time into the front end of the tunnel kiln. The brick are heated to a high temperature by natural gas-fired burners along the sides of the kilns. The firing cycle is several days in length as the brick are heated to nearly 3,000 degrees Fahrenheit.

Neither kiln incorporates pollution control equipment. A high percentage of the binder is destroyed during the firing process, as the binder burns out of the brick. The kiln is comprised of several zones including a binder burnout zone, a furnace zone and cooling zones. The brick have been cooled to several hundred degrees when they exit the tunnel kiln.

BAKER DOLOMITE

THE J.E. BAKER COMPANY

HIGH TEMPERATURE REFRACTORIES

232 EAST MARKET STREET
P.O. BOX 1189
YORK, PA 17405
(717) 848-1501
TWX 499-7158

November 21, 1990

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Mr. Ron Davis
Bureau of Air Quality
PA. Dept. of Environmental Resources
1 Ararat Blvd.
Harrisburg, PA 17110

Dear Mr. Davis:

RE: TESTING NO. 2 ROTARY KILN

Enclosed is the Roy F. Weston, Inc., discussion of the impact the air duct diameters had on the results of their testing. These tests were conducted on June 1, 1990, on our No. 2 rotary kiln at York plant for nitrogen oxides.

Please review this information. With our pending new rotary kiln, this data forms the basis for our PSD application. We need to be absolutely sure that this data is representative or must a sampling be repeated. Please contact Weston directly if you have any technical questions. If, however, meetings or correspondence are necessary, we must be copied or given the opportunity to attend any meetings.

Please advise me of your findings and let me know if you need any additional information.

Sincerely yours,

Ronald O. Downey
Manager Environmental
Engineering

ds32402

Enclosure

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AIR QUALITY CONTROL

WESTON
MANAGERS DESIGNERS/CONSULTANTS
WESTON WAY
WEST CHESTER, PA 19380
PHONE: 215-692-3030
TELEX: 83-5348

21 September 1990

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DER-HBG. REGION
AIR QUALITY CONTROL

J.E. Baker Company
PO Box 1189
York, PA 17405

Attention: Mr. Ron Downey

Subject: Emission Test Program at Number 2 Kiln

Dear Mr. Downey:

Roy F. Weston, Inc. (WESTON) conducted an emission test program to measure total nitrogen oxides (NO_x) concentrations and mass rates at the Number 2 Kiln on June 1, 1989. The purpose of this test program was to obtain baseline emission measurements for the Number 2 Kiln, prior to the replacement of the baghouse used for particulate control. The program consisted of continuous measurements for NO_x concentrations conducted using EPA Method 7E (continuous analyzer) and grab samples in flasks using EPA Method 7A. Velocity traverses were conducted to measure the volumetric flow rate used to calculate the mass emission rates. Moisture measurements were conducted according to EPA Method 4.

The samples were collected from two parallel ducts upstream from the pair of the baghouse forced draft fans, one fan for each duct. This location was chosen because there were no stack sampling locations and no straight run of duct between the forced draft fans and the baghouse itself. Grills for the introduction of ambient air to dilute the process gas and reduce temperature were located immediately upstream of the forced draft fans.

The sampling locations met the minimum upstream and downstream requirements of EPA Method 1, however, the access was limited. All measurement activities were conducted from the basket of a manlift at least 70 feet above ground. The structured steel framework housing the forced draft fans was over two stories tall and the parallel ducts sloped away from the only location available for the manlift. As a result, the sampling team could only access the measurement locations from directly above the sampling ports. The process gas was hot, approximately 900°F and the radiant heat from the uninsulated ductwork and the convected hot air from the region of the two fans further complicated the task of testing from a fully extended boom.

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Three distinct sampling errors occurred during the course of this test program which had varying amounts of impact on the results as described below:

1. The sampling ports could not be completely sealed during velocity traverse. The sample ports were irregular holes cut in the duct wall with no nipple or other refinement. The ducts were under at least 2.5 in H_2O negative pressure. The test crew members could not approach the duct wall because of the high temperature of the uninsulated ductwork, and attempts to fit a sealing ring around the pitot tube assembly were frequently frustrated by the high temperature. It was decided to discount the velocity readings at the traverse points adjacent to the port openings if they differed significantly from the values obtained at the other traverse points due to the ambient air filtration and wall effects. These were more pronounced on the smaller south duct at which at least the first and often the second traverse points were discounted. The velocity traverses at the larger north duct were only affected at the first point, nearest to the port, and the efforts to seal this port were somewhat more effective. The process of discounting the readings for the first or second traverse points due to air infiltration and wall effects was considered to have only a minor impact on data quality since a total of sixteen traverse points minimum were used versus the twelve points required for this location.

2. The NO_x grab samples were difficult to obtain due to the access problems and temperature differential which contributed to several broken probes during the sampling period. The grab sample results did not correlate well with the continuous Method 7E readings. NO_x concentration for ¾ of Method 7A grab samples collected on the south duct agreed with the instantaneous readings measured by Method 7E. All grab samples collected on the north duct were significantly below the Method 7E data, presumably due to ambient air dilution caused by a cracked probe. However, the Method 7E sample system passed repeated calibration and bias drift tests conducted at the analyzer and from the end of the probe.

   Based on comparisons of these data, we believe that only the Method 7E continuous emission data were representative of the NO_x concentrations.

Since the Method 7E data were consistent and were verified by calibration gas standards and also in part by the Method 7A results, the Method 7E NO_x concentration data are considered reliable and representative of the process emissions.

3. The duct diameters were assumed, not measured. The error in part, was a result of an incident involving a breakdown of the manlift on the preliminary test day. One crew member was in the basket positioning the Method 7E continuous monitoring probe prior to making the duct measurements when an electrical failure disabled the manlift. The crew members on the ground were able to use the emergency hydraulic release on the manlift to retract the boom without further incident or injury. However, the manlift was out of for several hours the duct diameter measurements could not be obtained at that time.

   An assumed diameter was included in the test plan for each duct and these assumed diameters were visually "confirmed" by observation from the ground and discussion with plant personnel during the time the manlift was out of service. WESTON's team leader failed to physically confirm and document these stack diameter assumptions prior to the start of testing. As a result, the south duct was assigned a diameter of 4 ft. and the north duct was assigned a diameter of 6 ft. when the actual diameters were respectively 6 ft. and 7 ft., according to Mr. Ron Downey of J.E. Baker.

This failure to physically measure duct diameter had a serious impact on the representativeness of the original data. The calculated volumetric flow rate was significantly lower than the actual volumetric flow rate since the measured velocity was multiplied by a smaller crossectional area. The crossectional area traversed during for the velocity measurements was also in error since the traverse points were calculated on a smaller duct diameter. The magnitude of the traverse point location errors has been examined, as shown on the attached figures. The error between the actual velocity sampling points and the theoretical ideal points is small for the north duct, since WESTON used more traverse points than were required by EPA Method 1 and the discrepancy between the assumed and actual diameters was relatively small. Thus, the only significant error in the north duct measured flow readings is the duct diameter.

The south duct traverse points were significantly different from the ideal traverse point configuration. However, since the first two points were normally discarded due to wall effects, the south duct velocity traverse was actually an average velocity measured

WESTON

for the centroid of the duct. Given the high temperature and long straight run of this duct, the centroid velocity should be a fair representation of average velocity in this duct.

The flow measurement error was initially noticed by Mr. Ron Downey of J.E. Baker in early 1990 after comparing volumetric flow rates from previous WESTON emission test measurements at the No. 1 Kiln stack, and engineering calculations for heat content of the No. 2 Kiln exhaust, and the products of combustion calculated for the No. 2 Kiln exhaust. When the data from these different approaches were converted to comparable bases, i.e., consistent production rate, uniform temperature, consideration of air quenching, etc., the originally measured volumetric flow rate at the No. 2 Kiln was consistently lower than the estimated or calculated flow by a factor of 30 to 35%.

The incorrect duct diameter measurements were finally identified through the joint efforts of WESTON and J.E. Baker and when the revised volumetric flow rates were calculated using the correct diameters, all four sources of flow calculations were in agreement.

The emission results were recalculated using the duct diameters provided by J.E. Baker and these revised results were presented in June 1990. This revised results are considered representative of the NO_x mass rates at the Number 2 Kiln on June 1, 1989.

I suggest that a copy of this letter be provided to PADER as an explanation of the differences between the original test report and the June 1990 revised results. As noted in the discussion above the test locations and conditions were challenging from a testing perspective. However, most importantly, WESTON has evaluated the impacts of all sampling errors and assumptions and considers the revised test results to be accurate and representative.

If you have any questions, please contact me.

Very truly yours,

ROY F. WESTON, INC.

Barry L. Jackson

Barry L. Jackson
Project Director

BLJ/kh

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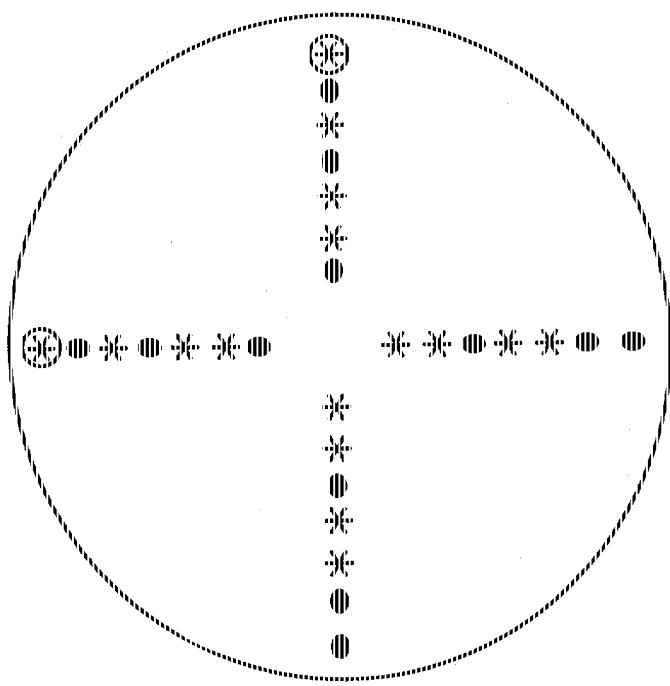
Ideal Point Location	
No.	Inches
1	3 3/4
2	12 3/8
3	24 3/4
4	59 1/4
5	71 5/8
6	80 3/8

Actual Point Location	
No.	Inches
1	2 1/4
2	7 1/2
3	14
4	23 1/4
5	48 3/4
6	58
7	64 1/2
8	69 3/4



DIAMETER 7 FT.

Ideal Point

Actual Point

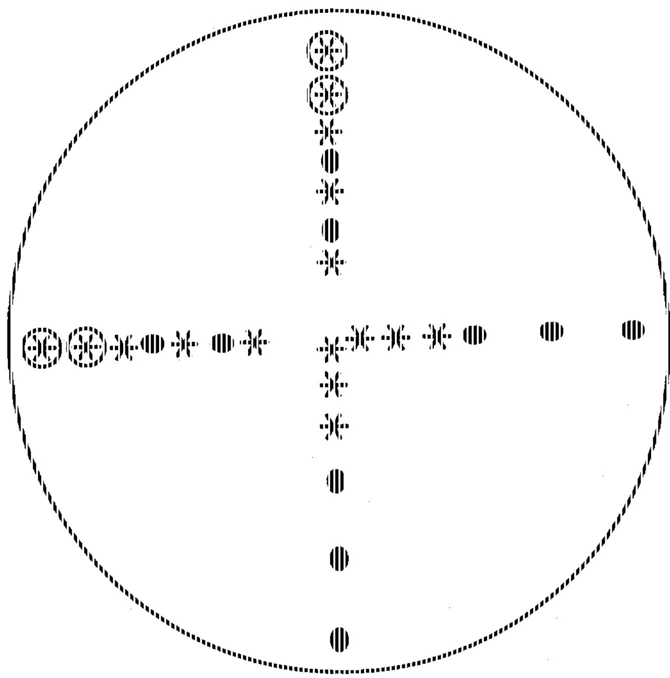
Not measured due to wall effects

JE BAKER
NO. 2 KILN
NORTH DUCT TRAVERSE POINTS

JE001-DB

Ideal Point Location	
No.	Inches
1	3 1/8
2	10 5/8
3	21 1/4
4	50 3/4
5	61 3/8
6	68 7/8

Actual Point Location	
No.	Inches
1	1 1/2
2	5
3	9 1/8
4	15 1/2
5	32 1/2
6	35 5/8
7	43
8	48 1/2



DIAMETER 6 FT.

Ideal Point

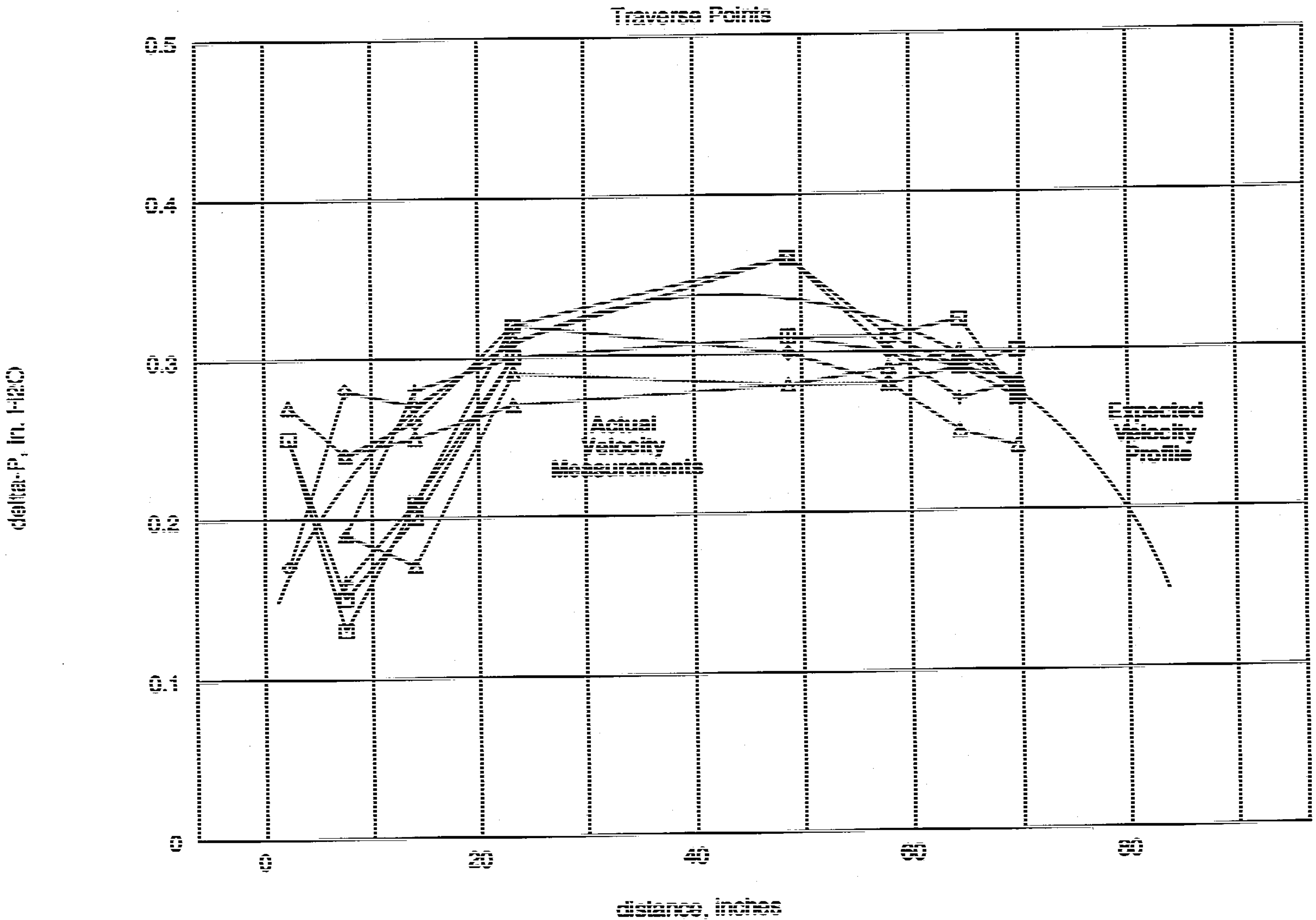
Actual Point

Not measured due to wall effects

JE BAKER
NO. 2 KILN
SOUTH DUCT TRAVERSE POINTS

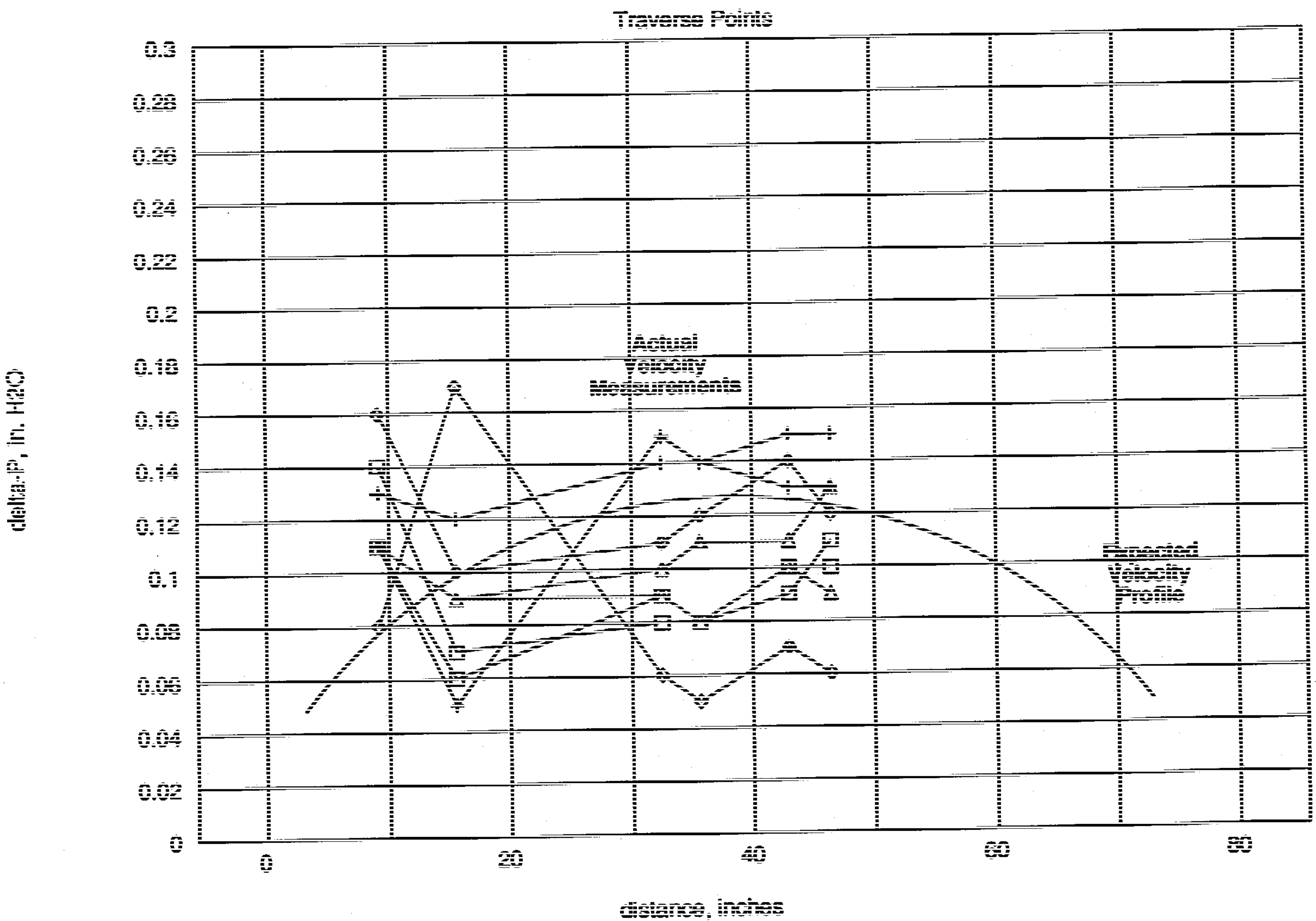
[illegible]

NORTH DUCT



Traverse Points
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
delta-P, in. H2O
distance, inches
Actual Velocity Measurements
Expected Velocity Profile

SOUTH DUCT



Traverse Points
Actual Velocity Measurements
Expected Velocity Profile
delta-P, in. H2O
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0
20
40
60
80
distance, inches

REVISED

EMISSION TEST REPORT AT J.E. BAKER COMPANY NUMBER TWO KILN

Prepared for:

J.E. BAKER COMPANY
P.O. Box 1189
York, Pennsylvania 17405

Prepared by:

ROY F. WESTON, INC.
One Weston Way
West Chester, Pennsylvania 19380

JUNE 1990

PROJECT NO. 2373-01-02

TABLE OF CONTENTS

1.0 INTRODUCTION

On June 1, 1989, Roy F. Weston (WESTON) conducted an emissions test program on the two ducts exiting the Number Two kiln located at the J. E. Baker Company facility in York, Pennsylvania. The purpose of these baseline tests was to establish the existing oxides of nitrogen (NO_x) and carbon monoxide (CO) emissions exiting the Number Two kiln.

The emission results are summarized on Table 1. The nitrogen oxides measurements were conducted by two independent techniques. The correlation between the two methods is not strong when the four method 7A grab samples are compared to the one hour averages measured by Method 7E. The correlation is slightly improved when the Method 7A grab samples are compared to instantaneous Method 7E values as shown in Section 4.

The average concentration of the Method 7A grab samples are consistently lower than the average Method 7E concentrations measured by continuous emission monitors (CEM). After a review of the data, it is believed that the higher results are more representative of the stack emissions.

TABLE 1

SUMMARY OF AVERAGE EMISSION RESULTS

J.E. BAKER NUMBER TWO KILN

Run #	Location	Volumetric Flowrate DSCFM	Carbon Monoxide PPM	Carbon Monoxide lb/hr	Nitrogen Oxides Method 7A PPM	Nitrogen Oxides Method 7A lb/hr	Nitrogen Oxides Method 7E PPM	Nitrogen Oxides Method 7E lb/hr
1	South duct	15,400	46.3	3.1	596	65.7	1,199	132.2
2	South duct	23,500	47.9	4.9	1,089	183.4	1,240	208.7
3	South duct	18,200	54.3	4.3	889	115.9	1,198	156.2
Average		19,033	49.5	4.1	858	121.7	1,212	165.7
1	North duct	37,500	63.0	10.3	248	66.7	1,265	339.7
2	North duct	38,100	67.4	11.2	553	151.0	1,232	336.1
3	North duct	38,700	68.5	11.6	622	172.5	1,213	336.3
Average		38,100	66.3	11.0	474	130.1	1,237	337.4
TOTAL NORTH & SOUTH		**57,100**		**15.1**		**251.8**		**503.1**

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2.0 DESCRIPTION OF TEST LOCATIONS

Number Two Kiln Ducts

Test ports were positioned on each of the two ducts leading from the Number Two Kiln exit. The ports were located on an inclined section of metal duct at a point which is upstream from the bend leading to the induced draft fans. The fans are positioned on the inlet side of the forced air baghouse which services the Number Two Kiln.

Two test ports, 90° apart, were placed on a straight section of the metal ducts (4' and 6' ID) at a site which is >8 diameters downstream and 2 diameters upstream from the nearest gas flow disturbances. Traverse point selection criteria dictated by EPA Method 1 require a minimum of 12 points, 6 per port axis, for this configuration.

Ambient air bleed-in dampers were located between the sample port locations and the baghouse exhaust. There were no good sampling locations in the breaching or the baghouse exhaust.

Since no sampling platform exists, the sample points were accessed by manlift. The difficult access and extreme conditions hampered the sampling effort. Gas temperatures in the uninsulated duct were greater than 900°F. It was necessary for the test crew to position themselves above the sloping duct in the manlift in order to gain access to the port. High ambient temperatures were encountered during the test effort.

3.0 TEST PROCEDURES

Preliminary Tests

Preliminary test data were obtained at each of the two sampling locations. Stack geometry measurements were recorded, and traverse point distances calculated. A preliminary velocity traverse was performed at each location utilizing a calibrated "S"-type pitot tube and a Dwyer inclined manometer to determine velocity profiles. Flue gas temperatures were observed with a calibrated direct readout pyrometer equipped with a chromel-alumel thermocouple.

Due to restricted access and high temperature, the test crew was unable to seal the sample port. The two traverse ports nearest to the port opening were not used to calculate velocity.

Formal Tests

A series of three test runs were conducted to measure the concentration and mass rates of NO_x and CO at each duct.

Each test period was at least one hour in length. Oxides of nitrogen, carbon monoxide, carbon dioxide and oxygen concentrations were measured continuously by WESTON continuous emission monitoring (CEM) system employing EPA Methods 3A, 7E, and 10. In addition, grab samples (four per test run) were collected every 5 to 15 minutes by EPA Method 7A procedures. The grab sampling was conducted to establish a relationship between the continuous and manual methods.

Due to restricted access, three consecutive runs were conducted on each duct. A single volumetric flow rate measurement was performed in conjunction with each test run. One moisture per test location was performed during the test program. Representatives of J.E. Baker collected process operations data during each test period.

4.0 RESULTS

The test program results were summarized in Table 1. The individual sample run data are presented for each run on the following tables. The first three runs for the south duct are presented on Tables 2 through 6. One M-7A grab sample from run 3 (SR3-2) on the south duct was discarded since the concentration was equivalent to the blank value. The one minute averages recorded by the CEM system are presented in Tables 3 - 5. These give an indication of the variable of the gas concentration with time. In fact, the strip chart trace, presented in the Appendix, indicates an even greater variability. Similar results for test runs on the north duct are presented on Tables 6 through 9. No obvious outliers were detected in the Method 7A grab samples so all data was included in the average.

The individual Method 7A grab sample results are presented on Table 10. These show the generally high but variable results for grab samples collected at the south duct vs the consistently lower results for samples collected at the north duct. Table 10 also compares the individual Method 7A grab sample results with the maximum and minimum NO_x concentrations measured by the CEM system during the sampling interval. This shows fairly good agreement between Method 7A and the CEM range at the south duct. Two thirds of the grab samples fall within the CEM concentration range and these are distributed between both the high and low concentration ranges. The comparison between Method 7A and the CEM data for the north duct shows consistently low concentrations. Few Method 7A grab sample concentrations fall within the low range of the CEM data.

There is a systematic difference between the two methods at the north duct. The sampling probe was broken during the Method 7A sampling on the north duct. The replacement probe was leak checked before use but it may also have been damaged during use.

TABLE 2
J.E. BAKER
YORK, PENNSYLVANIA
SUMMARY OF NOx AND CO TEST DATA AND RESULTS

TEST DATA:				
Test run number	1	2	3	
Test location	SOUTH DUCT	SOUTH DUCT	SOUTH DUCT	
Test date	6-1-89	6-1-89	6-1-89	
Test time period	1020-1120	1120-1235	1235-1335	
SAMPLING DATA:				
Sampling duration, min.	60.0	60.0	60.0	
Nozzle diameter, in.	NA	NA	NA	
Cross sectional nozzle area, sq.ft.	NA	NA	NA	
Barometric pressure, in. Hg	30.02	30.02	30.02	
Avg. orifice press. diff., in H2O	1.50	1.50	1.50	
Avg. dry gas meter temp., deg F	110	110	110	
Avg. abs. dry gas meter temp., deg. R	570	570	570	
Total liquid collected by train, ml	44.0	44.0	44.0	
Std. vol. of H2O vapor coll., cu.ft.	2.1	2.1	2.1	
Dry gas meter calibration factor	1.006	1.006	1.006	
Sample vol. at meter cond., dcf	38.863	38.863	38.863	
Sample vol. at std. cond., dscf (1)	36.4	36.4	36.4	
Percent of isokinetic sampling	NA	NA	NA	
GAS STREAM COMPOSITION DATA:				
CO2, % by volume, dry basis	17.2	16.5	16.7	
O2, % by volume, dry basis	8.9	9.5	9.6	
N2, % by volume, dry basis	73.9	74.0	73.7	
Molecular wt. of dry gas, lb/lb mole	31.11	31.02	31.06	
H2O vapor in gas stream, prop. by vol.	0.054	0.054	0.054	
Mole fraction of dry gas	0.946	0.946	0.946	
Molecular wt. of wet gas, lb/lb mole	30.4	30.3	30.4	
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:				
Static pressure, in. H2O	-2.40	-2.50	-2.40	
Static pressure, in. Hg	-0.176	-0.184	-0.176	
Absolute pressure, in. Hg	29.84	29.84	29.84	
Avg. temperature, deg. F	840	799	867	
Avg. absolute temperature, deg.R	1300	1259	1327	
Pitot tube coefficient	0.84	0.84	0.84	
Total number of traverse points	12	12	12	
Avg. gas stream velocity, ft./sec.	23.8	35.1	28.6	
Stack/duct cross sectional area, sq.ft.	28.27	28.27	28.27	
Avg. gas stream volumetric flow, wacf/min.	40300	59500	48400	
Avg. gas stream volumetric flow, dscf/min.	15400	23500	18200	AVERAGE
CARBON MONOXIDE (CO) EMISSIONS (method 10):				
Average concentration, lbs/dscf	3.36E-06	3.48E-06	3.95E-06	3.60E-06
Average concentration, ppm/vol	46.30	47.90	54.30	49.50
Mass rate, lbs/hr	3.11	4.91	4.31	4.11
NITROGEN OXIDES (NOx) EMISSIONS (method 7A):				
Average concentration, lbs/dscf	7.11E-05	1.30E-04	1.06E-04	1.02E-04
Average concentration, ppm/vol	595.56	1089.16	888.72	857.81
Mass rate, lbs/hr	65.73	183.44	115.92	121.70
NITROGEN OXIDES (NOx) EMISSIONS (method 7E):				
Average concentration, lbs/dscf	1.63E-04	1.68E-04	1.63E-04	1.65E-04
Average concentration, ppm/vol	1198.5	1239.9	1198.4	1212.27
Mass rate, lbs/hr	132.19	208.69	156.22	165.70

(1) Standard conditions = 68 deg. F (20 deg. C) and 29.92 in. (760 mm) Hg, dry basis

TABLE 3
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
SOUTH DUCT
C.E.M. DATA SUMMARY
RUN 1

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %
06/01/89	10:20-10:21	33.9	672.8	18.3	8.2
06/01/89	10:21-10:22	37.1	946.4	18.7	8.0
06/01/89	10:22-10:23	44.8	812.0	18.5	8.4
06/01/89	10:23-10:24	37.2	726.1	18.4	8.1
06/01/89	10:24-10:25	26.2	628.3	17.9	8.0
06/01/89	10:25-10:26	42.8	1215.4	18.4	8.1
06/01/89	10:26-10:27	29.4	1330.9	17.3	9.3
06/01/89	10:27-10:28	25.3	1435.2	17.5	9.4
06/01/89	10:28-10:29	34.2	1277.8	17.2	9.3
06/01/89	10:29-10:30	56.5	1211.2	16.8	9.0
06/01/89	10:30-10:31	59.9	1210.2	16.8	9.0
06/01/89	10:31-10:32	57.0	1400.7	16.7	9.1
06/01/89	10:32-10:33	20.3	1332.3	16.4	9.4
06/01/89	10:33-10:34	35.7	1377.3	16.8	9.4
06/01/89	10:34-10:35	49.1	1088.5	16.2	9.1
06/01/89	10:35-10:36	65.3	955.7	16.4	8.6
06/01/89	10:36-10:37	53.0	945.6	16.9	8.3
06/01/89	10:37-10:38	65.4	1329.3	17.3	8.8
06/01/89	10:38-10:39	22.1	1441.1	16.9	9.0
06/01/89	10:39-10:40	21.7	1569.0	17.2	9.4
06/01/89	10:40-10:41	18.3	1455.3	16.9	9.6
06/01/89	10:41-10:42	38.1	1085.0	16.6	9.3
06/01/89	10:42-10:43	58.6	885.0	17.2	8.4
06/01/89	10:43-10:44	50.9	1060.4	17.7	8.4
06/01/89	10:44-10:45	54.7	1263.2	17.3	8.8
06/01/89	10:45-10:46	68.3	1332.8	18.2	9.1
06/01/89	10:46-10:47	58.2	1158.5	17.4	8.9
06/01/89	10:47-10:48	71.2	1224.6	17.3	8.8
06/01/89	10:48-10:49	69.5	1342.8	18.1	9.2
06/01/89	10:49-10:50	25.9	1390.5	18.1	9.5
06/01/89	10:50-10:51	22.1	1490.6	17.5	9.4
06/01/89	10:51-10:52	28.3	1306.5	17.6	9.6
06/01/89	10:52-10:53	57.6	1156.8	16.9	9.1
06/01/89	10:53-10:54	65.4	936.6	17.0	8.7
06/01/89	10:54-10:55	69.6	1130.4	17.3	8.7
06/01/89	10:55-10:56	59.7	1301.8	17.0	8.8
06/01/89	10:56-10:57	31.8	1394.5	17.2	9.0
06/01/89	10:57-10:58	36.1	1242.7	16.4	9.0
06/01/89	10:58-10:59	55.7	1288.7	17.4	9.0
06/01/89	10:59-11:00	67.2	1214.1	17.3	9.0
06/01/89	11:00-11:01	49.0	1468.1	16.8	9.0
06/01/89	11:01-11:02	16.6	1522.6	16.8	9.5
06/01/89	11:02-11:03	15.4	1551.4	16.4	9.6
06/01/89	11:03-11:04	35.6	1195.8	16.6	9.4
06/01/89	11:04-11:05	67.8	1168.8	16.5	9.2
06/01/89	11:05-11:06	66.6	1264.6	16.4	9.0
06/01/89	11:06-11:07	53.3	1297.8	16.5	9.3
06/01/89	11:07-11:08	63.2	1164.6	16.5	9.2
06/01/89	11:08-11:09	70.1	1139.8	16.6	9.0
06/01/89	11:09-11:10	67.7	966.7	16.7	8.9
06/01/89	11:10-11:11	53.1	919.1	17.0	8.3
06/01/89	11:11-11:12	52.7	914.0	17.0	8.2
06/01/89	11:12-11:13	67.6	1196.9	17.3	8.6
06/01/89	11:13-11:14	57.6	1255.4	17.6	8.7
06/01/89	11:14-11:15	42.5	1426.6	17.6	9.1
06/01/89	11:15-11:16	25.2	1513.1	17.6	9.3
06/01/89	11:16-11:17	39.3	1199.6	16.4	9.3
06/01/89	11:17-11:18	65.0	972.0	17.0	8.8
06/01/89	11:18-11:19	50.0	956.7	17.0	8.5
06/01/89	11:19-11:20	59.4	1289.8	17.5	8.7
	AVERAGE	46.3	1198.5	17.2	8.9

TABLE 6
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
SOUTH DUCT
C.E.M. DATA SUMMARY
RUN 2

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %	
06/01/89	11:20-11:21	59.2	1273.0	17.2	9.0	
06/01/89	11:21-11:22	42.9	1285.1	16.9	9.0	
06/01/89	11:22-11:23	63.4	1177.5	16.9	8.9	
06/01/89	11:23-11:24	36.3	1458.6	17.5	9.2	
06/01/89	11:24-11:25	25.4	1378.9	17.3	9.4	
06/01/89	11:25-11:26	29.9	1652.9	16.8	9.3	
06/01/89	11:26-11:27	60.0	1185.9	17.0	9.3	
06/01/89	11:27-11:28	67.3	950.2	17.0	8.9	
06/01/89	11:28-11:29	48.2	598.4	17.0	8.4	
06/01/89	11:29-11:30	48.2	1032.5	17.5	8.2	
06/01/89	11:30-11:31	66.2	1213.6	17.7	8.7	
06/01/89	11:31-11:32	51.6	1387.6	18.1	9.0	
06/01/89	11:32-11:33	44.1	1272.8	17.2	9.0	
06/01/89	11:33-11:34	33.1	1411.6	17.4	9.0	
06/01/89	11:34-11:35	36.3	1283.1	17.3	9.1	
06/01/89	11:35-11:36	56.9	1336.1	17.4	9.0	
06/01/89	11:36-11:37	24.0	1477.0	17.3	9.4	
06/01/89	11:37-11:38	21.1	1487.7	16.9	9.6	
06/01/89	11:38-11:39	22.0	1329.4	16.9	9.3	
06/01/89	11:39-11:40	51.1	1267.7	16.8	9.3	
06/01/89	11:60-11:41	58.9	1164.9	16.9	9.0	
06/01/89	11:61-11:42	71.5	1187.0	17.1	9.0	
06/01/89	11:62-11:43	62.1	1091.6	16.8	8.8	
06/01/89	11:63-11:44	59.6	1307.3	16.6	9.1	
06/01/89	11:44-11:45	50.3	1184.6	16.5	9.1	
06/01/89	11:45-11:46	60.3	1231.8	16.7	8.8	
06/01/89	11:46-11:47	62.8	1076.6	16.7	8.7	
06/01/89	11:47-11:48	68.6	1091.8	16.8	8.6	
06/01/89	11:48-11:49	66.0	1222.9	17.0	8.7	
06/01/89	11:49-11:50	40.0	1407.3	17.0	9.2	
						* Calibration break from 1150-1205
06/01/89	12:06-12:07		984.5			
06/01/89	12:07-12:08	48.3	1189.9	10.7	9.5	
06/01/89	12:08-12:09	73.2	1161.8	13.8	9.2	
06/01/89	12:09-12:10	60.6	1138.6	16.2	9.1	
06/01/89	12:10-12:11	69.8	1323.1	16.4	9.1	
06/01/89	12:11-12:12	20.2	1461.5	17.3	9.7	
06/01/89	12:12-12:13	18.6	1476.9	17.0	9.7	
06/01/89	12:13-12:14	21.6	1300.6	16.5	9.7	
06/01/89	12:14-12:15	48.5	1256.3	16.8	9.5	
06/01/89	12:15-12:16	63.5	1180.2	17.1	9.3	
06/01/89	12:16-12:17	66.6	1217.8	17.2	9.6	
06/01/89	12:17-12:18	39.4	1277.6	16.6	9.3	
06/01/89	12:18-12:19	41.4	1319.3	16.9	9.5	
06/01/89	12:19-12:20	42.4	1180.5	17.2	9.5	
06/01/89	12:20-12:21	59.1	819.9	16.9	8.8	
06/01/89	12:21-12:22	57.5	964.1	17.3	8.4	
06/01/89	12:22-12:23	71.8	1139.4	17.4	8.8	
06/01/89	12:23-12:24	63.7	1328.0	17.7	9.2	
06/01/89	12:24-12:25	30.7	1403.0	17.4	9.5	
06/01/89	12:25-12:26	17.2	1676.0	17.0	9.7	
06/01/89	12:26-12:27	61.5	1098.2	17.2	9.4	
06/01/89	12:27-12:28	75.4	1152.8	18.1	9.0	
06/01/89	12:28-12:29	77.2	1056.0	17.3	8.9	
06/01/89	12:29-12:30	54.9	1305.1	18.1	9.2	
06/01/89	12:30-12:31	40.7	1277.3	17.2	9.3	
06/01/89	12:31-12:32	37.6	1364.8	17.8	9.3	
06/01/89	12:32-12:33	48.1	1249.1	17.2	9.2	
06/01/89	12:33-12:34	25.3	1451.3	17.4	9.6	
06/01/89	12:34-12:35	17.0	1420.4	17.1	9.6	
	AVERAGE	47.9	1239.9	16.9	9.1	

TABLE 5
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
SOUTH DUCT
C.E.M. DATA SUMMARY
RUN 3

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %
06/01/89	12:35-12:36	14.2	1627.5	16.9	9.7
06/01/89	12:36-12:37	44.6	1160.3	16.8	9.5
06/01/89	12:37-12:38	73.3	947.0	16.8	9.2
06/01/89	12:38-12:39	54.5	798.4	17.2	8.6
06/01/89	12:39-12:40	55.8	940.1	17.7	8.7
06/01/89	12:40-12:41	71.6	1103.5	17.7	8.7
06/01/89	12:41-12:42	66.2	1375.2	17.5	9.0
06/01/89	12:42-12:43	34.4	1356.9	17.5	9.3
06/01/89	12:43-12:44	45.5	1340.2	17.6	9.3
06/01/89	12:44-12:45	44.8	1318.1	17.8	9.1
06/01/89	12:45-12:46	68.3	1283.4	17.0	9.1
06/01/89	12:46-12:47	29.6	1467.2	17.4	9.5
06/01/89	12:47-12:48	19.5	1553.0	17.2	9.8
06/01/89	12:48-12:49	21.7	1314.8	17.3	9.6
06/01/89	12:49-12:50	62.8	1171.2	16.9	9.3
06/01/89	12:50-12:51	75.1	1039.5	17.0	9.0
06/01/89	12:51-12:52	75.6	1116.3	17.8	9.1
06/01/89	12:52-12:53	78.8	1061.3	17.3	9.1
06/01/89	12:53-12:54	75.1	1153.5	17.3	9.2
06/01/89	12:54-12:55	70.7	1212.2	17.5	9.1
06/01/89	12:55-12:56	72.2	1026.1	17.8	8.9
06/01/89	12:56-12:57	76.4	1123.0	17.8	8.7
06/01/89	12:57-12:58	70.6	1256.3	17.4	8.9
06/01/89	12:58-12:59	43.6	1382.2	18.0	9.2
06/01/89	12:59-13:00	23.3	1419.4	17.8	9.4
06/01/89	13:00-13:01	26.9	1386.9	17.1	9.4
06/01/89	13:01-13:02	57.1	875.2	17.0	9.4
06/01/89	13:02-13:03	70.8	1054.7	18.1	8.5
06/01/89	13:03-13:04	76.9	1126.1	18.1	8.8
06/01/89	13:04-13:05	63.9	1274.8	18.0	9.1
06/01/89	13:05-13:06	50.5	1357.6	17.3	9.1
06/01/89	13:06-13:07	28.3	1407.8	17.4	9.2
06/01/89	13:07-13:08	59.2	1264.9	17.4	9.1
06/01/89	13:08-13:09	45.2	1348.3	17.4	9.4
06/01/89	13:09-13:10	29.4	1357.9	17.1	9.5
06/01/89	13:10-13:11	22.2	1493.0	16.6	9.5
06/01/89	13:11-13:12	21.5	1296.0	16.9	9.6
06/01/89	13:12-13:13	68.9	867.1	16.1	9.0
06/01/89	13:13-13:14	50.4	797.4	16.4	8.6
06/01/89	13:14-13:15	62.8	1012.2	17.3	8.6
06/01/89	13:15-13:16	77.1	1099.6	17.8	8.7
06/01/89	13:16-13:17	78.7	1146.2	18.0	8.8
06/01/89	13:17-13:18	73.8	1093.2	18.1	8.8
06/01/89	13:18-13:19	82.3	1192.0	18.1	8.9
06/01/89	13:19-13:20	53.1	1337.9	17.8	9.0
06/01/89	13:20-13:21	36.1	1455.5	17.3	9.3
06/01/89	13:21-13:22	16.1	1571.2	17.0	9.6
06/01/89	13:22-13:23	18.9	1451.3	16.7	9.8
06/01/89	13:23-13:24	37.2	1257.2	17.1	9.5
06/01/89	13:24-13:25	77.0	1050.0	17.0	9.2
06/01/89	13:25-13:26	75.5	1167.4	17.6	9.0
06/01/89	13:26-13:27	76.3	1277.5	17.6	9.3
06/01/89	13:27-13:28	50.6	1266.7	17.1	9.3
06/01/89	13:28-13:29	68.7	1221.0	17.5	9.3
06/01/89	13:29-13:30	62.0	1133.3	17.8	9.1
06/01/89	13:30-13:31	53.5	889.9	18.0	8.6
06/01/89	13:31-13:32	63.5	672.6	15.8	8.5
	AVERAGE	54.3	1198.6	17.4	9.1

TABLE 6
J.E. BAKER
YORK, PENNSYLVANIA
SUMMARY OF NOx AND CO TEST DATA AND RESULTS

TEST DATA:				
Test run number	1	2	3	
Test location	NORTH DUCT	NORTH DUCT	NORTH DUCT	
Test date	6-1-89	6-1-89	6-1-89	
Test time period	1450-1550	1550-1650	1650-1750	
SAMPLING DATA:				
Sampling duration, min.	60.0	60.0	60.0	
Nozzle diameter, in.	NA	NA	NA	
Cross sectional nozzle area, sq.ft.	NA	NA	NA	
Barometric pressure, in. Hg	30.02	30.02	30.02	
Avg. orifice press. diff., in H2O	0.75	0.75	0.75	
Avg. dry gas meter temp., deg F	116	116	116	
Avg. abs. dry gas meter temp., deg. R	576	576	576	
Total liquid collected by train, ml	17.0	17.0	17.0	
Std. vol. of H2O vapor coll., cu.ft.	0.8	0.8	0.8	
Dry gas meter calibration factor	1.006	1.006	1.006	
Sample vol. at meter cond., dcf	12.760	12.760	12.760	
Sample vol. at std. cond., dscf (1)	11.8	11.8	11.8	
Percent of isokinetic sampling	NA	NA	NA	
GAS STREAM COMPOSITION DATA:				
CO2, % by volume, dry basis	18.3	19.0	18.6	
O2, % by volume, dry basis	9.2	9.2	9.4	
N2, % by volume, dry basis	72.5	71.8	72.0	
Molecular wt. of dry gas, lb/lb mole	31.30	31.41	31.35	
H2O vapor in gas stream, prop. by vol.	0.063	0.063	0.063	
Mole fraction of dry gas	0.937	0.937	0.937	
Molecular wt. of wet gas, lb/lb mole	30.5	30.6	30.5	
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:				
Static pressure, in. H2O	-2.20	-2.10	-2.10	
Static pressure, in. Hg	-0.162	-0.154	-0.154	
Absolute pressure, in. Hg	29.86	29.87	29.87	
Avg. temperature, deg. F	920	890	910	
Avg. absolute temperature, deg.R	1380	1350	1370	
Pitot tube coefficient	0.84	0.84	0.84	
Total number of traverse points	12	12	12	
Avg. gas stream velocity, ft./sec.	45.4	45.1	46.6	
Stack/duct cross sectional area, sq.ft.	38.50	38.50	38.50	
Avg. gas stream volumetric flow, wacf/min.	104800	106100	107600	
Avg. gas stream volumetric flow, dscf/min.	37500	38100	38700	AVERAGE
CARBON MONOXIDE (CO) EMISSIONS (method 10):				
Average concentration, lbs/dscf	4.58E-06	4.90E-06	4.98E-06	4.82E-06
Average concentration, ppm/vol	63.00	67.40	68.50	66.30
Mass rate, lbs/hr	10.30	11.20	11.56	11.02
NITROGEN OXIDES (NO2) EMISSIONS (method 7A):				
Average concentration, lbs/dscf	2.97E-05	6.60E-05	7.43E-05	5.67E-05
Average concentration, ppm/vol	248.24	552.82	621.89	474.32
Mass rate, lbs/hr	66.72	150.95	172.49	130.05
NITROGEN OXIDES (NO2) EMISSIONS (method 7E):				
Average concentration, lbs/dscf	1.51E-04	1.47E-04	1.45E-04	1.48E-04
Average concentration, ppm/vol	1264.90	1231.80	1213.30	1236.67
Mass rate, lbs/hr	339.76	336.14	336.30	337.39

(1) Standard conditions = 68 deg. F (20 deg. C) and 29.92 in. (760 mm) Hg, dry basis

TABLE 7
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
NORTH DUCT
C.E.M. DATA SUMMARY
RUN 1

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %
06/01/89	14:53-14:54	26.9	1500.2	17.7	9.9
06/01/89	14:54-14:55	28.5	1352.0	18.0	9.9
06/01/89	14:55-14:56	45.4	1318.4	18.1	9.9
06/01/89	14:56-14:57	62.3	1262.9	18.1	9.8
06/01/89	14:57-14:58	79.0	1039.7	19.3	9.6
06/01/89	14:58-14:59	85.5	1005.2	19.3	9.0
06/01/89	14:59-15:00	87.7	1095.9	19.5	9.1
06/01/89	15:00-15:01	87.3	1156.1	19.2	9.1
06/01/89	15:01-15:02	81.2	1226.2	19.2	9.4
06/01/89	15:02-15:03	65.1	1238.3	19.4	9.3
06/01/89	15:03-15:04	93.0	1130.9	19.4	9.2
06/01/89	15:04-15:05	81.8	1279.7	19.1	9.1
06/01/89	15:05-15:06	70.4	1384.0	18.4	9.4
06/01/89	15:06-15:07	23.8	1530.0	18.0	9.9
06/01/89	15:07-15:08	17.3	1648.5	17.7	10.2
06/01/89	15:08-15:09	15.5	1554.3	18.0	10.2
06/01/89	15:09-15:10	21.1	1433.3	18.4	10.0
06/01/89	15:10-15:11	37.7	1303.5	18.7	9.8
06/01/89	15:11-15:12	74.9	1188.3	18.5	9.6
06/01/89	15:12-15:13	77.5	1267.0	18.8	9.6
06/01/89	15:13-15:14	79.1	1250.7	18.7	9.6
06/01/89	15:14-15:15	71.2	1155.0	19.4	9.5
06/01/89	15:15-15:16	78.8	957.6	19.7	8.9
06/01/89	15:16-15:17	79.1	977.6	19.9	8.7
06/01/89	15:17-15:18	76.7	899.9	19.8	8.9
06/01/89	15:18-15:19	91.8	1146.0	20.1	8.9
06/01/89	15:19-15:20	60.6	1561.0	19.1	9.4
06/01/89	15:20-15:21	41.3	1454.2	19.2	9.6
06/01/89	15:21-15:22	60.7	1118.4	20.2	9.4
06/01/89	15:22-15:23	101.8	1269.4	19.7	9.0
06/01/89	15:23-15:24	79.6	1230.9	18.9	9.2
06/01/89	15:24-15:25	70.2	1366.1	18.9	9.2
06/01/89	15:25-15:26	70.6	1285.9	18.5	9.1
06/01/89	15:26-15:27	55.1	1613.0	18.6	9.4
06/01/89	15:27-15:28	36.5	1675.3	18.2	9.4
06/01/89	15:28-15:29	28.7	1697.2	18.1	9.8
06/01/89	15:29-15:30	28.1	1659.2	18.0	9.8
06/01/89	15:30-15:31	41.0	1392.9	18.3	9.7
06/01/89	15:31-15:32	33.3	1279.6	18.5	9.6
06/01/89	15:32-15:33	91.5	1039.2	19.5	9.3
06/01/89	15:33-15:34	85.7	962.8	19.6	8.8
06/01/89	15:34-15:35	77.1	981.7	19.6	8.9
06/01/89	15:35-15:36	87.5	1059.7	19.5	8.9
06/01/89	15:36-15:37	88.2	1220.2	19.1	9.1
06/01/89	15:37-15:38	68.4	1312.8	18.9	9.2
06/01/89	15:38-15:39	67.6	1389.8	18.7	9.3
06/01/89	15:39-15:40	43.2	1303.8	19.2	9.3
06/01/89	15:40-15:41	91.5	1124.1	19.5	9.1
06/01/89	15:41-15:42	69.2	1292.7	19.1	9.4
06/01/89	15:42-15:43	58.6	1383.0	18.6	9.7
06/01/89	15:43-15:44	68.5	1600.9	18.5	9.6
06/01/89	15:44-15:45	65.2	1601.5	18.3	9.7
06/01/89	15:45-15:46	36.2	1344.8	18.5	9.7
06/01/89	15:46-15:47	71.4	1228.6	18.5	9.6
06/01/89	15:47-15:48	76.6	1248.3	18.8	9.4
06/01/89	15:48-15:49	75.6	1278.6	18.4	9.4
06/01/89	15:49-15:50	66.2	1240.4	19.2	9.4
	AVERAGE	65.0	1264.9	18.9	9.4

TABLE 8
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
NORTH DUCT
C.E.M. DATA SUMMARY
RUN 2

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %
06/01/89	15:50-15:51	84.7	1009.3	19.5	9.0
06/01/89	15:51-15:52	92.1	980.5	19.7	8.8
06/01/89	15:52-15:53	81.0	1038.4	19.6	8.8
06/01/89	15:53-15:54	87.5	1269.5	19.3	9.0
06/01/89	15:54-15:55	44.2	1477.5	18.0	9.4
06/01/89	15:55-15:56	16.4	1559.3	18.2	9.9
06/01/89	15:56-15:57	33.3	1268.4	19.1	9.7
06/01/89	15:57-15:58	91.9	1101.0	19.7	9.1
06/01/89	15:58-15:59	89.8	1040.8	19.4	8.9
06/01/89	15:59-16:00	92.1	1202.6	19.4	9.1
06/01/89	16:00-16:01	75.3	1165.2	19.1	9.2
06/01/89	16:01-16:02	82.4	1276.3	19.0	9.1
06/01/89	16:02-16:03	55.0	1337.1	18.3	9.2
06/01/89	16:03-16:04	42.5	1467.2	18.1	9.6
06/01/89	16:04-16:05	24.8	1418.9	18.2	9.6
06/01/89	16:05-16:06	37.5	1372.5	18.4	9.8
06/01/89	16:06-16:07	48.3	1272.1	18.5	9.6
06/01/89	16:07-16:08	88.3	988.6	19.9	9.3
06/01/89	16:08-16:09	81.4	1033.9	19.7	8.7
06/01/89	16:09-16:10	87.3	1111.1	19.7	8.9
06/01/89	16:10-16:11	80.0	1272.3	19.2	9.0
06/01/89	16:11-16:12	77.3	1280.4	19.1	9.2
06/01/89	16:12-16:13	70.8	1275.9	19.3	9.1
06/01/89	16:13-16:14	79.4	1262.6	19.2	9.2
06/01/89	16:14-16:15	43.6	1380.2	19.0	9.1
06/01/89	16:15-16:16	67.5	1334.1	18.8	9.2
06/01/89	16:16-16:17	23.4	1540.5	18.1	9.6
06/01/89	16:17-16:18	24.1	1430.3	18.2	9.9
06/01/89	16:18-16:19	35.0	1426.8	18.5	9.6
06/01/89	16:19-16:20	66.3	1207.3	18.6	9.5
06/01/89	16:20-16:21	78.4	1240.6	18.8	9.4
06/01/89	16:21-16:22	78.5	1215.5	18.6	9.4
06/01/89	16:22-16:23	67.0	1315.9	18.7	9.4
06/01/89	16:23-16:24	79.0	1155.1	18.6	9.4
06/01/89	16:24-16:25	80.3	1139.8	19.2	9.3
06/01/89	16:25-16:26	71.3	942.6	19.5	8.7
06/01/89	16:26-16:27	74.4	1077.0	19.6	8.5
06/01/89	16:27-16:28	90.7	1083.7	19.2	8.8
06/01/89	16:28-16:29	96.3	1201.1	19.3	8.9
06/01/89	16:29-16:30	53.7	1414.2	18.0	9.3
06/01/89	16:30-16:31	21.2	1616.2	18.0	9.7
06/01/89	16:31-16:32	27.1	1318.5	18.7	9.7
06/01/89	16:32-16:33	71.2	1231.0	19.5	9.3
06/01/89	16:33-16:34	86.5	1130.6	19.4	9.0
06/01/89	16:34-16:35	91.9	1209.7	19.5	9.1
06/01/89	16:35-16:36	80.2	1217.4	19.2	9.0
06/01/89	16:36-16:37	67.5	1261.3	19.5	9.3
06/01/89	16:37-16:38	69.1	1313.4	18.8	9.2
06/01/89	16:38-16:39	31.9	1534.5	18.5	9.7
06/01/89	16:39-16:40	22.9	1413.0	18.5	9.9
06/01/89	16:40-16:41	40.4	1338.1	18.7	9.7
06/01/89	16:41-16:42	75.5	1079.3	19.0	9.4
06/01/89	16:42-16:43	91.8	964.4	19.9	9.0
06/01/89	16:43-16:44	70.0	872.1	19.7	8.7
06/01/89	16:44-16:45	79.0	1070.7	19.8	8.7
06/01/89	16:45-16:46	93.4	1081.3	19.5	8.8
06/01/89	16:46-16:47	92.5	1228.8	19.3	8.9
06/01/89	16:47-16:48	69.6	1215.8	19.2	9.1
06/01/89	16:48-16:49	99.6	1203.2	19.3	9.0
06/01/89	16:49-16:50	90.3	1064.2	19.2	9.0
	AVERAGE	67.4	1231.8	19.0	9.2

TABLE 9
J.E. BAKER
YORK, PENNSYLVANIA
ROTARY KILN No.2
NORTH DUCT
C.E.M. DATA SUMMARY
RUN 3

DATE	TIME	CO ppm	NOx ppm	CO2 %	O2 %
06/01/89	16:50-16:51	99.4	1201.2	19.1	8.9
06/01/89	16:51-16:52	42.2	1378.0	18.1	9.6
06/01/89	16:52-16:53	39.5	1398.3	18.3	9.7
06/01/89	16:53-16:54	72.3	1175.5	18.8	9.4
06/01/89	16:54-16:55	94.8	1020.7	19.2	9.3
06/01/89	16:55-16:56	78.9	934.3	19.3	9.0
06/01/89	16:56-16:57	83.4	1236.5	18.6	9.1
06/01/89	16:57-16:58	57.5	1266.4	18.6	9.4
06/01/89	16:58-16:59	90.3	1163.6	18.8	9.4
06/01/89	16:59-17:00	97.1	866.8	19.8	9.2
06/01/89	17:00-17:01	31.5	452.5	21.4	8.1
06/01/89	17:01-17:02	27.5	551.6	21.4	7.7
06/01/89	17:02-17:03	45.3	869.4	19.8	8.4
06/01/89	17:03-17:04	90.5	1094.2	19.3	8.8
06/01/89	17:04-17:05	77.6	1291.0	18.2	9.2
06/01/89	17:05-17:06	77.1	1332.5	18.3	9.4
06/01/89	17:06-17:07	70.5	1272.2	18.9	9.5
06/01/89	17:07-17:08	73.2	1256.2	19.1	9.0
06/01/89	17:08-17:09	81.7	1333.4	- 18.7	9.2
06/01/89	17:09-17:10	64.5	1268.9	19.2	9.3
06/01/89	17:10-17:11	90.2	1287.4	19.3	9.2
06/01/89	17:11-17:12	76.3	1191.8	20.2	9.1
06/01/89	17:12-17:13	94.7	1163.4	19.9	9.0
06/01/89	17:13-17:14	62.5	1365.0	18.8	9.4
06/01/89	17:14-17:15	28.7	1557.7	17.9	9.6
06/01/89	17:15-17:16	14.6	1666.2	17.4	9.9
06/01/89	17:16-17:17	20.4	1511.6	17.4	10.1
06/01/89	17:17-17:18	44.3	1219.7	18.9	9.6
06/01/89	17:18-17:19	93.5	1001.9	19.3	9.0
06/01/89	17:19-17:20	105.6	1092.2	19.7	9.0
06/01/89	17:20-17:21	96.6	1143.8	19.4	8.9
06/01/89	17:21-17:22	75.0	1361.4	18.6	9.1
06/01/89	17:22-17:23	55.5	1384.0	18.2	9.3
06/01/89	17:23-17:24	52.0	1397.8	18.2	9.4
06/01/89	17:24-17:25	56.5	1350.6	17.8	9.5
06/01/89	17:25-17:26	67.0	1325.8	18.2	9.5
06/01/89	17:26-17:27	31.9	1442.5	17.3	9.7
06/01/89	17:27-17:28	25.0	1413.1	18.3	9.9
06/01/89	17:28-17:29	66.8	1167.1	18.6	9.7
06/01/89	17:29-17:30	103.5	1210.2	18.3	9.6
06/01/89	17:30-17:31	89.9	1129.7	17.8	9.5
06/01/89	17:31-17:32	99.3	1279.2	17.8	9.5
06/01/89	17:32-17:33	76.1	1306.8	17.5	9.6
06/01/89	17:33-17:34	50.5	1405.4	17.9	9.7
06/01/89	17:34-17:35	54.0	1229.0	18.4	9.7
06/01/89	17:35-17:36	101.8	1052.6	19.5	9.0
06/01/89	17:36-17:37	80.3	851.9	19.6	8.7
06/01/89	17:37-17:38	92.6	985.6	19.8	8.8
06/01/89	17:38-17:39	86.6	926.6	20.0	8.9
06/01/89	17:39-17:40	89.0	1290.9	18.6	9.1
06/01/89	17:60-17:41	35.5	1562.7	17.5	9.7
06/01/89	17:61-17:42	17.5	1491.7	17.9	9.9
06/01/89	17:42-17:43	64.9	1259.5	18.1	9.4
06/01/89	17:43-17:44	92.9	1189.8	18.1	9.4
06/01/89	17:44-17:45	88.6	1137.3	18.1	9.3
06/01/89	17:45-17:46	89.6	1074.9	16.6	9.9
06/01/89	17:46-17:67	67.9	1127.1	16.3	12.8
06/01/89	17:47-17:68	81.7	1168.4	16.9	12.3
06/01/89	17:48-17:69	59.7	1331.6	18.6	10.3
06/01/89	17:49-17:50	53.3	1410.3	19.0	9.6
	AVERAGE	68.5	1213.3	18.6	9.4

WESTON

TABLE 10

J. B. BAKER ROTARY KILN NO. 2

COMPARISON OF METHOD 7A AND METHOD 7E RESULTS

	GRAB TIME	RUN NO.	METHOD 7A GRAB SAMPLES NO_x, PPM	TIME PERIOD	METHOD 7E CEM CONCENTRATION RANGE NO_x, PPM
SOUTH DUCT					
	10:20	SR1-1	695	10:20-10:23	500 - 1,100
	10:35	SR1-2	601	10:33-10:38	575 - 1,400
	10:50	SR1-3	362	10:48-10:50	876 - 1,675
	11:00	SR1-4	723	10:59-11:01	650 - 1,575
	11:10	SR2-1	887	11:09-11:13	725 - 1,425
	11:18	SR2-2	907	11:18-11:21	375 - 1,550
	12:10	SR2-3	1,228	12:12-12:14	1,000 - 1,600
	12:15	SR2-4	1,335	12:24-12:26	1,000 - 1,550
	12:31	SR3-1	1,188	12:30-12:33	775 - 1,525
	12:39	SR3-2	75[a]	12:38-12:40	775 - 1,125
	13:06	SR3-3	1,113	13:05-13:07	1,100 - 1,475
	13:19	SR3-4	365	13:17-13:20	900 - 1,400
NORTH DUCT					
	15:30	NR1-1	328	15:28-15:32	875 - 1,600
	15:39	NR1-2	168	15:37-15:41	900 - 1,550
	15:44	NR1-3	248	15:41-15:44	900 - 1,525
	15:50	NR1-4	249	15:49-15:33	850 - 1,300
	16:17	NR2-1	404	16:16-16:18	1,050 - 1,650
	16:28	NR2-2	448	16:26-16:28	875 - 1,675
	16:38	NR2-3	667	16:37-16:39	1,050 - 1,600
	16:45	NR2-4	692	16:42-16:45	800 - 1,400
	17:00	NR3-1	655	16:59-17:01	375 - 1,325
	17:12	NR3-2	578	17:11-17:13	875 - 1,750
	17:22	NR3-3	495	17:20-17:23	1,050 - 1,525
	17:38	NR3-4	795	17:37-17:40	675 - 1,700

[a] Not used in Method 7A averages

MISC766A.RPT

APPENDIX A

EXAMPLE CALCULATION

J. E. BAKER
YORK, PENNA.

Test Data			
Run number	1	2	3
Location	SOUTH DUCT	SOUTH DUCT	SOUTH DUCT
Date	6-1-89	6-1-89	6-1-89
Time period	1020-1120	1120-1235	1235-1335
Operator			
Inputs For Calcs.			
Sq. rt. delta P	0.275390	0.613910	0.328490
Delta H	1.50000	1.50000	1.50000
Stack temp. (deg.F)	839.50	798.50	867.00
Meter temp. (deg.F)	110.10	110.10	110.10
Sample volume (act.)	38.863	38.863	38.863
Barometric press. (in.Hg)	30.02	30.02	30.02
Volume H2O imp. (ml)	26.00	26.00	26.00
Weight chnge sil. gel (g)	20.00	20.00	20.00
% CO2	17.200	16.500	16.700
% O2	8.900	9.500	9.600
% CO	0.000	0.000	0.000
% N	73.900	74.000	73.700
Area of stack (sq.ft.)	28.270	28.270	28.270
Sample time (min.)	60	60	60
Static pressure (in.H2O)	-2.40	-2.50	-2.40
Nozzle dia. (in.)	0.0000	0.0000	0.0000
Meter box cal.	1.0060	1.0060	1.0060
Cp of pitot tube	0.84	0.84	0.84

J. E. BAKER
YORK, PENNA.

Test Data			
Run number	1	2	3
Location	NORTH DUCT	NORTH DUCT	NORTH DUCT
Date	6-1-89	6-1-89	6-1-89
Time period	1450-1550	1550-1650	1650-1750
Operator			

Inputs For Calcs.			
Sq. rt. delta P	0.513060	0.516120	0.528920
Delta H	0.75000	0.75000	0.75000
Stack temp. (deg.F)	920.00	890.00	910.00
Meter temp. (deg.F)	116.00	116.00	116.00
Sample volume (act.)	12.760	12.760	12.760
Barometric press. (in.Hg)	30.02	30.02	30.02
Volume H2O imp. (ml)	8.00	8.00	8.00
Weight chnge sil. gel (g)	9.00	9.00	9.00
% CO2	18.300	19.000	18.600
% O2	9.200	9.200	9.400
% CO	0.000	0.000	0.000
% N	72.500	71.800	72.000
Area of stack (sq.ft.)	38.500	38.500	38.500
Sample time (min.)	60	60	60
Static pressure (in.H2O)	-2.20	-2.10	-2.10
Nozzle dia. (in.)	NA	NA	NA
Meter box cal.	1.0050	1.0050	1.0050
Cp of pitot tube	0.84	0.84	0.84

Example Calculations

Moisture Calculations

1. Volume of water vapor catch at standard conditions.

Vwc = (0.04707*Vlc) + (0.04715*Vsg)

[illegible] 0.04707(25) + 0.04715([illegible]) = 2.073

Where:

Vwc = volume of water collected, standard conditions, cu.ft.

Vlc = volume of liquid in impinger catch, ml.

Vsg = weight of water trapped in silica gel, mg.

2. Moisture content of a gas stream.

Bws = (Vwc)/(Vwc+Vms)

2.073 [illegible] 95.603 = [illegible]

Where:

Bws = moisture content of gas stream, volume percent.

3. Moisture content of a gas stream using wet bulb temperature.

Bws = (W/18)/[(W/18)+(1/28.84)]

[illegible]

Where:

W = mass of water vapor per pound dry air, lb/lb; obtained from psychrometric chart.

18, 28.84 = molecular weights of water, air.

Volumetric Flow Measurements

4. Dry molecular weight a of gas stream.

Md = 0.44*(%CO2)+0.32*(%O2)+0.28*(%N2+%CO)

17.2(.44) + 0.3 [illegible] + 73.9(.28)

Where: = 30.93

Md = dry molecular weight of stack gas, lb/lbmole.

5. Molecular weight of gas stream, wet basis.

Ms = Md*(1-Bws)+18*Bws

[illegible] 3([illegible])

= [illegible] .3

Where:

Ms = wet molecular weight of stack gas, lb/lbmole.

6. Gas Velocity at stack conditions.

Vs = 85.49*Cp*($\sqrt{\Delta p}$)avg.*(Ts/Ps/Ms)$^{1/2}$

85.49(.84)([illegible]) $\sqrt{\frac{[illegible] + 460}{30.3 \cdot [illegible]}}$

= [illegible]

Where:

Vs = gas velocity at stack conditions, ft./sec.

Cp = pitot tube coefficient.

p = velocity head of gas stream, in. H2O.

Ts = stack temperature, R.

7. Stack gas volumetric flow at stack conditions.

Qa = 3600*Vs*As

[illegible] 29.27 = 2,422,000 cfh

40,300 cfm

Where:

Qa = volumetric gas flow at stack conditions, cfh.

As = cross-sectional area of stack, sq.ft.

8. Dry gas volumetric flow at standard conditions.

Qs = 17.64*Qa*Ps/Ts*(1-Bws)

Where:

Qs = volumetric gas flow at standard conditions, dscfh.

2,422,000 ... = 932,000 dscfh

15,400 dscm

NOx Concentration Calculations

9. M7E Continuous Nitrogen Oxides Emissions.

Mnox = Cavg * Qs * 46 /365.35/1000000

1198.5 * 932,000 * 46 / ... = 132.2

Where:

Mnox = mass flow rate of NOx, lb/h.

46 = molecular weight of NOx, lb/lbmole.

365.35 = conversion factor, standard molar volume, lbmole/cu.ft.

Cavg = average concentration of NOx measured by continuous analyzer, ppm.

10. Method 7A Grab Sample Emissions

Vsc = 17.64*(Vf-Va)*[(Pf/Tf)-(Pi/Ti)]

17.64 (2... - 25) [...] = 1544.1

Where:

Vsc = sample volume at standard conditions, ml

Vf = volume of flask and valve, ml

Va = volume of absorbing solution, 25 ml.

Pi,f = absolute pressure of flask, initial and final.

Ti,f = absolute temperature of flask, initial and final.

17.64 = conversion to standard conditions, 68^F, 29.92 in.Hg

11. Method 7A sample concentration

Cnox = HSF * 10000 / Vsc

245.05 * 10000 / 1544.1 = 1268

Where:

HSF = Sample peak height, calibration factor, additional dilution factor, ug Nox.

10000 = conversion from ug/ml to mg/cu.m times standard 10:1 dilution factor.

12. Method 7A emission rate

1328.8 $\frac{mg}{m^3}$ [illegible] = 694.7 ppm

Same as Equation 9, using Cnox .

694.7 × 932 [illegible] = 77.3 [illegible]

13. Carbon Monoxide emission rate

Same as Equation 9, using average CO concentration and 28 for MW.

463 [illegible] 932,000 × 28/ [illegible] = 3.11 [illegible]

NORTH DUCT NOX INPUTS

DATE	Sample #	Pbar	Initial pressure Leg Ai	Leg Bi	Initial temp. deg. F	deg R	Flask volume	Pi/Ti	Pbar recovery	Final pressure		final temp. deg. F	deg. R	Pf/Tf	Standard volume	NSF	Conc. mg/dscm	Conc. ppm	Conc. lbs/dscf
RUN 1																			
6-1-89	NR1-1	30.02	15.20	12.80	91.00	551.00	2079.00	0.003666061	29.55	-0.700	-0.500	87.00	547.00	0.051828153	1745.04	109.40	626.92	327.75	3.92E-05
6-1-89	NR1-2	30.02	15.20	12.80	95.00	555.00	2077.00	0.003639639	29.55	-0.100	-0.100	86.00	546.00	0.053754578	1814.02	58.20	320.83	167.73	2.00E-05
6-1-89	NR1-3	30.02	13.40	14.80	96.00	556.00	2080.00	0.003273381	29.55	-1.100	-0.900	86.00	546.00	0.050457875	1710.45	81.20	474.73	248.19	2.96E-05
6-1-89	NR1-4	30.02	14.50	12.90	92.00	552.00	2097.00	0.004746378	29.55	-0.500	-0.400	88.00	548.00	0.052281021	1737.4	82.85	476.86	249.30	2.98E-05
RUN 2																			
6-1-89	NR2-1	30.02	14.80	13.20	94.00	554.00	2066.00	0.003646209	29.55	-1.000	-0.800	88.00	548.00	0.050638686	1691.88	130.80	773.10	404.18	4.83E-05
6-1-89	NR2-2	30.02	14.80	13.10	93.00	553.00	2062.00	0.003833634	29.55	-0.100	-0.100	87.00	547.00	0.053656307	1790.26	153.65	858.26	448.70	5.36E-05
6-1-89	NR2-3	30.02	14.80	13.10	96.00	556.00	2100.00	0.003812949	29.55	-0.200	-0.100	86.00	546.00	0.053571428	1821.31	232.30	1,275.46	666.81	7.96E-05
6-1-89	NR2-4	30.02	14.90	13.10	95.00	555.00	2100.00	0.003639639	29.55	0.100	0.100	88.00	548.00	0.054288321	1853.89	245.25	1,322.89	691.61	8.26E-05
RUN 3																			
6-1-89	NR3-1	30.02	14.80	13.00	95.00	555.00	2088.00	0.004	29.55	-0.900	-0.800	86.00	546.00	0.051007326	1710.66	214.45	1,253.61	655.39	7.83E-05
6-1-89	NR3-2	30.02	14.70	12.70	95.00	555.00	2080.00	0.004720720	29.55	-1.000	-0.800	86.00	546.00	0.050824175	1671.26	184.90	1,106.35	578.40	6.91E-05
6-1-89	NR3-3	30.02	14.40	12.70	93.00	553.00	2065.00	0.005280289	29.55	-0.400	-0.300	87.00	547.00	0.052742230	1707.95	161.80	947.33	495.27	5.92E-05
6-1-89	NR3-4	30.02	15.00	12.90	94.00	554.00	2103.00	0.003826714	29.55	-1.000	-1.000	86.00	546.00	0.050457875	1709.31	248.00	1,450.88	758.52	9.06E-05

SOUTH DUCT NOX INPUTS

DATE	Sample #	Pbar	Initial pressure Leg Ai	Leg Bi	Initial temp. deg. F	deg R	Flask volume	Pi/Ti	Pbar recovery	Final pressure		final temp. deg. F	deg. R	Pf/Tf	Standard volume	NSF	Conc. mg/dscm	Conc. ppm	Conc. lbs/dscf
RUN 1																			
6-1-89	SR1-1	30.02	15.20	13.10	84.00	544.00	2114.00	0.003161764	29.55	-0.300	-0.200	86.00	546.00	0.053205128	1844.1	245.05	1,328.83	694.71	8.30E-05
6-1-89	SR1-2	30.02	15.10	13.00	88.00	548.00	2097.00	0.003503649	29.55	-0.800	-0.700	85.00	545.00	0.051373626	1749.65	201.25	1,150.23	601.34	7.18E-05
6-1-89	SR1-3	30.02	15.20	13.10	87.00	547.00	2078.00	0.003144424	29.55	-1.000	-0.800	85.00	545.00	0.050917431	1730.1	119.95	693.31	362.46	4.33E-05
6-1-89	SR1-4	30.02	15.20	13.10	90.00	550.00	2100.00	0.003127272	29.55	-0.100	-0.100	85.00	545.00	0.053853211	1856.72	257.00	1,384.16	723.64	8.64E-05
RUN 2																			
6-1-89	SR2-1	30.02	15.20	13.10	87.00	547.00	2100.00	0.003144424	29.55	-0.400	-0.400	86.00	546.00	0.052655677	1812.26	307.30	1,695.67	886.50	1.06E-04
6-1-89	SR2-2	30.02	15.20	13.10	88.00	548.00	2110.00	0.003138686	29.55	-0.500	-0.400	85.00	545.00	0.052568807	1818.01	315.35	1,734.59	906.84	1.08E-04
6-1-89	SR2-3	30.02	15.10	13.00	88.00	548.00	2090.00	0.003503649	29.55	-0.300	-0.300	87.00	547.00	0.052925045	1800.25	423.05	2,349.95	1228.55	1.47E-04
6-1-89	SR2-4	30.02	15.10	13.00	89.00	549.00	2090.00	0.003497267	29.55	-0.800	-0.700	88.00	548.00	0.051186131	1737.14	443.50	2,553.05	1334.73	1.59E-04
RUN 3																			
6-1-89	SR3-1	30.02	15.10	13.00	90.00	550.00	2075.00	0.003490909	29.55	-0.100	-0.100	86.00	546.00	0.053754578	1817.63	413.05	2,272.46	1188.04	1.42E-04
6-1-89	SR3-2	30.02	15.10	13.00	90.00	550.00	2071.00	0.003490909	29.55	-0.100	-0.100	87.00	547.00	0.053656307	1810.54	25.95	143.33	74.93	8.95E-06
6-1-89	SR3-3	30.02	15.10	13.00	89.00	549.00	2081.00	0.003497267	29.55	-0.400	-0.300	87.00	547.00	0.052742230	1786.01	380.20	2,128.77	1112.92	1.33E-04
6-1-89	SR3-4	30.02	15.20	13.10	89.00	549.00	2103.00	0.003132969	29.55	-0.200	-0.100	86.00	546.00	0.053571428	1848.87	129.15	698.53	365.19	4.36E-05

2,127.64 1112.53

k25

Total NOx as NO2

Paul Hector
430-7401 (FAX)

	SAMPLE #	NOX (as) 1	2		PERCENT DIFF
Blank	1	19.6	19.3	19.45	2
SR1- 1	2	248.8	241.3	245.05	3
2	3	202.5	200.0	201.25	1
3	4	117.0	122.1	119.55	4
4	5	298.2	299.8	299	1
SR2, 1	6	309.2	309.4	309.3	1
2	7	318.0	312.7	315.35	2
3	8	423.5	422.6	423.05	0
4	9	438.3	448.9	443.6	2
SR3. 1	10	412.6	413.5	413.05	0
2	11	25.9	26.0	25.95	0
3	12	381.7	370.7	376.2	1
4	13	128.2	130.1	129.15	1
1	14	111.6	107.2	109.4	4
2	15	90.1	90.3	90.2	0
3	16	79.6	82.8	81.2	4
4	17	82.2	83.5	82.85	2
1	18	128.1	133.9	130.6	4
DR2 - 2	19	155.4	151.9	153.65	2
3	20	226.2	238.4	232.3	5
4	21	239.1	251.4	245.25	5
1	22	210.6	218.3	214.45	4
DR3- 2	23	180.2	189.6	184.9	5
3	24	161.7	161.9	161.8	0
4	25	201.8	294.2	248	5

28

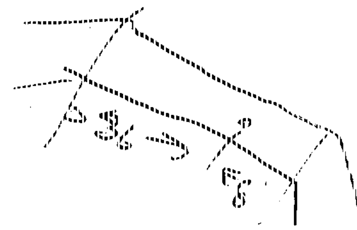
SAMPLE #	NOX PK HT	S	NOX (mg/dscm)	NOX TV (mg/dscm)	% RECOVERY
1081	1640	0.0867	71.4	59.7	120
1081	1524	0.0867	66.2	59.7	111
1081	1489	0.0874	64.9	59.7	109
1081	1460	0.0894	63.3	59.7	106
1081	1598	0.0910	70.9	59.7	119
1081	1590	0.0916	71.0	59.7	119
			68.0	59.7	114
4900	1936	0.0867	839.3	737.2	114
4900	1826	0.0867	791.6	737.2	107
4900	1903	0.0874	831.6	737.2	113
4900	1884	0.0894	806.4	737.2	109
4900	1870	0.0910	850.9	737.2	115
4900	1896	0.0916	850.0	737.2	115
			828.3	737.2	112

APPENDIX B

RAW FIELD DATA

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

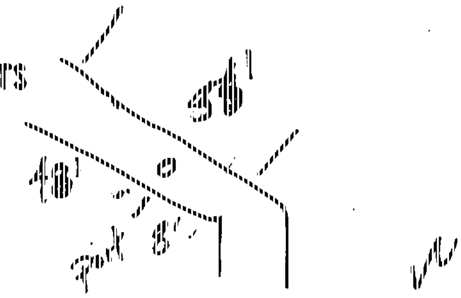
PLANT: JE BAKER
DATE: 5/31/83
SAMPLING LOCATION: South (SEAD) Unit
INSIDE OF FAR WALL TO OUTSIDE OF PORT, (DISTANCE A): 4'
INSIDE OF NEAR WALL TO OUTSIDE OF PORT, (DISTANCE B): 24
STACK I.D., (DISTANCE A - DISTANCE B): 4'
NEAREST UPSTREAM DISTURBANCE: ≈36 > 9 dd
NEAREST DOWNSTREAM DISTURBANCE: ≈8 > 1.5 dd
CALCULATOR: WK



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	0.032	46"	1.5	44	
2	0.105		5.0		
3	0.194		9 1/2		
4	0.323		15.5		
5	0.677		32.5		
6	0.806		38 5/8		
7	0.895		42 43.0		
8	0.968		46.5		

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS



SCHEMATIC OF SAMPLING LOCATION

PLANT JEBALER
DATE 5/31/69
SAMPLING LOCATION North (STB)
INSIDE OF FAR WALL TO
OUTSIDE OF PORT, (DISTANCE A) 6'
INSIDE OF NEAR WALL TO
OUTSIDE OF PORT, (DISTANCE B) N/A
STACK I.D., (DISTANCE A - DISTANCE B) 6'
NEAREST UPSTREAM DISTURBANCE 48' >27 ds
NEAREST DOWNSTREAM DISTURBANCE 8' = 21 dd
CALCULATOR PK

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	0.032	72"	2 1/4		
2	0.105		7 1/2		
3	0.194		14.0		
4	0.323		23 1/4		
5	0.677		48 3/4		
6	0.806		58.0		
7	0.895		64.5		
8	0.968		69 3/4		

MOISTURE DETERMINATION FORM

Plant JE BAKER Date 6/1/89

Sample location NORTH Duct [illegible] Run no. [illegible]

Operator [illegible] Barometric pressure (P_b), in. Hg. 30.02

Comments: [illegible]

	24-hr. clock time	Gas meter reading, ft.^{3}	Orifice meter pressure differential (ΔH), in. H_2O	Dry gas meter temperature (T_m) Inlet °F.	Outlet °F.
Stop	17:35	481.545	0.5	107	116
Start	16:00	468.785	1.0	114	127
		Total V_m ~~11.678~~ 12.76	Ave. ΔH .75	Avg. T_m 116	

Impinger volume

Final, ml 208

Initial, ml 200

Net, ml 8

Silica gel weight

Final, g 309

Initial, g 300

Net, g 9

Calculations

(1) P_b = 30.02

(2) Total V_m = 12.76

(3) Avg. ΔH = .25

(4) Avg. T_m = 116

(5) Net ml = 8

(6) Net g = 9

(7) $$V_{m(std)} = \frac{17.64 \times V_m \left(P_b + \frac{\Delta H}{13.6}\right)}{(T_m + 460)} = \frac{17.64 \times 12.76 \left(30.02 + \frac{.25}{13.6}\right)}{(116 + 460)} = 11.753$$

(8) $V_{w(std)}$ = (.04707 × Net ml) + (.04715 × Net g) =

(.04707 × 8) + (.04715 × 9) = .801

(9) $$\%M = \frac{100 \times V_{w(std)}}{V_{w(std)} + V_{m(std)}} = \frac{100 \times .801}{.801 + 11.753} = 6.4$$

NITROGEN OXIDE FIELD DATA FORM

Plant: J. E. BAKER
City: YORK, PA
Sample location: NORTH DUCT
Date: 6-1-89
Operator: CLARKE, MARZ
Barometric pressure (P_{bar}) 30.02 in. Hg

Sample number	Sample point location	Sample time 24-hr	Probe temperature, °F	Flask and valve number	Volume of flask and valve (V_F), ml	Initial pressure in. Hg: Leg A_i	Leg B_i	P_i[a]	Initial temperature: °F (t_i)	°R (T_i)[b]
NR1-1	GRID		250	E	2079	15.2	12.8		~~96~~ 91	551
NR1-2	|		|	N	2077	15.2	12.8		95	555
NR1-3	|		|	RFW-6	2080	13.4	14.8		96	556
NR1-4	|		|	I	2097	14.5	12.9		92	552
NR2-1	|		|	LP	2066	14.8	13.2		94	554
NR2-2	|		|	W	2062	14.8	13.1		93	553
NR2-3	|		|	RFW-1	2100	14.8	13.1		96	556
NR2-4	|		|	RFW-3	2100	14.9	13.1		95	555
NR3-1	|		|	E	2088	14.8	13.0		95	555
NR3-2	|		|	SH	2080	14.7	12.7		95	555
NR3-3	|		|	K	2065	14.4	12.7		93	553
NR3-4	⟂		⟂	N7	2103	15.0	12.9		94	554

[a] $P_i = P_{bar} - (A_i + B_i)$. [b] $T_i = t_i + 460°F$.

NO_x SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant J. E. BAKER Date 6-2-89

Sample recovery personnel R.H. R.A. Barometric pressure, (P_{bar}) 29.55 in. Hg

Person with direct responsibility for recovered samples P.C.

Sample Number	Flask ID	Final Pressure P/V *	Final pressure, in. Hg			Final temperature,		Sample recovery time, 24-h	pH adjusted 9 to 12	Liquid level marked	Samples stored in locked container
			Leg A_f	Leg B_f	P_f *	°F (t_f)	°R (T_f)				
NE1-1	F	V	.7	.5		87	547	1333	—	yes	yes
NE1-2	N	V	.1	.1		86	546	1335	—		
NE1-3	RFW-6	V	1.1	.9		86	546	1339	—		
NE1-4	I	V	.5	.4		88	548	1329	—		
NE2-1	LP	V	1	.8		88	548	1315	—		
NE2-2	W	V	.1	.1		87	547	1322	—		
NE2-3	RFW-4	V	.2	.1		86	546	1320	—		
NE2-4	RFW-3	P	.1	.1		88	548	1326	—		
NE3-1	E	V	.9	.8		86	546	1310	—		
NE3-2	SY	V	1	.8		86	546	1250	—		
NE3-3	K	V	.3.4	.3		87	547	1343	—		
NE3-4	N7	V	1	1		86	546	1301	—		

$P_f = P_{bar} - (A_f + B_f)$. $T_f = t_f + 460°F$.

Lab person with direct responsibility for recovered samples

Date recovered samples received 6-2-89 Analyst

All samples identifiable? All liquids at marked level?

Remarks

Signature of lab sample trustee

* Indicate P=pressure or V=vacuum when measuring final pressure in. Hg

NITROGEN OXIDE FIELD DATA FORM

Plant J.E. BAKER City YORK, PA

Sample location SOUTH DUCT Date 6-1-89

Operator Hill Barometric pressure (P_{bar}) 30.02 in. Hg

Sample number	Sample point location	Sample time 24-hr	Probe temperature, °F	Flask and valve number	Volume of flask and valve (V_F), ml	Initial pressure in. Hg: Leg A_i	Leg B_i	P_i[a]	Initial temperature: °F (t_i)	°R (T_i)[b]
SR1-1	GRAB	1620	250	D-3	2114	15.2	13.1		84	544
SR1-2	|	1635	|	D	2097	15.1	13.0		88	548
SR1-3	|	1650	|	E-1	2076	15.2	13.1		87	547
SR1-4	|	1100	|	RFW 4	2100	15.2	13.1		90	550
SR2-1	|	1110	|	RFW-8	2100	15.2	13.1		87	547
SR2-2	|	1118	|	RFW-2	2110	15.2	13.1		88	548
SR2-3	|	1210	|	M	2090	15.1	13.0		88	548
SR2-4	|	1216	|	RFW 5	2090	15.1	13.0		89	549
SR3-1	|	1222	|	EU	2075	15.1	13.0		90	550
SR3-2	|	1230	|	2	2071	15.1	13.0		90	550
SR3-3	|	1240	|	C	2081	15.1	13.0		89	549
SR3-4	⊥	1245	⊥	C-1	2103	15.2	13.1		89	549

[a] $P_i = P_{bar} - (A_i + B_i)$. [b] $T_i = t_i + 460°F$.

NO_x SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant J.G. Baker Date 6-2-89

Sample recovery personnel V.C., A.M. Barometric pressure, (P_{bar}) 29.55 in. Hg

Person with direct responsibility for recovered samples V.C.

Sample Number	Flask ID	Final Pressure P/V *	Final pressure, in. Hg			Final temperature,		Sample recovery time, 24-h	pH adjusted 9 to 12	Liquid level marked	Samples stored in locked container
			Leg A_f	Leg B_f	P_f =	°F (t_f)	°R (T_f)				
SR1-1	D-3	V	.7	.2		86	546	1442	—	Yes	Yes
SR1-2	D	V	.8	.7		86	546	1447	—		
SR1-3	E-1	V	1	.8		85	545	1932	—		
SR1-4	RFW-4	V	.1	.1		85	545	1439	—		
SR2-1	RFW-8	V	.4	.4		86	546	1436	—		
SR2-2	RFW-2	V	.5	.4		85	545	1428	—		
SR2-3	M	V	.3	.3		87	547	1414	—		
SR2-4	RFW-5	V	.6	.7		88	548	1420	—		
SR3-1	FU	V	.1	.1		86	546	1423	—		
SR3-2	2	V	.1	.1		87	547	1417	—		
SR3-3	C	V	.1	.3		87	547	1408	—		
SR3-4	C-1	V	.2	.1		86	546	1410	—		

$P_f = P_{bar} - (A_f + B_f)$. $T_f = t_f + 460°F$.

Lab person with direct responsibility for recovered samples

Date recovered samples received 6-3-89 Analyst

All samples identifiable? All liquids at marked level?

Remarks

Signature of lab sample trustee

* Indicate P=pressure or V=vacuum when measuring final pressure in. Hg

MOISTURE DETERMINATION FORM

Plant J. E. BAKER Date 6-1-89

Sample location Stack Duct Run no. 2

Operator GHL Barometric pressure (P_b), in. Hg. 30.02

Comments: Start leak check .002 cfm @ 15 in Hg.

Final Leak check .001 @ 9 = (.001)

	24-hr. clock time	Gas meter reading, ft.3	Orifice meter pressure differential (ΔH), in. H_2O	Dry gas meter temperature (T_m)			
				Inlet °F.		Outlet °F.	
Stop	11:56	468.725	1.5	108	107	109	107
Start	10:53	429.862	1.5	113	110	116	111
		Total V_m 38.863	Avg. ΔH 1.5	Avg. T_m 110.1			

Impinger volume

Final, ml 224

Initial, ml 200

Net, ml 24

Silica gel weight

Final, g 320

Initial, g 300

Net, g 20

Calculations

(1) P_b = 30.02

(2) Total V_m = 38.863

(3) Avg. ΔH = 1.5

(4) Avg. T_m = 110.1

(5) Net ml = 24

(6) Net g = 20

(7) $V_{m(std)} = \dfrac{17.64 \times V_m \left(P_b + \dfrac{\Delta H}{13.6}\right)}{(T_m + 460)} = \dfrac{17.64 \times 38.863 \left(30.02 + \dfrac{1.5}{13.6}\right)}{(570)} =$ 36.238

36.454

(8) $V_{w(std)}$ = (.04707 × Net ml) + (.04715 × Net g) =

(.04707 × 24) + (.04715 × 20) = 2.073

(9) $\%M = \dfrac{100 \times V_{w(std)}}{V_{w(std)} + V_{m(std)}} = \dfrac{100 \times 2.073}{2.073 + 36.238}$ = 5.4 %

GAS VELOCITY AND VOLUME DATA FORM

Plant JC Baker Location S-Out

Date 6-1-98 Run no. 1 24-hr. clock time 9:02

Operators [illegible] Stack diameter or dimensions, in. 48

Barometric pressure, in. Hg 30.08 Cross sectional area, ft.^{2}

Pitot tube identification no. 7A Cp 0.84

	Traverse Point Number	Velocity head (Δp), in. H_2O	Stack Temperature (T_s), °F	Static pressure (P_{static}) in. H_2O	Cyclonic flow determination: Δp at 0° reference	Cyclonic flow determination: Angle (α) which yields a null Δp
9:02 x	1	[illegible]			[illegible]	
	2	[illegible]	828 ?		[illegible]	[illegible]
	3	0.14			[illegible]	
	4	0.07				
	5	0.08		-2.4		
	6	0.08				
	7	0.10				
	8	0.10				
y	1	0.04				
	2	0.04				
	3	0.11				
	4	0.06				
	5	0.09	851			
	6	0.08				
	7	0.09				
	8	0.11				
	AVG. TSP	.2263	839.5	-2.4		
x	1	.17				
	2	.26	750			
	3	.11	847			
	4	.05				
	5	.15				
	6	.14				
	7	.13				
	8	.13				
y	1	.20		-2.5		
	2	.40				
	3	.13				
	4	.12				
	5	.14				
	6	.14				
	7	.15				
	8	.15				
	AVG. TDP	.4139	848.5	-2.5		
x	1	0.15				
	2	0.08				
	3	0.08				
	4	0.17				
	5	0.06				
	6	0.05				
	7	0.07		-2.4		
	8	0.06				
y	1					
	2	0.22				
	3	0.16	867			
	4	0.19				
	5	0.11				
	6	0.12				
	7 0.14					
	8 0.12					
		Avg. $\sqrt{\Delta p}$ .52049	Avg. Ts 867	Avg. P_{static} -2.4		Avg. α[a]

[a] Must be <10 degrees to be acceptable.

1:30

GAS VELOCITY AND VOLUME DATA FORM

Plant JE BAKER Location NORTH Duct Kiln
Date 6/1 Run no. 5/6 24-hr. clock time 15 45
Operators [illegible] Stack diameter or dimensions, in. 78
Barometric pressure, in. Hg ________ Cross sectional area, ft.^{2} ________
Pitot tube identification no. ________ Cp 0.84

R1

R2

Traverse Point Number	Velocity head (Δp), in. H_2O	Stack Temperature (T_s), °F.	Static pressure (P_{static}) in. H_2O	Cyclonic flow determination: Δp at 0° reference	Cyclonic flow determination: Angle (α) which yields a null Δp
X 1	0.25				
2	0.23				
3	0.30				
4	0.30	920			
5	0.31		-2.2		
6	0.31				
7	0.32				
8	0.27				
Y 1	0.25				
2	0.23				
3	0.21				
4	0.32				
5	0.32				
6	0.31				
7	0.29				
8	0.30				
[illegible]	[illegible]	920	-2.2		
X 1	[illegible]				
2	0.19				
3	0.28		-2.1		
4	0.30				
5	0.31	890			
6	0.30				
7	0.28				
8	0.27				
Y 1	0.48				
2	0.16				
3	0.21				
4	0.30				
5	0.30				
6	0.30				
7	0.27				
8	0.23				
[illegible]	[illegible]	810	-2.1		
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]		-2.2		
[illegible]	[illegible]	910			
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]		-2.1		
[illegible]	.21				
[illegible]	.36				
[illegible]	.30				
.29	Avg. $\sqrt{\Delta p}$ 0.5292	Avg. Ts 910	Avg. P static -2.1		Avg. α[a]

.23

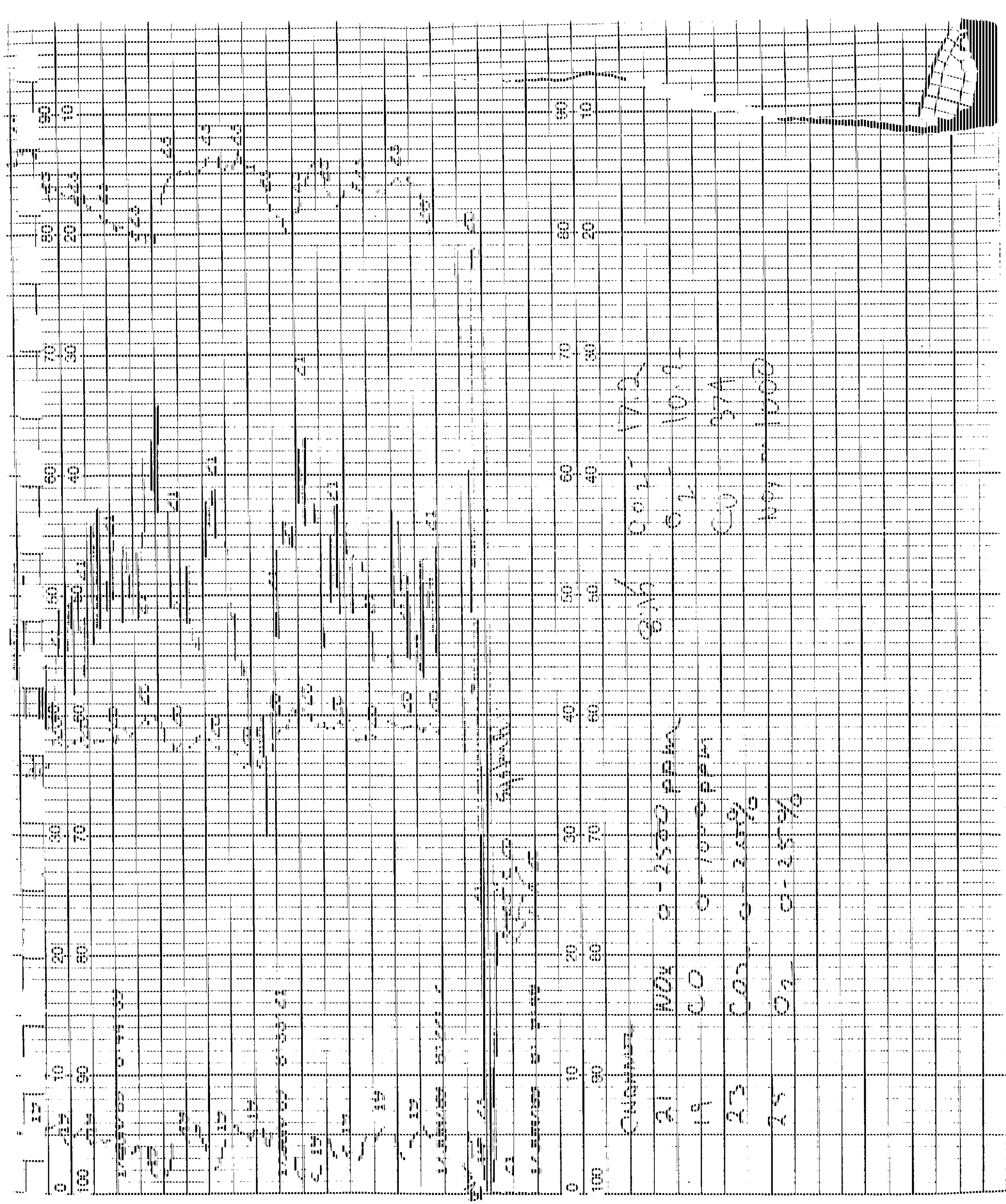
[a] Must be <10 degrees to be acceptable.

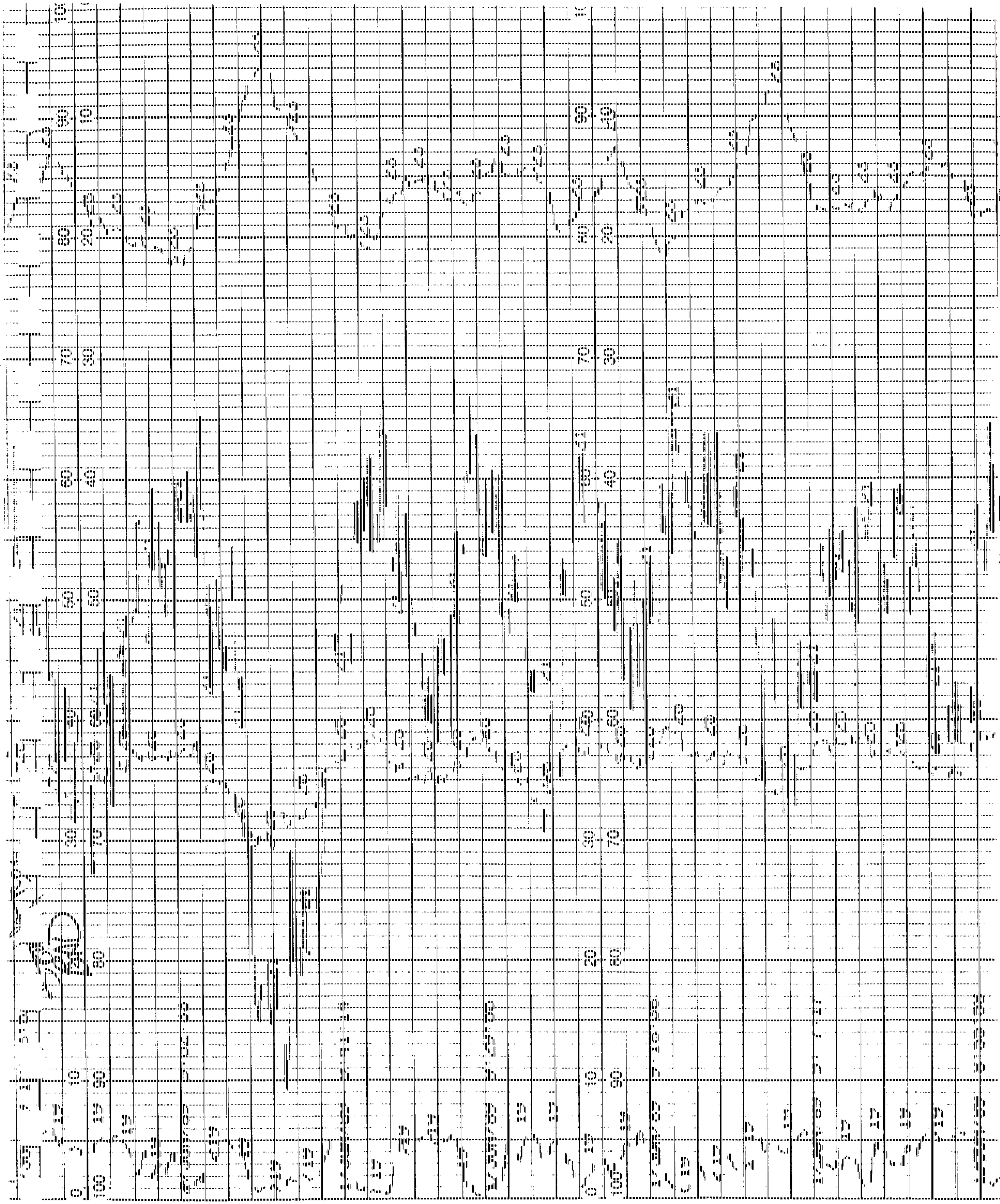
GAS VELOCITY AND VOLUME DATA FORM

Plant [illegible] Location [illegible] Duct
Date 6/1 Run no. P25 24-hr. clock time
Operators [illegible] Stack diameter or dimensions, in. 6/4
Barometric pressure, in. Hg 30.2 Cross sectional area, ft^2
Pitot tube identification no. Cp 0.84

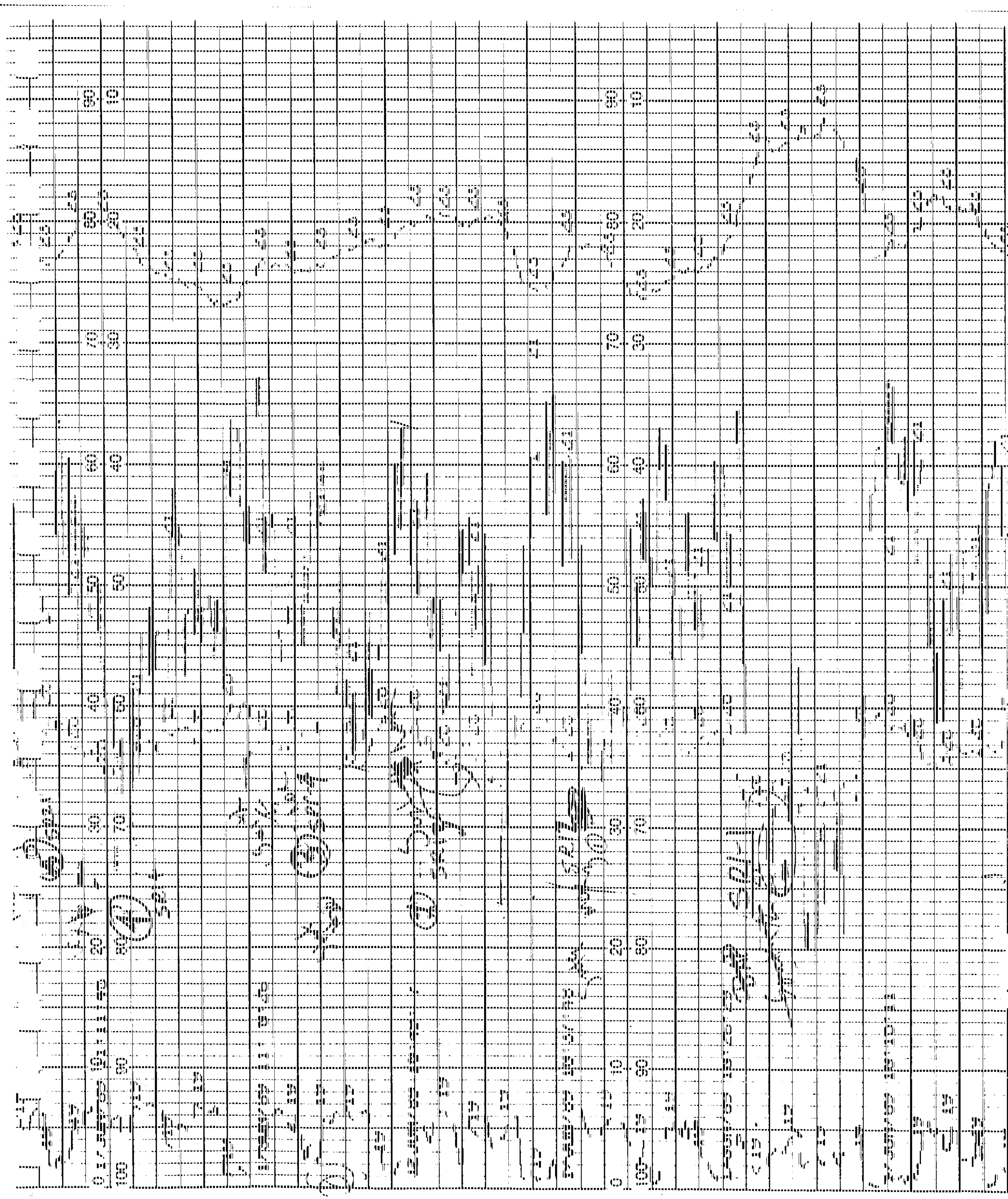
Traverse Point Number	Velocity head (Δp), in. H_2O	Stack Temperature (T_s), °F.	Static pressure (P_{static}) in. H_2O	Cyclonic flow determination: Δp at 0° reference	Angle (α) which yields a null Δp
[illegible]					
1	0.27				
2	0.24				
3	0.25	960			
4	0.27				
5	0.28				
6	0.28				
7	0.25		-2.2		
8	0.29				
2 1	0.50 ?				
2	0.19				
3	0.17				
4	0.29				
5	0.28				
6	0.29				
7	0.30				
8	0.26				
Avg. $\sqrt{\Delta p}$	.5173	960	-2.2		
K 1	0.26				
2	0.25				
3	0.11				
4	0.09	920			
5	0.19				
6	0.11		-2.5		
7	0.11				
8	0.13				
1	0.45(?)				
2	0.21				
3	0.11				
4	0.09				
5	0.09				
6	0.08	894			
7	0.10				
8	0.09				
Avg. $\sqrt{\Delta p}$	.3134	908	-2.6		
	Avg. $\sqrt{\Delta p}$	Avg. Ts	Avg. P static		Avg. α[a]

[a] Must be <10 degrees to be acceptable.

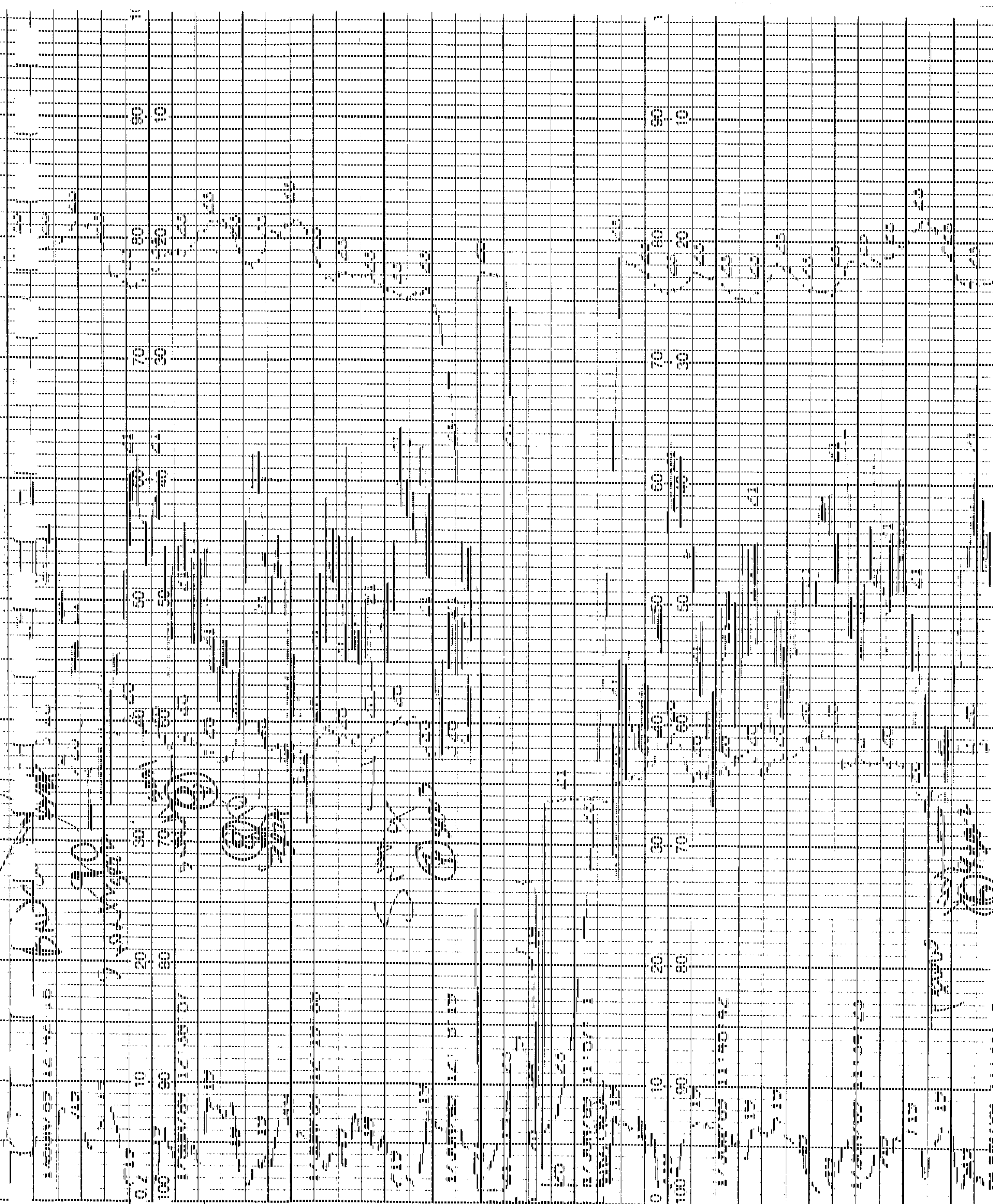

CHANNEL
21 NOx 0-2500 ppm
19 CO 0-1000 ppm
23 CO2 0-20%
25 O2 0-25%

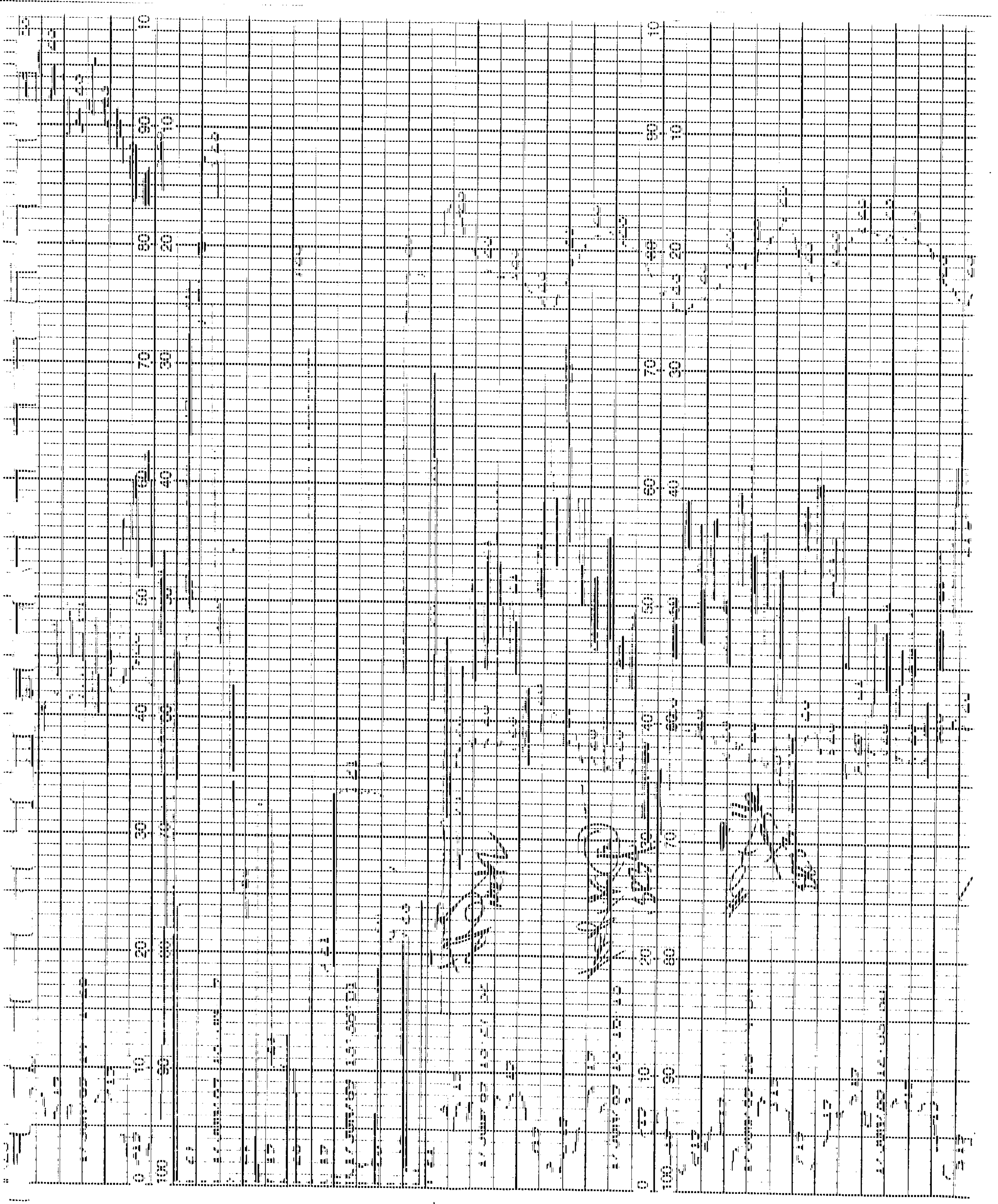


PRINTED IN U.S.A. CHART NO. 414450 MOLYTEK INC. 2419 SMALLMAN ST PITTSBURGH PA

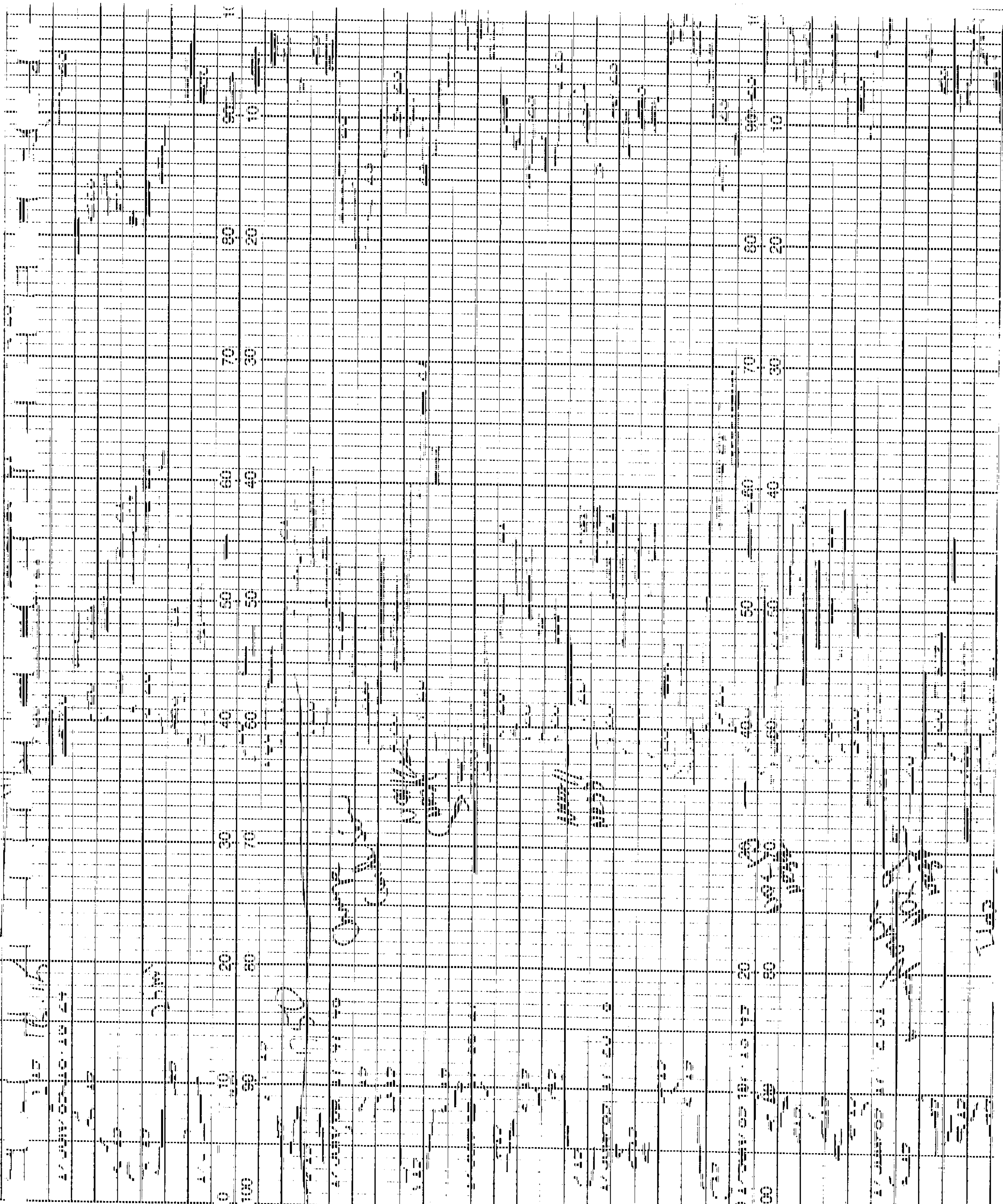


EK PGH PRINTED IN U.S.A. CHART NO. 414450 MOLYTEK INC. 2419 SMALLMAN ST. PITTSBURGH PA [illegible] TLX 812-56[illegible]





R-312 569 MOLYTEK PGH PRINTED IN U.S.A CHART NO. 414450 MOLYTEK INC. 2419 SMALLMAN ST PITTSBURGH PA 1522[illegible] (412) [illegible]



TUX 812 559 MOLYTEK PGH PRINTED IN U.S.A. CHART NO. 414450 MOLYTEK INC

APPENDIX C

LABORATORY REPORTS

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Paul Clarke

FROM: Ben Shapiro BS

DATE: 23 June 1989

PROJECT: J.E. Baker

W.O. NO.: 2373-01-02

SUBJECT: Analytical Results for RFW Batch 8906L543

ACTION:

Attached are the analytical results for the above listed RFW number.

If you have any questions about the data, please call.

BS/gjk

Attachment:

WESTON

ROY F. WESTON INC.
LIONVILLE LABORATORY

CLIENT: J.E. BAKER CO
RFW #: 8906L543
W.O. #: 2373-01-02-0000

SAMPLES RECEIVED: 06-03-89

INORGANIC NARRATIVE

The following is a summary of the quality control results and a description of any problems encountered during the analysis of this batch of samples:

1. The analytical methods applied by the laboratory in the analysis of air samples contained in this batch were derived from the Federal Register, 40 CFR, Part 60, revised July 1,1988, The Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA - 600/4-84-041, May 1987, and NIOSH Manual of Analytical Methods, 2nd & 3rd Editions.

Mark F. Saunders
Wet Lab Unit Leader
Lionville Analytical Laboratory

6/21/89
Date

Debra K. White
Inorganic Section Manager
Lionville Analytical Laboratory

6/21/89
Date

ROY F. WESTON, INC.

GLOSSARY OF TERMS - INORGANIC REPORTS

DATA QUALIFIERS

U - Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* - Indicates that the original sample result is greater than 4x the spike amount added. The USEPA-CLP has determined that spike results on samples where this occurs may be unreliable and, therefore, the control limits are not applicable.

ABBREVIATIONS

MB - Method or preparation blank.
MS - Matrix Spike.
MSD - Matrix Spike Duplicate.
REP - Sample Replicate.
LC - Indicates a method LCS or Blank Spike.
NC - Not calculable, result below the detection limit.

LABORATORY CHRONOLOGY AND HOLDTIME REPORT

The test code listed indicates the specific analysis or preparation procedure employed. The codes may be interpreted as follows:

MAAW - Metals prep test for AA digestion, water matrix.
MAAS - Metals prep test for AA digestion, soil matrix.
MICW - Metals prep test for ICP digestion, water matrix.
MICS - Metals prep test for ICP digestion, soil matrix.

M**TO- This type of code indicates a total metal analysis (eg. MAGTO indicates an analysis for total silver).

M**SO- This type of code indicates a soluble metal analysis. (eg. MAGSO indicates an analysis for soluble silver).

M**EP- This type of code indicates an EPTOXICITY metals analysis (eg. MAGEP indicates an analysis for eptox silver).

I**TO- This type of code indicates a non-metallic total analysis. There is also a complimentary soluble analysis for each of these codes (eg. ICNTO indicates an analysis for total cyanide).

A suffix of -R or -S following these codes indicates a replicate or spike analysis respectively.

ROY F. WESTON INC.

INORGANICS DATA SUMMARY REPORT 06/21/89

CLIENT: J.E. BAKER CO
WORK ORDER: 2373-01-02-0000

WESTON BATCH #: 8906L543

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
-001	NOX BLANK	NOX	35.0	u	UG	35.0
-002	SR1-1	NOX	249		UG	35.0
-003	SR1-2	NOX	202		UG	35.0
-004	SR1-3	NOX	118		UG	35.0
-005	SR1-4	NOX	258		UG	35.0
-006	SR2-1	NOX	309		UG	70.0
-007	SR2-2	NOX	318		UG	70.0
-008	SR2-3	NOX	424		UG	70.0
-009	SR2-4	NOX	458		UG	70.0
-010	SR3-1	NOX	413		UG	70.0
-011	SR3-2	NOX	35.0	u	UG	35.0
-012	SR3-3	NOX	382		UG	70.0
-013	SR3-4	NOX	128		UG	35.0

ROY F. WESTON INC.

INORGANICS DATA SUMMARY REPORT 06/21/89

CLIENT: J.E. BAKER CO
WORK ORDER: 2373-01-02-0000

WESTON BATCH #: 8906L543

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-014	NR1-1	NOX	112	UG	35.0
-015	NR1-2	NOX	58.1	UG	35.0
-016	NR1-3	NOX	79.6	UG	35.0
-017	NR1-4	NOX	82.2	UG	35.0
-018	NR2-1	NOX	128	UG	35.0
-019	NR2-2	NOX	155	UG	70.0
-020	NR2-3	NOX	226	UG	35.0
-021	NR2-4	NOX	239	UG	35.0
-022	NR3-1	NOX	211	UG	35.0
-023	NR3-2	NOX	180	UG	35.0
-024	NR3-3	NOX	162	UG	70.0
-025	NR3-4	NOX	242	UG	35.0

ROY F. WESTON INC.

INORGANICS PRECISION REPORT 06/21/89

CLIENT: J.E. BAKER CO
WORK ORDER: 2373-01-02-0000

WESTON BATCH #: 8906L543

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	% DIFF
-001REP	NOX BLANK	NOX	35.0 u	35.0 u	NC
-002REP	SR1-1	NOX	249	241	3.1
-003REP	SR1-2	NOX	202	200	1.2
-004REP	SR1-3	NOX	118	122	3.6
-005REP	SR1-4	NOX	258	256	0.90
-006REP	SR2-1	NOX	309	305	1.2
-007REP	SR2-2	NOX	318	313	1.7
-008REP	SR2-3	NOX	424	423	0.20
-009REP	SR2-4	NOX	458	448	2.2
-010REP	SR3-1	NOX	413	414	0.20
-011REP	SR3-2	NOX	35.0 u	35.0 u	NC
-012REP	SR3-3	NOX	382	379	0.80
-013REP	SR3-4	NOX	128	130	1.5

ROY F. WESTON INC.

INORGANICS PRECISION REPORT 06/21/89

CLIENT: J.E. BAKER CO
WORK ORDER: 2373-01-02-0000

WESTON BATCH #: 8906L543

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	% DIFF
-014REP	NR1-1	NOX	112	107	4.0
-015REP	NR1-2	NOX	58.1	58.3	0.30
-016REP	NR1-3	NOX	79.6	82.8	3.9
-017REP	NR1-4	NOX	82.2	83.5	1.6
-018REP	NR2-1	NOX	128	134	4.1
-019REP	NR2-2	NOX	155	152	2.3
-020REP	NR2-3	NOX	226	238	5.3
-021REP	NR2-4	NOX	239	251	5.0
-022REP	NR3-1	NOX	211	218	3.6
-023REP	NR3-2	NOX	180	190	5.1
-024REP	NR3-3	NOX--	162	162	0.10
-025REP	NR3-4	NOX	242	254	5.0

STEVE, DEANNA, DEB, MARK, JOE, CARTER, SUE, CHANG, DENISE, GCMS, MIKE, PM, GLORIA, PEG, GEORGE, 256, METALS PAGE 2

Custody Transfer Record/Lab Work Request

WESTON

WESTON Analytics Use Only: 8906L543

Client: J.T. Baker Co.
Work Order: 2373-01-02
Date Rec'd. 6/3/89 Date Due 7/1/89
RFW Contact: Paul Clarke
Client Contact/Phone:

WA Use Only Lab ID	Client ID/Description	Matrix	Date Collected	Refrigerator# / #Type Container: 1/P / Volume: 1 Gal / Preservative: / ANALYSES REQUESTED: NOx / Watch / PA
001	Nox Blank/Rinse Blank	MA	5-31-89	X
2	SR1-1	|	6-1-89	|
3	SR1-2	|	|	|
4	SR1-3	|	|	|
5	SR1-4	|	|	|
6	SR2-1	|	|	|
7	SR2-2	|	|	|
8	SR2-3	|	|	|
9	SR2-4	|	|	|
10	SR3-1	|	|	|
11	SR3-2	|	|	|
12	SR3-3	|	|	|
13	SR3-4	|	|	|

WATCH HOLD TIMES!!

Matrix: S - Soil, SE - Sediment, SO - Solid, W - Water, O - Oil, A - Air, WI - Wipe, DS - Drum Solids, DL - Drum Liquids, F - Fish, L - EP/TCLP Leachate, X - Other

Special Instructions:

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
Archived	[illegible]	[illegible]	6/3/89	12:00					

WESTON Analytics Use Only

Samples Were:
1 Shipped or Hand-Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/Leaking (Improperly Sealed)
Y N
NOTES:

4 Properly Preserved
Y N
NOTES:

5 Received Within Holding Times
Y N Blank - out of hold
NOTES: Close to Hold = 4!!

COC Tape Was:
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES: 6/3/89

COC Record Was:
1 Present Upon Receipt of Samples Y N

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

RFW 21-21-001/A-12/88

7-115

STEVE, DEANNA, DEB, MARK, JOE, CARTER, SUE, CHANG, DENISE, GCMS, MIKE, PM, GLORIA, PEG, GEORGE.

Custody Transfer Record/Lab Work Request

WESTON Analytics Use Only: 8906L543

Client: J.E. Baker Co.
Work Order: 2373-61-02
Date Rec'd: 6/3/89 Date Due: 7/1/89
RFW Contact: Paul Clarke
Client Contact/Phone:

Refrigerator#														
#/Type Container														
Volume														
Preservative														
ANALYSES REQUESTED				NOX MOMOD MAN										

WA Use Only Lab ID	Client ID/Description	Matrix	Date Collected											
014	NR1-1 / 125 ml plastic	AIR	6-1-89	X										
15	NR1-2													
16	NR1-3													
17	NR1-4													
18	NR2-1													
19	NR2-2													
20	NR2-3													
21	NR2-4													
22	NR3-1													
23	NR3-2													
24	NR3-3													
25	NR3-4													

Matrix:
S - Soil; SE - Sediment; SO - Solid; W - Water; O - Oil; A - Air; WI - Wipe; DS - Drum Solids; DL - Drum Liquids; F - Fish; L - EP/TCLP Leachate; X - Other

Special Instructions:

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
All/Analysis	K. Hill	[illegible]	6/3/89	12:00					

WESTON Use Only
Samples Were:
1 Shipped or Hand-Delivered
NOTES:
2 Ambient or Chilled
NOTES:
3 Received Broken/Leaking (Improperly Sealed) Y N
NOTES:
4 Properly Preserved Y N
NOTES:
5 Received Within Holding Times Y N
NOTES:

COC Tape Was:
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES:

COC Record Was:
1 Present Upon Receipt of Samples Y N

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

WESTON

APPENDIX D

EQUIPMENT CALIBRATION RECORDS

EBA003A.RPT

CEM Calibration Data Sheet

Recorded By PClarke Date 6/1

Client [illegible] Test Site #2 Kiln

Computer File: Series ________ Test ________

13:36 Bias 1900 10:50

	Calibration Error Check				System Bias Check				
					Pre Test		Post Test		
	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (% of Span)	System Calibration Response	System Cal. Bias (% of Span)	System Calibration Response	System Cal. Bias (% of Span)	Drift (% of Span)
CO Zero	0	1.2	12.1						
CO Low	254	258	250				10		22.5
CO Mid	462	461.5					243		268
CO High	871	87							
CO2 Zero	0	0.6							
CO2 Low	5.0	4.9	6.0				0.0		2.0
CO2 Mid	10.0	10.0	4.8				5.0		4.9
CO2 High	15.3	15.2							
O2 Zero	0	0.0	.01						
O2 Low	6.0	6.1	6.8				0.8		9.0
O2 Mid	11.9	12.0					5.8		4.8
O2 High	18/21	21							
THC Zero									
THC Low									
THC Mid									
THC High									
NOx Zero	0	3.4	4.3						
NOx Low	265	[illegible]					2.2		4.9
NOx Mid	463	470							
NOx High	810	815	813				819		813
SO2 Zero									
SO2 Low									
SO2 Mid									
SO2 High									

CemDS010786

CEM Calibration Data Sheet

Recorded By Phil Clarke Date 5/1/89
Client BAKER Test Site #2 East
Computer File: Series ______ Test ______

South

Init 9:00 BIAS 8:30 BIAS 12:02 BIAS 13:27

	Calibration Error Check				System Bias Check				
					Pre Test		Post Test		
	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (% of Span)	System Calibration Response	System Cal. Bias (% of Span)	System Calibration Response	System Cal. Bias (% of Span)	Drift (% of Span)
CO Zero	0	-0.6	0.0		10.4	12.1			
CO Low	253	254	257		269	271			
CO Mid	462	462							
CO High	811	807							
CO2 Zero		0.0	0.0		-0.0	0.0	-cont		
CO2 Low		4.8	4.7		4.4	4.4			
CO2 Mid		10.5							
CO2 High		15.6							
O2 Zero		0.0	0.3		-1.4	-1.9			
O2 Low		6.1	5.6		5.2	5.5			
O2 Mid		11.9							
O2 High		18.0							
THC Zero									
THC Low									
THC Mid									
THC High									
NOx Zero	0	1.8	2.1		3.7	3.1			
NOx Low	253	258	[illegible]						
NOx Mid	463	463							
NOx High	810	815	806		851	840	840		
SO2 Zero									
SO2 Low									
SO2 Mid									
SO2 High									

CemDS010786

52
59
56
6

CEM DATA SHEET

Recorded By ____________ Date ____________
Client ____________ Test Site ____________
Computer File: Series ________ Test ________

CALIBRATON DATA

	Pre-Test	Post Run 1	Post Run 2	Post Test	% Drift
O2 ZERO	0.0				
O2 MED	11.9				
AMB O2	18.0				
NOx ZERO	1.2				
NOx LOW	1.2				
NOx MED					
NOx HIGH					
SO2 ZERO					
SO2 MED					
CO ZERO	-0.6				
CO MED	482 507				
CO2 ZERO	0.0				
CO2 MED	10.5				
~~HC ZERO~~	256				
HC LOW					
HC MED					
HC HIGH					

253 50 6.0
462 10.0 11.9
811 153 12.9

CALIBRATION GAS DATA

Type	Concentration	Pressure	Tank Number	Exp. Date
N2 Zero				
O2 Medium				
NOx Low				
NOx Medium				
NOx High				
SO2 Medium				
CO Medium				
CO2 Medium				
HC Low				
HC Medium				
HC High				

253
463
810

Worker: M. LED BARKER

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Test numbers 5 Date 7 JUNE 89 Meter box number NUTECH #9 Plant BAKER

Barometric pressure, P_b = 29.95 in.Hg Dry gas meter number 6E4391 3 Pretest Y 1.006

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average (t_d), °F	Time (θ), min	Vacuum setting, in. Hg.	Y_i	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$
1.5	10	493.330 483.250	72	77 84 87	76 77 79	80	14:30	5"	1.003	
	10									
	10									

Y = 1.003

* If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, $\frac{t_{d_i} + t_{d_o}}{2}$, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

$$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$$

$$\Delta H@_i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$$

M. T. Barker

APPENDIX E

PROCESS DATA LOGS

CONDITIONS DURING STACK TEST

JUNE 1, 1989

J. E. BAKER - NO. 2 KILN

	Stone Feed	Kiln RPM	Prod. Rate	Fuel Rate Coke	Feed End Temp.	Exit Temp.	Baghouse Temp.
8:00 AM	640	28	2000	8600	1540	1118	564
9:00	640	28	1600	8100	1543	1120	562
10:00	663	29	2000	8300	1532	1120	558
11:00	663	29	1700	8300	1535	1110	556
12:00	663	29	1800	8200	1536	1108	558
1:00 PM	663	29	1800	8100	1520	1100	556
2:00	663	29	2000	8000	1524	1100	558
3:00	663	29	1800	8000	1517	1102	554
4:00	663	29	1900	8000	1518	1120	556
5:00	663	29	2000	8000	1513	1117	563
6:00	640	28	2000	8000	1514	1121	558
7:00	640	28	1500	8200	1512	1113	558
8:00	640	28	1700	8200	1522	1122	561

HOURLY RATES

Natural Gas Usage - 2.38 MCFH
Coal - 78,400
Coke - 17,800 } 9,948 pounds/hr.
Oxygen - 45% on gauge - 11,405 cubic ft./hr.
Stone Feed - 31.9 TPH
Production Rate - 13.7 TPH

Coal Analysis: Sulfur - 0.28
Ash - 8.16
Volatiles - 31.3
BTU's/# - 13,999 (as fired)

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WESTON

APPENDIX F

LIST OF PROJECT PARTICIPANTS

WESTON

APPENDIX F

PROJECT PARTICIPANTS

The following Roy F. Weston personnel participated in the planning and execution of this project.

Barry L. Jackson Project Director	econENVIRONomics
Paul Clarke Technical Manager	econENVIRONomics
Patrick Mara Technician	econENVIRONomics
Ken Hill Technician	econENVIRONomics
Ben Shapiro Project Manager	WESTON ANALYTICS

JG Baker #2 Kiln

ROY F. WESTON, INC.

EMISSION TEST DATA/REPORT QA/QC CHECK LIST

Raw Test Data	Initial Data Averages	Data Check 1	Data Check 2 (if req'd)	Data Completeness Check
Laboratory Data	Initial Lab Calculator	Check 1	Check 2 (if req'd)	Data Completeness Check
Test Result Calculations	Initial Calculator	Check 1	Check 2 (if req'd)	Reasonable-ness Check
Test Data Tables	Author	Check 1	Check 2 (if req'd)	Completeness Reasonable-ness Check
Report Body	Author	Check 1	Check 2 (if req'd)	Table of Contents, Figure, page number Check
Appendices Completeness	Originator	Check 1	Check 2 (if req'd)	

Compilation Check: Page alignment and completeness

Draft Report (if required) ______

Final Report ______

Date provided to Client: ______

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