Mississippi Department of Environmental Quality
Office of Pollution Control

I-sys 2000 Master Site Detail Report

Site Name: Koppers Industries Inc

PHYSICAL ADDRESS	
LINE 1:	Tie Plant Road
LINE 2:	
LINE 3:	
MUNICIPALITY:	Tie Plant
STATE CODE:	MS
ZIP CODE:	38960-

MAILING ADDRESS	
LINE 1:	PO Box 160
LINE 2:	
LINE 3:	
MUNICIPALITY:	Tie Plant
STATE CODE:	MS
ZIP CODE:	38960-

OTHER INFORMATION	
MASTER ID:	000876
COUNTY:	Grenada
REGION	NRO
SIC 1:	2491
AIR TYPE:	TITLE V
HW TYPE:	TSD
SOLID TYPE:	
WATER TYPE:	INDUSTRIAL
BRANCH:	Energy
ECED CONTACT:	Collier, Melissa
BASIN:	

AIR PROGRAMS ☑ SIP ☐ PSD ☐ NSPS ☐ NESHAPS ☐ MACT

Mississippi Department of Environmental Quality
Office of Pollution Control

Pemits

PROGRAM	PERMIT TYPE	PERMIT #	MDEQ PERMIT CONTACT	ACTIVE
AIR	TITLE V	096000012	Burchfield, David	YES
WATER	PRE-TREATMENT	MSP090300	Collins, Bryan	YES
HAZ. WASTE	TSD	HW8854301		NO
HAZ. WASTE	EPA ID	MSD007027543		NO
HAZ. WASTE	TSD	HW8854301	Stover, Wayne	YES
GENERAL	BASELINE	MSR22005		NO
WATER	SOP	MSU081080		NO

Compliance Actions

MEDIA	ACTIVITY TYPE	SCHEDULED	COMPLETED	INSPECTED B
HAZ WASTE	Financial Record Review	1/18/00	1/18/00	Twitty, Russ
WATER	CMI - PRETREATMENT			Whittington, Darryail
WATER	CEI - PRETREATMENT	9/30/00		Twitty, Russ
WATER	CEI - NA	9/30/00		Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	9/30/00		Twitty, Russ
AIR	State Compliance Inspection	9/30/00		Twitty, Russ
WATER	CEI - NA	3/2/99	3/2/99	Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	3/2/99	3/2/99	Twitty, Russ
AIR	State Compliance Inspection	3/2/99	3/2/99	Twitty, Russ

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

440 College Park Dr., Monroeville, PA 15146

April 20, 1988

RECEIVED
APR 21 1988
Dept. of Natural Resources
Bureau of Pollution Control

Ken Petre
Bureau Of Pollution Control
Department of Natural Resources
P.O. Box 10385
Jackson, Mississippi 39209

RE: Permit NO 0960-00012

Dear Ken:

As we discussed, the attached document is the test plan for the Koppers Grenada boiler permit renewal. Please review the document and notify us if you feel there are any deficiencies in the proposed program. As I explained we are on a tight schedule as we would like to perform the tests the week of May 2nd.

I can be reached at the above address or at my direct number which is 412-733-9427.

Sincerely,

John T. Kane, Jr.

JTK/smj

Attachment

cc: R. Anderson
J. Batchelder
R. Clayton

BOILER PERMIT RENEWAL WORK PLAN
GRENADA, MISSISSIPPI

Prepared for:

KOPPERS COMPANY, INC.
GRENADA, MISSISSIPPI

Prepared by:

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
440 COLLEGE PARK DRIVE
MONROEVILLE, PENNSYLVANIA 15146

PROJECT NO. 189200-00

APRIL 1988

TABLE OF CONTENTS

Page

LIST OF TABLES iii

1.0 SAMPLING AND MONITORING PLAN 1-1

1.1 Process Off-Gas Analysis 1-1

2.0 SOLID STREAM SAMPLING 2-1

2.1 Ash and Residue Sampling 2-1

3.0 SAMPLE HANDLING AND ANALYSIS 3-1

3.1 Sample Handling and Preparation 3-1
3.2 Stack Samples 3-1
3.3 Handling of Solid Material Samples 3-2

4.0 PREPARATION OF RESULTS 4-1

LIST OF TABLES

		Page
1	Summary of Testing Thermal Treatment Test Burn Stack Sampling Schedule	1-1a
2	Summary of Testing Thermal Treatment Test Burn Solids Sampling Schedule	1-1b
3	Summary of Testing Thermal Treatment Test Burn Continuous Emissions Monitors	1-2a
4	Summary of Testing Thermal Treatment Test Burn Samples Generated From Manual Stack Tests	3-1a

1.0 SAMPLING AND MONITORING PLAN

The overall performance of the unit will be judged based on the outcome of two analytical approaches. These approaches will be conducted simultaneously through the collection of samples and data on both the gas and solid streams. The emphasis of the solids sampling will be the confirmation of the degree of contamination of the materials being processed and the determination of the effect of thermal treatment on the material through analysis of the ash streams. Tables 1 and 2 outline the sampling routine to be observed for each burn condition. These tables list the samples to be taken, the frequency of sampling, and the analytical procedures to be observed.

1.1 Process Off-Gas Analysis

Analysis of stack gas for the components as listed in Table 1 encompasses a large portfolio of measurement procedures. This battery of tests will begin once the Wellons woodwaste boiler reaches a stable condition reflecting the specified operating conditions for the particular test run.

The first phase of the stack testing will provide background information necessary for both physical sampling location and isokinetic sampling rate program. The stack will be measured to determine the acceptability of existing traverse ports. Also, the number and location of sampling points on the traverse will be calculated. Background information for the particulate test isokinetic program will then be gathered through the diagnostic use of methods 2 for velocity due to flow, 3A for stack gas molecular weight, and 4 for stack gas moisture content.

This information is used as input for an isokinetic computer program to determine testing parameters for the first method 5 and modified method 5 (MM5) of the sequence. From that point on, the information gathered from the previous test will be used to update the program. The isokinetics program will be conducted for each method 5 and MM5 test, because sampling rate is crucial for testing accuracy.

The conditions which are suggested for this test program are based upon the existing permit. The conditions to be tested will include the boiler fired on the primary fuel (wood and wood waste), primary fuel plus creosote waste, and primary fuel plus

KOPPERS COMPANY, INC
GRENADA TIE PLANT, GRENADA, MISSISSIPPI

SUMMARY OF TESTING
THERMAL TREATMENT TEST BURN

TABLE 1
STACK SAMPLING SCHEDULE

PARAMETER	COLLECTION FREQUENCY	ANALYTICAL PROCEDURE
Sample port Location	1/program	EPA Method 1
Traverse Points	1/program	EPA Method 1
Flow Velocity	1/condition*	EPA Method 2
Gas Molecular Weight	1/condition* 3/condition	EPA Method 3A
Gas Moisture	1/condition* 3/condition	EPA Method 4
Particulate Concentration	3/condition	EPA Method 5
Semi Volatile Hydrocarbons	3/condition	Modified Method 5
Carbon Monoxide	Continuous	EPA Method 10
HCl	3/condition	Ion Chromatography of Impinger Catch Penta in Oil Only

* Performed as an initial test to establish stack parameters for sources tested the first time, or determined from the first test run and used as calculations parameters for following tests.

KOPPERS COMPANY, INC
GRENADA TIE PLANT, GRENADA, MISSISSIPPI

SUMMARY OF TESTING
THERMAL TREATMENT TEST BURN

TABLE 2
SOLIDS SAMPLING SCHEDULE

PARAMETER	COLLECTION FREQUENCY	ANALYTICAL PROCEDURE
Solid Waste Feed Streams	1/program[1]	PAH Content by EPA Method 610 Heat Content, Ultimate & Prox Analysis, Sulfur and Halogen Contents
Bottom Ash	1/program[2]	PAH Content by EPA Method 610 Ultimate & Prox Analysis, Sulfur and Halogen Contents
Fly Ash	1/program[3]	PAH Content by EPA Method 610 Ultimate & Prox Analysis, Sulfur and Halogen Contents

[1] Samples of the feed material will be collected on site during the compositing of the feedstock.

[2] Samples of solid residue will be collected after cooling. These will be composited for each run.

[3] All fly ash collected in the control device for the period of the test run, will be removed as the fly ash sample. After the run, the unit will be cleaned.

penta in oil waste. For each condition, three method 5 particulate tests will be conducted. Each test will run approximately one hour. Also for each condition, three MM5 tests will be performed. Where possible, the modified method 5 sampling will be run simultaneously with the particulate tests. This will be accomplished by sampling with the method 5 train through one port, starting at the farthest point in, while the MM5 train will start at the farthest point out on the traverse of the second port. The three method 5 and MM5 tests per condition will be run during a period of approximately 6 hours. A pictorial representation of the sampling train is included as figure MM5-1. Figure MM5-2 illustrates the accompanying MM5 condenser and XAD resin cartridge. The method 5 sampling train will be modified to include 0.1 N sodium hydroxide in the impingers to collect hydrogen chloride gas that may be developed during the testing of the penta in oil waste material.

The destruction and removal efficiency (DRE) of the Principal Organic Hazardous Constituents (POHC) shall be determined from the MM5 POHC sample train catch. The POHCs resulting from the burning of creosote material are acenaphthlene pyrene. Conversely, the POHC determined for the penta in oil material is octachloro dibenzo-p-dioxin. These POHCs are established in the existing permit (Permit # 0960-00012) under Part II, Emissions Limitations and Monitoring Requirements.

During the entire six hour manual stack test program, a series of continuous emissions monitors will be operating. These units are housed and operated in a mobile laboratory. The equipment is listed according to the sample conditioning required in Table 3.

All stack gas will be drawn from the stack through a heated probe and filter by a heated sample line to the mobile lab. The sample gas will be processed through a condensing gas conditioner prior to analysis for O_2, CO_2, and CO. The conditioner is a Thermal Environmental Model 600 which passes the sample line through a refrigerated glycol bath maintained at 35 to 40°F.

2.0 SOLID STREAM SAMPLING

During the program, solid samples will be generated from two sources. In order to meet the goals of the trial burn program, analysis as outlined in Table 2, will be performed on all solid streams. The sampling of these streams will proceed according to the following description.

2.1 Ash and Residue Sampling

The two solids streams which will require sampling during the program are the ash streams. The boiler bottom ash will be the bulk of the materials. Upon completion of the test run the composite residue sample will be well blended and two 1 pound samples set aside in amber glass sample containers.

The second ash sample will be the material collected in the particulate control device. This material, fly ash, will collect in the hopper of the control device for the duration of the test cycle. Once each test cycle is completed, the device will be cleaned and the fly ash collected into a compositing container. Two 1 pound samples for analysis will be drawn from this container and placed in amber glass bottles.

KOPPERS COMPANY, INC
GRENADA TIE PLANT, GRENADA, MISSISSIPPI

SUMMARY OF TESTING
THERMAL TREATMENT TEST BURN

TABLE 3
CONTINUOUS EMISSIONS MONITORS

Manufacturer	Parmeter	Model	Principal of Operation	Range of Operation
Infrared Industries	CO_2/CO (>0.5%)	702	NDIR	
Infrared Industries	CO (>50 ppm_v)	730	NDIR	(0-500, 0-1000)
Combustion Engineering	O_2	305A	Polaragraphic	

3.0 SAMPLE HANDLING AND ANALYSIS

The following sections briefly describe the procedures to be utilized during the handling of samples from their inception to the reporting of analytical results. These procedures cover the analysis of all the parameters in the various solid samples, and the analysis of the collected samples produced through the use of manual stack test procedures. Any deviation from the procedures outlined herein will be thoroughly documented in the final report.

3.1 Sample Handling and Preparation

All samples will be sealed, labeled, packed in ice, and stored in insulated containers, in the field and during shipment. Solid residue and ash samples will be stored and shipped separately from stack samples. All samples will be identified on chain of custody forms at the site of generation. These forms will accompany the samples for signature from the receiving and analyzing parties. Completed copies of the chain of custody forms will be included in the final report. Samples will be handled in the manner outlined in the following sections.

3.2 Stack Samples

Upon delivery of the samples to the analyzing laboratory, chain of custody forms will be signed and turned over to the sample receiving group for log in purposes. The samples will be unpacked from the shipping containers and refrigerated until sample preparation or analysis begins. The exception to this is the method 5 filters which will immediately be placed in a desiccation device. Table 4 illustrates the samples which will be generated through the use of each sample method.

Method 5 analysis of the front half will proceed according to the Federal method. MM5 samples will be extracted according to procedures which include the extraction of the filter by soxhlet procedure for 18 to 22 hours. The condensate will be extracted with solvent three times. The volume of the solvent for each extraction will be 10% of the condensate volume. The sorbant trap will also be extracted in a soxhlet device for 18 to 22 hours. Upon completion of all extractions, the solvent portions of these extractions will be combined and moisture removed through anhydrous sodium sulfate processing. The volume will then be reduced through use

KOPPERS COMPANY, INC
GRENADA TIE PLANT, GRENADA, MISSISSIPPI

SUMMARY OF TESTING
THERMAL TREATMENT TEST BURN

TABLE 4
SAMPLES GENERATED FROM MANUAL STACK TESTS

METHOD	SAMPLES GENERATED
I EPA Method 5	Filter, Front Half Acetone Rinse, Impinger Solution, Penta in Oil Tests Only
II Modified Method 5	Filter, Front Half Solvent Rinse Sorbant Trap Condensate and Receiver Rinse

of a Kuderna-Danish apparatus to a specific volume, and the resulting sample prepared according to EPA procedures.

To each MM5 sorbant trap a known volume of surrogate PAH solution will be added for the determination of extraction efficiency. The compounds added will be benz(e)pyrene and decaflurobyphenyl. These compounds are not common to wood wastes and are not normally analyzed for by the method as listed by EPA

3.3 Handling of Solid Material Samples

Upon receipt of the solid samples, the chain of custody form duties will be performed and the samples logged in and refrigerated. The samples generated in the field have been in duplicate. These samples are segregated into one each for organic (PAH) analysis and for inorganic (prox and ultimate, heat content, and metals) analysis.

Samples for organic analysis will be prepared through solvent extraction in a soxhlet apparatus. The extract will be prepared according cleanup procedures outlined in the analytical methods. Again, samples will be spiked with the surrogate compounds mentioned in section 6.1.1 prior to extraction. This procedure enables the evaluation of the entire extraction sample preparation and analysis procedures.

Samples for inorganic analysis are analyzed on a "as is" basis. Heat content and moisture are analyzed on the samples as received. The remaining inorganic components will be determined a dried portion of the sample.

4.0 PREPARATION OF RESULTS

The results of the program will be presented in two forms. The report dealing with the study will contain a summary of all results obtained. Attached to the report will be an appendix which include all operating data, field data sheets, monitor strip charts, analytical reports, and stack emissions calculation program outputs.

Koppers Inc

General Information

ID	Branch	SIC	County	Basin	Start	End
876	Energy and Transportation	2491	Grenada	Yazoo River	11/09/1981	

Address

Physical Address (Primary)	Mailing Address
1 Koppers Drive Tie Plant, MS 38960	PO Box 160 Tie Plant, MS 38960

Telecommunications

Type	Address or Phone
Work phone number	(662) 226-4584, Ext. 11

Alternate / Historic AI Identifiers

Alt ID	Alt Name	Alt Type	Start Date	End Date
2804300012	Koppers Industries, Inc.	Air-AIRS AFS	10/12/2000	
096000012	Koppers Industries, Inc.	Air-Title V Fee Customer	03/11/1997	
096000012	Koppers Industries, Inc.	Air-Title V Operating	03/11/1997	03/01/2002
096000012	Koppers Industries, Inc.	Air-Title V Operating	01/13/2004	01/01/2009
MSR220005	Koppers Industries, Inc.	GP-Wood Treating	09/25/1992	
MSD007027543	Koppers Industries, Inc.	Hazardous Waste-EPA ID	08/27/1999	
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	06/28/1988	06/28/1998
HW8854301	Koppers Industries, Inc.	Hazardous Waste-TSD	11/10/1999	09/30/2009
876	Koppers Industries, Inc.	Historic Site Name	11/09/1981	12/11/2006
876	Koppers, Inc.	Official Site Name	12/11/2006	
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	11/14/1995	11/13/2000
MSP090300	Koppers Industries, Inc.	Water-Pretreatment	09/18/2001	08/31/2006
MSU081080	Koppers Industries, Inc.	Water-SOP	11/09/1981	11/30/1985

Regulatory Programs

Program	SubProgram	Start Date	End Date
Air	Title V - major	06/01/1900	
Hazardous Waste	Large Quantity Generator	08/27/1999	
Hazardous Waste	TSD - Not Classified	06/28/1988	
Water	Baseline Stormwater	01/01/1900	
Water	PT CIU	11/14/1995	
	PT CIU - Timber Products		

Water	Processing (Subpart 429)	11/14/1995	
Water	PT SIU	11/14/1995	

Locational Data

Latitude	Longitude	Metadata	S / T / R	Map Links
33 ° 44 ' 3 .00 (033.734167)	89 ° 47 ' 8 .06 (089.785572)	**Point Desc:** PG- Plant Entrance (General). Data collected by Mike Hardy on 11/8/2005. Elevation 223 feet. Just inside entrance gate. **Method:** GPS Code (Psuedo Range) Standard Position (SA Off) **Datum:** NAD83 **Type:** MDEQ	Section: Township: Range:	SWIMS TerraServer Map It

12/20/2006 12:16:40 PM

KOPPERS COMPANY, INC.
GRENADA, MS
BOILER STACK TESTS
WITH SLUDGES MIXED IN FUEL

Prepared by: John T. Kane, Jr.
Air Quality Engineering
Environmental Resources
Koppers Company, Inc.
August 4, 1982

TABLE OF CONTENTS

	Page
Introduction	1
Regulations	2
Process Description	2
Test Procedures	3
Results	5
Conclusions	7
Figure 1 - Temperature Readings	9
Table 1 - Creosote Sludge Tests	10
Table 2 - Penta-In-Oil Tests	12

Appendix A

Field Data Sheets

Penta-In-Oil Tests

100 lb/hr	GR-BS-19	A-1
	GR-BS-18	A-2
	GR-BS-17	A-3
250 lb/hr	GR-BS-16	A-4
	GR-BS-15	A-5
	GR-BS-14	A-6
400 lb/hr	GR-BS-13	A-7
	GR-BS-12	A-8
	GR-BS-11	A-9

Creosote Tests

100 lb/hr	GR-BS-10	A-10
	GR-BS-9	A-11
	GR-BS-8	A-12
250 lb/hr	GR-BS-7	A-13
	GR-BS-6	A-14
	GR-BS-5	A-15

TABLE OF CONTENTS (Cont.)

Page

400 lb/hr GR-BS-4.....A-16
GR-BS-3.....A-17
GR-BS-2.....A-18

Background Test
GR-BS-1.....A-20

Computer Printout-Test Results

Background Test
GR-BS-1.....A-22
100 lb/hr GR-BS-2.....A-26
GR-BS-3.....A-30
GR-BS-4.....A-34
250 lb/hr GR-BS-5.....A-38
GR-BS-6.....A-42
GR-BS-7.....A-46
400 lb/hr GR-BS-8.....A-50
GR-BS-9.....A-54
GR-BS-10.....A-58

Penta-In-Oil Tests
100 lb/hr GR-BS-11.....A-62
GR-BS-12.....A-66
GR-BS-13.....A-70
250 lb/hr GR-BS-14.....A-74
GR-BS-15.....A-78
GR-BS-16.....A-82
400 lb/hr GR-BS-17.....A-86
GR-BS-18.....A-90
GR-BS-19.....A-94

Appendix B

Grenada Boiler Plant Permit.....B-1
Federal Guidelines on Incinerator Emissions.....B-7
Federal Register Vol. 46 No. 15 1/23/81
40 CFR Parts 122, 264, and 265

TABLE OF CONTENTS (Cont.)

Page

Amendments to Incinerator Guidelines.....B-19
Federal Register Vol. 47 No. 122 6/24/82
40 CFR Parts 122 and 264

Appendix C - Chemical Analysis
Creosote Sludge Analysis.....C-1
Creosote Tests POHC Catch Analysis.....C-2
Penta Tests Chlorine Catch Analysis.....C-4
Penta Tests Chloride Catch Analysis.....C-5
Penta Tests Ash and Flyash Cl Analysis.....C-6
Penta Tests Penta, OCDD, and HCDD Catch Analysis.....C-7

Appendix D - Steam Charts
May 18.....D-1
May 19.....D-2
May 20.....D-3

KOPPERS COMPANY, INC.
GRENADA, MS
BOILER STACK TESTS
WITH SLUDGES MIXED IN FUEL

Introduction

During the week of May 17, 1982, studies were undertaken to examine the effect of disposal of wood-treating sludges utilizing thermal destruction in the existing plant boiler. The facility at which these diagnostic tests were undertaken is the the Grenada, Mississippi, tie plant. Sludges which were burned were penta-in-oil sludge and creosote sludge. These sludges are generated by pressure treating wood with these materials. The sludges were burned with the primary boiler fuel which is wood chips.

The tests were conducted by Koppers Air Quality Engineering. State of Mississippi Bureau of Pollution Control official, Dan McLeod, viewed the testing, which was allowed because of a source permit modification granted by the Bureau.

Destruction and removal efficiency of the thermal destruction process were determined by stack gas measurement of primary organic hazardous constituents found in each sludge. Effectiveness of this disposal process met the criteria established by Federal guidelines for the operation of incinerators.

No regulation exists for this source covering the parameters examined, other than particulate and visible emissions. However, the compliance of this source with the strict incinerator guidelines shows Koppers' desire to meet with a disposal problem in a safe way, utilizing the intent of resource conservation and recovery.

Regulations

Source emissions for the tie plant boiler are regulated by conditions set forth in the Permit to Operate Air Emissions Equipment as issued by the State of Mississippi, Department of Natural Resources. The permit was originally issued December 11, 1979, and modified May 11, 1982, to allow the test burning of waste materials as additives to the wood fuel. Emissions, as limited by the modified permit, are 0.3 grains/DSCF and opacity limit of no greater than 40%.

A condition added to the emissions limits is the determination of various parameters of the stack gas as indicated in the Federal guidelines for hazardous waste disposal through incineration. These guidelines require the measurement of the destruction and removal efficiency (DRE) for the primary organic hazardous constituents (POHCs). The desired DRE is 99.99% of each POHC through the thermal destruction unit and flue gas cleanup equipment. Also regulated by these guidelines is the emission of hydrogen chloride (HCl). Current regulation (June 24, 1982) requires removal of HCl from stack gas to less than 4 lb/hr, or to an efficiency where one percent of the HCl in the inlet stream is not removed, whichever is more on a mass basis.

Particulate emissions are also regulated in the Federal document. However, the source permit granted by the State overrides this guideline. The Federal guidelines, as they appear in the Federal Register, are included in Appendix B along with the source permit. The use of the Federal incinerator guidelines for a boiler is done because of a lack of any other guidance.

Process Description

The facility at which the test burns were conducted is the indirect fired steam generator at the Grenada tie plant. The boiler is a cogeneration

unit providing both the steam and electrical needs for the production facility. The unit is fired with bark (wood waste) as the primary fuel. Process sludges were mixed with the bark on the fuel feed conveying system. The sludges consisted of materials cleaned from the bottom of wood treating cylinders and is classified under two categories according to process. The first category is creosote sludge waste generated from pressure treating wood with creosote. The second waste is from treating cylinders where wood is pressure treated with pentachlorophenol in oil.

Boiler loadings for the sludge burning conditions were as follows:

Creosote (lb/hr)	Steam Load (lb/hr)
100	24,000
250	26,000
400	26,000

Penta in Oil (lb/hr)	Steam Load (lb/hr)
100	22,000
250	20,000
400	16,000

These numbers represent an estimate of the hourly production rate taken from the steam tables included in Appendix D.

Test Procedures

The number of tests run for the combustion evaluation was greatly expanded because of an interpretation by State officials of test procedures submitted by this department. This interpretation meant three tests would be performed for each sludge firing condition, instead of the intended one test. The

following is a discussion of the procedures used for the necessary determinations of parameters for each sludge.

A. Creosote sludge: Creosote waste from the treating cylinders was added at rates of 100, 250, and 400 lb/hr. Sludge was added for a period of one-half hour prior to any testing. Under each condition, three tests were run to determine the amount of POHC in the stack gas. This determination was done by condensing and absorbing the POHC in the impinger catch of the sampling train. No particulate removal apparatus was provided in the sampling train. The actual sampling train was a modified EPA method 5 train with the cyclone and filter excluded. EPA methods 1 through 4 were followed to determine sampling points, and stack gas velocity, moisture content and fixed gas concentration.

Creosote POHC content of the probe wash and impinger catch and rinses was extracted with methylene chloride and concentrated to a suitable volume for analysis by liquid injection gas chromatography. The results of this procedure showed the 18 organic compounds usually associated with creosote to be less than detectable. A more elaborate analytical procedure was undertaken. This method involved use of high-pressure liquid chromatography, which would increase the sensitivity by two decimal places. However, this method looks for only naphthalene, acenaphthene, fluorene, phenanthrene, fluoranthrene, pyrene, and chrysene. The other 11 creosote components cannot be analyzed for under this determination.

B. Penta-in-oil sludge: Penta-in-oil sludge was added to the bark fuel in 100, 250, and 400 lb/hr increments. Again, the sludge for each increment was added one-half hour prior to any stack tests. EPA methods 1 through 4 were utilized to

determine sampling points, stack gas velocity, and stack gas moisture and fixed gases contents. Further modifications of the sampling train used in the creosote tests were required to insure the collection of the pentachlorophenol, the dioxin impurities found in technical penta, and chloride and chlorine in the stack gas. One modification was the addition of a glass canister which supports a porous polymer resin (XAD-2). The sampled gas stream passed through this resin before being processed through the desiccant. In order to facilitate the operation of the resin canister, particulate removal equipment (filter and cyclone) was used in the hot box, as particulate tends to blind the resin support. Also, the solutions in the first and second impingers were aqueous 0.1 N sodium hydroxide solutions. This solution was used to absorb gaseous chloride and chlorine as well as condense POHCs. The probe and glassware used during a given test were rinsed with benzene. The filter, impinger catch and XAD resin were extracted with benzene. The extracts and rinse were combined and condensed for the gas chromatographic work. The aqueous solution was analyzed for inorganic chloride and free chlorine.

Samples of the fly ash and boiler ash were taken to allow a material balance to be performed on the chloride.

Results

Summation of results of the test burns are contained in Tables 1 and 2. Table 1 contains the results of the creosote burns. The destruction and removal efficiencies (DRE) of seven hydrocarbons comprising 57% by weight of the creosote components identified in the sludge feed are listed in this table. All but two DREs are better than the 99.99% efficiency level, as listed in the Federal incinerator regulations. The two DREs which do not

make the required level are fractionally lower (99.988% for acenaphthene and 99.989% for pyrene; 100 lb/hr test) than the desired destruction and removal limits. Although these DRE's are essentially 99.99%, the reason for the slightly lower level could be the small amount of these components introduced by the sludge addition. The actual destruction and removal of these components through thermal destruction is not difficult as seen in the corrsponding DREs in the 250 and 400 lb/hr results. The DREs at these increased loadings are all over 99.99%.

Test results were not adjusted for background levels of creosote components produced through the combustion of wood. The production of polynuclear aromatic hydrocarbons through thermal destruction fossil fuels, wood and municipal waste is widely publicized.[1,2] R. Clement and W. Karasek in their work indicate the association of the highest concentration of PAH in the smallest sized particles. Therefore, it is reasonable to find background levels of creosote components in the stack gas. Actual emissions were not corrected for background to allow the DRE to be an absolute calculation in regards to the mass loading of a POHC being emitted.

The calculation for the removal of pentachlorphenol produced equally satisfactory DREs. All three feed loading rates resulted in a DRE of greater than 99.99%. Emissions of dioxins, OCDD and HCDD were extremely low. HCDD was not detectd in any test. OCDD was detected, resulting in DREs less than 99.99%, but better than 99.5% for 250 lb/hr and 400 lb/hr feed rates. The maximum emission rate detected for any test was 6.4×10^{-5} lb/hr or about 0.6 lb/yr.

---

[1]R. E. Clement an F. W. Karasek, "Distribution of Organic Compounds on Size-Fractionated Municipal Incinerator Fly-Ash Particles," Journal of Chromatography, 234 (1982) 395-405.

[2]Mark A. Golembiewski, "Environmental Assessment of a Waste-To-Energy Process: Burlington Electric's Wood and Oil Co-Fired Boiler," National Technical Information Service, EPA-600/7-80-148, August 1980.

Hydrogen chloride (HCl) was detected in small quantities. The highest emission rate was less than 0.2 lb/hr, which is below the 4 lb/hr emission level which would trigger the need to control these emissions as noted in the Federal incinerator guidelines. No free chlorine was detected. The detection limit corresponded to less than 0.001 lb/hr Cl_2.

An attempt was made to perform a chloride balance around boiler operation. Samples were taken of the boiler ash and the fly ash for chloride analysis. Also, as already noted, the chloride content of the stack gas was measured. Summation of the chloride in these outlet streams measured 2.97 lb/hr Cl. A breakdown of this summation shows an average of 0.2 lb/hr Cl as gaseous HCl. The remainder (2.57 lb/hr) is in solid form in either the fly ash or the boiler ash. The boiler feed during the time for which these results were compiled contained about 4 lb/hr Cl.

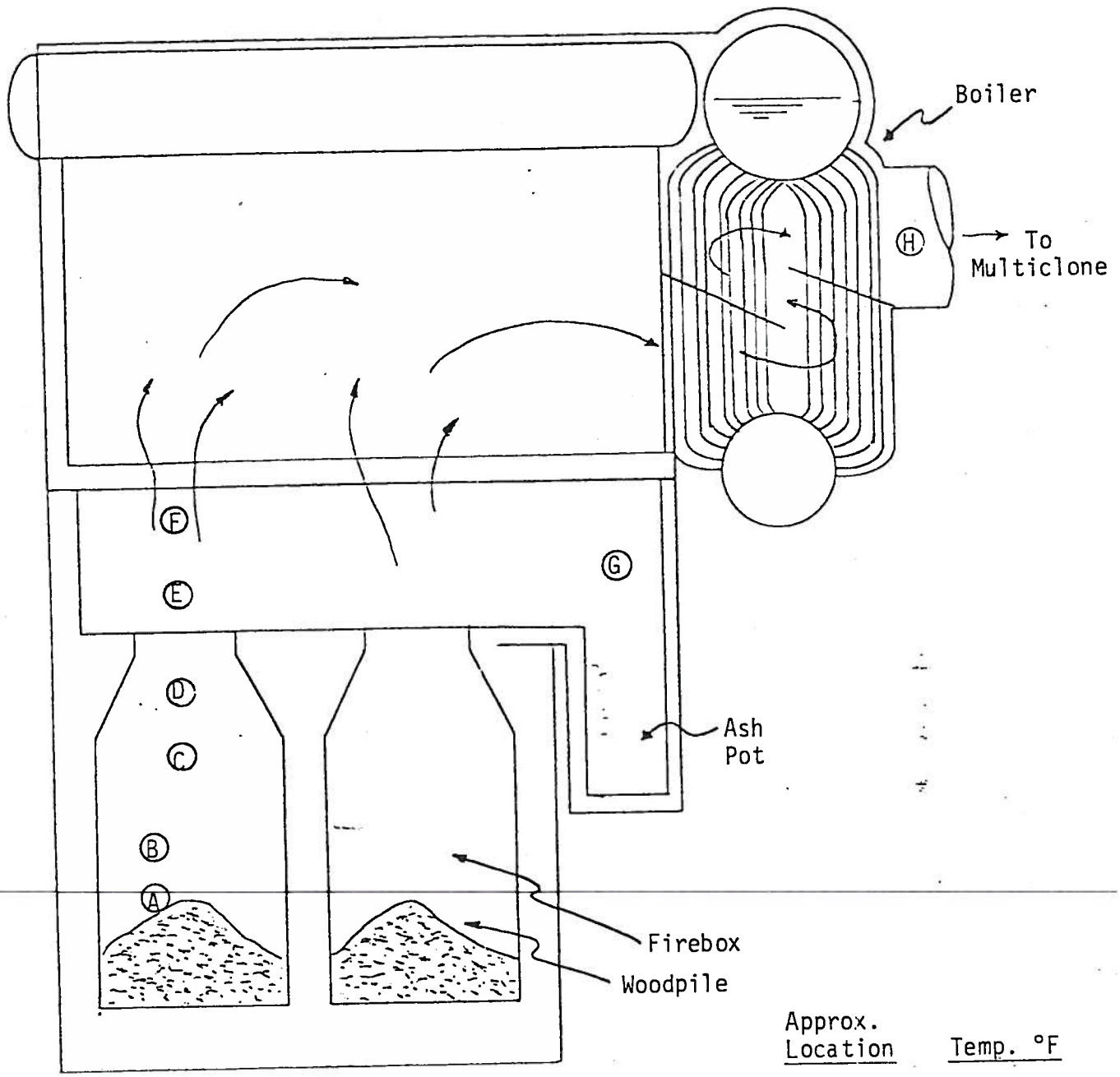
Calculations of the information for the creosote and penta tests are included in Appendix A. Analytical results are enclosed in Appendix C.

Other data obtained during the testing were temperatures of various locations throughout the boiler. Figure 1 locates these points and lists the average temperature obtained for each point.

Conclusions

As indicated by the results of this study, thermal destruction of the penta-in-oil and creosote sludges is a viable means of disposal. The process allows the plant to recover the heating values of the sludges while realizing an operationg cost decrease due to the lack of the present land disposal costs. Also, the maximum amount of sludge which could be burned at any one time does not seem apparent by the tests. This limit will have to be set by Mississippi Bureau of Pollution Control.

The stack emissions are in compliance with the State issued permit as modified for the study. Also, as required in the permit, the source passed tests which outline the scope of emissions control as indicated in the Federal guidelines for thermal destruction of sludges by incineration.



Approx. Location	Temp. °F
A	1325
B	2100
C	2100-2160
D	2200
E	1900-2100
F	1900
G	1600
H	550

Koppers Company, Inc.
Grenada, MS
Boiler Stack Emissions Tests
With Sludges Mixed in Fuel

Figure 1
Temperature Readings

TABLE 1

KOPPERS COMPANY, INC.
GRENADA, MS
BOILER STACK EMISSIONS TESTS
WITH SLUDGES MIXED IN FUEL
CREOSOTE SLUDGE TESTS

Test Conditions	Naphth-alene	Acenaph-thene	Fluorine	Anthracene/ Phenanth-rene	Fluor-anthrene	Pyrene	Chrysene
I. Background (lb/hr)	0.00055	0.00077	0.00015	0.00166	0.00116	0.00077	0.00015
II. 100 lb/hr Sludge							
Components: In (lb/hr)	12	2.8	2.8	9.3	4.1	3.2	2.9
Out							
GR-BS-2 (lb/hr)	0.00104	0.00043	0.00012	0.00063	0.00019	0.00009	0.00018
GR-BS-3 (lb/hr)	0.00045	0.0002	0.00005	0.00024	0.0001	0.00092	0.00000
GR-BS-4 (lb/hr)	0.00062	0.00035	0.00012	0.00047	0.00015	0.00008	0.00000
Average (lb/hr)	0.0007	0.00033	0.000097	0.00045	0.00015	0.00036	0.00002
DRE (%)	99.994	99.988	99.997	99.995	99.996	99.989	99.999
III. 250 lb/hr Sludge							
Components: In (lb/hr)	30	7.0	7.0	23.25	10	8.0	7.25
Out							
GR-BS-5 (lb/hr)	0.00285	0.00008	0.00021	0.00166	0.0008	0.0005	0.00009
GR-BS-6 (lb/hr)	0.00079	0.00038	0.00012	0.00053	0.00025	0.0001	0.00005
GR-BS-7 (lb/hr)	0.00064	0.00039	0.00013	0.00054	0.00034	0.00016	0.00013
Average (lb/hr)	0.00143	0.00028	0.00015	0.00091	0.00046	0.00025	0.00009
DRE (%)	99.995	99.996	99.998	99.996	99.995	99.997	99.999

TABLE 1 (Cont.)

Test Conditions	Naphth-alene	Acenaph-thene	Fluorine	Anthracene/ Phenanth-rene	Fluor-anthrene	Pyrene	Chrysene
IV. 400 lb/hr Sludge							
Components: In (lb/hr)	48	11.2	11.2	37.2	16.4	12.8	11.6
Out							
GR-BS-8 (lb/hr)	0.00363	0.0022	0.00072	0.00225	0.00066	0.0004	0.00009
GR-BS-9 (lb/hr)	0.00067	0.00034	0.00013	0.00047	0.00013	0.00007	0.00003
GR-BS-10 (lb/hr)	0.00143	0.00058	0.00045	0.00104	0.00024	0.00013	0.00002
Average (lb/hr)	0.00191	0.00104	0.0004	0.00125	0.00034	0.0002	0.00005
DRE (%)	99.996	99.991	99.996	99.997	99.998	99.998	99.999

TABLE 2

KOPPERS COMPANY, INC.
GRENADA, MS
BOILER STACK EMISSIONS TESTS
WITH SLUDGES MIXED IN FUEL
PENTA IN OIL TESTS

Test Conditions	Pentachloro-phenol	OCDD	HCDD	Hydrogen Chloride	Chlorine
I. 100 lb/hr Sludge Components: In (lb/hr)	1.55	0.0034	0.0015	1.0[1]	0.0
Out:					
GR-BS-11 (lb/hr)	0.000099	$<1x10^{-8}$	$<1x10^{-8}$	0.044	<0.001
GR-BS-12 (lb/hr)	0.000042	$<1x10^{-8}$	$<1x10^{-8}$	0.06	<0.001
GR-BS-13 (lb/hr)	0.000037	$<1x10^{-8}$	$<1x10^{-8}$	0.096	<0.001
Average (lb/hr)	0.000059	$<1x10^{-8}$	$<1x10^{-8}$	0.067	<0.001
Removal Efficiency (%)	99.996	>99.99	>99.99	-	-
II. 250 lb/hr Sludge Components In (lb/hr)	3.9	0.0084	0.0038	2.5[1]	0.0
Out					
GR-BS-14 (lb/hr)	0.000058	0.000042	$<1x10^{-8}$	0.043	<0.001
GR-BS-15 (lb/hr)	0.000241	0.00003	$<1x10^{-8}$	0.101	<0.001
GR-BS-16 (lb/hr)	0.000192	0.000025	$<1x10^{-8}$	0.207	<0.001
Average (lb/hr)	0.000164	0.000032	$<1x10^{-8}$	0.117	<0.001
Removal Efficiency (%)	99.996	99.62	>99.99	-	-
III. 400 lb/hr Sludge Components: In (lb/hr)	6.2	0.0136	0.006	4.0[1]	0.0
Out					
GR-BS-17 (lb/hr)	0.000366	0.000064	$<1x10^{-8}$	0.087	<0.001
GR-BS-18 (lb/hr)	0.000140	$<1x10^{-8}$	$<1x10^{-8}$	0.316	<0.001
GR-BS-19 (lb/hr)	0.000045	$<1x10^{-8}$	$<1x10^{-8}$	0.181	<0.001
Average (lb/hr)	0.000183	0.000021	$<1x10^{-8}$	0.195	<0.001
Removal Efficiency (%)	99.997	99.85	>99.99	-	-

[1]Based upon calculation of chloride contents of penta.

APPENDIX

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5-20-82 | ΔH@: 1.74 (4-28-82) | HOT BOX NO.: ~~4~~ 5
LOCATION: Boiler Stack | TEST NO.: GR-BS-19 | METER CORRECTION: 1.0056 | COLD BOX NO.: ~~3~~ 5
ACTIVITY NO: Outlet | NOZZLE: .273 | PITOT CORRECTION: .84 | PROBE NO.: ~~5~~ 5-7
CONTROL BOX OPERATOR _____ | STATIC PRESSURE Ps: _____ | CONTROL BOX NO.: 3 | FILTER NO.: 340331
PROBE HANDLER _____ | PORT DIRECTION: See Below | NOMOGRAPH SET POINT: _____ | STACK DIA.: 36"
CLEAN UP _____ | BAROMETRIC PRESSURE 29.85 | LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
South	~~1845~~	~~231.780~~	~~.50~~										
1.6	1845	663.355	.50	1.31	1.31	114	105	8.5	474	260	Iced down <50°F	250	4 m/PT
5.25			.50	1.31	1.31	128	104	8.5	476				
10.7			.55	1.44	1.44	131	104	9.0	478				
25.3			.60	1.57	1.57	131	103	10.5	479				
30.75			.60	1.57	1.57	131	102	11.0	478				
34.4	1909	679.59	.60	1.57	1.57	130	102	12.0	477				
West		67											
34.4	1914	679.519	.55	1.44	1.44	116	102	11.5	477	479			
30.75			.60	1.57	1.57	127	101	13.0					
25.3			.65	1.70	1.70	125	100	16.0	481				
10.7			.55	1.44	1.44	123	100	14.5	483				
5.25			.55	1.44	1.44	123	100	15.0	488				
1.6	~~1940~~ 1940	695.817	.50	1.31	1.31	123	100	14.5	480				

LEAK CHECK

	in Hg	Rate
Before	6	0.02
After	6	0.02

ORSAT

	1	2	3
CO_2			
O_2			

Impinger No.	Initial	Final	Difference
1	100mL 1N NaOH	170	70
2	100mL 1N NaOH	112	12
3	DRY 1-2 XAD	5	5
4	SILICA GEL	14.3	14.3

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5-20-82 | ΔH@: 1.74 (4-~~20~~-82) | HOT BOX NO.: 4
LOCATION: Boiler Stack | TEST NO.: GR-BS-18 | METER CORRECTION: 1.00~~3~~6 | COLD BOX NO.: 4
ACTIVITY NO: Outlet | NOZZLE: .273 | PITOT CORRECTION: .84 | PROBE NO.: 5-1
CONTROL BOX OPERATOR _____ | STATIC PRESSURE Ps: _____ | CONTROL BOX NO.: 3 | FILTER NO.: 3&10
PROBE HANDLER _____ | PORT DIRECTION: _____ | NOMOGRAPH SET POINT: _____ | STACK DIA.: 36"
CLEAN UP _____ | BAROMETRIC PRESSURE 29.85 | LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
West		2											4 min/pt
34.4	1845	230.079	0.55	1.44	1.45	104	103	6.5	467				
30.75			0.55	1.44	1.45	119	104	6	464				
25.3			0.55	1.44	1.45	123	104	6	466				
10.7			0.5	1.31	1.3	129	104	6	470				
5.25			0.5	1.31	1.3	129	104	6	466				
1.6			0.5	1.31	1.3	129	104	6.5	464				
South		247.273											
1.6	1904		0.55	1.44	1.45	119	103	7.5	460				
5.25			0.5	1.31	1.3	129	103	7.5	462				
10.7			0.5	1.31	1.3	129	103	7.5	468				
25.3			0.6	1.57	1.6	131	103	10.5	475				
30.75			0.55	1.44	1.45	130	103	10.5	480				
34.4	1938	263.463	0.5	1.31	1.3	130	103	11	484				

LEAK CHECK

	in Hg	Rate
Before	10.5	0.02

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100mL Water	169	69
2	100mL Water	115	15
3	Dry		5
4			

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Granada
LOCATION: Boiler Stack
ACTIVITY NO: 1735
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 5/20/82
TEST NO.: GR BS-17
NOZZLE: 0.273
STATIC PRESSURE Ps: -.40
PORT DIRECTION: See Below
BAROMETRIC PRESSURE 29.95

ΔH@: 1.74 (4-20-82)
METER CORRECTION: 1.0056
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL 1 x 25' ____ x 50'

HOT BOX NO.: 1
COLD BOX NO.: 1
PROBE NO.: S-4
FILTER NO.: 315
STACK DIA.: 36"

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
South	1736	630.664	.60	1.52	1.52	114	112	6.0	457	260	Iced down 250°F	255	4 min/pt
34.4			.65	1.65	1.65	128	110	7.0	460				
30.75			.65	1.65	1.65	129	109	7.0	455				
25.3			.50	1.31	1.31	131	108	6.0	453				
10.7			.50	1.31	1.31	133	108	6.5	451				
5.25	1800	647.165	.50	1.31	1.31	135	108	7.0	451				
1.6													
West													
34.4	1804	647.165	.55	1.44	1.44	122	108	7.5	450				
30.75			.60	1.52	1.52	135	107	8.5	454				
25.3			.60	1.52	1.52	135	107	9.0	456				
10.7			.55	1.44	1.44	136	106	9.0	453				
5.25			.50	1.31	1.31	136	107	8.5	451				
1.6	1828	663.230	.50	1.31	1.31	136	106	9.0	451				

LEAK CHECK

	in Hg	Rate
Before	12.0	4.0 cfm
After	12.0	4.0 cfm

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100mL 1N NaOH	146	46
2	100mL 1N NaOH	110	10
3	DRY ↔ XAD		2
4	Sil Gel		12.3

>3

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5/20/83 | ΔH@: 1.74 (4-1-82) | HOT BOX NO.: 4
LOCATION: Boiler Stack | TEST NO.: GR-BS-16 | METER CORRECTION: 1.026 | COLD BOX NO.: 4
ACTIVITY NO: OuT/xT | NOZZLE: 0.273 | PITOT CORRECTION: .84 | PROBE NO.: S-1
CONTROL BOX OPERATOR RJ | STATIC PRESSURE Ps: -0.5 | CONTROL BOX NO.: 3 | FILTER NO.: 336
PROBE HANDLER M6 | PORT DIRECTION: South-west | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP AJ Kane | BAROMETRIC PRESSURE 29.9 | LENGTHS OF UMBILICAL ___ x 25' ✓ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
~~Start~~ South	15	193.805											4 min/107
34.4	1520	193.805	0.6	~~1.48~~	1.50	114	110	5.5	490	250	Feed dam	250	
30.75			0.65	1.58	1.60	132	110	6.0	490				
25.3			0.80	1.94	1.95	135	110	7.5	494				
10.7			0.90	2.43	2.45	136	110	10.5	503				
5.25			0.90	2.43	2.45	136	110	10.5	489				
1.6	1544	212.358	0.60	1.48	1.50	136	110	8.5	474				
~~Start~~	1548	212.358	0.70	1.76	1.75	124	108	9.0	480				
1.6	1548	212.358	0.70	1.76	1.75	124	105	9.0	480				
5.25			0.90	2.43	2.45	134	108	13.5	493				
10.7			0.6	1.48	1.50	131	105	11.0	493				
25.3			~~0.80~~ 0.60	1.48	1.50	133	108	11.0	496				
30.75			0.60	1.48	1.50	135	108	11.0	490				
34.4	1612	230.185	0.60	1.48	1.50	133	108	11.0	490				

LEAK CHECK

	in Hg	Rate
Before	13"	0.02

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 NaOH	162	62
2	100 NaOH	115	15
3	Dry	10	10
4	Silica Gel		13.5
5			

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5/20/82 | ΔH@: 1.74 (4-20-82) | HOT BOX NO.: 5
LOCATION: Boiler Stack | TEST NO.: GR-BS-15 | METER CORRECTION: 1.0056 | COLD BOX NO.: 5
ACTIVITY NO: Outlet | NOZZLE: 0.273 | PITOT CORRECTION: 0.84 | PROBE NO.: 55
CONTROL BOX OPERATOR _____ | STATIC PRESSURE Ps: -.05 | CONTROL BOX NO.: 1 | FILTER NO.: 329
PROBE HANDLER _____ | PORT DIRECTION: West | NOMOGRAPH SET POINT: _____ | STACK DIA.: 36"
CLEAN UP _____ | BAROMETRIC PRESSURE 29.9 | LENGTHS OF UMBILICAL ✓ x 25' ____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
West	1520	595.776	1.00	2.51	2.51	111	102	11.0	460	250°F	FCED Down	250	4 M/PT
34.4			1.00	2.51	2.51	111	102	11.0	460				
30.75			0.90	2.26	2.26	120	101	11.0	504				
25.3			0.80	2.01	2.01	122	100	12.0	514				
10.7			0.60	1.71	1.71	123	100	10.5	507				
5.25			0.60	1.71	1.71	126	100	10.5	487				
1.6	1544	613.669	0.50	1.26	1.26	127	100	10.0	480				
South													
1.6	1548	613.669	0.60	1.71	1.71	114	100	10.0	480				
5.25			0.60	1.71	1.71	126	100	10.0	485				
10.7			0.70	1.76	1.75	129	102	13.0	496				
25.3			0.80	2.01	2.01	128	102	17.0	504				
30.75			0.60	1.71	1.71	123	102	17.0	492				
34.4	1612	630.459	0.60	1.71	1.71	123	102	17.0	482				

LEAK CHECK

	in Hg	Rate
Before	8"	LT

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 NaOH	116.0	16.0
2	100 NaOH	113.6	13.6
3	Dry		1.0
4	Silica Gel		13.0
5			

A-5

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada
DATE: 5-20-82
ΔH@: 1.74 4-1-82
HOT BOX NO.: 1
LOCATION: Boiler Stack
TEST NO.: BR-BS-14
METER CORRECTION: 1.0026
COLD BOX NO.: 1
ACTIVITY NO: 1735
NOZZLE: .271
PITOT CORRECTION: .84
PROBE NO.: 5'-4
CONTROL BOX OPERATOR JK
STATIC PRESSURE Ps: -0.4
CONTROL BOX NO.: 3
FILTER NO.: 319
PROBE HANDLER MG
PORT DIRECTION: See Below
NOMOGRAPH SET POINT:
STACK DIA.: 36
CLEAN UP
BAROMETRIC PRESSURE 29.90
LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
West	1400	154.137	0.9	2.43	2.45	110	105	10.5	492				4mm/PT
34.4													
30.75			0.9	2.43	2.45	117	105	11	493				
25.3			0.8	1.94	1.95	123	104	10	493				
10.7			0.7	1.70	1.7	124	104	9.5	482				
5.25			0.65	1.58	1.6	128	105	9	483				
7.6	1424	173.194	0.5	1.22	1.2	130	105	7.5	480				
South													
1.6	1426	173.203	0.5	1.24	1.25	122	104	7	481				
5.25			0.6	1.48	1.5	131	105	10	483				
10.7			0.8	1.98	2.0	132	106	13	479				
25.3			0.9	2.23	2.25	131	106	15	481				
30.75			0.85	2.10	2.1	126	106	15	481				
34.4	1450	191.606	0.8	1.98	2.0	125	106	15	478				

LEAK CHECK

	in Hg	Rate
Before	7.0	2.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100mL, 1N NaOH	150	50
2	100mL, 1N NaOH	118	18
3	DRY ↔ XAD	3	3
4	SILICEL		10.2
5			

A-6

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5-20-82 | ΔH@: 1.74 4-20-82 | HOT BOX NO.: 4
LOCATION: Boiler Stack | TEST NO.: BB-BS-13 | METER CORRECTION: 1.0056 | COLD BOX NO.: 4
ACTIVITY NO: Outlet | NOZZLE: .272 | PITOT CORRECTION: .84 | PROBE NO.: 5'-3
CONTROL BOX OPERATOR | STATIC PRESSURE Ps: -.45 | CONTROL BOX NO.: 1 | FILTER NO.: 313
PROBE HANDLER | PORT DIRECTION: See Below | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE 29.90 | LENGTHS OF UMBILICAL 1 x 25' ____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
~~West~~	1235	559.110	.80	1.94	1.94	104	95	7.0	506	260	Exceeded 120°F	250	4m/PT
1.6"		34.4	.90	2.19	2.19	122	94	8.0	508				
5.25			.85	2.07	2.07	123	94	8.0	505				
10.7			.70	1.70	1.70	126	95	7.0	505				
25.3			.70	1.70	1.70	127	96	8.0	503				
30.75	1259	577.427	.60	1.46	1.46	127	96	8.5	502				
34.4													
South													
1.6	1304	577.427	.60	1.46	1.46	111	98	7.5	503				
5.25			.65	1.58	1.58	128	99	9.0	505				
10.7			.75	1.82	1.82	130	100	11.0	504				
25.3			.85	2.07	2.07	129	99	13.5	504				
30.75			.90	2.19	2.19	125	99	15.0	502				
34.4	1332	595.069	.65	1.58	1.58	123	99	13.0	502				

LEAK CHECK

	in Hg	Rate
Before	9.0	.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100ML 1N NaOH	175	75
2	100ML 1N NaOH	115	15
3	DRY ⇔ XAD		6
4	SILGEL.		10
5			

A-7

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA
LOCATION: Boiler Stack
ACTIVITY NO: OUTLET
CONTROL BOX OPERATOR JK
PROBE HANDLER GRR + PRJ
CLEAN UP

DATE: 5-20-82
TEST NO.: GR-BS-12
NOZZLE: .283
STATIC PRESSURE Ps:
PORT DIRECTION: See Below
BAROMETRIC PRESSURE 29.85

ΔH@: 1.74 4-1-82
METER CORRECTION: 1.0026
PITOT CORRECTION: .84
CONTROL BOX NO.: 3
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' 1[illegible] x 50'

HOT BOX NO.: 5
COLD BOX NO.: 5
PROBE NO.: 5-5
FILTER NO.: 338
STACK DIA.: 36

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
South	1100 AM	115.444	0.55	1.54	1.55	102	98	9.5	482	250		250	
1.6			0.7	1.91	1.9	115	98	12	485				
5.25													
10.7			0.75	2.05	2.05	116	98	14	484				
25.3			0.8	2.19	2.2	116	98	15	495				
30.75			0.9	2.56	2.55	111	98	18	496				
34.4	1124	134.613	0.7	1.91	1.9	109	98	18	490				
West													
34.4	1128	134.613	0.8	2.19	2.2	112	98	17	499				
30.75			0.8	2.19	2.2	109	98	18	499				
25.3			0.7	1.91	1.9	108	99	18	504				
10.7			0.6	1.71	1.7	108	99	17.5	498				
5.25			0.6	1.71	1.7	108	99	18	494				
1.6	1152	153.029	0.55	1.54	1.55	109	99	18	493				

LEAK CHECK

	in Hg	Rate
Before	6.5	<0.02

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 ml 0.1 N H_2O	156	56
2	100 ml 0.1 N H_2O	115	15
3	Blank	7	7
4	23g Recim x 10-2		11.2
5			

A-8

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA DATE: 5-20-82 ΔH@: 1.74 4-20/82 HOT BOX NO.: 1
LOCATION: BOILER STACK TEST NO.: BR-BS-11 METER CORRECTION: 1.0056 COLD BOX NO.: 1
ACTIVITY NO: OUTLET NOZZLE: .1283 PITOT CORRECTION: .84 PROBE NO.: S-4
CONTROL BOX OPERATOR _____ STATIC PRESSURE Ps: -.50 CONTROL BOX NO.: 1 FILTER NO.: 320
PROBE HANDLER _____ PORT DIRECTION: SEE BELOW NOMOGRAPH SET POINT: _____ STACK DIA.: 36"
CLEAN UP _____ BAROMETRIC PRESSURE 29.85 LENGTHS OF UMBILICAL 1 x 25' _____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
													4m/PT
West 1													
34.4	1100	518.638	.85	2.38	2.38	94	89	17.0	502	~260	IceBrown <500°F	255	
30.75			.90	2.46	2.46	103	88	18.0	504				
25.3			.80	2.19	2.19	103	88	18.0	507				
10.7			.75	2.04	2.04	105	88	17.0	503				
5.25			.70	1.99	1.99	108	89	16.5	502				
1.6	1124	538.016	.160	1.71	1.71	109	90	15	502				
South													
1.6	1128	538.016	.160	1.71	1.71	110	90	15	503				
5.25			.70	1.99	1.99	113	91	16.5	504				
10.7			.75	2.14	2.14	111	91	19.0	502				
25.3			.80	2.28	2.28	108	91	20.0	504				
30.75			.85	2.42	2.42	107	92	20.0	503				
34.4	1132	557.114	.80	2.28	2.28	106	92	20.0	502				

LEAK CHECK

	in Hg	Rate
Before	7.5	4.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100ML 1N NaOH	150	50
2	100ML 1N NaOH	116	16
3	DRY VXAD	0	10
4	SIL GEL		12.25
5			

A-6

Air Quality Engineering
EROH Department
Koppers Company, Inc.

(3)

STACK SAMPLING DATA SHEET

PLANT: Grenada | DATE: 5/19/82 | ΔH@: 1.74 (4-1-82) | HOT BOX NO.: 1
LOCATION: Boiler Stack | TEST NO.: GR-BS-10 | METER CORRECTION: 1.0026 | COLD BOX NO.: 1
ACTIVITY NO: 1735 | NOZZLE: 0.283 | PITOT CORRECTION: 0.84 | PROBE NO.: 5'-1
CONTROL BOX OPERATOR BS | STATIC PRESSURE Ps: -.50 | CONTROL BOX NO.: 3 | FILTER NO.: None
PROBE HANDLER GRR | PORT DIRECTION: | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE 29.9 | LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	923	035.846	0.8	2.43	2.45	94	92	6.0	445	No Heat	Ice & Down <50°F	No Heat	4 — /PT
30.75			0.8	2.43	2.45	108	92	6.0	447				
25.3			0.8	2.43	2.45	112	92	6.0	451				
10.7			0.65	1.97	1.95	118	92	5.0	455				
5.25			.65	1.97	1.97	121	93	5.0	454				
1.6	0947	055.917	.65	1.97	1.97	124	94	5.0	452				
South													
34.4	0953	055.917	.60	1.82	1.82	112	99	4.0	449				
30.75			.70	2.12	2.12	124	98	4.5	449				
25.3			.80	2.43	2.43	128	98	5.0	451				
10.7			.90	2.73	2.73	129	98	6.0	450				
5.25			.85	2.58	2.58	131	100	5.5	450				
1.6	1017	075.962	.70	2.12	2.12	132	101	4.5	450				

LEAK CHECK

	in Hg	Rate
Before	6.0	4.00 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 ml H_2O	247	147
2	100 ml H_2O	125	25
3	DRY		
4	Silica Gel		13.74
5			

4-10

(2)

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA | DATE: 5-19-82 | ΔH@: 1.74 4-20-82 | HOT BOX NO.: 5
LOCATION: BOILER STACK | TEST NO.: GR-BS-9 | METER CORRECTION: 1.0056 | COLD BOX NO.: 5
ACTIVITY NO: OUTLET | NOZZLE: .283 | PITOT CORRECTION: .84 | PROBE NO.: 5'-5
CONTROL BOX OPERATOR MG | STATIC PRESSURE Ps: -.50 | CONTROL BOX NO.: 1 | FILTER NO.: NONE (Bypass)
PROBE HANDLER B.R | PORT DIRECTION: See Below | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE 29.90 | LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
SOUTH	0923	432.013	.60	1.82	1.82	108	90	5.0	439	NO HEAT	ICED DOWN 250F	NO HEAT	4 m/pt
1.6			.75	2.28	2.28	117	90	6.0	440				
5.25			.80	2.43	2.43	120	90	7.0	452				
10.7			.90	2.73	2.73	123	90	8.0	457				
25.3			.90	2.73	2.73	124	90	8.0	454				
30.75	0947	452.044	.75	2.28	2.28	126	91	7.0	450				
34.4													
WEST													
34.9	0953	452.044	.85	2.58	2.58	119	94	7.0	449				
30.75			.90	2.73	2.73	124	93	7.5	449				
25.3			.90	2.73	2.73	125	93	7.5	452				
10.7			.70	2.12	2.12	129	92	6.0	451				
5.25			.75	2.28	2.28	127	92	6.5	451				
1.6	1017	472.457	.60	1.82	1.82	127	92	5.5	450				

LEAK CHECK

	in Hg	Rate
Before	10.0	0.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	245	145
2	100 mL H_2O	137	37
3	DRY		10
4	SIL GEL		14.9
5			

A-11

Air Quality Engineering
EROH Department
Koppers Company, Inc.

Test - 8,9,10
400LB/HR CREOSOTE

(1)

STACK SAMPLING DATA SHEET

PLANT: GRENADA
LOCATION: BOILER STACK
ACTIVITY NO: OUTLET
CONTROL BOX OPERATOR: M. C.
PROBE HANDLER: B. R.
CLEAN UP:

DATE: 5-19-82
TEST NO.: GR-BS-8
NOZZLE: .310
STATIC PRESSURE Ps: -.50
PORT DIRECTION:
BAROMETRIC PRESSURE: 29.90

ΔH@: 1.74 4-20-82
METER CORRECTION: 1.0056
PITOT CORRECTION: .84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT: 4.37
LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

HOT BOX NO.: 4
COLD BOX NO.: 4
PROBE NO.: 5'-3
FILTER NO.: DONE (BYPASS)
STACK DIA.: 36"

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
WEST 0													
34.4	0810	395.515	.85	3.72	3.72	98	94	13.0	435	NO HEAT	ICED DOWN 50F	NO HEAT	3 mm/PT
30.75			.90	3.94	3.94	105	94	15.0	435				
25.3			.90	3.94	3.94	106	93	15.0	436				
10.7			.70	3.06	3.06	109	91	11.0	435				
5.25			.70	3.06	3.06	111	90	11.0	433				
1.6	0828	413.609	.60	2.62	2.62	113	89	9.0	433				
SOUTH													
34.4	0832	413.609	.90	3.94	3.94	101	86	15.0	433				
30.75			.90	3.94	3.94	106	85	15.0	433				
25.3			.90	3.94	3.94	107	84	15.0	434				
10.7			.75	3.28	3.28	108	84	12.0	438				
5.25			.70	3.06	3.06	113	84	12.0	435				
1.6	0850	431.616	.60	2.62	2.62	115	84	9.0	435				

LEAK CHECK

	in Hg	Rate
Before	7.5	4.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	210	110
2	100 mL H_2O	125	25
3	DRY	6	6.0
4	SILICA GEL		17.4
5			

A-12

Air Quality Engineering
EROH Depart
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA | DATE: 5-18-82 | ΔH@: 1.74 ⇒ 1.82 | HOT BOX NO.: 7
LOCATION: BOILER STACK | TEST NO.: GR-BS-7 | METER CORRECTION: 1.00260 | COLD BOX NO.: 7
ACTIVITY NO: OUTLET | NOZZLE: ø 273 | PITOT CORRECTION: 0.84 | PROBE NO.: 5-5
CONTROL BOX OPERATOR JK | STATIC PRESSURE Ps: -.41 | CONTROL BOX NO.: 3 | FILTER NO.: NONE
PROBE HANDLER GRR | PORT DIRECTION: See Below | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE | LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

west Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	5:28	009.106	0.7	1.82	1.82	89	75	4.5	450				3m/pt
30.75			0.8	2.08	2.1	93	75	5	452				1900
25.3			0.6	1.56	1.6	98	75	5	453				approx. amb. temp
10.7			0.6	1.56	1.6	103	77	5	455				
5.25			0.60	1.56	1.6	105	78	5	460				
1.60	5:46	022.552	0.5	~~1.3~~ 1.3	1.3	107	79	4.5	454				
SOUTH													
1.60	5:50		0.6	1.56	1.6	95	80	4.0	450				
5.25			0.6	1.56	1.6	107	80	4.0	451				
10.7			0.6	1.64	1.6	109	80	4.0	454				
25.3			0.7	1.82	1.82	111	81	4.5	455				
30.75			0.7	1.82	1.82	112	81	4.5	454				
34.4	6:08	035.628	0.6	1.56	1.56	113	81	4.5	451				

LEAK CHECK

	in Hg	Rate
efore	8.0	.002 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	168	68
2	100 mL H_2O	109	9
3	DRY		3.0
4	SIL GEL		6.1
5			

A-13

Air Quality Engineering
EROH Depart
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA | DATE: 5-18-82 | ΔH@: 1.74 4-20-82 | HOT BOX NO.: 5
LOCATION: BOILER STACK | TEST NO.: GR-BS-6 | METER CORRECTION: 1.0056 | COLD BOX NO.: 5
ACTIVITY NO: OUTLET | NOZZLE: .274 | PITOT CORRECTION: .84 | PROBE NO.: 5.4"
CONTROL BOX OPERATOR | STATIC PRESSURE Ps: -.40 | CONTROL BOX NO.: 1 | FILTER NO.: NONE
PROBE HANDLER | PORT DIRECTION: | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE 29.80 | LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
SOUTH 1.60	1730	368.893	.55	1.43	1.43	100	79	5.0	448	NO HEAT	<50 F ICED POOP		3m/PT
1.60			.70	1.82	1.82	101	79	5.0	450				
5.25			.70	1.82	1.82	106	78	5.0	449				
10.7			~~.70~~										
25.3			.70	1.82	1.82	108	77	5.0	449				
30.75			.85	2.2	2.2	109	77	5.0	449				
34.4	1748	382.207	.75	1.95	1.95	110	77	5.0	449				
WEST													
34.4	1750	382.207	.70	1.82	1.82	94	77	5.0	448				
30.75			.75	1.95	1.95	81	77	5.0	450				
25.3			.75	1.95	1.95	110	77	5.0	451				
10.7			.65	1.69	1.69	111	77	~~5.0~~	452				
5.25			.55	1.43	1.43	111	77	~~5.5~~	450				
1.60	1808	395.055	.50	1.30	1.30	111	77	3.0	450				

LEAK CHECK

	in Hg	Rate
efore	8.0	.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	175	75
2	100 mL H_2O	110	10
3	DRY		4.0
4	SIL GEL.		9.10
5			

A-14

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

Test 5→7 250 lb/hr Creosote

(6)

PLANT: GRENADA
LOCATION: Boiler Stack
ACTIVITY NO: Outlet
CONTROL BOX OPERATOR M.G
PROBE HANDLER J.K
CLEAN UP B.J & B.R

DATE: 5-18-82
TEST NO.: ~~BR-G~~ G R-BS-5
NOZZLE: .270
STATIC PRESSURE Ps: -.43
PORT DIRECTION: See Below
BAROMETRIC PRESSURE 29.80

ΔH@: 1.74 4-20-82
METER CORRECTION: 1.005 G
PITOT CORRECTION: .84
CONTROL BOX NO.: 1.0
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

HOT BOX NO.: 1
COLD BOX NO.: 1
PROBE NO.: 5'-1
FILTER NO.: None
STACK DIA.: 36"

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
West													
34.4	1607	340.921	.90	2.2	2.2	110	96	5.0	449	No Heat	Iced Down <50F	No Heat	3mm/PT
30.75			.90	2.2	2.2	125	96	5.0	449				
25.3			.80	1.96	1.96	129	97	4.5	457				
10.7			.70	1.71	1.71	129	98	4.0	459				
5.25			.70	1.71	1.71	130	97	4.0	455				
1.60	1625	354.559	.55	1.35	1.35	129	97	3.5	455				
South													
34.4	1629	354.559	.90	2.2	2.2	114	95	5.0	460				
30.75			.90	2.2	2.2	124	94	5.0	461				
25.3			.85	2.08	2.08	124	93	5.0	461				
10.7			.80	1.96	1.96	124	93	5.0	461				
5.25			.70	1.71	1.71	124	92	4.0	461				
1.60	1647	368.548											

LEAK CHECK

	in Hg	Rate
Before	7.0	L.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 ML H_2O	210	110
2	100 ML H_2O	112	12
3	Dry	2	2
4	Sil Gel		8.45
5			

A-15

Air Quality Engineering
EROH Depart
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

Test 2 → 4 100lb/w Creosote

PLANT: GRENADA DATE: 5-18-82 ΔH@: HOT BOX NO.: 7
LOCATION: BOILER Stack TEST NO.: GR-BS-4 METER CORRECTION: 1.0026 COLD BOX NO.: 7
ACTIVITY NO: OUTLET NOZZLE: 0.273 PITOT CORRECTION: 0.84 PROBE NO.: 3-5
CONTROL BOX OPERATOR STATIC PRESSURE Ps: -0.4 CONTROL BOX NO.: 3 FILTER NO.:
PROBE HANDLER PORT DIRECTION: NOMOGRAPH SET POINT: STACK DIA.: 36
CLEAN UP BAROMETRIC PRESSURE LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
WEST													
1.6	1450	981.025	0.5	1.30	1.30	93	93	5	450				
5.25			0.7	1.82	1.8	107	93	6	454				
10.7			0.75	1.95	1.95	110	94	6.5	455				
25.3			0.75	1.95	1.95	116	94	6.5	462				
30.75			0.75	1.95	1.95	119	94	6.5	457				
34.4	1508	994.425	0.7	1.82	1.8	122	95	6.8	453				
South													
1.6	1512	994.425	0.65	1.56	1.6	121	95	6.0	450				
5.25			0.7	1.82	1.82	122	96	6.5	453				
10.7			0.7	1.82	1.82	125	97	6.5	457				
25.3			0.75	1.95	1.95	126	98	6.5	459				
30.75			0.7	1.82	1.82	128	97	6.5	460				
34.4	1530	008.032	0.65	1.69	1.7	129	97	6.5	454				

LEAK CHECK

	in Hg	Rate
Before	8	<0.01

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 - H_2O	181	81
2	"	118	18
3	DI-4		
4	Silica Gel		10.45
5			

A-15

Air Quality Engineering
EROH Department
Koppers Company, Inc.

(5)

STACK SAMPLING DATA SHEET

PLANT: GRENADA | DATE: 5-18-82 | ΔH@: 1.74 (4/20/82) | HOT BOX NO.: 4

LOCATION: BOILER STACK | TEST NO.: GR-BS-3 | METER CORRECTION: 1.0056 | COLD BOX NO.: 4

ACTIVITY NO: OUTLET | NOZZLE: .272 | PITOT CORRECTION: .84 | PROBE NO.: 5'-3

CONTROL BOX OPERATOR _____ | STATIC PRESSURE Ps: -.40 | CONTROL BOX NO.: 1 | FILTER NO.: NONE (BYPASS)

PROBE HANDLER _____ | PORT DIRECTION: SOUTH | NOMOGRAPH SET POINT: _____ | STACK DIA.: 36"

CLEAN UP _____ | BAROMETRIC PRESSURE _____ | LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	1450	312.251	.80	2.08	2.08	116	97	5.0	450	NO HEAT	ICED DOWN <50°F	NO HEAT	3 mi/PT
30.75			.80	2.08	2.08	127	97	5.0	451				
25.3			.85	2.21	2.21	129	96	5.0	451				
10.7			.75	1.95	1.95	130	96	4.5	456				
5.25			.70	1.82	1.82	130	96	4.0	451				
1.6	1508	326.281	.60	1.56	1.56	130	96	3.5	451				
WEST													
34.4	1512	326.281	.90	2.34	2.34	118	96	5.0	451				
30.75			.90	2.34	2.34	127	96	5.0	451				
25.3			.90	2.34	2.34	129	95	5.0	454				
10.7			.70	1.82	1.82	128	95	4.0	451				
5.25			.70	1.82	1.82	128	94	4.0	451				
1.6	1530	340.441	.55	1.43	1.43	127	93	3.5	451				

LEAK CHECK

	in Hg	Rate
Before	8.0	1.02

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	180	80
2	100 mL H_2O	125	25
3	DRY		4
4	SILICA		9.4
5			

A-17

Air Quality Engineering
EROH Departm
Koppers Company, Inc.

3

STACK SAMPLING DATA SHEET

PLANT: GRENADA | DATE: 5-18-82 | ΔH@: 1.74 (4-20-82) | HOT BOX NO.: 5
LOCATION: BOILER STACK | TEST NO.: GR-BS-2 | METER CORRECTION: 1.0056 | COLD BOX NO.: 5
ACTIVITY NO: OUTLET | NOZZLE: .274 | PITOT CORRECTION: .84 | PROBE NO.: 5'-4
CONTROL BOX OPERATOR | STATIC PRESSURE Ps: -.45 | CONTROL BOX NO.: 1 | FILTER NO.: 310
PROBE HANDLER | PORT DIRECTION: WEST | NOMOGRAPH SET POINT: | STACK DIA.: 36"
CLEAN UP | BAROMETRIC PRESSURE 29.95 | LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	1402	283.412	.90	2.34	2.34	110	107	8.0	453	NO HEAT	ICE DOWN 450°F	NO HEAT	2 mm/PT
			.90	2.34	2.34	118	105	8.0	457				
30.75													
25.3			.90	2.34	2.34	121	104	8.0	460				
10.7			.80	2.08	2.08	124	103	8.0	458				
5.25			.70	1.82	1.82	124	102	7.0	457				
1.6	1420	297.548	.50	1.30	1.30	125	101	5.5	457				

LEAK CHECK

	in Hg	Rate
Before	8.5	1.02 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 H_2O	198	98
2	100 ml H_2O	122	22
3	Dry		3
4	Sil. Gel.	8.81	8.81
5			

A-18

Air Quality Engineering
EROH Department
Koppers Company, Inc.

STACK SAMPLING DATA SHEET

PLANT: GRENADA DATE: 5-18-82 ΔH@: _____ HOT BOX NO.: _____

LOCATION: BOILER STACK TEST NO.: GR-BS-2 METER CORRECTION: _____ COLD BOX NO.: _____

ACTIVITY NO: OUTLET NOZZLE: _____ PITOT CORRECTION: _____ PROBE NO.: _____

CONTROL BOX OPERATOR _____ STATIC PRESSURE Ps: _____ CONTROL BOX NO.: _____ FILTER NO.: _____

PROBE HANDLER _____ PORT DIRECTION: South NOMOGRAPH SET POINT: _____ STACK DIA.: _____

CLEAN UP _____ BAROMETRIC PRESSURE _____ LENGTHS OF UMBILICAL _____ x 25' _____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum Vm in. Hg	Stack Temp. T_s °F	Probe Temp. Tp °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	1425	297.518	.80	2.08	2.08	120	100	8.0	450				
30.75			.85	2.21	2.21	126	100	8.0	449				
25.3			.85	2.21	2.21	128	99	8.5	449				
10.7			.75	1.95	1.95	128	99	8.0	449				
5.25			.70	1.82	1.82	128	98	7.0	449				
1.16	1443	311.718	.60	1.56	1.56	129	97	6.5	449				

LEAK CHECK

	in Hg	Rate
Before		

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1			
2			
3			
4			

Air Quality Engineering
EROH Department
Coppers Company, Inc.

STACK SAMPLING DATA SHEET

(1)

PLANT: GRANADA | DATE: 5-18-82 | ΔH@: 1.74 (4-20-82) | HOT BOX NO.: 7

LOCATION: BOILER STACK | TEST NO.: GR-BS-1 | METER CORRECTION: 1.0056 | COLD BOX NO.: 7

ACTIVITY NO: OUTLET | NOZZLE: .254 | PITOT CORRECTION: .84 | PROBE NO.: 5'-S

CONTROL BOX OPERATOR M.G | STATIC PRESSURE Ps: -.40 | CONTROL BOX NO.: 1 | FILTER NO.: 305

PROBE HANDLER B.J | PORT DIRECTION: WEST | NOMOGRAPH SET POINT: | STACK DIA.: 36"

CLEAN UP B.R | BAROMETRIC PRESSURE 29.90 | LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
1.6	1110	250.462	.45	.85	.85	96	86	3.0	455	~255	Iced Down <50 F	230	4 min/pt
			.45	.85	.85	104	86	3.0	453				
5 1/4			.70	1.47	1.47	107	86	5.0	454				North
			.70	1.47	1.47	110	86	5.0	453				Cell
10.7			.75	1.57	1.57	112	87	5.0	453				1950°F
			.75	1.57	1.57	115	87	5.0	453				
25.3			.75	1.57	1.57	117	88	5.0	458				
			.75	1.57	1.57	118	88	5.0	468				
30.3 1/4			.75	1.57	1.57	119	88	5.0	446				
			.75	1.57	1.57	120	89	5.0	454				
34.4			.70	1.47	1.47	122	90	5.0	453				
	1134	265.791	.70	1.47	1.47	123	90	5.0	452				
		31.98											
							105						

LEAK CHECK

	in Hg	Rate
fore	8.0	4.0 CFM

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1	100 mL H_2O	215	115
2	100 mL H_2O	123	23
3	DRY		?
4	S.G. Gel.	8.28	8.28
5			

A-20

Air Quality Engineering
EROH Depart[illegible]
Koppers Company, Inc.

(2)

STACK SAMPLING DATA SHEET

PLANT: GRENADA DATE: 5-18-82 ΔH@: _____ HOT BOX NO.: _____

LOCATION: BOILER STACK TEST NO.: GR-BS-1 METER CORRECTION: _____ COLD BOX NO.: _____

ACTIVITY NO: OUTLET NOZZLE: _____ PITOT CORRECTION: _____ PROBE NO.: _____

CONTROL BOX OPERATOR _____ STATIC PRESSURE Ps: _____ CONTROL BOX NO.: _____ FILTER NO.: _____

PROBE HANDLER _____ PORT DIRECTION: SOUTH NOMOGRAPH SET POINT: _____ STACK DIA.: _____

CLEAN UP _____ BAROMETRIC PRESSURE _____ LENGTHS OF UMBILICAL _____ x 25' _____ x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m in. Hg	Stack Temp. T_s °F	Probe Temp. T_p °F	Imp. Temp. T_I °C/°F	Hot Box Temp. T_H °F	Comments
34.4	1138	265.791	.75	1.57	1.57	109	93	5.0	451				4 min/pt
			.75	1.57	1.57	121	93	5.5	451				
30.3/4			.80	1.65	1.65	123	93	6.0	452				
			.80	1.65	1.65	125	93	6.0	453				
25.3			.80	1.65	1.65	126	93	6.0	454				
			.80	1.65	1.65	126	93	6.0	453				
10.7			.80	1.65	1.65	126	93	6.0	452				
			.80	1.65	1.65	127	94	6.0	453				
5.25			.75	1.57	1.57	127	94	6.0	452				
			.75	1.57	1.57	127	94	6.0	451				
1.6			.70	1.47	1.47	128	94	6.0	451				
	1202	282.437	.70	1.47	1.47	128	94	6.0	451				

LEAK CHECK

	in Hg	Rate
Before		

ORSAT

	1	2	3
CO_2			
O_2			
CO			

Impinger No.	Initial	Final	Difference
1			
2			
3			
4			
5			

A-21

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
BLANK RUN
5-18-82
#22-1375

AIR QUALITY ENGINEERING
GR-BS-1

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHA.	0.00001	0.00055	0.00000
ACENAPH.	0.00001	0.00077	0.00000
FLUORENE	0.00000	0.00025	0.00000
PHENANTHRE	0.00002	0.00166	0.00000
FLUORANTH.	0.00001	0.00116	0.00000
PYRENE	0.00001	0.00077	0.00000
CHRYSENE	0.00000	0.00015	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	26904.
(SCFM)	15589.
MOISTURE CONTENT (%)	18.91
STACK TEMPERTURE (F)	453.2

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	30.287
PERCENT ISOKINETIC	99.74

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-1 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTE VELOCITY FT/SEC
1.6W	1110.0	250.462	0.450	0.85	0.85	96.	86.	3.0	455.	50.1
			0.450	0.85	0.85	104.	86.	3.0	453.	50.1
5.3			0.700	1.47	1.47	107.	86.	5.0	454.	62.5
			0.700	1.47	1.47	110.	86.	5.0	453.	62.5
10.7			0.750	1.57	1.57	112.	87.	5.0	453.	64.7
			0.750	1.57	1.57	115.	87.	5.0	453.	64.7
25.3			0.750	1.57	1.57	117.	88.	5.0	458.	64.8
			0.750	1.57	1.57	118.	88.	5.0	458.	64.8
30.8			0.750	1.57	1.57	119.	88.	5.0	456.	64.8
			0.750	1.57	1.57	120.	89.	5.0	454.	64.7
34.4			0.700	1.47	1.47	122.	90.	5.0	453.	62.5
	1134.0	265.791	0.700	1.47	1.47	123.	90.	5.0	452.	62.4
34.4S	1138.0	265.791	0.750	1.57	1.57	109.	93.	5.0	451.	64.6
			0.750	1.57	1.57	121.	93.	5.5	451.	64.6
30.8			0.800	1.65	1.65	123.	93.	6.0	452.	66.7
			0.800	1.65	1.65	125.	93.	6.0	453.	66.8
25.3			0.800	1.65	1.65	126.	93.	6.0	454.	66.8
			0.800	1.65	1.65	126.	93.	6.0	453.	66.8
10.7			0.800	1.65	1.65	126.	93.	6.0	452.	66.7
			0.800	1.65	1.65	127.	94.	6.0	453.	66.8
5.3			0.750	1.57	1.57	127.	94.	6.0	452.	64.6
			0.750	1.57	1.57	127.	94.	6.0	451.	64.6
1.6			0.700	1.47	1.47	128.	94.	6.0	451.	62.4
	1202.0	282.437	0.700	1.47	1.47	128.	94.	6.0	451.	62.4

O R S A T

CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	1	115.0
	2	23.0
	3	3.0
	4	0.0
ABSORBED H2O		8.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	8.0
FINAL	LT 0.02CFM	9.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-1 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.90
B.	AVG. DELTA H (IN H2O)	1.50
C.	METER PRESSURE (IN. HG.)	30.01
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.87
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2540
I.	NOZZLE AREA (SQ. FT.)	0.000352
J.	AVG. STACK TEMP (DEG. R.)	913.2
K.	AVG. METER TEMP (DEG. R.)	564.8
L.	CONDENSATE VOL. (ML)	141.0
M.	ABSORBED H2O (ML)	8.3
N.	TOTAL H2O (ML)	149.3
O.	METERED GAS (CF)	31.975
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	32.154
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	7.501
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	39.655
T.	PERCENT H2O (100R/S)	18.91
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	18.91
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	30.287

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8109	X	44.0	=	5.17
CO	0.000	X	0.8109	X	28.0	=	0.00
O2	0.045	X	0.8109	X	32.0	=	1.17
N2	0.810	X	0.8109	X	28.2	=	18.52
H2O		X	Y/100=0.1891	X	18.0	=	3.40
					MOLECULAR WEIGHT OF STACK GAS	=	28.27

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	63.43
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	26904.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15589.
	STACK FLOW RATE (DRY)	12640.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-I/100)))	64.119
CC.	PERCENT ISOKINETIC (100BB/(J*AA*X))	99.74

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-1 5-18-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHA.	0.00000	0.00001	0.00000	0.00000
ACENAPH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHRE	0.00000	0.00003	0.00000	0.00000
FLUORANTH.	0.00000	0.00002	0.00000	0.00000
PYRENE	0.00000	0.00001	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHA.	0.00000	0.00000
ACENAPH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHRE	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHA.	0.00001
ACENAPH.	0.00001
FLUORENE	0.00000
PHENANTHRE	0.00003
FLUORANTH.	0.00002
PYRENE	0.00001
CHRYSENE	0.00000
ALL MATLS.	0.00010

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHA.	0.0	0.00	0.00001	0.00055
ACENAPH.	0.0	0.00	0.00001	0.00077
FLUORENE	0.0	0.00	0.00000	0.00025
PHENANTHRE	0.0	0.00	0.00002	0.00166
FLUORANTH.	0.0	0.00	0.00001	0.00116
PYRENE	0.0	0.00	0.00001	0.00077
CHRYSENE	0.0	0.00	0.00000	0.00015

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-2

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00104	0.00000
ACENAPHTH.	0.00000	0.00043	0.00000
FLUORENE	0.00000	0.00012	0.00000
PHENANTHR.	0.00001	0.00063	0.00000
FLUORANTH.	0.00000	0.00019	0.00000
PYRENE	0.00000	0.00009	0.00000
CHRYSENE	0.00000	0.00018	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	27695.
(SCFM)	16074.
MOISTURE CONTENT (%)	19.04
STACK TEMPERTURE (F)	453.1

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	26.533
PERCENT ISOKINETIC	97.11

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-2 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTE VELOCITY FT/SEC
34.4W	1402.0	283.412	0.900	2.34	2.34	110.	107.	8.0	453.	70.8
30.8			0.900	2.34	2.34	118.	105.	8.0	457.	71.0
25.3			0.900	2.34	2.34	121.	104.	8.0	460.	71.1
10.7			0.800	2.08	2.08	124.	103.	8.0	458.	66.9
5.3			0.700	1.82	1.82	124.	102.	7.0	457.	62.6
1.6W	1420.0	297.548	0.500	1.30	1.30	125.	101.	5.5	457.	52.9
34.4S	1425.0	297.548	0.800	2.08	2.08	120.	100.	8.0	450.	66.6
30.8			0.850	2.21	2.21	126.	100.	8.0	449.	68.7
25.3			0.850	2.21	2.21	128.	99.	8.5	449.	68.7
10.7			0.750	1.95	1.95	128.	99.	8.0	449.	64.5
5.3			0.700	1.82	1.82	128.	98.	7.0	449.	62.3
1.6S	1443.0	311.718	0.600	1.56	1.56	129.	97.	6.5	449.	57.7

O R S A T	
CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	
1	98.0
2	22.0
3	3.0
4	0.0
ABSORBED H2O	8.8

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	8.5
FINAL LT	0.02CFM	10.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-2 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.95
B.	AVG. DELTA H (IN H2O)	2.00
C.	METER PRESSURE (IN. HG.)	30.10
D.	STATIC PRESSURE (IN. H2O)	-0.45
E.	STATIC PRESSURE (IN. HG.)	-0.033
F.	STACK PRESSURE (IN. HG.) (A+E)	29.92
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2740
I.	NOZZLE AREA (SQ. FT.)	0.000409
J.	AVG. STACK TEMP (DEG. R.)	913.1
K.	AVG. METER TEMP (DEG. R.)	572.3
L.	CONDENSATE VOL. (ML)	123.0
M.	ABSORBED H2O (ML)	8.8
N.	TOTAL H2O (ML)	131.8
O.	METERED GAS (CF)	28.306
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	28.465
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	6.692
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	35.157
T.	PERCENT H2O (100R/S)	19.04
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	19.04
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	26.533

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8096	X	44.0	=	5.17
CO	0.000	X	0.8096	X	28.0	=	0.00
O2	0.045	X	0.8096	X	32.0	=	1.17
N2	0.810	X	0.8096	X	28.2	=	18.49
H2O		X	Y/100=0.1904	X	18.0	=	3.43
					MOLECULAR WEIGHT OF STACK GAS	=	28.25

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	65.30
Y.	AVG. FLOW RATE (CFM) (GG=H*60)	27695.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	16074.
	STACK FLOW RATE (DRY)	13014.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	56.088
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	97.11

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00002	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00001	0.00000	0.00000
FLUORANTH.	0.00000	0.00000	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00002
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00001
FLUORANTH.	0.00000
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00004

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00104
ACENAPHTH.	0.0	0.00	0.00000	0.00043
FLUORENE	0.0	0.00	0.00000	0.00012
PHENANTHR.	0.0	0.00	0.00001	0.00063
FLUORANTH.	0.0	0.00	0.00000	0.00019
PYRENE	0.0	0.00	0.00000	0.00009
CHRYSENE	0.0	0.00	0.00000	0.00018

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-3

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00000	0.00045	0.00000
ACENAPHTH.	0.00000	0.00020	0.00000
FLUORENE	0.00000	0.00005	0.00000
PHENANTHR.	0.00000	0.00024	0.00000
FLUORANTH.	0.00000	0.00010	0.00000
PYRENE	0.00001	0.00092	0.00000
CHRYSENE	0.00000	0.00000	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	27441.
(SCFM)	15955.
MOISTURE CONTENT (%)	17.47
STACK TEMPERTURE (F)	451.6

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	26.0
SCFD GAS SAMPLED	26.481
PERCENT ISOKINETIC	134.62

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-3 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTE VELOCITY FT/SEC
34.4S	1450.0	312.251	0.800	2.08	2.08	116.	97.	5.0	450.	66.4
30.8			0.800	2.08	2.08	127.	97.	5.0	451.	66.4
25.3			0.850	2.21	2.21	129.	96.	5.0	451.	68.5
10.7			0.750	1.95	1.95	130.	96.	4.5	456.	64.5
5.3			0.700	1.82	1.82	130.	96.	4.0	451.	62.1
1.6S	1508.0	326.281	0.600	1.56	1.56	130.	96.	3.5	451.	57.5
34.4W	1512.0	326.281	0.900	2.34	2.34	118.	96.	5.0	451.	70.5
30.8			0.900	2.34	2.34	127.	96.	5.0	451.	70.5
25.3			0.900	2.34	2.34	129.	95.	5.0	454.	70.6
10.7			0.700	1.82	1.82	128.	95.	4.0	451.	62.1
5.3			0.700	1.82	1.82	128.	94.	4.0	451.	62.1
1.6S	1520.0	340.441	0.550	1.43	1.43	127.	93.	3.5	451.	55.1

ORSAT	
CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	1	80.0
	2	25.0
	3	4.0
	4	0.0
ABSORBED H2O		9.5

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	20-82
METER	1.0056	20-82
PITOT	0.84	1-80

LEAK CHECK

		RATE	IN.HG
INITIAL	LT	0.02CFM	8.0
FINAL	LT	0.02CFM	7.5

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-3 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.95
B.	AVG. DELTA H (IN H2O)	1.98
C.	METER PRESSURE (IN. HG.)	30.10
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.92
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2720
I.	NOZZLE AREA (SQ. FT.)	0.000404
J.	AVG. STACK TEMP (DEG. F.)	911.6
K.	AVG. METER TEMP (DEG. R.)	571.1
L.	CONDENSATE VOL. (ML)	109.0
M.	ABSORBED H2O (ML)	9.5
N.	TOTAL H2O (ML)	118.5
O.	METERED GAS (CF)	28.190
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	28.348
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	6.002
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	34.350
T.	PERCENT H2O (100R/S)	17.47
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	17.47
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	26.481

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8253	X	44.0	=	5.27
CO	0.000	X	0.8253	X	28.0	=	0.00
O2	0.045	X	0.8253	X	32.0	=	1.19
N2	0.810	X	0.8253	X	28.2	=	18.85
H2O		X	Y/100=0.1747	X	18.0	=	3.15
					MOLECULAR WEIGHT OF STACK GAS	=	28.45

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	64.70
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27441.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15955.
	STACK FLOW RATE (DRY)	13167.
AA.	SAMPLE TIME (SEC)	1560.
BB.	NOZZLE VOLUME (Q(J/K/(1-I/100)))	54.830
CC.	PERCENT ISOKINETIC (100B2/(I*AA*X))	134.62

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-3 5-18-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00001	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00000	0.00000	0.00000
FLUORANTH.	0.00000	0.00000	0.00000	0.00000
PYRENE	0.00000	0.00001	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00001
ACENAPHTH.	0.00000
FLUORENE	0.00000
PHENANTHR.	0.00000
FLUORANTH.	0.00000
PYRENE	0.00001
CHRYSENE	0.00000
ALL MATLS.	0.00003

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00000	0.00045
ACENAPHTH.	0.0	0.00	0.00000	0.00020
FLUORENE	0.0	0.00	0.00000	0.00005
PHENANTHR.	0.0	0.00	0.00000	0.00024
FLUORANTH.	0.0	0.00	0.00000	0.00010
PYRENE	0.0	0.00	0.00001	0.00092
CHRYSENE	0.0	0.00	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-4

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00062	0.00000
ACENAPHTH.	0.00000	0.00035	0.00000
FLUORENE	0.00000	0.00012	0.00000
PHENANTHR.	0.00000	0.00047	0.00000
FLUORANTH.	0.00000	0.00015	0.00000
PYRENE	0.00000	0.00008	0.00000
CHRYSENE	0.00000	0.00000	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	26113.
(SCFM)	15121.
MOISTURE CONTENT (%)	16.89
STACK TEMPERTURE (F)	455.3

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	25.496
PERCENT ISOKINETIC	97.41

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-4 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTED VELOCITY FT/SEC
1.6W	1450.0	981.025	0.500	1.30	1.30	93.	83.	5.0	450.	52.4
5.3			0.700	1.82	1.80	107.	93.	6.0	454.	62.2
10.7			0.750	1.95	1.95	110.	94.	6.5	455.	64.4
25.3			0.750	1.95	1.95	116.	94.	6.5	462.	64.6
30.8			0.750	1.95	1.95	119.	94.	6.5	457.	64.5
34.4W	1508.0	994.425	0.700	1.82	1.80	122.	95.	6.8	453.	62.1
1.6S	1512.0	994.425	0.600	1.56	1.60	121.	95.	6.0	450.	57.4
5.3			0.700	1.82	1.82	122.	96.	6.5	453.	62.1
10.7			0.700	1.82	1.82	125.	97.	6.5	457.	62.3
25.3			0.750	1.95	1.95	126.	98.	6.5	459.	64.5
30.8			0.700	1.82	1.82	128.	97.	6.5	460.	62.4
34.4S	1530.0	1008.032	0.650	1.69	1.70	129.	97.	6.5	454.	59.9

O R S A T	
CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	1	81.0
	2	18.0
	3	0.0
	4	0.0
ABSORBED H2O		10.4

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	8.0
FINAL LT	0.02CFM	8.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-4 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.95
B.	AVG. DELTA H (IN H2O)	1.79
C.	METER PRESSURE (IN. HG.)	30.08
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.92
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	915.3
K.	AVG. METER TEMP (DEG. R.)	566.3
L.	CONDENSATE VOL. (ML)	99.0
M.	ABSORBED H2O (ML)	10.4
N.	TOTAL H2O (ML)	109.4
O.	METERED GAS (CF)	27.007
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	27.077
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.501
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	32.579
T.	PERCENT H2O (100R/S)	16.89
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	16.89
U.	SCFD GAS SAMPLED (530*O*C/(29.9*K))	25.496

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8311	X	44.0	=	5.30
CO	0.000	X	0.8311	X	28.0	=	0.00
O2	0.045	X	0.8311	X	32.0	=	1.20
N2	0.810	X	0.8311	X	28.2	=	18.98
H2O		X	Y/100=0.1689	X	18.0	=	3.04
					MOLECULAR WEIGHT OF STACK GAS	=	28.52

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	61.57
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	26113.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15121.
	STACK FLOW RATE (DRY)	12567.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-I/100)))	52.659
CC.	PERCENT ISOKINETIC (100BB/(1*AA*X))	97.41

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-4 5-18-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G).	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00001	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00001	0.00000	0.00000
FLUORANTH.	0.00000	0.00000	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00001
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00001
FLUORANTH.	0.00000
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00003

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00062
ACENAPHTH.	0.0	0.00	0.00000	0.00035
FLUORENE	0.0	0.00	0.00000	0.00012
PHENANTHR.	0.0	0.00	0.00000	0.00047
FLUORANTH.	0.0	0.00	0.00000	0.00015
PYRENE	0.0	0.00	0.00000	0.00008
CHRYSENE	0.0	0.00	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-5

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00003	0.00285	0.00000
ACENAPHTH.	0.00001	0.00080	0.00000
FLUORENE	0.00000	0.00021	0.00000
PHENANTHR.	0.00001	0.00166	0.00000
FLUORANTH.	0.00001	0.00080	0.00000
PYRENE	0.00000	0.00050	0.00000
CHRYSENE	0.00000	0.00009	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	28105.
(SCFM)	16156.
MOISTURE CONTENT (%)	19.48
STACK TEMPERTURE (F)	457.3

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	25.911
PERCENT ISOKINETIC	97.73

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-5 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTE VELOCITY FT/SEC
34.4W	1607.0	340.921	0.900	2.20	2.20	110.	96.	5.0	449.	70.9
30.8			0.900	2.20	2.20	125.	96.	5.0	449.	70.9
25.3			0.800	1.96	1.96	129.	97.	4.5	457.	67.1
10.7			0.700	1.71	1.71	129.	98.	4.0	459.	62.9
5.3			0.700	1.71	1.71	130.	97.	4.0	455.	62.7
1.6W	1625.0	354.559	0.550	1.35	1.35	129.	97.	3.5	455.	55.6
34.4S	1629.0	354.559	0.900	2.20	2.20	114.	95.	5.0	460.	71.3
30.8			0.900	2.20	2.20	114.	95.	5.0	460.	71.3
25.3			0.850	2.08	2.08	124.	93.	5.0	461.	69.3
10.7			0.800	1.96	1.96	124.	93.	5.0	461.	67.3
5.3			0.700	1.71	1.71	124.	92.	4.0	461.	62.9
1.6S	1647.0	368.548	0.700	1.71	1.71	124.	92.	4.0	461.	62.9

O R S A T	
CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	1	110.0
	2	12.0
	3	2.0
	4	0.0
ABSORBED H2O		8.4

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	7.0
FINAL LT	0.02CFM	7.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-5 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.80
B.	AVG. DELTA H (IN H2O)	1.92
C.	METER PRESSURE (IN. HG.)	29.94
D.	STATIC PRESSURE (IN. H2O)	-0.43
E.	STATIC PRESSURE (IN. HG.)	-0.032
F.	STACK PRESSURE (IN. HG.) (A+E)	29.77
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2700
I.	NOZZLE AREA (SQ. FT.)	0.000398
J.	AVG. STACK TEMP (DEG. R.)	917.3
K.	AVG. METER TEMP (DEG. R.)	569.0
L.	CONDENSATE VOL. (ML)	124.0
M.	ABSORBED H2O (ML)	8.4
N.	TOTAL H2O (ML)	132.4
O.	METERED GAS (CF)	27.627
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	27.782
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	6.721
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	34.503
T.	PERCENT H2O (100R/S)	19.48
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	19.48
J.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	25.911

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.145	X	0.8052	X	44.0	=	5.14
CO	0.000	X	0.8052	X	28.0	=	0.00
O2	0.045	X	0.8052	X	32.0	=	1.16
N2	0.810	X	0.8052	X	28.2	=	18.39
H2O		X	Y/100=0.1948	X	18.0	=	3.51
					MOLECULAR WEIGHT OF STACK GAS	=	28.20

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	66.27
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	28105.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	16156.
	STACK FLOW RATE (DRY)	13009.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	55.621
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	97.73

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-5 5-18-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00004	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00003	0.00000	0.00000
FLUORANTH.	0.00000	0.00001	0.00000	0.00000
PYRENE	0.00000	0.00001	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00004
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00003
FLUORANTH.	0.00001
PYRENE	0.00001
CHRYSENE	0.00000
ALL MATLS.	0.00010

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00003	0.00285
ACENAPHTH.	0.0	0.00	0.00001	0.00080
FLUORENE	0.0	0.00	0.00000	0.00021
PHENANTHR.	0.0	0.00	0.00001	0.00166
FLUORANTH.	0.0	0.00	0.00001	0.00080
PYRENE	0.0	0.00	0.00000	0.00050
CHRYSENE	0.0	0.00	0.00000	0.00009

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-6

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00079	0.00000
ACENAPHTH.	0.00000	0.00038	0.00000
FLUORENE	0.00000	0.00012	0.00000
PHENANTHR.	0.00000	0.00053	0.00000
FLUORANTH.	0.00000	0.00025	0.00000
PYRENE	0.00000	0.00010	0.00000
CHRYSENE	0.00000	0.00005	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	25821.
(SCFM)	14970.
MOISTURE CONTENT (%)	15.41
STACK TEMPERTURE (F)	449.6

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	25.477
PERCENT ISOKINETIC	95.90

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-6 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTE VELOCITY FT/SEC
1.6S	1730.0	368.693	0.550	1.43	1.43	100.	79.	5.0	448.	54.9
5.3			0.700	1.82	1.82	101.	79.	5.0	450.	62.0
10.7			0.700	1.82	1.82	106.	78.	5.0	449.	62.0
25.3			0.700	1.82	1.82	108.	77.	5.0	449.	62.0
30.8			0.850	2.20	2.20	109.	77.	5.0	449.	68.3
34.4S	1748.0	382.207	0.750	1.95	1.95	110.	77.	5.0	449.	64.1
34.4W	1750.0	382.207	0.700	1.82	1.82	94.	77.	5.0	448.	61.9
30.8			0.750	1.95	1.95	109.	77.	5.0	450.	64.2
25.3			0.750	1.95	1.95	110.	77.	5.0	451.	64.2
10.7			0.650	1.69	1.69	111.	77.	4.0	452.	59.8
5.3			0.550	1.43	1.43	111.	77.	4.5	450.	54.9
1.6W	1808.0	395.055	0.500	1.30	1.30	111.	77.	3.0	450.	52.4

O R S A T	
CO2	14.5
O2	4.5
CO	0.0
N	81.0

IMPINGER NO.	1	75.0
	2	10.0
	3	4.0
	4	0.0
ABSORBED H2O		9.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

		RATE	IN.HG
INITIAL	LT	0.02CFM	8.0
FINAL	LT	0.02CFM	11.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-6 5-18-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.80
B.	AVG. DELTA H (IN H2O)	1.76
C.	METER PRESSURE (IN. HG.)	29.93
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.77
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2740
I.	NOZZLE AREA (SQ. FT.)	0.000409
J.	AVG. STACK TEMP (DEG. R.)	909.6
K.	AVG. METER TEMP (DEG. R.)	552.0
L.	CONDENSATE VOL. (ML)	89.0
M.	ABSORBED H2O (ML)	9.1
N.	TOTAL H2O (ML)	98.1
O.	METERED GAS (CF)	26.362
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	26.510
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	4.831
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	31.341
T.	PERCENT H2O (100R/S)	15.41
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	15.41
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	25.477

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8459	X	44.0	=	5.40
CO	0.000	X	0.8459	X	28.0	=	0.00
O2	0.045	X	0.8459	X	32.0	=	1.22
N2	0.810	X	0.8459	X	28.2	=	19.32
H2O		X	Y/100=0.1541	X	18.0	=	2.77
					MOLECULAR WEIGHT OF STACK GAS	=	28.71

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	60.88
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	25821.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	14970.
	STACK FLOW RATE (DRY)	12663.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	51.639
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	95.90

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-6 5-18-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00001	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00001	0.00000	0.00000
FLUORANTH.	0.00000	0.00000	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00001
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00001
FLUORANTH.	0.00000
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00003

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00079
ACENAPHTH.	0.0	0.00	0.00000	0.00038
FLUORENE	0.0	0.00	0.00000	0.00012
PHENANTHR.	0.0	0.00	0.00000	0.00053
FLUORANTH.	0.0	0.00	0.00000	0.00025
PYRENE	0.0	0.00	0.00000	0.00010
CHRYSENE	0.0	0.00	0.00000	0.00005

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR CREOSOTE
5-18-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-7

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00064	0.00000
ACENAPHTH.	0.00000	0.00039	0.00000
FLUORENE	0.00000	0.00013	0.00000
PHENANTHR.	0.00001	0.00054	0.00000
FLUORANTH.	0.00000	0.00034	0.00000
PYRENE	0.00000	0.00016	0.00000
CHRYSENE	0.00000	0.00013	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	24916.
(SCFM)	14388.
MOISTURE CONTENT (%)	13.73
STACK TEMPERTURE (F)	453.3

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	25.597
PERCENT ISOKINETIC	99.04

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-7 5-18-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECT VELOCIT FT/SEC
34.4W	1728.0	9.106	0.700	1.82	1.82	89.	75.	4.5	450.	61.8
30.8			0.800	2.08	2.10	93.	75.	5.0	452.	66.1
25.3			0.600	1.56	1.60	98.	75.	5.0	453.	57.3
10.7			0.600	1.56	1.60	103.	77.	5.0	455.	57.3
5.3			0.600	1.56	1.60	105.	78.	5.0	460.	57.5
1.6W	1746.0	22.552	0.500	1.30	1.30	107.	79.	4.5	454.	52.3
1.6S	1750.0	22.552	0.600	1.56	1.56	95.	80.	4.0	450.	57.2
5.3			0.600	1.56	1.60	107.	80.	4.0	451.	57.2
10.7			0.600	1.56	1.60	109.	80.	4.0	454.	57.3
25.3			0.700	1.82	1.82	111.	81.	4.5	455.	61.9
30.8			0.700	1.82	1.82	112.	81.	4.5	454.	61.9
34.4S	1808.0	35.628	0.600	1.56	1.56	113.	81.	4.5	451.	57.2

O R S A T			
CO2	14.5	IMPINGER NO. 1	68.0
O2	4.5	2	9.0
CO	0.0	3	3.0
N	81.0	4	0.0
		ABSORBED H2O	6.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	8.0
FINAL LT	0.02CFM	8.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.80
B.	AVG. DELTA H (IN H2O)	1.67
C.	METER PRESSURE (IN. HG.)	29.92
D.	STATIC PRESSURE (IN. H2O)	-0.41
E.	STATIC PRESSURE (IN. HG.)	-0.030
F.	STACK PRESSURE (IN. HG.) (A+E)	29.77
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	913.3
K.	AVG. METER TEMP (DEG. R.)	551.0
L.	CONDENSATE VOL. (ML)	80.0
M.	ABSORBED H2O (ML)	6.1
N.	TOTAL H2O (ML)	86.1
O.	METERED GAS (CF)	26.522
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	26.591
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	4.233
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	30.824
T.	PERCENT H2O (100R/S)	13.73
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	13.73
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	25.597

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8627	X	44.0	=	5.50
CO	0.000	X	0.8627	X	28.0	=	0.00
O2	0.045	X	0.8627	X	32.0	=	1.24
N2	0.810	X	0.8627	X	28.2	=	19.71
H2O		X	Y/100=0.1373	X	18.0	=	2.47
					MOLECULAR WEIGHT OF STACK GAS	=	28.92

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	58.75
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	24916.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	14388.
	STACK FLOW RATE (DRY)	12412.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	51.089
CC.	PERCENT ISOKINETIC (100BB/(J*AA*X))	99.04

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-7 5-16-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00001	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00001	0.00000	0.00000
FLUORANTH.	0.00000	0.00001	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00001
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00001
FLUORANTH.	0.00001
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00004

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00064
ACENAPHTH.	0.0	0.00	0.00000	0.00039
FLUORENE	0.0	0.00	0.00000	0.00013
PHENANTHR.	0.0	0.00	0.00001	0.00054
FLUORANTH.	0.0	0.00	0.00000	0.00034
PYRENE	0.0	0.00	0.00000	0.00016
CHRYSENE	0.0	0.00	0.00000	0.00013

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR CREOSOLE
5-19-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-8

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00003	0.00363	0.00000
ACENAPHTH.	0.00002	0.00220	0.00000
FLUORENE	0.00001	0.00072	0.00000
PHENANTHR.	0.00002	0.00225	0.00000
FLUORANTH.	0.00001	0.00066	0.00000
PYRENE	0.00000	0.00040	0.00000
CHRYSENE	0.00000	0.00009	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	27549.
(SCFM)	16290.
MOISTURE CONTENT (%)	17.36
STACK TEMPERTURE (F)	434.6

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	36.0
SCFD GAS SAMPLED	34.786
PERCENT ISOKINETIC	95.81

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-8 5-19-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECT VELOCIT FT/SEC
34.4W	810.0	395.515	0.850	3.72	3.72	98.	94.	13.0	435.	67.9
30.8			0.900	3.94	3.94	105.	94.	15.0	435.	69.8
25.3			0.900	3.94	3.94	106.	93.	15.0	436.	69.9
10.7			0.700	3.06	3.06	109.	91.	11.0	435.	61.6
5.3			0.700	3.06	3.06	111.	90.	11.0	433.	61.5
1.6W	828.0	413.609	0.600	2.62	2.62	113.	89.	9.0	433.	57.0
34.4S	832.0	413.600	0.900	3.94	3.94	101.	86.	15.0	433.	69.8
30.8			0.900	3.94	3.94	106.	85.	15.0	433.	69.8
25.3			0.900	3.94	3.94	107.	84.	15.0	434.	69.8
10.7			0.750	3.28	3.28	108.	84.	12.0	438.	63.9
5.3			0.700	3.06	3.06	113.	84.	12.0	435.	61.6
1.6S	850.0	431.616	0.600	2.62	2.62	115.	84.	9.0	435.	57.0

O R S A T

CO2	14.5
O2	6.0
CO	0.0
N	79.5

IMPINGER NO.	1	110.0
	2	25.0
	3	6.0
	4	0.0
ABSORBED H2O		13.4

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	7.5
FINAL LT	0.02CFM	16.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-8 5-19-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.90
B.	AVG. DELTA H (IN H2O)	3.43
C.	METER PRESSURE (IN. HG.)	30.15
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.86
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.3100
I.	NOZZLE AREA (SQ. FT.)	0.000524
J.	AVG. STACK TEMP (DEG. R.)	894.6
K.	AVG. METER TEMP (DEG. R.)	557.9
L.	CONDENSATE VOL. (ML)	141.0
M.	ABSORBED H2O (ML)	13.4
N.	TOTAL H2O (ML)	154.4
O.	METERED GAS (CF)	36.110
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	36.312
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	7.628
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	43.940
T.	PERCENT H2O (100R/S)	17.36
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	17.36
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	34.786

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8264	X	44.0	=	5.27
CO	0.000	X	0.8264	X	28.0	=	0.00
O2	0.060	X	0.8264	X	32.0	=	1.59
N2	0.795	X	0.8264	X	28.2	=	18.53
H2O		X	Y/100=0.1736	X	18.0	=	3.12
					MOLECULAR WEIGHT OF STACK GAS	=	28.51

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	64.96
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27549.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	16290.
	STACK FLOW RATE (DPY)	13462.
AA.	SAMPLE TIME (SEC)	2160.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	70.455
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	95.81

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-8 5-19-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00007	0.00000	0.00000
ACENAPHTH.	0.00000	0.00004	0.00000	0.00000
FLUORENE	0.00000	0.00001	0.00000	0.00000
PHENANTHR.	0.00000	0.00004	0.00000	0.00000
FLUORANTH.	0.00000	0.00001	0.00000	0.00000
PYRENE	0.00000	0.00001	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00007
ACENAPHTH.	0.00004
FLUORENE	0.00001
PHENANTHR.	0.00004
FLUORANTH.	0.00001
PYRENE	0.00001
CHRYSENE	0.00000
ALL MATLS.	0.00019

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00003	0.00363
ACENAPHTH.	0.0	0.00	0.00002	0.00220
FLUORENE	0.0	0.00	0.00001	0.00072
PHENANTHR.	0.0	0.00	0.00002	0.00225
FLUORANTH.	0.0	0.00	0.00001	0.00066
PYRENE	0.0	0.00	0.00000	0.00040
CHRYSENE	0.0	0.00	0.00000	0.00009

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR CREOSOLE
5-19-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-9

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00067	0.00000
ACENAPHTH.	0.00000	0.00034	0.00000
FLUORENE	0.00000	0.00013	0.00000
PHENANTHR.	0.00000	0.00047	0.00000
FLUORANTH.	0.00000	0.00013	0.00000
PYRENE	0.00000	0.00007	0.00000
CHRYSENE	0.00000	0.00003	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	27981.
(SCFM)	16275.
MOISTURE CONTENT (%)	20.38
STACK TEMPERTURE (F)	449.5

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	38.244
PERCENT ISOKINETIC	98.74

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-9 5-19-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECT VELOCIT FT/SEC
1.6S	923.0	432.013	0.600	1.82	1.82	108.	90.	5.0	439.	57.5
5.3			0.750	2.28	2.28	117.	90.	6.0	440.	64.4
10.7			0.800	2.43	2.43	120.	90.	7.0	452.	66.9
25.3			0.900	2.73	2.73	123.	90.	8.0	457.	71.2
30.8			0.900	2.73	2.73	124.	90.	8.0	454.	71.1
34.4S	947.0	452.044	0.750	2.28	2.28	126.	91.	7.0	450.	64.7
34.4W	953.0	452.044	0.850	2.58	2.58	119.	94.	7.0	449.	68.9
30.8			0.900	2.73	2.73	124.	93.	7.5	449.	70.9
25.3			0.900	2.73	2.73	125.	93.	7.5	452.	71.0
10.7			0.700	2.12	2.12	129.	92.	6.0	451.	62.6
5.3			0.750	2.28	2.28	127.	92.	6.5	451.	64.8
1.6W	1017.0	472.457	0.600	1.82	1.82	127.	92.	5.5	450.	57.9

O R S A T			
CO2	14.5	IMPINGER NO. 1	145.0
O2	6.0	2	37.0
CO	0.0	3	10.0
N	79.5	4	0.0
		ABSORBED H2O	14.9

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	6.0
FINAL LT	0.02CFM	8.5

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-9 5-19-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.90
B.	AVG. DELTA H (IN H2O)	2.38
C.	METER PRESSURE (IN. HG.)	30.07
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.86
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2830
I.	NOZZLE AREA (SQ. FT.)	0.000437
J.	AVG. STACK TEMP (DEG. R.)	909.5
K.	AVG. METER TEMP (DEG. R.)	566.9
L.	CONDENSATE VOL. (ML)	192.0
M.	ABSORBED H2O (ML)	14.9
N.	TOTAL H2O (ML)	206.9
O.	METERED GAS (CF)	40.444
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	40.670
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	10.413
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	51.084
T.	PERCENT H2O (100R/S)	20.38
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	20.38
U.	SCFD GAS SAMPLED (530*G*C/(29.9*K))	38.244

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.7962	X	44.0	=	5.08
CO	0.000	X	0.7962	X	28.0	=	0.00
O2	0.060	X	0.7962	X	32.0	=	1.53
N2	0.795	X	0.7962	X	28.2	=	17.85
H2O		X	Y/100=0.2038	X	18.0	=	3.67
					MOLECULAR WEIGHT OF STACK GAS	=	28.13

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	65.98
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27981.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	16275.
	STACK FLOW RATE (DRY)	12957.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	81.953
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	98.74

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-9 5-19-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00001	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00000	0.00000	0.00000
PHENANTHR.	0.00000	0.00001	0.00000	0.00000
FLUORANTH.	0.00000	0.00000	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00001
ACENAPHTH.	0.00001
FLUORENE	0.00000
PHENANTHR.	0.00001
FLUORANTH.	0.00000
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00004

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00067
ACENAPHTH.	0.0	0.00	0.00000	0.00034
FLUORENE	0.0	0.00	0.00000	0.00013
PHENANTHR.	0.0	0.00	0.00000	0.00047
FLUORANTH.	0.0	0.00	0.00000	0.00013
PYRENE	0.0	0.00	0.00000	0.00007
CHRYSENE	0.0	0.00	0.00000	0.00003

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR CREOSOLE
5-19-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-10

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
NAPHTHAL.	0.00001	0.00143	0.00000
ACENAPHTH.	0.00001	0.00058	0.00000
FLUORENE	0.00000	0.00045	0.00000
PHENANTHR.	0.00001	0.00104	0.00000
FLUORANTH.	0.00000	0.00024	0.00000
PYRENE	0.00000	0.00013	0.00000
CHRYSENE	0.00000	0.00002	0.00000

2. STACK CONDITIONS

FLOW (ACFM)	27157.
(SCFM)	15782.
MOISTURE CONTENT (%)	18.88
STACK TEMPERTURE (F)	450.3

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	37.765
PERCENT ISOKINETIC	98.71

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-10 5-19-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECT VELOCIT FT/SEC
34.4W	923.0	35.846	0.800	2.43	2.45	94.	92.	6.0	445.	66.4
30.8			0.800	2.43	2.45	108.	92.	6.0	447.	66.5
25.3			0.800	2.43	2.45	112.	92.	6.0	451.	66.7
10.7			0.650	1.97	1.95	118.	92.	5.0	455.	60.2
5.3			0.650	1.97	1.95	121.	93.	5.0	454.	60.2
1.6W	947.0	55.917	0.650	1.97	1.95	124.	94.	5.0	452.	60.1
1.6S	953.0	55.917	0.600	1.82	1.82	112.	99.	4.0	449.	57.7
5.3			0.700	2.12	2.12	124.	98.	4.5	449.	62.3
10.7			0.800	2.43	2.43	128.	98.	5.0	451.	66.7
25.3			0.900	2.73	2.73	129.	98.	6.0	450.	70.7
30.8			0.850	2.58	2.58	131.	100.	5.5	450.	68.7
34.4S	1017.0	75.962	0.700	2.12	2.12	132.	101.	4.5	450.	62.3

O R S A T

CO2	14.5
O2	6.0
CO	0.0
N	79.5

IMPINGER NO.	1	147.0
	2	25.0
	3	0.0
	4	0.0
ABSORBED H2O		13.7

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	6.0
FINAL LT	0.02CFM	8.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-10 5-19-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.90
B.	AVG. DELTA H (IN H2O)	2.25
C.	METER PRESSURE (IN. HG.)	30.07
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.86
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2830
I.	NOZZLE AREA (SQ. FT.)	0.000437
J.	AVG. STACK TEMP (DEG. R.)	910.3
K.	AVG. METER TEMP (DEG. R.)	567.6
L.	CONDENSATE VOL. (ML)	172.0
M.	ABSORBED H2O (ML)	13.7
N.	TOTAL H2O (ML)	185.7
O.	METERED GAS (CF)	40.116
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	40.220
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	9.362
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	49.583
T.	PERCENT H2O (100R/S)	18.88
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	18.88
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	37.765

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.145	X	0.8112	X	44.0	=	5.18
CO	0.000	X	0.8112	X	28.0	=	0.00
O2	0.060	X	0.8112	X	32.0	=	1.56
N2	0.795	X	0.8112	X	28.2	=	18.19
H2O		X	Y/100=0.1888	X	18.0	=	3.40
					MOLECULAR WEIGHT OF STACK GAS	=	28.32

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	64.03
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27157.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15782.
	STACK FLOW RATE (DRY)	12802.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	79.517
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	98.71

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-10 5-19-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
NAPHTHAL.	0.00000	0.00003	0.00000	0.00000
ACENAPHTH.	0.00000	0.00001	0.00000	0.00000
FLUORENE	0.00000	0.00001	0.00000	0.00000
PHENANTHR.	0.00000	0.00002	0.00000	0.00000
FLUORANTH.	0.00000	0.00001	0.00000	0.00000
PYRENE	0.00000	0.00000	0.00000	0.00000
CHRYSENE	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
NAPHTHAL.	0.00000	0.00000
ACENAPHTH.	0.00000	0.00000
FLUORENE	0.00000	0.00000
PHENANTHR.	0.00000	0.00000
FLUORANTH.	0.00000	0.00000
PYRENE	0.00000	0.00000
CHRYSENE	0.00000	0.00000

TOTALS

NAPHTHAL.	0.00003
ACENAPHTH.	0.00001
FLUORENE	0.00001
PHENANTHR.	0.00002
FLUORANTH.	0.00001
PYRENE	0.00000
CHRYSENE	0.00000
ALL MATLS.	0.00009

PARAMETER	MW	PPM	GR/SCFD	LB/HR
NAPHTHAL.	0.0	0.00	0.00001	0.00143
ACENAPHTH.	0.0	0.00	0.00001	0.00058
FLUORENE	0.0	0.00	0.00000	0.00045
PHENANTHR.	0.0	0.00	0.00001	0.00104
FLUORANTH.	0.0	0.00	0.00000	0.00024
PYRENE	0.0	0.00	0.00000	0.00013
CHRYSENE	0.0	0.00	0.00000	0.00002

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-11

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00036755	0.04368500	0.58026075
PCP	0.00000084	0.00009928	**********
OCDD	0.00000000	0.00000000	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	28152.
(SCFM)	15437.
MOISTURE CONTENT (%)	10.18
STACK TEMPERTURE (F)	503.1

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	36.871
PERCENT ISOKINETIC	89.00

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-11 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4W	1100.0	518.638	0.850	2.38	2.38	94.	89.	17.0	502.	70.
30.8			0.900	2.46	2.46	103.	88.	18.0	504.	72.
25.3			0.800	2.19	2.19	103.	88.	18.0	507.	68.
10.7			0.750	2.14	2.14	105.	88.	17.0	503.	66.
5.3			0.700	1.99	1.99	108.	89.	16.5	502.	63.
1.6W	1124.0	538.016	0.600	1.71	1.71	109.	90.	15.0	502.	59.
1.6S	1128.0	538.016	0.600	1.71	1.71	110.	90.	15.0	502.	59.
5.3			0.700	1.99	1.99	113.	91.	16.5	504.	63.
10.7			0.750	2.14	2.14	111.	91.	19.0	502.	66.
25.3			0.800	2.28	2.28	108.	91.	20.0	504.	68.
30.8			0.850	2.42	2.42	107.	92.	20.0	503.	70.
34.4S	1152.0	557.114	0.800	2.28	2.28	106.	92.	20.0	502.	68.

C R S A T			
CO2	7.4	IMPINGER NO. 1	50.0
O2	10.1	2	16.0
CO	0.0	3	10.0
N	82.4	4	0.0
		ABSORBED H2O	12.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
~~PITOT~~	~~0.84~~	~~7-1-80~~

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	7.5
FINAL LT	0.02CFM	21.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.85
B.	AVG. DELTA H (IN H2O)	2.14
C.	METER PRESSURE (IN. HG.)	30.01
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.81
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2830
I.	NOZZLE AREA (SQ. FT.)	0.000437
J.	AVG. STACK TEMP (DEG. R.)	963.1
K.	AVG. METER TEMP (DEG. R.)	558.2
L.	CONDENSATE VOL. (ML)	76.0
M.	ABSORBED H2O (ML)	12.3
N.	TOTAL H2O (ML)	88.3
O.	METERED GAS (CF)	38.476
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	38.691
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	4.383
S.	TOTAL SAMPLED VOLUME (CF) (O+R)	43.074
T.	PERCENT H2O (100R/S)	10.18
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	10.18
U.	SCFD GAS SAMPLED (530*O*C/(29.9*K))	36.871

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-Y/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.074	X	0.8982	X	44.0	=	2.93
CO	0.000	X	0.8982	X	28.0	=	0.01
O2	0.101	X	0.8982	X	32.0	=	2.90
N2	0.824	X	0.8982	X	28.2	=	20.89
H2O		X	Y/100=0.1018	X	18.0	=	1.83
					MOLECULAR WEIGHT OF STACK GAS	=	28.56

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	66.38
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	28152.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15437.
	STACK FLOW RATE (DRY)	13866.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	74.322
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	89.00

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-11 5-20-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00088	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00088
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00088

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	0.58	0.00037	0.04369
PCP	0.0	********	0.00000	0.00010
OCDD	0.0	********	0.00000	0.00000
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-12

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00052048	0.05961931	0.82168382
PCP	0.00000036	0.00004173	**********
OCDD	0.00000000	0.00000000	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	26984.
(SCFM)	14953.
MOISTURE CONTENT (%)	10.63
STACK TEMPERTURE (F)	493.3

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	35.506
PERCENT ISOKINETIC	88.99

KOPPERS COMPANY, INC.

GRENADA BOILER STACK

GR-BS-12 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
1.6S	1100.0	115.444	0.550	1.54	1.55	102.	98.	9.5	482.	56.
5.3			0.700	1.91	1.91	115.	98.	12.0	485.	63.
10.7			0.750	2.05	2.05	116.	98.	14.0	484.	65.
25.3			0.800	2.19	2.20	116.	98.	15.0	495.	68.
30.8			0.900	2.56	2.55	111.	98.	18.0	496.	72.
34.4S	1124.0	134.613	0.700	1.91	1.90	109.	98.	18.0	490.	63.
34.4W	1128.0	134.613	0.800	2.19	2.20	112.	98.	17.0	499.	68.
30.8			0.800	2.19	2.20	109.	98.	18.0	499.	68.
25.3			0.700	1.91	1.90	108.	98.	18.0	504.	64.
10.7			0.600	1.71	1.70	108.	99.	17.5	498.	59.
5.3			0.600	1.71	1.70	108.	99.	18.0	494.	58.
1.6W	1152.0	153.029	0.550	1.54	1.55	109.	99.	18.0	493.	56.

O R S A T			
CO2	7.4	IMPINGER NO. 1	56.0
O2	10.1	2	15.0
CO	0.0	3	7.0
N	82.4	4	0.0
		ABSORBED H2O	11.2

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	6.5
FINAL LT	0.02CFM	20.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.85
B.	AVG. DELTA H (IN H2O)	1.95
C.	METER PRESSURE (IN. HG.)	29.99
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.82
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2830
I.	NOZZLE AREA (SQ. FT.)	0.000437
J.	AVG. STACK TEMP (DEG. R.)	953.3
K.	AVG. METER TEMP (DEG. R.)	564.3
L.	CONDENSATE VOL. (ML)	78.0
M.	ABSORBED H2O (ML)	11.2
N.	TOTAL H2O (ML)	89.2
O.	METERED GAS (CF)	37.585
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	37.683
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	4.480
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	42.163
T.	PERCENT H2O (100R/S)	10.63
	THEORETICAL MAXIMUN	100.00
	PERCENT WATER USED	10.63
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	35.506

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-Y/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.074	X	0.8937	X	44.0	=	2.92
CO	0.000	X	0.8937	X	28.0	=	0.01
O2	0.101	X	0.8937	X	32.0	=	2.89
N2	0.824	X	0.8937	X	28.2	=	20.78
H2O		X	Y/100=0.1063	X	18.0	=	1.91
					MOLECULAR WEIGHT OF STACK GAS	=	28.51

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	63.62
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	26984.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	14953.
	STACK FLOW RATE (DRY)	13364.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-I/100)))	71.231
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	88.99

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-12 5-20-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00120	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00120
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00120

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	0.82	0.00052	0.05962
PCP	0.0	********	0.00000	0.00004
OCDD	0.0	********	0.00000	0.00000
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
100 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-13

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00083440	0.09583711	1.31728148
PCP	0.00000032	0.00003718	**********
OCDD	0.00000000	0.00000000	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	28049.
(SCFM)	15392.
MOISTURE CONTENT (%)	12.94
STACK TEMPERTURE (F)	504.1

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	33.775
PERCENT ISOKINETIC	91.41

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-13 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
1.6W	1235.0	559.110	0.800	1.94	1.94	104.	95.	7.0	506.	68.
5.3			0.900	2.19	2.19	122.	94.	8.0	508.	73.
10.7			0.850	2.07	2.07	123.	94.	8.0	505.	70.
25.3			0.700	1.70	1.70	126.	95.	7.0	505.	64.
30.8			0.700	1.70	1.70	127.	96.	8.0	503.	64.
34.4W	1259.0	577.427	0.600	1.46	1.46	127.	96.	7.5	502.	59.
1.6S	1304.0	577.427	0.600	1.46	1.46	111.	98.	7.5	503.	59.
5.3			0.650	1.58	1.58	128.	99.	9.0	505.	61.
10.7			0.750	1.82	1.82	130.	100.	11.0	504.	66.
25.3			0.850	2.07	2.07	129.	99.	13.5	504.	70.
30.8			0.900	2.19	2.19	125.	99.	15.0	502.	72.
34.4S	1328.0	595.069	0.650	1.58	1.58	123.	99.	13.0	502.	61.

O R S A T			
CO2	7.4	IMPINGER NO. 1	75.0
O2	10.1	2	15.0
CO	0.0	3	6.0
N	82.4	4	0.0
		ABSORBED H2O	10.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	9.0
FINAL LT	0.02CFM	15.5

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.90
B.	AVG. DELTA H (IN H2O)	1.81
C.	METER PRESSURE (IN. HG.)	30.03
D.	STATIC PRESSURE (IN. H2O)	-0.45
E.	STATIC PRESSURE (IN. HG.)	-0.033
F.	STACK PRESSURE (IN. HG.) (A+E)	29.87
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2720
I.	NOZZLE AREA (SQ. FT.)	0.000404
J.	AVG. STACK TEMP (DEG. R.)	964.1
K.	AVG. METER TEMP (DEG. R.)	570.0
L.	CONDENSATE VOL. (ML)	96.0
M.	ABSORBED H2O (ML)	10.1
N.	TOTAL H2O (ML)	106.1
O.	METERED GAS (CF)	35.959
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	36.160
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.376
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	41.536
T.	PERCENT H2O (100R/S)	12.94
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.94
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	33.775

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-Y/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.074	X	0.8706	X	44.0	=	2.84
CO	0.000	X	0.8706	X	28.0	=	0.01
O2	0.101	X	0.8706	X	32.0	=	2.81
N2	0.824	X	0.8706	X	28.2	=	20.24
H2O		X	Y/100=0.1294	X	18.0	=	2.33
					MOLECULAR WEIGHT OF STACK GAS	=	28.23

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	66.13
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	28049.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15392.
	STACK FLOW RATE (DRY)	13400.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	70.259
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	91.41

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00183	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00183
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00183

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	1.32	0.00083	0.09584
PCP	0.0	********	0.00000	0.00004
OCDD	0.0	********	0.00000	0.00000
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-14

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00035868	0.04259584	0.56625640
PCP	0.00000049	0.00005783	**********
OCDD	0.00000035	0.00004206	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	27439.
(SCFM)	15382.
MOISTURE CONTENT (%)	9.95
STACK TEMPERTURE (F)	483.8

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	34.777
PERCENT ISOKINETIC	91.73

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-14 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4W	1400.0	154.137	0.900	2.43	2.45	110.	105.	10.5	492.	71.
30.8			0.900	2.43	2.45	117.	105.	11.0	493.	72.
25.3			0.800	1.94	1.95	123.	104.	10.0	493.	67.
10.7			0.700	1.70	1.70	124.	104.	9.5	482.	63.
5.3			0.650	1.58	1.60	128.	105.	9.0	483.	60.
1.6W	1424.0	173.194	0.500	1.22	1.20	130.	105.	7.5	480.	53.
1.6S	1426.0	173.203	0.500	1.24	1.25	122.	104.	7.0	481.	53.
5.3			0.600	1.48	1.50	131.	105.	10.0	483.	58.
10.7			0.800	1.98	2.00	132.	106.	13.0	479.	67.
25.3			0.900	2.23	2.25	131.	106.	15.0	481.	71.
30.8			0.850	2.10	2.10	126.	106.	15.0	481.	69.
34.4S	1450.0	191.606	0.800	1.98	2.00	125.	106.	15.0	478.	67.

O R S A T	
CO2	7.4
O2	10.1
CO	0.0
N	82.4

IMPINGER NO. 1	50.0
2	18.0
3	3.0
4	0.0
ABSORBED H2O	10.2

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	7.0
FINAL LT	0.02CFM	15.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.90
B.	AVG. DELTA H (IN H2O)	1.87
C.	METER PRESSURE (IN. HG.)	30.04
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.87
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2710
I.	NOZZLE AREA (SQ. FT.)	0.000401
J.	AVG. STACK TEMP (DEG. R.)	943.8
K.	AVG. METER TEMP (DEG. R.)	575.0
L.	CONDENSATE VOL. (ML)	71.0
M.	ABSORBED H2O (ML)	10.2
N.	TOTAL H2O (ML)	81.2
O.	METERED GAS (CF)	37.460
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	37.557
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	4.150
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	41.708
T.	PERCENT H2O (100R/S)	9.95
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	9.95
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	34.777

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.074	X	0.9005	X	44.0	=	2.94
CO	0.000	X	0.9005	X	28.0	=	0.01
O2	0.101	X	0.9005	X	32.0	=	2.91
N2	0.824	X	0.9005	X	28.2	=	20.94
H2O		X	Y/100=0.0995	X	18.0	=	1.79
					MOLECULAR WEIGHT OF STACK GAS	=	28.59

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	64.70
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27439.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15382.
	STACK FLOW RATE (DRY)	13852.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	68.461
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	91.73

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00081	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00081
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00081

PARAMETER	MW	PPM	GR/SCF	LB/HR
HCL	35.5	0.57	0.00036	0.04259
PCP	0.0	********	0.00000	0.00006
OCDD	0.0	********	0.00000	0.00004
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-15

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00089074	0.10065660	1.40622914
PCP	0.00000213	0.00024093	**********
OCDD	0.00000027	0.00002998	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	27347.
(SCFM)	15276.
MOISTURE CONTENT (%)	13.70
STACK TEMPERTURE (F)	487.0

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	32.503
PERCENT ISOKINETIC	88.73

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-15 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4W	1520.0	595.776	1.000	2.51	2.51	111.	102.	11.0	460.	75.
30.8			1.000	2.51	2.51	111.	102.	11.0	460.	75.
25.3			0.900	2.26	2.26	120.	101.	11.0	504.	73.
10.7			0.800	2.01	2.01	122.	100.	12.0	514.	69.
5.3			0.600	1.71	1.71	126.	100.	10.5	487.	59.
1.6W	1544.0	613.669	0.500	1.26	1.26	127.	100.	10.0	480.	53.
1.6S	1548.0	613.669	0.600	1.71	1.71	114.	100.	10.0	480.	58.
5.3			0.600	1.71	1.71	126.	100.	10.0	485.	59.
10.7			0.700	1.76	1.76	129.	102.	13.0	496.	64.
25.3			0.800	2.01	2.01	128.	102.	17.0	504.	68.
30.8			0.600	1.71	1.71	123.	102.	17.0	492.	59.
34.4S	1612.0	630.459	0.600	1.71	1.71	123.	102.	17.0	482.	58.

O R S A T			
CO2	7.4	IMPINGER NO. 1	60.0
O2	10.1	2	26.0
CO	0.0	3	10.0
N	82.4	4	0.0
		ABSORBED H2O	13.0

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	8.0
FINAL LT	0.02CFM	17.0

KOPPERS COMPANY, INC.

GRENADA BOILER STACK

GR-BS-15 5-20-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.90
B.	AVG. DELTA H (IN H2O)	1.91
C.	METER PRESSURE (IN. HG.)	30.04
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.86
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	947.0
K.	AVG. METER TEMP (DEG. R.)	571.4
L.	CONDENSATE VOL. (ML)	96.0
M.	ABSORBED H2O (ML)	13.0
N.	TOTAL H2O (ML)	109.0
O.	METERED GAS (CF)	34.683
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	34.877
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.536
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	40.413
T.	PERCENT H2O (100R/S)	13.70
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	13.70
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	32.503

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.074	X	0.8630	X	44.0	=	2.82
CO	0.000	X	0.8630	X	28.0	=	0.01
O2	0.101	X	0.8630	X	32.0	=	2.79
N2	0.824	X	0.8630	X	28.2	=	20.07
H2O		X	Y/100=0.1370	X	18.0	=	2.47
					MOLECULAR WEIGHT OF STACK GAS	=	28.15

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	64.48
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	27347.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15276.
	STACK FLOW RATE (DRY)	13184.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	66.980
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	88.73

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-15 5-20-82

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00188	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00188
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00189

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	1.41	0.00089	0.10066
PCP	0.0	********	0.00000	0.00024
OCDD	0.0	********	0.00000	0.00003
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
250 LB/HR PENTA
5-20-82
822-1735

A-82

AIR QUALITY ENGINEERING
GR-BS-16

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00183199	0.20685703	2.89219656
PCP	0.00000170	0.00019230	**********
OCDD	0.00000022	0.00002495	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	26992.
(SCFM)	15027.
MOISTURE CONTENT (%)	12.34
STACK TEMPERTURE (F)	490.2

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	33.456
PERCENT ISOKINETIC	91.43

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-16 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4S	1520.0	193.805	0.600	1.48	1.50	114.	110.	5.5	490.	59.
30.8			0.650	1.58	1.60	132.	110.	6.0	490.	61.
25.3			0.800	1.94	1.95	135.	110.	7.5	494.	68.
10.7			0.900	2.43	2.45	136.	110.	10.5	503.	72.
5.3			0.900	2.43	2.45	136.	110.	10.5	489.	72.
1.6S	1544.0	212.358	0.600	1.48	1.50	136.	110.	8.5	474.	58.
1.6W	1548.0	212.358	0.700	1.76	1.75	124.	108.	9.0	480.	63.
5.3			0.900	2.43	2.45	134.	108.	13.5	493.	72.
10.7			0.600	1.48	1.50	131.	108.	11.0	493.	59.
25.3			0.600	1.48	1.50	133.	108.	11.0	496.	59.
30.8			0.600	1.48	1.50	135.	108.	11.0	490.	59.
34.4W	1612.0	230.185	0.600	1.48	1.50	135.	108.	11.0	490.	59.

ORSAT		IMPINGER NO.	
CO2	7.4	1	62.0
O2	10.1	2	15.0
CO	0.0	3	10.0
N	82.4	4	0.0
		ABSORBED H2O	12.5

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	12.0
FINAL LT	0.02CFM	15.0

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-16 5-20-82

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.90
B.	AVG. DELTA H (IN H2O)	1.80
C.	METER PRESSURE (IN. HG.)	30.03
D.	STATIC PRESSURE (IN. H2O)	-0.50
E.	STATIC PRESSURE (IN. HG.)	-0.037
F.	STACK PRESSURE (IN. HG.) (A+E)	29.86
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	950.2
K.	AVG. METER TEMP (DEG. R.)	580.4
L.	CONDENSATE VOL. (ML)	87.0
M.	ABSORBED H2O (ML)	12.5
N.	TOTAL H2O (ML)	99.5
O.	METERED GAS (CF)	36.380
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	36.475
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.134
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	41.609
T.	PERCENT H2O (100R/S)	12.34
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.34
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	33.456

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.074	X	0.8766	X	44.0	=	2.86
CO	0.000	X	0.8766	X	28.0	=	0.01
O2	0.101	X	0.8766	X	32.0	=	2.83
N2	0.824	X	0.8766	X	28.2	=	20.38
H2O		X	Y/100=0.1234	X	18.0	=	2.22
					MOLECULAR WEIGHT OF STACK GAS	=	28.31

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	63.64
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	26992.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	15027.
	STACK FLOW RATE (DRY)	13173.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	68.120
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	91.43

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00398	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00398
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00398

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	2.89	0.00183	0.20686
PCP	0.0	********	0.00000	0.00019
OCDD	0.0	********	0.00000	0.00002
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-17

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00082340	0.08664414	1.29992306
PCP	0.00000348	0.00036595	**********
OCDD	0.00000061	0.00006458	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	23476.
(SCFM)	13633.
MOISTURE CONTENT (%)	9.95
STACK TEMPERTURE (F)	452.7

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	30.112
PERCENT ISOKINETIC	88.40

KOPPERS COMPANY, INC.
GRENADA BOILER STACK
GR-BS-17 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4S	1736.0	630.664	0.600	1.52	1.52	114.	112.	6.0	457.	57.
30.8			0.650	1.65	1.65	128.	110.	7.0	450.	59.
25.3			0.650	1.65	1.65	129.	109.	7.0	455.	59.
10.7			0.500	1.31	1.31	131.	108.	6.0	453.	52.
5.3			0.500	1.31	1.31	133.	108.	6.5	451.	52.
1.6S	1800.0	647.165	0.500	1.31	1.31	135.	108.	7.0	451.	52.
34.4W	1804.0	647.165	0.550	1.44	1.44	122.	108.	7.5	450.	54.
30.8			0.600	1.52	1.52	135.	107.	8.5	454.	57.
25.3			0.600	1.52	1.52	135.	107.	9.0	456.	57.
10.7			0.550	1.44	1.44	136.	106.	9.0	453.	55.
5.3			0.500	1.31	1.31	136.	107.	8.5	451.	52.
1.6W	1828.0	663.230	0.500	1.31	1.31	136.	106.	9.0	451.	52.

O R S A T			
CO2	7.4	IMPINGER NO. 1	46.0
O2	10.1	2	10.0
CO	0.0	3	2.0
N	82.4	4	0.0
		ABSORBED H2O	12.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	12.0
FINAL LT	0.02CFM	12.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.95
B.	AVG. DELTA H (IN H2O)	1.44
C.	METER PRESSURE (IN. HG.)	30.06
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.92
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	912.7
K.	AVG. METER TEMP (DEG. R.)	579.4
L.	CONDENSATE VOL. (ML)	58.0
M.	ABSORBED H2O (ML)	12.3
N.	TOTAL H2O (ML)	70.3
O.	METERED GAS (CF)	32.566
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	32.748
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	3.618
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	36.367
T.	PERCENT H2O (100R/S)	9.95
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	9.95
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	30.112

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-Y/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	0.074	X	0.9005	X	44.0	=	2.94
CO	0.000	X	0.9005	X	28.0	=	0.01
O2	0.101	X	0.9005	X	32.0	=	2.91
N2	0.824	X	0.9005	X	28.2	=	20.94
H2O		X	Y/100=0.0995	X	18.0	=	1.79
					MOLECULAR WEIGHT OF STACK GAS	=	28.59

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	55.35
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	23476.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	13633.
	STACK FLOW RATE (DPY)	12276.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (0(J/K/(1-T/100)))	57.283
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	88.40

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00161	0.00000
PCP	0.00000	0.00000	0.00001	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00161
PCP	0.00001
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00162

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	1.30	0.00082	0.08664
PCP	0.0	********	0.00000	0.00037
OCDD	0.0	********	0.00000	0.00006
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR PENTA
5-20-82
822-1735

AIR QUALITY ENGINEERING
GR-BS-18

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00324966	0.31615129	5.13029432
PCP	0.00000144	0.00014040	**********
OCDD	0.00000000	0.00000000	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	23326.
(SCFM)	13272.
MOISTURE CONTENT (%)	14.48
STACK TEMPERTURE (F)	468.4

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	30.945
PERCENT ISOKINETIC	98.27

KOPPERS COMPANY, INC.

GRENADA BOILER STACK

GR-BS-18 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
34.4W	1845.0	230.079	0.550	1.44	1.45	104.	103.	6.5	462.	55.
30.8			0.550	1.44	1.45	119.	104.	6.0	464.	56.
25.3			0.550	1.44	1.45	123.	104.	6.0	466.	56.
10.7			0.500	1.31	1.30	129.	104.	6.0	470.	53.
5.3			0.500	1.31	1.30	129.	104.	6.0	466.	53.
1.6W	1909.0	247.273	0.500	1.31	1.30	129.	104.	6.5	464.	53.
1.6S	1914.0	247.273	0.550	1.44	1.45	119.	103.	7.5	460.	55.
5.3			0.500	1.31	1.30	129.	103.	7.5	462.	53.
10.7			0.500	1.31	1.30	129.	103.	7.5	468.	53.
25.3			0.600	1.57	1.60	131.	103.	10.5	475.	58.
30.8			0.550	1.44	1.45	130.	103.	10.5	480.	56.
34.4S	1938.0	263.463	0.500	1.31	1.30	130.	103.	11.0	484.	53.

O R S A T			
CO2	7.4	IMPINGER NO. 1	69.0
O2	10.1	2	15.0
CO	0.0	3	5.0
N	82.4	4	0.0
		ABSORBED H2O	21.7

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-1-82
METER	1.0026	4-1-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	12.5
FINAL LT	0.02CFM	14.0

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.85
B.	AVG. DELTA H (IN H2O)	1.39
C.	METER PRESSURE (IN. HG.)	29.95
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.82
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	928.4
K.	AVG. METER TEMP (DEG. R.)	574.3
L.	CONDENSATE VOL. (ML)	89.0
M.	ABSORBED H2O (ML)	21.7
N.	TOTAL H2O (ML)	110.7
O.	METERED GAS (CF)	33.384
P.	GAS METER CORRECTION	1.0026
Q.	CORRECTED METERED GAS (CF)	33.471
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.667
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	39.138
T.	PERCENT H2O (100R/S)	14.48
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	14.48
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	30.945

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.074	X	0.8552	X	44.0	=	2.79
CO	0.000	X	0.8552	X	28.0	=	0.01
O2	0.101	X	0.8552	X	32.0	=	2.76
N2	0.824	X	0.8552	X	28.2	=	19.88
H2O		X	Y/100=0.1448	X	18.0	=	2.61
					MOLECULAR WEIGHT OF STACK GAS	=	28.05

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	55.00
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	23326.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	13272.
	STACK FLOW RATE (DRY)	11350.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (D(J/K/(1-T/100)))	63.276
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	98.27

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00653	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00653
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00653

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	5.13	0.00325	0.31615
PCP	0.0	********	0.00000	0.00014
OCDD	0.0	********	0.00000	0.00000
HCDD	0.0	********	0.00000	0.00000

KOPPERS COMPANY, INC.
GRENADA
BOILER STACK
400 LB/HR PENTA
5-20-82
622-1735

AIR QUALITY ENGINEERING
GR-BS-19

SUMMARY OF TEST RESULTS

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR	PPM
HCL	0.00180371	0.18119629	2.84754801
PCP	0.00000045	0.00004504	**********
OCDD	0.00000000	0.00000000	**********
HCDD	0.00000000	0.00000000	**********

2. STACK CONDITIONS

FLOW (ACFM)	24136.
(SCFM)	13579.
MOISTURE CONTENT (%)	13.69
STACK TEMPERTURE (F)	478.9

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	48.0
SCFD GAS SAMPLED	30.224
PERCENT ISOKINETIC	92.93

KOPPERS COMPANY, INC.

GRENADA BOILER STACK A-95

GR-BS-19 5-20-82

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORREC VELOCI FT/SE
1.6S	1845.0	663.355	0.500	1.31	1.31	114.	105.	8.5	474.	53.
5.3			0.500	1.31	1.31	128.	104.	8.5	476.	53.
10.7			0.550	1.44	1.44	131.	104.	9.0	478.	56.
25.3			0.600	1.57	1.57	131.	103.	10.5	479.	58.
30.8			0.600	1.57	1.57	131.	102.	11.0	478.	58.
34.4S	1909.0	679.519	0.600	1.57	1.57	130.	102.	12.0	474.	58.
34.4W	1914.0	679.519	0.550	1.44	1.44	116.	102.	11.5	477.	56.
30.8			0.600	1.57	1.57	127.	101.	13.0	479.	58.
25.3			0.650	1.70	1.70	125.	100.	16.0	481.	61.
10.7			0.550	1.44	1.44	123.	100.	14.5	483.	56.
5.3			0.550	1.44	1.44	123.	100.	15.0	488.	56.
1.6W	1938.0	695.817	0.500	1.31	1.31	123.	100.	14.5	480.	53.

O R S A T			
CO2	7.4	IMPINGER NO. 1	70.0
O2	10.1	2	12.0
CO	0.0	3	5.0
N	82.4	4	0.0
		ABSORBED H20	14.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.74	4-20-82
METER	1.0056	4-20-82
PITOT	0.84	7-1-80

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	6.0
FINAL LT	0.02CFM	18.5

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.85
B.	AVG. DELTA H (IN H2O)	1.47
C.	METER PRESSURE (IN. HG.)	29.96
D.	STATIC PRESSURE (IN. H2O)	-0.40
E.	STATIC PRESSURE (IN. HG.)	-0.029
F.	STACK PRESSURE (IN. HG.) (A+E)	29.82
G.	STACK DIAMETER (IN.)	36.00
H.	STACK AREA (SQ. FT.)	7.07
	NOZZLE DIAMETER	0.2730
I.	NOZZLE AREA (SQ. FT.)	0.000406
J.	AVG. STACK TEMP (DEG. R.)	938.9
K.	AVG. METER TEMP (DEG. R.)	573.5
L.	CONDENSATE VOL. (ML)	87.0
M.	ABSORBED H2O (ML)	14.3
N.	TOTAL H2O (ML)	101.3
O.	METERED GAS (CF)	32.462
P.	GAS METER CORRECTION	1.0056
Q.	CORRECTED METERED GAS (CF)	32.644
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	5.178
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	37.822
T.	PERCENT H2O (100R/S)	13.69
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	13.69
U.	SCFD GAS SAMPLED (530*Q*C/(29.9*K))	30.224

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-Y/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	0.074	X	0.8631	X	44.0	=	2.82
CO	0.000	X	0.8631	X	28.0	=	0.01
O2	0.101	X	0.8631	X	32.0	=	2.79
N2	0.824	X	0.8631	X	28.2	=	20.07
H2O		X	Y/100=0.1369	X	18.0	=	2.46
					MOLECULAR WEIGHT OF STACK GAS	=	28.15

W.	PITOT CORRECTION	0.840
X.	AVERAGE CORRECTED VELOCITY (FPS)	56.91
Y.	AVG. FLOW RATE (CFM) (GG*H*60)	24136.
Z.	STACK FLOW RATE (SCFM) (530*X/J*F/29.92)	13579.
	STACK FLOW RATE (DRY)	11720.
AA.	SAMPLE TIME (SEC)	2880.
BB.	NOZZLE VOLUME (Q(J/K/(1-T/100)))	61.916
CC.	PERCENT ISOKINETIC (100BB/(I*AA*X))	92.93

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
HCL	0.00000	0.00000	0.00354	0.00000
PCP	0.00000	0.00000	0.00000	0.00000
OCDD	0.00000	0.00000	0.00000	0.00000
HCDD	0.00000	0.00000	0.00000	0.00000

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
HCL	0.00000	0.00000
PCP	0.00000	0.00000
OCDD	0.00000	0.00000
HCDD	0.00000	0.00000

TOTALS

HCL	0.00354
PCP	0.00000
OCDD	0.00000
HCDD	0.00000
ALL MATLS.	0.00354

PARAMETER	MW	PPM	GR/SCFD	LB/HR
HCL	35.5	2.85	0.00180	0.18120
PCP	0.0	********	0.00000	0.00005
OCDD	0.0	********	0.00000	0.00000
HCDD	0.0	********	0.00000	0.00000

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
Bureau of Pollution Control
P. O. Box 10385
Jackson, Mississippi 39209
May (601) 961-5171

B-1

MAY 18 1982

AIR QUALITY ENGINEE

Mr. Ray Ohlis
Koppers Company, Inc.
P. O. Box 160
Grenada, Mississippi 38960

Dear Mr. Ohlis:

Re: Modification
Operating Permit No. 0960-00012
Tie Plant, Mississippi

This letter is to inform you that the above referenced operating permit has been modified. This modification consists of permitting you for six months to test burn waste materials (creosote sludge and penta-in-oil sludge) with the primary fuel. During this time stack emission tests will be performed by the requirements presented in the request for a modification.

Enclosed please find a copy of the modified permit.

If you should have objections to this permit modification and desire that a Permit Board hearing be held, you should make written application to the Permit Board within thirty (30) days after receipt of this notice; otherwise, the terms, conditions and limitations of the modified permit shall become final.

Very truly yours,

Dan M. McLeod
North Air Emissions Section

DMM:els
Enclosure
cc: Mr. William J. Baldwin
Mr. John T. Kane, Jr.

State of Mississippi
Air Pollution Control
PERMIT

TO OPERATE AIR EMISSIONS EQUIPMENT

THIS CERTIFIES THAT

Koppers Company, Inc.
Tie Plant,
Mississippi

has been granted permission to operate air emissions equipment in accordance with emission limitations, monitoring requirements and other conditions set forth herein. This permit is issued in accordance with the provisions of the Mississippi Air and Water Pollution Control Law (Section 49-17-1 et seq., Mississippi Code of 1972), and the regulations and standards adopted and promulgated thereunder.

Issued this 11th day of December, 19 79

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF POLLUTION CONTROL PERMIT BOARD

_____
Director

Expires 1st day of December, 19 82.

Permit No. 0960-00012

PERMIT MODIFIED: MAY 11, 1982

PART I
GENERAL CONDITIONS

1. All emissions authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any air pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions or modifications which will result in new, different, or increased emission of air pollutants must be reported by submission of a new application.

2. The permittee shall at all times maintain in good working order and operate as efficiently as possible all air pollution control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

3. Solids removed in the course of control of air emissions shall be disposed of in a manner such as to prevent the solids from becoming windborne and to prevent the materials from entering state waters.

4. Any diversion from or bypass of collection and control facilities is prohibited except (i) where unavoidable to prevent loss of life or severe property damage or (ii) when approved by the Mississippi Department of Natural Resources Bureau of Pollution Control Permit Board.

5. Whenever any emergency, accidental or excessive discharge of air contaminants occurs, the office of the Mississippi Department of Natural Resources Bureau of Pollution Control shall be notified immediately of all information concerning cause of the discharge, point of discharge, volume and characteristics, and whether discharge is continuing or stopped.

6. Should the Executive Director of the Mississippi Department of Natural Resources declare an Air Pollution Emergency Episode, the permittee will be required to operate in accordance with the permittee's previously approved Emissions Reduction Schedule.

7. The permittee shall allow the Mississippi Department of Natural Resources Bureau of Pollution Control and the Mississippi Department of Natural Resources Bureau of Pollution Control Permit Board and/or their authorized representatives, upon the presentation of credentials:

   a. To enter upon the permittee's premises where an air emission source is located or in which any records are required to be kept under the terms and conditions of this permit; and

   b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any air emission.

8. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to:

   a. Violation of any terms or conditions of this permit;

   b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

   c. A change in any condition that required either a temporary or permanent reduction or elimination of authorized air emissions.

9. For renewal of this permit the applicant shall make application not less than one-hundred eighty (180) days prior to the expiration date of the permit substantiated with current emissions data, test results or reports or other data as deemed necessary by the Mississippi Department of Natural Resources Bureau of Pollution Control Permit Board.

10. Except for data determined to be confidential under the Mississippi Air and Water Pollution Control Law, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Mississippi Department of Natural Resources Bureau of Pollution Control.

11. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

12. Nothing herein contained shall be construed as releasing the permittee from any liability for damage to persons or property by reason of the installation, maintenance, or operation of the air cleaning facility, or from compliance with the applicable statutes of the State, or with local laws, regulations, or ordinances.

13. This permit is non-transferable.

14. This permit is for air pollution control purposes only.

PART II
EMISSION LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning December 11, 1979, and lasting until December 1, 1982, the permittee is authorized to operate air emissions equipment and emit air contaminants from wood preserving facility with one woodwaste boiler.

Such emissions shall be limited and monitored by the permittee as specified below:

EMISSION CHARACTERISTIC	EMISSION LIMITATIONS		
	lb/hr	lbs/day	Other units (specify)
Particulate Matter			.3 grains/dscf
Opacity			40%

EMISSION CHARACTERISTIC	MONITORING REQUIREMENTS		
	Measurement Frequency	Sample Type	Reporting Frequency

PART III
OTHER REQUIREMENTS

The permittee will be allowed to test burn penta-in-oil sludge or creosote sludge with the primary fuel (woodwaste) for six (6) months or until October 11, 1982. At such time if no problems have occurred, the Bureau will go to Public Notice for thirty (30) days for the public's response. The test burning is allowed pursuant to the following conditions:

(1) At any time the Bureau receives justifiable odor complaints from the test burning of the cresote slude or penta-in-oil sludge with the primary fuel the Bureau will request the test burning be terminated.

(2) The permittee will perform emission compliance test in accordance to the submitted methods approved by the Bureau for each of the previously established parameters, at the following increments: 100, 250, and 400 lb/hr of each of the sludges. There will also be emission compliance tests performed with no sludge being added to obtain baseline data. If so chosen to combine the sludges emission compliance shall also be performed for all requested parameters.

(3) The permittee shall retain operating logs containing in-stack opacity stripcharts and sludge feed rate data for the Department of Natural Resources, Bureau of Pollution Control review upon request.

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122, 264, and 265

[SWH-FRL 1730-5]

Incinerator Standards for Owners and Operators of Hazardous Waste Management Facilities; Consolidated Permit Regulations

AGENCY: Environmental Protection Agency.

ACTION: Interim Final Rule (Parts 264 and 122) and Final rule (Part 265).

SUMMARY: The Environmental Protection Agency is amending its regulations for the management of hazardous waste by (1) promulgating, on an interim final basis, incinerator standards that will be the basis for permit issuance to owners and operators of hazardous waste management facilities (Part 264, Subpart O); (2) finalizing the interim status incinerator standards issued on May 19, 1980 (Part 265, Subpart O); and, (3) amending the permit regulations (Part 122) to correspond to the facility regulations being published today.

Under the Resource Conservation and Recovery Act (RCRA), the Agency is required to establish a Federal hazardous waste management system. Early last year EPA began issuing the first phase of regulations designed to implement that system. In January of this year EPA promulgated major portions of the Phase II technical standards for facilities that treat and store hazardous wastes. Today's publication adds another part to the Phase II technical standards by setting forth requirements for owners or operators of incinerator facilities that treat hazardous waste. These regulations provide the necessary standards by which permits may be granted. The substantive requirements for hazardous waste incinerator permits are included in Part 264, Subpart O. Information required for Part B of a permit application is specified in Part 122.25(b)(5). In many cases trial burns will be necessary to gather data needed for Part B of an incinerator facility's permit application. Criteria for trial burn permits are detailed in Part 122.27(b). Interim Status Standards must be observed by existing facilities until final action on their permit applications. EPA is today finalizing the Interim Status Standards for Incinerators which were promulgated, on an interim final basis, on May 19, 1980. These are in Part 265, Subpart O.

DATES: *Effective Date:* These regulations become effective on July 22, 1981, which is six months after the date of publication in the Federal Register, as RCRA Section 3010(b) requires.

Comment Date: These regulations are issued on an interim final basis. EPA will accept public comments on the Part 264 and Part 122 regulations and comments in response to requests in the preamble until March 24, 1981. In regard to the final regulation (Part 265), EPA will accept comments only on technical errors (e.g., typographical errors, inaccurate cross references, etc.).

ADDRESSES: Comments should be sent to Docket Clerk [Docket No. 30041], Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Public Docket: The public docket for these regulations is located in Room 2711, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C., and is available for viewing from 9:00 a.m. to 4:00 p.m. Monday through Friday, excluding holidays. Among other things, the docket contains background documents which explain, in more detail than the preamble to this regulation, the basis for many of the provisions in this regulation.

Copies of Regulations: Single copies of these regulations will be available approximately 30 days after publication from Ed Cox, Solid Waste Information, U.S. Environmental Protection Agency, 26 West St. Clair Street, Cincinnati, Ohio 45268, telephone (513) 684-5362. Multiple copies will be available from the Superintendent of Documents, Washington, D.C. 20402.

FOR FURTHER INFORMATION CONTACT: For general information contact the RCRA hazardous waste hotline, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460 (phone 800-424-9346, or in Washington, D.C. 554-1404).

For information on implementation of these regulations, contact the EPA regional offices below:

Region I

Dennis Huebner, Chief, Waste Management Branch, John F. Kennedy Building, Boston, Massachusetts 02203, (617) 223-5775

Region II

Dr. Ernest Regna, Chief, Solid Waste Branch, 26 Federal Plaza, New York, New York 10007, (212) 264-0503

Region III

Robert L. Allen, Chief, Hazardous Materials Branch, 6th and Walnut Streets, Philadelphia, Pennsylvania 19106, (215) 597-0980

Region IV

James Scarbrough, Chief, Residuals Management Branch, 345 Courtland Street, N.E., Atlanta, Georgia 30308, (404) 881-3016

Region V

Karl J. Klepitsch, Jr., Chief, Waste Management Branch, 230 South Dearborn Street, Chicago, Illinois 60604, (312) 886-6148

Region VI

R. Stan Jorgensen, Acting Chief, Solid Waste Branch, 1201 Elm Street, First International Building, Dallas, Texas 75270, (214) 767-8941

Region VII

Robert L. Morby, Chief, Hazardous Materials Branch, 324 East 11th Street, Kansas City, Missouri 64106, (816) 374-3307

Region VIII

Lawrence P. Gazda, Chief, Waste Management Branch, 1860 Lincoln Street, Denver, Colorado 80203, (303) 837-2221

Region IX

Arnold R. Den, Chief, Hazardous Materials Branch, 215 Fremont Street, San Francisco, California 94105, (415) 556-4606

Region X

Kenneth D. Feigner, Chief, Waste Management Branch, 1200 6th Avenue, Seattle, Washington 98101, (206) 442-1260

SUPPLEMENTARY INFORMATION: This preamble outlines the basis and purpose of the standards for incineration of hazardous waste that the Agency is publishing in today's Federal Register. It also summarizes and explains changes from the standards originally proposed. More complete explanation of, and support for, these standards can be found in "*Background Document,* 40 CFR Part 264 Subpart O, and 40 CFR Part 265 Subpart O: Incineration," and in the guidance materials which the Agency has developed to assist in the understanding and implementation of these regulations. The latest drafts of these manuals—"Engineering Handbook on Hazardous Waste Incineration," and "Permit Writers' Guidance Document for Hazardous Waste Incineration"—are available in the RCRA docket room, as is the Background Document.

EPA is also proposing today a procedure to allow a variance in acceptable incinerator emissions, based on case-by-case assessments of the risk to human health and the environment from such emissions. This procedure

could be used to set emission limits for hazardous inorganic constituents and combustion by-products, as well as for organic constituents controlled by today's promulgation. This proposal appears elsewhere in today's Federal Register and is discussed in a separate preamble section.

Preamble Outline

I. *Authority*
II. *Background*
III. *Synopsis of the 1978 Proposal*
A. The Regulation as Proposed
B. Comments on the Proposed Regulation
IV. *The Incinerator Regulations Promulgated Today*
A. Part 264—General Standards for Hazardous Waste Incineration
B. Part 122—Incinerator Facility Permits
C. Part 265—Interim Status Standards for Hazardous Waste Incineration
V. *Issues Raised by Comments, and Changes in the Regulation*
A. General Concept Underlying the Regulations
B. Significant Comments; Changes to Part 264
C. Significant Comments; Changes to Part 122
D. Significant Comments; Changes to Part 265
VI. *Regulatory Analysis*
A. Economic Analysis
B. Regulatory Alternatives
VII. *OMB Review*
VIII. *Supporting Documents*

I. Authority

These regulations are issued under the authority of Section 1006, 2002(a), 3004, 3005, and 3007 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. §§ 6905, 6912(a), 6924, 6925, and 6927.

II. Background

On December 18, 1978, EPA issued proposed standards for owners and operators of hazardous waste management facilities, including standards for incinerators (43 FR 58946). The Agency received more than 250 comments on the proposed incinerator regulations and held five public hearings on the December 18 proposal. On May 19, 1980, EPA promulgated the first of two major phases of the final regulations for hazardous waste management facilities. Phase I included administrative standards for hazardous waste facilities with RCRA permits (40 CFR Part 264) and administrative and technical standards for hazardous waste facilities in interim status (40 CFR Part 265). As part of those May 19, 1980 regulations, EPA issued interim status standards for incineration under 40 CFR Part 265, Subpart O. Those Subpart O regulations are being promulgated today as final standards with few minor changes to reflect additional public comment.

EPA also announced on May 19, 1980, its intent to promulgate the technical standards for hazardous waste facilities with permits (40 CFR Part 264) as Phase II of the regulations in the fall of 1980. (For a discussion of the phased approach to the regulations see the background and overview discussion accompanying the Parts 264 and 265 regulations published on May 19, 1980, at 45 FR 33154. For a discussion of the Phase II regulations overall, see the introductory material accompanying the January 12, 1981 regulations at 46 FR 2802.)

Early in January of this year, EPA promulgated the first portion of Phase II of the technical standards for facilities with permits. These included standards addressing financial requirements, closure and post-closure, location, and storage in containers, tanks, piles, and surface impoundments.

The regulations for incinerators that EPA is issuing today represent an additional part of the Phase II standards. Another part of Phase II, standards for land disposal, is being promulgated elsewhere in today's Federal Register.

The Agency has also made additions in today's promulgation to the permitting regulations in Part 122 to correspond with the new technical requirements of Part 264, Subpart O. These include information required for Part B of a permit application (§ 122.25(b)(5)) and criteria for trial burn permits (§ 122.27). Elsewhere in today's Federal Register, the Agency is proposing additions to the Part 264, Subpart O standards being promulgated today. These additions will necessitate future additions to the Part 122 permitting standards.

Many of the terms used in today's regulation are defined in the Part 260 regulations which were issued on May 19, 1980, at 45 FR 33066. For example one key point underlying the regulations promulgated today is that incineration of hazardous waste is a form of "treatment" as treatment is defined under § 260.10(73).

The definintion of incinerator in § 260.10(30) notes that the primary purpose is to "thermally break down hazardous waste." This should be differentiated from the combustion of wastes primarily for the recovery of their thermal value, which is not "incineration" and, in accordance with the exclusion of reused or recycled wastes under § 261.6, is exempt from these incinerator regulations.

Today's regulations should also be distinguished from "thermal treatment" standards for which the Agency has published interim status standards (Part 265, Subpart P) which it intends to finalize sometime soon. The Agency has not yet issued technical permit standards for thermal treatment under Part 264. When promulgated, these standards will address thermal treatment processes which do not come under the definition of incineration.

As a result of adding Subpart O to Part 264, the Agency has also made a number of technical conforming changes to other sections, including §§ 264.10, 264.13, 264.15, 264.73, 264.112, and 264.142.

III. Synopsis of the 1978 Proposal for Incinerators

A. The Regulations as Proposed

Proposed regulations for incineration of hazardous waste were published as 40 CFR § 250.45–1 on December 18, 1978 (45 FR 59008). They required owners and operators to meet a number of performance standards coupled with various operating requirements, most of which were intended to help ensure that the performance criteria were continuously met.

The performance criteria required that all incinerators burning hazardous wastes achieve a destruction efficiency (DE) of 99.99%, and a combustion efficiency of at least 99.9%; that particulate emissions be less than 270 mg./scm^3 (0.12 gr/scf) at zero excess air; that fugitive emissions be controlled; and that emission controls remove more than 99% of the halogens when hazardous wastes containing more than 0.5% halogens were burned.

Proposed operating regulations required that owners or operators monitor and record significant variables at 15 minute intervals; that trial burns be conducted, analyzed and reported to the Regional Administrator before each new and "significantly different" hazardous waste was incinerated; and that the wastes be retained for 2 seconds at 1000° C. combustion temperature (1200° C. for halogen containing wastes). A "note" or variance provided that incinerators need not comply with the detailed combustion criteria if an equivalent combustion efficiency could be achieved by other means. A device to automatically cut off waste feed whenever combustion or scrubber conditions changed significantly was a final requirement.

B. Comments on the Proposed Regulations

The Agency received more than 250 comments on the proposed incinerator regulations. The most significant of these are discussed in Section V of this

preamble. All of them are considered in the accompanying "Background Document."

Many comments dealt with broad and general issues such as the propriety of applying any design and operating requirements, rather than relying solely on performance standards. Some comments questioned the Agency's statutory authority to regulate hazardous waste incineration under RCRA at all, rather than under the Clean Air Act.

On the other hand, many comments were essentially technical. One comment suggested that turbulence criteria be added to the time and temperature requirements. Others suggested that the measurement methodology was unclear or difficult to apply and that the measurement locations and frequencies for emission and effluent temperature measurements need to be specified. Three comments pointed to dangers inherent in automatic cut-off devices, and suggested that gradual shut-downs were preferable.

A middle range of comments accepted the general framework of the proposed regulations but stated that specific criteria were unnecessary or infeasible. In particular it was claimed that the halogen removal levels appropriate for chlorine were more stringent than those necessary or possible for other halogens, such as bromides or iodides. Similar comments suggested that the general 99.99% Destruction Efficiency requirement was impractical and very costly and would divert wastes from the relatively "safe" incineration option into "dangerous" longterm disposal in landfills. Some comments suggested varying Destruction Efficiency in accord with each waste's degree of hazard.

The high cost of trial burns and of trial burn analyses was frequently mentioned. There was considerable concern about the requirement that a new trial burn be performed before each "significantly different" new waste was incinerated. Several commenters pointed out that the almost infinite variety of chemical mixtures making up waste feeds made this requirement both expensive and impossible to apply with certainty, depending on the definition of "significantly different." A few comments suggested that the requirement that fugitive emissions be controlled should be more specific.

A final category of comments suggested specific exemptions or additional inclusions for the regulations when finally promulgated. The most important of these dealt with exempting wastes which were hazardous solely because of ignitability. Others recommended clarifying the status of incinerator ash residue and scrubber effluents as hazardous wastes, and of cement kiln incinerators and utility boilers burning hazardous wastes for their thermal value.

IV. The Incinerator Regulations Promulgated Today

A. Part 264—General Standards for Hazardous Waste Incineration

1. Applicability (§ 264.340)

This regulation and § 122.27(b) provide the substantive basis for all incinerator permits to be issued under Section 3005 of RCRA. In accord with §§ 261.2(c)(2) and 261.6, Part 260 defines "incinerator" so that combustion of wastes *primarily* for the recovery of their thermal value is not "incineration" and thus, is exempt from these standards. EPA plans to reconsider, and perhaps narrow, the § 261.6 exclusions in the future. The Agency specifically solicits comments on appropriate regulation of emissions from combustion of hazardous waste for purposes of thermal recovery.

The Agency may soon move to integrate these regulations with those promulgated under the Toxic Substance Control Act (TSCA) to control incineration of polychlorinated biphenyls (PCBs). EPA welcomes comments on the form and substance of that integration. Until that time the incineration of wastes which are subject to EPA's TSCA disposal criteria (40 CFR Part 761) will continue to be subject to control under TSCA rather than RCRA. Those requirements are more stringent than, but not inconsistent with, the requirements of this Subpart.

Thermal treatment of hazardous waste in systems other than incinerators is seldom utilized now, but EPA expects that practice to grow in importance. Interim Status Standards for such treatment were published, on an interim final basis, as Subpart P of Part 265. The Agency expects to finalize those standards soon and to promulgate permitting standards for non-incinerator thermal treatment at some time in the future. These are expected to be Subpart P of 40 CFR Part 264.

Finally, the regulation provides that wastes which are hazardous solely because of ignitability (and which contain no constitutents listed as toxic in Part 261, Appendix VIII) must be burned in accordance with a permit, but are exempted from most of the substantive requirements of the Subpart O regulations.

2. Waste Analysis (§ 264.341)

Required waste analysis takes two forms.

First, on an on-going basis, the operator must ensure that waste feed to the incinerator does not deviate from that defined in his permit. Such a deviation would be a violation of the permit. The permit, under § 264.345(b), will be written to specify wastes which the facility has demonstrated its ability to treat adequately. Thus, for waste feeds not specified in the permit, there is no assurance that the required performance standards can be met, especially in the absence of defined operation conditions. As a result, the Agency will require facilities to analyze waste feeds adequately to ensure that they remain within the terms of their permits, and to indicate in their waste analysis plans (required by § 264.13) how they will do this.

A second, and more intensive, form of waste analysis is required as part of each permit application and whenever a permit modification or a trial burn permit is sought. In these cases the applicant must describe certain physical properties of his waste feed and must analyze his waste sufficiently to identify the presence of any hazardous organic constituents listed in Part 261, Appendix VIII, except that the applicant need not analyze for Appendix VIII constituents which would not reasonably be expected to be in the waste. This analysis must be performed using the techniques specified in EPA's publication SW–846, or techniques of at least equivalent sensitivity and reliability.

A comprehensive analysis of the hazardous organic constituents of a waste as it is to be incinerated is necessary to identify the waste components to which the performance standard (especially the destruction and removal requirement) will apply. Analytical techniques such as capillary column gas chromatography and a "reverse search" of mass spectra are well within the capability of widely available laboratory services, so long as the constituents to be searched for are specified in some way. In order to identify hazardous components of waste feeds and, at the same time, limit the scope of the waste analysis to practical limits, the scope of the search is initially specified as those constituents listed in Part 261, Appendix VIII. In almost all cases the scope of the mass spectral analysis will be further limited by deleting analysis for those Appendix VIII constituents which would not reasonably be expected to be present in the waste.

Incinerators commonly receive wastes from a wide variety of generating processes and mix them for combustion

on the basis of BTU value and physical characteristics. Thus analysis of waste feed that will actually be burned is more important than analysis of wastes as they are received or as they are stored prior to blending as a waste feed. Further, reliance on information provided on the manifest or data considered as part of EPA's listing process will seldom be adequate. Therefore, the analysis required by § 264.341 is necessary to allow EPA to define operating conditions necessary to incinerate the waste feed in compliance with appropriate performance standards.

3. Principal Organic Hazardous Constituents (POHCs) (§ 264.342)

Waste feed mixtures will be specified in each facility's permit. For each waste feed mixture, identified in a facility permit, the permit will specify Principal Organic Hazardous Constituents (POHC's) which must be destroyed or removed as required by the applicable performance standard. Identification of those waste feed constitutents to which the performance standard will be applied is central to application of the standard. The Agency has chosen to designate specific POHC's rather than require that *all* hazardous constituents of the waste feed meet the performance standard. This reduces the analytical burden and associated cost of verifying compliance with the performance standard. Selecting limited POHCs avoids the necessity for measuring compliance against perhaps dozens of constituents that may be present in a given waste in insignificant quantities. Finally, designating as POHCs those waste constituents which are most difficult to destroy will generally ensure that less stable hazardous organic constituents are also destroyed.

For those reasons POHC selection will be made by the permit writer primarily on the basis of difficulty of incineration, but the permit writer may then consider concentration or quantity of constituents and need not designate as POHCs those present only in insignificant quantities. Thus the regulation says that difficult-to-burn constituents are those "most likely" to be selected as POHCs, while larger quantity constituents are "more likely" to be selected than those present in lesser quantities.

4. Performance Standards (§ 264.343)

Three performance standards are the heart of this regulation. The most important of these is the requirement that incinerators burning hazardous waste must achieve a destruction and removal efficiency (DRE) of 99.99% for each POHC designated for each waste feed. This requirement (which includes particulate removal) is based on extensive data indicating that such a destruction efficiency is attainable in industrial incinerators burning a wide range of organic hazardous wastes. EPA has now defined the required performance standard to include credit for removal efficiencies as well as destruction efficiencies. This approach makes the performance standard more easily attainable since it allows credit for removal by air pollution control equipment as well as for destruction in a combustion zone, and it avoids the technical difficulties associated with precise measurements within the extreme conditions of a combustion zone. Yet the reliance on destruction and removal efficiency, rather than mere destruction efficiency, poses no environmental hazards since the standard still covers all emissions *before* their release to the environment, and since waste residues trapped by emission control equipment must still be treated as hazardous wastes and managed properly within the RCRA system.

There are limits to the destruction and removal efficiency approach. It does not control the actual mass of POHCs emitted since, for any given destruction and removal efficiency, mass emissions vary directly in proportion to variations in mass feed rate. Perhaps most importantly, the approach fails to account for emissions of hazardous combustion by-products which may be equally or more hazardous than POHCs themselves. Finally, metals, since they are not combustible, are not now controlled using this approach.

EPA has considered, and is still considering, the feasibility of additional approaches to the control of emissions from hazardous waste incinerators. The Agency is today proposing, elsewhere in today's Federal Register, a set of procedures for varying the performance standard to address the problems just mentioned. However, until it is clear that the proposed variance procedure is practicable, the Agency is relying upon the approach promulgated today. The effect of these combined approaches is that in the absence of data showing that lesser emission levels are safe or that greaters levels are necessary, the Agency will require that hazardous wastes not be incinerated under standards less stringent than those known to be currently attainable by the existing technology of high quality commercial hazardous waste incineration. Initial analysis of data available to the Agency indicates that, for typical waste feed rates, most organic wastes will present no significant health hazards when treated to a 99.99% destruction and removal efficiency.

An additional performance standard is a requirement that incinerators burning hazardous waste containing more than 0.5% chlorine must remove 99% of the hydrogen chloride from their exhaust gas. The level of 0.5% chlorine content was chosen as the threshold level for the 99% hydrogen chloride removal requirement since the chlorine content of American coal ranges up to almost that concentration. Current Clean Air Act regulations do not specify hydrogen chloride or chlorine limits for emissions for the combustion of such coal. The small additional emissions from incineration of low-chlorine hazardous wastes are not likely to be a serious problem. Some potential candidates for incineration (for example hexochlorobenzene) do include high chlorine levels and will produce significant emissions. Thus the hydrogen chloride removal requirement is necessary.

The final performance standard is that incinerators not emit particulate matter exceeding 180 milligrams per dry standard cubic meter. Particulates from hazardous waste combustion can absorb hazardous constituents onto their surface, or may themselves be hazardous, making their control important. Control is addressed through the DRE standard because particulates are included in the analysis of the stack emissions for POHC's. However, neither combustion by-products nor metals are controlled through the performance standards promulgated today. Thus, some control of these substances can be achieved by controlling the emissions of particulates. The emission limits required are the same as those required by the Clean Air Act's New Source Performance Standards for municipal incinerators. Data indicate that they are achievable by all hazardous waste incinerators except, perhaps, for cement kilns. Cement kilns are exempt from this Subpart when burning waste for re-use or for recovery of thermal value.

It is very important to note that, while these three performance standards are the goal of this regulation, it is not technically practicable to directly monitor compliance with the performance standards on a continuous basis. Enforcement instead will be based on compliance with operating conditions demonstrated (by trial burns or alternative data) to be adequate to achieve these performance standards, and then specified in the permit. However, EPA may require verification

tests of compliance with the performance standard either periodically, as specified in the permit, or when there is an indication that the performance standards are not being met. If the test, or other data, indicate non-compliance with the performance standard, then the Agency will have grounds to modify, revoke, or re-issue a permit so as to ensure that the performance standards will be met. In most cases the Agency does not expect verification tests to be necessary more frequently than annually.

5. New Wastes: trial burns or permit modifications (§ 264.344)

Each permit will specify the waste feeds which it allows and the operating conditions required for each waste feed. When an owner or operator wishes to burn waste feeds for which operating conditions have not been set in a permit he must either secure a permit modification, or, if the burn is to be of short duration and for the specific purposes listed in § 122.27(b), he must secure a temporary trial burn permit.

The criteria for granting trial burn permits are specified in § 122.27(b) which is summarized later in this preamble. The criteria for granting new permits and permit modifications are those outlined in Part 264, Subpart O. These criteria require demonstration, for a defined waste feed, of operating conditions adequate to achieve the performance standards of § 264.343. This demonstration may be based either on the results of an approved trial burn, or on alternative data adequate to demonstrate that the performance standard can be met and adequate to define operating conditions necessary to meet the standard. Obviously, if an owner or operator wishes to avoid repeated applications for permit modifications, it is in his interests to demonstrate, in each permit application, the widest possible variety of waste feeds that can be adequately incinerated under each set of operating conditions. Furthermore, for economic reasons, applicants may wish to define their waste feeds in varying groups, seeking less stringent operating requirements for easily combusted waste feeds, while narrowing the class of waste feeds that are subject to more demanding and expensive operating requirements. To the extent that the applicant can demonstrate in his permit application that the required performance standards can be met for each of these classes of waste feed, he is, of course, free to make these separations.

6. Operating Requirements (§ 264.345)

Each permit will specify, on a case-by-case basis, operating conditions which have been demonstrated (in the trial burn) to be adequate to meet the performance standard and with which compliance is required. The regulation specifies several operating parameters which will almost always be significant variables for attainment of the performance standards. Limits will be set for these operating parameters in every permit. However, if any specific incinerator's design or waste feed makes it necessary, the permit writer may also specify other operating requirements necessary to ensure that the applicable performance standards are met.

Three further operating requirements will be applied uniformly. During start-up and shut-down of an incinerator, hazardous waste must not be fed unless the incinerator is at a steady state of operation. This requirement is aimed at the problem of inconsistent performance and incomplete combustion when wastes are burned in a zone where combustion conditions have not stabilized within limits defined in the permit.

The regulation also requires that fugitive emissions must be controlled. Where feasible this should be through total sealing of the combustion zone. Where that is impossible (as with rotary kilns) incinerators should maintain "negative pressure", i.e. a combustion zone pressure lower than atmospheric pressure. Alternative means of control may be allowed where they are demonstrated to provide effectiveness equivalent to maintenance of "negative pressure." These requirements are necessitated by the danger of escape of fugitive emissions—including hazardous waste constituents—that could threaten human health or the environment. They are already generally practiced in commercial hazardous waste incineration.

Finally, incinerators must be operated with a functioning system to shut off waste feed when operating requirements are violated. This requirement will protect against deviation from the performance standard; in fact, it is implicit in the requirements that hazardous wastes can be incinerated only in compliance with a permit and that the operating requirements are conditions of the permit. After shutting off hazardous waste feed, the facility may take appropriate steps to either shut-down the incinerator or to return to operating conditions defined in its permit.

7. Monitoring and Inspections (§ 264.347)

EPA has made every effort to reduce monitoring and inspection to the minimum level necessary to ensure that operation of the incinerator does not deviate from the required performance standards. In fact, the recognition that it is technically not practical to continuously monitor for compliance with the performance standard is a major factor underlying the monitoring which is required. The regulation requires, as a minimum, continuous monitoring of combustion temperature, waste feed rate, and air feed rate.

These are the variables which most significantly affect destruction and removal efficiency; they are also continuously controllable by incinerator operators. Continuous monitoring of carbon monoxide emissions is also required. This monitoring is the simplest procedure for approximate verification that adequate combustion actually is taking place. Finally, the regulation requires daily inspection of the incinerator and associated equipment, including alarm systems and emergency shut-down controls. Since the incinerator is a complex system, subject to high stress conditions, this inspection is necessary to control against leaks, spills, or fugitive emissions, and to ensure that stand-by systems will actually operate when needed.

8. Closure (§ 264.351)

At closure the owner must remove all hazardous waste and hazardous waste residues from the incinerator site. Wastes which are hazardous solely because of ignitability are *not* exempt from this provision, since the risk they pose to human health and the environment is very real when they are not being burned in the controlled combustion zone of a permitted hazardous waste incinerator.

B. Part 122—Incinerator Facility Permits

Part 122 includes regulations covering the permitting process. Two portions of Part 122 are particularly related to hazardous waste incinerator operation. Section 122.25 describes information required in Part B of an owner or operator's permit application; § 122.25(b)(5) describes the particular information required in applications for permits to incinerate hazardous waste. Section 122.27 describes short-term permits; § 122.27(b) sets out the procedures and standards for obtaining a permit to conduct a trial burn of hazardous waste.

1. Permit Application Information (§ 122.25(b)(5))

Permit writer's will have to make significant judgments, based on information contained in facility permit applications. EPA has limited the information required in Part B of a permit application for an incinerator to that necessary to make those judgments properly. As § 122.25(b)(5) specifies, applicants must meet one or more of three sets of information requirements.

If the facility is seeking to incinerate hazardous waste under the exemption available for waste which is hazardous solely because it is ignitable, the permit application must provide analytical results adequate to determine that hazardous constituents listed in Part 261, Appendix VIII, are not present in the waste. The reasons for this are explained above, in the substantive discussion of the ignitability exemption.

Initially, information will be submitted for most facilities under § 122.25(b)(5)(ii). This requires that an applicant submit the results of a trial burn of the relevant waste feed, conducted under § 122.27(b). This submission must include all the waste analyses, engineering data, analytical results, and calculations related to the trial burn and its results. This information must be adequate to allow the permit writer to determine operating conditions that will ensure that the facility will meet the performance standards for the relevant waste feeds.

Finally, applicants may seek to avoid the trial burn requirement by submission of alternative data. This information, specified in § 122.25(b)(5)(iii), is essentially a re-statement of the information required to obtain a trial burn permit under § 122.27(b). It is supplemented by such further information as the permit writer may require to determine that the alternative data in adequate to ensure that the performance standards will be met, and to set adequate operating parameters.

2. Trial Burn Permits (§ 122.27(b))

Destruction and removal efficiencies for any given waste feed can vary greatly, and are dependent both on operating conditions and on specific aspects of any incinerator's design. Thus, compliance with applicable performance standards will often have to be demonstrated by empirical measurement, rather than by prediction. Trial burns are the mechanisms for these measurements.

Each trial burn can be conducted only with the specific approval of a permitting official. However, the full procedural requirements for general permits need not be followed. This is because short term permits will be of limited duration (generally less than a dozen hours of combustion, spread over operating periods of up to two weeks), and for the limited purposes of determining feasability of compliance, and the operating conditions necessary to comply, with applicable performance standards. In addition, trial burns will not be allowed if they pose an imminent hazard to human health or the environment.

Applications for a trial burn permit must include a trial burn plan which, if approved, will become a condition of the trial burn permit. This plan will include a waste analysis (indentical to that required for general permits) which describes certain physical properties of the proposed waste feed and which includes an analysis sufficient to identify the presence of any hazardous organic constituents listed in Part 261, Appendix VIII, which may be present in the waste.

In addition, the applicant must provide a detailed description of his incinerator and of the sampling and monitoring procedures to be followed, along with descriptions of safety equipment and full information about the time, waste quantity, and operating conditions of the proposed trial burn.

The permitting official may ask to have this information supplemented if he needs further data to determine whether the trial burn is likely to demonstrate compliance with the performance standards, identify associated operating conditions, and will not itself present an imminent hazard to human health and the environment. When the permitting official determines that the data meet these objectives, he will approve the trial burn plan, will specify the trial Principal Organic Hazardous Constituents (trial POHCs) for which the facility must calculate destruction and removal efficiencies during the trial burn, and will issue a trial burn permit incorporating the conditions in the trial burn plan.

When trial burns are carried out, EPA may wish to have an observor present and, if necessary, can insist upon doing so under the authority of Section 3007 of RCRA, and 40 CFR 122.(7)(i). In any case the trial burn must be conducted in accordance with the trial burn permit and waste feed must cease when specified operating conditions are violated.

Determinations specified in the trial burn permit must be made during the trial burn, or as soon after it as is practical. In all cases, these will include a quantitative analysis of the trial POHCs in the waste feed to the incinerator and a quantitative analysis of the trial POHCs in the exhaust gas emitted from the incinerator. These analyses are necessary to make the required computation of destruction and removal efficiency (DRE) in accordance with the formula specified in § 264.343(a). This DRE computation must be supported and verified by a total mass balance of the trial POHCs in the waste feed, and must be compared with required quantitative analyses of scrubber water and other residues for trial POHCs. Measurement of hazardous combustion by-products will be used to verify attainment of the DRE performance standard, through comparison with the mass balance of POHCs. It may also help meet public concern about the presence of by-products in incinerator emissions. Data accumulated from these trial burn analyses may lead to reductions in the number and complexity of subsequent trial burns, either by reducing the need for those burns, or by aiding the selection of surrogates to simplify such analyses.

Compliance with the other performance standards must be demonstrated by direct measurement of particulate emissions and hydrogen chloride removal efficiencies. Sources of fugitive emissions and their means of control must also be identified.

Measurements of average, maximum, and minimum temperatures in the combustion zone and of air feed rates are always necessary to help establish operating conditions which will assure continued compliance with the performance standard. In addition, the trial burn permit may specify other data collection, if necessary to determine compliance with applicable performance standards, or to establish operating requirements.

Since § 122.27 Short-Term Permits are somewhat separate from the normal permitting procedures, and since they will not always include public participation, for purposes of clarity the Agency has specified that all submissions required by this subsection shall be certified by signature. Since repeated submissions may be required to establish acceptable waste analyses, trial burn plans, and trial burn analyses, the Agency has decided to require only that the certification be made by a person authorized to make reports, rather than requiring that each submission be signed by a person of vice-presidential or equivalent corporate rank.

C. Part 265—Interim Status Standards for Hazardous Waste Incineration

Facilities which qualify for interim status may continue to operate until final Agency action on their permit applications. Throughout that time owners or operators must comply with all relevant interim status standards. If the owner or operator of a facility which has interim status wishes to burn a waste which he has not listed in Part A of his permit application, he must supplement his Part A application as required by § 122.23(c)(1).

EPA is today finalizing the Interim Status Standards which were issued, on an interim final basis, on May 19, 1980 (45 FR 33250). With small exceptions the regulations follow the text of the interim final promulgation. They are discussed in the preamble accompanying that promulgation. The Agency has, however, modified those regulations in two significant ways. First, the regulation now prevents hazardous waste feed during shut-down situations, in addition to forbidding it during start-up conditions. On the other hand, the Agency has recognized that wastes which are hazardous solely because of ignitability can be burned safely even when operating conditions are unstable. Thus the final regulations allow exemptions for ignitable wastes, conditional upon the owner or operator performing and maintaining analyses that show that the waste feed would not reasonably be expected to contain hazardous constituents listed in Part 261, Appendix VIII.

V. Issues Raised by Comments, and Changes in the Regulation

A. General Concepts Underlying the Regulation

1. *Authority*

Several commenters argued that RCRA granted EPA no authority to regulate hazardous waste incineration since legislative history did not label incineration a form of "disposal" and since the Clean Air Act adequately controlled incinerator emissions.

Whether hazardous waste incineration falls within the Section 1004(3) definition of "disposal" is not a controlling issue. The Agency is regulating incineration as "treatment" of hazardous wastes. Section 1004(34) defines treatment:

> (34) The term "treatment", when used in connection with hazardous waste, means any method, technique, or process, including neutralization, designed to change the biological character or composition of any hazardous waste so as to neutralize waste and render it non-hazardous, safe for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it non-hazardous.

As a process designed to render hazardous waste non-hazardous and reduced in volume, incineration certainly falls within this definition. The Agency's statutory mandate to regulate such treatment pocesses is then found in Section 3004, which requires that the Administrator promulgate performance standards for the treatment of hazardous wastes.

This also fits the broad structure of RCRA, which requires that hazardous wastes be sent only to facilities which have RCRA permits to treat them. The Administrator's authority in this matter is make even more clear in Section 3004 which says that the standards set by the Agency "shall include, but need not be limited to, requirements respecting—

> (3) Treatment . . . of all such wastes . . . pursuant to such operating methods, techniques, and practices as may be satisfactory to the Administrator.

This mandate also serves the objectives of the statute, defined by Congress in Section 1003(4) as, among other things, "regulating the treatment . . . of hazardous wastes which have adverse affects on health and the environment". Furthermore, incineration of hazardous wastes was discussed extensively in EPA's 1974 *Report to Congress: Disposal of Hazardous Wastes*, a document that strongly influenced Congressional development of RCRA. Additionally, EPA has consistently indicated in both Federal Register proposals and Congressional testimony that it will control incinerators under RCRA. Congress gave no signs of disapproval of this in the 1980 RCRA amendments.

The Agency cannot agree with those commenters who suggested that the proposed regulations should be replaced by, or were in conflict with, the Clean Air Act. Current Clean Air Act regulations address only a portion of the potential emissions from a hazardous waste incinerator. The Clean Air Act is oriented toward control of emissions on a pollutant-by-pollutant basis, and current regulations are focused largely on wide-spread, large-volume, pollutants (particulates, NO_x, SO_x, etc) and on specified hazardous emissions from specific sources. In contrast, the pollutants which could be emitted from hazardous waste incinerators are far more numerous and diverse. Many are acutely toxic or carcinogenic. A case-by-case, chemical by chemical, regulatory approach under the Clean Air Act is not practical in this situation.

RCRA provides authority to control emissions broadly through destruction and combustion performance standards and direct operating and design standards. Such a regulatory approach is necessary in order to adequately protect human health and the environment as required by RCRA. To the exent that standards can be developed in the future under the Clean Air Act to deal with specific hazardous air emissions, this may aid in the task of regulating hazardous waste incineration. Moreover, since hazardous waste incinerators will often store and generate hazardous waste, they will already be within the RCRA system for manifests and permitting. Thus regulating hazardous waste incineration under RCRA (rather than the Clean Air Act) may be the simplest way to minimize the regulatory burden on applicants.

2. Performance Standards and Engineering Judgment

Several comments on the proposed regulations criticized as too inflexible two facets of the proposed regulations: (1) universally applicable specific design and operating requirements, and (2) performance requirements that did not allow waste-specific variances.

Both of these concerns were seriously considered. As discussed in the next paragraph, the Agency has revised the regulations so that they now rely heavily on performance standards, with few operating requirements specified. Facility-specific and waste-specific variances proved, however, to be technically and procedurally complex. They required techniques and procedures which were not proposed and which relied on much scientific knowledge not included in the 1978 proposal. EPA, therefore, is proposing today a waste-specific and facility-specific variance and a procedure for applying it. The Agency specifically solicits comments and data relevant to the proposed variance and procedure; but, until the variance is shown to be feasible and is finalized, permits will be issued under the performance standards promulgated today.

The other general comment was easier to address. The proposed regulations included specific, universally applicable operating requirements for temperature, dwell-time, combustion efficiency, and quantity of excess air. Commenters persuasively argued that these standards did not provide enough flexibility to account for the many differences in wastes and incinerator

B-14

signs, and that they were often not necessary, even to meet the performance standards EPA required. On more abstract grounds they also argued that performance standards were inherently better than operating standards since they adequately protected human health and the environment, while not stifling innovative approaches which might be more economical, more efficient, or more effective.

The Agency concluded that these comments had merit. Different wastes and different incinerator designs have been shown in EPA tests to attain the required destruction and removal efficiencies under a variety of operating conditions. Thus some flexibility to tailor operating standards on a case-by-case basis can more effectively assure protection of human health, while, at the same time, avoiding needless requirements. The regulations now include few nationally applicable design and operating standards, but rely instead on selected performance standards. However, as many industry comments pointed out, it is technically impractical to continuously monitor the most important of these performance requirements (destruction and removal efficiency) especially when quick response times may be important. Thus pure reliance on performance standards is not feasible and specific operating criteria will have to be observed for proper facility operation and to demonstrate compliance with the required DRE. These specific operating standards will now, however, be specified on a case-by-case basis during the permit drafting process based primarily on the results of trial burns (or alternative data) which demonstrate the operating conditions necessary to achieve compliance with the performance standards. The permit writer will need to exercise some measure of scientific and engineering judgment in interpreting the trial burn data and defining acceptable limits on operating conditions and waste feed variations. The procedural mechanisms for making these case-by-case determinations (including data compilations from trial burns) are necessarily complex, but they appear the best alternative to uniform national standards.

This approach—tailoring of regulatory requirements to specific wastes and facilities, based on the trial burn (or alternative data)—is consistent with the approach EPA has adopted for other regulations for management of hazardous waste. It recognizes that case-by-case judgments, based on site-specific circumstances can be applied in establishing the operating requirements applicable to an incinerator. In making such scientific and engineering judgments, the permit writers will be able to apply the latest state-of-the-art information on incinerator technology and the thermal destruction characteristics of waste to the facility-specific information obtained from trial burns and contained in permit applications. To aid this process, EPA is publishing a "Permit Writer's Guidance Document for Hazardous Waste Incineration" and an "Engineering Handbook on Hazardous Waste Incineration." The Agency expects to make these manuals available to the public in the near future. The latest drafts of these manuals are now available for inspection in the RCRA docket room, but the Agency expects to update them periodically.

B. Significant Comments; and Changes to Part 264

The Agency has considered each comment relevant to hazardous waste incineration. Significant ones are summarized here; others are included in the detailed discussions in the companion "Background Document."

Commenters suggested that incineration of wastes which are hazardous solely because of ignitability should not be subject to incineration regulations. EPA agrees in principle and, as mentioned above, has exempted such wastes from most of the substantive requirements of Part 264, Subpart O. However, applicants must show in a permit application that an ignitable waste does not contain toxic organic constituents listed in Part 261, Appendix VIII. This showing must be based on an analysis of the waste for any organic constituents listed in Appendix VIII, except those that can be demonstrated not to be reasonably likely to be in the waste. This showing is necessary because wastes which fail the ignitability characteristic described in Part 261 may also contain toxic organic constituents. Even wastes listed solely for ignitability may contain such constituents if the Agency did not have exhaustive composition data at the time of listing. Since toxic organic constituents must be destroyed in an incinerator in accordance with the performance standard, any ignitable waste containing such constituents is subject to all of the Subpart O standards.

Incineration of ignitable wastes which are exempted from most of Subpart O will, however, still be covered by RCRA permits. This allows generators and transporters of ignitable hazardous wastes to ship them to the facilities. It also ensures that they will be safely stored and otherwise handled until and through the facility's closure period.

Commenters challenged the waste analysis requirement both on the general grounds that it was ambiguous and unnecessary (since manifest data should suffice) and on the specific ground that determination of "principal hazardous components" was ambiguous and, perhaps, ruinously expensive. The waste analysis requirements are now far more detailed and linked more closely to the determination of the "principal hazardous components"—now called "principal organic hazardous constituents (POCHs)." The requirements clearly require more information than is shown on the manifest, as indeed they must since further information is requred to determine DRE and set operating conditions. EPA has also improved the clarity of the regulation by specifying that it is the waste *feed* to the incinerator that must be analyzed for burn-related information (thus assuring that affects of combination and blending are given credit and consideration), and by specifying which detailed waste analyses requirements are required only on permit application and which simplified analyses must be performed on an on-going basis.

Finally, EPA has responded to concern about determination of "principal hazardous components" by establishing a procedure for identification of POHCs during each permit writing process. The applicant may suggest certain POHCs for designation, but the determination will be made by the permit writer, using all available data (including trial burns) to determine those organic hazardous constituents most difficult to burn and present in significant quantities. This POHC selection analysis, while costly, will not be prohibitive since, even where necessary, GC/MS analysis against an identified list of constituents (those organics listed in Part 261, Appendix VIII) will give adequate qualitative and quantitative results at a reasonable cost. Even this analysis can be reduced if the applicant demonstrates that listed constituents would not reasonably be expected to be present in the waste feed.

Commenters often favored performance standards in theory but criticized the proposed Destruction Efficiency requirement of 99.99% for several reasons. Some criticized its general attainability, others argued that measurement near combustion zones was dangerous and inherently

unreliable; others pointed out that *inorganic* materials such metallic as elements, could not be "destroyed" by any combustion process short of nuclear transformation.

The regulations now call for a "Destruction and Removal Efficiency (DRE)" of 99.99% rather than 99.99% Destruction Efficiency (DE). This very significant change avoids the risks and unreliability of combustion zone gas measurement, and it gives facilities credit for pollutant removals made by their air pollution control equipment. It also means that measurements will be made at the point of release to the atmosphere—the real point of concern for protection of human health and the environment. Yet adequate protection is assured because air pollution control residues must be safely managed; in fact protection may be enhanced by the greater reliability of measurement.

EPA also now applies the DRE only to hazardous *organic* constituents, thus recognizing that inorganics are not "destroyed" by combustion. Inorganics can, of course, be "removed" from incinerator emissions, however the Agency has not yet analyzed data on what removal efficiencies represent the state of the art for inorganics removal controls. EPA is today proposing a procedure for case-by-case determinations of acceptable inorganic emissions. The Agency specifically solicits comments on that procedure and data on attainable inorganic removal standards.

Finally, on the most important point (attainability), EPA surveyed U.S. and international technical literature to obtain all available data on performance of incinerators destroying hazardous waste. EPA has now identified 54 waste/incinerator combinations for which an efficiency determination has been reported. This survey included all of the applicable full scale test work performed by EPA's Office of Solid Waste in 1975 and 1978, as well as all known and relevant test burns reported by industry, including a test-burn report submitted by the American Society of Mechanical Engineers.

In reviewing the 54 incinerator tests, all but nine achieved at least a 99.99% destruction efficiency. The remaining nine achieved efficiencies very close to 99.99%, and, upon close examination of the test reports, all of those nine tests had explainable and correctable problems which prevented attaining a 99.99% destruction efficiency. Since the final regulation is based on destruction and *removal* efficiency, the 99.99% performance level is more readily attainable than that monitored in test burns. Data clearly indicate that commercial hazardous waste incinerators can attain a 99.99% DRE for a wide-range of organic hazardous wastes, including those most difficult to burn.

Commenters objected to the proposed 99% removal requirement for all halogens, noting the difficulty of achieving 99% removal of halogens other than hydrogen chloride and claiming that other halogens were less dangerous than hydrogen chloride. Some argued for case-by-case determinations of necessary halogen removals.

EPA has retained the 99% removal requirement for hydrogen chloride from wastes containing significant amounts of chlorine. The comments received, and surveys of the technology in place, indicate that 99% removal for hydrogen chloride is attainable. EPA's Office of Solid Waste determined hydrogen chloride removals for four of its test burns in 1975 and 1976. All exceeded the required removals. Industry reports confirm this. The Agency, however, does not yet have data to support the attainability of, or need for, similar removals for other hydrogen halides. EPA is today proposing a procedure for case-by-case determination of acceptable hydrogen halide emissions, based on assessment of impacts on human health and the environment. The Agency specifically solicits comments on that procedure and on attainable hydrogen halide control levels.

Commenters criticized the proposed regulatory standard for particulate emissions. Some felt that it was too stringent, and others saw it as more permissive than existing Clean Air Act standards. Both groups criticized the complex formula for correcting for carbon dioxide in the exhaust stream.

EPA has clarified the formula to make it clear that the formula, calculations, and final standard are equivalent to the New Stationary Source Performance Standard for municipal incinerators promulgated under the Clean Air Act. Industry information and EPA's own full-scale tests indicate that this standard is attainable for facilities regulated under this Subpart.

Commenters objected to EPA's reliance on a combination of continuous monitoring of carbon monoxide emissions and a requirement of 99.9% combustion efficiency as an indicator of destruction efficiency. Determination of the combustion efficiency involves monitoring of both CO and CO_2 from the combustion process on a continuous basis. Commenters argued that a 99.9% combustion efficiency, as defined in the proposed regulation, is not achievable. Commenters also argued that measurement is a problem because absorption of CO_2 in wet scrubber systems can produce errors in the measurement of combustion efficiency.

The Agency has decided to drop the specification of combustion efficiency, as a result of these and related comments, and because the objectives of the proposed combustion efficiency standard can be obtained more simply. Thus, carbon dioxide no longer needs t be monitored. The final standard states that the carbon monoxide in the exhaus stack will be monitored on a continuou basis, but the maximum concentration limit in the emissions will be specified as an operating condition on a case-by-case basis in each permit. The permit limit will be determined based on a tria burn test or on other data submitted in lieu of a trial burn.

Carbon Monoxide monitoring is important because it provides a continuous indicator of the completeness of combustion which has taken place in an incinerator. When C monitoring is combined with continuou monitoring of temperature, waste feed rate, and air feed rate, it is possible to determine on a continuous basis whether the incinerator is operating within limits defined in the trial burn a necessary to achieve 99.99% DRE.

As discussed above, commenters critized reliance on uniform operating requirements. The Agency agrees and these requirements will now be set on case-by-case basis. The final regulatio specify several incinerator operating parameters which are to become part the permit issued by the Agency. Thes are combustion temperature, waste fe rate, air feed rate, and CO level in the exhaust gas. Also specified will be allowable variations in waste composition of the incinerator feed, a allowable changes in incinerator desi and operating procedures. Standards regarding changes in design, operatio and feed composition are now specifi

The first reason for this is the shift from uniform requirements to those s on a case-by-case basis. It is now necessary to ensure that incinerator practices do not change (from those specified in permit applications) in w that could make the specified conditi inadequate. A related reason is that DRE is now not monitored directly o continuously and the proposed combustion efficiency requirement h been dropped. Modifications to incinerators after trial burns could a DRE without detection. Permit write therefore, will specify acceptable changes in incineration design, configuration, operating methods, an waste feed character.

Commenters criticized the propose standard for control of fugitive

emissions of unburned hazardous waste and combustion products. Most stated that the level of control required was vague, or that EPA should state it as the level of best practical technology. Others argued that limited fugitive emissions are inevitable in some types of incinerators, particularly rotary kilns.

The Agency has now made the standard more precise. It now specifies two control techniques in current usage—sealing the combustion zone, and operating so that pressures in the combustion zone are less than in ambient air. Data indicate that the first technique can be used in all incinerators except rotary kilns, while "negative pressure" is the norm for all incinerators except fluidized bed incinerators. In any case, each facility may rely on either or both practices, or on any new method demonstrated to meet a performance standard equivalent to that achieved by "negative pressure" systems.

Commenters criticized the proposal for requiring that incinerators be shut-down and that waste feed be cut off whenever permit deviations occurred. Some argued that automatic shut-downs would in fact be harmful since rapid cooling would damage refractory liners.

The Agency has modified the regulation to make clear that, while hazardous waste *feed* must be cut-off, a total facility shutdown is not required. Human health and the environment will be protected if waste feed ceases. Non-hazardous auxiliary fuel feed may continue. Having ceased waste feed, the facility is free to correct deviations through whatever control modifications the situation requires.

Commmenters critized the proposed monitoring and facility inspection requirements. They questioned the expense and reliability of the required gaseous monitoring equipment, the frequency of inspections, and the specification of monitoring points. In these final rules, the Agency has specified a minimum schedule for monitoring and inspecting the operation of incinerators. Combustion and CO monitoring equipment must be monitored continuously, and operating corrections made to ensure that critical conditions are not allowed to vary outside permit limits. In addition, the regulation requires that equipment be inspected in accordance with both the minimum frequencies specified in the Subpart O standard and in the facility inspection schedule.

The permit writer may require measurements and calculations (similar to those used in a trial burn) to verify compliance with the DRE. The Agency expects that generally this will not be required more frequently than annually, and in most cases even less frequently.

C. Significant Comments; and Changes to Part 122

Comments suggested that trial burns should not be subject to the incinerator performance standard since the purpose of the trial burn is to determine the feasibility of, and the conditions necessary for, compliance with that standard. They also argued that failures to meet the performance standard might be inevitable, instructive, in good faith, and of minor environmental consequence. EPA agrees with much of this argument and, as discussed above, has created a special, simplified, permit process for trial burns. This procedure, codified as § 122.27(b), effectively exempts trial burns from Subpart O and subjects them only to conditions directly relevant to trial burns. In substance, these parallel §§ 264.341 (waste analysis) and 264.342 (POHC selection). These are combined with required compliance with approved operating conditions set forth in an approved trial burn plan. They provide an alternative basis for protection of human health and the environment, adequate for the limited mass and duration of trial burn emissions.

Trial burns are essential to the application of this regulation. The evaluation of trial burn data, and the setting of permit conditions which result from those data, represent the major focus of scientific and engineering judgment by the permitting official. It is in that process that the permit writer:

(1) applies scientific and engineering judgment to identify the principal organic hazardous constituents to which the performance standard applies, and

(2) establishes the operating conditions that will be placed in the permit.

The Agency intends that new trial burns should be minimized to the extent possible and conduct of those burns should proceed quickly so that they do not become an administrative barrier to the utilization of hazardous waste incineration. This is a particular concern with off-site facilities that burn a wide variety of hazardous wastes from many different generators. The regulations deal with this concern in several ways.

First, the simplified permit process described in § 122.27(b) has been set up. Second, as § 122.25 and Subpart O make clear, a trial burn may be waived, if the facility owner or operator can provide data equivalent to that which would be developed in a trial burn. This may be data from previous operational burns in a similar incinerator on similar waste, burns in pilot facilities, etc. Finally, trial burns can be minimized by prudent planning and structuring of trial burns by the facility owner or operator.

Although the DRE performance standard applies to each waste feed burned, this does not mean that a separate trial burn for each waste or each different mixture of wastes is required. To the extent practicable, the Agency intends to establish a ranking of wastes based on difficulty of thermal destruction. If an owner or operator established (through a trial burn) operating conditions for those wastes which are most difficult to destroy, this could provide the alternative documentation for the permitting official to allow certain other wastes to be burned at the same conditions. To avoid overly stringent burn conditions for easily combusted wastes, the facility owner might want to carry out, at different operating conditions, trial burns on two or more basic group of wastes, or waste mixtures, so that permit conditions could be established for each.

As an aid to this approach, EPA is working to construct a hierarchy of waste incinerability. Currently, data are available to develop comparative and predictive assessments, but not to define a complete hierarchy. It is now possible, based on current knowledge, to make some judgments of relative incinerability of different wastes. Data indicate that each of several predictive theories are reasonably accurate and that various theories generally agree in outcome. As more test burns are completed, and as more research and pilot incineration tests are conducted by EPA, a more complete incinerability hierarchy will be developed. As this data base is developing, the permit writer will need to exercise judgment in establishing the bounds on wastes and waste mixtures that can be burned at a given set of incinerator conditions. Thus, initially the trial burn burden may be large, but it should diminish substantially over time.

The Agency has placed a specific requirement in the trial burn section requiring that data collected from any approved trial burn be submitted to the Agency. This information is to be submitted whether or not the trial burn was successful in demonstration compliance with the performance standards. This data will allow the Agency to determine if excessive amounts of POHC's were emitted during the trial burn, to add to the information base being developed by the Agency, and to determine the reliability of successful trial burn results that are reported to the Agency.

D. Significant Comments; and Changes to Part 265

Commenters argued that banning the use of high BTU hazardous waste as fuel to start-up incinerators was contrary to sound practice. Some also argued that wastes which contain only carbon, hydrogen, and oxygen should be allowed as start-up fuel. Finally they asserted that EPA had failed to recognize degree of hazard of wastes.

The Agency has concluded that use of clean auxiliary fuel (such as fuel oil or natural gas) to start-up incinerators is a prudent practice. EPA realizes, however, that some wastes may be hazardous due solely to ignitability and might well be suitable for start-up. Thus, the final regulations for interim status incineration exempt wastes which are hazardous due solely to ignitability from the substantive requirements of this Subpart. The Agency has also modified the operating requirements to require that hazardous waste not be fed to the incinerator during shut down.

The Agency, however, disagrees with the comment that wastes which have only hydrogen, oxygen, and carbon in their structure should be exempted from the pre-heating requirement. An example of such a waste material is benzene, which contains only hydrogen and carbon, but which is hazardous because of its carcinogenic properties.

Finally, EPA has decided not to incorporate a degree of hazard approach into these Interim Status Standards since, even if feasible at all, it would require greater interaction between facilities and the Agency than interim status makes practical.

VI. Regulatory Analysis

Executive Order 12044 requires EPA to prepare a regulatory analysis for all new significant regulations. This analysis includes a comprehensive economic impact analysis and a discussion of the regulatory alternatives considered.

A. Economic Analysis

EPA plans to complete its formal analysis of the total Part 264 RCRA program and make it available for public review and comment in mid-1981. The Agency has, however, completed a fairly substantial preliminary analysis of the cost of the regulation published today. A copy of the preliminary cost analysis will shortly be available in the EPA Regional libraries, the EPA Headquarters library and the Docket Room in the Office of Solid Waste.

While total costs and impacts of the entire Part 264 regulation cannot be determined yet, EPA is building a model which allows such determinations. Inputs to this model are quantities of waste by waste stream and industry, unit costs of waste management, lists of feasible management methods for each waste stream, and capacity for existing management processes. The output from the model is the cost of the regulation by industry. These costs then serve as input to determining impacts. The incinerator costs discussed here will be used in this model.

The incremental costs by which RCRA regulations will increase the costs of current practice of managing hazardous waste are now being determined. These are the incremental costs of treating (or storing or disposing) of waste by a given method (e.g., in a incinerator) which is in compliance with the regulations. Preliminary costs have been developed for incinerators. In the following analysis these costs are presented on an incremental annualized after tax basis. Because they are incremental, they represent the additional cost of waste management imposed by the Part 264 general status regulations (over and above the costs imposed by the Part 265 interim status standards) on those owners or operators required to obtain a RCRA permit for incinerating hazardous waste. Because they are annualized, they represent the cost (in 1980 dollars) the owner or operator would incur if he incurred the same cost each year.

As a result of the permitting standards for incinerator, (Subpart O of Part 264), operators of incinerators will face higher costs. The regulations require the owners or operators of incinerators to achieve a destruction and removal efficiency (DRE) of 99.99%, to perform trial burns, to monitor continuously for carbon monoxide, to install an automatic shut down system which will automatically keep waste from entering the combustion chamber when incinerator operating conditions do not comply with the permit conditions, to close the incinerator against fugitive emissions, and to determine the principle organic hazardous constituents of the waste.

In the cost analysis, EPA determined that different types of wastes will incur different incremental costs. The primary reasons for cost differences among waste types is that some wastes require a higher temperature than others to assure a DRE of 99.99%, and that some types of wastes must be incinerated in a rotary kiln, while others can be incinerated in a liquid injector. The following table shows the annualized unit baseline (or pre-RCRA) cost for incineration, the cost increment due to the Part 265 Subpart O and financial requirements regulations, the increment due to the Part 264 Subpart O and Financial requirements regulations, and the cost of incineration following the Part 264 regulations. These figures show that the cost increment due to these Part 264 incinerator regulations is very low, and adds less than 6% to current costs even for the most toxic materials to be burned.

Annualized Incremental Unit Cost of Compliance With Part 264 for Incinerators[1]

[Unit cost (dollars per ton)]

Cost	Nonhalogenated liquids	Halogenated liquids	Nonhalogenated solids and sludges	Halogenated solids and sludges	Highly toxic materials
Baseline	$53.57	$259.29	$357.14	$556.79	$556.79
Part 265 without financial requirements	.97	1.94	.97	.97	.97
Part 265 financial requirements	1.86	7.04	12.34	12.34	12.34
Part 264 without financial requirements	3.62	7.23	3.62	11.62	45.48
Part 264 financial requirements	.22	.87	1.52	1.52	1.52
Total	60.24	276.37	375.59	583.24	617.10

[1] These costs are based on waste streams being incinerated as follows:
- Nonhalogenated liquids are incinerated in a liquid injection incinerator without pollution control devices and with a design capacity of 20,000 MT per year.
- Halogenated liquids are incinerated in a liquid injection incinerator with pollution control devices and with a design capacity of 10,000 MT per year.
- Nonhalogenated solids and sludges, halogenated solids and sludges, and highly toxic materials are incinerated in a rotary kiln incinerator with pollution control devices and with a design capacity of 20,000 MT per year.

The cost for Part 265 without financial requirements includes costs for monitoring, recordkeeping and reporting, administration, training and contingency plans, and equipment. It excludes the cost of waste analysis, which is dependent on the annual quantity of particular waste streams incinerated.

cos[illegible] Part 265 financial
re[illegible] includes the cost of
ire as well as providing a trust fund
losure. To the extent that owners or
ators are able to use letters of credit
rety bonds to comply with the
ncial requirements, these costs will
ignificantly lower. The cost for Part
without financial requirements
:cts costs for achieving the requisite
, performing trial burns, monitoring
CO, installing and operating an
omatic waste feed cut-off system,
ermining the principal hazardous
anic components of the waste, and
iodically inspecting and analyzing
ns to insure compliance with permit
ditions. The cost for Part 264
ancial requirements reflects the fact
t the analysis assumes that owner or
erators will build trust funds over 10
ars for Part 264 and 15 years for Part
5.

The annualized incremental unit costs
Part 264 were derived from estimates
capital and operating and
aintenance costs (O & M costs). The
llowing table shows the capital and
& M costs, and serves as the basis for
ese Part 264 estimates.

otal Incremental Capital and Operating
an[illegible]intenance Cost of Compliance
Wi[illegible]t 264 for Incinerators

[Cost in thousands of dollars]

Cost	Liquid injection—non-halogenated and halogenated liquids	Rotary kiln		
		Non-halogenated solids and sludges	Halogenated solids and sludges	Highly toxic materials
Capital	222.2	222.2	222.2	352.2
O & M	84.0	84.0	308.0	1,246.0

The cost analysis indicates that an owner or operator will incur capital costs for the following requirements: a) conducting trial burns; b) attaining the required destruction and removal efficiency; c) monitoring CO continuously; d) installing an automatic waste feed shut-off system; and e) determining the principal organic hazardous constituents of the waste feed. In addition, the owner or operator will incur annual operating and maintennce costs for (a) through (e), plus annual costs for periodic inspections and analyses of burns.

B. Regulatory Alternatives

EPA plans to prepare and make [illegible]le for public comment in mid-19[illegible] full Regulatory Analysis for the entire RCRA program. This will include both the economic impact analysis and a summary of the regulatory approaches considered.

The Regulatory Flexibility Act (PL-96-354) requires all Federal agencies to consider the effects of their regulations on "small entities", i.e. small businesses, small organizations, and small governmental jurisdictions. It requires agencies to propose for public comment "Regulatory Flexibility Analysis" for any regulations proposed *after* January 1, 1981, and which will cause a significant impact on a substantial number of small entities. Since the Agency proposed this regulation before January 1, 1981, it is not legally required to comply with the Regulatory Flexibility Act.

However, the Agency is concerned about small entity impacts and has already considered them. EPA believes that a significant portion of the impact of the hazardous waste regulations on small businesses is caused by the regulations previously promulgated under § 3001 of RCRA. These rules define hazardous waste and thus determine who must comply with the regulation. For primarily administrative reasons, the Agency included a special exemption in the regulations promulgated on May 19, 1980 for small quantity generators (§ 261.5). This provision exempts from full regulation generators that produce less than 1000 kilograms of hazardous waste per calendar month (except that there are lower exemptions for certain acutely hazardous wastes). This exemption applies to firms that are small quantity generators which also incinerate their waste on-site. Such incinerators would not be subject to the Subpart O regulations for incinerators. Thus, EPA believes it has directly addressed the objectives of this Act.

VII. OMB Review

Under the Federal Reports Act of 1942, as amended by the Paperwork Reduction Act of 1980, OMB reviews reporting requirements in proposed forms and regulations in order to minimize the reporting burden on respondents and the cost to government. Although EPA has initiated discussions with the staff of OMB, time has prevented the completion and submission to OMB of the reporting requirements, and supporting materials, contained in these regulations. These regulations, pursuant to Section 3010(b) of the Act, do not take effect until six months after their promulgation. EPA anticipates that OMB review will be completed well before the reporting requirements take effect.

VIII. Supporting Documents

A. Background Documents

Included in the record supporting these regulations are two background documents providing response to public comments and rationale for how and why the regulations have come to be written the way they are. In conjunction with the references listed in them, these documents provide the basis for and defense of the promulgated regulations.

The background documents include: (1) summaries and responses to comments on the May 19 interim final, interim status, regulations; (2) summaries and responses to comments on the propriety of certain May 19 regulations as interim status requirements; (3) summaries and responses to comments on the proposed (December 1978) general standards; and (4) rationale for the general standards promulgated today.

Copies of these documents are available for review in the EPA regional office libraries and at the EPA headquarters library, Room 2404, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460.

B. Guidance Documents

To assist owners and operators of facilities as well as regulatory officials to implement these regulations, EPA has prepared guidance manuals. These will not have the effect of regulations, but will provide guidance on how to apply the regulations and will include certain operation information on incineration.

EPA has prepared the following manuals in support of the hazardous waste incinerator regulations: Engineering Handbook on Hazardous Waste Incineration; Permit Writers Guidance Document on Hazardous Waste Incineration.

For a more complete list of manuals that EPA is preparing in support of the entire hazardous waste regulatory program see the preamble discussion in the January 12, 1981 regulation.

(Secs. 1006, 2002(a), 3004, 3005, and 3007 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. §§ 6905, 6912(a), 6924, 6925 and 6927)

Dated: January 13, 1981.

Douglas M. Costle,

Administrator.

For the reasons set out in the Preamble, 40 CFR Parts 264, 265, and 122 are amended as set forth below. Part 264, Subpart O, and §§ 122.25(b)(5) and 122.27(b) are published in the Federal Register as interim final rules, and Part 265, Subpart O, is published in the

Federal Register

Part V

Environmental Protection Agency

Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Consolidated Permit Regulations; and the Hazardous Waste Management System

B-20

IRONMENTAL PROTECTION
NCY

FR Parts 122 and 264

[-[redacted]089-3]

idards Applicable to Owners and
rators of Hazardous Waste
itment, Storage, and Disposal
lities; Consolidated Permit
ulations

NCY: Environmental Protection
ncy (EPA).

ON: Notice of withdrawal of
osal to suspend effective date of
im final regulations.

MARY: EPA is announcing
idrawal of its proposal to suspend
effective date of the permitting
dards for hazardous waste
nerators, as applied to existing
lities, and is ending its policy,
ounced on October 20, 1981, of
poning requests for Part B permit
lications for existing hazardous
te incinerators.

ES: Today's action is effective June
1982.

FURTHER INFORMATION CONTACT:
RCRA Hotline, 800/424-9346 or 202/
-3000, or Stephen A. Lingle, Chief,
hnology Branch, Hazardous and
istrial Waste Division, Office of
d [redacted]e, 202/755-9200.

PLEMENTARY INFORMATION:

uthority

he regulations for incineration of
ardous waste (40 CFR Parts 264 and
Subpart O) are issued under the
ority of Sections 1006, 2002(a), 3004,
5, and 3007 of the Solid Waste
posal Act, as amended by the
ource Conservation and Recovery
(RCRA) of 1976, as amended, 42
.C. 6905, 6912(a), 6924, 6925, and
7.

ackground

he Solid Waste Disposal Act, as
ended by the Resource Conservation
Recovery Act (RCRA) of 1976,
uires EPA to establish performance,
ign and operating standards, as
essary, for facilities that treat, store,
dispose of hazardous wastes. EPA
t proposed regulations for these
lities in December of 1978 (43 FR
46). On May 19, 1980, EPA
mulgated an initial set of regulations
a first step in meeting the
uirements of RCRA (45 FR 33066). On
uary 23, 1981, EPA promulgated
ulations which established the
tut[redacted]required standards for
ine[redacted]rs, one class of hazadous
waste treatment facilities. These standards imposed identical requirements on new and existing incinerators.

EPA invited public comment on the standards to ensure that we had not overlooked any major problems in addressing the comments received on the standards proposed earlier (December 18, 1978, 43 FR 59008). The Agency intended to remedy any serious problems which might be surfaced by public comments before the standards became effective on July 22, 1981. In response to its invitation for comments, EPA received a number of comments from the regulated community contending that, for various financial, technical, and practical reasons, the standards were inappropriate for application to existing incinerators. Additionally, nearly all of these commenters stated that EPA had failed to fulfill a statutory mandate to distinguish between new and existing hazardous waste management facilities in promulgating the standards.

More specifically, a trade association, which represents companies operating (by their estimate) approximately 300 on-site incinerators, alleged that the cost of complying with the regulations (that is, to meet the required 99.99% destruction and removal efficiency) would force half of these incinerators to cease operation even though they posed no threat to human health. The association estimated that the annual industrywide cost of compliance (including the cost of off-site disposal in cases where closures occur) would be 700 million dollars.

Because the Agency was not able to address these comments within a reasonable period of time, on October 20, 1981 (46 FR 51407), EPA proposed to suspend the effective date of the standards as applied to existing incinerators, pending a reexamination of the standards in light of the comments received. In the same publication, EPA also proposed to suspend the effective date of the standards applicable to existing storage surface impoundments. The Agency will deal with final disposition of that proposal in a separate document.

Concurrent with the proposal to suspend the effective date of the standards for existing incinerators, EPA announced an immediately effective policy of not calling in Part B permit applications for those facilities. The Agency stated that it would permit only new incinerators and existing incinerators for which Part B permit applications were voluntarily submitted, pending disposition of the proposed suspension.

After reviewing the comments submitted on the proposed suspension, EPA has concluded that there is no basis for suspending the standards for incineration at this time. Therefore, the Agency is no longer actively considering the suspension. Furthermore, since a suspension is not contemplated by EPA, there is no longer any reason to defer all permitting of existing incinerators. EPA is therefore discontinuing its policy, announced on October 20, 1981 (46 FR 51407), of refraining from requesting permit applications for existing incinerators. The permitting policy regarding existing hazardous waste incinerators has been made immediately effective in order to promptly clarify, to the public and to the states, the way in which EPA intends to address these facilities in the context of the permitting program and the state authorization process. The basis for these decisions is discussed below.

III. Synopsis of Public Comments on the Proposed Suspension

Many of the comments received in support of the proposed suspension were general statements of agreement. Those who elaborated made two points. First, these commenters contended that Section 3004 of RCRA, as amended in 1980 (42 U.S.C. 6924), requires EPA to distinguish between new and existing facilities when promulgating regulations for hazardous waste treatment, storage, and disposal. They maintained that the absence of such a distinction in the current incinerator standards is a fundamental legal defect and that the suspension is therefore necessary until such a distinction can be considered.

Second, some commenters supporting the suspension, principally the above cited trade association and some of its member companies, contended that implementation of the standards applicable to existing incinerators would force closure of many incinerators which currently pose no threat to human health. They argued that, in many cases, the cost of compliance will be so great as to result in closure rather than retrofitting or upgrading and that therefore, failure to suspend the regulations would impose unjustified and substantial economic penalties.

Commenters who opposed the suspension argued that a regulatory distinction between new and existing incinerators is unnecessary because the current standards have been shown to be achievable by existing incinerators. Furthermore, they argued that distinction between new and existing facilities is not mandated but, instead,

lowed by RCRA and that
ıplementation of the suspension would
ve firms operating existing
cinerators a substantial competitive
lge[illegible] those who construct and
pe[illegible]ew incinerators. They also
gued that EPA's consideration of
:onomic impact in promulgating
gulations under RCRA is inappropriate
:cause the Act identifies protection of
ıman health and the environment as
ı sole objective.

Commenters who opposed the
spension generally focused their
guments on the claims raised by the
ade association, since the information
ovided by this group was an important
ctor in EPA's decision to propose the
spension. In particular, two
mmenters provided a detailed critique
the trade association's document,
ntesting its underlying assumptions,
e adequacy of the data supporting
ose assumptions and the final
nclusions drawn. At the outset, these
mmenters stated that the association's
onomic analysis was primarily
njecture and therefore not appropriate
the sole basis for a decision
ncerning the suspension.

With regard to specific points made
the association, commenters who
posed the suspension identified three
ajor issues. First, they maintained that
e trade association did not
bs[illegible]te its claim that many existing
cin[illegible]rs cannot meet the current
ındards. Second, they indicated that
e association failed to provide
fficient evidence for the contention
at those incinerators which do not
:et the standards will close rather
an upgrade. Commenters pointed out
at the association's analysis failed to
plore the numerous options currently
ailable for retrofitting or upgrading
isting incinerators and that this
ıulted in overstatement of the
ıjected economic impact of the
rent standard.

Third, commenters who took
ception to the trade association
cument criticized the assertion that
isting incinerators operate safely
thout meeting the current standards.
ey stated that the trade association
ıort made no reference to any existing
ormation which would substantiate
alleged safety of existing
inerators currently operating below
npliance levels. One commenter
ıcluded, based on theoretical
culations, that incinerator
formance levels below the required
99% destruction and removal
icie[illegible](DRE) will result in
ost[illegible]ly higher mass emissions of
zardous waste constituents. This
commenter also contended that no conclusions can be drawn regarding the safety of emissions resulting from operation below 99.99% DRE since the magnitude of the hazard is closely tied to many site-specific factors.

Several commenters addressed the impact of a suspension on the process of granting State interim authorization under Section 3006 of RCRA. They expressed concern that a suspension, if instituted, would cause an unfair and illegal delay in the State authorization process. They also pointed out that the delay would mean that facilities permitted under State programs while the suspension is in effect would then need to undergo a second permitting process, once the Federal standards become effective, in order to receive a RCRA permit. This two-stage permitting process, according to commenters, would be costly, both to facility owners and the State programs.

IV. EPA's Response to Comments and Basis for Today's Action

A. Statutory Issues

Commenters raised two issues which are relevant to the criteria for decision-making set forth by RCRA. First, commenters opposing the suspension argued that suspension of the current standards only for the purpose of considering their economic impact would be improper because the statute specifies only one objective: protection of human health and the environment. These commenters concluded that suspension of the current effective date, pending re-examination of economic impacts, would therefore be contrary to RCRA.

While the Agency recognizes protection of human health and the environment as the primary objective of RCRA, we have consistently held that this goal does not preclude the consideration of cost factors as they relate to the selection of an appropriate regulatory strategy. We believe that economic factors have been appropriately considered in the development of the current hazardous waste management regulations. For example, on May 19, 1980, in our publication of the Phase I regulations, EPA stated that the cost-effectiveness of various regulatory alternatives was considered in order to assure that protection of human health and the environment is achieved through the most efficient means (45 FR 33089). The performance standard for incinerators requiring 99.99% destruction and removal of principal organic hazardous constituents reflects a consideration of cost to the extent that it requires performance at a level known to be attainable by technology currently in use.

Consideration of economic impact may also be necessary in order to develop a regulatory program which effectively balances EPA's environmental goals. For example, economics is an important consideration when the costs of complying with a particular regulation are so high as to result in decreased nationwide availability of preferable hazardous waste management technologies. Such a decrease in capacity may result in shunting hazardous wastes to less desirable management options, thereby indirectly affecting the degree of protection of human health and the environment. In such a case, the cost of compliance will, to some extent, determine the overall level of protection provided. Therefore, EPA disagress with commenters who claim that the Agency does not have authority to suspend the current standards in order to consider their economic impact.

The second issue relating to RCRA's criteria for decisionmaking was raised by commenters who supported the suspension. They argue that the absence of a distinction between new and existing facilities in the current incinerator standards is a fundamental legal defect because the 1980 amendments to RCRA mandate such a distinction.

In 1980, Section 3004 of RCRA (Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) was amended by Congress to include the following language:

> In establishing such standards the Administrator shall, where appropriate, distinguish in such standards between requirements appropriate for new facilities and for facilities in existence on the date of promulgation of such regulation (42 U.S.C. 6924).

While this addition clearly allows for regulatory distinction between new and existing facilities, it is not mandated in all cases. Additionally, the legislative history addressing this amendment suggests that Congress was primarily concerned with problems which might arise if rigid design standards are imposed on existing surface impoundments (see H.R. Rep. No. 191, 96th Cong., 1st Sess.). Therefore, regulatory distinction between new and existing hazardous waste management facilities will be made when appropriate, as indicated by the factual record developed during the course of rulemaking.

B. Technical and Economic Issues

The trade association document which provided much of the information supporting the October 20 proposal [illegible] three key points concerning the potential impact of the standards on existing incinerators: (1) That approximately one-half of an estimated 300 incinerators owned by its members cannot meet the performance standard for 99.99% destruction and removal of principal organic hazardous constituents and therefore will close; (2) that compliance with the standards (including off-site disposal where closures occur) will cost the industry an estimated $700 million annually; and (3) that many of the incinerators which will close do not pose a danger to human health at their current performance levels. However, as pointed out by commenters who opposed the suspension, the association did not provide substantive data to support any of these points. In response to a specific request by EPA for further information, the association has stated that the above points were based on estimates made by industry experts in the absence of hard data.

This lack of data supporting the claim that existing incinerators are unable to meet the current performance standard is significant. The current standards are supported, in part, by data collected [illegible] 54 test burns conducted in 15 different incinerators. A destruction efficiency of at least 99.99% was achieved in all but nine of these tests. Furthermore, close examination of those tests in which the destruction efficiency was less than 99.99% showed that in all nine tests, the incinerators had experienced explainable and correctable problems. In some instances, for example, the incinerator operating conditions were purposely varied to extremes in order to determine whether the destruction efficiency would fall below 99.99%. It is also important to note that most of the 54 test burns were conducted during the mid-1970s and represent technology which was in use at that time.

The promulgated regulation does not limit compliance to achievement of 99.99% destruction efficiency. Instead, the required 99.99% destruction and removal efficiency allows the incinerator operator to achieve compliance through a combination of destruction by combustion and removal by air pollution control devices. Thus, the standard does not demand a level of performance beyond the capability of existing technology as demonstrated by the incinerator test burns. EPA believes, therefore, that the existing data indicate that commercial hazardous waste incinerators can attain 99.99% destruction and removal of principal organic hazardous constituents. Absent the submission by commenters of any contradicting data regarding the performance of existing incinerators, EPA cannot accept the assertion, made by the association, that over half of the incinerators operated by their member companies cannot meet the current standards.

The Agency also agrees with commenters who found inadequate support for the economic impacts alleged by the association. Even if signifiant numbers of incinerators were unable to meet the current standards, EPA finds no support for the assumption that these facilities would close rather than modify or upgrade their operations. As commenters pointed out, numerous alternatives exist for upgrading incinerator performance, such as raising temperature through increased use of auxiliary fuel or modification of incinerator components.

Finally, EPA does not believe that the association has demonstrated that existing incinerators not currently achieving the performance standards would not present a risk to human health. This point was also contested sharply by commenters, who presented some evidence of potential hazard caused by existing incinerators.

In promulgating the 99.99% DRE performance standard, on January 23, 1981 (46 FR 7666), EPA indicated its intent to develop a variance provision for that standard based on a facility-specific assessment of human health risk. The preamble to the regulations indicated, however, that until EPA determined that such a variance was practicable, the Agency believed it reasonable to require that all incinerators achieve performance levels "known to be currently attainable by the existing technology of high quality commercial hazardous waste incineration" (46 FR 7669). The preamble also indicated that "for typical waste feed rates, most organic wastes will present no significant health hazards when treated to a 99.99% destruction and removal efficiency" (46 FR 7669).

In the preamble to the proposed variance provision which accompanied the January 23, 1981 rule (46 FR 7634), the Agency acknowledged that "the destruction and removal of efficiency performance standard may be either more or less stringent than necessary to provide assurance of protecting human health and the environment in all circumstances" (46 FR 7685). This occurs for two reasons. First, the DRE performance standard does not control the actual mass of hazardous waste constituents emitted. Second, the standard does not account for site-specific factors such as waste characteristics (e.g., inherent toxicity), incinerator design (e.g., waste feed rate), and location parameters (e.g., meteorology and population distribution), all of which affect the actual level of risk to human health and the environment at an individual facility. By incorporating facility-specific risk analysis in the permitting process, the amendment proposed on January 23, 1981 would have the effect of including a detailed consideration of the above factors in determining the necessary level of protection.

A risk analysis of this type requires extensive data describing emissions of hazardous air pollutants, exposure levels, exposed populations and the effects of pollutants on human health. Because such data are rarely available, they must be generated by direct measurement or estimated by means of computer simulation techniques. Once the data are collected and models are developed, their precision and accuracy must be evaluated before a meaningful risk analysis can be conducted.

One of the primary goals of EPA's ongoing Regulatory Impact Analysis is to characterize the risks to human health and the environment associated with incineration of hazardous wastes.

This activity will provide valuable information regarding the feasibility of conducting site-specific risk assessments. For this reason, action on the January 23, 1981 proposal prior to completion of the RIA would be premature. Today's action, therefore, does not include promulgation of the proposed variance provision.

The trade association's assertion that performance at 99.5 or 99.9% DRE is protective in all or most cases is reflective of the Agency's statement, of January 23, 1981 (46 FR 7685), that the DRE performance standard may be either more or less stringent than necessary to provide assurance of protecting human health and the environment in all circumstances. Neither the trade association nor other commenters, however, provided information adequate to support the assertion. Once the RIA is complete EPA will have the data to indicate whether and for which types of facilities the current performance standards are either over protective or under protective. In such cases, EPA will use the data from the RIA to establish, as appropriate, either a case-by-case variance, as proposed in January of

1981, or to tailor the standards to provide appropriate levels of performance for diffeent classes of facilities.

comment responding to the October 20, 1981 proposal, the trade association proposed that, as an alternative to implementing the suspension, EPA should issue permits to existing incinerators that demonstrate 99.9% DRE but cannot demonstrate 99.99% DRE. This approach to permitting existing facilities would require that EPA amend the performance standard to allow this lesser destruction and removal efficiency for permitting existing facilities. However, the Agency does not have the data necessary to support such an amendment at this time. As stated above, the Agency's existing trial burn data clearly support the achievability of a 99.99% DRE.

C. Impact on State RCRA Programs

The preamble to the October 20 proposal recognizes that suspension of the regulations applicable to existing facilities would affect the State authorization process under Section 3006 of RCRA. EPA has addressed the concerns of commenters regarding this issue to some extent in the notice of February 24, 1982 (47 FR 8010). This notice announced a change in Agency policy which eliminates the delay in State authorization decisions that had been imposed by the October 20 proposal. The new policy allows States to receive interim authorization for issuing RCRA permits for both new and existing incinerators (and storage surface impoundments). However, if the Agency suspended the effective dates for certain exisitng facilities, State authorization to issue RCRA permits to those facilities would automatically lapse under the new policy.

This policy did not address the concern expressed by commenters that facilities permitted under State programs, while the Federal standards are suspended, will have to be issued a second permit when the Federal standards are reinstated. EPA agrees that adding this complexity (and expense) to the State interim authorization process is undesirable and should be avoided if possible. Today's decision to withdraw the proposal to suspend the standards eliminates this concern.

V. Permitting Activities Prior to Completion of the Regulatory Impact Analysis (RIA)

Executive Order 12291 requires EPA to prepare a Regulatory Impact Analysis (RIA) of the incinerator standards published on January 23, 1981. In accordance with the Order, a major study is underway to evaluate the human health risks and economic impacts associated with both the current incinerator standards and several alternative standards. The Agency expects a draft RIA to be ready for public review and comment by April of 1983.

The goal of the Regulatory Impact Analysis (RIA) is to provide the Agency with a comprehensive review of the costs and benefits associated with the RCRA hazardous waste incinerator standards. This information will allow EPA to re-evaluate several aspects of the current standards for incinerators, including their appropriateness for application to existing facilities. The Agency will then consider the results of this analysis in finalizing the standards for incineration.

VI. Regulatory Analyses

A. Executive Order 12291

Section 3(B) of Executive Order 12291 (46 FR 12193, February 19, 1981) requires EPA to prepare a regulatory impact analysis on all "major" rules. A major rule is defined as a rule which is likely to result in:

- An annual effect on the economy of $100 million or more;
- A major increase in costs or prices for consumers, individual industries, Federal, State or local government agencies or geographic regions regions; or
- Significant adverse effects on competition, employment, investment, productivity, innovation or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

EPA has determined that today's action will not result in any of the foregoing impacts prior to completion of a draft RIA on the current incinerator standards and consideration of any changes to those standards which might derive from the RIA (see previous discussion). In addition, EPA believes that today's action, withdrawal of the October 20, 1981 proposal and discontinuation of the policy of refraining from requesting permit applications from existing hazardous waste incinerators, does not constitute a rule. Accordingly, the Agency does not believe that an RIA specific to today's action is required and one has not been prepared.

EPA has submitted this notice to the Office of Management and Budget (OMB) for review under the Executive Order. OMB's comments, if any, are filed in the RCRA public docket, Room S269, U.S. Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460.

B. Regulatory Flexibility Analysis

Under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.), EPA is required to determine whether its regulations will have a significant impact on a substantial number of small entities. Section 603 of the Act requires that an initial Regulatory Flexibility Analysis be prepared when a rule is proposed and Section 604 requires a final analysis upon promulgation. Since today's action does not constitute the promulgation of a rule, EPA has determined that no Regualtory Flexibility Analysis is required.

List of Subjects

40 CFR PART 122

Administrative practice and procedure, Air pollution control, Hazardous materials, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control, water supply, Confidential business information.

40 CFR PART 264

Hazardous materials, Packaging and containers, Reporting and recordkeeping requirement, Security measures, Surety bonds, Waste treatment and disposal.

Dated: June 21, 1982.

Anne M. Gorsuch,

Administrator.

[FR Doc. 82-17098 Filed 6-23-82; 8:45 am]

BILLING CODE 6560-50-M

3-23

B-24

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122, 264 and 265

[S FRL-2024-3]

The Hazardous Waste Management System

AGENCY: Environmental Protection Agency.

ACTION: Interim final amendments to interim final and final rules.

SUMMARY: The Resource Conservation and Recovery Act (RCRA) requires that EPA set regulatory standards for all facilities which treat, store, or dispose of hazardous waste. In partial implementation of its requirement, on January 23, 1981, EPA set regulatory standards for incinerators that burn hazardous waste. These regulations were issued as "interim final," which means that, although they were issued in final form, the Agency invited public comment on them with a view to future amendment.

Today, EPA is amending, on an interim final basis, certain of its regulations applicable to hazardous waste incineration facilities. Today's amendments include revisions to: the general standards for permitting hazardous waste incinerators (Part 264, Subpart O), published in the Federal Register on January 23, 1981; the interim status standards for hazardous waste incinerators (Part 265, Subpart O), revised on January 23, 1981; and the consolidated permit requirements for incinerators (Part 122), published on May 19, 1980 and January 23, 1981.

The amendments pertain specifically to: (1) The permit procedure for incinerators, (2) exemption of corrosive and some reactive wastes from selected Subpart O standards, (3) the performance standard for hydrogen chloride emissions, (4) the performance standard for particulate emissions, (5) designation of air feed rate as an operating and monitoring parameter, (6) inspection of the waste feed cutoff system, (7) visual inspection of the stack gas plume during interim status, and (8) requirements for data collection during the trial burn. Additional issues addressed by this preamble but not pertaining to regulatory amendments include: criteria for the selection of principal organic hazardous constituents (POHCs), applicability of the regulations to incinerators installed as air pollution control devices, and the need for regulation of particulate emissions.

DA

Effective Date: June 24, 1982.

Comments Date: EPA will accept public comments on these amendments until July 26, 1982.

ADDRESSES: Comments should be sent to: Docket Clerk, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

Public Docket: The Public Docket for this amendment is located in room S-269, Waterside Mall, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. and is available for viewing from 8:30 a.m. until 4:00 p.m., Monday through Friday, exclusive of holidays.

FOR FURTHER INFORMATION CONTACT: The RCRA hazardous waste HOTLINE, Office of Solid Waste (WH-565), telephone: (800) 424-9346 or, in Washington, D.C.: 382-3000; or Jan Jablonski, Hazardous and Industrial Waste Division, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460; telephone: (202) 755-9200.

SUPPLEMENTARY INFORMATION:

Preamble Outline:

I. Authority
II. Overview
  A. Background
  B. Structure of today's preamble
III. Amendments
  A. Incinerator permit procedures
  1. RCRA permits for new incinerators
  2. RCRA permits for existing incinerators
  B. Applicability of the incinerator standards
  C. Amendments to the performance standards
  1. The performance standard for HCl removal
  2. The performance standard for particulate emissions
  D. Requirements for operation, inspection and monitoring
  1. Designation of air feed rate as an operating and monitoring parameter
  2. Inspection of the waste feed cutoff mechanism
  3. Visual inspection of the stack gas plume during interim status
E. Trial burn requirements
  1. Requirement for monitoring hazardous combustion by-products
  2. Computation of a total mass balance of the trial POHCs
IV. Other Important Issues
  A. Selection of principal organic hazardous constituents
  B. Applicability of the incinerator regulations to fume incinerators
  C. Regulation of particulate emissions from hazardous waste incinerators
V. Supporting Documents
  A. Background documents
  B. Guidance documents
VI. Regulatory Impacts
VII. Interim Final Regulations: Effective Dates
VIII. List of Subjects in 40 CFR Parts 122, 264, and 265

I. Authority

This amendment is issued under the authority of Sections 1006, 2002(a), 3004, and 3005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 U.S.C. 6905, 6912(a), 6924, and 6925.

II. Overview

A. Background

The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, requires EPA to establish a national regulatory program to insure that hazardous wastes are managed in a manner which does not endanger human health or the environment from the time they are created until their eventual destruction or final disposition. To this end, the Act requires regulations governing generation and transport of hazardous waste and, most significantly for today's amendments, requires that all treatment, storage, and disposal of hazardous wastes be conducted in accordance with a valid RCRA permit.

The Act defines a hazardous waste as any solid waste which may cause mortality or serious illness, or may "pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." (42 U.S.C. 6921) The statute further requires EPA to list specific hazardous wastes and to establish criteria by which wastes which are not specifically listed may be identified as hazardous. The statute also requires EPA to:

> Promulgate regulations establishing such performance standards, applicable to owners and operators of facilities for the treatment, storage or disposal of hazardous waste identified or listed under this subtitle, as may be necessary to protect human health or the environment. (42 U.S.C. 6924),

Each such facility must apply for and receive a permit which applies the standards to its own particular circumstances and states its particular compliance obligations.

RCRA allows existing facilities to operate during the period before a final permit decision is reached, provided that the owner or operator has made a timely submission of the required permit application. A facility is legally eligible for operation during this period, called the period of "interim status," only if it was in existence on November 19, 1980 and if the owner or operator submits a RCRA permit application.

On May 19, 1980, EPA published initial regulations as a first step in

eting the requirements of RCRA. pendix VIII of those regulations cified certain chemical substances ich, when present in a waste, could ve[illegible] basis for designating the ste as hazardous for purposes of ulation under RCRA. The regulations n explicitly listed a large number of :ardous wastes (see 40 CFR Part 261). addition, these regulations list four aracteristics" by which additional stes may be classified as hazardous. ese are ignitability, corrosivity, ctivity and Extraction Procedure (EP) icity (which generally measures a dency to release specific hazardous emicals through leaching). The May 1980 promulgation also included ne general requirements for the eration of existing facilities during erim status, including limited interim tus standards for hazardous waste inerators.

On January 23, 1981, EPA promulgated gulations which established the tutorily required standards for uing operating permits to one class of zardous waste treatment facilities: inerators (46 FR 7666). These ndards set forth the requirements inerators must meet to qualify for the erating permit which the statute ntemplates every RCRA facility will entually receive.

Because of the large number of RCRA [illegible]at must be issued, the permit plication needed to qualify for interim atus may be due years before the cility's individual permit will be nsidered. Requiring all of the formation needed for a decision ncerning the facility permit at the time qualification for interim status would sult in a requirement that owners and erators provide a great deal of formation to the Agency long before it needed for regulatory purposes. rthermore, because of the lengthy riod which ensues following ualification for interim status, formation provided so far in advance ight well be outdated by the time EPA gins to evaluate the permit plication.

To avoid this result, EPA has divided e permit application into two parts. art A, which is relatively brief, is filed y owners and operators of existing cilities in order to qualify for interim atus. Part B of the permit application ntains the balance of the information ecessary to fully evaluate the facility's erformance and reach a decision ncerning issuance of a permit. A cility may file a Part B application olu[illegible]ily at any time. Alternatively, ne[illegible]cy may require its submission.

EPA's January 23, 1981 regulations pecifically identified the information necessary to complete a Part B application for an incinerator. In many cases, the required information can only be collected by conducting a test burn using the hazardous waste which the facility will eventually be permitted to treat. The regulations therefore specified the information to be collected during such a test burn.

The regulations also specified three broad substantive requirements regarding incinerator performance. They are that the principal organic hazardous constituents (POHCs) designated in each waste must be destroyed and/or removed to an efficiency of 99.99%, that particulate emissions must not exceed 180 milligrams per dry standard cubic meter corrected to 12% carbon dioxide in the stack gas, and that, in most cases, the gaseous hydrogen chloride (HCl) resulting from combustion must be reduced by 99% prior to release to the atmosphere. The regulations also specified a number of requirements for incinerator operation, performance monitoring and inspections. Finally, they established the procedures by which permits to hazardous waste incinerators would be granted.

During the comment period which followed publication of the incinerator regulations, the Agency received numerous comments which suggested that changes or clarifications were needed. In addition, the Agency held a public hearing and technical assistance conference in Cincinnati, Ohio on April 21 and 22, 1981, at which additional comments were received. After careful evaluation of these comments, EPA has determined that modification of certain Subpart O regulations would enhance their technical feasibility and reduce the cost of compliance, while maintaining adequate protection of human health and the environment.

Portions of today's preamble and amendments address issues that were also raised by the litigants in *AMSA v. EPA, Nos. 81–1440 et al. (D.C. Cir. 1981),* a lawsuit seeking review of the January 23, 1981 incinerator regulations. Those litigants include an environmental advocacy group (the Environmental Defense Fund), hazardous waste generators (the Chemical Manufacturers' Association and the Association of Metropolitan Sewerage Agencies) and waste incinerator specialists (the National Solid Wastes Management Association and SCA Services, Inc.). They have, in the context of settlement negotiations, seen an earlier draft of today's amendments. Their written comments are included in the record of this rule-making. The Background Document for today's amendments cites those comments whenever the Agency has relied on information included in them.

B. Introduction to Today's Preamble

Today, EPA is amending the incinerator regulations in a number of respects, none of which changes them fundamentally. Each of these changes is discussed, in detail, below. The changes fall into five major areas: (1) Changes to the procedures for issuing incinerator permits, (2) changes to the scope of applicability of the incinerator regulations, (3) modifications to the performance standards, (4) changes in the requirements for incinerator operation, performance monitoring and inspection, and (5) minor alterations in the trial burn data collection requirements.

The amendments published today include changes to all of the Part 264, Subpart O sections, except § 264.342 (Principal Organic Hazardous Constituents). Certain changes are being made simply to clarify the intent of the regulations or to correct for procedural difficulties. For example, § 264.341 (Waste-analysis) is being revised to acknowledge problems encountered by applicants seeking permits for new incinerators prior to construction. This change simply formalizes the Agency's intent to require waste analysis information to the extent that it is available to owners and operators of new facilities. Other changes alter the regulatory requirements. For example, § 264.340 (Applicability) is being revised to expand the number of wastes which may be exempted from the performance standards of Subpart O.

As a result of the changes to Part 264, minor conforming changes are necessary in the permit application requirements of §§ 122.25 and 122.27. Other, more significant, changes to § 122.27 follow from recognition of the need to operate new facilities for periods before and after the trial burn. Today's amendments also include changes to the data reporting requirements of §§ 122.25 and 122.27. The Agency is removing the requirements for identification of hazardous combustion by-products from these sections since the amendment pertaining to those substances (proposed January 23, 1981, 46 FR 7684) is still under consideration. The provisions regarding waste analysis in § 122.27(b) have been rewritten in order to more clearly describe the three-step process by which wastes should be screened for hazardous constituents. Additionally, EPA has modified the requirement in § 122.27 for computation of a total mass balance of the trial

POHCs following completion of the trial burn.

Today's amendments include two changes to the interim status standards for incinerators (Part 265, Subpart O). Section 265.340 (Applicability) is being revised to reflect the amendment to § 264.340 concerning wastes which may be exempted from the Part 264, Subpart O performance standards. Secondly, the provision for hourly visual inspection of the stack gas plume (§ 265.347) is being deleted in order to compensate for various practical problems inherent in the original regulation. EPA believes that these and all of today's amendments will reduce the regulatory burden imposed on hazardous waste incinerators without compromising the integrity of its mandate under RCRA to protect human health and the environment.

The following table summarizes the significant changes made by today's amendments. It is presented here as an aid to the reader in recognizing the changes made in the regulatory requirements and is not intended to be used as a surrogate for the regulatory text. The statements appearing in the table are intended as brief summaries and do not include all aspects of the existing and amended regulations. The reader is referred to the regulatory paragraphs cited in the table for information concerning specific requirements.

Public comments received in response to the January 23, 1981 regulations raised several issues which related to interpretation of the regulations and the basis and purpose of specific requirements. Today's preamble also discusses these issues and provides a statement regarding the Agency's position on each.

The basis and purpose of today's amendments is presented, in greater detail, in the Background Document which is a companion to this notice. The document also provides the Agency's response to public comments which relate specifically to the amendments. Comments not germane to today's amendments continue to be under consideration by the Agency and will be addressed in the future.

SUMMARY OF SIGNIFICANT AMENDMENTS TO THE REGULATIONS FOR HAZARDOUS WASTE INCINERATORS

Section	Jan. 23, 1981 regulation	Amended regulation
264.340	Exempted wastes: (1) Listed ignitables and (2) those failing the test for ignitability, when shown to contain no Appendix VIII substances.	Exempted wastes: (1) Listed ignitables, corrosives and/or selected reactives and (2) those failing the tests for ignitability, corrosivity and/or selected reactivity characteristics, when shown to contain no or insignificant levels of Appendix VIII substances.
264.343(b)	Performance Standard for HCl Emissions: If: Waste input exceeds 0.5% chloride, Then: Remove 99% of stack gas HCl.	Performance Standard for HCl Emissions: If: Stack emissions exceed 1.8 kg HCl/hr, Then: Control emissions so that they do not exceed the larger of the following: (1) 1.8 kg HCl/hr, or (2) 1% of the HCl in the stack gas.
264.343(c)	Performance Standard for Particulate Emissions: Emissions may not exceed 180 mg/DSCM when corrected to 12% carbon dioxide.	Performance Standard for Particulate Emissions: Emissions may not exceed 180 mg/DSCM when corrected to 50% excess air or as otherwise specified in the permit.
264.344	No provisions for permits to new incinerators	Allows for four-phase permit for new incinerators: Phase 1: "Shake-down" phase. Phase 2: Trial burn. Phase 3: "Follow-up" phase. Phase 4: Permanent operation phase.
264.345	Air Feed Rate to be designated as an operating requirement.	Indicator of Combustion Gas Velocity to be designated as an operating requirement.
122.27	1. New facilities must have final RCRA permit prior to construction.	1. New facilities submit Part B of the permit application and required information for trial burn plan simultaneously. Permit is issued, after opportunity for public hearing.
	2. Requirement to monitor Hazardous Combustion By-Products during trial burn.	2. Deleted.
	3. Waste Analysis requirements for trial burn plan	3. Language Clarification.

[1] Equivalent changes have been made in the corresponding section of Part 265 (Interim Status Standards).

III. Amendments

A. Incinerator Permit Procedures

The January 23, 1981 regulations established application requirements and permitting procedures for granting RCRA permits to new and existing incinerators (46 FR 7681). Section 122.25(b)(5) established three methods by which applicants could satisfy the Part B permit application requirements. Briefly, owners and operators seeking to burn only wastes which might be eligible for exemption from the performance standards for incineration were required to provide a substantially abbreviated version of the permit application. Facilities that will burn other wastes were either required to conduct a trial burn or seek a waiver of the trial burn requirement by submitting sufficient alternative information.

1. *RCRA permits for new incinerators.* Prior to the issuance of the January 23, 1981 incinerator standards, EPA published the Consolidated Permit Regulations (45 FR 33290). Section 122.22(b)(1) of those regulations provided that new hazardous waste management facilities, i.e., those facilities not "in existence" on November 19, 1980, could not begin physical construction after November 19, 1980, until a final RCRA permit had been issued for the facility. This "construction ban" created a problem for new incineration facilities. Under the May 19, 1980 regulations, new incinerators could not begin construction until they had received a RCRA permit, and facilities choosing to use the trial burn method to apply could not receive a RCRA permit until they performed a trial burn and submitted the results. These new facilities were clearly placed in an untenable position, as they could not perform the trial burn until after construction, but could not construct until they had received a final RCRA permit, often requiring performance of a trial burn.

Today's amendments revise and simplify the January 23, 1981 permitting procedures for new facilities. For those facilities applying under the trial burn method, submission of a trial burn plan with the Part B application is required under revised § 122.27(b). The permitting authority (the "Director") will then process the permit completely through the Part 124 procedures, including preparation of a draft permit, and an opportunity for public comment and hearing. After completion of this process, the Director will issue a permit which establishes all of the conditions needed to comply with the standards of Part 264, Subparts B through H and Subpart O.

This permit will be the "finally effective RCRA permit" required, by § 122.22, for commencement of physical construction. It will be issued prior to the trial burn and will therefore allow advanced approval of new facilities applying by the trial burn method, an action which the previous regulation did not allow. This meets the concern expressed by commenters that they may be required to invest large amounts of capital before the Director has completed review of the facility design and operation, and approved a trial burn.

The permit will be structured to provide for four phases of operation. The initial phase begins immediately following completion of construction. During this phase, the facility may be operated for "shake-down" purposes, in

to identify possible mechanical
ılties, ensure that the facility has
ed operational readiness and
ve steady-state operating
tio ior to conducting the trial
Th urposes may be partially
nplished by operating the unit with
lary fuel or non-hazardous waste
for conditioning of refractories).
e litigant felt that burning of
dous waste should not be allowed
g shake-down. Engineering
derations, however, will
ssitate operation of the incinerator,
to conducting the trial burn, using
azardous waste or wastes for
h the permit will be written. Thus,
mended regulation allows the
tor to specify, on a case-by-case
, conditions under which a new
ty may operate to treat hazardous
e during the shakedown period.
is phase of the permit is limited to
ours of operation to treat
rdous waste (approximately 30
of continuous operation) in order
event prolonged operation in the
nce of permit requirements of
nstrated adequacy. The Director
extend the allowable hazardous
e treatment period for one
tional period of up to 720 hours if
pplicant is able to demonstrate
e for the extension. Requests for
nsions should be accompanied by a
ile tement regarding the
ien performance and the need
ne extens on.
ıe provision for a single extension
vers one litigant's concern that
ic participation might be excluded
decisions to allow burning of
ırdous wastes during shake-down.
initial public hearing will allow an
ortunity to comment on the permit
litions to be imposed during shake-
n and on the single extension. If
ational constraints require further
nsion of the shake-down period,
ortunity for additional public
icipation is appropriate. Thus,
ıer extensions will require
lification of the permit, according to
procedures of § 122.15 (Modification
evocation and reissuance of
nits).
he operating requirements for the
ke-down period must meet two
eria: (1) They must be sufficiently
ıgent, based on the Director's best
ineering judgment, to meet the
ormance standards of § 264.343, and
hey must not restrict operation to
ı a degree that the operator is unable
repare the incinerator to perform
perly during the trial burn. Design
op ing information submitted
n of the permit application and
experience gained from other permit deliberations will aid the Director in determining whether the incinerator is likely to achieve the performance standards of § 264.343 when operated under certain conditions. Sufficiently conservative conditions can be implemented by limiting the waste feed rate or concentration of hazardous constituents input to the incinerator, or by requiring operation at temperatures in the upper reaches of the incinerator's operating range. The Director should be able to specify conditions which will protect human health and the environment while allowing sufficient inputs of hazardous wastes to prepare the incinerator to function properly during the trial burn.

There are numerous feasible approaches to establishing acceptable operating conditions during the shake-down period. For example, some applicants may wish to operate in the early stages of the shake-down period using auxiliary fuel or non-hazardous wastes, followed by an informal or small-scale trial burn. The results of this burn might then be used to establish a preliminary set of operating conditions to be effective during the remainder of the shake-down. Alternatively, the applicant might operate during shake-down under the operating requirements originally proposed by EPA in December of 1978 (43 FR 59008). The final decision will be made on a case-by-case basis. The permit application must be accompanied by a statement which identifies the conditions under which he proposes to operate during shake-down and gives some justification for selecting these conditions. The Director will evaluate the proposal and decide upon the conditions to be included in the permit.

After timely and satisfactory completion of all shake-down operations, the second phase of the permit begins. This phase consists solely of the period allotted for conducting the trial burn. The operating requirements applicable during this phase will be set in accordance with the trial burn plan and will be determined following a careful review of the plan and all other information submitted with Part B of the permit application.

Following completion of the trial burn, a period of several weeks to several months will be necessary for completion and submission of the trial burn results and subsequent specification of operating conditions to reflect the results. This period represents the third operational phase of the permit. Since shutdown of the incinerator during this period might result in substantial financial losses, and in diversion of hazardous wastes to less effective treatment alternatives, the Agency has determined that some provision must be made to allow operation. The amendment, therefore, will allow the Director to specify a set of operating requirements to take effect following completion of the trial burn and until modified operating requirements are specified in the facility permit.

EPA has considered numerous approaches for setting requirements to be applied during this phase. The amended regulation requires that the permit conditions be designed to meet the performance standards of § 264.343. Therefore, as in the case of the shake-down period, engineering judgment will be necessary to set these conditions. Again, conservative conditions should be applied; for example, the Director may choose to impose the most stringent operating conditions imposed during the trial burn or he may restrict waste composition or feed rate. The incinerator will have been operated to treat hazardous wastes during the trial burn and perhaps during a shake-down period prior to the follow-up phase. Therefore, there may be circumstances in which the Agency will consider whether any continuous monitoring data collected during the trial burn could be used to assist in selecting operating requirements for the follow-up period.

For example, during the trial burn, the stack emissions might be monitored for total unburned hydrocarbons (i.e., all unburned organic substances in the stack gas). By assuming that the total concentration of unburned hydrocarbons measured is emitted in the form of the POHC [1] which is most difficult to burn, a destruction and removal efficiency (DRE) might be calculated using the unburned hydrocarbon data. The operating requirements which result in attainment of this DRE during the trial burn could then be designated for application during the follow-up phase. The assumptions involved in this approach are necessarily conservative and act to offset uncertainty concerning possible

[1] A principal organic hazardous constituent (POHC) is an organic chemical which is a constituent of the waste to be burned and has been identified as hazardous by EPA in Appendix VIII of 40 CFR Part 261. In each case, the permitting authority will designate POHCs to be used in measuring destruction and removal efficiency of the incinerator. As discussed later in this preamble the incinerator will be operated during a trial burn to demonstrate 99.99 percent destruction and removal efficiency for each POHC designated by the permitting authority. The operating conditions shown to achieve 99.99 percent destruction and removal efficiency will then become conditions of the permit. Generally, those organic constituents which are most difficult to destroy and most abundant in the waste will be selected as POHCs.

damage to human health and the environment. For this reason and because EPA lacks information concerning the feasibility of such an approach, today's amendment does not require that total unburned hydrocarbon data be used to set the permit conditions for the follow-up phase. However, EPA specifically requests that interested parties submit comments regarding the technical, financial, and practical aspects of such an approach. After further consideration of the method and review of any comments received, EPA will determine whether the above approach can be used with a high degree of confidence.

As in the case of the shake-down phase, the applicant should include a statement, with the permit application, describing the conditions under which he proposes to operate during the follow-up phase. In the event that data collected during the shake-down or the trial burn phases show that different operating conditions will be necessary, the applicant may amend the permit application and the Director may modify the permit conditions, as required. This modification may proceed according to § 122.17 (Minor modifications of permits), which does not require implementation of the procedures specified in Part 124, including preparation of a draft permit and opportunity for public hearing and appeal.

Detailed review of the trial burn results will show either that the incinerator is capable of complying with the performance standards when operating within the trial burn conditions, or that compliance was not attained during the trial burn and a second test is necessary. If compliance was shown, the permit may be modified to set, as the final operating requirements those demonstrated during the trial burn according to § 122.17 (Minor modifications of permits). If compliance has not been shown and an additional trial burn is necessary, the permit may also be modified under § 122.17, to allow for an additional trial burn. In cases where 99.99 percent DRE is achieved for some but not all of the trial POHCs, the permit must be modified to allow incineration of only those POHCs for which compliance has been demonstrated. A further trial burn will be necessary if the applicant wishes to show compliance for the remaining trial POHCs. When all permit modifications are complete, the facility begins its fourth and final operating phase which continues throughout the duration of the permit.

2. *RCRA permits for existing incinerators.* Because RCRA provides for existing incinerators to operate under interim status while awaiting the Agency's decision concerning permit issuance, these facilities do not experience the operating restrictions which complicate the permitting process for new incinerators. The amendments to the procedure for permitting existing incinerators therefore do not change the actual process. Instead, the changes which have been made only serve to clarify the sequence of events involved in the application process.

The revisions at issue affect §§ 122.25(b)(5) and 122.27(b). They require that owners and operators of existing facilities who apply under the trial burn method submit their trial burn plans either before or with their Part B permit application. The Director will then evaluate the plan and approve it after making the determinations required in § 122.27(b)(2). If a trial burn plan is submitted and approved before the permit application has been submitted, the applicant should conduct the trial burn, and submit the resulting data with the permit application. If completion of this process conflicts with the date set by the Director for submission of the Part B application, the applicant should contact the Director to extend the date for submission of the Part B application or submit the Part B without the trial burn results and provide the data within 90 days following completion of the trial burn. If a trial burn plan is submitted with Part B of the permit application, the Director, when approving the plan, will specify a time period for conducting the trial burn and submitting the results. Following submission of the trial burn results and the Part B application, the Director may prepare a draft permit which will specify the proper operating requirements under § 264.345, based on the results of the trial burn, along with all other applicable permit conditions. This permit will then be processed through the standard procedures of Part 124.

The trial burn application procedure for existing facilities differs from new facilities because an existing facility in interim status is authorized to conduct treatment of hazardous wastes. Therefore, an existing facility needs no prior approval to continue operation or conduct a trial burn. However, without the Director's approval, the owner or operator cannot be certain that the trial burn data will be sufficient to meet the Director's needs. Thus, the applicant will find it advantageous to obtain the Director's approval of a trial burn plan prior to conducting the test. During review of the trial burn plan, the Director will designate principal organic hazardous constituents to be monitored and will specify other data requirements. However, the applicant may choose to collect data during the course of normal operation under interim status or may acquire data from similar facilities burning similar wastes to be submitted with Part B of the permit application in lieu of conducting a trial burn according to an approved trial burn plan.

The January 23, 1981 regulations required that trial burn results be submitted to the Director no later than 30 days following completion of the burn. Comments received following publication of those regulations suggested that the 30 day period is not sufficient to allow completion of chemical analysis, data computation, and reporting. EPA concurred with commenters on this point and has extended the time period to 90 days following completion of the trial burn. As discussed above, the applicant may avail himself of various options for submitting the trial burn results and Part B of the permit application, and should recognize that EPA, in accordance with § 122.22(a)(2), will allow the applicant at least six months from the date of request to submit Part B of the permit application. Therefore, the 90-day limitation takes effect only after this six month period has elapsed.

B. Applicability of the Incineration Standards

The January 23, 1981 regulations exempted ignitable hazardous wastes from compliance with most of the standards for incinerators. This exemption was allowed because the regulations focused primarily on controlling emissions of hazardous organic substances, toxic metals and hydrogen chloride. As discussed below, the regulations require that incineration of hazardous waste result in destruction and removal of 99.99% of the hazardous organic waste constituents. The restriction on particulate emissions works to control release of toxic metals and hydrogen chloride emissions are controlled through imposition of a performance standard for air pollution control devices. Wastes which have been designated as hazardous solely because of ignitability were exempted from coverage because they lack the properties which these standards are designed to control.

As noted earlier, a solid waste becomes a "hazardous waste" subject to regulation under Subtitle C of RCRA in

o ways. Either the waste is
d as hazardous because it
nazardous constituents listed
dix VIII and has been
ly [illegible] as hazardous by EPA,
za[illegible]s because it fails one or
PA's characteristic tests for
y, corrosivity, reactivity or
n Procedure toxicity. The
n from the technical standards
ration applied to wates which
nated as hazardous by either
lely because of their ignitable
s.
commenters felt that the
n for ignitable wastes should
ded to include corrosive and
wastes. The majority of these
ers further suggested that the
should designate allowable
ations of Appendix VIII
nts for the exempted wastes.
o suggested that the exemption
e automatic, based on criteria
d in the regulations rather than
e discretion of the Regional
trator.
as decided to expand the
on, as requested by commenters,
le corrosive wastes and wastes
ny of the reactivity
ristics described by § 261.23(a)
3), (6), (7), and (8). Today's
ent to § 264.340 provides for
ic granting of the exemption for
as[illegible]hen they have been
o [illegible]n none of the hazardous
ents listed in Appendix VIII of
. In contrast, ignitable, corrosive
ctive wastes having low
rations of some Appendix VIII
ents may be exempted if the
l Administrator finds that the
ion will not result in a potential
o human health and the
ment.
es eligible for the exemption
those which are hazardous
lue to any of the selected
eristics and those which are
ous solely due to any
ation of those characteristics.
s which are listed as hazardous in
1 due to the presence of toxic
uents and wastes having the
tion Procedure toxicity
teristic will not be eligible for the
tion.
has not yet listed any wastes
because of corrosivity. However,
emption for corrosives now
s to wastes which are hazardous
failure of the corrosivity test.
l the Agency determine that
listings are necessary, this
ion may be applied when a waste
d [illegible] corrosive properties.
n r[illegible]t to reactive wastes, the
y has two concerns: (1) Certain reactive wastes require careful treatment, storage, and disposal because they may release toxic gases, such as cyanide, upon reaction with other substances, and (2) reactive wastes which are explosive, when burned in the presence of other wastes, create the potential for release of hazardous pollutants to the environment in the event of an explosion. The exemption for reactive wastes has therefore been limited to accommodate these concerns. First, wastes having the reactivity characteristics described by § 261.23(a) (4) and (5) will not be exempted since they may emit toxic gases and vapors upon reaction. Second, wastes described by any of the remaining reactivity characteristics are explosive or capable of violent reactions that could disperse toxic substances into the environment. Therefore, the amendment specifies that such wastes, if exempted, cannot be burned in the presence of any other hazardous waste.

EPA's selection of wastes to be exempted under § 264.340 was based on a consideration of the purpose underlying each of the performance standards of § 264.343. Since the destruction and removal efficiency (DRE) requirement measures emissions of hazardous organic constituents and the performance standard for particulate emissions is intended primarily as a means of controlling toxic metals and hazardous organic substances adhering to particulate material, application of these standards is inappropriate when the waste is known to contain none or only insignificant concentrations of the Appendix VIII hazardous constituents.

EPA has further determined that application of the performance standard for HCl emissions to incineration of these wastes is unnecessary. Although Appendix VIII does not include an exhaustive list of chlorinated organic substances, it does include a large percentage of the chlorinated substances expected to be present in hazardous wastes. Therefore, we believe that there will be few, if any, exempted wastes which, when burned, will create emissions in excess of the allowable emission rate of 4 pounds per hour, set by today's amendment to § 264.343.

Applicants seeking exemption under § 264.340 must submit sufficient waste analysis data with Part B of the permit application to document levels of all hazardous constituents listed in Appendix VIII of Part 261 which would reasonably be expected to be found in the waste. The waste constituents excluded from analysis must be identified, and the reason for their exclusion stated. During interim status, owners and operators are required to document, in writing, that any exempted waste would not reasonably be expected to contain any Appendix VIII hazardous constituents. This documentation must be retained throughout the period of interim status.

When setting the conditions of the permit, the Regional Administrator will determine whether an exemption should be granted for incineration of an ignitable, corrosive, or reactive waste base on a review of the waste analysis data. This review will focus primarily on the identity and numbers of any Appendix VIII (Part 261) hazardous constituents in the waste, and on the concentrations in which those constituents are found in the waste. Today's amendment allows an ignitable, corrosive, or reactive waste in which none of the hazardous constituents listed in Appendix VIII of Part 261 have been detected to be exempted without further consideration of its content. The Regional Administrator's review of the waste analysis plan and data, both of which accompany Part B of the permit application, is necessary in this case in order to determine that the sampling and analysis methods used and the data generated show that no hazardous constituents are present at levels which can be detected by the analytical methods required by § 122.27 (i.e., those specified in SW-846, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods"). Although the exact detection limits vary for specific constituents, those present in concentrations below 1 part per million (ppm) in the waste generally will not be detected.

Since small, but detectable, concentrations of Appendix VIII hazardous constituents may not always pose a hazard to human health when incinerated, the amended regulation also provides that the Regional Administrator may grant an exemption when low concentrations of hazardous constituents are detected in the waste. One litigant criticized this provision as too lenient. However, if EPA provided no allowance for trace contaminants, the exemption would be unworkable. In making a determination regarding exemption in this case, the Regional Administrator may begin by considering the concentration of each hazardous constituent found in the waste feed and estimating the concentration (e.g., by assuming 99.99% destruction and removal) which will result in the stack gas.

EPA estimates indicate that constitutents present in the waste feed in concentrations as low as 1000 ppm

e routinely detected by stack gas sis and that a waste concentration) ppm probably represents a cal lower limit beyond which ni of 99.99% destruction and va be difficult to document. gas concentrations resulting from % destruction and removal of ituents present in the waste feed in ntrations below 100 ppm can ally be measured only through the sampling and analysis techniques exceed the capabilities of those mended in EPA's guidance manual)ling and Analysis Methods for dous Waste Incineration) and the nal Administrator may presume re allowable for purposes of the)tion.

Regional Administrator may also ler available measures of the 'e toxicity of each hazardous tuent in order to ascertain whether dial exists for threat to human . In rare cases where the tutents under consideration are 1 to be extremely toxic (e.g., -TCDD), the Regional nistrator may overcome the nptive exemption, even when ted stack gas concentrations are that modified sampling and is methods will be necessary for rement. This approach allows the ial Administrator the option of g emption when the toxic tue present in a waste, in his ent, pose a potential health l, even at low levels. In granting tionary authority to the Regional istrator in this limited area, EPA icularly interested in determining sibility of future regulations ring the toxicity criterion as a in POHC selection.

endments to the Incinerator mance Standards

regulations require that ous waste incinerators comply ree performance standards. The nportant of these is the ment that incinerators achieve a tion and removal efficiency of 99.99% for each principal hazardous constituent (POHC) ated in each waste feed. This rd is not affected by today's ments. The second performance rd is a requirement that ators burning wastes containing an 0.5% chlorine remove 99% of eous hydrogen chloride (HCl) in k emissions. The final ance standard requires that ators emit no more than 180 im articulate material per nd ubic meter of stack gas ins per dry standard cubic foot), corrected to 12% carbon dioxide in the stack gas. Amendments to both the HCl and particulate control standards are discussed below.

1. *The performance standard for HCl removal.* The interim final, Subpart O, regulations require that incinerators burning a waste feed which is more than 0.5% chlorine remove 99% of the hydrogen chloride (HCl) in the stack gas. A substantial number of comments addressed the acceptability of this standard. The majority of these comments requested that the performance standard be modified to regulate organically bound chloride only. Many also stated that, since wet scrubbers used to remove chlorides operate with increasingly less efficiency as HCl concentrations decrease, specific provisions are necessary for burning small quantities of chlorinated organic wastes or waste streams having a low chlorinated organic concentration. Commenters pointed out that because the standard allows a large incinerator burning a waste relatively high in chloride to emit a much greater quantity of HCl than a small facility burning a waste which is relatively low in chloride, it does not regulate uniformly. Most contended that a maximum allowable HCl emission level would provide a more adequate means for regulating and suggested allowable ambient air concentrations ranging from 12 parts per billion to 10 parts per million.

The amended performance standard requires that incinerators emitting more than 4 pounds of HCl per hour achieve a removal efficiency of up to 99%. The required removal efficiency will vary for each facility since, for incinerators emitting more than 4 pounds of HCl per hour, removal need only be sufficient to reduce emissions to that rate. A minimum of 99% removal efficiency is required when removal at this efficiency will not reduce emissions to 4 pounds per hour. This requirement is based primarily on the Agency's determination that 99% removal represents currently achievable technology and is supported by data obtained from the test burns conducted by EPA's Office of Solid Waste during 1975 and 1976. Whenever HCl removal was measured, the 99% standard was achieved. Additional industry reports reinforce these data.

Establishment of the maximum allowable uncontrolled emission level at 4 pounds per hour results from consideration of a number of factors including information supplied by commenters. Specifically, the value was derived through application of the single source (CRSTER) model for short term air pollution exposures. The Threshold Limit Value for exposure to HCl in workplace air, developed by the American Conference of Governmental Industrial Hygienists, was modified to account for the hourly difference between occupational and environmental exposures. The resulting value was then altered by a safety factor of 100 in order to arrive at an appropriate ambient air concentration. This number was used to represent a safe exposure level and provided input to the single source model for calculation of the corresponding allowable emission rate. This approach is not only the most acceptable of methods currently available but is consistent with suggestions made by commenters. EPA believes that 4 pounds of HCl per hour is a safe and conservative allowable emission rate which insures adequate protection and resolves the problems raised by commenters regarding small facilities.

A case-by-case approach to setting mass emission limits, through the use of risk assessments in the permitting process, would further tailor this standard to reflect actual risks to human health. EPA has proposed the use of quantitative risk assessments as a basis for altering the performance standard in individual cases (46 FR 7684, January 23, 1981), and will evaulate its usefulness during the course of the regulatory impact analysis currently underway. If adopted as a final regulation, this approach will provide a mechanism for varying the HCl emission limit established by today's amendment.

2. *The performance standard for particulate emissions.* The interim final performance standard for control of particulate emissions requires that a hazardous waste incinerator emit no more than 180 milligrams of particulate material per dry standard cubic meter, when corrected to 12% carbon dioxide in the stack gas. This correction is designed as a protection against attempts to meet the particulate standard simply by diluting the stack gas, rather than by controlling the particulates. Selection of the correction factor was based on an assumption that the stack gas should contain 12% carbon dioxide when the incinerator is operated using 50% excess air. Further dilution with air, of course, would alter the percentage of carbon dioxide. However, comments suggested that the required correction of measured particulate emissions to 12% carbon dioxide is inappropriate since it originated from standards promulgated under the Clean Air Act which address burning of fuel relatively high in carbon content (i.e.,

ous coal). The correction factor, ıters contended, is not ıtative of typical hazardous arb content, and does not r t h quantities of excess ired for burning hazardous

2% carbon dioxide correction ;as indeed derived from data ing the combustion of coal. t the use of excess air, burning of ults in stack emissions which 18% carbon dioxide. Assuming : of 50% excess air is ntative of common practices, the iate carbon dioxide content) 12%.
ımmenters indicated, there are jor problems involved in g this factor to incineration of ous wastes: (1) The correction is ın conditions appropriate to materials of high carbon content nappropriate for hazardous ncineration because carbon varies considerably among and (2) since carbon dioxide is ed to a significant extent in wet er systems, the correction ire requires sampling the ns in the hot zone of the stack, clean-up by pollution control . In order to eliminate these ties and correct for the wide f e s air use among ou te incineration facilities ency has selected a replacement carbon dioxide correction ure.
mended, the performance d for particulate emissions s adjustment of the measured late concentration by the ng correction factor (CF):

$$\frac{14}{21-Y}$$

Y is the oxygen measured in the as, expressed as a volumetric tage.
correction procedure parallels bon dioxide correction since it the measured particulate tration to reflect the same rd conditions, specifically 50% air. The factor is derived from mula:

$$\frac{21-X}{21-Y}$$

X is the volumetric oxygen tage of the stack gas resulting ur with a given percentage of a s the volumetric oxygen tage measured in the stack and 21 is the oxygen content of ambient air expressed as a volumetric percent. At 50% excess air, the stack gas will contain 7% oxygen by volume and the formula becomes:

$$CF=\frac{21-7}{21-Y}=\frac{14}{21-Y}$$

This correction factor provides several advantages. Since pollution control devices do not significantly alter oxygen concentrations, it is no longer necessary to sample emissions in the hot zone of the stack. Sampling and analytical methods for oxygen measurement are sufficiently similar to those used for measurement of carbon dioxide so as to impose no additional cost. Furthermore, basing the correction on oxygen rather than carbon dioxide content relies on assumptions which are representative of conditions typically found during incineration of hazardous wastes. EPA views this change as one which will significantly decrease the burden imposed by the performance standard for particulate emissions, without increasing the potential threat to human health and the environment. For further discussion of the basis underlying this correction procedure, the reader is referred to the Background Document for today's amendments.

The utility of the new correction factor is restricted to incinerators which use only ambient air as an oxygen source. The factor will necessarily be altered for units which incinerate under oxygen enriched conditions. An appropriate correction factor will be selected on a case-by-case basis for these incinerators and will be established as a condition of the permit. A more appropriate correction factor may be calculated by replacing the volumetric percentage of oxygen in ambient air, used in the above formula (21%), with a value which represents the total oxygen input to the incinerator, also expressed as a volumetric percent. This combined value, K, is calculated from the formula:

$$K=\frac{21(V_a)+100(V_o)}{V_a+V_o}$$

Where V_a is the volume of air fed to the combustion zone and V_o is the volume of oxygen fed to the combustion zone, both corrected to standard conditions. The above correction factor then becomes:

$$CF=\frac{K-7}{K-Y}$$

And is substituted in the equation:

B-31

$$P_c=P_m\cdot\frac{K-7}{K-Y}$$

Where P_c is the corrected concentration of particulate matter and P_m is the measured concentration of particulate matter.

D. Requirements for Operation, Inspection and Monitoring

The regulations include several requirements for incinerator operation, inspection and monitoring. After a permit is issued, temperature, waste feed rate, air flow rate and stack gas carbon monoxide must be monitored continuously. In addition, the incinerator must be inspected for signs of spills, leakage and fugitive emissions and the emergency waste feed cutoff system must be tested daily. The regulations require that several operating requirements be specified in each permit. At a minimum, these include: limitations on waste feed composition, stack gas carbon monoxide, air feed rate, waste feed rate and allowable variations in design and operating procedures. Incinerators operating in interim status are required to monitor any existing instruments which relate to combustion and emission control at 15 minute intervals. Daily inspection for signs of spills, leakage and fugitive emissions and hourly observation of the stack gas plume must also occur during interim status. Several amendments to the operating, monitoring and inspection requirements are discussed below, including one amendment to the interim status requirements.

1. *Designation of air feed rate as a monitoring and operating parameter.* The interim final regulations listed several parameters which were to be designated as operating and monitoring requirements in each facility permit. These included carbon monoxide in the exhaust gas, waste feed rate, and combustion temperature. Several comments criticized the efficacy of air feed rate monitoring. Such monitoring, they contended, is not a reliable measurement of retention time [2] and is not feasible for all types of incinerators. Commenters suggested that measurement of other parameters, such as combustion gas flow rate, stack gas oxygen concentration, induced or forced draft fan flow rate, fan motor current, or pressure differential within the system,

[2] Generally, retention time correlates with the incinerator's destruction and removal efficiency. As retention time increases, destruction efficiency increases.

ved as substitutes for air feed
a retention time indicator.
riginally used the term "air feed
in[illegible]e the rate at which air
ro[illegible]he incinerator
tion zone. The comments
however, that this term has
erpreted more conservatively
Agency originally intended. As
ters stated, incinerators such as
ilns do not employ a forced draft
which lends itself to
ment of air feed rate. Instead,
awn into the kiln at many points
ial feed rate is impossible to
. In such a situation,
ment of combustion gas flow
ore appropriate.
ed rate was included as an
g parameter for two reasons: (1)
y that sufficient excess air
e combustion zone in order that
tion is completed to the extent
, and (2) to provide a ceiling for
flow rate through the
tion zone in order to assure
t retention time. Since
ation of air feed rate as an
g parameter is not appropriate
cilities, today's amendment
guage which allows the use of
propriate indicators of
ion gas flow rate, in situations
easurement of air feed or flow
iff[illegible]Suitable indicators, such
ti[illegible]n amperage or exhaust
city, may be considered.
differential within the system
be monitored; however, it is
t to recognize that pressure
tial across exhaust gas wet
rs should not be relied on since
ctors affect the scrubber
and will act to decrease the
of its use as an indicator of
ion zone retention time.
gency intends that the owner or
select a parameter which will
lculation of the volumetric gas
e, to be measured during the
n, by considering accuracy,
n, ease of measurement and
lesign. The Regional
trator will then evaluate this
n, based on the relevant
ion included in Part B of the
pplication and, taking the above
ations into account, the
er to be measured will be
ed in the facility permit.
and operators seeking to use
ernatives should supplement
t B applications with
ion concerning possible sources
ure[illegible]t error and the necessary
sa[illegible]easures, so that a
ful[illegible]aluation can be made.
guidance concerning selection of an appropriate indicator of combustion gas flow rate can be found in the Guidance Manual for Evaluating Permit Applications for the Operation of Hazardous Waste Incineration Units.

2. *Inspection of the waste feed cutoff mechanism.* The interim final regulations included a requirement for daily inspection of hazardous waste incinerators and associated equipment. Many commenters expressed concern that requiring daily inspection of the emergency waste feed cutoff mechanism would create an undue financial burden. They maintained that proper inspection requires the skill of a qualified instrument mechanic and is therefore too costly to be conducted on a daily basis. Furthermore, other commenters contended that the reliability of such emergency equipment is sufficient to support the assumption that an incinerator will operate safely even when failure of a component part occurs, and that in the event that the system should not respond, waste feed cutoff can be accomplished manually. In view of the reliability and limited use of such equipment, several comments concluded that weekly or monthly inspections would be more appropriate.

The amended regulation requires inspection at two levels of detail. Daily inspections may be limited to visual examination of the incinerator and associated equipment for signs of leakage, spills, corrosion or breakdown. A careful check of the emergency waste feed cutoff system and associated alarms must be conducted weekly. This inspection should be conducted by properly trained personnel (e.g., an instrument mechanic) and should include testing of the control panel circuits, triggering, through test circuits, of alarms and any other associated automatic functions (e.g., temperature maintenance systems). Operation of the waste feed cutoff valve should be included as part of the weekly inspection in cases where the valve is not "fail safe" (i.e., does not fail in the closed position). A fail safe valve, however, need not be operated weekly.

The degree to which inspection of the emergency waste feed cutoff system will disrupt normal operation of the incinerator will vary, depending upon facility design and other facility-specific factors. For example, liquid injection incinerators equipped with multiple feed nozzles may undergo weekly inspection with very little disruption simply by checking the cutoff to each nozzle individually while maintaining operation of the remaining nozzles. However, disruption may be significant in other instances. The amended regulation therefore gives the Regional Administrator the authority to allow inspection of the emergency waste feed cutoff system as infrequently as monthly. The Agency intends that this variance be granted only when the applicant has shown that weekly inspection will be highly disruptive (e.g., potential exists for refractory shock or other equipment damage) or will impose an inordinately large financial burden due to some facility-specific condition. In each case, granting of the variance should be conditional on a finding that proper operation will be maintained.

The inspection requirements have been disigned to provide adequate continuous assurance that the waste feed cutoff system will respond when needed. Although the mechanisms involved receive limited use and will not suffer greatly from wear, the potential for failure due to neglect is significant and the consequences of failure can be severe. Visual inspections will identify obvious needs for repair. However, since all components of the feed cutoff system are not visually accessible, periodic verification of the operability of the system in necessary both to assure protection of human health and the environment and to protect against the possibility of equipment damage in the event that the emergency waste feed cutoff system is triggered.

3. *Visual inspection of the stack gas plume during interim status.* The interim status standards for hazardous waste incinerators were published as interim final on May 19, 1980. On January 23, 1981, the regulations were amended and finalized. These standards included a requirement for hourly observation of the stack gas plume and subsequent correction of operating parameters, when necessary, as indicated by unusual color or opacity. Petitioners in *Association of Metropolitan Sewerage Agencies* v. *EPA 81–1440 (D.C. Cir.)* have identified two problems with implementation of this standard.

First, petitioners point out that visual inspection during nighttime hours is of little or no value. Secondly, since the regulation does not specifically identify "normal" appearance, petitioners contend that compliance with the requirement is difficult. Another litigent, however, argued that this provision should be retained as the only significant control applicable during interim status.

EPA concurs with the petitioners who contend that the visual inspection requirement is impractical. Initially, the inspection standard was intended to establish the operator's responsibility to recognize serious environmental and

ealth hazards and take the ecessary to prevent or alleviate er. During interim status th erator's ability to detect az s limited by the on obtained from reading any continous or periodic ng devices and observing the ace of the stack gas plume. ailable equipment varies ably from facility to facility, the n cannot rely on the use of any ng devices. Additionally, s based on stack plume opacity are of limited usefulness since missions vary in steam and ate content. Absent a standard ould be reasonably applicable cinerators, the Agency has the provision for monitoring the s plume during interim status.

Burn Requirements

nuary 23, 1981 regulations set letailed list of technical data and tion which must be collected he trail burn and submitted with f the permit application. Today's ents to the performance ds and the requirements for g, monitoring and inspecting that corresponding changes be the trial burn information nents. For example, the phrase sti as flow rate" has replaced d Two significant nents are discussed below.

quirement for monitoring ous combustion by-products. On 23, 1981, in addition to gating the existing incinerator ions, EPA proposed amendments ormance standards for ators. One requirement which the ment would add is a performance rd for destruction and removal of ous combustion by-products are formed during combustion. endment was intended to s those hazardous substances may be formed when wastes are down in the combustion zone e resulting chemical fragments bine to form other hazardous nces.

nticipation of finalizing the sed amendment, EPA included a ement in the promulgated tions for monitoring hazardous stion by-products during the trial Some commenters and one litigant d that the requirement would le the Agency with valuable data bing the formation of hazardous stion by-products. EPA is tly luating the proposal and dd after completion of the tory impact analysis of the rator regulations which is currently underway. Therefore, the requirement for identifying hazardous combustion by-products in incinerator stack gas during the trial burn has been deleted.

2. *Computation of a total mass balance of the trial POHCs.* Section 122.27(b) of the interim final regulations included requirements for quantitative analysis of the scrubber water, ash and other incineration residues and for computation of a total mass balance of the trial POHCs, both to be conducted following completion of the trial burn. Today's amendment to § 122.27 deletes the requirement for a "total mass balance of the trial POHCs." While analysis of the scrubber water, ash and other residues is still required, the amended regulation states that this analysis is intended to estimate the fate of the trial POHCs. Owners and operators will not be required to account for the destruction or removal of the total mass of each trial POHC. However, the required analysis must provide sufficient information to determine whether the PHOCs are primarily destroyed through thermal combustion or removed either by the air pollution control system, or in the bottom ash.

Comments received following publication of the Subpart O Regulation expressed a strong belief that the costs associated with conducting a trial burn would be much greater (i.e., $150,000 to $200,000) than EPA had estimated (i.e., $40,000 to $60,000). This discrepancy should be somewhat reduced by today's amendment to § 122.27(b) since it will eliminate any perceived need to shut down the incinerator and thoroughly empty and clean the scrubber system. Furthermore, since many applicants may petition the Agency under Part 260 to delist bottom ash or scrubber effluents, the required analysis of residues will often serve a dual purpose. The amended regulation therefore acts to decrease the costs incurred during the trial burn while preserving the intent of the orignial requirement.

IV. Other Important Issues

Several issues which concerned interpretation of the regulatory language or the basis and purpose of the regulations were raised by a majority of the commenters who responded to the January 23, 1981 promulgation. The issues include: selection of the POHCs in each waste feed, the applicability of the incinerator regulations to fume incinerators, and the need to regulate particulate emissions from hazardous waste incinerators. Although consideration of these issues did not lead to amendment of the regulations, further discussion may clarify these issues and is presented below.

A. Selection of Principal Organic Hazardous Constituents

In order to establish compliance with the performance standard for 99.99% destruction and removal of organic waste constituents, the regulations provide for selection, by the permitting official, of principal organic hazardous constituents (POHCs) for each waste feed to be burned. POHCs are hazardous organic substances present in the waste representative of those constituents which are most difficult to burn and most abundant in the waste. The incinerator standards set out the criteria to be used in selecting POHCs (i.e., ease of incinerability and concentration). EPA's Guidance Manual for Evaluating Permit Applications for the Operation of Hazardous Waste Incineration Units suggest one method for making the selection.

The destruction and removal efficiency is actually measured only for the POHCs and the incinerator's performance in treating these substances is used to indicate overall performance in treating organic wastes. When a contrived waste feed is used for the trial burn, these constituents will be added to the feed in concentration similar to those expected during normal operation. They are then to be quantified both in the waste and in the stack emissions during the trial burn. This provision acts to simplify the sampling and analysis efforts which are necessary to determine whether the performance standard has been achieved, thereby reducing the cost and complexity of the trial burn.

The regulation specified the following standard for use by the permitting official in designating POHCs:

> This specification will be based on the degree of difficulty of incineration of the organic constituents in the waste and on their concentration or mass in the waste feed, considering the results of waste analyses and trial burns or alternative data submitted with Part B of the facility's permit application. Organic constituents which represent the greatest degree of difficulty of incineration will be the most likely to be designated as POHCs. Constituents are more likely to be designated as POHCs if they are present in large quantities or concentrations in the waste. (40 CFR 264.342)

Many commenters requested that EPA provide more specific regulatory language concerning POHC selection and that a maximum allowable number of POHCs per waste be designated. In general, commenters expressed concern that, absent more specific guidance in

tions, POHC selection would ry and overly burdensome, n costly sampling and analysis nts.

pa standards provide a n for selecting POHCs and g operating requirements on a ase basis through the process. The Agency has etting cumbersome design and standards for nationwide n, and has developed a system ows the permit writer to select rating conditions, for each hich are the most effective in compliance with the ce standards. This selection is a demonstration made by the plicant during the trial burn. In aintain the flexibility of this PA must avoid the use of fining regulatory language, is reason the specific limits on ection are not enumerated in tion. Section 264.342 cites two iteria for consideration is POHCs: quantity or tion, and ease of lity.

dance Manual for Evaluating plications for the Operation of s Waste Incineration Units forumla for incorporating criteria into a numeric index is eral guide in POHC The anual can also assist writer in specifying allowable stituents, based on the feed ts burned in the trial burn, trial burns with contrived ids.

anual on chemical analysis of Test Methods for the n of Solid Waste, Physical/ Methods" (SW-846), provides techniques which will detect tions of hazardous ts in wastes down to itely 1 part per million. In POHCs, the Regional ator generally will not select ts which are present in a l at concentrations less than per million, since, for many s, special stack sampling s would be required to tack gas concentrations rom 99.99% destruction and fficiency of waste constituents concentrations below this estimates indicate that waste ts present in concentrations 1000 ppm will be routinely y stack gas analysis following n and removal at 99.99% a t a waste tio 100 ppm probably a practical lower limit beyond which determination of 99.99% destruction and removal will be difficult to verify.

The Regional Administrator however, will not always be able to definitively establish that an organic hazardous constituent present in relatively low concentrations (i.e., concentrations between 100 and 1000 ppm) will not be detected in the stack gas following 99.99% destruction and removal. Therefore, a POHC may be selected which subsequently will not be detected in the stack gas, despite careful fulfillment of the sampling, analysis and quality control requirements set forth in the trial burn plan. In such an instance, EPA intends that attainment of 100% destruction and removal will be assumed for that POHC. In cases where the waste under consideration contains none of the organic constituents listed in Appendix VIII, no POHCs can or will be designated and the trial burn will be used only to establish the incinerator's ability to comply with the performance standards for hydrogen chloride and particulate emissions.

With respect to ease of incinerability, EPA has developed a ranking of the Appendix VIII hazardous constituents based on Heat of Combustion values. This hierarchy will allow the applicant to demonstrate the required level of performance for a large number of constituents by successfully burning one or several of those which are most difficult to destroy. The Agency does not intend however, that the incinerability ranking be used as a substitute for the permit writer's engineering judgment. The list will provide the permit writer and applicant with a useful means for identifying the constituents of a waste which are likely to most difficult to destroy and may be used in conjunction with other information relating to the incinerability of an organic constituent (e.g., Auto Ignition Temperature), when available.

Heat of Combustion values are measured under controlled laboratory conditions or derived from theoretical calculations. Therefore, they provide only an indication of the temperature at which a hazardous constituent will be destroyed. In situations where the Heat of Combustion values for the waste constituents under consideration do not differ considerably and no other information regarding incinerability is available, the ranking must be used cautiously and selection of a number of trial POHCs may be necessary.

By developing the incinerability hierarchy, the Agency has attempted to provide a mechanism which will aid in minimizing the number of POHCs selected for each trial burn. In theory, the permit writer need select as a POHC only the single hazardous constituent which is most difficult to destroy, as indicated by the hierarchy. However, because of the imperfections inherent to the hierarchy more than one POHC must be selected in many cases. Overall, the Agency believes that the incinerability ranking will allow permit writers to confine POHC selection to fewer than six constituents in most cases, reducing the need for costly sampling and analysis.

B. Applicability of the Incinerator Regulations to Fume Incinerators

Several commenters asked that EPA clarify the applicability of the incinerator regulations to fume incinerators. Such incinerators are installed as air pollution control devices pursuant to regulations under the Clean Air Act, and commenters contended that these facilities do not fall into regulatory jurisdiction under RCRA.

EPA agrees with commenters that fume incinerators are subject only to regulation under the Clean Air Act and does not intend that the Parts 264 and 265 regulations apply to these facilities. Fume incinerators which are used to destroy gaseous emissions from various industrial processes, for example, are not subject to regulation under RCRA. In general, the RCRA standards do not apply to fume incinerators since the input is not identifiable as a solid waste, according to the definition set forth in § 261.2.

C. Regulation of Particulate Emissions from Hazardous Waste Incinerators

The performance standard for control of particulate emissions is equivalent to the particulate standard established by EPA's New Source Performance Standard for municipal incinerators, promulgated under authority of the Clean Air Act (46 FR 7674). Several commenters contended that this use of a Clean Air Act standard to satisfy the requirements of RCRA was inappropriate.

In borrowing the Clean Air Act standard for use by the RCRA hazardous waste regulations, the Agency has simply adopted a standard which is known to be achievable (see the Background Document on Incineration, December, 1980) and which the Agency views as the minimum necessary level of control for hazardous waste incinerators. The reason for using this standard in the RCRA regulations is not the same as the reason for using it under the Clean Air Act. The standard for control of particulate emissions

oncern for the release of
s, particularly heavy
l as organic hazardous
vhi[illegible]here to
te[illegible]Currently, no other
etal emissions are
e RCRA regulations.
shows that particulate
ying toxic substances
to human health. EPA has
the current particulate
stablish basic control

Documents

l Documents

supporting these
ncludes background
oviding response to public
l the rationale underlying
regulations. These
d the references listed in
of the record indicating
purpose of the
egulations. The
ocuments address
eived on the interim final
blished January 23, 1981
vhich pertained to the
ed in this preamble, the
nd interim status
blished May 19, 1980 (45
l the proposed regulations
[illegible]18, 1978 (43 FR
[illegible]e documents are
eview in the EPA Regional
es and at the EPA
Library, Room 2404,
ll, 401 M Street, SW.,
D.C. 20460.

Documents

aring guidance manuals to
owners and operators as
tory officials. These
not have the force of
ut will provide assistance
e regulations and will
ical information
e operation of incinerators.
ls include an Engineering
Hazardous Waste
nd the Guidance Manual
Permit Applications for
of Hazardous Waste
Units. For a more complete
s supporting the hazardous
ory program, see the
he interim final rules,
uary 12, 1981 (46 FR 2802).

y Impacts

termined, pursuant to
der No. 12291, that today's
[illegible]constitute a major
[illegible]latory impact
quired. The amendments to
264, and 265 regulations presented here will not impose any additional costs on the regulated community. EPA has submitted the necessary Standard Form 83 (Request for OMB Review) in accordance with the Paperwork Reduction Act and Executive Order No. 12291. Any comments received from OMB are included in the docket for this rulemaking.

The Regulatory Flexibility Act requires all Federal agencies to consider the impacts of their regulations on small business entities. For the reasons discussed in this preamble, EPA believes that the net effect of today's amendments will be to reduce the regulatory and economic burden imposed on all hazardous waste incinerators, including those belonging to small businesses. Pursuant to section 605 of the Regulatory Flexibility Act, it has been determined that today's amendments will not have a significant impact on a substantial number of small entities. A copy of this certification has been submitted to the Chief Counsel for Advocacy of the Small Business Administration.

VII. Interim Final Regulations: Effective Dates

On July 24, 1981, EPA published a Notice of Effective Dates of Interim Final Rules (46 FR 38318). This notice confirmed the effective dates of the incinerator regulations (July 22, 1981) and the standards applicable to hazardous waste storage facilities (July 13, 1981). The notice also announced EPA's intention to initiate rulemaking to suspend the effective dates of the interim final (Part 264) regulations for existing incinerators and storage surface impoundments, pending further evaluation of the appropriateness of the standards for those facilities.

Today's amendments address some of the issues related to the January 23, 1981 regulations. These regulations were noticed on an interim final basis, with a specific request for comments. Many comments were received in response to the request and today's amendments are being promulgated as interim final on the basis of that notice and comment period. Since the regulations are currently at the interim final stage, interested parties will have ample opportunity to comment on these amendments before the regulations are issued in final form.

Section 3010(b) of RCRA requires that revisions to regulations pertaining to requirements for permitting "* * * shall take effect on the date six months after the date of * * * revision." The Agency does not believe that a literal application of this requirement would be appropriate in this case. The purpose of section 3010(b) is to allow persons handling hazardous wastes sufficient lead time to prepare for compliance with new regulatory requirements. Because today's amendments generally ease the task of the permit applicant, delaying their effective date is not necessary to preserve the objective of section 3010(b). Futhermore, EPA believes that an effective date of six months after promulgation would be counterproductive, since much of the regulatory burden which these amendments seek to avert would already have been imposed on new facilities and because the existing permitting procedures create difficulties for owners and operators seeking permits for new incinerators. Today's amendments, therefore, become effective immediately.

List of Subjects

40 CFR Part 122

Administrative practice and procedure, Air pollution control, Hazardous materials, Reporting requirements, Waste treatment and disposal, Water pollution control, Water supply, Confidential business information.

40 CFR Part 264

Hazardous materials Packaging and containers, Reporting requirements, Security measures, Surety bonds, Waste treatment and disposal.

40 CFR Part 265

Air pollution control, Hazardous materials, Packaging and containers, Reporting requirements, Security measures, Surety bonds, Waste treatment and disposal, Water supply.

Dated: June 21, 1982.

Anne M. Gorsuch,

Administrator.

For the reasons set out in the preamble, Title 40 of the Code of Federal Regulations is amended as follows:

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

Subpart O—Incinerators

1. The authority citation for Part 264 reads as follows:

Authority: Sections 1006, 2002(a), and 3004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, as amended (42 U.S.C. 6905, 6912(a) and 6924).

64.340 is amended by
graph (b), redesignating
paragraph (c) as paragraph
ng paragraph (c) to
vs:

olicability.

* *

nsideration of the waste
ided with Part B of the
ation, the Regional
r, in establishing the permit
ust exempt the applicant
rements of this Subpart
341 (Waste analysis) and
osure),
egional Administrator finds
e to be burned is:
s a hazardous waste in Part
D, of this Chapter solely
ignitable (Hazard Code I),
azard Code C), or both; or
is a hazardous waste in
part D, of this Chapter
se it is reactive (Hazard
haracteristics other than
n § 261.23)(a) (4) and (5),
be burned when other
astes are present in the
one; or
rdous waste solely because
the characteristic of
corrosivity, or both, as
by the test for
cs Hazardous wastes
61, Subpart C, of this

rdous waste solely because
any of the reactivity
cs described by § 261.23(a)
), (7), and (8) of this
will not be burned when
ous wastes are present in
ion zone; and
vaste analysis shows that
ntains none of the
onstituents listed in Part
ix VIII, of this Chapter,
l reasonably be expected to
ste.
vaste to be burned is one
cribed by paragraphs
1)(ii), (b)(1)(iii), or (b)(1)(iv)
on and contains insignificant
ns of the hazardous
listed in Part 261, Appendix
Chapter, then the Regional
or may, in establishing
itions, exempt the applicant
irements of this Subpart,
.341 (Waste analysis) and
losure), after consideration
analysis included with Part
nit application, unless the
Im ator finds that the
os reat to human health
ironment when burned in an

(d) The owner or operator of an incinerator may conduct trial burns subject only to the requirements of § 122.27(b) of this Chapter (Short term and incinerator permits).

3. Section 264.341 is amended by revising paragraph (a) as follows:

§ 264.341 Waste analysis.

(a) As a portion of the trial burn plan required by § 122.27(b) of this Chapter, or with Part B of the permit application, the owner or operator must have included an analysis of the waste feed sufficient to provide all information required by § 122.27(b)(2) or 122.25(b)(5) of this Chapter. Owners or operators of new hazardous waste incinerators must provide the information required by § 122.27(b)(3) or 122.25(b)(5) of this Chapter to the greatest extent possible.

4. Section 264.343 is amended by revising paragraphs (b) and (c) to read as follows:

§ 264.343 Performance standards.

* * * * *

(b) An incinerator burning hazardous waste and producing stack emissions of more than 1.8 kilograms per hour (4 pounds per hour) of hydrogen chloride (HCl) must control HCl emissions such that the rate of emission is no greater than the larger of either 1.8 kilograms per hour or 1% of the HCl in the stack gas prior to entering any pollution control equipment.

(c) An incinerator burning hazardous waste must not emit particulate matter in excess of 180 milligrams per dry standard cubic meter (0.08 grains per ~~dry standard cubic foot) when corrected~~ for the amount of oxygen in the stack gas according to the formula:

$$P_c = P_m \cdot \frac{14}{21-Y}$$

Where P_c is the corrected concentration of particulate matter, P_m is the measured concentration of particulate matter, and Y is the measured concentration of oxygen in the stack gas, using the Orsat method for oxygen analysis of dry flue gas, presented in Part 60, Appendix A (Method 3), of this Chapter. This correction procedure is to be used by all hazardous waste incinerators except those operating under conditions of oxygen enrichment. For these facilities, the Regional Administrator will select an appropriate correction procedure, to be specified in the facility permit.

* * * * *

5. Section 264.344 is amended by revising the title and adding new paragraph (c) as follows:

§ 264.344 Hazardous waste incinerator permits.

* * * * *

(c) The permit for a new hazardous waste incinerator must establish appropriate conditions for each of the applicable requirements of this Subpart, including but not limited to allowable waste feeds and operating conditions necessary to meet the requirements of § 264.345, sufficient to comply with the following standards:

(1) For the period beginning with initial introduction of hazardous waste to the incinerator and ending with initiation of the trial burn, and only for the minimum time required to establish operating conditions required in paragraph (c)(2) of this Section, not to exceed a duration of 720 hours operating time for treatment of hazardous waste, the operating requirements must be those most likely to ensure compliance with the performance standards of § 264.343, based on the Regional Administrator's engineering judgment. The Regional Administrator may extend the duration of this period once for up to 720 additional hours when good cause for the extension is demonstrated by the applicant.

(2) For the duration of the trial burn, the operating requirements must be sufficient to demonstrate compliance with the performance standards of § 264.343 and must be in accordance with the approved trial burn plan;

(3) For the period immediately following completion of the trial burn, and only for the minimum period sufficient to allow sample analysis, data computation, and submission of the trial burn results by the applicant, and review of the trial burn results and modification of the facility permit by the Regional Administrator, the operating requirements must be those most likely to ensure compliance with the performance standards of § 264.343, based on the Regional Administrator's engineering judgement.

(4) For the remaining duration of the permit, the operating requirements must be those demonstrated, in a trial burn or by alternative data specified in § 122.25(b)(5)(iii) of this Chapter, as sufficient to ensure compliance with the performance standards of § 264.343.

6. Section 264.345 is amended by revising paragraph (b)(4) and (c) to read as follows:

§ 264.345 Operating requirements.

* * * * *

(b) * * *

(4) An appropriate indicator of combustion gas velocity;

* * * * *

ring start-up and shut-down of erator, hazardous waste (except xempted in accordance with) must not be fed into the on[illegible]s the incinerator is g w[illegible] the conditions of n (temperature, air feed rate, cified in the permit.

* * *

ion 264.347 is amended by paragraphs (a)(1) and (b), ating paragraph (c) as h (d), and adding new h (c) as follows:

Monitoring and inspections.

*

bustion temperature, waste and the indicator of on gas velocity specified in the ermit must be monitored on a is basis.

* * * *

incinerator and associated it (pumps valves, conveyors, .) must be subjected to visual inspection, at least leaks, spills, fugitive , and signs of tampering. emergency waste feed cutoff id associated alarms must be least weekly to verify y, unless the applicant ates to the Regional rator that weekly inspections ly[illegible]ct or upset operations es[illegible]quent inspection will be At a minimum, operational ist be conducted at least

monitoring and inspection be recorded and the records laced in the operating log by § 264.73.

—INTERIM STATUS RDS FOR OWNERS AND ORS OF HAZARDOUS WASTE ENT, STORAGE, AND L FACILITIES

)—Incinerators

uthority citation for Part 265 ollows:

y: Sections 1006, 2002(a), and 3004 d Waste Disposal Act, as amended ource Conservation and Recovery , as amended (42 U.S.C. 6905, d 6924).

on 265.340 is amended by paragraph (b) to read as

Applicability.

* * *

mers and operators of ion[illegible]ing hazardous waste ept[illegible] all of the requirements of this Subpart, except § 265.351 (Closure), provided that the owner or operator has documented, in writing, that the waste would not reasonably be expected to contain any of the hazardous constituents listed in Part 261, Appendix VIII, of this Chapter, and such documentation is retained at the facility, if the waste to be burned is:

(1) Listed as a hazardous waste in Part 261, Subpart D, of this Chapter solely because it is ignitable (Hazard Code I), corrosive (Hazard Code C), or both; or

(2) Listed as a hazardous waste in Part 261, Subpart D, of this Chapter solely because it is reactive (Hazard Code R) for characteristics other than those listed in § 261.23(a) (4) and (5), and will not be burned when other hazardous wastes are present in the combustion zone; or

(3) A hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the tests for characteristics of hazardous wastes under Part 261, Subpart C, of this Chapter; or

(4) A hazardous waste solely because it possesses the reactivity characteristics described by § 261.23(a) (1), (2), (3), (6), (7), or (8) of this Chapter, and will not be burned when other hazardous wastes are present in the combustion zone.

§ 265.347 [Amended]

10. Section 265.347 is amended by removing paragraph (b) and redesignating old paragraph (c) as new paragraph (b).

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

11. The authority citation for Part 122 reads as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*, Safe Drinking Water Act, 42 U.S.C. 3007 *et seq.*, and Clean Water Act, 33 U.S.C. 1251 *et seq.*

12. Section 122.17 is amended by adding new paragraphs (e)(3), (e)(4) and (e)(5) as follows:

§ 122.17 Minor modifications of permits.

* * * * *

(e) * * *

(3) Change the ranges of the operating requirements set in the permit to reflect the results of the trial burn, provided that the change is minor.

(4) Change the operating requirements set in the permit for conducting a trial burn, provided that the change is minor.

(5) Grant one extension of the time period for determining operational readiness following completion of construction, for up to 720 hours operating time for treatment of hazardous waste.

* * * * *

13. Section 122.25 is amended by revising paragraph (b)(5) (i), (ii), (iii)(E)(*2*), (iii)(E)(*3*), and (iii)(F)(*4*) to read as follows:

§ 122.25 Contents of Part B.

* * * * *

(b) * * *

(5) * * *

(i) When seeking exemption under § 264.340 (b) or (c) of this Chapter (ignitable, corrosive or reactive wastes only):

(A) Documentation that the waste is listed as a hazardous waste in Part 261, Subpart D, of this Chapter solely because it is ignitable (Hazard Code I), corrosive (Hazard Code C), or both; or

(B) Documentation that the waste is listed as a hazardous waste in Part 261, Subpart D, of this Chapter solely because it is reactive (Hazard Code R) for characteristics other than those listed in § 261.23(a) (4) and (5) of this Chapter, and will not be burned when other hazardous wastes are present in the combustion zone; or

(C) Documentation that the waste is a hazardous waste solely because it possesses the characteristic of ignitability, corrosivity, or both, as determined by the tests for characteristics of hazardous wastes under Part 261, Subpart C, of this Chapter; or

(D) Documentation that the waste is a hazardous waste solely because it possesses the reactivity characteristics listed in § 261.23(a) (1), (2), (3), (6), (7), or (8) of this Chapter, and that it will not be burned when other hazardous wastes are present in the combustion zone; or

(ii) Submit a trial burn plan or the results of a trial burn, including all required determinations, in accordance with § 122.27(b); or

(iii) * * *

(E) * * *

(*2*) Methods and results of monitoring temperatures, waste feed rates, carbon monoxide, and an appropriate indicator of combustion gas velocity (including a statement concerning the precision and accuracy of this measurement),

(*3*) The certification and results required by § 122.27(b)(5)(ii).

* * * * *

(F) * * *

ndication of combustion gas
ty.

* * *

Sec. 122.27 is amended by
ing the title and revising
:aph (b) to read as follows:

**7 Short term and incinerator
s.**

* * * *

*Hazardous Waste Incinerator
ts.* (1) For the purposes of
aining operational readiness
ing completion of physical
uction, the Director must establish
t conditions, including but not
d to allowable waste feeds and
ing conditions, in the permit to a
azardous waste incinerator. These
t conditions will be effective for
nimum time required to bring the
rator to a point of operational
ess sufficient to conduct a trial
ot to exceed 720 hours operating
or treatment of hazardous waste.
irector may extend the duration of
erational period once, for up to
ditional hours, at the request of
plicant when good cause is
. The permit may be modified to
the extension according to
.7 (Minor modifications of permits)
Chapter.

pplicants must submit a
ent, with Part B of the permit
ation, which suggests the
ions necessary to operate in
iance with the performance
rds of § 264.343 of this Chapter
this period. This statement
include, at a minimum,
tions on waste constituents, waste
ates and the operating parameters
ied in § 264.345 of this Chapter.
The Director will review this
ent and any other relevant
ation submitted with Part B of the
application and specify
ements for this period sufficient to
he performance standards of
43 of this Chapter based on his
ering judgement.

For the purposes of determining
ility of compliance with the
mance standards of § 264.343 of
apter and of determining
ate operating conditions under
45 of this Chapter, the Director
stablish conditions in the permit
w hazardous waste incinerator to
ctive during the trial burn.

Applicants must propose a trial
lan prepared under paragraph
ii) of this Section with Part B of
rmit application.

The trial burn plan must include
lowing information:

(A) An analysis of each waste or mixture of wastes to be burned which includes:

(*1*) Heat value of the waste in the form and composition in which it will be burned.

(*2*) Viscosity (if applicable), or description of physical form of the waste.

(*3*) An identification of any hazardous organic constituents listed in Part 261, Appendix VIII, of this Chapter, which are present in the waste to be burned, except that the applicant need not analyze for constituents listed in Part 261, Appendix VIII, of this Chapter which would reasonably not be expected to be found in the waste. The constituents excluded from analysis must be identified, and the basis for their exclusion stated. The waste analysis must rely on analytical techniques specified in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 122.20), or their equivalent.

(*4*) An approximate quantification of the hazardous constituents identified in the waste, within the precision produced by the analytical methods specified in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," (incorporated by reference, see § 122.20) or their equivalent.

(B) A detailed engineering description of the incinerator for which the permit is sought including:

(*1*) Manufacturer's name and model number of incinerator (if available).

(*2*) Type of incinerator.

(*3*) Linear dimensions of the incinerator unit including the cross sectional area of combustion chamber.

(*4*) Description of the auxiliary fuel system (type/feed).

(*5*) Capacity of prime mover.

(*6*) Description of sutomatic waste feed cut-off system(s).

(*7*) Stack gas monitoring and pollution control equipment.

(*8*) Nozzle and burner design.

(*9*) Construction materials.

(*10*) Location and description of temperature, pressure, and flow indicating and control devices.

(C) A detailed description of sampling and monitoring procedures, including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

(D) A detailed test schedule for each waste for which the trial burn is planned including date(s), duration, quantity of waste to be burned, and other factors relevant to the Director's decision under paragraph (b)(2)(v) of this Section.

(E) A detailed test protocol, including, for each waste identified, the ranges of temperature, waste feed rate, combustion gas velocity, use of auxiliary fuel, and any other relevant parameters that will be varied to affect the destruction and removal efficiency of the incinerator.

(F) A description of, and planned operating conditions for, any emission control equipment which will be used.

(G) Procedures for rapidly stopping waste feed, shutting down the incinerator, and controlling emissions in the event of an equipment malfunction.

(H) Such other information as the Director reasonably finds necessary to determine whether to approve the trial burn plan in light of the purposes of this paragraph and the criteria in paragraph (b)(2)(v) of this section.

(iii) The Director, in reviewing the trial burn plan, shall evaluate the sufficiency of the information provided and may require the applicant to supplement this information, if necessary, to achieve the purposes of this paragraph.

(iv) Based on the waste analysis data in the trial burn plan, the Director will specify as trial Principal Organic Hazardous Constituents (POHCs), those constituents for which destruction and removal efficiencies must be calculated during the trial burn. These trial POHCs will be specified by the Director based on his estimate of the difficulty of incineration of the constituents identified in the waste analysis, their ~~concentration or mass in the waste feed~~, and, for wastes listed in Part 261, Subpart D, of this Chapter, the hazardous waste organic constituent of constituents identified in Appendix VII of that Part as the basis for listing.

(v) The Director shall approve a trial burn plan if he finds that:

(A) The trial burn is likely to determine whether the incinerator performance standard required by § 264.343 of this Chapter can be met;

(B) The trial burn itself will not present an imminent hazard to human health or the environment;

(C) The trial burn will help the Director to determine operating requirements to be specified under § 264.345 of this Chapter; and

(D) The information sought in paragraphs (b)(2)(v) (A) and (C) of this Section cannot reasonably be developed through other means.

(vi) During each approved trial burn (or as soon after the burn as is practicable), the applicant must make the following determinations:

(A) A quantitative analysis of the trial POHCs in the waste feed to the incinerator.

(B) A quantitative analysis of the exhaust gas for the concentration and mass emissions of the trial POHCs, oxygen (O_2) and hydrogen chloride (HCl).

(C) A quantitative analysis of the scrubber water (if any), ash residues, and other residues, for the purpose of estimating the fate of the trial POHCs.

(D) A computation of destruction and removal efficiency (DRE), in accordance with the DRE formula specified in § 264.343(a) of this Chapter.

(E) If the HCl emission rate exceeds 1.8 kilograms of HCl per hour (4 pounds per hour), a computation of HCl removal efficiency in accordance with § 264.343(b) of this Chapter.

(F) A computation of particulate emissions, in accordance with § 264.343(c) of this Chapter.

(G) An identification of sources of fugitive emissions and their means of control.

(H) A measurement of average, maximum, and minimum temperatures and combustion gas velocity.

(I) A continuous measurement of carbon monoxide (CO) in the exhaust gas.

(J) Such other information as the Director may specify as necessary to ensure that the trial burn will determine compliance with the performance standards in § 264.343 of this Chapter and to establish the operating conditions required by § 264.345 of this Chapter as necessary to meet that performance standard.

(vii) The applicant must submit to the Director a certification that the trial burn has been carried out in accordance with the approved trial burn plan, and must submit the results of all the determinations required in paragraph (b)(2)(vi). This submission shall be made within 90 days of completion of the trial burn, or later if approved by the Director.

(viii) All data collected during any trial burn must be submitted to the Director following the completion of the trial burn.

(ix) All submissions required by this paragraph must be certified on behalf of the applicant by the signature of a person authorized to sign a permit application or a report under § 122.6.

(x) Based on the results of the trial burn, the Director shall set the operating requirements in the final permit according to § 264.345 of this Chapter. The permit modification shall proceed as a minor modification according to § 122.17.

(3) For the purposes of allowing operation of a new hazardous waste incinerator following completion of the trial burn and prior to final modification of the permit conditions to reflect the trial burn results, the Director may establish permit conditions, including but not limited to allowable waste feeds and operating conditions sufficient to meet the requirements of § 264.345 of this Chapter, in the permit to a new hazardous waste incinerator. These permit conditions will be effective for the minimum time required to complete sample analysis, data computation and submission of the trial burn results by the applicant, and modification of the facility permit by the Director.

(i) Applicants must submit a statement, with Part B of the permit application, which identifies the conditions necessary to operate in compliance with the performance standards of § 264.343 of this Chapter, during this period. This statement should include, at a mimimum, restrictions on waste constituents, waste feed rates and the operating parameters identified in § 264.345 of this Chapter.

(ii) The Director will review this statement and any other relevant information submitted with Part B of the permit application and specify those requirements for this period most likely to meet the performance standards of § 264.343 of this Chapter based on his engineering judgement.

(4) For the purposes of determining feasibility of compliance with the performance standards of § 264.343 of this chapter and of determining adequate operating conditions under § 264.345 of this chapter, the applicant for a permit to an existing hazardous waste incinerator may prepare and submit a trial burn plan and perform a trial burn in accordance with paragraphs (b)(2)(ii) through (b)(2)(ix) of this section. Applicants who submit trial burn plans and receive approval before submission of a permit application must complete the trial burn and submit the results, specified in paragraph (b)(2)(vi), with Part B of the permit application. If completion of this process conflicts with the date set for submission of the Part B application, the applicant must contact the Director to establish a later date for submission of the Part B application or the trial burn results. If the applicant submits a trial burn plan with Part B of the permit application, the trial burn must be conducted and the results submitted within a time period to be specified by the Director.

[FR Doc. 82-17099 Filed 6-23-82; 8:45 am]

BILLING CODE 6560-50-M

KOPPERS

RECEIVED
JUN 4 1982
AIR QUALITY ENGINEERING

Interoffice Correspondence

To A. Lorince

From M. R. Dysart

Location EROH-Air Quality Engineering

Location Chromatographic Analysis Group

Subject Grenada Air Testing (1735).

Date June 3, 1982

Your methylene chloride solutions and creosote sludge were analyzed for creosote components by gas chromatography. The methylene chloride blank and impinger solutions, GR-BS-2 through GR-BS-10 (A1 106228 and 106219 through 106227), each contained less than 0.2 mg per 25 ml of each creosote component; this is the limit of detection by the method of analysis used.

The results of the creo sludge sample (A1 106229) are listed below. Identifications were made from retention data only.

Components:	Weight Percent
Unknowns (7)	1.9
Naphthalene	12
Unknowns (1)	0.2
Methylnaphthalenes (2)	3.4
Biphenyl/Dimethylnaphthalenes(5)	2.2
Acenaphthene	2.8
Dibenzofuran	2.0
Fluorene	2.8
Methyl fluorenes (6)	5.0
Phenanthrene/Anthracene	9.3
Carbazole	0.8
Methylphenanthrenes (3)	1.5
Fluoranthene	4.1
Pyrene	3.2
Unknowns (6)	2.0
Chrysene	2.9
Unknowns (5)	1.6

Martin R. Dysart

M. R. Dysart

/mg

cc: J. D. Christian M. P. Mattison Files

KOPPERS

Interoffice Correspondence

RECEIVED
JUN 16 1982
AIR QUALITY ENGINEERING

To A. Lorince

From S. J. Ondrey

Location EROH-Air Quality Engineering

Location Chromatographic Analysis Group

Subject Air Testing - Grenada - PNA's (1735).

Date June 16, 1982

Your methylene chloride impinger solutions were analyzed for selected polynuclear aromatic hydrocarbons (PNA's) by a liquid chromatographic technique. Prior to analysis, a portion of each sample was concentrated and exchanged into acetonitrile, a solvent that is compatible with the liquid chromatographic technique used for this sample. Your methylene chloride blank (Al 106228) was handled in the same manner and found to contain <0.5 micrograms per total sample of each component listed in the attached table. All identifications were made from retention data only.

Stephen J. Ondrey

S. J. Ondrey

/mg
Attachment

cc: J. D. Christian
M. P. Mattison
Files

Grenada - PNA's

Sample No.	GR-BS-1	GR-BS-2	GR-BS-3	GR-BS-4	GR-BS-5	GR-BS-6	GR-BS-7	GR-BS-8	GR-BS-9	GR-BS-10
A1 No.	106354	106219	106220	106221	106222	106223	106224	106225	106226	106227
Component:				Micrograms/Total Sample						
Naphthalene	10	16	6.9	9.5	43	12	10	71	15	32
Acenaphthylene	7.3	0.6	<0.5	1.5	27	0.5	1.4	3.2	1.1	3.2
Acenaphthene	14	6.6	3.1	5.4	12	5.8	6.1	43	7.5	13
Fluorene	4.6	1.9	0.8	1.8	3.2	1.8	2.1	14	2.9	10
Phenanthrene	29	9.2	3.7	7.2	23	7.5	7.6	40	9.8	22
Anthracene	1.2	0.5	<0.5	<0.5	2.1	0.6	0.8	4.0	0.6	1.2
Fluoranthene	21	2.9	1.5	2.3	12	3.8	5.3	13	2.9	5.4
Pyrene	14	1.4	1.0	1.3	7.6	1.5	2.5	7.8	1.5	3.0
Benz(a)anthracene	1.8	<0.5	<0.5	<0.5	0.7	0.6	1.9	1.2	<0.5	<0.5
Chrysene	2.8	<0.5	<0.5	<0.5	1.4	0.8	2.1	1.8	0.6	0.5

KOPPERS

Interoffice Correspondence

To Mr. John Kane

From H. J. Holmes

Location Air Quality Engineering

Location Chemical Analysis Group

Subject EROH Air Quality Eng. Serv. - Sludge Disposal Study (1735)

Date July 2, 1982

Your effluent samples from the Grenada Tie Plant have been analyzed by a N,N-diethyl-p-phenylenediamine spectrophotometric procedure with the following results:

Your Sample No.	AL No.	ppm Total Chlorine
GR-BS-11	106286	none detected[1]
GR-BS-12	106287	" "
GR-BS-13	106288	" "
GR-BS-14	106289	" "
GR-BS-15	106290	" "
GR-BS-16	106291	" "
GR-BS-17	106292	" "
GR-BS-18	106293	" "
GR-BS-19	106294	" "
Blank (0.1 N NaOH)	106295	" "

[1] The limit of detection for the procedure used is 0.1 ppm.

H. J. Holmes

sjb
cc: Dr. J. D. Christian
Mr. M. Morris
Mr. H. A. Sweeney
Research Files
cf

KOPPERS

Interoffice Correspondence

To Mr. John Kane

From Mrs. Barbara J. Barnes

Location Air Quality Engineering

Location Chemical Analysis Group

Subject EROH Air Quality Eng. Services - Sludge Disposal Study (1735)

Date July 13, 1982

Your impinger solution samples have been analyzed by an ion chromatographic technique with the following results:

Your Sample Identification	AL No.	ppm Chloride[1]
GR-BS-11 0.1 N NaOH	106286	3.1
GR-BS-12 "	106287	4.2
GR-BS-13 "	106288	6.0
GR-BS-14 "	106289	2.9
GR-BS-15 "	106290	6.2
GR-BS-16 "	106291	13.5
GR-BS-17 "	106292	6.1
GR-BS-18 "	106293	22
GR-BS-19 "	106294	12.0
0.1 N NaOH Blank	106295	0.1

[1] Component identification was made by retention time and sample spiking.

Barbara J. Barnes

Barbara J. Barnes

sjb
cc: Dr. J. D. Christian
Mr. M. Morris
Mr. H. A. Sweeney
Research Files
cf

KOPPERS

Interoffice Correspondence

RECEIVED
JUL 19 1982
AIR QUALITY ENGINEERING

To Mr. John Kane

From Mrs. Barbara J. Barnes

Location Air Quality Engineering

Location Chemical Analysis Group

Subject EROH Air Quality Eng. Services - Sludge Disposal Study (1735)

Date July 16, 1982

Your ash samples from the Grenada Tie Plant have been analyzed by an ion chromatographic technique with the following results:

Your Sample Identification	Cyclone Catch	Grenada Boiler Ash
AL No.	106334	106335
ppm Total Chloride[1]	9900	------
Total ml of liquid submitted	----	144
Total µg of Chloride[1] in liquid sample	----	3,900
Total grams of ash submitted	----	229
Total µg of Chloride[1] in ash sample	----	90,700

[1] Component identification was made by retention time data only.

Barbara J. Barnes

Barbara J. Barnes

sjb
cc: Dr. J. D. Christian
Mr. M. Morris
Mr. H. A. Sweeney
Research Files
cf

KOPPERS

Interoffice Correspondence

To John Kane

From W. E. Swab/M. J. Johnson

Location ER-Air Quality Engineering

Location Chromatographic Analysis Group

Subject Grenada Tie Plant (1735).

Date June 24, 1982

Your benzene impingers, penta sludge, and cyclone catch samples were analyzed for pentachlorophenol (PCP), octachlorodibenzo-p-dioxin (OCDD), and hexachlorodibenzo-p-dioxins (HCDD) by gas chromatographic techniques. The PCP values were determined via the standard diazomethane derivatization technique, but the samples were cleaned up over an alumina "mini" column prior to analysis for OCDD and HCDD. The alumina "mini" columns were prepared from 5 mm I.D. glass tubing which was drawn to a fine tip. A small plug of glass wool was inserted, and the column was filled with approximately 20 cm of Alcoa F-20 alumina. A 5-cc aliquot of each sample was then passed through a freshly prepared "mini" column. As in previous work, the recovery of OCDD was determined to insure that no OCDD was being adsorbed by the columns. A 5-cc aliquot of an OCDD standard treated as previously described, gave 100% recovery. The same results were also obtained for a tetra-chlorodibenzo-p-dioxin isomer as well as octachlorodibenzofuran. Since only qualitative solutions of two HCDD isomers were available, they were used to check the retention time range which HCDD isomers would elute. As a result, the HCDD content in your sludge sample was calculated with the OCDD response factor. All identifications were made from retention data only. Results are listed in the attached table.

W. E. Swab

M. J. Johnson

/mg
Attachment

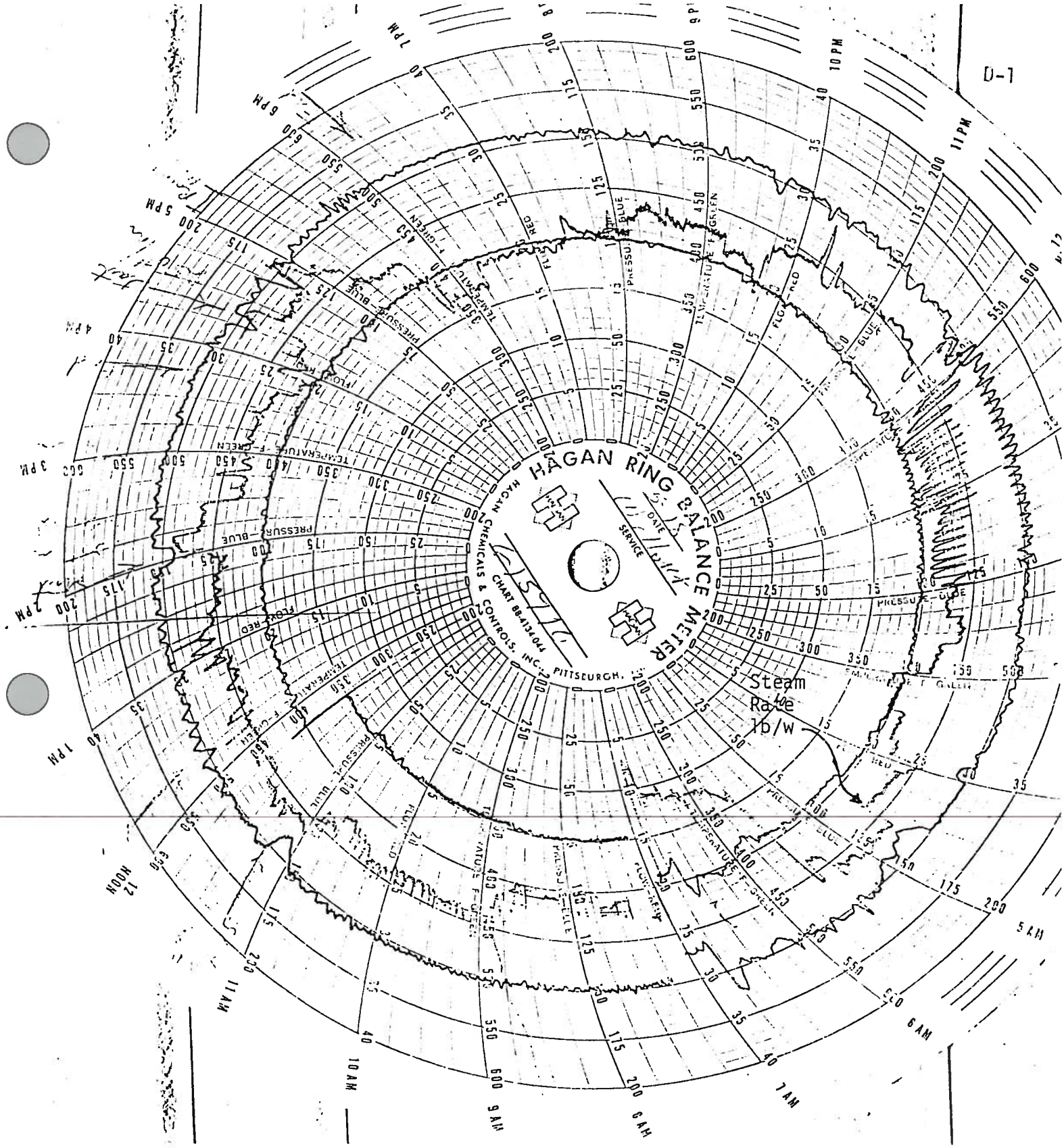
cc: J. D. Christian
M. P. Mattison
Files

Grenada Tie Plant Samples

Micrograms/Total Sample (100 ml)

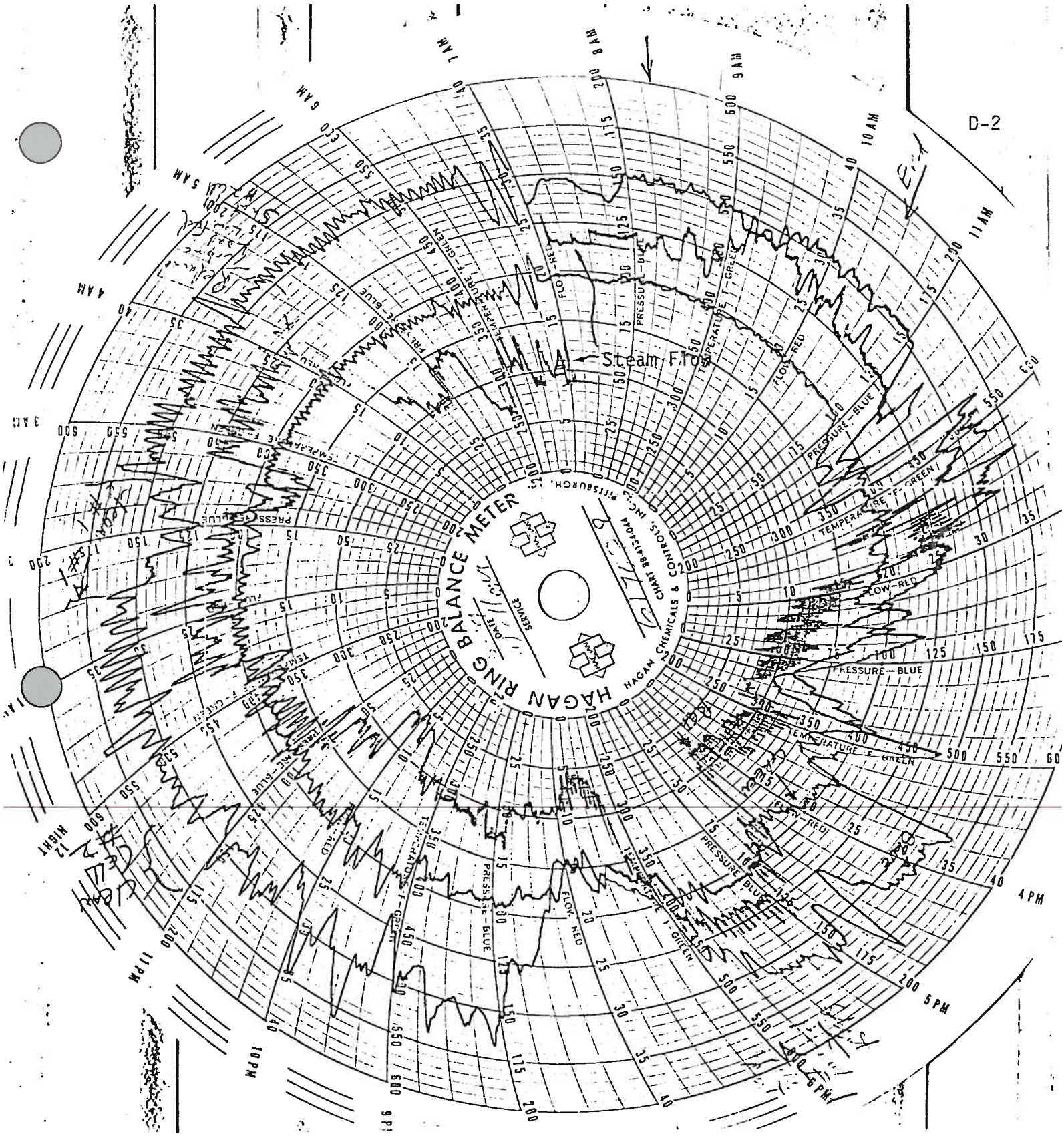
Sample No.	Al No.	PCP	OCDD	HCDD
GR-BS-11B	106276	2.0	<0.25	<0.25
-12B	106277	0.84	<0.25	<0.25
-13B	106278	0.71	<0.25	INT
-14B	106279	1.1	0.80	0.25
-15B	106280	4.5	0.56	INT
-16B	106281	3.7	0.48	INT
-17B	106282	6.8	1.2	INT
-18B	106283	2.9	<0.25	INT
-19B	106284	0.88	<0.25	INT
Benzene Blank	106285	0.75	<0.25	<0.25
			ppm by weight	
PCP Sludge 5/20/82	106333	15,500	34	15
Cyclone Catch	106334	<1	<0.2	INT

INT = Interference.



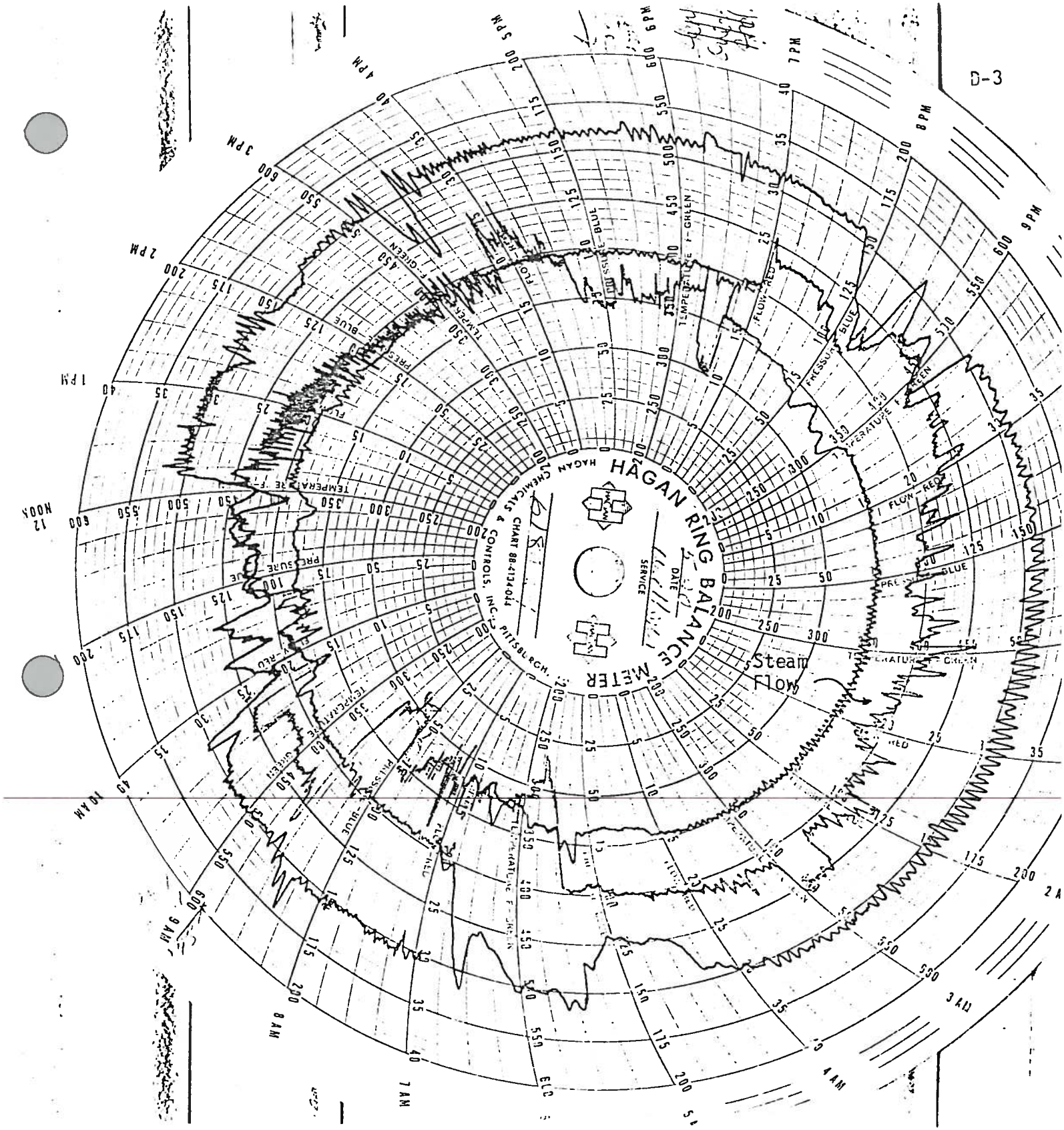
GRENADA BOILER STEAM CHART

MAY 18, 1982



GRENADA BOILER STEAM CHART

MAY 19, 1982



GRENADA BOILER STEAM CHART

MAY 20, 1982

Mississippi Department of Environmental Quality
Office of Pollution Control

I-sys 2000 Master Site Detail Report

Site Name: Koppers Industries Inc

PHYSICAL ADDRESS	
LINE 1:	Tie Plant Road
LINE 2:	
LINE 3:	
MUNICIPALITY:	Tie Plant
STATE CODE:	MS
ZIP CODE:	38960-

MAILING ADDRESS	
LINE 1:	PO Box 160
LINE 2:	
LINE 3:	
MUNICIPALITY:	Tie Plant
STATE CODE:	MS
ZIP CODE:	38960-

OTHER INFORMATION	
MASTER ID:	000876
COUNTY:	Grenada
REGION	NRO
SIC 1:	2491
AIR TYPE:	TITLE V
HW TYPE:	TSD
SOLID TYPE:	
WATER TYPE:	INDUSTRIAL
BRANCH:	Energy
ECED CONTACT:	
Collier, Melissa	
BASIN:	

AIR PROGRAMS ☑ SIP ☐ PSD ☐ NSPS ☐ NESHAPS ☐ MACT

Mississippi Department of Environmental Quality
Office of Pollution Control

Pemits

PROGRAM	PERMIT TYPE	PERMIT #	MDEQ PERMIT CONTACT	ACTIVE
AIR	TITLE V	096000012	Burchfield, David	YES
WATER	PRE-TREATMENT	MSP090300	Collins, Bryan	YES
HAZ. WASTE	TSD	HW8854301		NO
HAZ. WASTE	EPA ID	MSD007027543		NO
HAZ. WASTE	TSD	HW8854301	Stover, Wayne	YES
GENERAL	BASELINE	MSR22005		NO
WATER	SOP	MSU081080		NO

Compliance Actions

MEDIA	ACTIVITY TYPE	SCHEDULED	COMPLETED	INSPECTED B
HAZ WASTE	Financial Record Review	1/18/00	1/18/00	Twitty, Russ
WATER	CMI - PRETREATMENT			Whittington, Darryail
WATER	CEI - PRETREATMENT	9/30/00		Twitty, Russ
WATER	CEI - NA	9/30/00		Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	9/30/00		Twitty, Russ
AIR	State Compliance Inspection	9/30/00		Twitty, Russ
WATER	CEI - NA	3/2/99	3/2/99	Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	3/2/99	3/2/99	Twitty, Russ
AIR	State Compliance Inspection	3/2/99	3/2/99	Twitty, Russ

Mississippi Department of Environmental Quality
Office of Pollution Control

I-sys 2000 Master Site Detail Report

Site Name: Koppers Industries Inc

PHYSICAL ADDRESS		OTHER INFORMATION	
LINE 1:	Tie Plant Road	MASTER ID:	000876
LINE 2:		COUNTY:	Grenada
LINE 3:		REGION	NRO
MUNICIPALITY:	Tie Plant	SIC 1:	2491
STATE CODE:	MS	AIR TYPE:	TITLE V
ZIP CODE:	38960-	HW TYPE:	TSD
		SOLID TYPE:	
MAILING ADDRESS		WATER TYPE:	INDUSTRIAL
LINE 1:	PO Box 160	BRANCH:	Energy
LINE 2:		ECED CONTACT:	
LINE 3:		Collier, Melissa	
MUNICIPALITY:	Tie Plant	BASIN:	
STATE CODE:	MS		
ZIP CODE:	38960-		

AIR PROGRAMS ☑ SIP ☐ PSD ☐ NSPS ☐ NESHAPS ☐ MACT

Mississippi Department of Environmental Quality
Office of Pollution Control

Pemits

PROGRAM	PERMIT TYPE	PERMIT #	MDEQ PERMIT CONTACT	ACTIVE
AIR	TITLE V	096000012	Burchfield, David	YES
WATER	PRE-TREATMENT	MSP090300	Collins, Bryan	YES
HAZ. WASTE	TSD	HW8854301		NO
HAZ. WASTE	EPA ID	MSD007027543		NO
HAZ. WASTE	TSD	HW8854301	Stover, Wayne	YES
GENERAL	BASELINE	MSR22005		NO
WATER	SOP	MSU081080		NO

Compliance Actions

MEDIA	ACTIVITY TYPE	SCHEDULED	COMPLETED	INSPECTED B
HAZ WASTE	Financial Record Review	1/18/00	1/18/00	Twitty, Russ
WATER	CMI - PRETREATMENT			Whittington, Darryail
WATER	CEI - PRETREATMENT	9/30/00		Twitty, Russ
WATER	CEI - NA	9/30/00		Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	9/30/00		Twitty, Russ
AIR	State Compliance Inspection	9/30/00		Twitty, Russ
WATER	CEI - NA	3/2/99	3/2/99	Twitty, Russ
HAZ WASTE	Compliance Evaluation Inspection	3/2/99	3/2/99	Twitty, Russ
AIR	State Compliance Inspection	3/2/99	3/2/99	Twitty, Russ

DRY GAS METER CALIBRATION

Meter ID Andersen

Calibration Method DGM/DGM **By** WBM

Calibration Meter ID 651729 **Pbar** 29.83

Date 4/1/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
2	2.00	16.00	704.400	717.151	62	582.336	595.218	60	80	60	65	0.993	0.79	0.72	1.757
2	2.00	15.00	717.151	729.029	59	595.218	607.481	75	89	64	75	0.995	0.8	0.73	1.736
2	2.00	15.00	729.029	740.890	61	607.481	619.748	82	94	74	84	1.004	0.81	0.73	1.723
Averages:												**1.00**			**1.74**

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
242 INGLESIDE DRIVE
MADISON, MS 39110

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : DRV0116
Scott Project # : 576120

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number : ALM016008
Cylinder Pressure + : 1900 psig
Certificate Date : 1/27/95
Previous Certificate Date : None
Expiration Date : 1/27/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	90.46 ppm	±1% NIST Directly Traceable

Balance Gas: Air

+ Do not use when cylinder pressure is below 150 psig.
* Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 1668	6/7/96	ALM-032015	95.5 ppm Propane in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Propane : Beckman/400/1002059	1/19/95	Flame Ionization Detector

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Propane

First Triad Analysis

Date: 1/27/95 Response Units: mv

Z1=0.00	R1=95.50	T1=90.50
R2=95.50	Z2=0.00	T2=90.40
Z3=0.00	T3=90.50	R3=95.50

Avg. Conc. of Cust. Cyl. 90.46 ppm

Second Triad Analysis

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4

r=1.00000	NTRM 1668
Constants:	A=-0.088524000
B=1.000900000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Analyst

Scott Specialty Gases, Inc.

12/95

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, Procedure G1; September, 1993.

Cylinder Number : ALM003060
Cylinder Pressure + : 1900 psig
Certificate Date : 11/29/95
Previous Certificate Date : None
Expiration Date : 11/29/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	937.1 ppm	±1% NIST Directly Traceable

Balance Gas: Air

*Do not use when cylinder pressure is below 150 psig.
Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

	Expiration Date	Cylinder Number	Concentration
NTRM 2646	12/8/95	AAL18338	974 ppm ppm Propane in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian1400/08982426	11/29/95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Propane

First Triad Analysis

Date: 11/29/95 Response Units: mv

Z1=0.00	R1=655.57	T1=630.68
R2=654.53	Z2=0.00	T2=630.68
Z3=0.00	T3=630.68	R3=656.59

Avg. Conc. of Cust. Cyl. 937.1 ppm

Second Triad Analysis

Calibration Curve

Concentration=$A+Bx+Cx^2+Dx^3+Ex^4$

r=1.00000	NTRM 2646
Constants:	A=0.637342500
B=1.484780000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Sarah Reister
Analyst

PP-1

Scott Specialty Gases, Inc.

Shipped From: 3714 LAPAS DRIVE
HOUSTON TX 77023
Phone: 713-644-4820 Fax: 713-644-0244

CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING
DANNY RUSSELL
P O BOX 655

RIDGELAND MS 39158

PROJECT #: 04-43362-001
PO#: DRV0517
ITEM #: 040243 E CAL
DATE: 5/26/95

CYLINDER #: ALM055984

ANALYTICAL ACCURACY: +/- 1%
PRODUCT EXPIRATION: 5/24/96

BLEND TYPE : ACUBLEND MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
CARBON MONOXIDE	452.	PPM	453.	PPM
OXYGEN	11.	%	11.01	%
NITROGEN		BALANCE		BALANCE

2000 PSI

453

THIS PRODUCT IS TRACEABLE TO ALL PRODUCTION & ANALYTICAL DOCUMENTATION BY BOTH THE PROJECT & CYLINDER SERIAL NUMBERS IDENTIFIED ON THIS CERTIFICATE OF ANALYSIS.

ANALYST: _____

11/20/95 CO PAGE

Scott Specialty Gases

Shipped From: 3714 LAPAS DRIVE
HOUSTON TX 77023
Phone: 713-644-4820 Fax: 713-644-0244

CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING
DANNY RUSSELL
P O BOX 655

RIDGELAND MS 39158

PROJECT #: 04-48159-001
PO#: VERBAL
ITEM #: 04024315 DAL
DATE: 11/20/95

CYLINDER #: ALM049763
FILL PRESSURE: 2000PSI
BLEND TYPE : CEM 1 DAILY STANDARD

ANALYTICAL ACCURACY: -
PRODUCT EXPIRATION: 11/20/96

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON MONOXIDE	950.	PPM	950.	PPM
OXYGEN	3.	%	3.00	%
NITROGEN		BALANCE		BALANCE

THIS PRODUCT IS TRACEABLE TO DOCUMENTATION BY BOTH THE NUMBERS IDENTIFIED ON THIS CERTIFICATE OF ANALYSIS.

ALL PRODUCTION AND ANALYTICAL PROJECT AND CYLINDER SERIAL

ANALYST: WILLIAM MORGAN

12/95

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, Procedure G1, September, 1993.

Cylinder Number : AAL16787 **Certificate Date :** 11/29/95 **Expiration Date :** 11/29/97
Cylinder Pressure + : 1919 psig **Previous Certificate Date :** None

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	87.29 ppm	±1% NIST Directly Traceable
Total Oxides of Nitrogen	87.90 ppm	Reference Value Only

Balance Gas: Nitrogen

*Do not use when cylinder pressure is below 150 psig.
*Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

	Expiration Date	Cylinder Number	Concentration
NTRM 1686	7/27/97	ALM048742	504.0 ppm Nitric Oxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NOx Nicolet FTIR/8220/AAB9300205	11/1/95	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components
Nitric Oxide

First Triad Analysis

Date: 11/22/95	Response Units: ppm	
Z1=0.00	R1=504.00	T1=87.33
R2=504.29	Z2=0.00	T2=87.55
Z3=0.00	T3=86.96	R3=500.12
Avg. Conc. of Cust. Cyl. 87.28 ppm		

Second Triad Analysis

Date: 11/29/95	Response Units: ppm	
Z1=0.00	R1=504.00	T1=87.09
R2=499.31	Z2=0.00	T2=87.45
Z3=0.00	T3=87.35	R3=500.28
Avg. Conc. of Cust. Cyl: 87.30 ppm		

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4	
r=0.99999	NTRM 1686
Constants:	A=0.000000000
B=1.000000000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Robert Harburn
Analyst

PROTOCOL

Scott Specialty Gases, Inc.

NOx

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number : ALM058597
Cylinder Pressure + : 1950 psig
Certificate Date : 12/1/95
Previous Certificate Date : None
Expiration Date : 12/1/97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	469.0 ppm	±1% NIST Directly Traceable
Total Oxides of Nitrogen	473.0 ppm	Reference Value Only

Balance Gas: Nitrogen

*Do not use when cylinder preassure is below 150 psig.
Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

	Expiration Date	Cylinder Number	Concentration
NTRM 1686	7/27/97	ALM048742	504.0 ppm Nitric Oxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Nicolet FTIR/8220/AAB9300205	12/1/95	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis

Date: 11/22/95 Response Units: ppm

Z1=0.00	R1=504.00	T1=470.13
R2=504.29	Z2=0.00	T2=471.95
Z3=0.00	T3=469.45	R3=500.12

Avg. Conc. of Cust. Cyl. 470.5 ppm

Second Triad Analysis

Date: 12/1/95 Response Units: ppm

Z1=0.00	R1=504.00	T1=464.99
R2=504.73	Z2=0.00	T2=468.46
Z3=0.00	T3=468.99	R3=505.53

Avg. Conc. of Cust. Cyl: 467.5 ppm

Calibration Curve

Concentration=$A+Bx+Cx^2+Dx^3+Ex^4$

r=0.99999	NTRM 1686
Constants:	A=0.000000000
B=1.000000000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Robert Walker

Analyst

PROTOCOL

APPENDIX C.

VISIBLE EMISSIONS RECORD

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

VISIBLE EMISSIONS EVALUATION RECORD

R1

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

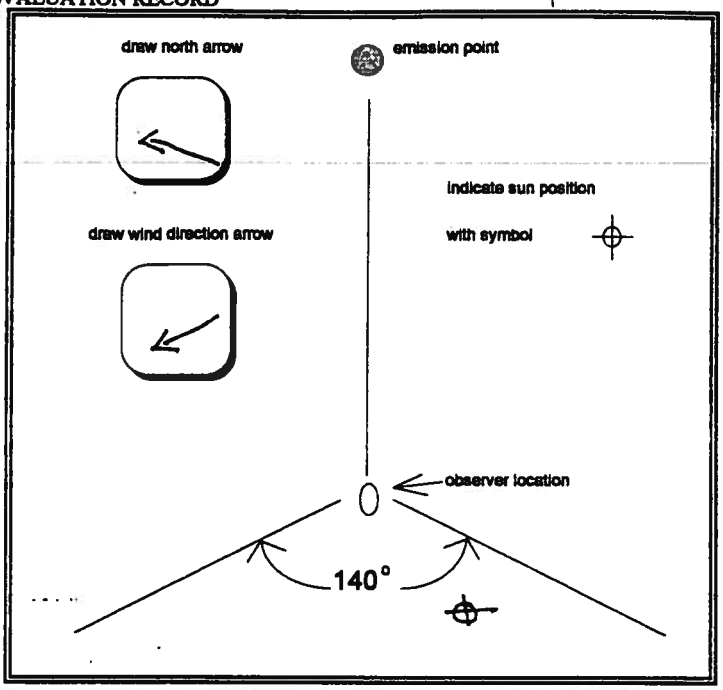
Date 2-20-96

Stack height 75'

Distance to source 150'

Direction from source Southwest

CONDITIONS	START	STOP
Time	1205	1305
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	73	73
Sky cover	Overcast	Overcast
Plume color		
Plume background	Sky, Clouds	Sky, Clouds



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10/18/95 Signature: Larry L. Carruth

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

VISIBLE EMISSIONS EVALUATION RECORD

PLANT Koppers - Tie Plant, Ms

Emission Point Woodwaste Boiler

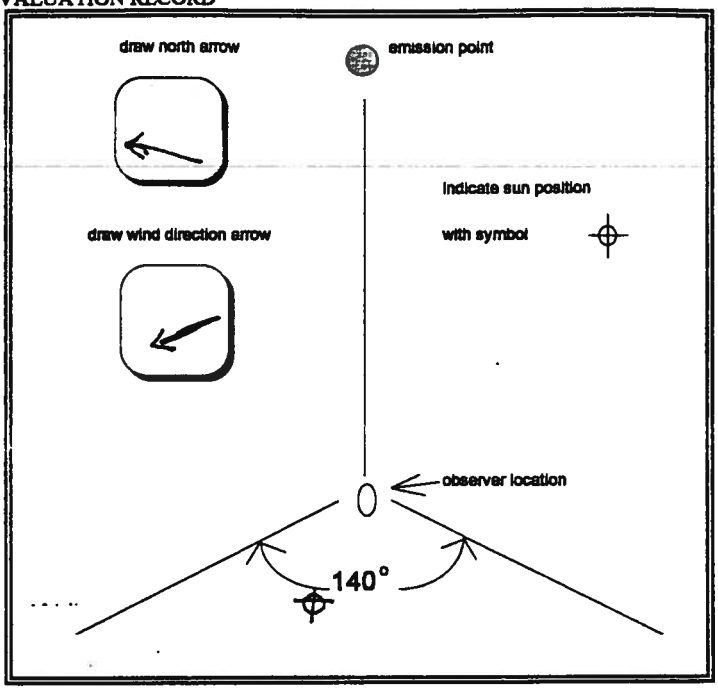
Date 2-20-96

Stack height 75'

Distance to source 150'

Direction from source Southwest

CONDITIONS	START	STOP
Time	1445	1545
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	76°	76°
Sky cover	Clear	Clear
Plume color		
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

	seconds					seconds					seconds					seconds			
min	0	15	30	45	min	0	15	30	45	min	0	15	30	45	min	0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Barry L. Carruth

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

R3

VISIBLE EMISSIONS EVALUATION RECORD

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

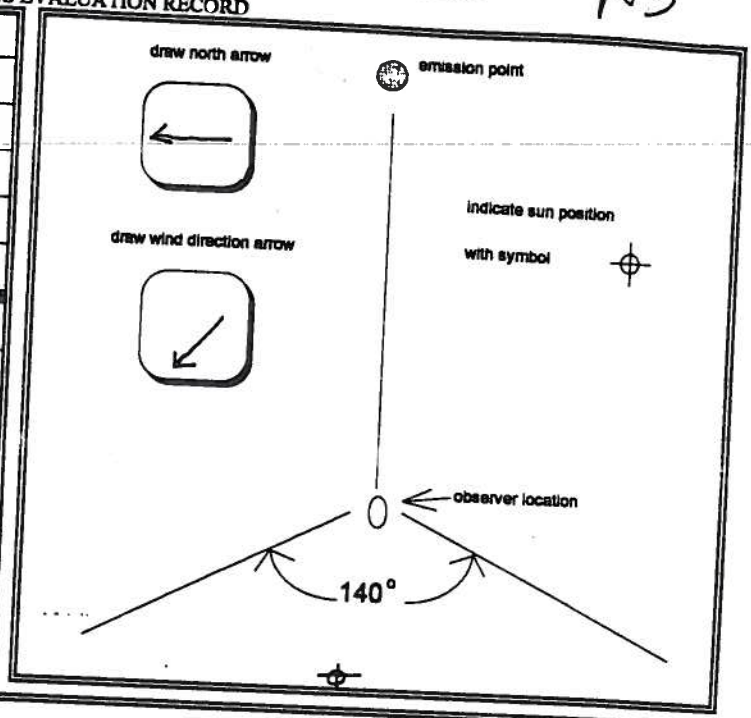
Date 2-20-96

Stack height 75'

Distance to source 130'

Direction from source West

CONDITIONS	START	STOP
Time	1717	1817
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	73°	70°
Sky cover	Clear	Clear
Plume color		
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0

min	seconds 0	15	30	45
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

min	seconds 0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0

min	seconds 0	15	30	45
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Barry L. Carroll

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

K 4

VISIBLE EMISSIONS EVALUATION RECORD

PLANT KOPPERS INDUSTRIES TIE PLANT, MS.

Emission Point WOODWASTE BOILER

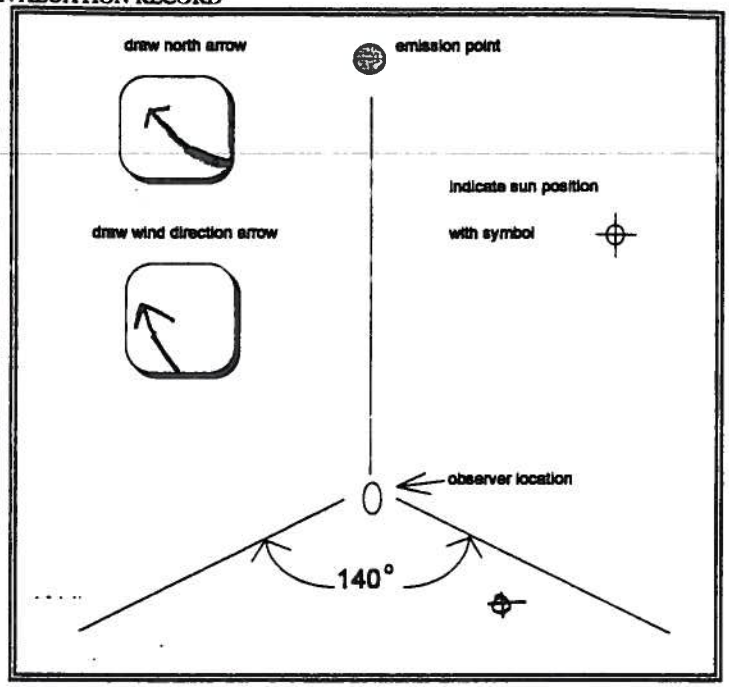
Date 2-21-96

Stack height 75'

Distance to source 150'

Direction from source Southwest

CONDITIONS	START	STOP
Time	1025	1125
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	65°	68°
Sky cover	Clear	Clear
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45
0	0	0	0	0	15	5	5	5	5	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	10	10	10	10	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	10	10	10	10	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	20	20	20	20	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	20	20	15	15	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	10	35	35	35	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	5	5	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	5	5	5	5	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	10	10	10	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carroll

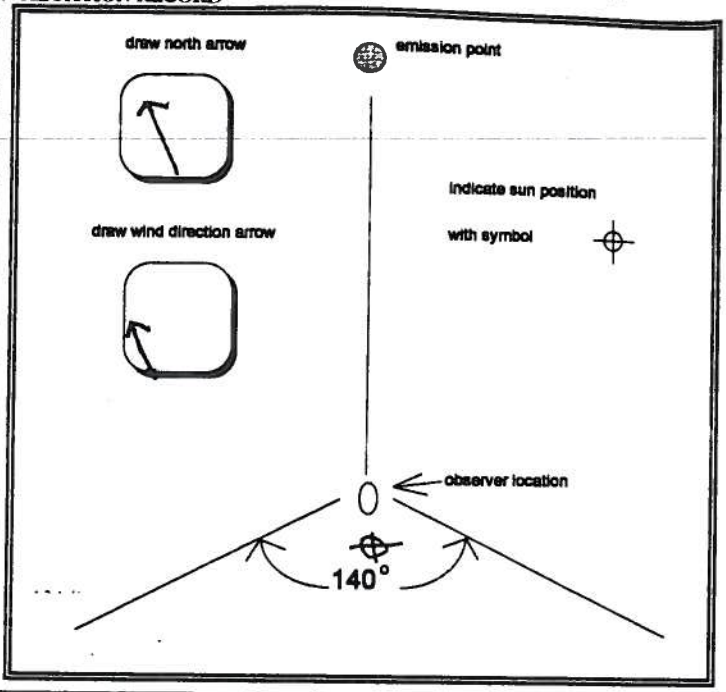
ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

RS

VISIBLE EMISSIONS EVALUATION RECORD

PLANT	Koppers - Tie Plant, Ms.
Emission Point	Woodwaste Boiler
Date	2-21-96
Stack height	75'
Distance to source	150'
Direction from source	Southwest

CONDITIONS	START	STOP
Time	1306	1406
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. °F	73°	73°
Sky cover	Clear	Clear
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0

min	seconds 0	15	30	45
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

min	seconds 0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0

min	seconds 0	15	30	45
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carroll

ENVIRONMENTAL MONITORING LABORATORIES - [illegible]

VISIBLE EMISSIONS EVALUATION RECORD

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

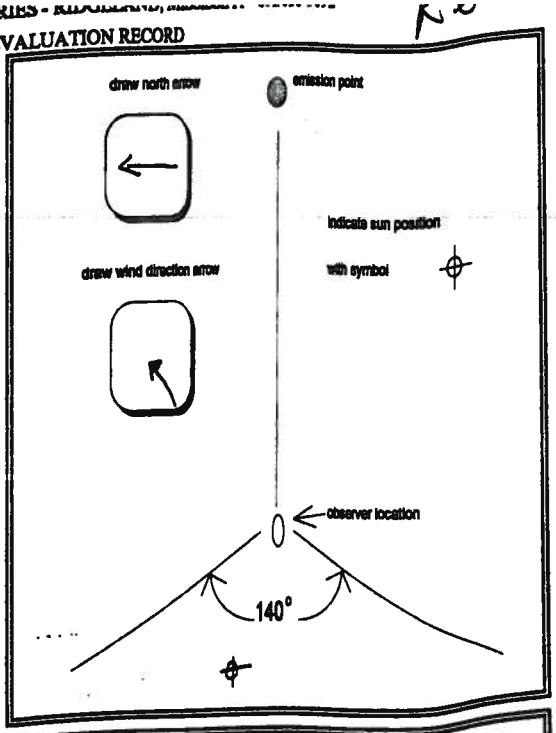
Date 2-21-96

Stack height 75'

Distance to source 125'

Direction from source West

CONDITIONS	START	STOP
Time	1547	1647
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. °F	74°	73°
Sky cover	Partly Cloudy	Partly Cloudy
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	5	5	5	5
9	5	5	5	5
10	10	10	10	10
11	5	5	5	0
12	0	0	0	0
13	5	5	5	5
14	0	0	0	0

min	seconds 0	15	30	45
15	0	0	0	0
16	5	5	5	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	0	0	0	0
21	0	0	0	0
22	5	5	5	5
23	5	5	5	5
24	0	0	0	0
25	5	5	5	5
26	5	5	5	5
27	5	5	5	5
28	5	5	5	5
29	0	0	0	0

min	seconds 0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	10	10	10	10
38	5	5	5	5
39	5	5	5	5
40	0	0	0	0
41	0	0	0	0
42	5	5	5	5
43	5	5	5	5
44	0	0	0	0

min	seconds 0	15	30	45
45	5	5	5	5
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	5	5	5	5
58	5	5	5	5
59	5	5	5	5

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Cornish

APPENDIX D.

POHC ANALYSES REPORT

(Bonner Analytical)

BONNER ANALYTICAL TESTING COMPANY
2703 OAK GROVE ROAD
HATTIESBURG, MS 39402
PH. (601) 264-2854

Client: ENVIRONMENTAL MONITORING LABORATORY

File Number: BT30583-30588
Collected By: Client

Sample Date/Time:
Date/Time Rec'd: 02-26-96 @ 1600

PROJECT: BURN STACK TESTS - KOPPER INDUSTRIES

Sample Identity	Sulfur % by wt.	Chlorine (mg/kg)	Heat Value BTU/lb	Water %
CREO	0.23	---	* 5,180	36.8
PENTA	0.18	---	6,860	19.0
C1	0.24	---	6,190	25.6
C2	0.14	---	7,150	25.8
Koppers Fly Ash	0.65	2,890	---	0.3
Bottom Ash **	0.049	420	---	0.10
Date/Time:	03-20-96/1450	03-26-96/1530	03-14-96/1500	03-13-96/1600
Analyst:	KAW	KAW	KAW	TCE
MDL:	0.01	50	30	0.1
Method #:	D-3177	D-808	D-240	D-2216

* A duplicate BTU determination yielded 4,980/lb.

** Bottom Ash received on 03-04-96 via Sunbelt Courier.

All analyses performed in accordance with 40 CFR 136 and amendments.

MDL = Method Detection Limit.

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

sr

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30576
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 1917
Analyst: dec

Koppers Industries - Grenada
KPS R1

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	6.08	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.20	0.20
Acenaphthene	0.62	0.20
Fluorene	0.62	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	3.52	0.20
Anthracene	3.74	0.20
Fluoranthene	0.50	0.20
Pyrene	0.26	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30577
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2018
Analyst: dec

Koppers Industries - Grenada
KPS R2

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	17.63	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.31	0.20
Acenaphthene	0.77	0.20
Fluorene	0.63	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	3.63	0.20
Anthracene	3.88	0.20
Fluoranthene	0.63	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

ient: Environmental Monitoring Laboratories
le Number: BT30578
llected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2120
Analyst: dec

Koppers Industries - Grenada
KPS R3

alytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
-Chlorophenol	ND	0.20
,4-Dichlorophenol	ND	0.20
aphthalene	28.86	0.20
-Chloro-3-methylphenol	ND	0.20
,4,6-Trichlorophenol	ND	0.20
,4,5-Trichlorophenol	ND	0.20
cenaphthylene	0.34	0.20
cenaphthene	0.97	0.20
luorene	0.67	0.20
entachlorophenol	ND	1.00
henanthrene	3.34	0.20
nthracene	3.56	0.20
luoranthene	0.65	0.20
yrene	0.26	0.20
enzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
enzo(b)fluoranthene	ND	0.20
enzo(k)fluoranthene	ND	0.20
enzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
enzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30579
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2221
Analyst: dec

Koppers Industries - Grenada
KPS R4

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	33.73	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.27	0.20
Acenaphthene	0.25	0.20
Fluorene	0.27	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	2.49	0.20
Anthracene	2.65	0.20
Fluoranthene	0.29	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30580
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2322
Analyst: dec

Koppers Industries - Grenada
KPS R5

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	34.73	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	4.07	0.20
Acenaphthylene	0.34	0.20
Acenaphthene	0.42	0.20
Fluorene	0.29	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	2.12	0.20
Anthracene	2.27	0.20
Fluoranthene	0.26	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30581
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 0023
Analyst: dec

Koppers Industries - Grenada
KPS R6

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	7.50	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	ND	0.20
Acenaphthene	ND	0.20
Fluorene	ND	1.00
Pentachlorophenol	1.25	0.20
Phenanthrene	1.33	0.20
Anthracene	ND	0.20
Fluoranthene	ND	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30582
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 0125
Analyst: dec

Koppers Industries - Grenada
KPS Blank

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	ND	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	ND	0.20
Acenaphthene	ND	0.20
Fluorene	ND	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	ND	0.20
Anthracene	ND	0.20
Fluoranthene	ND	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30583 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
Creosote Treated Fuel — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030796 @ 0010 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	12.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	12.5	ND			ND						ND			ND		
Naphthalene	125	8.0J			ND						ND			ND		
4-Chloro-3-methylphenol	12.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	12.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	12.5	ND			ND						ND			ND		
Acenaphthylene	125	28.2J			ND						ND			ND		
Acenaphthene	125	1017.8			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	125	767.2			ND						ND			ND		
Pentachlorophenol	62.5	8.3J			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	125	3027.6			ND						ND			ND		
Anthracene	125	851.5			ND						ND			ND		
Fluoranthene	125	2209.5			ND						ND			ND		
Pyrene	125	1622.9			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	125	400.3			ND						ND			ND		
Chrysene	125	423.9			ND						ND			ND		
Benzo(b)fluoranthene	125	207.9			ND						ND			ND		
Benzo(k)fluoranthene	125	194.1			ND						ND			ND		
Benzo(a)pyrene	125	194.8			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	125	53.2J			ND						ND			ND		
Dibenzo(a,h)anthracene	125	7.2J			ND						ND			ND		
Benzo(g,h,i)perylene	125	43.4J			ND						ND			ND		
SURROGATES:																
Fluorophenol		136.8	150	91.2	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		116.1	150	77.4	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		125.9	150	83.9	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		91.1	100	91.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		75.7	100	75.7	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		96.1	100	96.1	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		119.1	150	79.4	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		124.1	100	124.1	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by: _____
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30584 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
Penta Treated Fuel — SAMPLE POINT
Collected: 022096 @ 0111
Analyzed: 030796 @ — DATE / TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
2-Chlorophenol	11.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	11.5	ND			ND						ND			ND		
Naphthalene	115	522.7			ND						ND			ND		
4-Chloro-3-methylphenol	11.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	11.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	11.5	ND			ND						ND			ND		
Acenaphthylene	115	31.3J			ND						ND			ND		
Acenaphthene	115	935.9			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	115	829.5			ND						ND			ND		
Pentachlorophenol	575	1233.4			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	115	3315.2			ND						ND			ND		
Anthracene	115	967.0			ND						ND			ND		
Fluoranthene	115	2228.8			ND						ND			ND		
Pyrene	115	1562.7			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	115	412.6			ND						ND			ND		
Chrysene	115	410.3			ND						ND			ND		
Benzo(b)fluoranthene	115	227.5			ND						ND			ND		
Benzo(k)fluoranthene	115	198.5			ND						ND			ND		
Benzo(a)pyrene	115	218.8			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	115	60.5J			ND						ND			ND		
Dibenzo(a,h)anthracene	115	14.3J			ND						ND			ND		
Benzo(g,h,i)perylene	115	47.6J			ND						ND			ND		
SURROGATES:																
Fluorophenol		100.7	150	67.1	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		90.6	150	60.4	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		87.5	150	58.3	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		68.7	100	68.7	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		70.5	100	70.5	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		100.4	100	100.4	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		152.3	150	101.5	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		120.9	100	120.9	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by:
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30585 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
Cl Fuel Mix — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030796 @ 0212 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
2-Chlorophenol	15.0	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	15.0	ND			ND						ND			ND		
Naphthalene	150	724.8			ND						ND			ND		
4-Chloro-3-methylphenol	15.0	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	15.0	ND			ND						ND			ND		
2,4,5-Trichlorophenol	15.0	ND			ND						ND			ND		
Acenaphthylene	150	23.0J			ND						62.3	100	62.3	90.9	100	90.9
Acenaphthene	150	596.1			ND						ND			ND		
Fluorene	150	512.2			ND						80.8	150	53.9	131.7	150	87.8
Pentachlorophenol	750	211.6J			ND						ND			ND		
Phenanthrene	150	2121.7			ND						ND			ND		
Anthracene	150	546.8			ND						ND			ND		
Fluoranthene	150	1327.4			ND						76.2	100	76.2	89.4	100	89.4
Pyrene	150	911.1			ND						ND			ND		
Benzo(a)anthracene	150	238.7			ND						ND			ND		
Chrysene	150	250.4			ND						ND			ND		
Benzo(b)fluoranthene	150	113.0J			ND						ND			ND		
Benzo(k)fluoranthene	150	104.9J			ND						ND			ND		
Benzo(a)pyrene	150	104.0J			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	150	25.4J			ND						ND			ND		
Dibenzo(a,h)anthracene	150	0.9J			ND						ND			ND		
Benzo(g,h,i)perylene	150	21.3J			ND						ND			ND		
SURROGATES:																
Fluorophenol		106.9	150	71.3	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		116.5	150	77.7	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		115.4	150	76.9	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		79.1	100	79.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		66.7	100	66.7	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		85.6	100	85.6	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		118.2	150	78.8	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		103.2	100	103.2	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by: MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270
Collected: 022096 @
Analyzed: 030796 @ 0314

BT30586 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
C2 — Fuel Mix — SAMPLE POINT
DATE — TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
2-Chlorophenol	15.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	15.5	ND			ND						ND			ND		
Naphthalene	155	974.1			ND						ND			ND		
4-Chloro-3-methylphenol	15.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	15.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	15.5	ND			ND						ND			ND		
Acenaphthylene	155	34.9J			ND						62.3	100	62.3	90.9	100	90.9
Acenaphthene	155	739.4			ND						ND			ND		
Fluorene	155	618.4			ND						80.8	150	53.9	131.7	150	87.8
Pentachlorophenol	775	265.9J			ND						ND			ND		
Phenanthrene	155	2452.9			ND						ND			ND		
Anthracene	155	645.7			ND						76.2	100	76.2	89.4	100	89.4
Fluoranthene	155	1549.9			ND						ND			ND		
Pyrene	155	1034.7			ND						ND			ND		
Benzo(a)anthracene	155	284.7			ND						ND			ND		
Chrysene	155	303.4			ND						ND			ND		
Benzo(b)fluoranthene	155	157.8			ND						ND			ND		
Benzo(k)fluoranthene	155	142.8J			ND						ND			ND		
Benzo(a)pyrene	155	137.9J			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	155	36.2J			ND						ND			ND		
Dibenzo(a,h)anthracene	155	3.8J			ND						ND			ND		
Benzo(g,h,i)perylene	155	29.1J			ND						ND			ND		
SURROGATES:																
Fluorophenol		114.1	150	76.1	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		114.3	150	76.2	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		121.7	150	81.1	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		85.1	100	85.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		94.6	100	94.6	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		92.5	100	92.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		121.4	150	80.9	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		91.7	100	91.7	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by: MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30587 — BATCO File #
Enviromental Monitoring — COMPANY
Ash — SAMPLE TYPE
Koppers Flyash — SAMPLE POINT
Collected: 022096 @
Analyzed: 030696 @ 2051 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	0.30	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	0.30	ND			ND						ND			ND		
Naphthalene	0.30	0.06 J			ND						ND			ND		
4-Chloro-3-methylphenol	0.30	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	0.30	ND			ND						ND			ND		
2,4,5-Trichlorophenol	0.30	ND			ND						ND			ND		
Acenaphthylene	0.30	ND			ND						ND			ND		
Acenaphthene	0.30	0.02 J			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	0.30	0.01 J			ND						ND			ND		
Pentachlorophenol	1.50	ND			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	0.30	0.04 J			ND						ND			ND		
Anthracene	0.30	0.01 J			ND						ND			ND		
Fluoranthene	0.30	0.03 J			ND						ND			ND		
Pyrene	0.30	0.03 J			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	0.30	0.01 J			ND						ND			ND		
Chrysene	0.30	0.01 J			ND						ND			ND		
Benzo(b)fluoranthene	0.30	ND			ND						ND			ND		
Benzo(k)fluoranthene	0.30	ND			ND						ND			ND		
Benzo(a)pyrene	0.30	ND			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	0.30	ND			ND						ND			ND		
Dibenzo(a,h)anthracene	0.30	ND			ND						ND			ND		
Benzo(g,h,i)perylene	0.30	ND			ND						ND			ND		
SURROGATES:																
Fluorophenol		* 17.4	150	11.6	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		* 15.7	150	10.5	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		* 4.0	150	2.7	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		* 27.0	100	27.0	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		26.4	100	26.4	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		* 6.5	100	6.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		* 0.0	150	0.0	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		* 0.4	100	0.4	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

* - surrogates do not pass

Certified by: _____
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30588 — BATCO File #
Enviromental Monitoring — COMPANY
Ash — SAMPLE TYPE
Bottom Ash — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030696 @ 2153 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	0.35	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	0.35	ND			ND						ND			ND		
Naphthalene	0.35	1.27 J			ND						ND			ND		
4-Chloro-3-methylphenol	0.35	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	0.35	ND			ND						ND			ND		
2,4,5-Trichlorophenol	0.35	ND			ND						ND			ND		
Acenaphthylene	0.35	ND			ND						ND			ND		
Acenaphthene	0.35	0.01 J			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	0.35	0.17 J			ND						ND			ND		
Pentachlorophenol	1.75	ND			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	0.35	0.27 J			ND						ND			ND		
Anthracene	0.35	0.07 J			ND						ND			ND		
Fluoranthene	0.35	0.14 J			ND						ND			ND		
Pyrene	0.35	0.13 J			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	0.35	0.02 J			ND						ND			ND		
Chrysene	0.35	0.02 J			ND						ND			ND		
Benzo(b)fluoranthene	0.35	ND			ND						ND			ND		
Benzo(k)fluoranthene	0.35	ND			ND						ND			ND		
Benzo(a)pyrene	0.35	ND			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	0.35	ND			ND						ND			ND		
Dibenzo(a,h)anthracene	0.35	ND			ND						ND			ND		
Benzo(g,h,i)perylene	0.35	ND			ND						ND			ND		
SURROGATES:																
Fluorophenol		* 13.4	150	11.6	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		* 0.4	150	10.5	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		* 0.1	150	2.7	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		* 0.5	100	27.0	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		* 0.2	100	26.4	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		* 0.1	100	6.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		* 0.0	150	0.0	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		* 1.4	100	0.4	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

* - surrogates do not pass

Certified by: _____
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

CHAIN OF CUSTODY AND REQUEST

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention: Danny Russell

Laboratory: Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: Dr. Mike Bonner EML PO No. DR0223

Rush ☐ Routine ☐ Fax Results ☐

Project: Kopper Industries - Grenada

Treated wood test burn stack tests on 2-20-96

Rinse is Acetone, Methylene Chloride, some H_2O

ANALYSES REQUESTED

No. of containers	SAMPLE ID (BTE)	Sample matrix	REMARKS	PAH – EPA 8270	Chlorinated phenols incl. pentachlorophe EPA 8270	UNITS
1	KPS R1 - Filter	solid	combine	X	X	total micrograms
1	KPS R1 - Sorbent BT30576	solid				
1	KPS R1 - Rinse	aqueous	extracts			
1	KPS R2 - Filter	solid	combine	X	X	total micrograms
1	KPS R2 - Sorbent BT30577	solid				
1	KPS R2 - Rinse	aqueous	extracts			
1	KPS R3 - Filter	solid	combine	X	X	total micrograms
1	KPS R3 - Sorbent BT30578	solid				
1	KPS R3 - Rinse	aqueous	extracts			
1	KPS R4 - Filter	solid	combine	X	X	total micrograms
1	KPS R4 - Sorbent BT30579	solid				
1	KPS R4 - Rinse	aqueous	extracts			
1	KPS R5 - Filter	solid	combine	X	X	total micrograms
1	KPS R5 - Sorbent BT30580	solid				
1	KPS R5 - Rinse	aqueous	extracts			
1	KPS R6 - Filter	solid	combine	X	X	total micrograms
1	KPS R6 - Sorbent BT30581	solid				
1	KPS R6 - Rinse	aqueous	extracts			
1	KPS Filter Blank	solid	combine	X	X	total micrograms
1	KPS Blank - Sorbent BT30582	solid				
1	KPS Rinse Blank	aqueous	extracts			

Relinquished by: (print name; initial) Daniel G. Russell	Date/time 2-23-96	Received by: (print name; initial) RW Culpepper	Date/time 2/26/96 1600
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER	Date Shipped	Received for lab by:	

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention:

Laboratory: Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: EML PO No.

Project: Kopper Industries - Grenada
Treated wood test burn stack tests on 2-20-96

Rush ☐ Routine ☐ Fax Results ☐

No. of containers	SAMPLE ID	Sample matrix	REMARKS	ANALYSES REQUESTED: PAH and chl. phenols incl. penta EPA-8270	sulfur -- ASTM D-3177	chlorine - ASTM D-808	Heat value (ASTM D-240	H2O ASTM-D-2216	
1	Creo (creosote treated fuel)	solid		X	X		X	X	BT30583
1	Penta (penta treated fuel)	solid		X	X		X	X	30584
1	C1 (fuel mix)	solid		X	X		X	X	30585
1	C2 (fuel mix)	solid		X	X		X	X	30586
1	Koppers Flyash	solid		X	X	X		X	30587
0	botttom ash (to be shipped)	solid		X	X	X		X	BT 30588

SHIPPED BY SCHNEBELT COURIER

Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Daniel G. Russell	2/23/96	RW Culpepper	2/26/96 1600 RW
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER	Date Shipped	Received for lab by:	Date/time

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) 1,4-Dichlorobenzene-d4	11.90	152	798	40.00	NG/UL	-0.02
18) Napthalene-d8	14.43	136	9305	40.00	NG/UL	-0.08
33) Acenaphthene-d10	18.13	164	3411	40.00	NG/UL	-0.04
53) Phenanthrene-d10	21.20	188	4678	40.00	NG/UL	-0.03
64) Chrysene-d12	27.78	240	773	40.00	NG/UL	-0.03
72) Perylene-d12	0.00	264	0	0.00	NG/UL	-36.36
System Monitoring Compounds						%Recovery
2) 2-Fluorophenol	9.59	112	9932	358.31	NG/UL	238.87%
3) Phenol-d5	11.21	99	11611	323.98	NG/UL	215.99%
4) 2-Chlorophenol-d4	11.54	132	5876	230.89	NG/UL	153.93%
5) 1,2-Dichlorobenzene-d4	12.27	150	3079	94.72	NG/UL	94.72%
19) Nitrobenzene-d5	13.09	82	4069	32.11	NG/UL	32.11%
38) 2-Fluorobiphenyl	16.68	172	6113	51.25	NG/UL	51.25%
56) 2,4,6-Tribromophenol	19.79	330	1259	89.03	NG/UL	59.36%
66) Terphenyl-d14	24.49	244	8702	364.35	NG/UL	364.35%
Target Compounds						Qvalue
6) Phenol	11.24	94	40445	1009.93	NG/ULm	85
7) bis(2-Chloroethyl)ether	0.00	93		Not Detected		
8) 2-Chlorophenol	0.00	128		Not Detected		
9) 1,3-Dichlorobenzene	0.00	146		Not Detected		
10) 1,4-Dichlorobenzene	0.00	146		Not Detected		
11) 1,2-Dichlorobenzene	0.00	146		Not Detected		
12) Benzyl alcohol	0.00	108		Not Detected		
13) 2-Methylphenol	0.00	107		Not Detected		
14) 4-Methylphenol	0.00	107		Not Detected		
15) 2,2'oxybis(1-Chloropropane	0.00	45		Not Detected		
16) N-Nitroso-di-propylamine	0.00	70		Not Detected		
17) Hexachloroethane	0.00	117		Not Detected		
20) Nitrobenzene	0.00	77		Not Detected		
21) Isophorone	0.00	82		Not Detected		
22) 2-Nitrophenol	0.00	139		Not Detected		
23) 2,4-Dimethylphenol	0.00	122		Not Detected		
24) bis(2-Chloroethoxy)methane	0.00	93		Not Detected		
25) Benzoic acid	14.10	122	4976521	96702.33	NG/ULm	
26) 2,4-Dichlorophenol	14.19	162	12253	159.44	NG/ULm	84
27) 1,2,4-Trichlorobenzene	0.00	180		Not Detected		
28) Naphthalene	14.51	128	1443877	5545.25	NG/ULm	9
29) 4-Chloroaniline	0.00	127		Not Detected		
30) Hexachlorobutadiene	0.00	225		Not Detected		
31) 4-Chloro-3-methylphenol	0.00	107		Not Detected		
32) 2-Methylnaphthalene	15.92	142	98992	613.13	NG/ULm	98
34) Hexachlorocyclopentadiene	0.00	237		Not Detected		

(#) = qualifier out of range (m) = manual integration

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

	Compound	R.T.	QIon	Response	Conc Unit	Qvalue
35)	2,4,6-Trichlorophenol	16.54	196	44792	1391.80 NG/ULm	
36)	2,4,5-Trichlorophenol	16.64	196	3754	112.99 NG/ULm	7
37)	2-Chloronaphthalene	0.00	162		Not Detected	
39)	2-Nitroaniline	0.00	65		Not Detected	
40)	2,4-Dinitrophenol	0.00	184		Not Detected	
41)	4-Nitrophenol	0.00	139		Not Detected	
42)	Dimethylphthalate	0.00	163		Not Detected	
43)	Acenaphthylene	17.82	152	24122	151.59 NG/ULm	9
44)	3-Nitroaniline	0.00	138		Not Detected	
45)	Acenaphthene	18.20	154	18735	184.77 NG/ULm	9
46)	Dibenzofuran	18.52	168	46756	338.90 NG/ULm	9
47)	2,4-Dinitrotoluene	0.00	165		Not Detected	
48)	2,6-Dinitrotoluene	0.00	165		Not Detected	
49)	Diethylphthalate	18.99	149	613999	4810.95 NG/ULm	
50)	4-Chlorophenyl-phenylether	0.00	204		Not Detected	
51)	Fluorene	19.24	166	15755	145.54 NG/ULm	9
52)	4-Nitroaniline	0.00	138		Not Detected	
54)	4,6-Dinitro-2-methylphenol	0.00	198		Not Detected	
55)	N-Nitrosodiphenylamine	0.00	169		Not Detected	
57)	4-Bromophenyl-phenylether	0.00	248		Not Detected	
58)	Hexachlorobenzene	0.00	284		Not Detected	
59)	Pentachlorophenol	0.00	266		Not Detected	
60)	Phenanthrene	21.25	178	67735	421.02 NG/ULm	9
61)	Anthracene	21.34	178	11193	74.19 NG/ULm	9
62)	Di-n-butylphthalate	22.35	149	7446387	35963.11 NG/ULm	
63)	Fluoranthene	23.75	202	12699	97.86 NG/ULm	
65)	Pyrene	24.23	202	13466	327.52 NG/ULm	9
67)	Butylbenzylphthalate	25.71	149	60136	2488.05 NG/ULm	
68)	3,3'-Dichlorobenzidiene	0.00	252		Not Detected	
69)	Benzo(a)anthracene	0.00	228		Not Detected	
70)	Chrysene	0.00	228		Not Detected	
71)	bis(2-Ethylhexyl)phthalate	27.71	149	8923839	297095.72 NG/ULm	
73)	Di-n-Octylphthalate	0.00	149		Not Detected	
74)	Benzo(b)fluoranthene	0.00	252		Not Detected	
75)	Benzo(k)fluoranthene	0.00	252		Not Detected	
76)	Benzo(a)pyrene	0.00	252		Not Detected	
77)	Indeno(1,2,3-cd)pyrene	0.00	276		Not Detected	
78)	Dibenz(a,h)anthracene	0.00	278		Not Detected	
79)	Benzo(g,h,i)perylene	0.00	276		Not Detected	

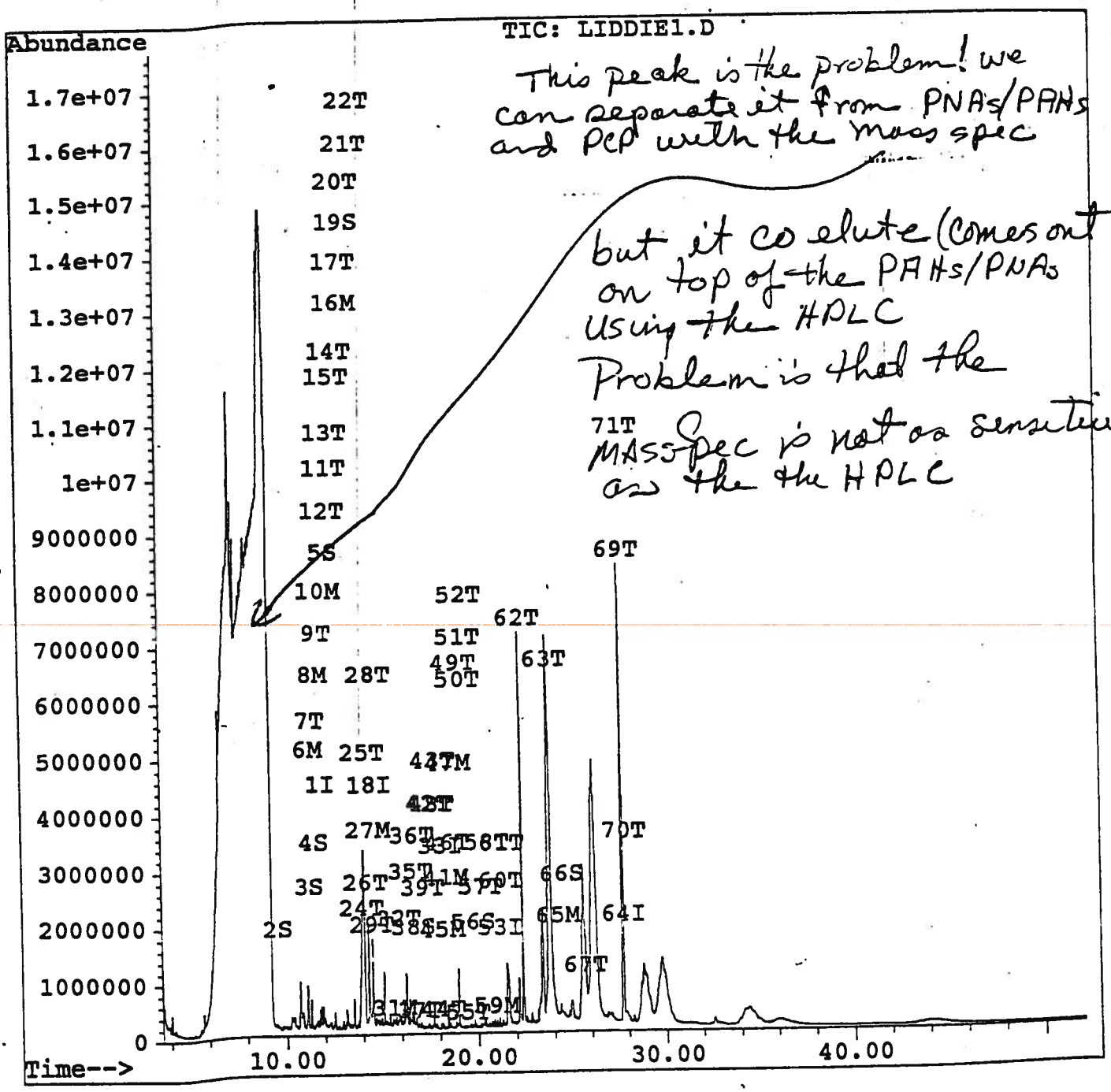
(#) = qualifier out of range (m) = manual integration

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

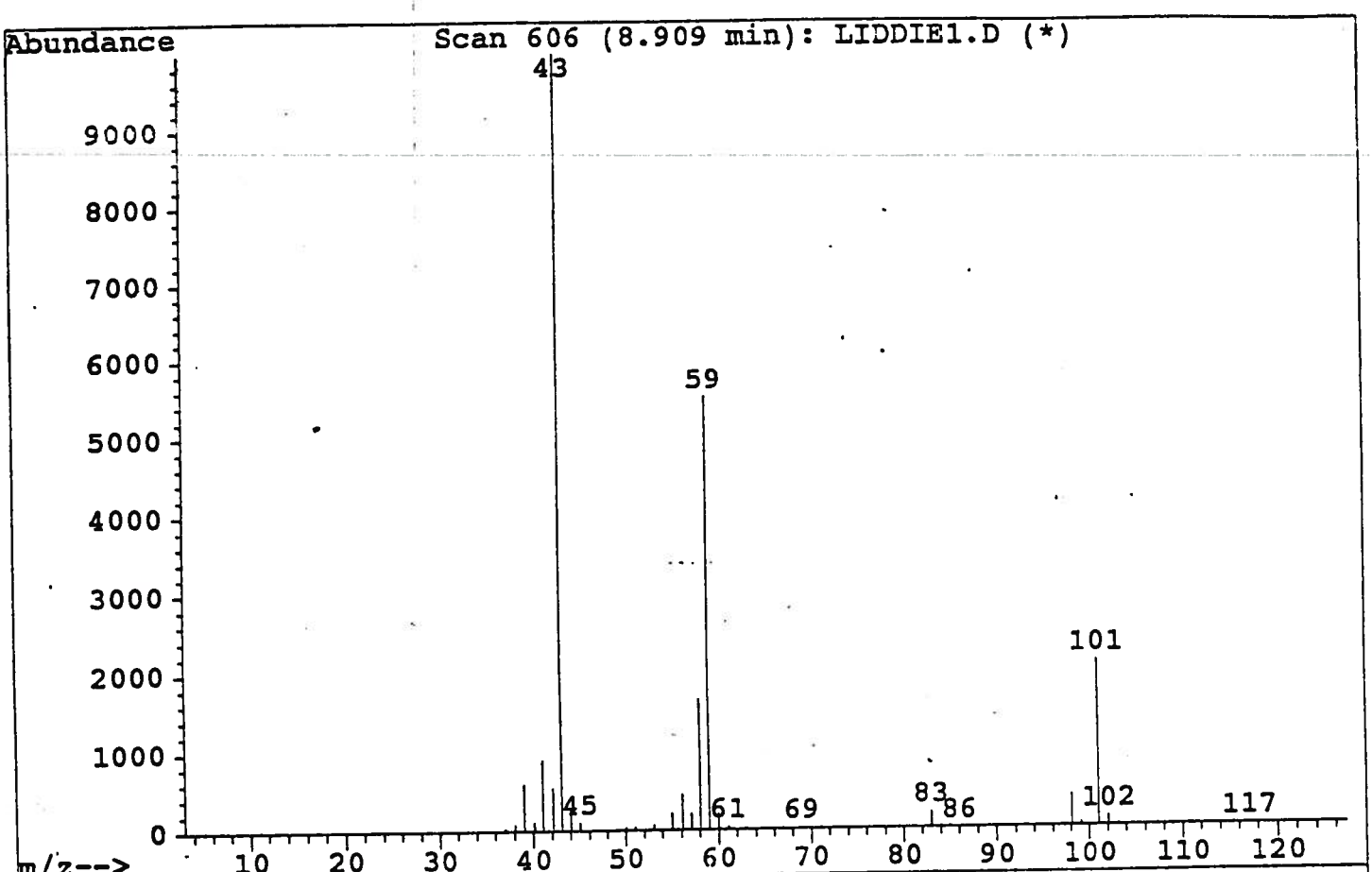
Operator: dec
Inst : 5971 - In
Multiplr: 1.00

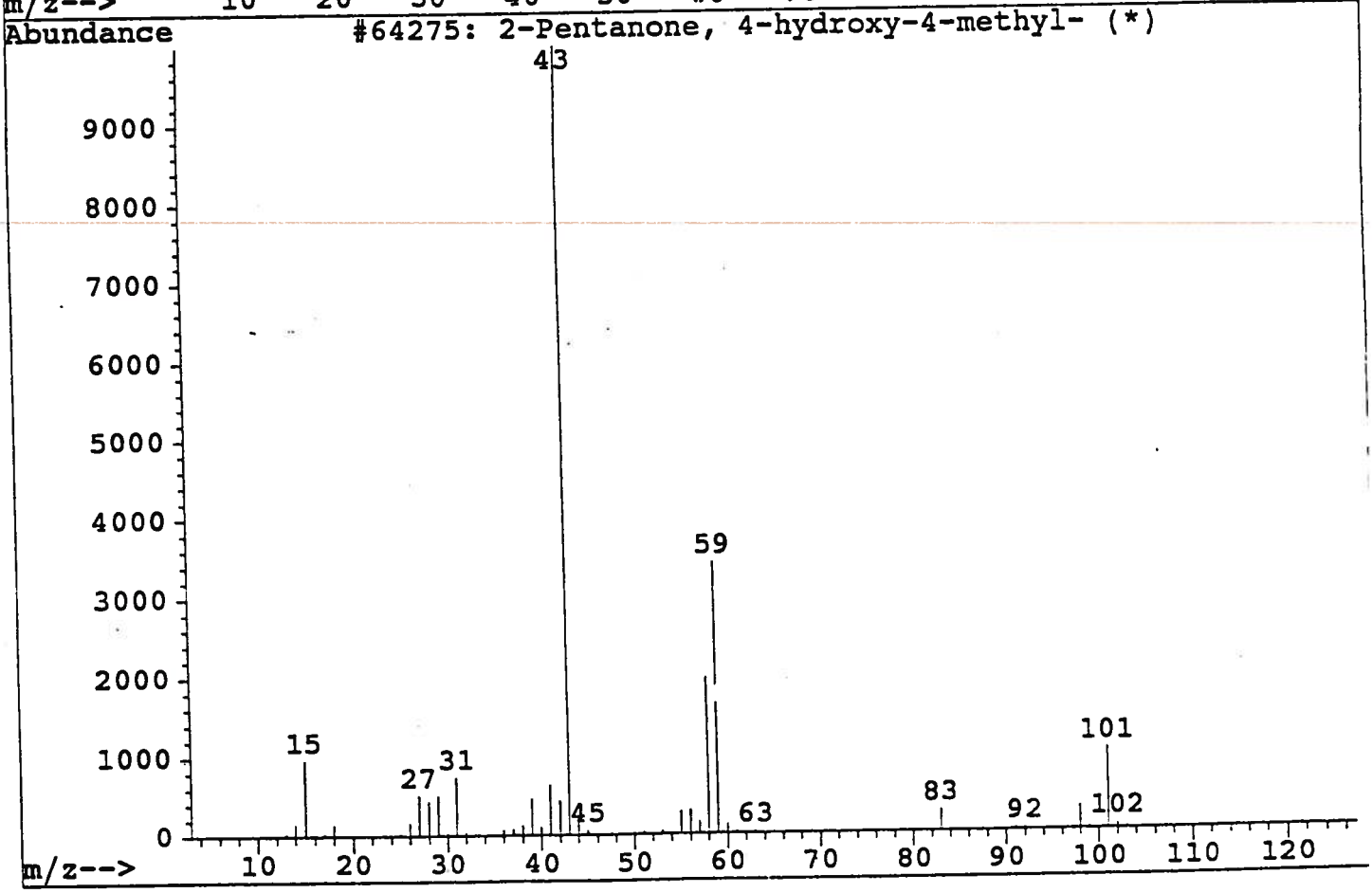
1-853-2151

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration



ID : 2-Pentanone, 4-hydroxy-4-methyl-

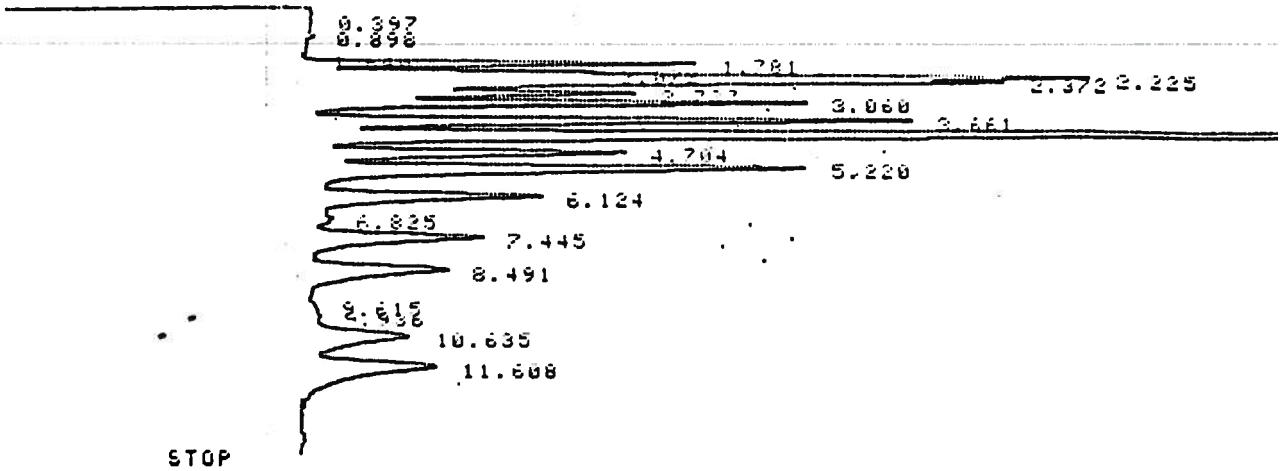




200 PF
1:0

* RUN # 4 JAN 1, 1901 05:28:08

START



STOP

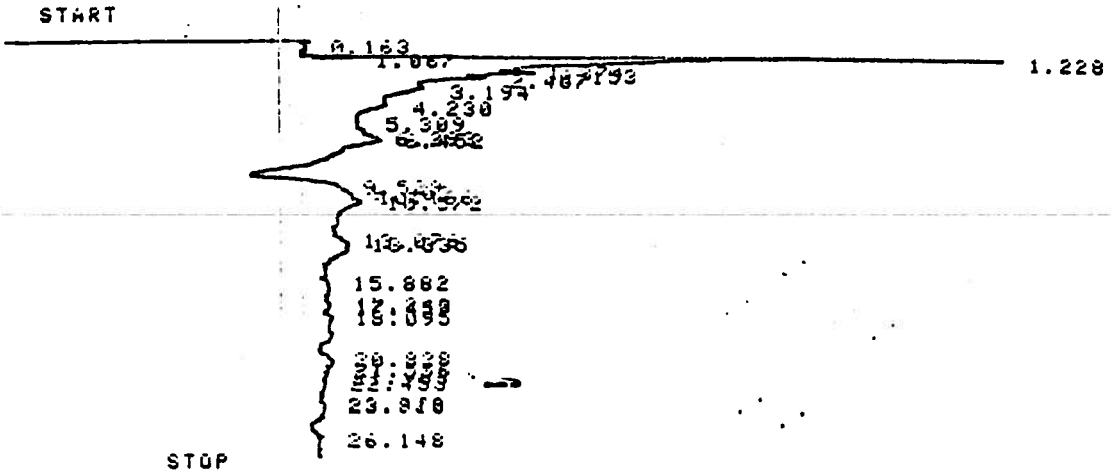
RUN# 4 JAN 1, 1901 05:28:08

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.397	7708	PV	.108	.03867
.898	15624	VV	.125	.07838
1.640	5278	BV	.061	.02648
1.781	772090	VV	.146	3.87332
2.072	389131	VV	.099	1.95214
2.225	1694432	VV	.159	8.50040
2.372	1768664	VV	.187	8.87280
2.737	923975	VV	.208	4.63527
3.060	1408856	VV	.208	7.06776
3.661	1719991	VV	.210	8.62862
4.116	4305770	VV	.227	21.60060
4.704	1068472	VV	.249	5.36017
5.220	1887207	VV	.280	9.46749
6.124	983742	VV	.316	4.93511
6.825	39194	VV	.120	.19662
7.445	787810	VV	.341	3.95218
8.491	707715	VV	.386	3.55037
9.615	7308	VV	.067	.03666
9.936	15919	VV	.094	.07986
10.635	543513	VV	.399	2.72662
11.608	881174	VV	.500	4.42056

TOTAL AREA=1.9934E+07

MUL FACTOR=1.0000E+00



RUN# 2 JAN 3, 1901 05:27:05

AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.067	26915	PP	.046	.87424
1.228	1572707	PV	.170	51.08378
1.874	217276	VV	.098	7.05743
2.153	532332	VV	.244	17.29090
2.457	382988	VV	.297	12.44000
3.194	38931	VV	.170	1.26453
4.230	17038	PV	.214	.55342
6.293	24274	VV	.089	.78845
6.452	36646	VV	.100	1.19031
9.529	107958	PV	.522	3.50663
9.902	11351	VV	.106	.36870
10.166	25025	VV	.127	.81285
10.572	22731	VV	.078	.73834
13.076	7520	PV	.134	.24426
15.882	8978	PV	.123	.29162
17.459	6554	VV	.064	.21288
18.095	9110	PV	.102	.29591
20.828	13376	PV	.137	.43447
21.983	7926	PV	.105	.25745
26.148	9047	VP	.086	.29386

TOTAL AREA=3078683

NUL FACTOR=1.0000E+00

Rinse Blank

* RUN # 8 JAN 3, 1901 08:02:08
START

STOP

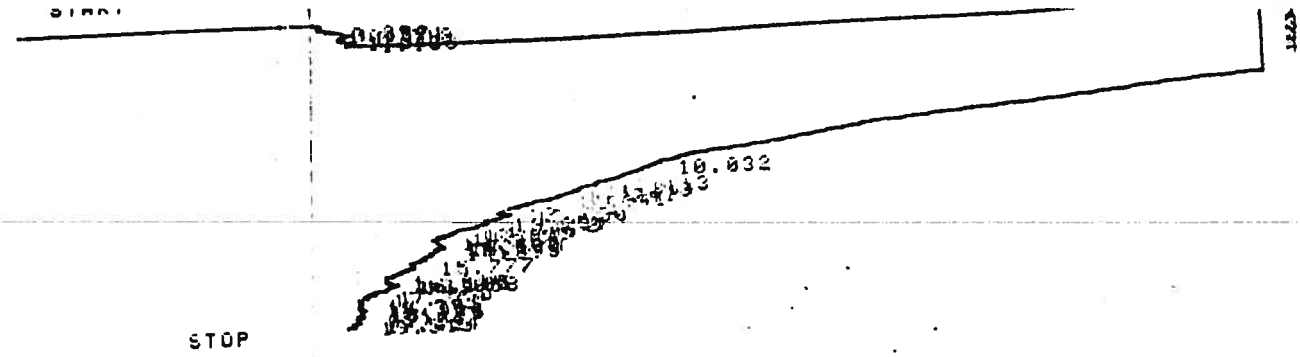
RUN# 8 JAN 3, 1901 08:02:08

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.520	8568	VV	.071	.00390
.659	11745	VV	.083	.00534
.760	28776	VV	.104	.01310
.885	21495	VV	.072	.00978
1.152	50200	VV	.081	.02284
1.245	97216	VV	.127	.04424
1.773	8597395	VH	.094	3.91247
2.085	112973000	SHH	.249	51.41128
2.420	88931968	SHB	.598	40.47080
3.050	574406	TBP	.311	.26140
3.454	369949	TVV	.137	.16835
3.599	746630	TVP	.208	.33977
3.975	6942010	TVB	.228	3.15914
5.913	20910	PV	.057	.00952
5.968	90788	VB	.175	.04132
6.949	26446	VB	.122	.01203
8.327	18654	VV	.070	.00849
8.535	111097	VB	.252	.05056
9.216	0381	PV	.066	.00301
9.798	6422	PP	.054	.00292
10.308	5180	PV	.052	.00236
11.178	5031	VV	.031	.00229
11.237	13550	VV	.059	.00617
11.398	8044	PV	.070	.00366
11.720	7207	VV	.039	.00328
12.836	41671	VV	.133	.01896
13.905	21421	VV	.055	.00975
13.432	5718	VP	.052	.00260

TOTAL AREA=2.1974E+08
MUL FACTOR=1.0000E+00

R1

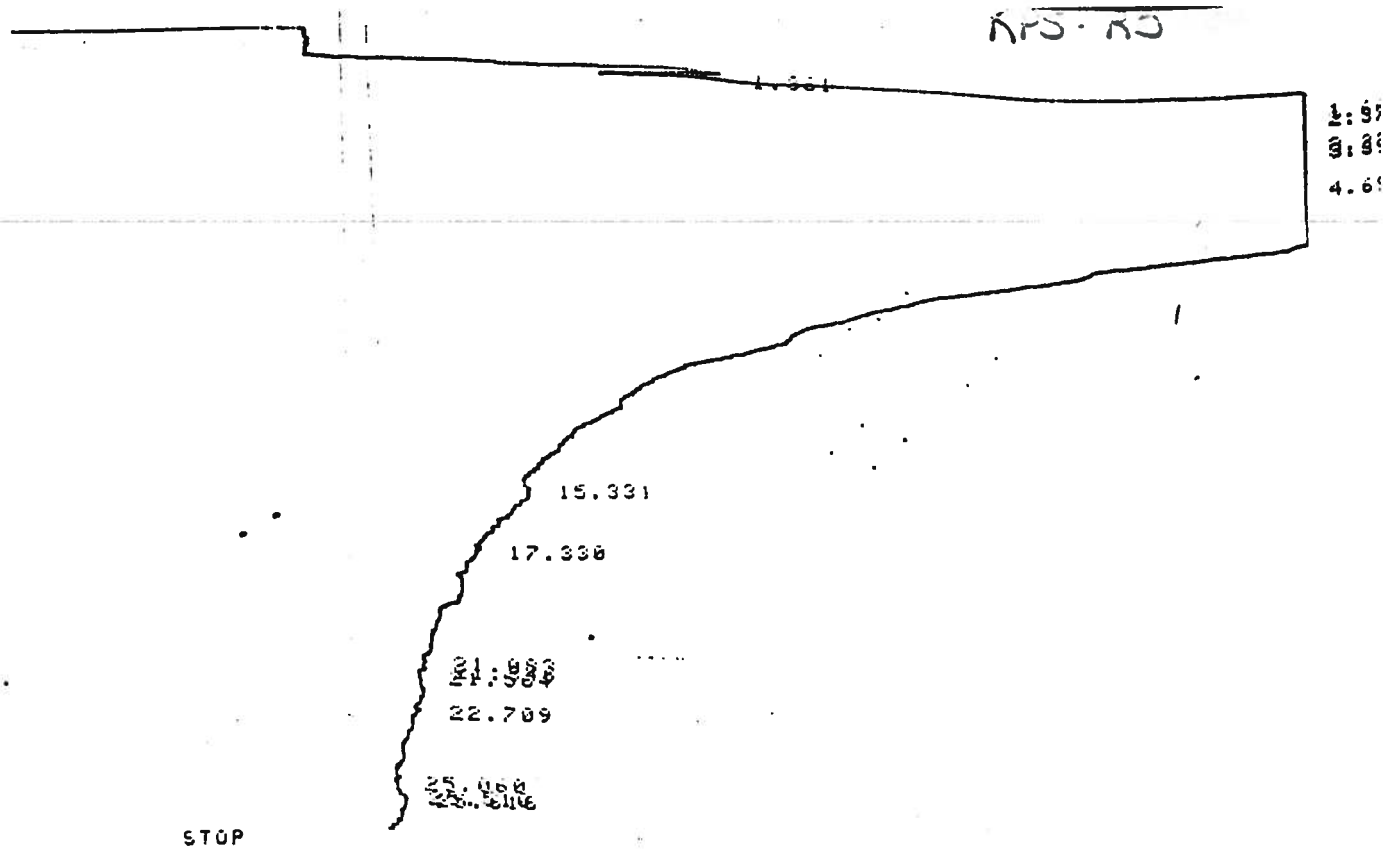


STOP

RUN# 9 JAN 3, 1901 08:18:09

AREA% RT	AREA	TYPE	WIDTH	AREA%
.394	7310	PV	.070	.00121
.452	7956	VV	.054	.00132
.571	32049	VV	.094	.00532
.718	34366	VV	.075	.00571
1.041	12771	VV	.043	.00212
1.183	80174	VV	.161	.01331
1.742	468772000	>SHH	.902	77.82074
2.436	8344986	TBB	.138	1.38535
3.120	26600800	SHH	.202	4.41599
3.311	41325696	SHH	.352	6.86047
3.745	56407680	SHB	.846	9.36423
4.210	376595	TBB	.176	.06252
4.755	45326	TBV	.052	.00752
10.032	6603	VV	.062	.00110
11.113	7819	VV	.068	.00130
11.354	6883	VV	.057	.00114
11.493	16076	VV	.083	.00267
11.741	17436	VV	.101	.00289
11.941	16291	VV	.082	.00270
12.830	28361	VV	.097	.00471
13.281	16653	VV	.122	.00276
13.705	6184	PV	.063	.00103
13.899	14294	VP	.081	.00237
14.056	18099	PP	.117	.00300
14.309	9936	VV	.098	.00165
14.465	9126	VV	.058	.00152
14.530	5461	VV	.037	.00091
14.670	11770	VV	.064	.00195
14.893	9305	VV	.070	.00154
15.777	12429	PV	.095	.00206
16.809	10455	VV	.069	.00174
16.865	6375	VV	.040	.00106
16.901	16538	VV	.074	.00275
17.058	33260	VV	.095	.00552
18.261	6032	VV	.069	.00100
18.520	8291	VV	.069	.00138
18.675	11274	VV	.072	.00187
18.793	8786	VV	.070	.00146
19.047	12410	VV	.077	.00206

TOTAL AREA=6.0337E+08
MUL FACTOR=1.0000E+00



RUN# 5 JAN 1, 1901 05:45:46

AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.361	1609227	PM	.309	.28732
1.662	415735200	SAM	.800	74.22848
2.372	6168592	TBB	.153	1.10139
3.230	6346301	SAM	.093	1.13312
3.398	129149000	SAB	.437	23.05922
4.690	1010444	TBB	.221	.18041
15.331	15641	VV	.095	.00279
17.330	6726	PV	.085	.00120
21.083	5699	PV	.080	.00102
21.346	8636	VV	.079	.00154
22.709	7731	PV	.066	.00138
25.616	12499	VV	.088	.00223

TOTAL AREA=5.6000E+08
MUL FACTOR=1.0000E+00

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

Performing self test unit will

KPS · R6

* RUN # 10 JAN 3, 1901 08:39:10
START

STOP

RUN# 10 JAN 3, 1901 08:39:10

AREA:

RT	AREA	TYPE	WIDTH	AREA%
.758	7847	VP	.072	.00192
1.038	16377	VV	.063	.00401
1.170	58897	VV	.137	.01443
1.765	339964960	VSHH	.654	83.28253
2.400	9098528	TBB	.197	2.22890
3.434	58393056	SHB	1.016	14.30478
3.714	479511	TBB	.198	.11747
4.746	187733	TBB	.179	.04599

TOTAL AREA=4.0821E+08
MUL FACTOR=1.0000E+00

KPS · R6

```
+  RUN #    10      JAN  3, 1901  08:39:10
START
```

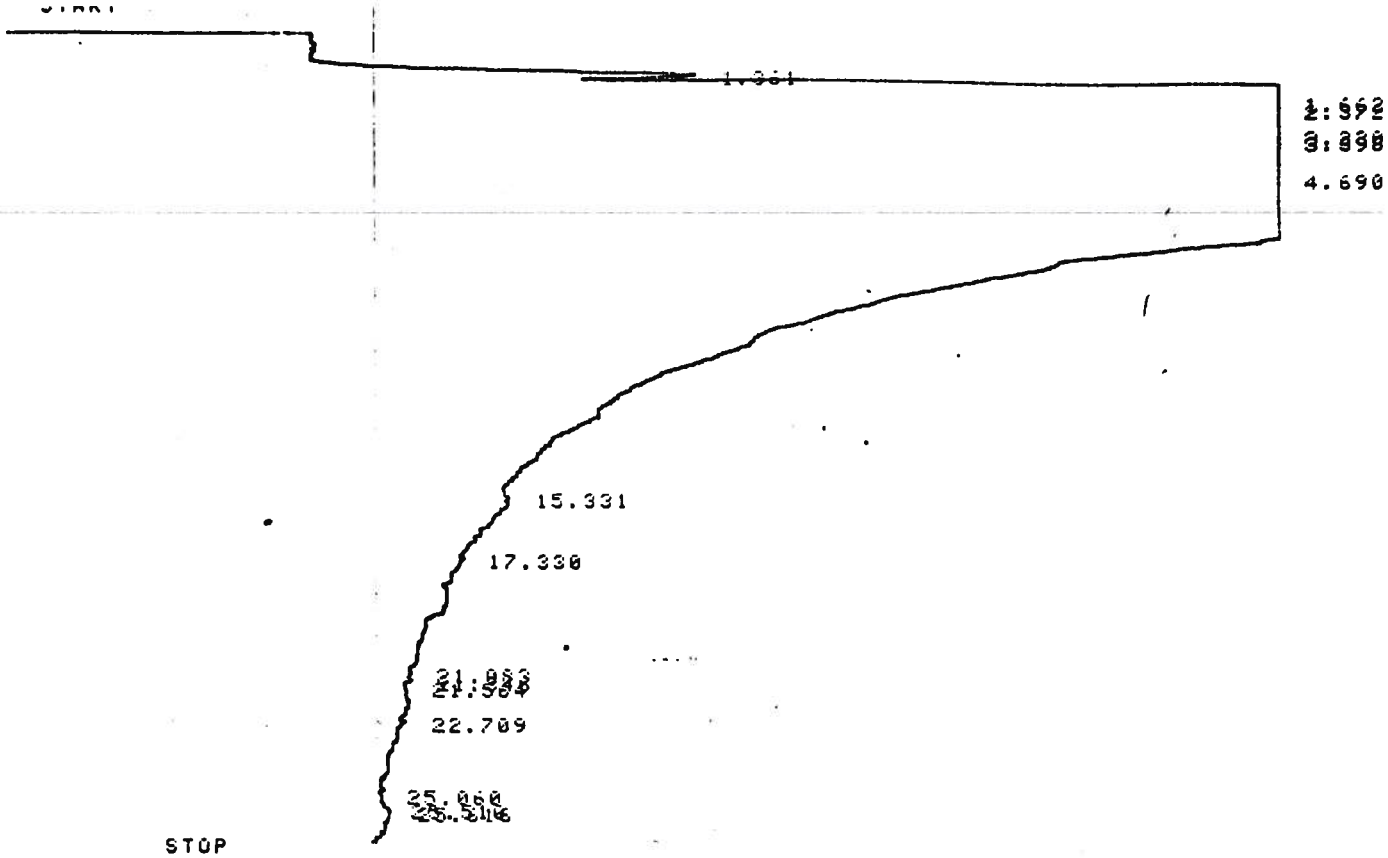
STOP

RUN# 10 JAN 3, 1901 08:39:10

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.758	7847	VP	.072	.00192
1.038	16377	VV	.063	.00401
1.170	58897	VV	.137	.01443
1.765	339964960	>SHH	.654	83.28253
2.400	9098528	TBB	.197	2.22890
3.434	58393056	SHB	1.016	14.30478
3.714	479511	TBB	.198	.11747
4.746	187733	TBB	.179	.04599

TOTAL AREA=4.0821E+08
MUL FACTOR=1.0000E+00



RUN# 5 JAN 1, 1901 05:45:46

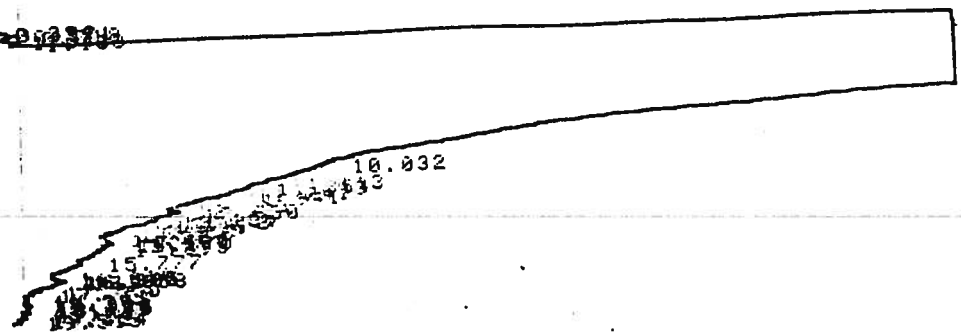
AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.361	1609227	PH	.309	.28732
1.662	415735200	>SHH	.800	74.22848
2.372	6168592	TBB	.153	1.10139
3.230	6346301	SHH	.093	1.13312
3.398	129149000	SHB	.437	23.05922
4.690	1010444	TBB	.221	.18041
15.331	15641	VV	.095	.00279
17.330	6726	PV	.085	.00120
21.083	5699	PV	.080	.00102
21.346	8636	VV	.079	.00154
22.709	7731	PV	.066	.00138
25.616	12499	VV	.088	.00223

TOTAL AREA=5.6008E+08
MUL FACTOR=1.0000E+00

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

Performing self test unit will



STOP

RUN# 9 JAN 3, 1901 08:18:09

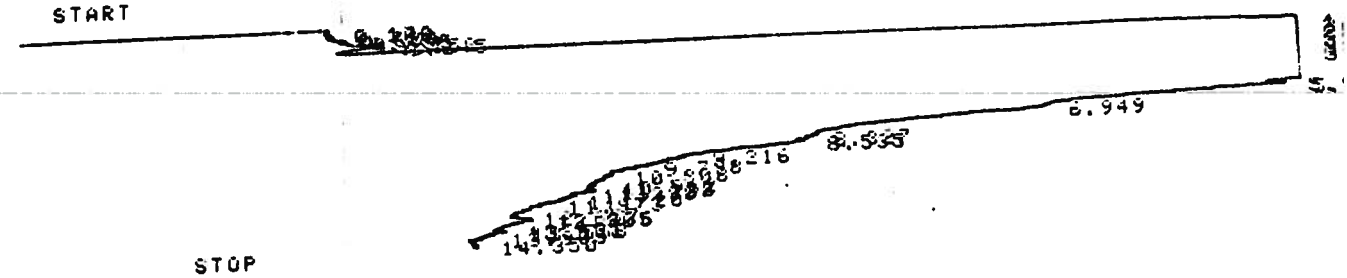
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.394	7310	PV	.070	.00121
.452	7956	VV	.054	.00132
.571	32049	VV	.094	.00532
.718	34366	VV	.075	.00571
1.041	12771	VV	.043	.00212
1.183	80174	VV	.161	.01331
1.742	468772000	>SHH	.902	77.82074
2.436	8344986	TBB	.138	1.38535
3.120	26600800	SHH	.202	4.41599
3.311	41325696	SHH	.352	6.86047
3.745	56407680	SHB	.846	9.36423
4.210	376595	TBB	.176	.06252
4.755	45326	TBV	.052	.00752
10.032	6603	VV	.062	.00110
11.113	7819	VV	.068	.00130
11.354	6883	VV	.057	.00114
11.493	16076	VV	.083	.00267
11.741	17436	VV	.101	.00289
11.941	16291	VV	.082	.00270
12.330	28361	VV	.097	.00471
13.281	16653	VV	.122	.00276
13.705	6184	PV	.063	.00103
13.899	14294	VP	.081	.00237
14.056	18099	PP	.117	.00300
14.309	9936	VV	.098	.00165
14.465	9126	VV	.058	.00152
14.530	5461	VV	.037	.00091
14.670	11770	VV	.064	.00195
14.893	9305	VV	.070	.00154
15.777	12429	PV	.095	.00206
16.809	10455	VV	.069	.00174
16.865	8375	VV	.040	.00139
16.901	16538	VV	.074	.00275
17.058	33260	VV	.095	.00552
18.261	6032	VV	.069	.00100
18.520	8291	VV	.069	.00138
18.675	11274	VV	.072	.00187
18.793	8786	VV	.070	.00146
19.047	12410	VV	.077	.00206

TOTAL AREA=6.0237E+08
NUL FACTOR=1.0000E+00

Rinse Blank

* RUN # 8 JAN 3, 1901 08:02:08
START



STOP

RUN# 8 JAN 3, 1901 08:02:08

AREA%

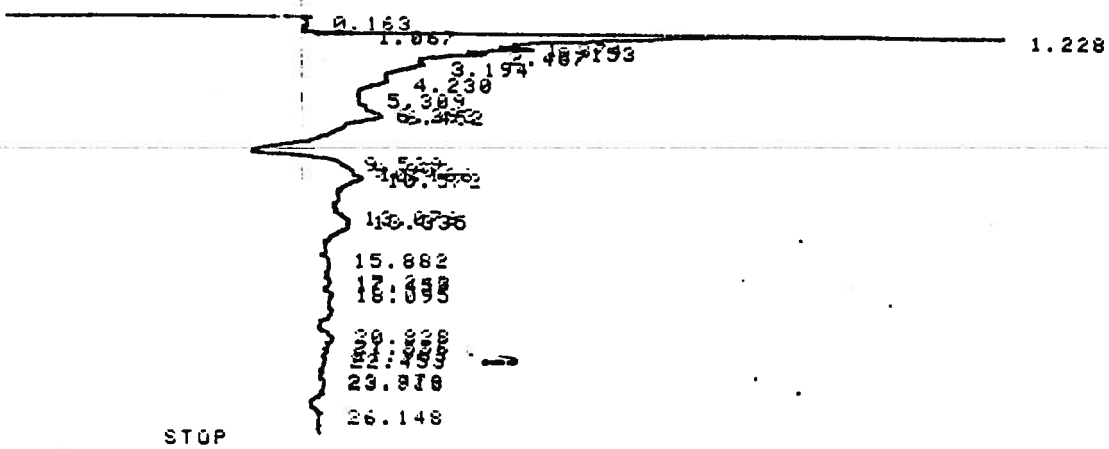
RT	AREA	TYPE	WIDTH	AREA%
.520	8568	VV	.071	.00390
.659	11745	VV	.083	.00534
.780	28776	VV	.104	.01310
.885	21495	VV	.072	.00978
1.152	50200	VV	.081	.02284
1.245	97216	VV	.127	.04424
1.773	8597395	VH	.094	3.91247
2.085	112973000	SHH	.249	51.41128
2.420	88931968	SHB	.598	40.47080
3.050	574406	TBP	.311	.26140
3.454	369949	TVV	.137	.16835
3.599	746630	TVP	.208	.33977
3.975	6942010	TVB	.238	3.15914
5.913	20910	PV	.057	.00952
5.968	90788	VB	.175	.04132
6.949	26446	VB	.122	.01203
8.327	18654	VV	.070	.00849
8.535	111097	VB	.252	.05056
9.216	8381	PV	.066	.00381
9.798	6422	PP	.054	.00292
10.308	5180	PV	.052	.00236
11.178	5031	VV	.031	.00229
11.237	13550	VV	.059	.00617
11.398	8044	PV	.070	.00366
11.720	7207	VV	.039	.00328
12.836	41671	VV	.133	.01896
12.905	21421	VV	.055	.00975
13.432	5718	VP	.052	.00260

TOTAL AREA=2.1974E+08
MUL FACTOR=1.0000E+00

R1

* RUN # 2 | JAN 3, 1901 05:27:05

START



RUN# 2 JAN 3, 1901 05:27:05

AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.067	26915	PP	.046	.87424
1.228	1572707	PV	.170	51.08378
1.874	217276	VV	.098	7.05743
2.153	532332	VV	.244	17.29090
2.457	382988	VV	.297	12.44000
3.194	38931	VV	.170	1.26453
4.230	17038	PV	.314	.55342
6.293	24274	VV	.089	.78845
6.452	36646	VV	.100	1.19031
9.529	107958	PV	.522	3.50663
9.902	11351	VV	.106	.36870
10.166	25025	VV	.127	.81285
10.572	22731	VV	.078	.73834
13.076	7520	PV	.134	.24426
15.882	8978	PV	.123	.29162
17.459	6554	VV	.064	.21288
18.095	9110	PV	.102	.29591
20.828	13376	PV	.137	.43447
21.983	7926	PV	.105	.25745
26.148	9047	VP	.086	.29386

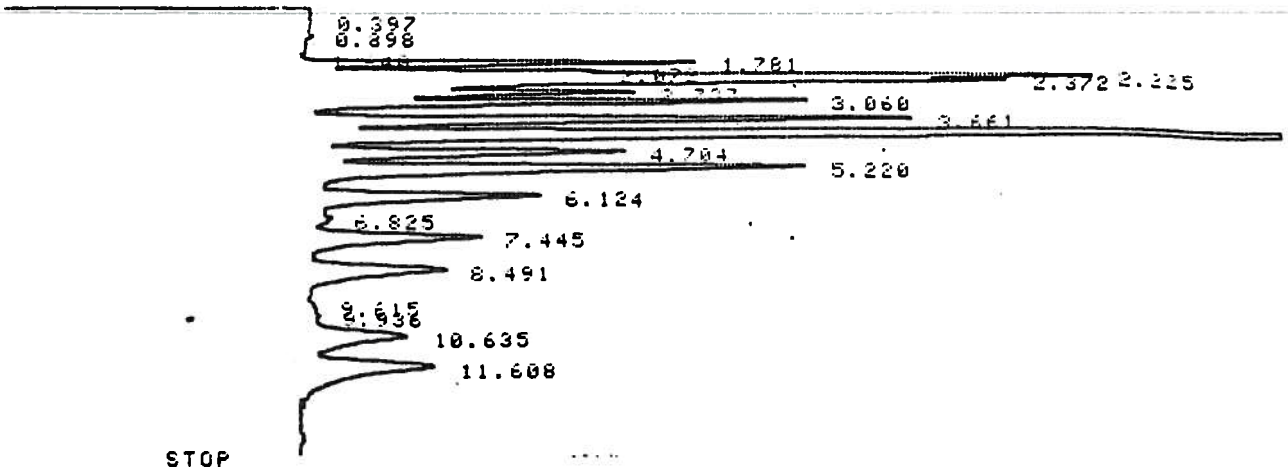
TOTAL AREA=3078683

MUL FACTOR=1.0000E+00

MUL FACTOR=1.0000E+00

200 ppb
1:0

* RUN # 4 JAN 1, 1901 05:28:08
START



STOP

RUN# 4 JAN 1, 1901 05:28:08

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.397	7708	PV	.108	.03867
.898	15624	VV	.125	.07838
1.640	5278	BV	.061	.02648
1.781	772090	VV	.146	3.87332
2.072	389131	VV	.099	1.95214
2.225	1694432	VV	.159	8.50040
2.372	1768664	VV	.187	8.87280
2.737	923975	VV	.208	4.63537
3.060	1408856	VV	.208	7.06776
3.661	1719991	VV	.210	8.62862
4.116	4305770	VV	.227	21.60060
4.704	1068472	VV	.249	5.36017
5.220	1887207	VV	.280	9.46749
6.124	983742	VV	.316	4.93511
6.825	39194	VV	.120	.19662
7.445	787810	VV	.341	3.95218
8.491	707715	VV	.386	3.55037
9.615	7308	VV	.067	.03666
9.936	15919	VV	.094	.07986
10.635	543512	VV	.399	2.72662
11.608	881174	VV	.500	4.42056

TOTAL AREA=1.9934E+07
MUL FACTOR=1.0000E+00

Quantitation Report

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Compound	R.T.	QIon	Response	Conc Unit	Qvalue
35) 2,4,6-Trichlorophenol	16.54	196	44792	1391.80 NG/ULm	93
36) 2,4,5-Trichlorophenol	16.64	196	3754	112.99 NG/ULm	70
37) 2-Chloronaphthalene	0.00	162		Not Detected	
39) 2-Nitroaniline	0.00	65		Not Detected	
40) 2,4-Dinitrophenol	0.00	184		Not Detected	
41) 4-Nitrophenol	0.00	139		Not Detected	
42) Dimethylphthalate	0.00	163		Not Detected	
43) Acenaphthylene	17.82	152	24122	151.59 NG/ULm	96
44) 3-Nitroaniline	0.00	138		Not Detected	
45) Acenaphthene	18.20	154	18735	184.77 NG/ULm	94
46) Dibenzofuran	18.52	168	46756	338.90 NG/ULm	98
47) 2,4-Dinitrotoluene	0.00	165		Not Detected	
48) 2,6-Dinitrotoluene	0.00	165		Not Detected	
49) Diethylphthalate	18.99	149	613999	4810.95 NG/ULm	96
50) 4-Chlorophenyl-phenylether	0.00	204		Not Detected	
51) Fluorene	19.24	166	15755	145.54 NG/ULm	98
52) 4-Nitroaniline	0.00	138		Not Detected	
54) 4,6-Dinitro-2-methylphenol	0.00	198		Not Detected	
55) N-Nitrosodiphenylamine	0.00	169		Not Detected	
57) 4-Bromophenyl-phenylether	0.00	248		Not Detected	
58) Hexachlorobenzene	0.00	284		Not Detected	
59) Pentachlorophenol	0.00	266		Not Detected	
60) Phenanthrene	21.25	178	67735	421.02 NG/ULm	97
61) Anthracene	21.34	178	11193	74.19 NG/ULm	98
62) Di-n-butylphthalate	22.35	149	7446387	35963.11 NG/ULm	99
63) Fluoranthene	23.75	202	12699	97.86 NG/ULm	1
65) Pyrene	24.23	202	13466	327.52 NG/ULm	92
67) Butylbenzylphthalate	25.71	149	60136	2488.05 NG/ULm	97
68) 3,3'-Dichlorobenzidiene	0.00	252		Not Detected	
69) Benzo(a)anthracene	0.00	228		Not Detected	
70) Chrysene	0.00	228		Not Detected	
71) bis(2-Ethylhexyl)phthalate	27.71	149	8923839	297095.72 NG/ULm	9
73) Di-n-Octylphthalate	0.00	149		Not Detected	
74) Benzo(b)fluoranthene	0.00	252		Not Detected	
75) Benzo(k)fluoranthene	0.00	252		Not Detected	
76) Benzo(a)pyrene	0.00	252		Not Detected	
77) Indeno(1,2,3-cd)pyrene	0.00	276		Not Detected	
78) Dibenz(a,h)anthracene	0.00	278		Not Detected	
79) Benzo(g,h,i)perylene	0.00	276		Not Detected	

(#) = qualifier out of range (m) = manual integration

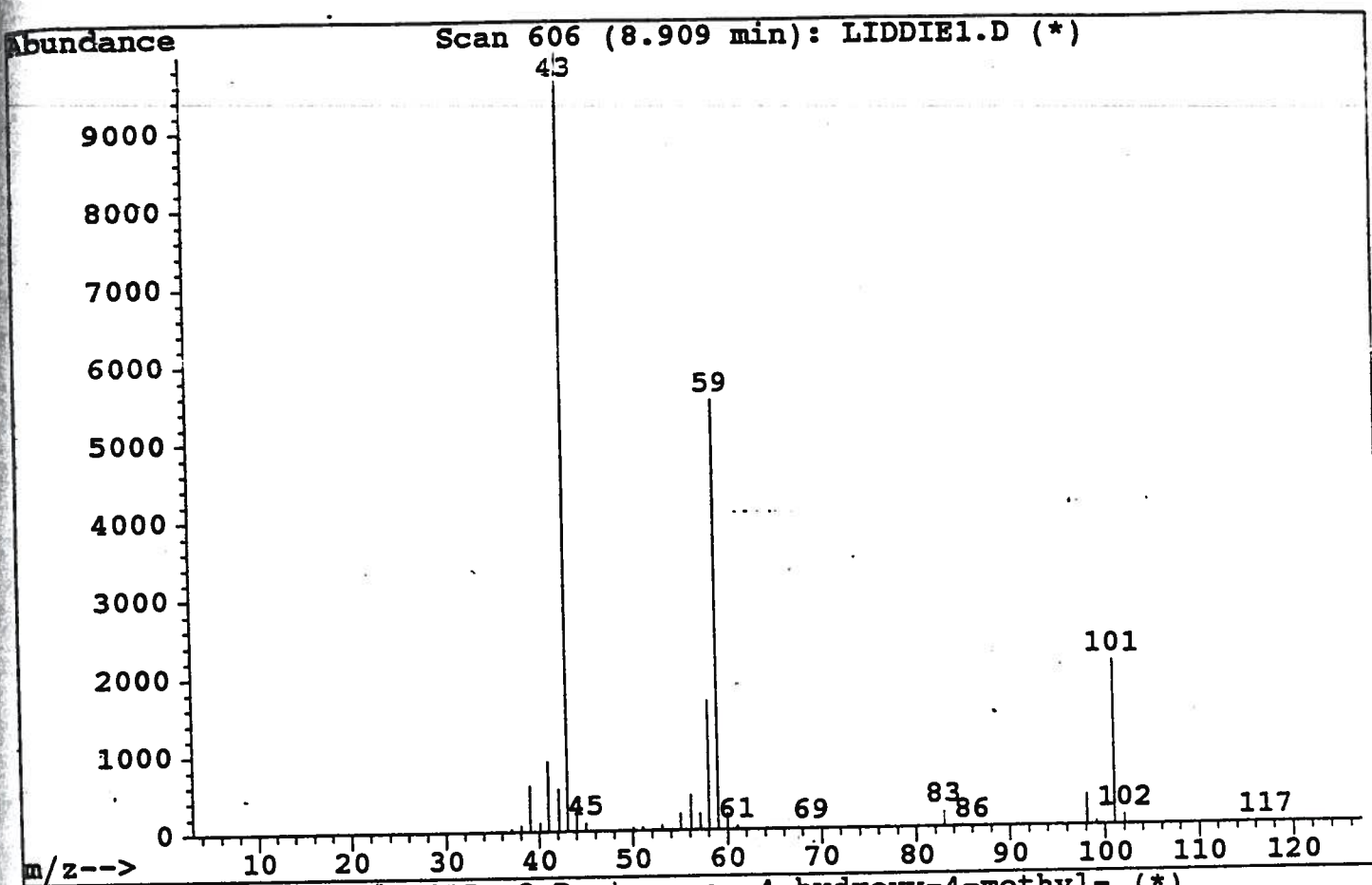
Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm Operator: dec
Sample : PAH Sample Inst : 5971 - In
Misc : 1ul offscale sample Multiplr: 1.00
Quant Time: Mar 26 8:32 1996

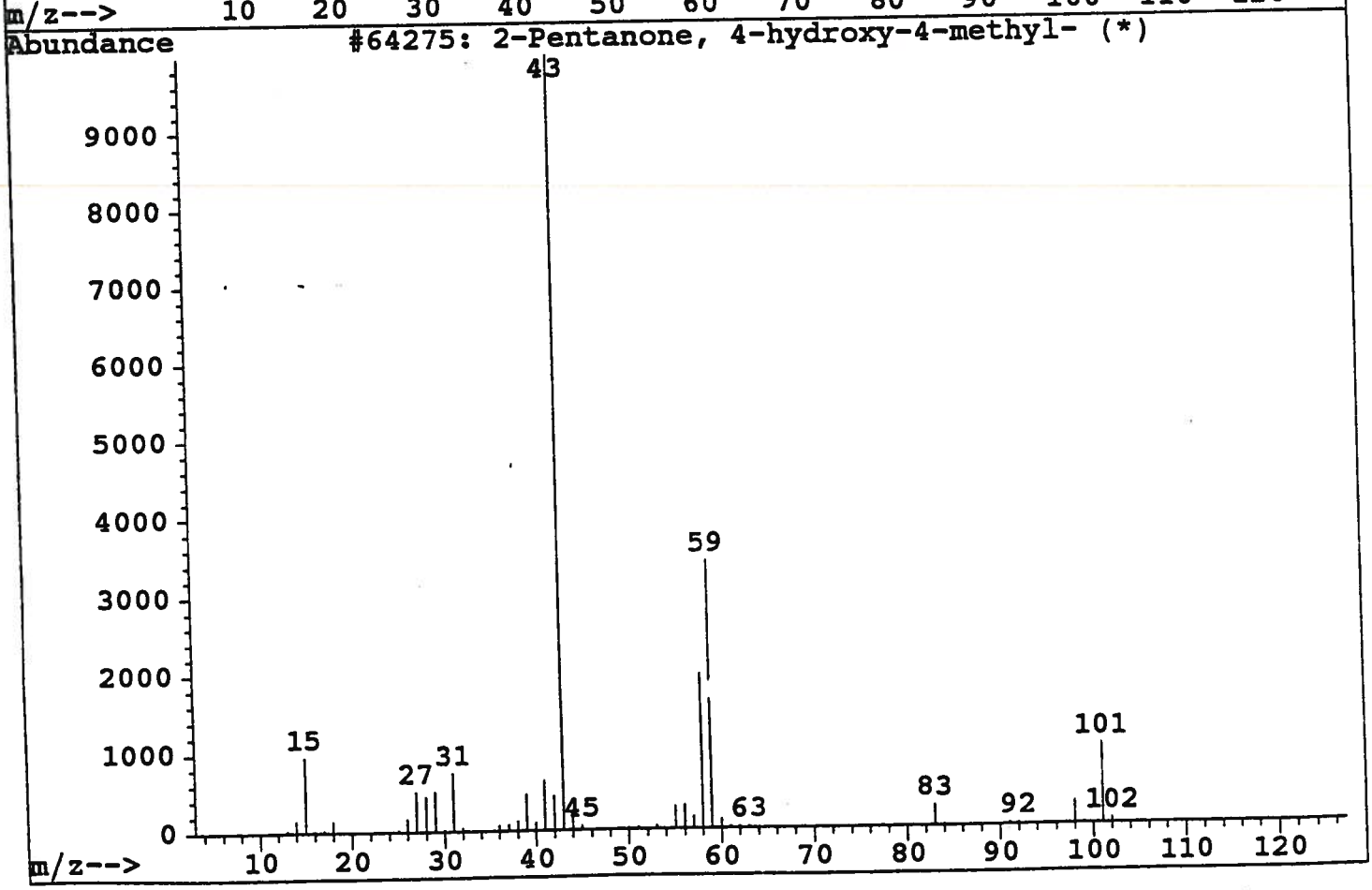
Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) 1,4-Dichlorobenzene-d4	11.90	152	798	40.00 NG/UL	-0.02
18) Napthalene-d8	14.43	136	9305	40.00 NG/UL	-0.08
33) Acenaphthene-d10	18.13	164	3411	40.00 NG/UL	-0.04
53) Phenanthrene-d10	21.20	188	4678	40.00 NG/UL	-0.03
64) Chrysene-d12	27.78	240	773	40.00 NG/UL	-0.03
72) Perylene-d12	0.00	264	0	0.00 NG/UL	-36.36
System Monitoring Compounds					%Recovery
2) 2-Fluorophenol	9.59	112	9932	358.31 NG/UL	238.87%
3) Phenol-d5	11.21	99	11611	323.98 NG/UL	215.99%
4) 2-Chlorophenol-d4	11.54	132	5876	230.89 NG/UL	153.93%
5) 1,2-Dichlorobenzene-d4	12.27	150	3079	94.72 NG/UL	94.72%
19) Nitrobenzene-d5	13.09	82	4069	32.11 NG/UL	32.11%
38) 2-Fluorobiphenyl	16.68	172	6113	51.25 NG/UL	51.25%
56) 2,4,6-Tribromophenol	19.79	330	1259	89.03 NG/UL	59.36%
66) Terphenyl-d14	24.49	244	8702	364.35 NG/UL	364.35%
Target Compounds					Qvalue
6) Phenol	11.24	94	40445	1009.93 NG/ULm	85
7) bis(2-Chloroethyl)ether	0.00	93		Not Detected	
8) 2-Chlorophenol	0.00	128		Not Detected	
9) 1,3-Dichlorobenzene	0.00	146		Not Detected	
10) 1,4-Dichlorobenzene	0.00	146		Not Detected	
11) 1,2-Dichlorobenzene	0.00	146		Not Detected	
12) Benzyl alcohol	0.00	108		Not Detected	
13) 2-Methylphenol	0.00	107		Not Detected	
14) 4-Methylphenol	0.00	107		Not Detected	
15) 2,2'oxybis(1-Chloropropane	0.00	45		Not Detected	
16) N-Nitroso-di-propylamine	0.00	70		Not Detected	
17) Hexachloroethane	0.00	117		Not Detected	
20) Nitrobenzene	0.00	77		Not Detected	
21) Isophorone	0.00	82		Not Detected	
22) 2-Nitrophenol	0.00	139		Not Detected	
23) 2,4-Dimethylphenol	0.00	122		Not Detected	
24) bis(2-Chloroethoxy)methane	0.00	93		Not Detected	
25) Benzoic acid	14.10	122	4976521	96702.33 NG/ULm	76
26) 2,4-Dichlorophenol	14.19	162	12253	159.44 NG/ULm	84
27) 1,2,4-Trichlorobenzene	0.00	180		Not Detected	
28) Naphthalene	14.51	128	1443877	5545.25 NG/ULm	99
29) 4-Chloroaniline	0.00	127		Not Detected	
30) Hexachlorobutadiene	0.00	225		Not Detected	
31) 4-Chloro-3-methylphenol	0.00	107		Not Detected	
32) 2-Methylnaphthalene	15.92	142	98992	613.13 NG/ULm	98
34) Hexachlorocyclopentadiene	0.00	237		Not Detected	

(#) = qualifier out of range (m) = manual integration

Library Searched : C:\DATABASE\NBS75K.L
Quality : 64
ID : 2-Pentanone, 4-hydroxy-4-methyl-

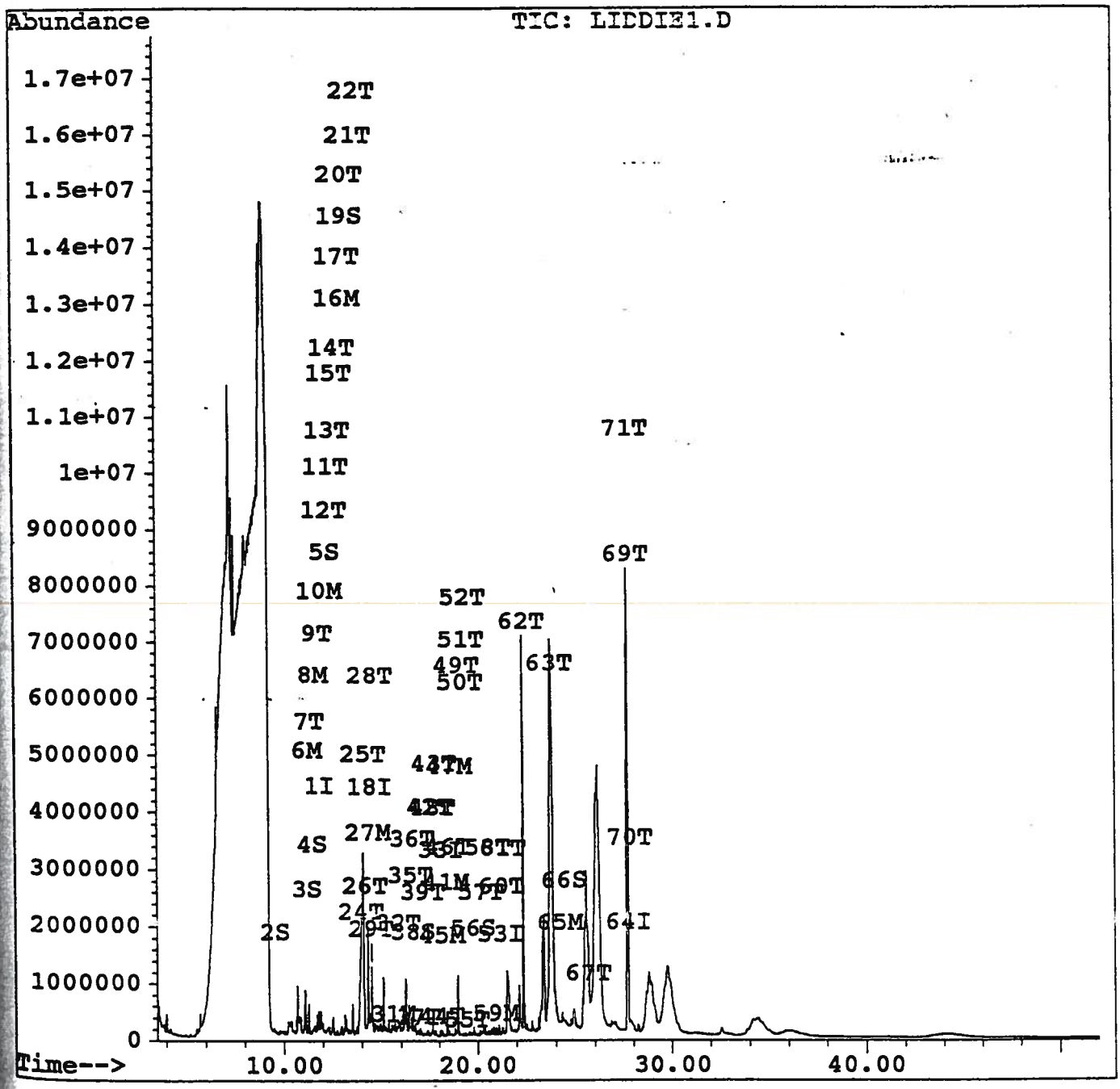




Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration



ONMENTAL MONITORING LABORATORIES
OFFICE BOX 655
LAND, MISSISSIPPI 39158

E: 601/856-3092
601/853-2151 Attention: Danny Russell

Laboratory:
Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: Dr. Mike Bonner EML PO No. DR0223

Rush ☐ Routine ☐ Fax Results ☐

Kopper Industries - Grenada

Treated wood test burn stack tests on 2-20-96

# of containers	SAMPLE ID	Sample matrix	REMARKS	ANALYSES REQUESTED: PAH -- EPA 8270	Chlorinated phenols incl. pentachlorophe EPA 8270	UNITS
1	KPS R1 - Filter	solid	combine	X	X	total micrograms
1	KPS R1 - Sorbent	solid				
1	KPS R1 - Rinse	aqueous	extracts			
1	KPS R2 - Filter	solid	combine	X	X	total micrograms
1	KPS R2 - Sorbent	solid				
1	KPS R2 - Rinse	aqueous	extracts			
1	KPS R3 - Filter	solid	combine	X	X	total micrograms
1	KPS R3 - Sorbent	solid				
1	KPS R3 - Rinse	aqueous	extracts			
1	KPS R4 - Filter	solid	combine	X	X	total micrograms
1	KPS R4 - Sorbent	solid				
1	KPS R4 - Rinse	aqueous	extracts			
1	KPS R5 - Filter	solid	combine	X	X	total micrograms
1	KPS R5 - Sorbent	solid				
1	KPS R5 - Rinse	aqueous	extracts			
1	KPS R6 - Filter	solid	combine	X	X	total micrograms
1	KPS R6 - Sorbent	solid				
1	KPS R6 - Rinse	aqueous	extracts			
1	KPS Filter Blank	solid	combine	X	X	total micrograms
1	KPS Blank - Sorbent	solid				
1	KPS Rinse Blank	aqueous	extracts			

linquished by: (print name; initial)	Date/time 2-23--96	Received by: (print name: initial)	Date/time
el G. Russell			
linquished by: (print name; initial)	Date/time	Received by: (print name: initial)	Date/time
linquished by: (print name; initial)	Date/time	Received by: (print name: initial)	Date/time
COURIER	Date Shipped	Received for lab by:	

APPENDIX E.

HCl ANALYSES REPORT

(CAE)

Clean Air Engineering
March 22, 1996

Mr.Danny Russell
Environmental Monitoring Laboratories
Post Office Box 655
Ridgeland, MS 39158

RE:		
	Purchase Order #:	DR0222.1
	CAE Lab #:	26699
	Type of Analysis:	Method 26 & Method 14
	No. of Samples:	17
	Date Received:	February 26, 1996
	Date Reported:	March 20, 1996

Dear Mr. Russell:

Enclosed please find results of analysis performed by Clean Air Engineering. If you should have any questions, please contact me at 847/991-3300 extension 2040

Thank you for choosing Clean Air Engineering for your Method 26 and Method 14 analysis.

Respectfully submitted,
CLEAN AIR ENGINEERING, INC.

Ronald Young

Ronald P. Young PhD
Project Manager

Encl.

cc: File 26699

RPY/mlc

Chromatographic Data Reduction

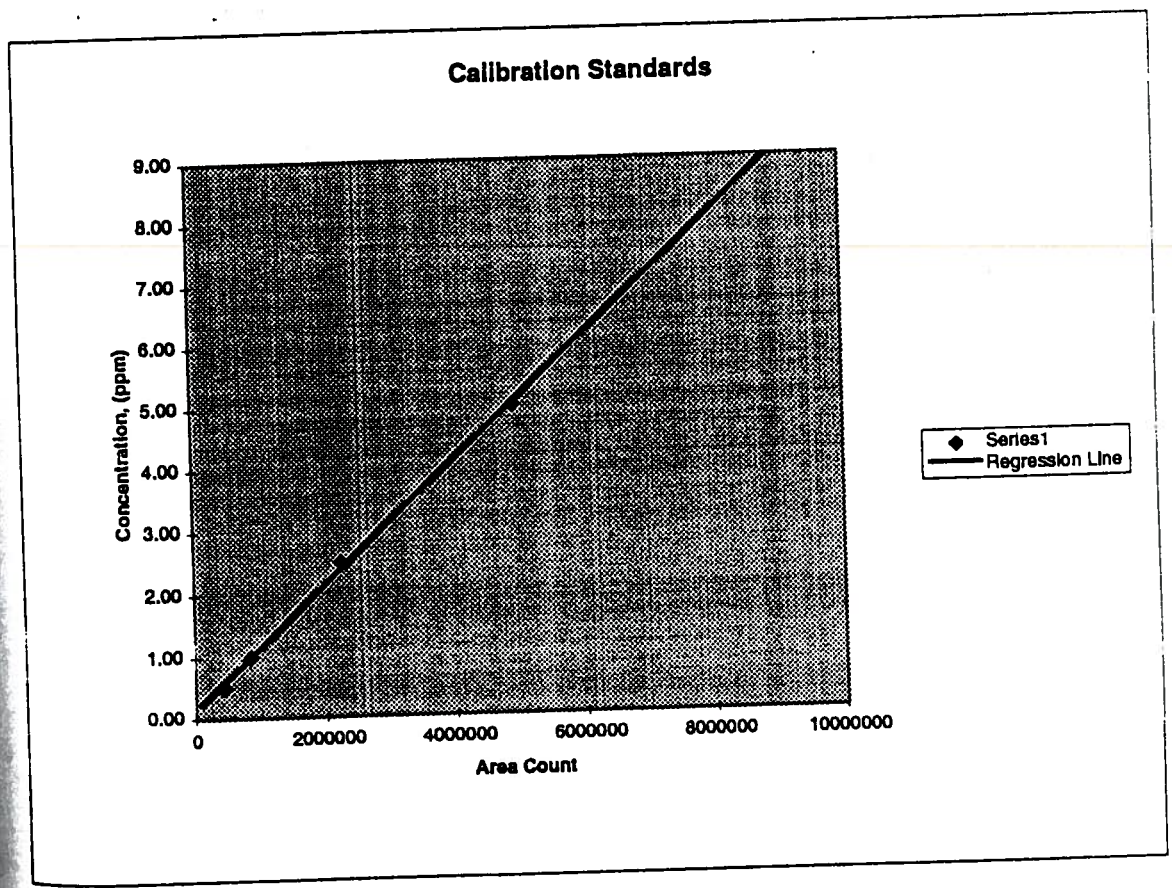
Client: EML
CAE Project No: 86-26699
Analyte: Chloride
Date: 3/20/1996

Standards

Standard Concentration, (ppm)	Integrator Area Counts			Response Factor
	Trial 1	Trial2	Average	
0.50	427506	424634	426070	1.17E-06
1.00	836717	838076	837397	1.19E-06
2.50	2248893	2252777	2250835	1.11E-06
5.00	4900527	4917983	4909255	1.02E-06
Average Response Factor				1.12E-06
Std. Dev. Response Factor				7.89E-08
RMS Dev. Response Factor				7.0%

Regression Analysis of Standards

Area Counts	Actual Concentration	Regression Concentration
426070	0.50	0.576
837397	1.00	0.986
2250835	2.50	2.394
4909255	5.00	5.044
Slope	9.968E-07	
Y-Intercept	0.1509	
Coefficient of Fit	0.9984	



Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699

Analyte: Chloride
Date: 3/20/1996

Sample Identification	Sample Description	Area Count Trial 1	Area Count Trial 2	Average Area Count	Original Volume (ml)	Aliquot Concentration, (ppm)	Dilution Factor	Sample Concentration, (ppm)	Total Mass Sample (mg)	Duplicate % Deviation	Spike Area Count	Spike % Recovery
26699-01	PCA BLANK	0		0	200	< 0.05	1	< 0.05				
26699-02	PCA RUN 1	2879424		2879424	432	3.02	10	30.2	13.1			
26699-03	PCA RUN 2	1156300		1156300	409	1.30	40	52.1	21.3			
26699-04	PCA RUN 3	1493205	1535773	1514489	422	1.66	25	41.5	17.5	2.81%		
26699-05	PCA RUN 4	611741		611741	467	0.76	25	19.0	8.88		2661154	96.0%
26699-06	PCA RUN 5	710327		710327	420	0.86	25	21.5	9.02			
26699-07	PCA RUN 6	190913		190913	474	0.34	25	8.53	4.04			
26699-14	KOPPERS BLANK	0		0	200	< 0.05	1	< 0.05				
26699-08	KOPPERS RUN 1	4916333		4916333	230	5.05	25	126.3	29.0			
26699-09	KOPPERS RUN 2	935111	971623	953367	238	1.10	100	110.1	26.2	3.83%		
26699-10	KOPPERS RUN 3	1614568		1614568	230	1.76	100	176.0	40.5		3284791	100.9%
26699-11	KOPPERS RUN 4	3609745		3609745	325	3.75	100	374.9	121.8			
26699-12	KOPPERS RUN 5	2439850		2439850	330	2.58	100	258.3	85.2			
26699-13	KOPPERS RUN 6	3366964	3375393	3371179	325	3.51	100	351.1	114.1	0.25%		
		Area Count	Area Count	Average		Detected		Expected		Percent		
Audit Samples		Trial 1	Trial 2	Area Count		Concentration, (ppm)		Concentration, (ppm)		Difference		
Internal		4994553	5002698	4998626		5.13		5.0		-2.67%		

Analyst: Winfred Ivy
Analytical Chemist

Reviewed By:

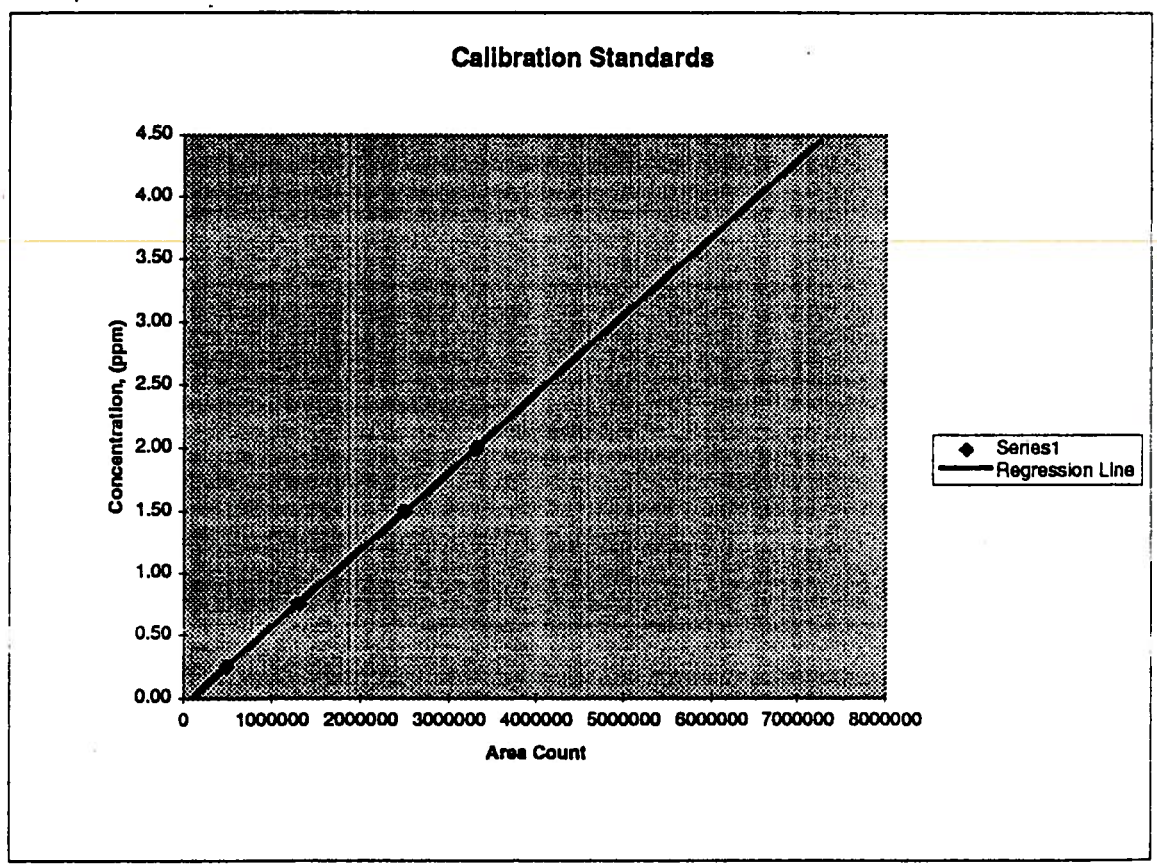
Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699
Analyte: Fluoride
Date: 3/20/1996

Standards

Standard Concentration, (ppm)	Integrator Area Counts			Response Factor
	Trial 1	Trial2	Average	
0.25	497963	463788	480876	5.20E-07
0.75	1314323	1301535	1307929	5.73E-07
1.50	2502803	2480306	2491555	6.02E-07
2.00	3328048	3296715	3312382	6.04E-07
Average Response Factor				5.75E-07
Std. Dev. Response Factor				3.92E-08
RMS Dev. Response Factor				6.8%

Regression Analysis of Standards		
Area Counts	Actual Concentration	Regression Concentration
480876	0.25	0.246
1307929	0.75	0.759
2491555	1.50	1.493
3312382	2.00	2.002
Slope	6.204E-07	
Y-Intercept	-0.0526	
Coefficient of Fit	0.9999	



Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699

Analyte: Fluoride
Date: 3/20/1996

Sample Identification	Sample Description	Area Count Trial 1	Area Count Trial 2	Average Area Count	Original Volume (ml)	Aliquot Concentration, (ppm)	Dilution Factor	Sample Concentration, (ppm)	Total Mass Sample (mg)	Duplicate % Deviation	Spike Area Count	Spike % Recovery
26699-14	DI H2O BLANK	0		0	200	< 0.05	1	< 0.05				
26699-15	NEWSPRINT RUN 1	990662		990662	497	0.56	1	0.56	0.28			
26699-16	NEWSPRINT RUN 2	714504	714768	714636	500	0.39	1	0.39	0.20	0.04%		
26699-17	NEWSPRINT RUN 3	845189		845189	485	0.47	1	0.47	0.23		2177229	105.9%
dit Samples		Area Count Trial 1	Area Count Trial 2	Average Area Count		Detected Concentration, (ppm)		Expected Concentration, (ppm)		Percent Difference		
Internal		3271105	3289482	3279794		1.98		2.0		0.89%		

Analyst: Winfred Ivy
Analytical Chemist

Reviewed By:

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

PAGE_1__ OF _1__

NMENTAL MONITORING LABORATORIES FICE BOX 655 AND, MISSISSIPPI 39158 601/856-3092 601/853-2151 Attention: Danny Russell	Laboratory: Clean Air Engineering Please return copy of chain of custody with analytical report Attention: Winfred Ivy EML PO No. DR0222.1

Koppers Industries boiler stack tests for
HCl emissions on 2-20-96

Rush ☐ Routine ☑ Fax Results ☐

SAMPLE ID	Sample matrix	REMARKS	ANALYSES REQUESTED: HCl by Method 26	UNITS
Koppers Run 1	aqueous	~ 3% peroxide	X	mg/liter
Koppers Run 2	aqueous	~ 3% peroxide	X	mg/liter
Koppers Run 3	aqueous	~ 3% peroxide	X	mg/liter
Koppers Run 4	aqueous	~ 3% peroxide	X	mg/liter
Koppers Run 5	aqueous	~ 3% peroxide	X	mg/liter
Koppers Run 6	aqueous	~ 3% peroxide	X	mg/liter
BLANK *	aqueous	~ 3% peroxide	X	mg/liter

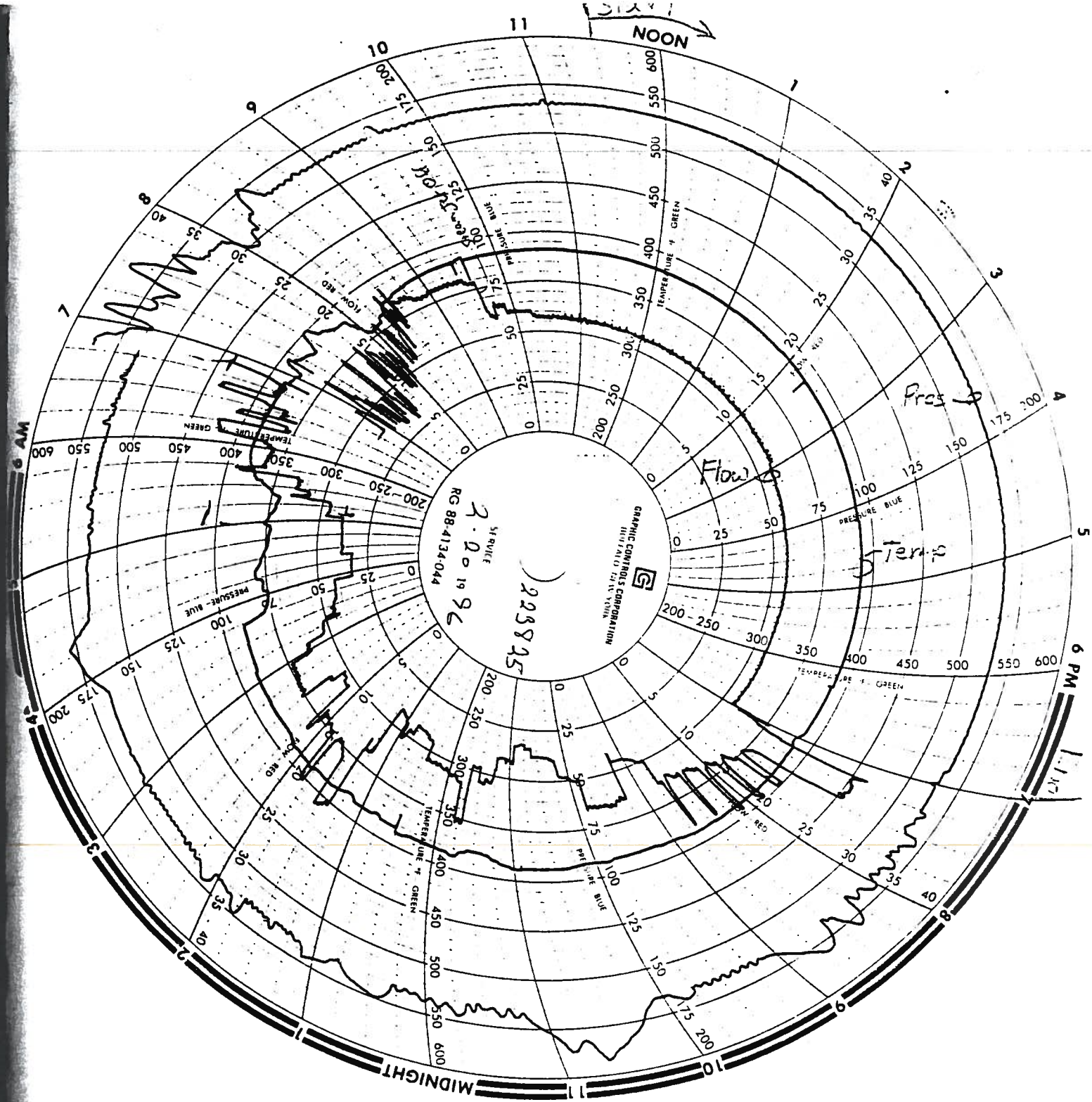
* Use same solution blank as marked for Newsprint blank

by: (print name; initial) Russell	Date/time 2/23/96	Received by: (print name; initial)	Date/time
by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER Fed Ex	Date Shipped	Received for lab by:	Date/time 2/26/96 1515

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/21/96 00:00 TO 02/22/96 23:59

Date/ Time	O2	CO	CO_7	Opacity	Cell 1	Cell 2
	%	ppm	ppm	%	F	F
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.2	76.2	117.0	0.9	1856	1656
02-21-96 08:00	9.2	11.5	25.3	2.4	1870	1926
02-21-96 09:00	9.3	15.5	30.8	5.0	1888	1966
02-21-96 10:00	7.1	20.3	19.5	3.8	2123	2219
02-21-96 11:00	7.7	9.4	9.9	1.0	2085	2192
02-21-96 12:00	8.3	23.7	29.6	1.9	2057	2000
02-21-96 13:00	7.6	21.7	22.6	1.2	2027	2131
02-21-96 14:00	7.2	11.4	11.6	1.5	2079	2191
02-21-96 15:00	6.9	11.8	11.7	2.1	2080	2239
02-21-96 16:00	7.2	3.4	3.8	1.4	2115	2234
02-21-96 17:00	10.9	7.8	13.7	0.2	1789	1864
02-21-96 18:00	15.8	21.1	87.2	0.0	1258	1281
02-21-96 19:00	12.8	155.9	325.4	3.4	1391	1555
02-21-96 20:00	12.1	21.9	34.8	0.0	1627	1575
02-21-96 21:00	12.6	20.8	35.8	0.0	1573	1506
02-21-96 22:00	12.1	15.5	25.3	0.0	1595	1562
02-21-96 23:00	12.7	21.6	38.8	0.1	1564	1505
02-22-96 00:00	12.7	24.2	42.1	0.0	1555	1479
02-22-96 01:00	12.2	20.6	34.3	0.1	1587	1510
02-22-96 02:00	11.3	15.1	23.4	0.1	1686	1657
02-22-96 03:00	11.6	6.3	12.6	0.0	1679	1635
02-22-96 04:00	12.9	8.6	16.3	0.0	1520	1479
02-22-96 05:00	13.1	58.5	118.7	0.6	1448	1499
02-22-96 06:00	12.8	26.0	48.0	0.3	1479	1543
02-22-96 07:00	12.8	13.8	25.3	0.0	1499	1500
02-22-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999

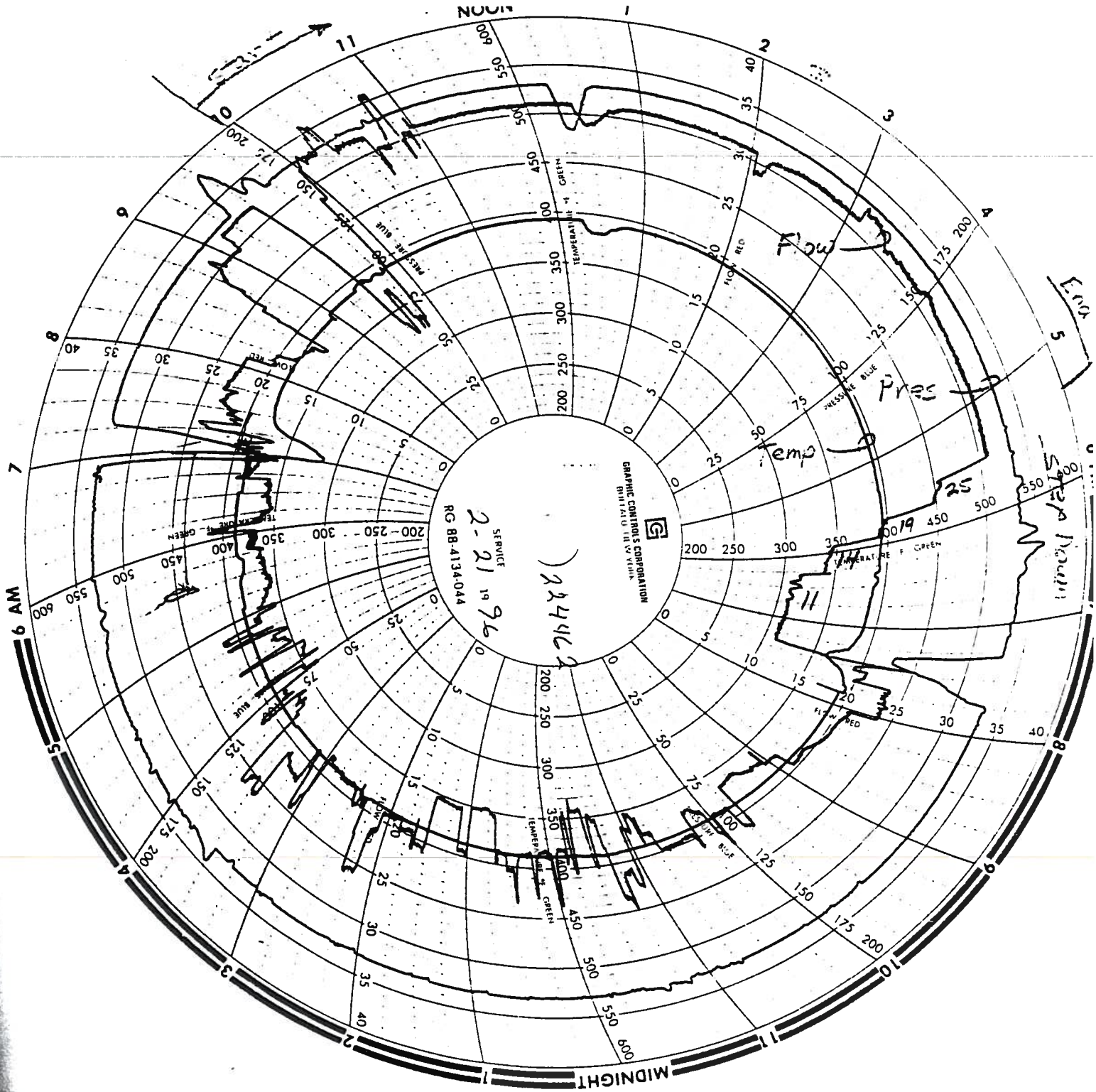

NOON
MIDNIGHT
6 AM
6 PM
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
SERVICE
RG 88-4134-044
2.20 19 96
223825
Pres
Flow
Temp
PRESSURE BLUE
TEMPERATURE °F GREEN
FLOW RED

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/20/96 00:00 TO 02/21/96 23:59

Date/ Time	O2	CO	CO_7	Opacity	Cell 1	Cell 2
	%	ppm	ppm	%	F	F
02-20-96 00:00	14.4	37.9	95.0	0.1	1287	1283
02-20-96 01:00	13.8	47.5	103.5	0.2	1429	1329
02-20-96 02:00	14.3	203.4	445.0	0.8	1737	1084
02-20-96 03:00	15.8	203.5	602.1	1.2	1496	934
02-20-96 04:00	15.9	221.0	643.8	2.3	1398	882
02-20-96 05:00	14.9	168.2	458.1	2.5	1197	1186
02-20-96 06:00	15.0	134.7	420.3	4.4	1214	1211
02-20-96 07:00	15.2	98.0	308.5	1.4	1236	1182
02-20-96 08:00	10.0	155.0	205.6	1.0	1566	1370
02-20-96 09:00	13.0	125.5	110.2	0.0	1485	1405
02-20-96 10:00	14.8	22.3	52.5	0.1	1343	1236
02-20-96 11:00	14.8	22.7	52.1	0.1	1301	1246
02-20-96 12:00	14.6	20.1	44.1	0.0	1264	1259
02-20-96 13:00	14.3	15.2	32.1	0.0	1278	1258
02-20-96 14:00	14.3	17.6	36.9	0.0	1272	1252
02-20-96 15:00	14.4	22.8	48.6	0.0	1267	1237
02-20-96 16:00	14.3	17.3	36.3	0.0	1252	1243
02-20-96 17:00	14.6	16.2	35.7	0.0	1269	1236
02-20-96 18:00	14.7	52.5	111.8	0.7	1327	1221
02-20-96 19:00	11.7	38.0	80.7	2.0	1578	1651
02-20-96 20:00	14.8	45.5	137.9	0.2	1325	1315
02-20-96 21:00	14.7	39.0	107.5	0.2	1319	1246
02-20-96 22:00	16.5	157.8	501.3	1.4	1073	1054
02-20-96 23:00	14.9	57.7	174.0	0.3	1229	1207
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.9	188.6	294.8	2.3	1840	1408
02-21-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999

Low Fire Test


NOON
MIDNIGHT
6 AM
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
SERVICE
2-21 1996
RG 88-4134-044
22462
Flow
Pres
Temp
Step Down
TEMPERATURE °F GREEN
PRESSURE BLUE
FLOW RED

2.6 in 34 / 890 / 76 / 110 / 104 — 820 / 89

Log - Day 1

2/20/96	(x 400) Steam Totalizer	Flow MLB/min	Conveyor Fuel Timer	@ ~ 8:30 Turbine Recovery, Kiln Off				
9:30	7.00 am 223,825 / 223,095	16	14881.1	- Ash Bin Empty				
9:40	223,409	13		Steam Jet turned off				
11:35	223,958	12.3	14882.5	Test PCHC		Test #1		GRN-F
1:00	223,993	11.4	14883.0	1151	1175	1280	1265	
1:40	224010	11.4	1483.2	1154	1173	1296	1276	GRN-F-2
1:42	End of test #1							
2:13	Start of test 2							
3:15	224050	11.2	14883.7	1141	1165	1270	1237	
4:13	224074	11.2	14884.0	1152	1176	1276	1248	
4:22	End of test 2							
5:30	224106	11.1	14884.5	1149	1168	1248	1235	
6:52	End of test 3							
	224141	11.0	14884.7	1139	1157	1324	1122	

34 / 400 / 12,000

Turbine / Generator @ ~ 200 KW during test

LOG - Day 2 - 2/21/96

Time	Steam Totalizer (x 430)	Steam Rate (MLB/hr)	Fuel Conveyor Timer (HR)	New Temp Probes 1	New Temp Probes 2	Exist Probes 1	Exist Probes 2	
9:20 am	224601	32.0	14890.8	1736	1765	2171	2283	
9:30-9:45	Bring turbine off, clean vac. jet strainer, bring back on line.							
	Turbine Generator set @ ~ 620 KW							
9:52	Start test 1							
9:54	224629	33.0	14891.1	1751	1772	2158	2304	
10:43	224692	28.0	14891.7	1659	1696	2045	2109	
12:08	224797	31.00	14892.8	1697	1717	2095	2195	
12:40	Start test 2							
12:41	224837	31.	14893.2	1645	1664	2068	2048	
2:05	224940	30.8	14894.5	1682	1700	2053	2141	
2:40	End of Test 2							
2:44	224987	31.0	14895.0	1692	1716	2107	2195	
3:20	Start test 3							
3:20	225033	31.0	14895.5	1693	1716	2031	2233	
4:02	225086	31.	14896.0	1690	1713	2142	2217	
5:13	225173	31	14896.8	1680	1701	2102	2224	NOX 120 pp
5:20	End Test 3			(Ave: [illegible]				
5:22	225184	31	14896.9	1674	1695			
5:25	DROP to	25	897.0	1567	1583	1893	2013	103
5:28	190	25						
5:35	Drop to	20.						
5:45	225204	19	14897.1	1404	1409	1630	1678	90
5:48	Drop to	15						55-75
6:03	225215	14	97.2	1248	1239	1409	1434	65
6:10	Drop to	12						
6:40	225231	11.0	97.3	1120	1101	1219	1238	50-60

2.6 hr 890 / 34 / 78 / 110 / 104

814 / 825 / 89

Log - Day 1

2/20/96

	(x 400) Steam Totalizer	Flow MLB/hr	Conveyor Fuel ~~Bit~~ timer	@~8:30 Turbine Running, Kiln Off
9:30	7:00 am 223,825 / 223,895	16	14881.1	- Ash Bin Empty
9:40	223,909	13		Steam Jet turned off
11:35	223,958	12.3	14882.5	
1:00	223,993	11.4	14883.0	
1:40	224010	11.4	1483.2	
1:42	End of test #1			
2:13	Start of test 2			
3:15	224050	11.2	14883.7	
4:13	224074	11.2	14884.0	
4:22	End of test 2			
5:30	224106	11.1	14884.5	
6:52	End of test 3			
	224141	11.0	14884.7	

34 / 400 / 12,800

	Start POHC Temps #1	Start POHC Temps #2	Test #1 Lower Temps (1)	Test #1 Lower Temps (2)	
1:00	1151	1175	1280	1265	GRN-F-1
1:40	1154	1173	1296	1276	GRN-F-2
3:15	1141	1165	1270	1237	
4:13	1152	1176	1246	1248	
5:30	1149	1168	1248	1235	
6:52	1139	1157	1324	1122	
Ave:	1148	1169	1277	1230	
	1158		1254		

Turbine / Generator @ ~ 200 KW during test

LOG - Day 2 - 2/21/96

Time	Steam Totalizer (x 460)	Steam Rate (MLB/hr)	Fuel Conveyor Timer (HR)	New Temp Probes 1	New Temp Probes 2	Exist Probes 1	Exist Probes 2	
5:30			88.5					
7:20 am	224861	32.0	14890.8	1736	1765	2171	2283	
9:30-9:45	Bring turbine off, clean vac. jet strainer, bring back on line.							
	Turbine Generator set @ ~ 620 KW							
9:52	Start test 1							
→ 9:54	224629	33.0	14891.1	1751	1772	2158	2304	
10:43	224692	28.0	14891.7	1659	1696	2045	2109	
12:08	224797	31.00	14892.8	1697	1717	2095	2195	
12:40	Start test 2							
12:41	224837	31.	14893.2	1645	1664	2068	2048	
2:05	224940	30.8	14894.5	1682	1700	2053	2141	
2:40	End of Test 2							
2:44	224987	31.0	14895.0	1692	1716	2107	2195	
3:20	Start test 3							
3:20	225033	31.0	14895.5	1698	1706	2031	2233	
4:02	225086	31.5	14896.0	1650	1713	2142	2217	
5:13	225173	31	14896.8	1690	1701	2102	2224	NOX
5:20	End Test 3			Ave: 1688	1710 (1699)	2089 (2137)	2185	120 ppm
5:22	225184	31	14896.9	1674	1695			
5:25	DROP to	25						
5:28	190	25	897.0	1567	1583	1853	2013	108
5:35	Drop to	20.						
5:45	225204	19	14897.1	1404	1409	1630	1678	90
5:48	Drop to	15						
6:03	225215	14	97.2	1248	1239	1409	1434	55-75 65
6:10	Drop to 12							
[illegible]	225231	11.0	[illegible]	1120	1101	1219	1238	50-60

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2/20/96 SCENARIO: Low

FUEL SAMPLING DATA

DATE	2/20	2/20	2/26	2/20	Composite
TIME	11:45	1:40	4:20	5:30	
SAMPLE ID #	GRN-F-1	GRN-F-2	GRN-F-3	GRN-F-4	GRN-C1
SAMPLED BY:	SD	SD	SD	SD	

STEAM DATA

MEASURE	START					END	TOTAL/ AVERAGE
Time (hr:min)	11:39	1:40	3:05	4:13	5:30		
Flow (lb/hr)	11,300	11,400	11,200	11,200	11,100		
Temp. (F)	380	380	385	389	390		
Pressure (psi)	165	165	165	165	165		
Flow Totalizer	223,958	224010	224050	224074	224106		

ASH DATA

	AMOUNT PRODUCED (lbs)	SAMPLE COLLECTION			
		DATE	TIME	ID #	BY (Initials)
FLY ASH	Time Start/Stop 9:30/7:15 30	Not	Sampled		
BOTTOM ASH	5:30A 7:00P 200	"	"		

Penta Only Wood Sampled from grinder 9:00 AM 5-8
GRN-Penta-1

Creo Only Wood Sampled from ground wood pile 9:00 AM 5-5
GRN-Creo-1

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 20 / 96 SCENARIO: Low - 40%

FUEL CONVEYOR DATA

MEASURE		START				END	TOTAL/ AVERAGE
Time	hr:min	8:10	~~1435~~ 1:35	5:00	3:00		
ConveryorTimer	min						
Converyor Speed	~~Yards~~ ft/min						
Fuel Sampling	Lbs	15	18	14	18		
	~~Feet~~ Sec	5	5	5	5		
	Lb/Ft ~~min~~	~~180~~ 225	216	168			193
Conveyed Fuel	Lbs/hr						~~11,580~~ 13,500 = 5.54 T/hr

FUEL BIN DATA

MEASURE	UNITS	START	END	DIFFERENCE
BIN 1	Cubic Feet	80%		
	Lbs.			
BIN 2	Cubic Feet	60%		
	Lbs			
TOTAL	Lbs.			
FUEL DENSITY	Lbs/CF			

FUEL USAGE CALCULATION

FUEL FROM CONVEYOR	PLUS FUEL IN BINS AT START	MINUS FUEL IN BINS AT END	TOTAL FUEL BURNED

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2/21/96 SCENARIO: High

FUEL SAMPLING DATA

DATE	2/21				
TIME	10:11	1:21			
SAMPLE ID #	GRN-F-5	GRN-F-6			
SAMPLED BY:	STF	STS			

STEAM DATA

MEASURE	START					END	TOTAL/ AVERAGE
Time (hr:min)	9:52						
Flow (lb/hr)	33,000						
Temp. (F)	390						
Pressure (psi)	365						
Steam Totalizer	224,629						

ASH DATA

	AMOUNT PRODUCED (lbs)	SAMPLE COLLECTION			
		DATE	TIME	ID #	BY (Initials)
FLY ASH	7:50a 300 lbs 5:30p				
BOTTOM ASH	5:30a 700 lb 7:00p				

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 21 / 96 SCENARIO: _____

FUEL CONVEYOR DATA

MEASURE		START				END	TOTAL/ AVERAGE
Time	hr:min	12:10	12:15	2:55			
ConveryorTimer	min						
Converyor Speed	ft/min						
Fuel Sampling	Lbs	10.0	11.0	14			
	~~Sec~~ Feet	5	5	5			
	Lb/Ft						
Conveyed Fuel	Lbs						

FUEL BIN DATA

MEASURE	UNITS	START	END	DIFFERENCE
BIN 1	Cubic Feet			
	Lbs.			
BIN 2	Cubic Feet			
	Lbs			
TOTAL	Lbs.			
FUEL DENSITY	Lbs/CF			

FUEL USAGE CALCULATION

FUEL FROM CONVEYOR	PLUS FUEL IN BINS AT START	MINUS FUEL IN BINS AT END	TOTAL FUEL BURNED

Grenada Stack Test - Test at plant of wood fuel samples.

GRN-C1

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 5:49 PM 02/20/96
RUN # 603

0.15 %Penta

GROUND BORING
(PCF AT D=43.6)
Penta=0.06
```

GRN-C1

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 5:59 PM 02/20/96
RUN # 604

0.12 %Penta

GROUND BORING
(PCF AT D=43.6)
Penta=0.05
```

GRN-C2

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 4:29 PM 02/21/96
RUN # 607

0.07 %Penta

GROUND BORING
(PCF AT D=41.6)
Penta=0.03
```

GRN-PENTA

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 2:26 PM 02/21/96
RUN # 606

0.22 %Penta

GROUND BORING
(PCF AT D=41.6)
Penta=0.09
```

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4564
FAX: (601) 226-4566

2-23-96

Steve:

Moisture calculations on pentachloro wood mixture

Dry Basis calculations

$$\frac{M - M_o}{m_o} \times 100$$

Sample #1
2-20-96

$$\frac{24.12 - 17.61}{17.61} \times 100 = 37\%$$

Sample #2

2-21-96

$$\frac{40.80 - 29.79}{29.79} \times 100 = 37\%$$

M. Sylvester

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

TELECOPY

DATE: 2-22-96 TOTAL NO. OF PAGES 8

TO: STEVE SMITH

FAX NO#

FROM: Mike Sylvester

IF YOU DO NOT RECEIVE ALL PAGES, CALL

FAX NO. 601-226-4588

Steve, I will mail you a copy also. When you get some numbers on the feed rates give me a call. so I can compare.

Thanks mike

Day 1 - GRN

Cell 1,450

1250

200

FLY ASH

2,530

2,500

30

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

2/22/96

Steve:

Moisture content calculations of Penta/Creo wood mixture. Calculated using Dry Basis.

$$\frac{M - M_o}{M_o} \times 100$$

Sample #1 2-20-96 (81.5 gr = Tare)

$$\frac{105.7 - 99.2}{99.2 - 81.5} = \frac{.37}{.065} \times 100 = 6.5\%$$ (36.9)

Sample #2 2-21-96 (100.0 gr = Tare)

$$\frac{140.8 - 129.8}{129.8 - 100.0} = \frac{0.37}{.084} \times 100 = 8.45\%$$ (36.9)

Ash weights after maximum production test 2-21-96

Fly ash = 300 lbs

Bottom ash = 700 lbs

M. Sylvester

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/20/96 00:00 TO 02/21/96 23:59

Date/ Time	O2 %	CO ppm	CO_7 ppm	Opacity %	Cell 1 F	Cell 2 F
02-20-96 00:00	14.4	37.9	95.0	0.1	1287	1283
02-20-96 01:00	13.8	47.5	103.5	0.2	1429	1329
02-20-96 02:00	14.3	203.4	445.0	0.8	1737	1084
02-20-96 03:00	15.8	203.5	602.1	1.2	1496	934
02-20-96 04:00	15.9	221.0	643.8	2.3	1398	882
02-20-96 05:00	14.9	168.2	458.1	2.5	1197	1186
02-20-96 06:00	15.0	134.7	420.3	4.4	1214	1211
02-20-96 07:00	15.2	98.0	308.5	1.4	1236	1182
02-20-96 08:00	10.0	155.0	205.6	1.0	1566	1370
02-20-96 09:00	13.0	125.5	110.2	0.0	1485	1405
02-20-96 10:00	14.8	22.3	52.5	0.1	1343	1236
02-20-96 11:00	14.8	22.7	52.1	0.1	1301	1246
02-20-96 12:00	14.6	20.1	44.1	0.0	1264	1259
02-20-96 13:00	14.3	15.2	32.1	0.0	1278	1258
02-20-96 14:00	14.3	17.6	36.9	0.0	1272	1252
02-20-96 15:00	14.4	22.8	48.6	0.0	1267	1237
02-20-96 16:00	14.3	17.3	36.3	0.0	1252	1243
02-20-96 17:00	14.6	16.2	35.7	0.0	1269	1236
02-20-96 18:00	14.7	52.5	111.8	0.7	1327	1221
02-20-96 19:00	11.7	38.0	80.7	2.0	1578	1651
02-20-96 20:00	14.8	45.5	137.9	0.2	1325	1315
02-20-96 21:00	14.7	39.0	107.5	0.2	1319	1246
02-20-96 22:00	16.5	157.8	501.3	1.4	1073	1054
02-20-96 23:00	14.9	57.7	174.0	0.3	1229	1207
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.9	188.6	294.8	2.3	1840	1408
02-21-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999

1312

1289

Low Fire Test

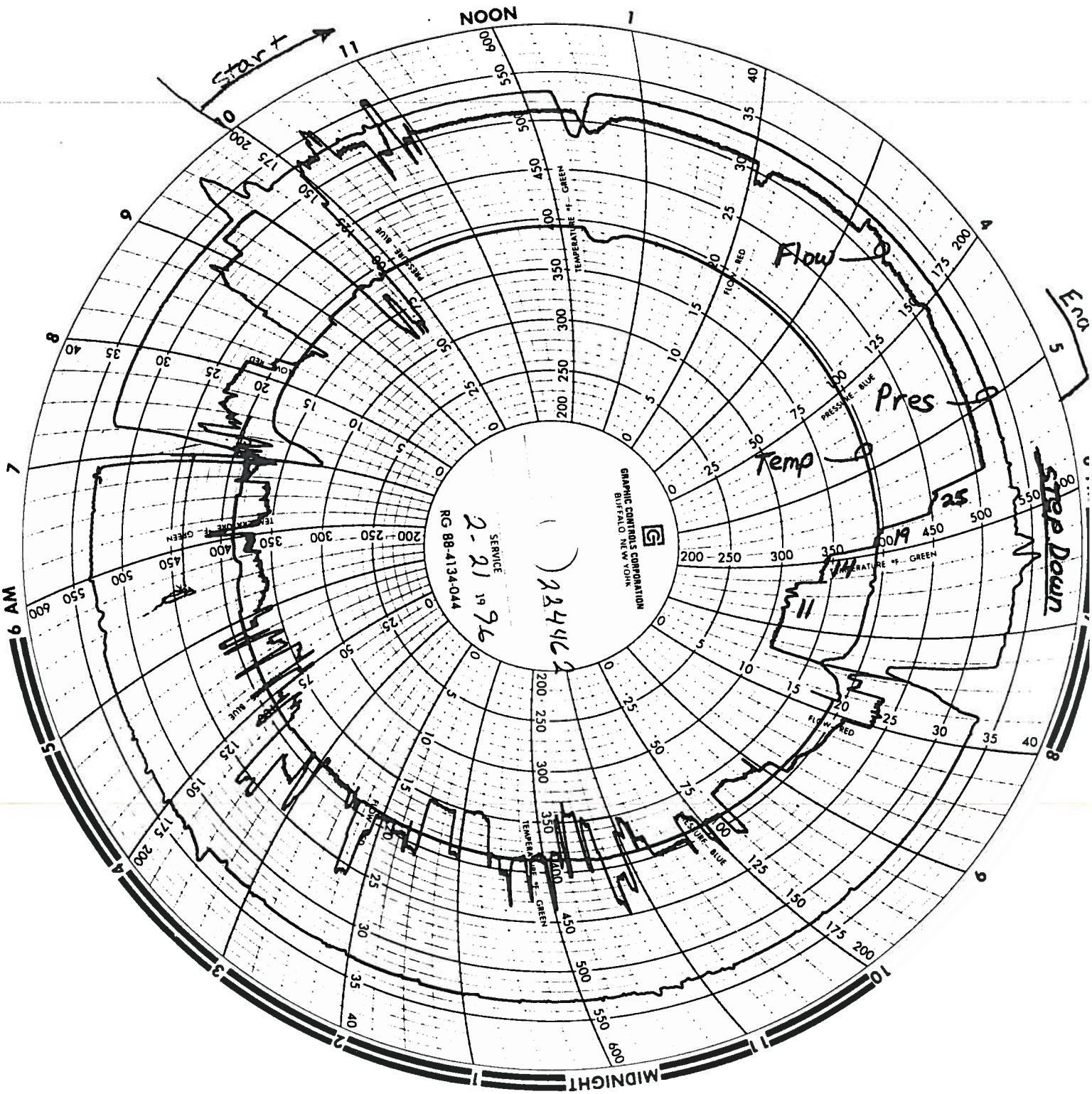
Start
NOON
6 PM
MIDNIGHT
Pres
Flow
Temp
End
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
SERVICE
RG 88-4134-044
TEMPERATURE °F – GREEN
PRESSURE – BLUE
FLOW – RED

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/21/96 00:00 TO 02/22/96 23:59

Date/ Time	O2 %	CO ppm	CO_7 ppm	Opacity %	Cell 1 F	Cell 2 F
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.2	76.2	117.0	0.9	1856	1656
02-21-96 08:00	9.2	11.5	25.3	2.4	1870	1926
02-21-96 09:00	9.3	15.5	30.8	5.0	1888	1966
02-21-96 10:00	7.1	20.3	19.5	3.8	2123	2219
02-21-96 11:00	7.7	9.4	9.9	1.0	2085	2192
02-21-96 12:00	8.3	23.7	29.6	1.9	2057	2000
02-21-96 13:00	7.6	21.7	22.6	1.2	2027	2131
02-21-96 14:00	7.2	11.4	11.6	1.5	2079	2191
02-21-96 15:00	6.9	11.8	11.7	2.1	2080	2239
02-21-96 16:00	7.2	3.4	3.8	1.4	2115	2234
02-21-96 17:00	10.9	7.8	13.7	0.2	1789	1864
02-21-96 18:00	15.8	21.1	87.2	0.0	1258	1281
02-21-96 19:00	12.8	155.9	325.4	3.4	1391	1555
02-21-96 20:00	12.1	21.9	34.8	0.0	1627	1575
02-21-96 21:00	12.6	20.8	35.8	0.0	1573	1506
02-21-96 22:00	12.1	15.5	25.3	0.0	1595	1562
02-21-96 23:00	12.7	21.6	38.8	0.1	1564	1505
02-22-96 00:00	12.7	24.2	42.1	0.0	1555	1479
02-22-96 01:00	12.2	20.6	34.3	0.1	1587	1510
02-22-96 02:00	11.3	15.1	23.4	0.1	1686	1657
02-22-96 03:00	11.6	6.3	12.6	0.0	1679	1635
02-22-96 04:00	12.9	8.6	16.3	0.0	1520	1479
02-22-96 05:00	13.1	58.5	118.7	0.6	1448	1499
02-22-96 06:00	12.8	26.0	48.0	0.3	1479	1543
02-22-96 07:00	12.8	13.8	25.3	0.0	1499	1500
02-22-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999

2044
2134
High Fire Test
Step Down Test



NOON
MIDNIGHT
6 AM
start
Flow
Pres
Temp
Stop Down
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
SERVICE
RG 88-4134-044
2-21 1996
22462
TEMPERATURE °F - GREEN
PRESSURE - BLUE
FLOW - RED

Burners, Instrumentation & Control Services, Inc.
1184 Thomas, P O Box 70226
Memphis, TN. 38107-0226
Phone: (901) 527-1576
Fax: (901) 527-1600

Location: Kildry
AFE#:
Project: Yearly Calib

General Acceptance Form

Ser# 48985

Tag Number: Hangan 3 Pen Recorder

Service: Boiler Press 0-200 Psi Temp 200°F - 600°F Flow 0 - 40000# PH

Reference Input	Unit Read	Error
Temp 136 Ω	200°F	± 1%
218	600°F	✓
0 Psi	0	✓
200 Psi	200	✓
0 H2O	0 Flow	✓
200 H2O	40,000# PH	✓

Kelly Nuiem
Contractor's Representative

2-13-96
Date

Corporate Engineering Rep.

Date

Division Representative

Date

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road Hattiesburg, MS 39402
Fax us @ (601) 268-7084



FAX COVER SHEET

Date / Time:	5-3-96/1510
Company Name:	Koppers Industries
Contact Name:	Stan Smith
Fax number:	412.227.2423
Fax Sent by:	Laurie
Number of Pages:	2 (Including Cover Sheet)

Fax Description:

If there are any problems with this transmission, please notify us immediately. Our phone number is: (601) 264-2854

FAX

CLIENT: ENVIRONMENTAL MONITORING

FILE #: ~~ET~~ 30585 - 30586 SAMPLE DATE/TIME: 2-20-96
COLLECTION: CLIENT DATE/TIME RECEIVED: 2-28-96

~~HOPPERS FLOOD MATERIALS~~ HOPPERS INDUSTRIES - GRENADA
TREATED WOOD TEST BURN STACK TESTS

SAMPLE IDENTITY		CHLORIDES mg/kg
C-1	30586	520
C-2	30585	1060
PENTA	30584	1510
CREOSOTE	30583	360
	DATE/TIME	5/3/96 1000
	ANALYST	KAW
	MDL	150
	METHOD	D-808

FAX TO STAN SMITH
412-227-2023

TOTAL P.02

REPORT OF AIR EMISSIONS TESTING
FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER

Tie Plant, Mississippi
February 20 and 21, 1996

FACILITY NO. 0960-00012
EMISSION POINT NO. AA-001

Koppers Industries
436 Seventh Avenue, K-1800
Pittsburgh, Pennsylvania 15219

Contact: Stephen T. Smith
ph: 412/227-2677

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Contact: Bob Daniel
ph: 601/226-4584

Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
✹ *601/856-3092* ✹

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092
fax : 601/853-2151

April 20, 1996

Subject: Koppers Industries - Tie Plant, Mississippi
Wood Waste Boiler - Stack Emissions Test Plan And Protocol

On February 20 and 21, 1996, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries, Inc. Testing was done to measure stack emissions of PM, SO_2, NOx, CO, HCl, and VOC (as C) from the wood waste boiler while test burning wood waste previously treated with creosote and pentachlorophenol. Additionally, emissions of POHC associated with creosote and pentachlorophenol were measured and compared to inlet quantities of those compounds to determine destruction and removal efficiency (DRE). These parameters were measured under two operating modes – low fire and high fire.

Results of emissions testing are tabulated below. The additionally measured parameters are summarized in the report that follows.

	PM		SO2	NOx	CO	HCl	VOC (as C)	% Opacity	POHC
	#/hr	gr/dscf	#/hr.	#/hr.	#/hr.	#/hr	#/hr.	hi six min.	% DRE
LOW FIRE	2.27	0.026	1.84	4.89	1.24	1.16	0.17	0.0	99.9971
HIGH FIRE	5.64	0.056	5.07	10.05	1.86	3.82	0.20	15.2	99.9985
Permit Limits	6.75	0.30	20.63	6.56	5.63	N/A	4.27	40	> 99.9

The testing project was coordinated by Mr. Stephen Smith of Koppers. Danny Russell of Environmental Monitoring Laboratories was responsible for sample collection and analysis of particulate and sulfur dioxide samples. Organic constituents samples and fuel and ash samples were shipped to Bonner Analytical in Hattiesburg, Mississippi, for analysis.

Following is a report of the test.

REPORT OF AIR EMISSIONS TESTS
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER

Tie Plant, Mississippi
February 20 and 21, 1996

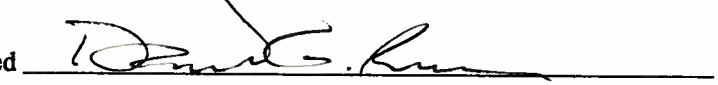
CONTENTS

1.0	TEST RESULTS	page 1
2.0	SOURCE DESCRIPTION	7
3.0	TEST PROCEDURES	8
4.0	DATA REDUCTION	9
5.0	NOMENCLATURE	25
6.0	CALIBRATION	26
7.0	APPENDICES:	27

A. Field and Laboratory Data
B. Calibrations
C. Visible Emissions Record
D. POHC Analysis Report (Bonner)
E. HCl Analysis (CAE)
F. Boiler Records (Koppers)

REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon my inquires of those responsible for obtaining the data or upon my direct acquisition of data, I believe the submitted information is true, accurate and complete.

Signed 

Daniel G. Russell

1.0 Test Results:

1.1 Mode 1: Low Fire Mode -- Approximately 15,000 pounds per hour.

1.1.1 PM/CO/NOx/SO2/HCl/VOC emissions test

Run No. ..... Date ..... Time Start ..... Time End		1 2/20/96 1205 1315	2 2/20/96 1443 1555	3 2/20/96 1715 1826	AVG. ------ ----- -----
PARTICULATE EMISSIONS	#/hr	2.32	2.57	1.92	2.27
PARTICULATE EMISSIONS	gr/dscf	0.026	0.029	0.021	0.026
PARTICULATE EMISSIONS	#/MM Btu	0.111	0.129	0.096	0.112
SO2 EMISSIONS	#/hr	1.87	1.59	2.05	1.84
SO2 EMISSIONS	ppm	18	16	20	18
SO2 EMISSIONS	#/MM Btu	0.089	0.080	0.102	0.090
CO EMISSIONS	#/hr	1.22	1.39	1.12	1.24
CO EMISSIONS	ppm	27	31	25	28
CO EMISSIONS	#/MM Btu	0.058	0.069	0.056	0.061
NOx EMISSIONS *	#/hr	4.92	4.83	4.93	4.89
NOx EMISSIONS *	ppm	66	66	66	66
NOx EMISSIONS *	#/MM Btu	0.235	0.242	0.246	0.241
VOC EMISSIONS	#/hr	0.20	0.17	0.14	0.17
VOC EMISSIONS	ppm	10	9	7	9
VOC EMISSIONS	#/MM Btu	0.009	0.008	0.007	0.008
HCl EMISSIONS	#/hr	1.10	0.93	1.46	1.16
HCl EMISSIONS	ppm	19	17	25	20
HCl EMISSIONS	#/MM Btu	0.053	0.047	0.073	0.057
HEAT INPUT	MM Btu/hr	20.96	19.97	20.07	20.33
VOLUMETRIC FLOWRATE	acfm	17440	17485	17448	17458
VOLUMETRIC FLOWRATE	dscfm	10396	10219	10431	10349
VELOCITY	ft./sec.	44.8	44.9	44.8	44.8
STACK TEMPERATURE	°F	346	359	353	353
MOISTURE	%	8.4	8.7	7.4	8.1
SAMPLE RATE	% isokinetic	95	101	100	99

Note: Listed NOx emissions were calculated based on NOx concentration measurements made at the conclusion of testing. Because the NOx analyzer failed during the first day of testing, that parameter was not measured during the low fire mode. Another analyzer was obtained and commissioned for the high fire mode testing done on the following day. At the conclusion of that testing, the boiler conditions were returned to the low fire test condition and NOx was measured. That measurement was used with the data obtained during the low fire mode to calculate the NOx emissions.

1.1.2 POHC Test

Run No.		1	2	3	AVG.
Date		2/20/96	2/20/96	2/20/96	------
Time Start		1134	1413	1646	-----
Time End		1142	1622	1850	-----
POHC Emissions	#/hr				
Acenaphthylene		5.1971E-06	7.5760E-06	8.3352E-06	7.0361E-06
Acenapthene		1.6111E-05	1.8818E-05	2.3780E-05	1.9570E-05
Anthracene		9.7186E-05	9.4823E-05	8.7274E-05	9.3094E-05
Benzo(a)anthracene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(a)pyrene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(b)fluoranthene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(g,h,i)perylene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(k)fluoranthene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Chrysene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Dibenzo(a,h)anthracene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Fluoranthene		1.2993E-05	1.5396E-05	1.5935E-05	1.4775E-05
Fluorene		1.6111E-05	1.5396E-05	1.6425E-05	1.5978E-05
Indeno(1,2,3-c,d)pyrene		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Naphthalene		1.5799E-04	4.3086E-04	7.0751E-04	4.3212E-04
Phenanthrene		9.1470E-05	8.8713E-05	8.1881E-05	8.7354E-05
Pyrene		6.7563E-06	4.8878E-06	6.3739E-06	6.0060E-06
Pentachlorophenol		2.5986E-05	2.4439E-05	2.4515E-05	2.4980E-05
2-Chlorophenol		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4-Dichlorophenol		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
4-Chloro-3-methylphenol		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4,6-Trichlorophenol		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4,5-Trichlorophenol		5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Total POHC		4.9737E-04	7.6445E-04	1.0358E-03	7.6586E-04
INLET POHC LOADING	#/hr	27.113	25.844	25.968	26.308
DRE	%	99.9982	99.9970	99.9960	99.9971
HEAT INPUT	MM Btu/hr	21.60	19.92	18.59	20.04
VOLUMETRIC FLOWRATE	acfm	17921	17044	17589	17518
VOLUMETRIC FLOWRATE	dscfm	10718	10190	9662	10190
VELOCITY	ft./sec.	46.0	43.8	45.2	45.0
STACK TEMPERATURE	°F	355	359	358	358
MOISTURE	%	7.0	6.6	14.3	9.3
SAMPLE RATE	% isokinetic	104	111	111	109

1.2 High Fire Mode - Approximately 31,000 pounds per hour

1.2.1 PM/CO/NOx/SO2/HCl/VOC emissions test

Run No.		4	5	6	AVG.
Date		2/21/96	2/21/96	2/21/96	------
Time Start		1023	1305	1544	-----
Time End		1132	1415	1653	-----
PARTICULATE EMISSIONS	#/hr	5.72	6.08	5.12	5.64
PARTICULATE EMISSIONS	gr/dscf	0.055	0.060	0.054	0.056
PARTICULATE EMISSIONS	#/MM Btu	0.116	0.128	0.108	0.118
SO2 EMISSIONS	#/hr	4.94	4.20	6.08	5.07
SO2 EMISSIONS	ppm	41	36	55	44
SO2 EMISSIONS	#/MM Btu	0.838	0.759	1.161	0.919
CO EMISSIONS	#/hr	1.96	2.41	1.22	1.86
CO EMISSIONS	ppm	37	47	25	37
CO EMISSIONS	#/MM Btu	0.040	0.051	0.026	0.039
NOx EMISSIONS	#/hr	10.16	10.09	9.88	10.05
NOx EMISSIONS	ppm	118	120	124	121
NOx EMISSIONS	#/MM Btu	0.207	0.213	0.209	0.210
VOC EMISSIONS	#/hr	0.27	0.18	0.15	0.20
VOC EMISSIONS	ppm	12	8	7	9
VOC EMISSIONS	#/MM Btu	0.006	0.004	0.003	0.004
HCl EMISSIONS	#/hr	4.38	3.04	4.05	3.82
HCl EMISSIONS	ppm	66	47	66	60
HCl EMISSIONS	#/MM Btu	1.341	0.990	1.394	1.242
HEAT INPUT	MM Btu/hr	49.19	47.34	47.23	47.92
VOLUMETRIC FLOWRATE	acfm	23864	23162	21980	23002
VOLUMETRIC FLOWRATE	dscfm	12020	11742	11126	11629
VELOCITY	ft./sec.	61.3	59.5	56.4	59.1
STACK TEMPERATURE	°F	443	429	429	434
MOISTURE	%	13.4	14.3	14.4	14.0
SAMPLE RATE	% isokinetic	100	101	101	101

1.2.2 POHC Test

Run No.	4	5	6	AVG.
Date	2/21/96	2/21/96	2/21/96	———
Time Start	0954	1235	1515	———
Time End	1158	1438	1718	———
POHC EMISSIONS #/hr				
Acenaphthylene	7.0175E-06	9.2323E-06	5.2681E-06	7.1726E-06
Acenapthene	6.4977E-06	1.1405E-05	5.2681E-06	7.7234E-06
Anthracene	6.8876E-05	6.1639E-05	3.5033E-05	5.5182E-05
Benzo(a)anthracene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(a)pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(b)fluoranthene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(g,h,i)perylene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(k)fluoranthene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Chrysene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Dibenzo(a,h)anthracene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Fluoranthene	7.5373E-06	7.0600E-06	5.2681E-06	6.6218E-06
Fluorene	7.0175E-06	7.8746E-06	5.2681E-06	6.7201E-06
Indeno(1,2,3-c,d)pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Naphthalene	8.7667E-04	9.4305E-04	1.9755E-04	6.7242E-04
Phenanthrene	6.4717E-05	5.7566E-05	3.2925E-05	5.1736E-05
Pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Pentachlorophenol	2.5991E-05	2.7154E-05	2.6340E-05	2.6495E-05
2-Chlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4-Dichlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
4-Chloro-3-methylphenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4,6-Trichlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4,5-Trichlorophenol	5.1982E-06	1.1052E-04	5.2681E-06	4.0327E-05
TOTAL POHC	1.1371E-03	1.3061E-03	3.8668E-04	9.4329E-04
INLET POHC LOADING #/hr	63.463	58.615	61.050	61.043
DRE %	99.9982	99.9978	99.9994	99.9985
HEAT INPUT MM Btu/hr	49.05	45.30	47.19	47.18
VOLUMETRIC FLOWRATE acfm	24163	21847	21822	22611
VOLUMETRIC FLOWRATE dscfm	11986	11238	11115	11446
VELOCITY ft./sec.	62.0	56.1	56.0	58.1
STACK TEMPERATURE °F	449	446	433	443
MOISTURE %	14.2	11.4	13.5	13.0
SAMPLE RATE % isokinetic	104	100	103	102

FUEL AND ASH ANALYSES

POHC	Creosote Fuel	Penta Fuel	Composite Fuel No. 1	Composite Fuel No. 2	Fly Ash	Bottom Ash
Acenaphthylene	28.2	31.3	23	34.9	ND	ND
Acenapthene	1017.8	935.9	596.1	739.4	0.02	0.01
Anthracene	851.5	967	546.8	645.7	0.01	0.07
Benzo(a)anthracene	400.3	412.6	238.7	284.7	0.01	0.02
Benzo(a)pyrene	194.8	218.8	104	137.9	ND	ND
Benzo(b)fluoranthene	207.9	227.5	113	157.8	ND	ND
Benzo(g,h,i)perylene	43.4	47.6	21.3	29.1	ND	ND
Benzo(k)fluoranthene	194.1	198.5	104.9	157.8	ND	ND
Chrysene	423.9	410.3	250.4	303.4	0.01	0.02
Dibenzo(a,h)anthracene	7.2	14.3	0.9	3.8	ND	ND
Fluoranthene	2209.5	2228.8	1327.4	1549.9	0.03	0.14
Fluorene	767.2	829.5	512.2	618.4	0.01	0.17
Indeno(1,2,3-c,d)pyrene	53.2	60.5	25.4	36.2	ND	ND
Naphthalene	8.0	522.7	724.8	974.1	0.06	1.27
Phenanthrene	3027.6	3315.2	2121.7	2452.9	0.04	0.27
Pyrene	1622.9	1562.7	911.1	1034.7	0.03	0.13
Pentachlorophenol	8.3	1233.4	211.6	265.9	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND	ND
Total POHC, mg/kg	11065.8	13216.6	7833.3	9426.6	0.220	2.100
#/#	0.01107	0.01322	0.00783	0.00943	2.20E-07	2.10E-06
OTHER						
Sulfur, % by wt.	0.23%	0.18%	0.24%	0.14%	0.65	0.049
Chlorine	----	----	----	----	2890	420
Heat value, Btu /#	5180	6860	6190	7150	----	----

2.0 Source Description:.

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for treating processes and turbine generator. Fuel is typically wood waste generated from the manufacture of treated wood products. For the test burn, fuel furnish consisted of hogged wood waste previously treated with pentachlorophenol or with creosote. For testing purposes, the fuel was mixed to contain approximately 50% penta treated and 50% creosote treated wood waste.

Tests were conducted under two operating modes: low fire and high fire. The low fire mode target steam production was 40% of capacity or 12,000 pounds per hour. Actual recorded steam rate for the period was 10,050 pounds per hour. Heat input as measured by the test data and F-factor technique was an average 20.33 MM Btu per hour. The high fire mode steam rate was an average recorded 29,600 pounds per hour and the measured heat input was 47.92 MM Btu per hour.

Steam rates, boiler combustion cell temperatures, CEM and COM data and fuel conveyor rates were recorded during the test period and those records are provided in Appendix F of this report. Additional process description and details of operation conditions during the test burn may be provided by Koppers Industries.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 Test Procedures: Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points, Method 3 to determine oxygen and carbon dioxide content of the stack gas, and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Each test series was completed by making triplicate 60 minute sample runs. Gasses were measured by the following methods.

Sulfur dioxide was measured by using the Method 6 option of simultaneous determination with particulate by substituting 3% hydrogen peroxide for the water in the first two impingers of the Method 5 sample train.

HCl was measured by procedures described in Method 26-A, taking the option to simultaneously determine particulate. Quartz filters, teflon probe liners and quartz nozzles were used for sampling. After an aliquot of the sample from the impinger catch was analyzed forSO2, the samples were shipped to Clean Air Engineering in Palatine, Illinois, for analysis.

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor of 9280 scf per million Btu of heat input for the wood waste fuel.

Carbon monoxide concentration was continuously monitored as described in Method 10. A TECO Model 48H gas correlation filter NDIR was used. Instrument calibration and bias checks was performed prior to and following each series of tests, and a mid range system bias check was made following each run by directing (certified) calibration to the gas sampling probe.

Nitrogen oxides was continuously monitored as described in Method 7E using a TECO Model 10S analyzer. Instrument calibration was performed prior to and following each series of tests, and a mid range system bias check was made prior to and following each run by directing (Protocol 1) calibration to the gas sampling probe.

VOC (as carbon) concentrations was measured using Method 25A (continuous monitoring with a flame ionization detector) with a TECO Model 51 heated multiple range FID. An appropriate range was selected and calibrated using appropriate low, mid and high range concentrations of EPA Protocol 1 mixtures of propane in nitrogen. Since calibrations are to be made with propane (C3H8), results as methane (CH3) (or as carbon) are determined by increasing the measured concentration by a factor of three. A continuous trace of VOC as propane was recorded for each 60 minute test period. Instrument calibration was performed initially, and following each 60 minute test period. Any necessary adjustments was made after recording the response of the mid range calibration gas introduced at the inlet to the VOC sampling probe. The gas samples was directed to the heated FID analyzer by way of heated teflon sample line maintained at a minimum temperature of 250°F.

Instrument calibrations were made with the aid of an Environics Model 2020 gas diluter and Method 205.

Destruction and removal efficiency (DRE) of the pentachlorophenol and creosote compounds was determined by measuring the mass quantities of the associated POHC's being introduced to the boiler and emissions of those compounds from the boiler stack. The inlet loading was determined by collecting wood waste samples and analyzing for the target POHC's. Outlet concentrations was measured by collecting samples on XAD-2 resin using the Modified Method 5 (MM5) sampling train. Analyses were performed by Bonner Analytical Laboratories in Hattiesburg, Mississippi using GCMS.

4.0 DATA REDUCTION

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Collected Data:		RUN 1	RUN 2	RUN 3	
Date :		**2/20/96**	**2/20/96**	**2/20/96**	
Time start :		**1205**	**1443**	**1715**	
Time end :		**1315**	**1555**	**1826**	
1. As	: sq ft	6.4918	6.4918	6.4918	
2. Dn	: in.	0.270	0.270	0.270	
3. Cp	: dimensionless	0.84	0.84	0.84	
4. Theta	: minutes	60.00	60.00	60.00	
5. Y	: dimensionless	1.01	1.01	1.01	
6. Pbar	: in. Hg	29.75	29.75	29.75	
7. Pg	: in. H2O	-0.37	-0.37	-0.37	
8. Vm	: cf (dry gas)	36.233	38.100	38.330	
9. sqr(DP),avg	: in.H2O^.5	0.6390	0.6352	0.6382	
10. DH	: in. H2O	1.3375	1.4750	1.4917	
11. ts	: degrees F	346.33	359.33	352.58	352.75
12. tm	: degrees F	73.67	73.46	71.17	
13. Vlc	: ml	70	77	65	
14. CO2	: percent	5.50	5.50	5.50	
15. O2	: percent	14.30	14.50	14.60	
16. CO	: percent	0.00	0.00	0.00	
17. C,CO	: ppm (dry)	27.00	31.10	24.60	27.57
18. F	: dscf	9400	9400	9400	
19. M,PM	: milligrams	60.9	72.3	53.4	
20. C,NOx	ppm	66	66	66	66.00
21 C,VOC	: ppm as propane	3.1	2.7	2.2	2.7
22 M,SO2	: milligrams	49.2	44.8	56.9	
23 M,HCl	: milligrams	29.00	26.20	40.50	

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.8483	29.8585	29.8597	
2. Ps : in. Hg (Pg/13.6)+Pbar	29.7228	29.7228	29.7228	
3. An : sq ft ((Dn/24)^2)(3.1416)	3.98E-04	3.98E-04	3.98E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)	36.120	38.009	38.405	37.511
5. Vwstd : scf (.04707cf/ml)(Vlc)	3.295	3.624	3.060	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	0.0836	0.0871	0.0738	0.0815
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.45	29.46	29.46	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.49	28.46	28.62	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	44.77	44.89	44.79	44.82
10. Q : cfm Vs As(60 sec/min)	17440	17485	17448	17458
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)	11345	11194	11262	11267
12. Qstd : dscfm Qstw(1-Bws)	10396	10219	10431	10349
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	208.07	219.03	224.84	217.31
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))	20.96	19.97	20.07	20.33
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	94.55	101.22	100.19	98.65

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Particulate Emissions	RUN 1	RUN 2	RUN 3	Avg.
16. E,PM : pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	2.32	2.57	1.92	2.27
17. C,PM : grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0260	0.0293	0.0214	0.0256
18. C'PM : grains/dscf @ 50% Xsair C'PM/(1-((1.5 O2-.133 N2 - .75 CO)/21))	0.0534	0.0622	0.0462	0.0539
19. E'PM : pounds/MM Btu E,PM/HeatInput	0.111	0.129	0.096	0.112

Carbon Monoxide Emissions				
20. E,CO : pounds/hr (C,CO*7.2708e-8)(60)(Qstd)	1.22	1.39	1.12	1.24
21. E'CO : pounds/MM Btu E,CO/Heat Input	0.058	0.069	0.056	0.061

NOx Emissions				
22. E,NOx : pounds/hr (C,NOx*1.194e-7)(60)(Qstd)	4.92	4.83	4.93	4.89
23. E'NOx : pounds/MM Btu E,NOx/Heat Input	0.235	0.242	0.246	0.241

VOC Emissions-				
24. C'VOC : ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	10.1	8.9	7.1	8.7
25. E,VOC : pounds/hr (C'VOC)(3.116e-8)(Qstd)(60)	0.20	0.17	0.14	0.17
26. E'VOC : pounds/MM Btu E,VOC/Heat Input	0.009	0.008	0.007	0.008

SO2 Emissions				
27. E,SO2 : pounds/hr (M,SO_2/Vmstd)(Qstd)(60)/(453590)	1.87	1.59	2.05	1.84
28. C,SO2 : ppm (M,SO2/Vmstd)(13.27)	18	16	20	18
29. E'SO2 : pounds/MM Btu E,SO2/Heat Input	0.089	0.080	0.102	0.090

HCl Emissions				
30. E,HCl : pounds/hr (M,Cl/Vmstd)(Qstd)(60)/(453590)	1.10	0.93	1.46	1.16
31. C,HCl : ppm (M,HCl/Vmstd)(23.949)	19.2	16.5	25.3	20.3
32. E'HCl : pounds/MM Btu E,SO2/Heat Input	0.053	0.047	0.073	0.057

PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

SO2 Sample Weight Determination

Collected data

RUN N0.	1	2	3
Vt-Vtb : ml	14.6	12.9	16.9
N : meq./ml	0.01015	0.01015	0.01015
Vsoln : ml	259	267	259
Va : ml	25	25	25

Calculation

RUN NO.	1	2	3
M,SO2 : N(Vt-Vtb)(Vsoln/Va)(32.03 mg/meq)	49.17	44.79	56.92

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

Collected Data:

			RUN1	RUN2	RUN3	
	Date	:	**2/20/96**	**2/20/96**	**2/20/96**	
	Time start	:	**1134**	**1413**	**1646**	
	Time end	:	**1142**	**1622**	**1850**	
1.	As	: sq ft	6.4918	6.4918	6.4918	
2.	Dn	: in.	0.220	0.220	0.220	
3.	Cp	: dimensionless	0.84	0.84	0.84	
4.	Theta	: minutes	120.00	120.00	120.00	
5.	Y	: dimensionless	1.00	1.00	1.00	
6.	Pbar	: in. Hg	29.75	29.75	29.75	
7.	Pg	: in. H2O	-0.39	-0.39	-0.39	
8.	Vm	: cf (dry gas)	57.590	59.269	55.039	
9.	sqr(DP),avg	: in.H2O^.5	0.6547	0.6218	0.6322	
10.	DH	: in. H2O	0.5233	0.5467	0.5671	
11.	ts	: degrees F	355.42	359.21	358.13	357.59
12.	tm	: degrees F	94.88	104.90	95.02	
13.	Vlc	: ml	87.5	83	185	
14.	CO2	: percent	5.50	5.50	5.50	
15.	O2	: percent	14.30	14.50	14.60	
16.	CO	: percent	0.00	0.00	0.00	
17.	C,CO	: ppm (dry)	27.00	31.10	24.60	27.57
18.	F	: dscf	9400	9400	9400	
19.	M,Species	: micrograms				
	Acenaphthylene		0.20	0.31	0.34	
	Acenapthene		0.62	0.77	0.97	
	Anthracene		3.74	3.88	3.56	
	Benzo(a)anthracene		*0.2*	*0.2*	*0.2*	
	Benzo(a)pyrene		*0.2*	*0.2*	*0.2*	
	Benzo(b)fluoranthene		*0.2*	*0.2*	*0.2*	
	Benzo(g,h,i)perylene		*0.2*	*0.2*	*0.2*	
	Benzo(k)fluoranthene		*0.2*	*0.2*	*0.2*	
	Chrysene		*0.2*	*0.2*	*0.2*	
	Dibenzo(a,h)anthracene		*0.2*	*0.2*	*0.2*	
	Fluoranthene		0.50	0.63	0.65	
	Fluorene		0.62	0.63	0.67	
	Indeno(1,2,3-c,d)pyrene		*0.2*	*0.2*	*0.2*	
	Naphthalene		6.08	17.63	28.86	
	Phenanthrene		3.52	3.63	3.34	
	Pyrene		0.26	*0.2*	0.26	
	Pentachlorophenol		*1*	*1*	*1*	
	2-Chlorophenol		*0.2*	*0.2*	*0.2*	
	2,4-Dichlorophenol		*0.2*	*0.2*	*0.2*	
	4-Chloro-3-methylphenol		*0.2*	*0.2*	*0.2*	
	2,4,6-Trichlorophenol		*0.2*	*0.2*	*0.2*	
	2,4,5-Trichlorophenol		*0.2*	*0.2*	*0.2*	

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

Calculations:	RUN1	RUN2	RUN3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.7885	29.7902	29.7917	
2. Ps : in. Hg (Pg/13.6)+Pbar	29.7213	29.7213	29.7213	
3. An : sq ft ((Dn/24)^2)(3.1416)	2.64E-04	2.64E-04	2.64E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)	54.559	55.157	52.135	53.950
5. Vwstd : scf (.04707cf/ml)(Vlc)	4.119	3.907	8.708	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	0.0702	0.0661	0.1431	0.0932
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.45	29.46	29.46	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.65	28.70	27.82	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	46.01	43.76	45.16	44.97
10. Q : cfm Vs As(60 sec/min)	17921	17044	17589	17518
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)	11527	10912	11276	11238
12. Qstd : dscfm Qstw(1-Bws)	10718	10190	9662	10190
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	208.07	219.03	224.84	217.31
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))	21.60	19.92	18.59	20.04
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	104.32	110.93	110.59	108.61

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

POHC Emissions		RUN 1	RUN2	RUN3	Avg.
16. E,Species	: pounds/hr (M,Species/Vmstd)(Qstd)(60)/(453590000)				
	Acenaphthylene	5.197E-06	7.576E-06	8.335E-06	7.036E-06
	Acenapthene	1.611E-05	1.882E-05	2.378E-05	1.957E-05
	Anthracene	9.719E-05	9.482E-05	8.727E-05	9.309E-05
	Benzo(a)anthracene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(a)pyrene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(b)fluoranthene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(g,h,i)perylene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(k)fluoranthene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Chrysene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Dibenzo(a,h)anthracene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Fluoranthene	1.299E-05	1.540E-05	1.593E-05	1.477E-05
	Fluorene	1.611E-05	1.540E-05	1.643E-05	1.598E-05
	Indeno(1,2,3-c,d)pyrene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Naphthalene	1.580E-04	4.309E-04	7.075E-04	4.321E-04
	Phenanthrene	9.147E-05	8.871E-05	8.188E-05	8.735E-05
	Pyrene	6.756E-06	4.888E-06	6.374E-06	6.006E-06
	Pentachlorophenol	2.599E-05	2.444E-05	2.452E-05	2.498E-05
	2-Chlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4-Dichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	4-Chloro-3-methylphenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4,6-Trichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4,5-Trichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
TOTAL		4.974E-04	7.644E-04	1.036E-03	7.659E-04

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire -
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Collected Data:		RUN 4	RUN 5	RUN 6	
Date	:	**2/21/96**	**2/21/96**	**2/21/96**	
Time start	:	**1023**	**1305**	**1544**	
Time end	:	**1132**	**1415**	**1653**	
1. As	: sq ft	6.4918	6.4918	6.4918	
2. Dn	: in.	0.270	0.270	0.270	
3. Cp	: dimensionless	0.84	0.84	0.84	
4. Theta	: minutes	60.00	60.00	60.00	
5. Y	: dimensionless	1.01	1.01	1.01	
6. Pbar	: in. Hg	29.82	29.82	29.82	
7. Pg	: in. H2O	-0.5	-0.5	-0.5	
8. Vm	: cf (dry gas)	43.625	43.517	41.719	
9. sqr(DP),avg	: in.H2O^.5	0.8282	0.8090	0.7671	
10. DH	: in. H2O	2.1458	2.0417	1.8458	
11. ts	: degrees F	443.17	428.75	429.08	433.67
12. tm	: degrees F	66.96	73.92	76.79	
13. Vlc	: ml	146	154	148	
14. CO2	: percent	12.00	12.00	12.00	
15. O2	: percent	7.50	7.70	7.00	
16. CO	: percent	0.00	0.00	0.00	
17. C,CO	: ppm (dry)	37.40	47.10	25.10	36.53
18. F	: dscf	9400	9400	9400	
19. M,PM	: milligrams	159.1	170.5	144.4	
21. C,NOx	: ppm	118	120	124	120.67
22. C,VOC	: ppm as propane	3.5	2.4	2.1	2.7
20. M,SO2	: milligrams	137.4	117.9	171.4	
19. M,HCl	: milligrams	121.80	85.20	114.10	

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire
PM/CO/NOx Emissions Test - February 21, 1996
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Calculations:		RUN 4	RUN 5	RUN 6	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar		29.9778	29.9701	29.9557	
2. Ps : in. Hg (Pg/13.6)+Pbar		29.7832	29.7832	29.7832	
3. An : sq ft ((Dn/24)^2)(3.1416)		3.98E-04	3.98E-04	3.98E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)		44.233	43.538	41.496	43.089
5. Vwstd : scf (.04707cf/ml)(Vlc)		6.872	7.249	6.966	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)		0.1345	0.1427	0.1437	0.1403
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)		30.22	30.23	30.20	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws		28.58	28.48	28.45	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))		61.27	59.46	56.43	59.05
10. Q : cfm Vs As(60 sec/min)		23864	23162	21980	23002
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)		13887	13697	12994	13526
12. Qstd : dscfm Qstw(1-Bws)		12020	11742	11126	11629
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]		54.54	57.04	48.67	53.41
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))		49.19	47.34	47.23	47.92
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)		100.15	100.90	101.50	100.85

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire -
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Particulate Emissions	RUN 4	RUN 5	RUN 6	Avg.
16. E,PM : pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	5.72	6.08	5.12	5.64
17. C,PM : grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0554	0.0603	0.0536	0.0564
18. C'PM : grains/dscf @ 50% Xsair C'PM/(1-((1.5 O2-.133 N2 - .75 CO)/21))	0.0569	0.0629	0.0529	0.0576
19. E'PM : pounds/MM Btu E,PM/HeatInput	0.116	0.128	0.108	0.118
Carbon Monoxide Emissions				
20. E,CO : pounds/hr (C,CO*7.2708e-8)(60)(Qstd)	1.96	2.41	1.22	1.86
21. E'CO : pounds/MM Btu E,CO/Heat Input	0.040	0.051	0.026	0.039
NOx Emissions				
22. E,NOx : pounds/hr (C,NOx*1.194e-7)(60)(Qstd)	10.16	10.09	9.88	10.05
23. E'NOx : pounds/MM Btu E,NOx/Heat Input	0.207	0.213	0.209	0.210
VOC Emissions-				
24. C'VOC : ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	12.1	8.4	7.4	9.3
25. E,VOC : pounds/hr (C'VOC)(3.116e-8)(Qstd)(60)	0.27	0.18	0.15	0.20
26. E'VOC : pounds/MM Btu E,VOC/Heat Input	0.006	0.004	0.003	0.004
SO2 Emissions				
26. E,SO2 : pounds/hr (M,SO_2/Vmstd)(Qstd)(60)/(453590)	4.94	4.20	6.08	5.07
27. C,SO2 : ppm (M,SO2/Vmstd)(13.27)	41	36	55	44
28. E'SO2 : pounds/MM Btu E,SO2/Heat Input	0.838	0.759	1.161	0.919
HCl Emissions				
28. E,HCl : pounds/hr (M,Cl/Vmstd)(Qstd)(60)/(453590)	4.38	3.04	4.05	3.82
29. C,HCl : ppm (M,HCl/Vmstd)(23.949)	65.9	46.9	65.9	59.6
30. E'HCl : pounds/MM Btu E,SO2/Heat Input	1.341	0.990	1.394	1.242

PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

SO2 Sample Weight Determination

Collected data

RUN N0.	4	5	6
Vt-Vtb : ml	12.5	10.6	15.6
N : meq./ml	0.01015	0.01015	0.01015
Vsoln : ml	338	342	338
Va : ml	10	10	10

Calculation

RUN NO.	1	2	3
M,SO2 : N(Vt-Vtb)(Vsoln/Va)(32.03 mg/meq)	137.36	117.86	171.42

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

Collected Data:

			RUN 4	RUN 5	RUN 6	
	Date	:	**2/21/96**	**2/21/96**	**2/21/96**	
	Time start	:	**0954**	**1235**	**1515**	
	Time end	:	**1158**	**1438**	**1718**	
1.	As	: sq ft	6.4918	6.4918	6.4918	
2.	Dn	: in.	0.220	0.220	0.220	
3.	Cp	: dimensionless	0.84	0.84	0.84	
4.	Theta	: minutes	120.00	120.00	120.00	
5.	Y	: dimensionless	1.00	1.00	1.00	
6.	Pbar	: in. Hg	29.82	29.82	29.82	
7.	Pg	: in. H2O	-0.37	-0.37	-0.37	
8.	Vm	: cf (dry gas)	64.042	57.739	58.882	
9.	sqr(DP),avg	: in.H2O^.5	0.8345	0.7606	0.7615	
10.	DH	: in. H2O	0.8442	0.6950	0.6908	
11.	ts	: degrees F	449.42	446.04	432.92	442.79
12.	tm	: degrees F	93.63	95.98	96.06	
13.	Vlc	: ml	214.5	149	185	
14.	CO2	: percent	12.00	12.00	12.00	
15.	O2	: percent	7.50	7.70	7.00	
16.	CO	: percent	0.00	0.00	0.00	
17.	C,CO	: ppm (dry)	37.40	47.10	25.10	36.53
18.	F	: dscf	9400	9400	9400	
19.	M,Species	: micrograms				
	Acenaphthylene		0.27	0.34	*0.2*	
	Acenapthene		0.25	0.42	*0.2*	
	Anthracene		2.65	2.27	1.33	
	Benzo(a)anthracene		*0.2*	*0.2*	*0.2*	
	Benzo(a)pyrene		*0.2*	*0.2*	*0.2*	
	Benzo(b)fluoranthene		*0.2*	*0.2*	*0.2*	
	Benzo(g,h,i)perylene		*0.2*	*0.2*	*0.2*	
	Benzo(k)fluoranthene		*0.2*	*0.2*	*0.2*	
	Chrysene		*0.2*	*0.2*	*0.2*	
	Dibenzo(a,h)anthracene		*0.2*	*0.2*	*0.2*	
	Fluoranthene		0.29	0.26	*0.2*	
	Fluorene		0.27	0.29	*0.2*	
	Indeno(1,2,3-c,d)pyrene		*0.2*	*0.2*	*0.2*	
	Naphthalene		33.73	34.73	7.5	
	Phenanthrene		2.49	2.12	1.25	
	Pyrene		*0.2*	*0.2*	*0.2*	
	Pentachlorophenol		*1*	*1*	*1*	
	2-Chlorophenol		*0.2*	*0.2*	*0.2*	
	2,4-Dichlorophenol		*0.2*	*0.2*	*0.2*	
	4-Chloro-3-methylphenol		*0.2*	*0.2*	*0.2*	
	2,4,6-Trichlorophenol		*0.2*	*0.2*	*0.2*	
	2,4,5-Trichlorophenol		*0.2*	4.07	*0.2*	

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

Calculations:		RUN 4	RUN 5	RUN 6	AVG.
1. Pm : in.Hg	(DH/13.6)+Pbar	29.8821	29.8711	29.8708	
2. Ps : in. Hg	(Pg/13.6)+Pbar	29.7928	29.7928	29.7928	
3. An : sq ft	((Dn/24)^2)(3.1416)	2.64E-04	2.64E-04	2.64E-04	
4. Vmstd : dscf	Vm Y(Pm/Pstd)(Tstd/Tm)	61.000	54.744	55.819	57.187
5. Vwstd : scf	(.04707cf/ml)(Vlc)	10.097	7.013	8.708	
6. Bws : dimensionless	Vwstd/(Vwstd+Vmstd)	0.1420	0.1136	0.1350	0.1302
7. Md : mol.wt. dry basis	.44 CO2+.32 O2+.28(CO+N2)	30.22	30.23	30.20	
8. Ms : mol.wt. wet basis	Md(1-Bws)+18 Bws	28.48	28.84	28.55	
9. Vs : ft/sec	Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	62.04	56.09	56.03	58.05
10. Q : cfm	Vs As(60 sec/min)	24163	21847	21822	22611
11. Qstw : scfm	Q(Ps/Pstd)(Tstd/Ts)	13969	12677	12849	13165
12. Qstd : dscfm	Qstw(1-Bws)	11986	11238	11115	11446
13. Xsair : percent	100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	54.54	57.04	48.67	53.41
14. HeatInput : MM Btu/hr	60 Qstd/(F 20.9/(20.9 - O2))	49.05	45.30	47.19	47.18
15. I : percent	[(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	104.31	99.84	102.92	102.36

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

POHC Emissions

16. E,Species : pounds/hr (M,Species/Vmstd)(Qstd)(60)/(453590000)	RUN 4	RUN 5	RUN 6	Avg.
Acenaphthylene	7.018E-06	9.232E-06	5.268E-06	7.173E-06
Acenapthene	6.498E-06	1.140E-05	5.268E-06	7.723E-06
Anthracene	6.888E-05	6.164E-05	3.503E-05	5.518E-05
Benzo(a)anthracene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(a)pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(b)fluoranthene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(g,h,i)perylene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(k)fluoranthene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Chrysene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Dibenzo(a,h)anthracene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Fluoranthene	7.537E-06	7.060E-06	5.268E-06	6.622E-06
Fluorene	7.018E-06	7.875E-06	5.268E-06	6.720E-06
Indeno(1,2,3-c,d)pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Naphthalene	8.767E-04	9.431E-04	1.976E-04	6.724E-04
Phenanthrene	6.472E-05	5.757E-05	3.293E-05	5.174E-05
Pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Pentachlorophenol	2.599E-05	2.715E-05	2.634E-05	2.649E-05
2-Chlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4-Dichlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
4-Chloro-3-methylphenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4,6-Trichlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4,5-Trichlorophenol	5.198E-06	1.105E-04	5.268E-06	4.033E-05
TOTAL	1.137E-03	1.306E-03	3.867E-04	9.433E-04

Destruction and Removal Efficiency Calculations

Data		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
Heat Input	: MM Btu/hr.	20.96	19.97	20.07	49.05	45.30	47.19
Heat Value	: Btu/#	6670	6670	6670	6670	6670	6670
POHC Emission Rate	: #/hr	4.974E-04	7.644E-04	1.036E-03	1.137E-03	1.306E-03	3.867E-04

Calculations:	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
Fuel Rate : #/hr (Heat Input)/(heat value)	3142	2995	3009	7354	6792	7074
POHC Inlet Loading : #/hr (Fuel Rate)(POHC Content)	27.113	25.844	25.968	63.463	58.615	61.050
DRE : % 100-((Emission / Inlet Loading)(100))	99.9982	99.9970	99.9960	99.9982	99.9978	99.9994

Average DRE for Low Fire = 99.9971

Average DRE for High Fire = 99.9984

The DRE values are biased low. Analytical minimum detectable values were used for calculating emission rates where there was a none detected amount of a constituent in the stack gas sample and zero values were used for calculating inlet loading where there was a none detected amount of a constituent found in the fuel sample.

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft^2	Nozzle cross sectional area
As	ft^2	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO_2	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C,X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH (delta H)	in. H_2O	Pressure drop across meter orifice
ΔP (delta P)	in. H_2O	Stack gas velocity pressure
E,X	#/hr	Emission rate of pollutant X
E'X	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M,X	milligrams	Sample weight of pollutant X
Md	#/# mole	Dry molecular weight of stack gas
Ms	#/# mole	Wet molecular weight of stack gas
N2	percent	Nitrogen content by volume, dry basis
O_2	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(DH/13.6)
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft^3	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required, are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, a gas meter calibration is checked in one of two ways. [1] Three calibration checks at intermediate orifice settings are performed or [2] orifice meter coefficients are used.

If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration.

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration which it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NAPP, Inc.

Temperature Measuring Instruments:

Most temperature measurements are made with a type K thermocouple and an Omega digital thermocouple thermometer which has an initial calibration traceable to NBS. Other measurements are made using bimetallic dial thermometers. The thermocouples and dial thermometers are checked following or during a test series against an ASTM mercury in glass thermometer.

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (delta P) and orifice pressure differential (delta H) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

7.0 APPENDICES

A. Field and Laboratory Data

B. Calibrations

C. Visible Emissions Record

D. POHC Analysis Report (Bonner)

E. HCl Analysis Report (CAE)

F Boiler Records (Koppers)

7.0 APPENDICES

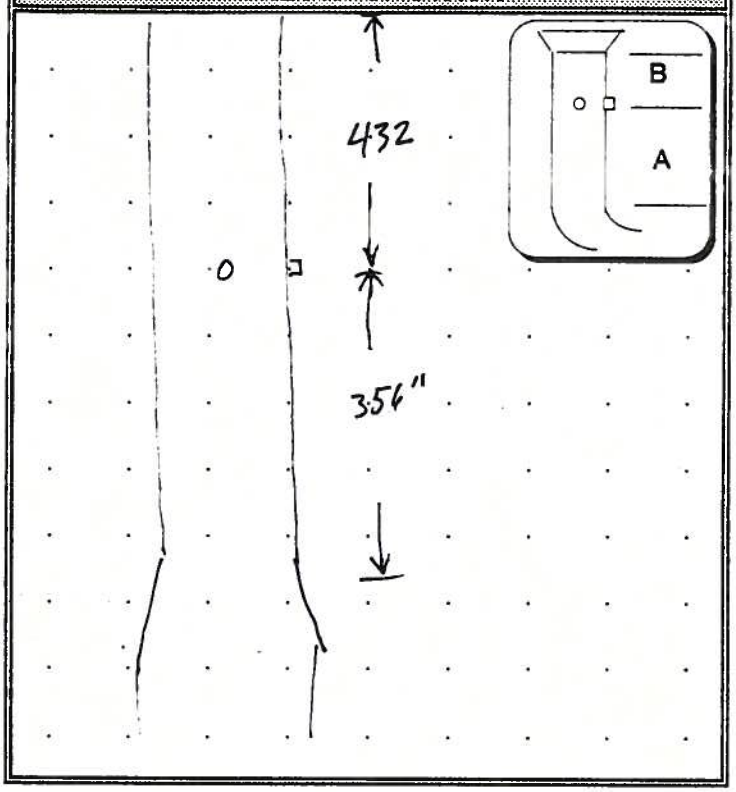
APPENDIX A.

SAMPLING AND ANALYTICAL DATA

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: KOPPERS **Date:** 2-9-96
SOURCE: BOILER
TEST FOR: YOU NAME IT
TEST OPERATORS: B MCKNIGHT

SKETCH OF STACK



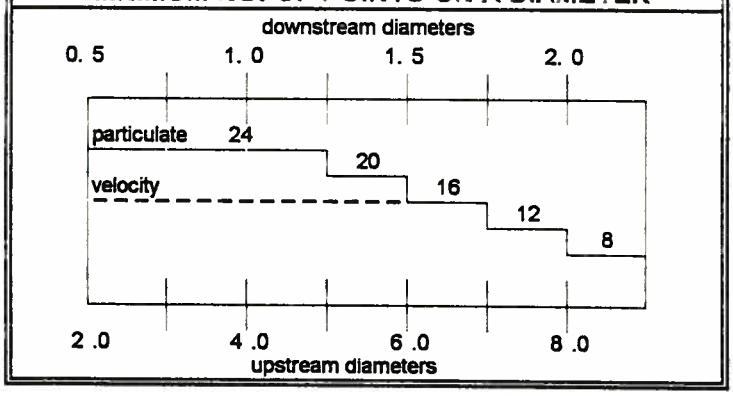
PERCENT OF DIAMETER

	points on a diameter							
	2	4	6	8	10	12	14	16
point no.								
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Point No.	inches from wall	velocity head
1	1.5	.75
2	5.0	.72
3	10.2	.70
4	24.3	.52
5	29.5	.37
6	33.0	.37

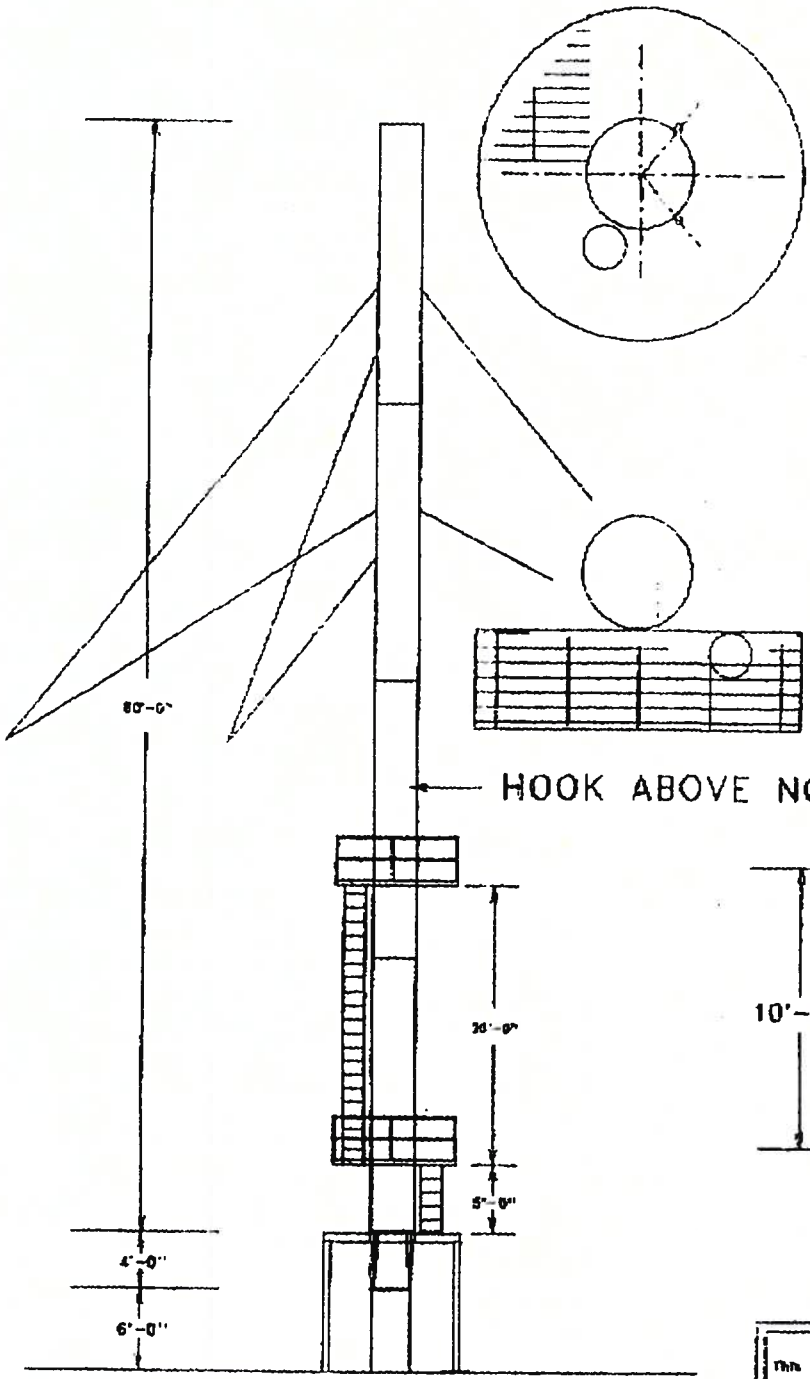
STACK DIAMETER:	34.5"
Distance from ports to disturbance:	
A. to upstream disturbance	356
B. to downstream disturbance	432
Upstream diameters:	10.3
Downstream diameters:	12.52
Minimum No. sample points required:	8
No. sample points selected:	12
Port Length:	NE 8" AND 7.5" SE
Port Type:	4" NIPPLE W 6" TO 4" REDUCER
Port Access:	CATWALK / BOARD / CHAINS

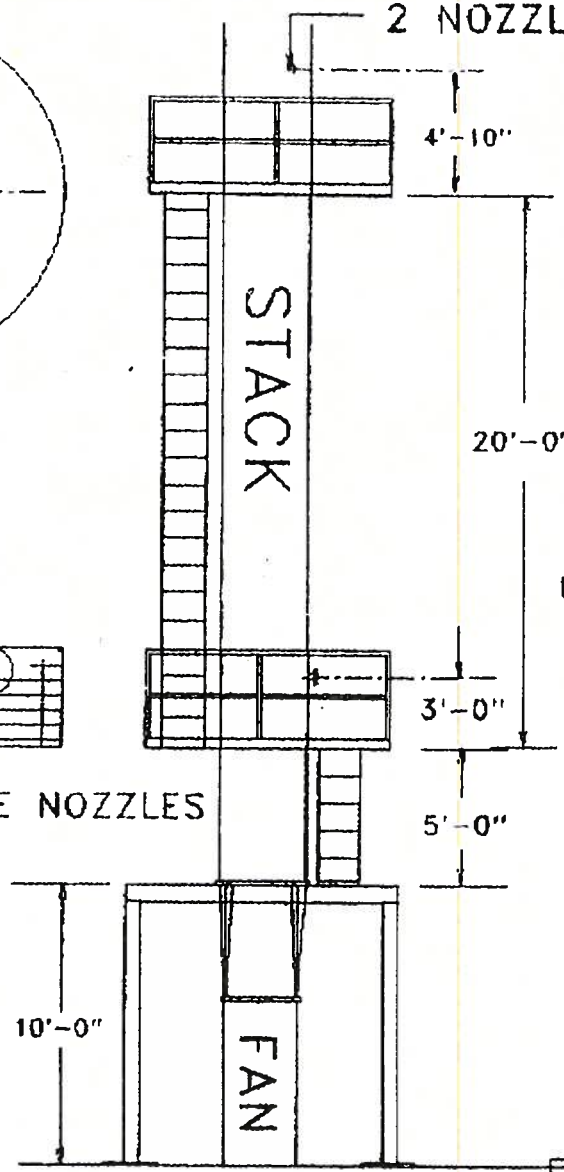
MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID: Pitot Cp: Stack Temp: 370

Remarks:





THIS DRAWING SHOWS MEASURMENT AND ELEVATIONS ONLY.

ALL WORK, LADDERS AND WALKWAYS WILL MEET ALL OSHA STANDARDS.

ALL METAL TO BE PRIMED AND PAINTED WITH HIGH TEMPATURE PAINT

FINISH GREY

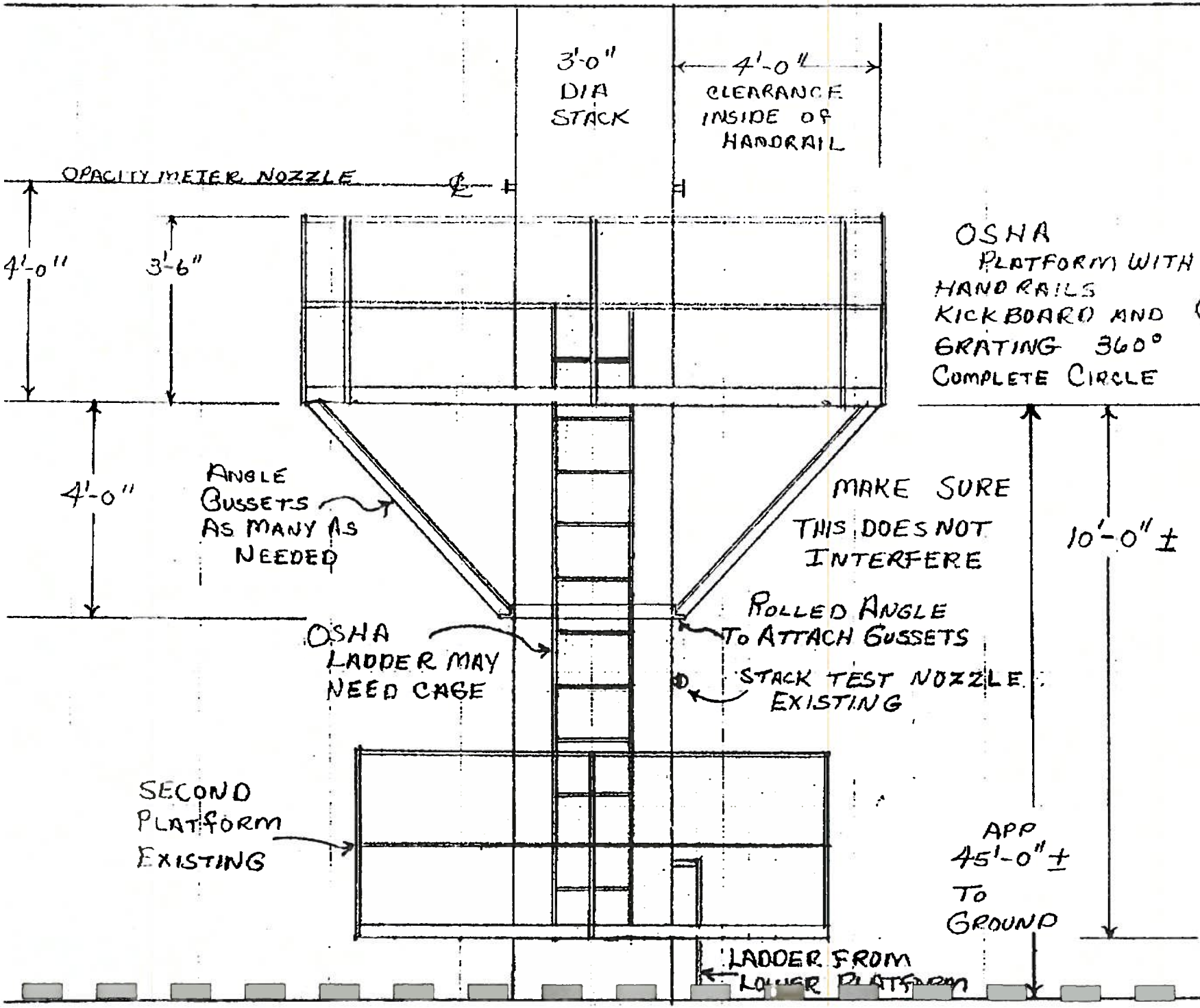
WILL NEED GUYS (6)

KOPPERS INDUSTRIES PITTSBURGH, PA.
This drawing and all information thereon is the property of KOPPERS INDUSTRIES, INC. and is confidential and must not be made public or copied unless authorized by it and is subject to return upon demand.
Copyright © Koppers Industries, Inc. 1991 -92

KOPPERS INDUSTRIES INC.
PLANT TIE PLANT, MISS.
PROJECT BOILER INDUSTRIAL FURNACE
DATE 4/20/92 SCALE U-15
BY RLD REV.
DRAWING # BIF-STACK-01

OCT 8 '95 16:13 FROM KOPPERS FLORENCE SC PAGE.003

ALL INFORMATION HEREON IS THE EXCLUSIVE PROPERTY OF KOPPERS COMPANY, INC., SCIENCE & TECHNOLOGY



Drawn By

Checked By

Date 10-3-95

Revision:

Date

Science & Technology
Koppers Company, Inc.
KOPPERS

TIE PLANT MS
OPACITY METER PLATFORM

OCT 8 '95 16:13 FROM KOPPERS FLORENCE SC PAGE.004

Plant Koppers Tie Plant, Ms.
Sampling Location Boiler - Woodwaste
Test For PM / SO_2 / CO / NO_x / VOC / VE / HCL
Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 1
Date 2-20-96
Time start 1205 end 1315

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis			Remarks:
Sample Box	No. 4	Minutes/Pt.	5.0	CO_2	0.7		
Probe/Pitot	4ft S.S.			O_2	14.3		
Pitot Cp	.84	NOMOGRAPH		CO	24.9 ppm		
Nozzle Dia.	.270	ΔH@	2.0	Time			
Filter No.		Meter Temp.	65				
		% H_2O	17	Condensate:			
Amb. Temp. °F	68°	C-Factor	.87	tare	206	fin 259	
Bar. Press. "Hg	29.75	Stack Temp.	375 / 350	Silica gel:			
Static Press. "H_2O	-.60	Ref. Δ P	.58 / .56	tare	695	fin 706	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head Δ P, in. H_2O	Orifice Δ H in. H_2O	Stack Temp. °F	Meter Temp. °F	Oven Temp. °F		
1	00 00	731.282	0.30	1.00	325	72	70 276	55 2	
2	5 00	733.9	0.38	1.20	343	71	71 260	54 2	
3	10 00	736.5	0.40	1.30	350	72	71 255	54 2	
4	15 00	739.8	0.45	1.50	359	72	71 255	54 2	
5	20 00	742.9	0.45	1.50	357	73	72 245	55 2	
6	25 00	746.0	0.42	1.40	345	74	73 252	55 2	
1	30 00	749.285	0.37	1.15	349	75	74 250	52 2	
2	5 00	752.0	0.40	1.30	345	75	74 256	52 2	
3	10 00	754.9	0.40	1.30	343	76	74 255	52 2	
4	15 00	758.0	0.50	1.65	344	77	75 258	52 2	
5	20 00	761.2	0.48	1.60	349	77	75 260	52 2	
6	25 00	764.5	0.37	1.15	347	78	76 256	52 2	
end	60 00	767.515							

leak check: .045 → .055 = .010 cfm @ 6" Hg

+ pitot @ 6.5
- pitot @ 6.3

34.233	.6390	1.3375	346.33	73.67		

Remarks: Avg VOC = 3.1 ppm C

Plant Koppers Tie Plant/MS
Sampling Location Woodwaste Boiler
Test For PM/SO_2/CO/NOx/VOC/VE/HCL
Test Operators G.McKnight / J. Winstead / L. Carruth

RUN No. 2
Date 2-20-96
Time start 1443 end 1555

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	No. 3	Minutes/Pt.	5.0	CO.	
Probe/Pitot	4ft S.S			O_2	14.5
Pitot Cp	.64	NOMOGRAPH		CO	31.1 ppm
Nozzle Dia.	.270	ΔH@	2.0	Time	
Filter No.		Meter Temp.	75		
		% H_2O	12	Condensate:	
Amb. Temp. °F	70°	C-Factor	98	tare 200 fin 267	
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H_2O	-.60	Ref. ΔP	.90	tare 676 fin 696	

Remarks:
AVG. VOC = 2.7

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H.O	Orifice ΔH in. H.O	Stack Temp. °F	Meter Temp. In °F	Meter Temp. Out °F	Oven Temp. °F	Imp. Temp °F	Vac. in.
1	00 00	767.895	0.40	1.45	357	73	73	256	67	2
2	5 00	770.6	0.35	1.25	356	73	73	255	61	2
3	10 00	773.8	0.42	1.55	361	73	73	248	60	2
4	15 00	777.0	0.45	1.65	366	74	73	256	60	2
5	20 00	780.3	0.42	1.55	360	74	73	252	60	2
6	25 00	783.6	0.38	1.40	360	74	73	248	60	2
1	30 00	786.918	0.38	1.40	359	73	73	253	60	2
2	35 00	789.9	0.36	1.30	355	74	73	245	60	2
3	40 00	792.9	0.45	1.65	360	74	73	248	60	2
4	45 00	796.3	0.44	1.60	360	75	73	256	60	2
5	50 00	799.5	0.40	1.45	359	75	73	252	60	2
6	2500	802.6	0.40	1.45	359	75	73	256	60	2
end	60 00	805.995								

leak check: .030 → .035 = .005 cfm @ 6"/Hg

+ pitot ✓ @ 6.5
− pitot ✓ @ 6.2

38.100	.6352	1.4750	359.33		73.46	

Plant: Koppers T.C. Plant, Ms.
Sampling Location: Woodwaste Boiler
Test For: PM/SO2/CO/NOx/VOC/HF/HCl
Test Operators: G.M'Knight / S. Winstead / L. Carruth

RUN No. 3
Date 2-20-96
Time start 1715 end 1826

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis			Remarks:
Sample Box	No. 4	Minutes/Pt.	5.0	CO.			
Probe/Pitot	4 ft S.S			O_2	14.6		
Pitot Cp	.84	NOMOGRAPH		CO	24.6		
Nozzle Dia.	.270	ΔH@	2.0	Time			
Filter No.		Meter Temp.	75				
		% H_2O	12	Condensate:			
Amb. Temp. °F	70	C-Factor	98	Tare	200	fin 259	VOC = 2.2
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:			
Static Press. "H_2O	-.50	Ref. ΔP	.50	Tare	700	fin 712	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F in	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1	1 00 00	805.388	0.40	1.45	353	73	72	248	66	2
2	5 00	809.1	0.38	1.40	352	73	72	252	66	2
3	10 00	812.1	0.42	1.55	350	73	72	252	66	2
4	15 00	815.3	0.42	1.55	356	73	72	260	66	2
5	20 00	818.5	0.40	1.45	353	72	71	257	66	2
6	25 00	821.5	0.40	1.45	353	72	71	253	66	2
2 1	30 00	824.678	0.38	1.40	351	70	69	250	66	2
2	5 00	827.6	0.38	1.45	351	70	69	249	66	2
3	10 00	831.1	0.40	1.45	353	70	70	247	66	2
4	15 00	833.9	0.45	1.65	353	71	70	252	66	2
5	20 00	837.2	0.42	1.55	352	71	70	250	66	2
6	25 00	840.3	0.42	1.55	354	72	70	250	66	2
end	60 00	843.718								
		leak check: .070 → .079 = .009 @ 6" Hg.								
		+ pitot ✓ @ 6.4								
		− pitot ✓ @ 6.2								
		38.330	.6382	1.4917	352.58		71.17			

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers

DATE TAKEN: 2-20-96 DATE ANALYZED: 2-26-96

DELIVERED BY: [illegible] RECEIVED BY: [illegible]

ANALYZED BY: [illegible]

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	3465	3464	[illegible]	
FILTER TARE, gms.	.5720	.5700	.6049	
	.6202	.6154	.7171	
	.6201	.6153	.7172	
FINAL WEIGHT, gms.	.6201	.6153	[illegible]	
NET GAIN, gms.	.0481	.0453	.0224	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Kop R1	Kop R2	[illegible]	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	190	160	170	
TARE WEIGHT, gms.	(87) 107.2271	(86) [illegible]	( ) [illegible]	( )
	107.2402	108.1737	[illegible]	
	107.2399	108.1730	114.3068	
FINAL WEIGHT, gms	107.2399	[illegible]	[illegible]	
NET GAIN, gms.	.0128	.0270	.0210	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	60.9	723	53.4	

Plant Koppers Tie Plant, MS

Sampling Location Woodwaste Boiler

Test For PM/SO2/NOx/VOC/VE/HCL

Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 4

Date 2-21-96

Time start 1023 end 1132

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	No. 3	Minutes/Pt.	5.0	CO_2	
Probe/Pitot	4 ft S.S			O_2	7.5%
Pitot Cp	.84	NOMOGRAPH		CO	37.4 ppm
Nozzle Dia.	.270	ΔH@	2.0	Time	NOx = 118 ppm
Filter No.		Meter Temp.	75		
		% H_2O	12 / 15	Condensate:	
Amb. Temp. °F	65°	C-Factor	.98 / .92	tare 200	fin 338
Bar. Press. "Hg	29.82	Stack Temp.	350 / 425	Silica gel:	
Static Press. "H_2O	-.50	Ref. ΔP	.50 / .59	tare 696	fin 694

Remarks:

AVG. VOC = 3.5 ppm

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp °F	Vac in. Hg
1	00 00	844.162	0.42	1.30	427	67	65	253	54	2
2	5 00	846.7	0.62	1.95	437	66	65	250	54	2
3	10 00	850.2	0.68	2.10	445	67	65	247	54	2
4	15 00	853.7	0.74	2.15	457	67	65	250	54	2
5	20 00	857.5	0.68	2.10	449	68	67	247	54	2
6	25 00	861.1	0.67	2.05	447	68	66	251	54	2
1	30 00	864.734	0.60	1.90	438	67	65	247	54	2
2	5 00	868.0	0.60	1.90	440	67	66	250	54	2
3	10 00	871.4	0.65	2.00	441	68	67	255	54	2
4	15 00	875.0	0.90	2.80	447	69	67	247	54	2
5	20 00	879.1	0.85	2.70	445	70	67	250	54	2
6	25 00	883.2	0.90	2.80	445	71	67	249	54	2
end	60 00	887.787								

leak check: .027 → .035 = .008 Ctm @ 6" Hg

+ pitot @ 6.5

− pitot @ 6.4

43.625 .8282 2.1458 443.17 66.96

Plant Koppers Tie Plant, MS
Sampling Location Woodwaste Boiler
Test For PM/SO2/NOx/VOC/VE/HCl
Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 5
Date 2-21-96
Time start 1305 end 1415

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis			
Sample Box	No. 4	Minutes/Pt.	5.0	CO_2			
Probe/Pitot	4 ft SS	NOMOGRAPH		O_2	7.7		
Pitot Cp	.84	ΔH@	2.0	CO	47.1		
Nozzle Dia.	.270	Meter Temp.	75	Time	NOx = 120 ppm		
Filter No.		% H_2O	15	Condensate:			
Amb. Temp. °F	75°	C-Factor	.92	tare	200	fin	342
Bar. Press. "Hg	29.82	Stack Temp.	425	Silica gel:			
Static Press. "H_2O	-.50	Ref. ΔP	.54	tare	712	fin	724

Remarks:
AVG. VOC = 2.4

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in Hg
1	00 00	888.161	0.60	1.90	435	72	71	260	64	2
2	5 00	891.4	0.65	2.00	436	72	71	257	61	2
3	10 00	895.1	0.65	2.00	439	73	72	254	61	2
4	15 00	898.6	0.70	2.20	442	74	72	254	61	2
5	20 00	902.4	0.70	2.20	445	75	72	254	61	2
6	25 00	906.1	0.65	2.00	444	75	73	256	61	2
1	30 00	909.842	0.68	2.10	444	74	73	253	61	2
2	5 00	913.5	0.65	2.00	445	76	74	249	61	2
3	10 00	916.9	0.60	1.90	436	76	74	254	61	2
4	15 00	920.5	0.68	2.10	438	77	74	252	61	3
5	20 00	924.2	0.70	2.20	431	77	74	248	61	3
6	25 00	928.0	0.60	1.90	430	78	75	252	61	3
end	60 00	931.678								

leak check: .010 → .020 = .010 cfm @ 17"Hg

+ pitot @ 6.3
- pitot @ 6.5

	43.517	.8090	2.0417	438.25		2392	

Plant Koppers Tie Plant, Ms.
Sampling Location Woodwaste Boiler
Test For PM / SO2 / NOx / VOC / VE / HCl
Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 6
Date 2-21-96
Time start 1544 end 1653

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	NO. 3	Minutes/Pt.	5.0	CO_2	
Probe/Pitot	4 ft S.S	NOMOGRAPH		O_2	7.0 %
Pitot Cp	.84	ΔH@	2.0	CO	25
Nozzle Dia.	.270	Meter Temp.	75	Time	NOx = 124 ppm
Filter No.		% H_2O	15		
Amb. Temp. °F	75°	C-Factor	.92	Condensate:	
Bar. Press. "Hg	29.82	Stack Temp.	425	tare 200 fin 338	
Static Press. "H_2O	-.50	Ref. ΔP	.59	Silica gel:	
				tare 698 fin 708	

Remarks
AVG = 2.1

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in Hg
1	00 00	932.188	0.55	1.75	428	77	76	250	76	2
2	5 00	935.4	0.65	2.00	428	77	76	252	66	2
3	10 00	939.0	0.50	1.55	432	78	76	246	64	2
4	15 00	942.3	0.65	2.00	436	78	76	250	66	2
5	20 00	945.8	0.68	2.10	431	78	77	247	66	2
6	25 00	949.5	0.68	2.10	428	78	77	251	66	2
1	30 00	953.422	0.55	1.75	425	77	78	251	66	2
2	5 00	956.6	0.60	1.90	431	77	76	251	66	2
3	10 00	960.1	0.60	1.90	435	77	76	240	66	2
4	15 00	963.6	0.57	1.80	427	77	76	263	66	2
5	20 00	967.0	0.50	1.55	425	78	76	252	66	2
6	25 00	970.4	0.55	1.75	423	77	76	252	66	2
Leak	60 00	973.907								

leak check: .040 → .049 = .009 cfm 2 1/2

+ pitot ✓ 6 of 6
- pitot ✓ 6 of 2

41.719	.7671	1.8458	429.08	76.29	

PARTICULATE CATCH ANALYSIS

SAMPLES: Kogarah

DATE TAKEN: 2-24-96 DATE ANALYZED: 2-26-96

DELIVERED BY: DR RECEIVED BY: [illegible]

ANALYZED BY: DR

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	4	5	6	
FILTER NO.	2067	2069	2072	
FILTER TARE, gms.	.6903	.6943	.6934	
	.7774	.7876	.7702	
	.7771	.7877	.7703	
FINAL WEIGHT, gms.	.7771	.7877	.7703	
NET GAIN, gms.	.0868	.0934	.0769	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Kog R 4	Kog R5	Kog R6	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	140	150	200	
TARE WEIGHT, gms.	(✓) 98.8230	(56) 105.8167	(4) 98.[illegible]	( )
	98.8957	105.8945	98.0696	
	98.8953	105.8940	98.0695	
FINAL WEIGHT, gms	98.8953	105.8940	98.0695	
NET GAIN, gms.	.0723	.0771	.0675	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	159.1	170.5	144.4	

BARIUM CHLORIDE -- SULFURIC ACID TITRATION

SAMPLES: Koppers - Grnds

DATE TAKEN: 2-20-96 DATE ANALYZED: 2-22-96

DELIVERED BY: DGR RECEIVED BY: DGR

ANALYZED BY: DGR

(Attach chain of custody if additional exchanges occur)

Standardize $BaCl_2$

titration	H_2SO_4 normality	H_2SO_4 Volume, ml	$BaCl_2$ Volume, ml	$BaCl_2$ normality *
1				
2				

*N $BaCl_2$ = (ml H_2SO_4)(N H_2SO_4)/(ml $BaCl_2$)

$BaCl_2$ Normality = .01015

Sample Titrations:

Sample ID	Sample Volume, ml	Aliquot Volume, ml	BaCl2 Volume, ml	Remarks
Run 1	259	25	17.6	
		25	17.6	
Run 2	267	25	12.9	
Run 3	259	25	16.9	
Run 4	338	10	12.5	
Run 5	342	10	13.6	
Run 6	338	10	15.6	
BLANK		20	< .05	

Plant Koppers Tie Plant, Ms.
Sampling Location Wood Waste Boiler
Test For POHC
Test Operators B. McKnight / C. Carruth

RUN No. 1
Date 2-20-96
Time start 1139 end 1142

Meter Box	ANDERSEN	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft tef			O_2	
Pitot Cp	84	NOMOGRAPH		CO	
Nozzle Dia.	.220	ΔH@	1.75	Time	
Filter No.		Meter Temp.	90		
		% H_2O	17	Condensate:	
Amb. Temp. °F	68	C-Factor	.75	tare 200	fin 277
Bar. Press. "Hg	29.75	Stack Temp.	375	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.51	tare 642	fin 702.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1 1	0 00	666.975	0.42	0.52	352	70	68	250	48	6
1	5 00	669.1	0.40	0.49	354	72	69	253	45	6
2	10 00	671.4	0.41	0.50	353	77	71	252	45	6
2	15 00	673.6	0.42	0.51	355	82	75	250	45	6
3	20 00	676.1	0.42	0.51	358	86	79	249	44	6
3	25 00	678.3	0.50	0.60	358	90	83	250	45	7
4	30 00	681.0	0.51	0.61	355	93	88	251	42	7
4	35 00	683.4	0.45	0.55	356	95	91	252	42	7
5	40 00	685.8	0.44	0.54	354	97	94	250	42	7
5	45 00	688.2	0.45	0.55	352	99	96	250	42	7
6	50 00	690.7	0.45	0.55	353	100	98	250	42	7
6	55 00	693.1	0.44	0.54	353	101	100	250	42	7
2 1	60/00	695.676	0.45	0.55	351	98	100	250	40	7
1	5 00	698.1	0.45	0.55	354	99	101	250	41	7
2	10 00	700.5	0.48	0.58	358	100	101	236	41	7
2	15 00	703.0	0.46	0.55	356	101	101	250	41	7
3	20 00	705.5	0.44	0.54	359	102	102	250	40	8
3	25 00	708.0	0.45	0.55	361	103	103	253	41	9
4	30 00	710.5	0.55	0.66	361	105	104	254	41	9
4	35 00	713.2	0.40	0.49	360	106	105	252	41	8
5	40 00	715.5	0.34	0.41	358	106	106	251	40	8
5	45 00	717.7	0.35	0.43	356	106	107	254	40	8
6	50 00	719.9	0.30	0.36	351	105	107	248	41	8
6	55 00	722.2	0.35	0.42	352	105	107	253	42	8
END	120/00	724.565								

LEAK CHECK: .003 → .005 = .002 cfm @ 10" Hg

+ pitot @ 6.6
− pitot @ 6.8

57.590	.6547	52.33	355.42	94.88	

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. MCKWIGHT / J. WINSTAD

RUN No. 2
Date 2-20-96
Time start 1413 end 1622

Meter Box	ANDERSEN	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft.			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	220 qtz.	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	12	Condensate:	
Amb. Temp. °F	68	C-Factor	.85	tare 200 fin 267	
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.30	tare 735 fin 751	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp Temp. °F	Vac in. Hg
1 1	0 00	724.855	0.40	0.56	350	90	93	249	46	5
1	5 00	727.2	0.41	0.57	353	92	93	246	45	5
2	10 00	729.7	0.42	0.60	356	95	93	250	46	10
2	15 00	732.2	0.40	0.56	356	95	93	251	45	10
3	20 00	734.9	0.40	0.56	360	102	97	251	45	14
3	25 00	737.4	0.42	0.60	362	105	100	240	45	16
4	30 00	740.1	0.45	0.64	364	106	103	241	43	16
4	35 00	742.4	0.38	0.54	364	108	108	239	43	15
5	40 00	745.1	0.38	0.54	360	110	107	251	43	14
5	45 00	747.7	0.35	0.50	360	109	107	253	43	15
6	50 00	750.2	0.35	0.50	360	108	109	259	43	15
6	55 00	752.6	0.35	0.50	359	107	109	249	43	15
2 1	60/00	755.205	0.39	0.55	355	101	105	250	40	16
1	5 00	757.6	0.39	0.55	356	101	106	244	40	16
2	10 00	760.0	0.40	0.56	358	102	105	246	41	16
2	15 00	762.4	0.40	0.56	360	102	104	250	41	15
3	20 00	764.9	0.40	0.56	363	103	104	254	41	15
3	25 00	767.4	0.39	0.55	362	103	104	256	41	16
4	30 00	769.8	0.40	0.56	361	104	105	249	41	15
4	35 00	772.3	0.40	0.56	362	104	104	252	41	15
5	40 00	774.8	0.36	0.51	360	105	105	250	42	15
5	45 00	777.3	0.34	0.48	360	104	104	251	42	15
6	50 00	779.5	0.35	0.50	360	104	106	250	42	16
6	55 00	781.8	0.36	0.51	360	103	104	252	41	15
END	120/00	784.124								

leak check: .074 → .076 = .002 cfm 18" Hg

I pitot @ 5.9
I pitot @ 5.8

59.269 .6218 .5467 359.21 104.90

Plant: Koppers Industries Tie Plant, MS.
Sampling Location: Woodwaste Boiler
Test For: PCHC
Test Operators: B. McGonigal / J. Winstead

RUN No. 3
Date: 2-20-96
Time start: 1646 end: 1850

Meter Box	Andersen	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	No. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft. tef.	NOMOGRAPH		O_2	
Pitot Cp	.84	ΔH@	1.75	CO	
Nozzle Dia.	.320 ave	Meter Temp.	100	Time	
Filter No.		% H_2O	12	Condensate:	
Amb. Temp. °F	75	C-Factor	.85	tare 200 fin 271	
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.30	tare 759.5 fin 766	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp °F In	Meter Temp °F Out	Oven Temp. °F	Imp. Temp. °C	Vac in. g
1	0000	784.429	0.36	0.51	355	88	92	247	40	4
1	5 00	786.6	0.40	0.56	358	86	91	250	40	4
2	10 00	788.9	0.40	0.57	359	88	90	250	40	4
2	15 00	791.2	0.40	0.57	363	90	89	250	40	5
3	20 00	793.3	0.42	0.60	362	92	91	252	41	6
3	25 00	795.8	0.39	0.55	363	92	90	249	40	6
4	30 00	798.2	0.40	0.56	360	95	94	253	41	5
4	35 00	800.3	0.41	0.58	360	96	95	250	41	5
5	40 00	802.7	0.39	0.55	357	97	96	251	52	5
5	45 00	805.0	0.40	0.56	356	96	96	253	52	5
6	50 00	607.2	0.40	0.56	356	97	97	252	52	5
6	55 00	809.5	0.36	0.51	355	96	97	252	50	5
1	00/00	811.845	0.40	0.56	354	92	94	252	50	5
1	5 00	814.1	0.43	0.62	353	92	94	252	50	6
2	10 00	816.4	0.42	0.60	355	94	95	253	50	6
2	15 00	818.6	0.42	0.60	357	95	95	261	50	7
3	20 00	821.1	0.42	0.60	360	95	97	253	50	6
3	25 00	823.4	0.40	0.56	360	95	98	247	50	6
4	30 00	825.7	0.45	0.64	359	99	98	257	50	6
4	35 00	828.2	0.42	0.60	359	100	98	250	50	6
5	40 00	830.5	0.40	0.56	361	100	99	249	57	6
5	45 00	832.8	0.38	0.55	357	100	100	257	57	5
6	50 00	835.1	0.36	0.51	358	100	100	250	50	5
6	55 00	837.2	0.37	0.53	358	100	100	251	50	5
END	10 00	839.468								
		leak check: .028	→		033	= .005	CFM 28 "Hg			
		+ pitot Δp 6.9								
		- pitot Δp 6.5								
		55.039	.6322	.5671	358.13		95.02			

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: pptc
Test Operators: B. McKNIGHT / J. WINSTEAD

RUN No. 4
Date 2-21-96
Time start 0954 end 1158

Meter Box	ANDERSON	No. Sample Pts.	6X2
Sample Box	NO. 1	Minutes/Pt.	10
Probe/Pitot	4 ft. tot.		
Pitot Cp	.84	NOMOGRAPH	
Nozzle Dia.	.220 qtz.	ΔH@	1.75
Filter No.		Meter Temp.	100
		% H_2O	12 / 15
Amb. Temp. °F	65	C-Factor	.85 / .80
Bar. Press. "Hg	29.82	Stack Temp.	350 / 425
Static Press. "H_2O	-.37	Ref. ΔP	1.30 / 1.55

Gas Analysis
CO_2
O_2
CO
Time

Condensate: tare 200 fin 393
Silica gel: tare 70 fin 741.5

Remarks:

Port	Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp °F In	Meter Temp °F Out	Oven Temp °F	Imp. Temp. °F	Vac in. Hg
1	1	0	839.862	0.71	0.90	421	69	68	245	40	8
	1	5	842.5	0.71	0.88	432	73	68	245	40	8
	2	10	845.1	0.85	1.05	445	79	70	253	40	9
	2	15	847.9	0.90	1.10	457	84	73	253	40	10
	3	20	850.8	0.76	0.91	452	89	77	252	40	9
	3	25	853.5	0.75	0.90	452	91	81	248	40	9
	4	30	856.3	0.60	0.71	450	93	84	254	40	9
	4	35	858.8	0.56	0.66	444	93	88	250	41	7
	5	40	861.1	0.60	0.71	449	96	90	250	40	8
	5	45	863.6	0.70	0.85	462	97	92	250	40	8
	6	50	866.4	0.70	0.85	456	99	94	250	41	8
	6	55	869.1	0.74	0.90	456	101	96	255	40	8
2	1	60/60	871.796	0.76	0.85	442	96	96	252	40	8
	1	5	874.3	0.71	0.90	448	98	97	253	40	9
	2	10	877.1	0.70	0.85	455	100	98	259	41	9
	2	15	879.7	0.76	0.90	455	101	98	259	41	10
	3	20	882.7	0.72	0.86	454	103	99	253	41	10
	3	25	885.2	0.67	0.80	459	104	100	253	40	9
	4	30	888.1	0.70	0.84	454	105	101	252	40	10
	4	35	890.8	0.71	0.85	452	106	102	251	40	10
	5	40	893.5	0.65	0.77	448	107	103	251	40	9
	5	45	896.2	0.62	0.74	449	107	104	251	40	9
	6	50	898.7	0.62	0.74	449	107	105	252	40	9
	6	55	901.3	0.62	0.74	450	107	105	252	40	9
END		120/60	903.904								

LEAK CHECK: .070 → .072 = .002 cfm @ 10" Hg

+ pitot = 5.9
− pitot = 6.0

64.042 .8345 .8442 449.42 93.63

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: D. McKNIGHT / J. WINSTEAD

RUN No. 5
Date 2-21-96
Time start 1235 end 1938

Meter Box	ANDERSEN	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft. tot	NOMOGRAPH		O_2	
Pitot Cp	.84	ΔH@	1.75	CO	
Nozzle Dia.	.220	Meter Temp.	100	Time	
Filter No.		% H_2O	15	Condensate:	
Amb. Temp. °F	65	C-Factor	.80	tare 200 fin 380	
Bar. Press. "Hg	29.82	Stack Temp.	450	Silica gel:	
Static Press. "H_2O	-.32	Ref. ΔP	1.55	tare 711 fin 720	

Remarks:

Port Point		El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vacuum in Hg
1	1	0 00	904.132	0.70	0.84	441	81	84	250	45	2
	1	5 00	906.6	0.80	0.95	449	83	84	252	43	17
	2	10 00	909.2	0.70	0.84	451	86	84	250	43	17
	2	15 00	911.7	0.70	0.84	449	90	85	251	43	16
	3	20 00	914.3	0.68	0.80	450	93	87	251	43	16
	3	25 00	916.0	0.68	0.80	450	95	89	251	42	16
	4	30 00	919.7	0.56	0.66	447	97	92	249	42	15
	4	35 00	922.1	0.62	0.73	448	98	93	252	42	15
	5	40 00	924.7	0.62	0.73	449	99	93	251	42	15
	5	45 00	927.1	0.63	0.75	449	99	96	251	40	15
	6	50 00	929.6	0.45	0.54	447	100	97	238	41	15
	6	55 00	932.0	0.44	0.52	450	99	98	251	41	15
2	1	60/00	934.336	0.40	0.48	431	96	97	250	41	15
	1	5 00	936.4	0.40	0.48	441	97	99	251	40	14
	2	10 00	938.6	0.40	0.48	442	98	99	250	41	15
	2	15 00	940.6	0.38	0.45	440	98	99	251	41	16
	3	20 00	942.7	0.45	0.54	442	99	99	251	41	15
	3	25 00	944.9	0.50	0.60	445	100	100	249	41	15
	4	30 00	947.2	0.55	0.65	448	101	100	250	41	16
	4	35 00	949.5	0.60	0.71	449	102	101	248	41	16
	5	40 00	951.9	0.70	0.84	448	103	101	236	41	16
	5	45 00	954.3	0.71	0.85	447	103	102	251	40	16
	6	50 00	956.8	0.69	0.80	446	103	102	251	41	16
	6	55 00	959.4	0.69	0.80	446	104	102	243	41	16
END		120/00	961.871								
			leak check: .001	⇒ .004	= .003 cfm @ 17" Hg						
			+ pitot ΔP 0.65								
			- pitot ΔP 0.60								
			57.739	.7606	.6950	446.04		95.98			

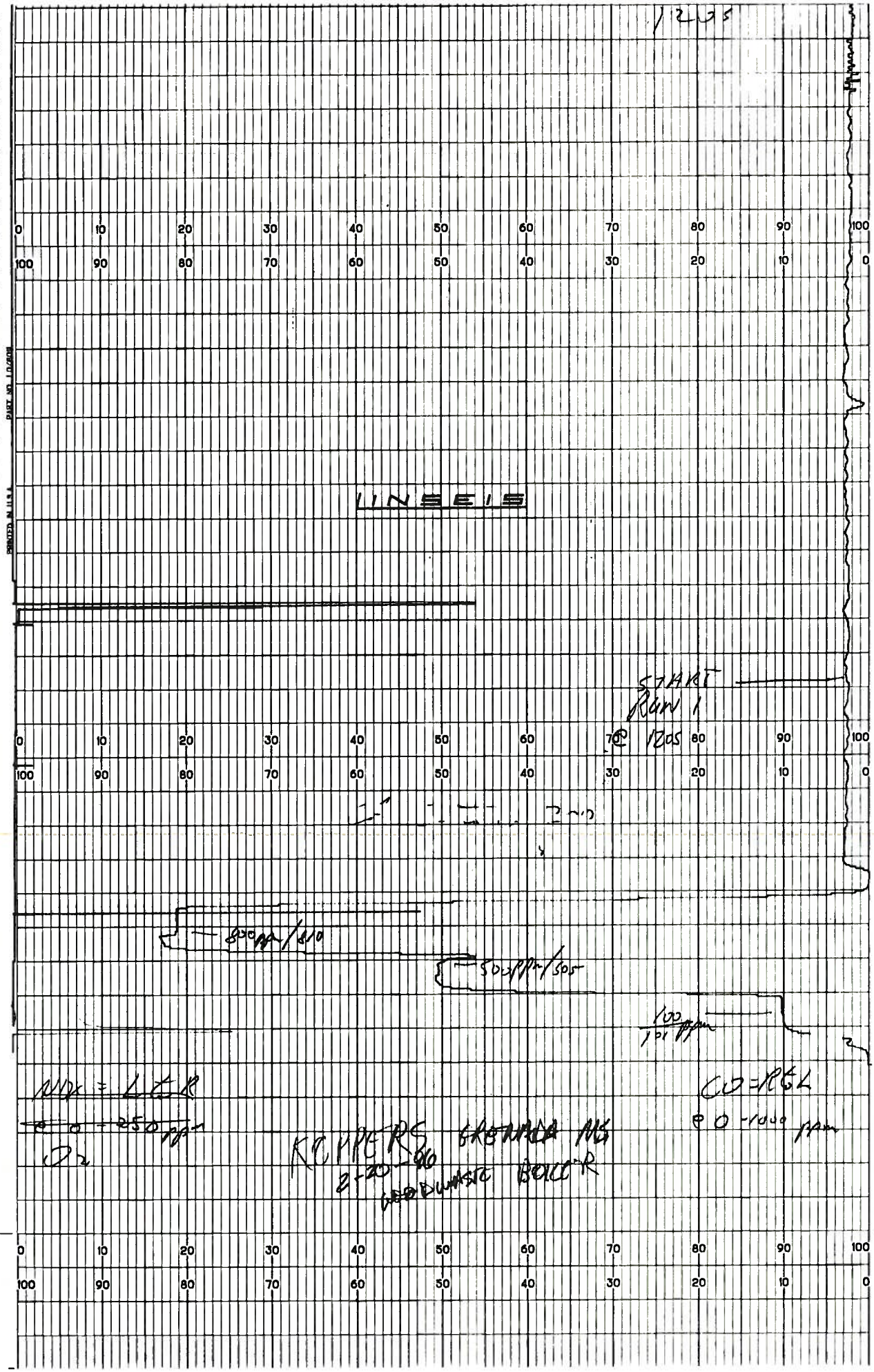
Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. McKNIGHT / J. WINSTEAD

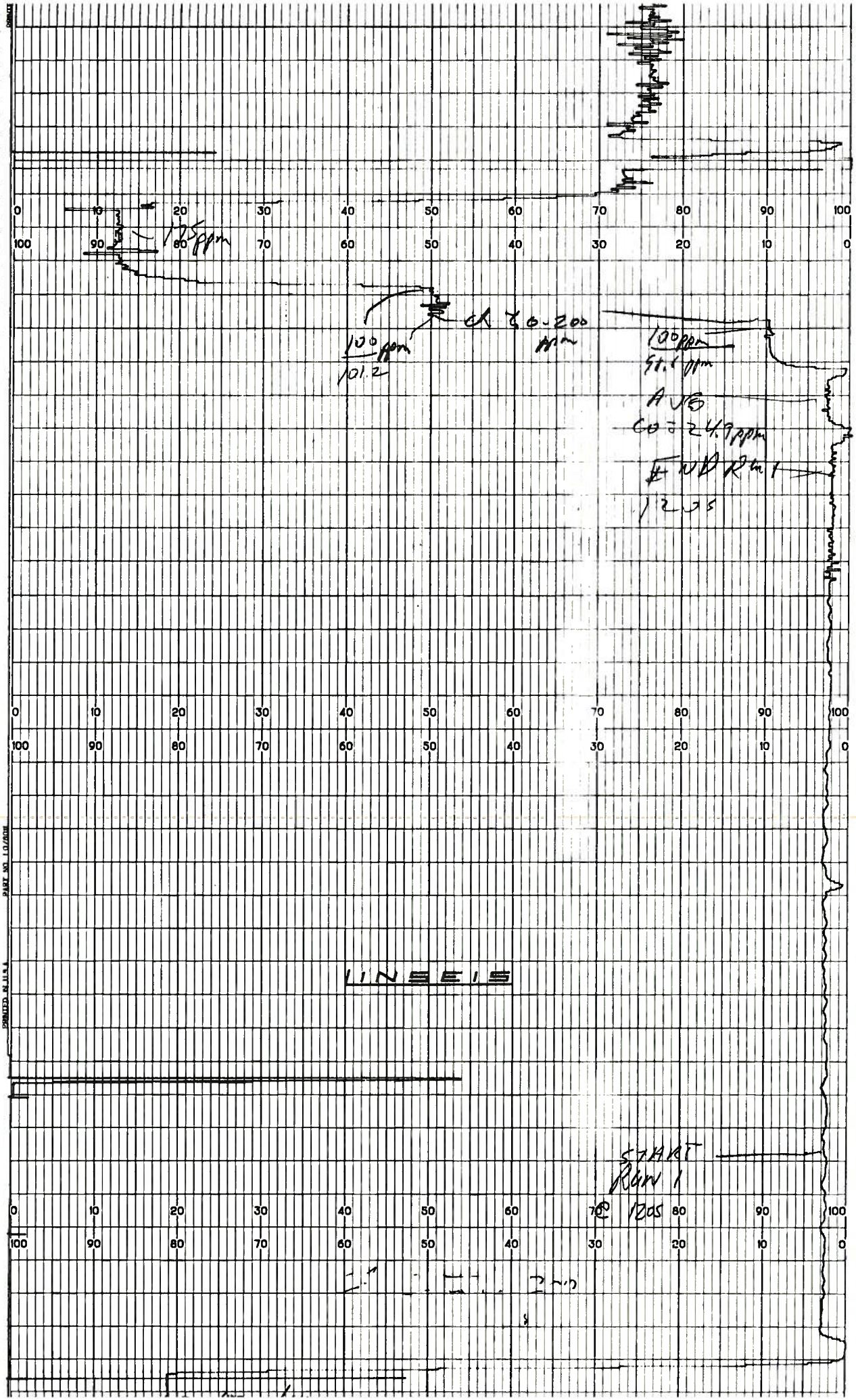
RUN No. 6
Date 2-21-96
Time start 1515 end 1718

Meter Box	ANDERSON	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	No. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft. tef.			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.220	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	15	Condensate:	
Amb. Temp. °F	65	C-Factor	.80	tare 200	fin 370
Bar. Press. "Hg	29.82	Stack Temp.	450	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.55	tare 742	fin 757

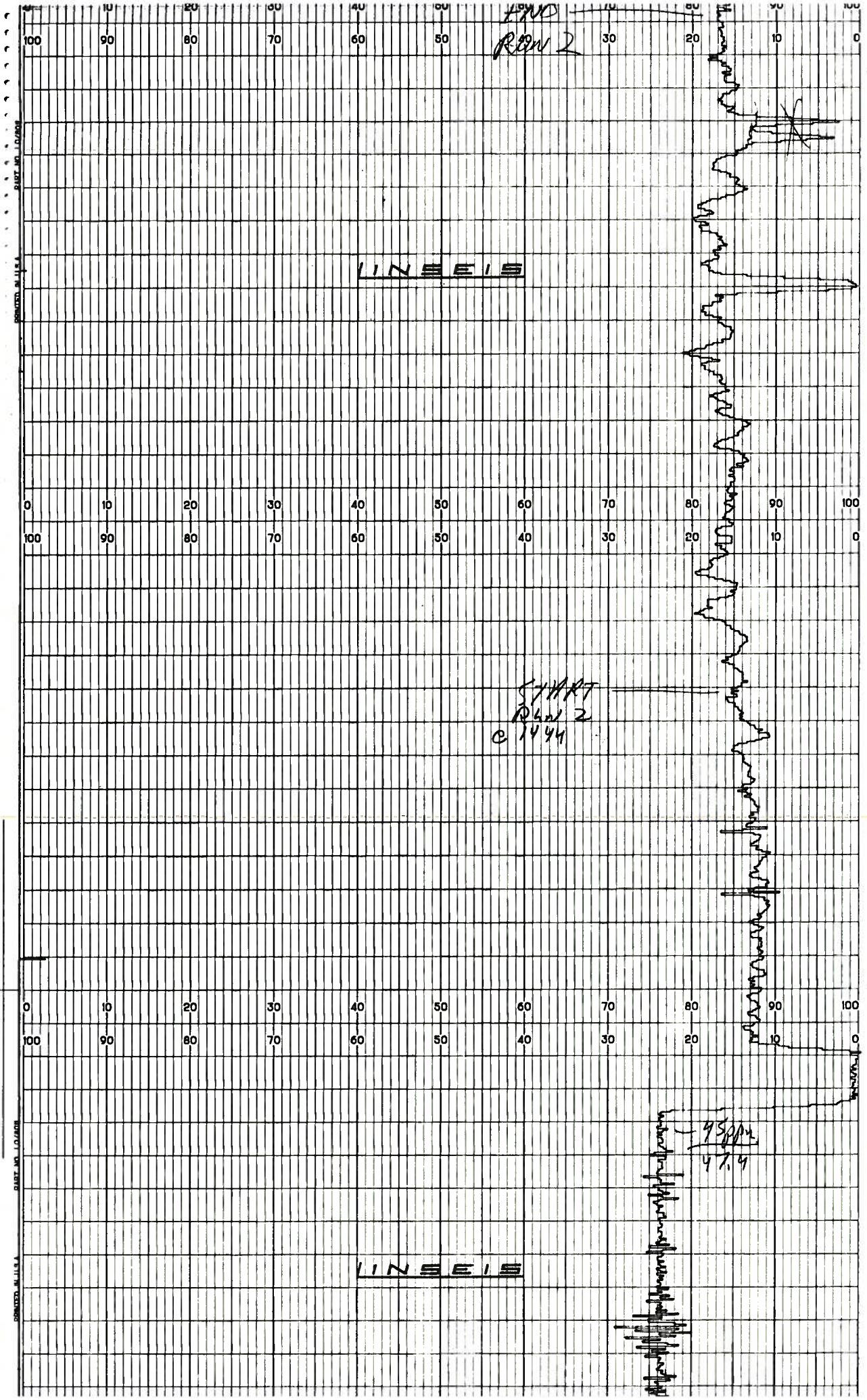
Remarks:

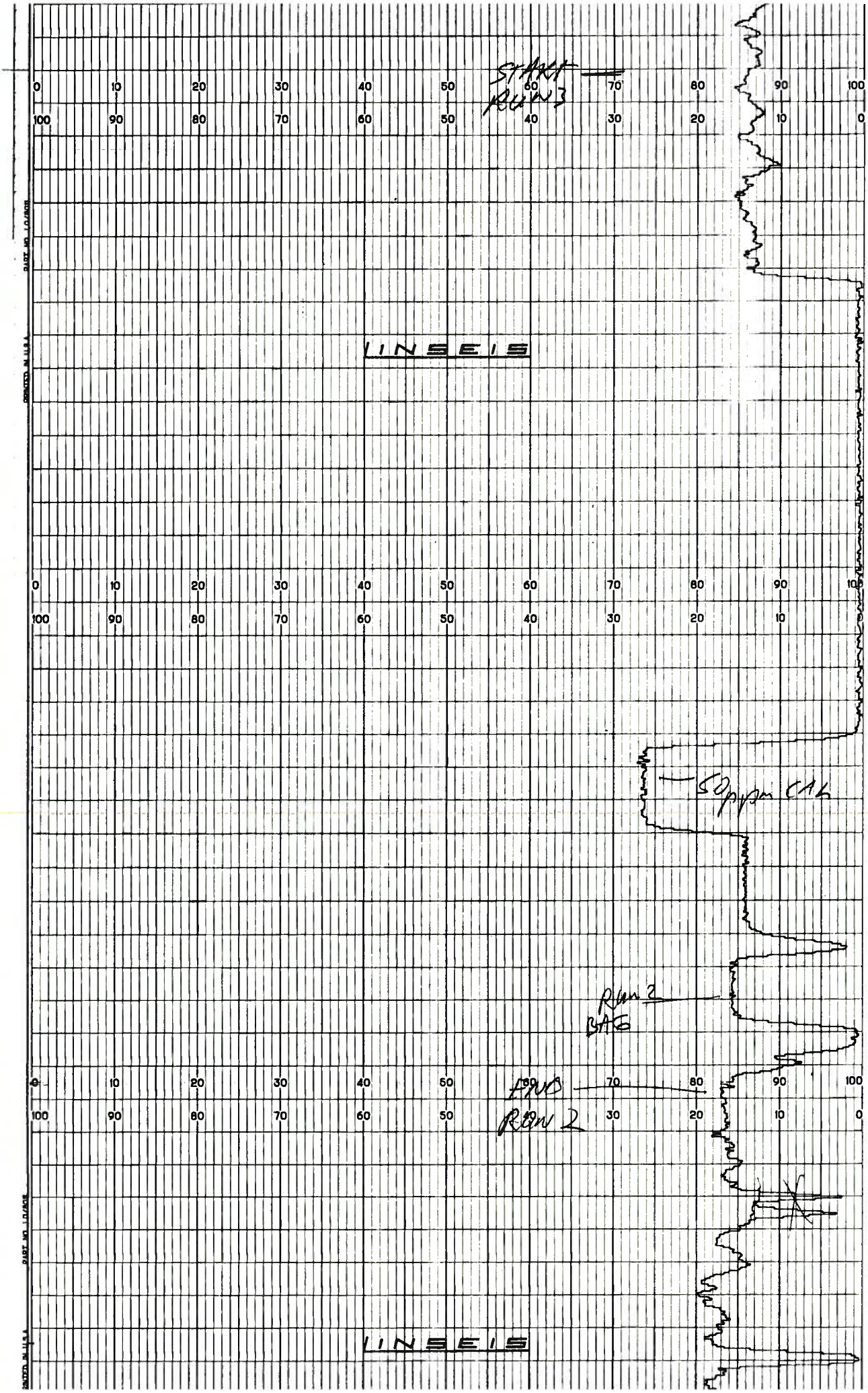
Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	mp Temp. °F	Vac in Hg
1 1	000	962.026	0.60	0.71	439	82	85	255	45	8
1	500	964.3	0.64	0.75	437	84	85	250	45	8
2	1000	966.8	0.65	0.77	438	88	88	250	45	10
2	1500	969.4	0.60	0.71	438	91	87	250	45	11
3	2000	971.8	0.60	0.71	438	88	94	250	45	11
3	2500	974.3	0.66	0.80	440	96	91	249	45	11
4	3000	977.0	0.65	0.77	440	98	98	250	44	11
4	3500	979.6	0.58	0.70	438	99	95	250	44	11
5	4000	982.0	0.51	0.61	433	100	96	250	44	11
5	4500	984.3	0.50	0.60	432	100	97	249	43	10
6	5000	986.6	0.52	0.62	431	100	98	250	43	10
6	5500	988.9	0.54	0.65	430	100	99	247	43	10
2 1	60/00	991.309	0.54	0.64	422	97	98	250	42	10
1	500	993.8	0.55	0.65	430	97	97	251	42	10
2	1000	996.0	0.55	0.65	429	98	98	251	42	12
2	1500	998.5	0.54	0.64	430	98	98	251	42	12
3	2000	000.9	0.52	0.63	431	99	98	252	42	12
3	2500	003.3	0.56	0.66	432	99	99	250	42	12
4	3000	005.7	0.55	0.65	434	99	99	250	42	12
4	3500	008.2	0.60	0.71	433	99	99	251	42	13
5	4000	010.6	0.64	0.75	433	100	99	251	42	14
5	4500	012.1	0.64	0.75	432	100	98	251	42	14
6	5000	015.8	0.62	0.75	427	103	93	250	42	14
6	5500	018.4	0.58	0.70	423	108	99	252	42	14
END	120/60	020.908								
			LEAK CHECK: .058	→ .060	= .002	cfm @ 15" Hg				
			+ pitot 6.5							
			− pitot 7.5							
		58.882	.7615	.6908	432.92		96.06			

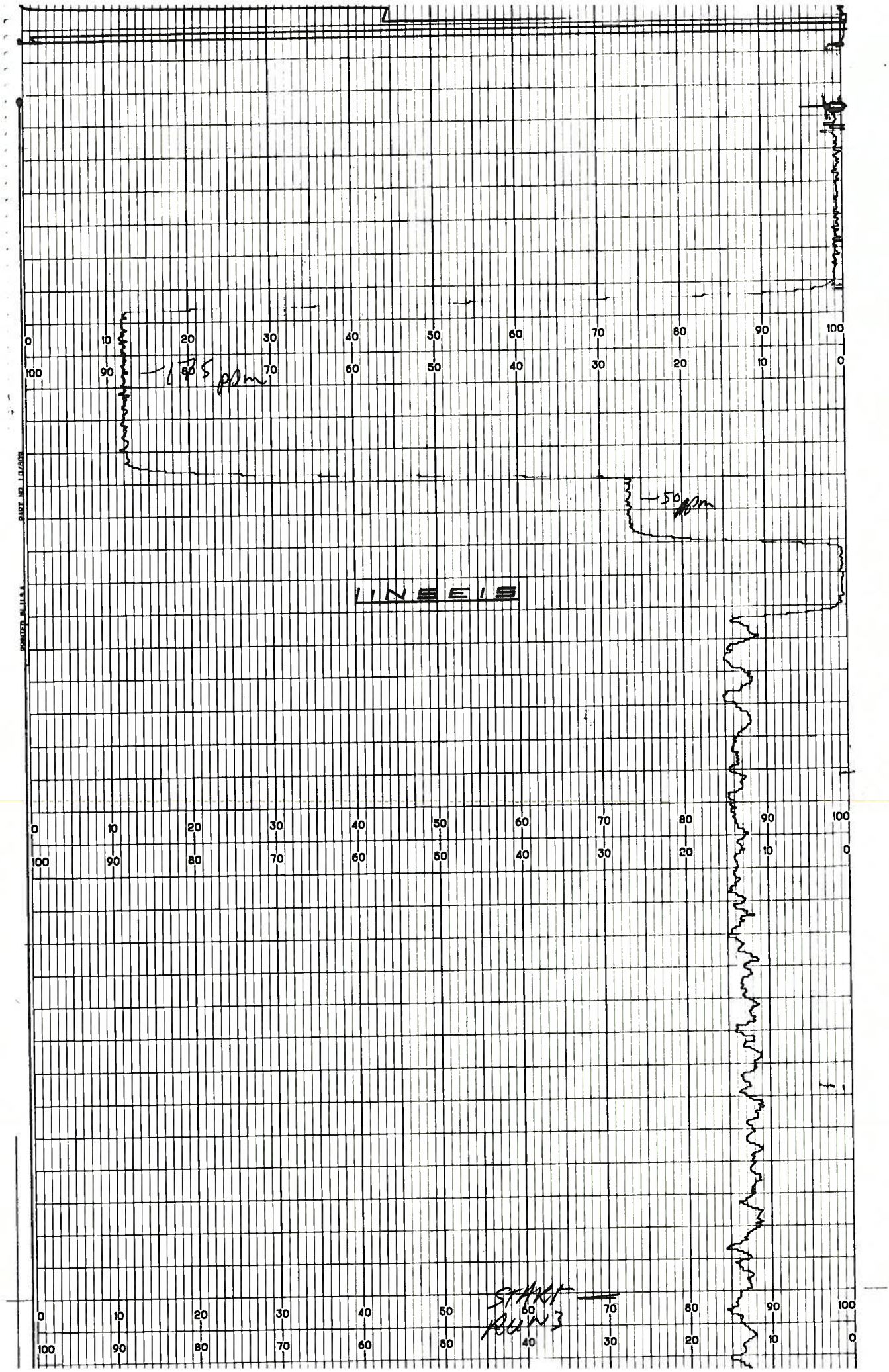

1205
LINSEIS
START
RUN 1
@ 1205
800ppm/810
500ppm/505
100/101 ppm
NOx = LER
@ 0 - 250 ppm
O2
CO = RGL
@ 0 - 1000 ppm
KOPPERS GRENADA MS
2-20-96
WOODWASTE BOILER



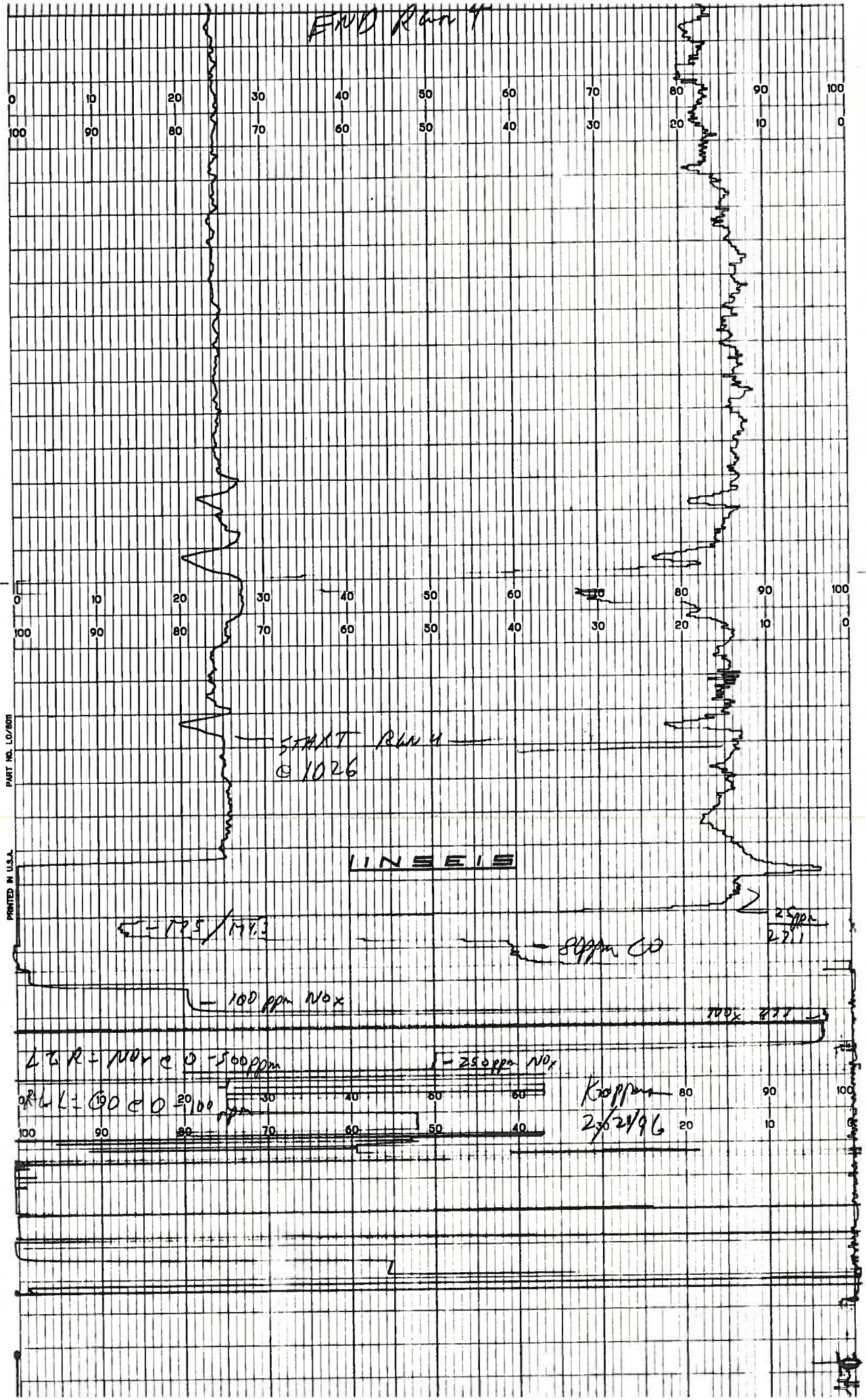
175 ppm
100 ppm
101.2
ch 60-200 ppm
100 ppm
AVG
CO = 24.9 ppm
END Run 1
1205
LINSEIS
START
Run 1
1205

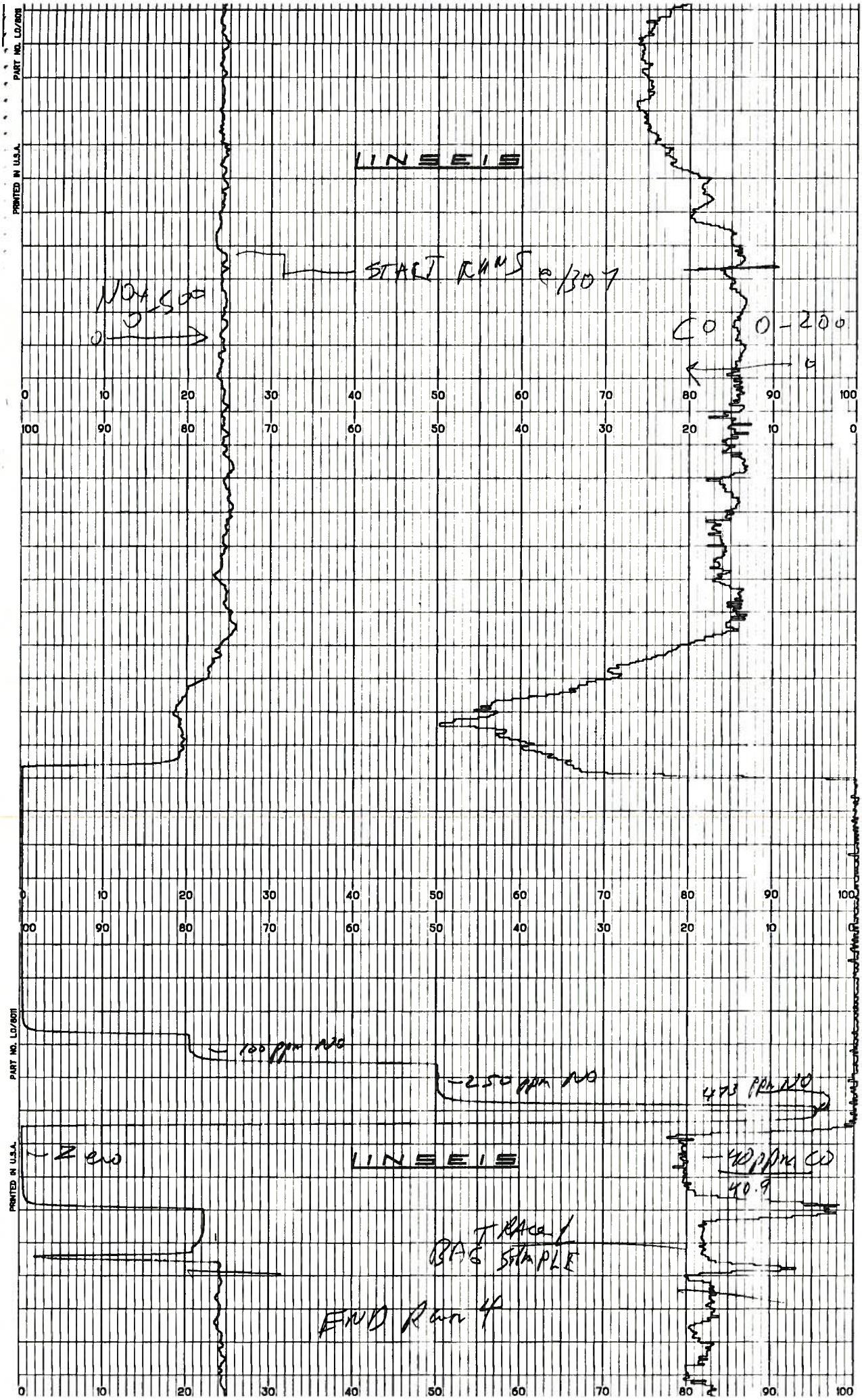

END
RUN 2
LINSEIS
START
RUN 2
@ 1444
45ppm
47.4
LINSEIS

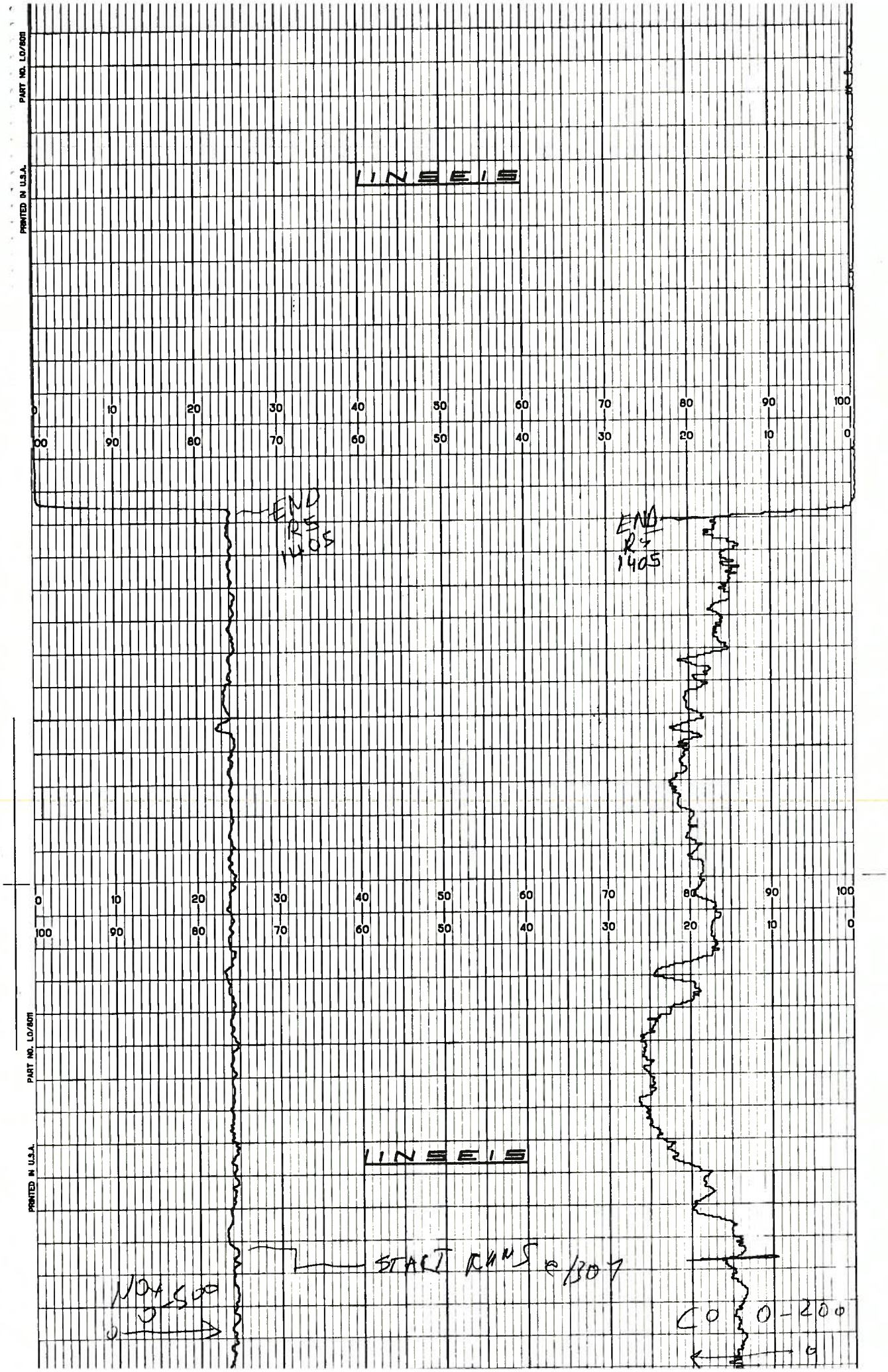

START
Run 2
LINSEIS
50 ppm CH4
Run 2
CH4
END
Run 2
LINSEIS

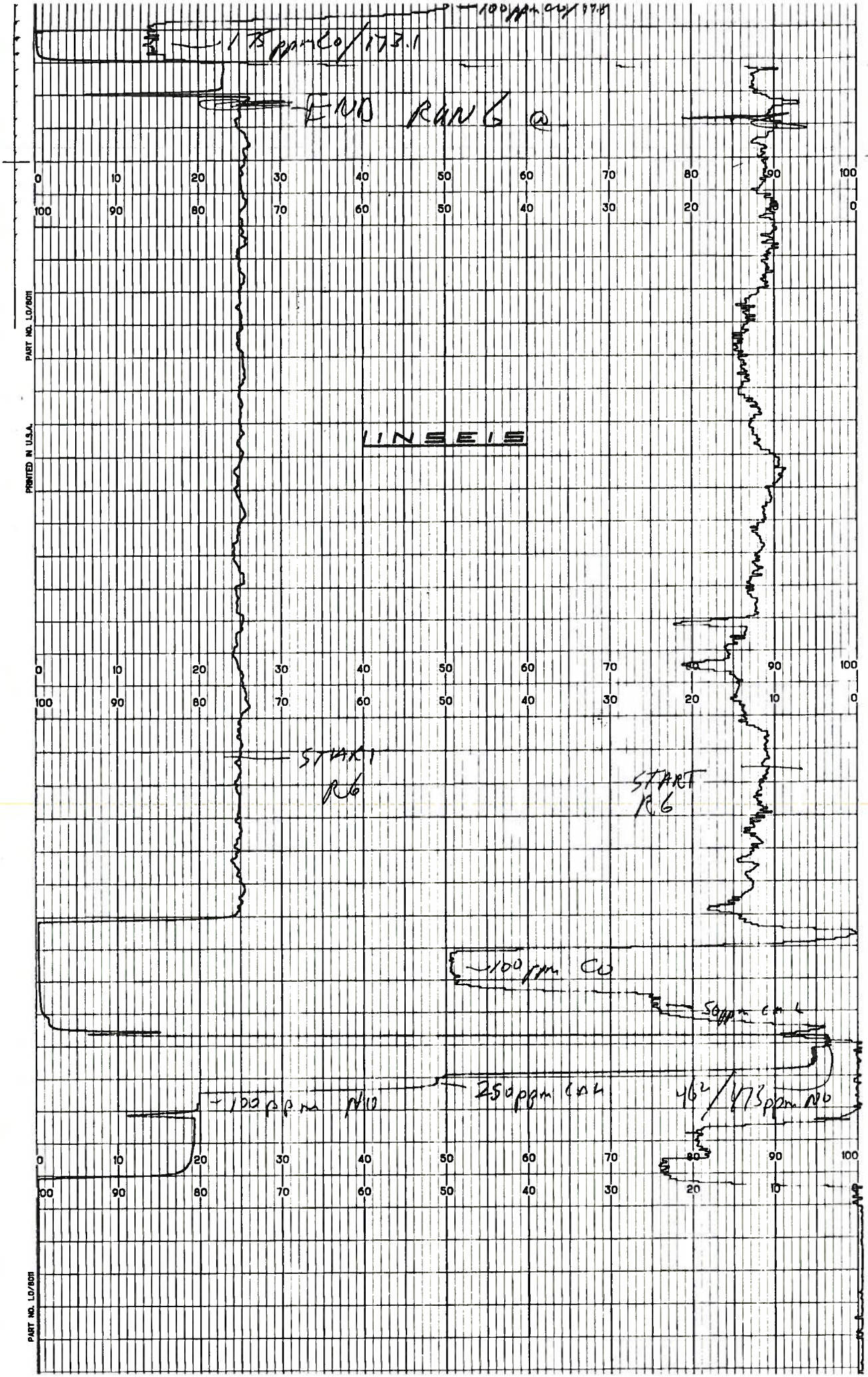


0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
175 ppm
50 ppm
LINSEIS
START
RUN 3

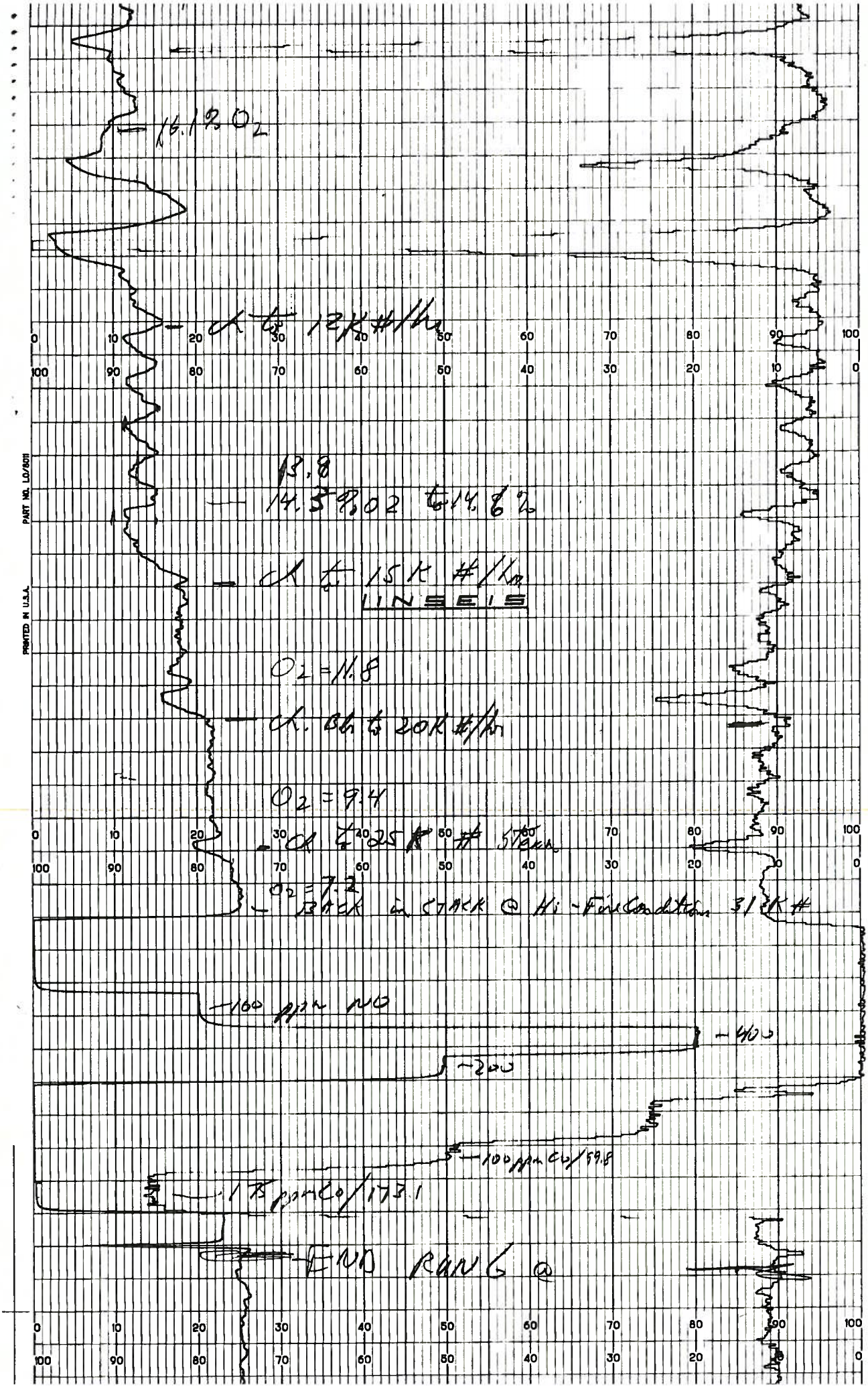

END Run 4
START Run 4
@ 1026
LINSEIS
100 ppm NOx
250 ppm NOx
PART NO. LO/8011
PRINTED IN U.S.A.

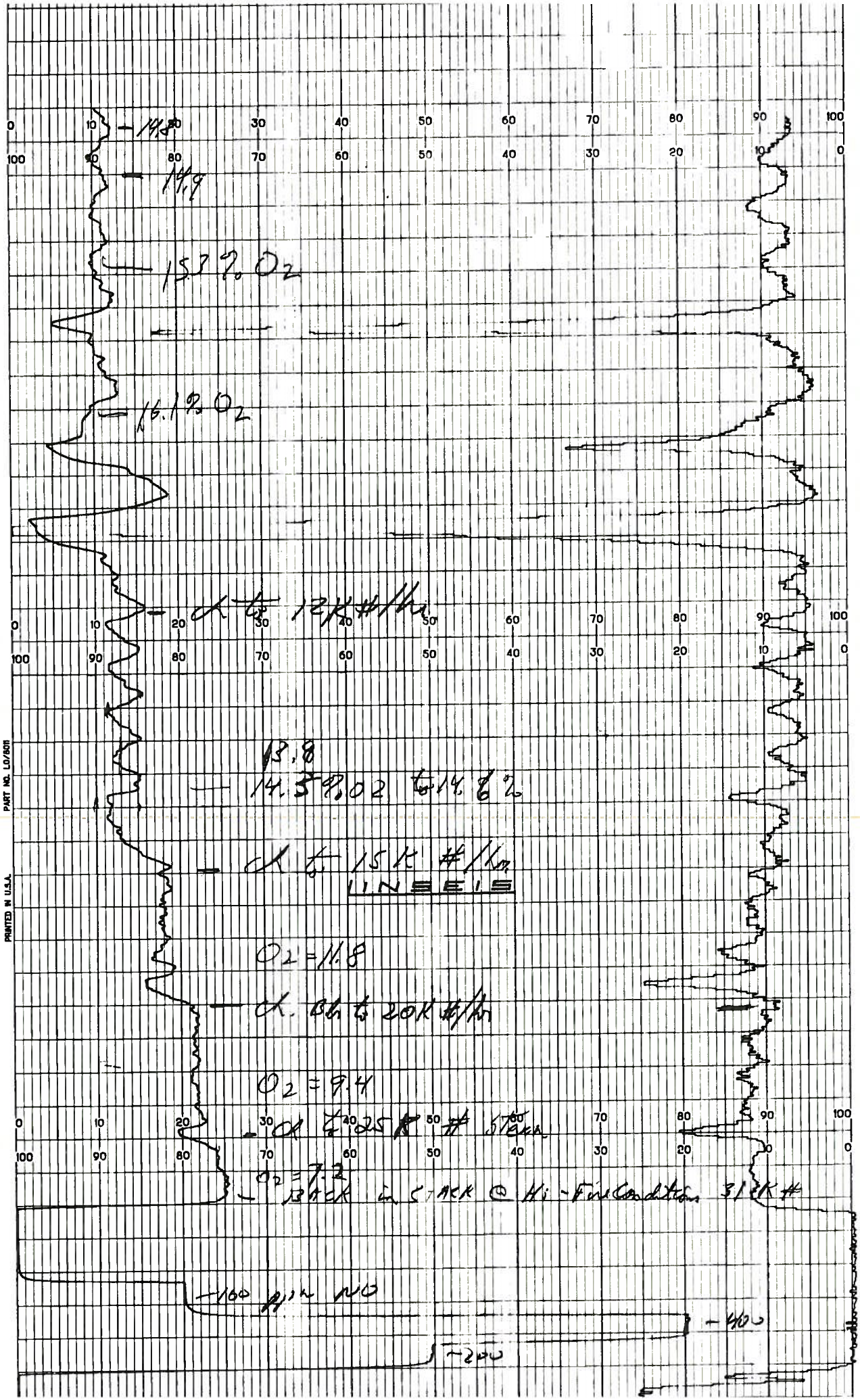

PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
START RUNS @ 1307
NOx 0-500
CO 0-200
0
100 ppm NO
250 ppm NO
473 ppm NO
Zero
LINSEIS
40 ppm CO
40.9
TRACE/
BAG SAMPLE
END Run 4


PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
END
RS
1405
END
RS
1405
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
START RUNS @ 1307
NOx 0-500
0
CO 0-200
0



100 ppm CO/173.1
175 ppm CO/173.1
END RUN 6 @
LINSEIS
START R6
START R6
100 ppm CO
50 ppm CAL
250 ppm CAL
100 ppm NO
462/473 ppm NO
PART NO. LO/8011
PRINTED IN U.S.A.


16.1% O2
ch to 12K #/hr
13.8
14.5% O2 to 14.6%
ch to 15K #/hr
LINSEIS
O2 = 11.8
ch. Bl to 20K #/hr
O2 = 9.4
ch to 25K # Steam
O2 = 7.2
BACK in STACK @ Hi-Fire Condition 31K #
100 ppm NO
400
200
100 ppm CO/99.8
175 ppm CO/173.1
END RUNG @
PART NO. LO/8011
PRINTED IN U.S.A.


PART NO. LO/8011
PRINTED IN U.S.A.

APPENDIX B.

CALIBRATION DATA

DRY GAS METER CALIBRATION

Meter ID Andersen

Calibration Method DGM/DGM **By** GNM

Calibration Meter ID 651729 **Pbar** 29.32

Date 1/2/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	5.00	8.00	143.691	153.873	64	141.776	151.828	56	78	55	59	0.997	1.24	0.716	1.798
1	4.00	9.00	153.873	164.484	60	151.828	162.527	67	76	59	65	0.995	1.17	0.752	1.631
1	3.00	10.00	164.484	174.285	58	162.527	172.592	76	88	65	72	0.999	0.99	0.73	1.730
1	2.00	13.00	174.285	184.575	56	172.592	183.341	79	87	71	77	0.994	0.82	0.729	1.733
1	1.00	17.00	184.575	194.083	56	183.341	193.311	81	84	76	81	0.996	0.58	0.733	1.716
Averages:												1.00			1.72

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)

Calibration Method DGM/DGM **By** GNM

Calibration Meter ID 651729 **Pbar** 29.32

Date 1/2/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
2	5.00	9.00	193.890	204.915	56	595.660	606.449	53	51	51	52	1.001	1.2	0.696	1.902
2	4.00	10.00	204.915	216.169	50	606.449	617.433	53	52	52	52	1.019	1.12	0.724	1.755
2	3.00	12.00	216.169	226.837	50	617.433	627.935	54	52	52	53	1.014	0.89	0.662	2.102
2	2.00	14.00	226.837	237.236	48	627.935	638.259	54	54	52	53	1.013	0.75	0.681	1.987
2	1.00	19.00	237.236	247.357	46	638.259	648.329	54	53	53	52	1.016	0.54	0.694	1.912
Averages:												1.01			1.93

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)

Calibration Method DGM/DGM **By** WBM

Calibration Meter ID 651729 **Pbar** 29.83

Date 4/1/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	2.00	15.00	741.031	752.341	62	595.558	606.443	56	58	56	57	1.024	0.74	0.681	1.986
1	2.00	23.00	752.341	769.719	64	606.443	623.348	59	66	57	62	1.017	0.75	0.682	1.981
1	2.00	15.00	769.719	780.957	64	623.348	634.294	63	64	61	61	1.018	0.74	0.677	2.009
Averages:												**1.02**			**1.99**

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

content and lack of oil and creosote from the preservative.

CO levels are also impacted by steam load fluctuations within the wood preserving plant which cause the boiler to call for increases or decreases in fuel feed rates. CO levels rise either when rates increase or decrease rapidly and then stabilize at lower levels when the steam load stabilizes.

d. Boiler Efficiency vs. Fuel Moisture Content

In a wood fired boiler, combustion efficiency is related directly to fuel moisture content in addition to factors typical of other types of boilers, such as excess air, physical limitations of boiler geometry, use of economizers, and steam temperature. Overall efficiency is simply heat output in steam divided by heat input by fuel.

The moisture content of wood fuel affects both heat input and efficiency. First, each pound of fuel consists of part fuel and part water. For example, at 40% moisture (wet basis), 40% of the fuel is water and 60% is dry wood fuel. If, for this example, the dry wood has a heat value of 10,000 BTU/lb, then each pound of this fuel will only provide 6,000 BTU of heat input. However, not only is the amount of available heat input displaced by water weight, a portion of the input heat is also used to heat and evaporate that water. Approximately 1000 BTU is required to evaporate each pound of water. Thus, 400 BTUs are required to heat the 0.4 lb of water contained in the fuel. The useful heat value, the amount left after evaporating water, is 5,600 BTU per pound of this wet fuel. By these numbers, fuel efficiency is 93% (5,600/6,000). Fuel efficiency drops to 85% at 50% wet moisture content.

The fuel efficiency, that due to fuel moisture, is separate from the boiler efficiency, which accounts for energy losses due to stack energy losses, excess air, and radient heat loss. Boiler efficiency typically runs about 70 to 80%. For the above example with the typical 70% boiler efficiency, total efficiency is 65% (.93 x .70). Thus, for each BTU of steam heat, about 1.5 BTU of input energy is required for the 40% wet moisture content wood fuel. An analysis and graph of this moisture to efficiency relationship is presented on Table 7.

As shown in Tables 2 and 3, actual efficiency for this boiler test was 56% for the low fire test and 60% for the high fire test. The low fire efficiency was reduced by high excess air, typical of low fire conditions, and fuel moisture. The high fire efficiency is lower than typical for industrial boilers due to the amount of moisture in the fuel.

Due to the lower efficiency of burning wood to produce steam, more input energy is needed to produce a given amount of steam. The input energy for the high fire test was approximately 48 mmBTU/hr, which exceeds the permit limit of 37.5 mmBTU/hr.

e. Sulfur Dioxide (SO2)

Evaluation of the results presented in Tables 5A and 5B indicates that most of the sulfur present in the fuel is not emitted at SO2. Although sulfur is bound to ash rather than destroyed as organic constituents are, a destruction and removal efficiency (DRE) can still be calculated. For SO2, constituent feed rate represents the amount of SO2 that would be produced if 100% of the sulfur in the fuel was converted to SO2. DREs of 95% for low fire conditions and 75% for high fire conditions were determined in the test burn.

These DRE levels are comparable to levels calculated for the Viking Boiler at McBain, MI [1] which determined removal efficiency of 67.8% for similar fuel.

f. Hydrochloric Acid (HCl)

Results presented in Tables 5A and 5B indicate that less than half of the chlorine present in the fuel is converted to HCl and emitted. The HCl DRE was calculated in the same way as for SO2, described above and Cl is also partially bound into the ash and slag. The DRE for low fire conditions was determined to be 70% and for high fire conditions was 52%. In this test, chlorine content of the mixed fuel was determined to be 0.1% (1060 ppm) during the high fire test and 0.05% (520 ppm) in the low fire test.

Test results for the Viking Boiler at McBain indicated that creosote treated wood contained approximately 0.04% chlorine and pentachlorophenol treated wood contained 0.43% chlorine. A DRE of 89% was determined for pentachlorophenol treated wood in that test. Since the Viking plant has an electrostatic precipitator, these results compare reasonably well.

g. Mass Balances for Chlorine and Sulfur

Mass balances were attempted for chlorine and sulfur, considering input from fuel and outputs to emissions and fly and bottom ash. However, only insigificant levels were measured in both the fly and bottom ash samples. It is believed that these materials become tightly bound into the chemical structure of the slag or ash particles so that they cannot be extracted by the laboratory procedure. The attempted mass balances were inconclusive.

h. Combustion Temperatures

Combustion temperatures were monitored during the stack tests at two sets of locations. The original test locations are two probes located at the bottom of the secondary combustion chamber

---

[1] Trial Burn Report and Permit Application, Viking Energy of McBain, prepared by Austin Environmental Engineering, July 14, 1995, Revision 2.

with one each just above the outlets of the combustion cells. The new probes are located at the top of the secondary combustion chamber near the superheater tubes. The lower original location has proven too extreme for long term use of temperature probes. The new location was selected to be somewhat cooler and less extreme an exposure for the probes so that longer life can be obtained from them.

Probe temperature readings were recorded manually through the tests on the test log sheets, Appendix B. The average temperatures for the probes are shown below:

COMBUSTION TEMPERATURE MONITORING

Probe Location	Existing Probes above Cells		New Probes @ Superheat Tubes	
Probe No.	#1	#2	#1	#2
LOW FIRE SCENARIO				
Ave. Temp.°F	1277	1230	1148	1169
Location Ave. Temp °F	1253.5		1158.5	
HIGH FIRE SCENARIO				
Ave. Temp.°F	2089	2185	1688	1710
Location Ave. Temp °F	2137		1699	

Inspection of the log sheets clearly shows that temperatures at the new locations follow the same trends as the existing location, except that they are generally about 100°F lower during low fire conditions and about 400°F lower during high fire conditions.

i. Destruction and Removal Efficiency (DRE)

The DRE is calculated on Tables 5A and 5B for low and high fire scenarios, respectively. The DRE is calculated for each PAH constituent, Total PAHs, pentachlorophenol, total chlorophenols, hydrochloric acid, and sulfur dioxide. Constituent feed rates are based on analysis results of the fuel composites for each test scenario. Emission rates are the average emission rates of each of three tests conducted for each scenario as presented in the Test Report by EML, Appendix A. For the emission amounts, non detectable levels are assumed to be at the detection limit, thus making a conservative assumption. All DREs for the organic constituents exceeded the permit requirement for 99.9%.

Note that an attempt was made to include PAH emissions determined in a previous stack test for untreated wood only. However, emissions during that test actually exceeded emissions during

this one. Therefore, only the values shown in the far right column for zero-background should be considered valid.

j. Fuel Feed Rates

Based on stack gas analyses, heat input rates were calculated. From those and measured heat value of the wood fuel, input fuel feed rates were calculated. Additionally, fuel feed rates were measured. Following is a comparison of these rates.

SCENARIO	HEAT INPUT (MMBtu/hr)	FUEL HEAT VALUE (Btu/Lb)	CALCULATED FUEL INPUT (Lb/hr)	MEASURED FUEL INPUT (Lb/hr)
Low Fire	20.04	6,190	3,237	3,118
High Fire	47.92	7,150	6,702	7,318

Given the assumptions and measuring inaccuracies involved in both methods of determining feel rates, these results compare well and provide assurance of their accuracy. The DRE calculations in Tables 5A and 5B use the measured fuel feed rates.

5. CONCLUSIONS

a. Parameters Within Permit Limits

Test results and operating experience indicate that compliance with the following emission limits or parameters can be maintained by the Grenada boiler system under all normal, expected operating conditions:

Particulate Matter
PM_{10}
Sulfur Dioxide
Volatile Organic Compounds
Opacity
99.9% DRE

b. NOx

The test indicates that when operated under high fire conditions, NOx emissions will exceed the current permit levels. KII believes that although the NOx levels are significantly higher than in the permit, the levels are at or below levels normally considered acceptable for industrial boilers. Emissions at the maximum experienced rate will be approximately 45 tons per year, less than half the major source threshold. The emission rate of about 0.2 lb/mmBTU is also significantly lower than "known low NOx boilers" cited by EPA[2] which ranged from 0.26 to nearly 0.50 lb/mmBTU. Thus, KII will request that the boiler permit be modified to a higher NOx emission limit.

c. CO

As indicated by the CEM monitoring before and since the test, it is clear that the boiler cannot be operated within the CO limit of the permit while fired on 100% untreated wood fuel. Modification of the permit for NOx, as above, will allow use of treated wood fuel as a the primary fuel and minimize the time CO emissions will be high. However, due to market and real world circumstances KII will, at times, only have untreated wood fuel available and, therefore, will need to operate on only that fuel. Two actions will be needed to assure compliance:

i. Adjust/upgrade steam control valves as needed to reduce the fluctuations in steam demand.

---

[2] EPA Proposed Rule on Nitrogen Oxide Emissions Reduction Program, 61 FR 1442, Jan. 19, 1996.

ii. Apply for permit modification to allow a higher emission limit when 100% untreated wood fuel is being fired.

d. Heat Input Rate

Although the fuel feed rate during the high fire test of 7,318 pounds per hour was well within the permit feed rate limit of 9,375 pounds per hour, the heat value input by this fuel was approximately 52 mmBTU/hr which exceeds the permit limit of 37.5 mmBTU/hr. If fuel with lower heat value and/or higher moisture content was used to produce the same amount of steam, the required heat input would be higher. (See discussion above at paragraph 4.d. and Table 7.) In order to allow for fuel variability, KII will apply for a permit modification to increase the allowable heat input to 15% greated than determined in this test, 60 mmBTU/hr.

e. Sulfur Dioxide (SO2)

SO2 emissions calculations will use the DRE calculated for the high fire rate of 75%.

f. Hydrocholoric Acid (HCl)

HCl emissions calculations will use the DRE calculated for the high fire rate of 52%.

g. Temperature Probe Locations

The new temperature probe locations tracked combustion temperature well while also providing a lower temperature. The probes at the new location should be used and the existing probes may be removed. The new probes will be connected to the CEM data system.

h. Organic Constituent Destruction Removal Efficiency (DRE)

The minimum required DRE of 99.9% was exceeded for all organic constituents at both low and high fire conditions. The high DRE under the low fire test conditions justifies changing the allowable minimum temperature at which treated wood may be fired to 1140°F.

TABLE 1
FUEL CONVEYOR RATE DATA

MEA-SURE	UNITS	CONVEYOR RATE MEASUREMENTS							AVE.
Date		2/20	2/20	2/20	2/20	2/21	2/21	2/21	
Time	hr:min	8:10	1:55	3:00	5:00	12:10	12:15	2:55	
Fuel Rate Measure-ment	Lbs	15	18	10	14	10	11	14	
	Sec.	5	5	5	5	5	5	5	
	Lb/min	180	216	120	168	120	132	168	158
	Lb/Hr	10800	12960	7200	10080	7200	7920	10080	9463

TABLE 2
OPERATING DATA

TEST DATE: **2/ 20/ 1996** SCENARIO: **LOW FIRE**

OPERATIONS	TIME	STEAM	WOOD FUEL
UNITS	HR:MIN:SEC	N/A	HOURS
AT START	11:35:00	223,958	14,882.5
AT END	18:52:00	224,141	14,884.9
DIFFERENCE	07:17:00	183	2.4
MULTIPLIER	1	400	9463
UNITS	HOURS	LB-STEAM	LB-FUEL
AMOUNT	7.28	73,200	22,711
PRODUCTION RATES PER HOUR		10,050	3,118
FUEL HEAT VALUE		6,190	BTU/LB
BOILER INPUT HEAT RATE		19,301,921	BTU/HR
BOILER OUTPUT STEAM HEAT		1,067	BTU/LB
BOILER OUTPUT STEAM HEAT RATE		10,723,716	BTU/HR
BOILER EFFICIENCY		56	PERCENT
ASH PRODUCTION	TIME	**FLY ASH**	WOOD FUEL
UNITS	HR:MIN:SEC	N/A	HOURS
AT START	09:30:00	0	14,881.1
AT END	19:15:00	30	14,885.2
DIFFERENCE	09:45:00	30	4.1
MULTIPLIER	1	1	9463
UNITS	HOURS	LB-ASH	LB-FUEL
AMOUNT	9.75	30	35,959
		BOTTOM ASH	
AT START	05:30:00	0	14,880.5
AT END	19:00:00	200	14,885.0
DIFFERENCE	13:30:00	200	4.5
MULTIPLIER	1	1	9463
UNITS	HOURS	LB-ASH	LB-FUEL
AMOUNT	13.50	200	42,584
FRACTION ASH IN FUEL		0.55%	

TABLE 3
OPERATING DATA

TEST DATE: **2 / 21 / 1996** SCENARIO: **MAXIMUM FIRE**

OPERATIONS	TIME	STEAM	WOOD FUEL
UNITS	HR:MIN:SEC	N/A	HOURS
AT START	09:52:00	224,629	14,891.1
AT END	17:22:00	225,184	14,896.9
DIFFERENCE	07:30:00	555	5.8
MULTIPLIER	1	400	9463
UNITS	HOURS	LB-STEAM	LB-FUEL
AMOUNT	7.50	222,000	54,885
PRODUCTION RATES PER HOUR		29,600	7,318
FUEL HEAT VALUE		7,150	BTU/LB
BOILER INPUT HEAT RATE		52,324,081	BTU/HR
BOILER OUTPUT STEAM HEAT		1,067	BTU/LB
BOILER OUTPUT STEAM HEAT RATE		31,583,200	BTU/HR
BOILER EFFICIENCY		60	PERCENT
ASH PRODUCTION	TIME	**FLY ASH**	WOOD FUEL
UNITS	HR:MIN:SEC	LB	HOURS
AT START	09:50:00	0	14,891.1
AT END	17:30:00	300	14,897.0
DIFFERENCE	07:40:00	300	5.9
MULTIPLIER	1	1	9463
UNITS	HOURS	LB-ASH	LB-FUEL
AMOUNT	7.67	300	55,832
		BOTTOM ASH	
AT START	05:30:00	0	14,888.5
AT END	19:00:00	700	14,897.4
DIFFERENCE	13:30:00	700	8.9
MULTIPLIER	1	1	9463
UNITS	HOURS	LB-ASH	LB-FUEL
AMOUNT	13.50	700	84,221
FRACTION ASH IN FUEL		1.37%	

TABLE 4
OPERATING AND EMISSIONS PARAMETERS SUMMARY

PARAMETER	UNITS	LOW FIRE TEST	HIGH FIRE TEST
Steam Flow Rate	lb/hr	10,050	29,600
Fuel Feed Rate	lb/hr	3,118	7,318
Fuel Heat Value	BTU/lb	6,500	6,500
Fuel Moisture Content (Dry)	%	37%	37%
Temperature, Low Probes	Deg. F	1,301	2,089
Temperature, High Probes	Deg. F	1,158	1,699
Stack Gas Flow (Q)	DSCFM	10,349	11,629
Opacity	%	0.3	1.6
Heat Input	MM BTU/hr	20.33	47.92
Excess Air	%	217	53.4
Carbon Dioxide (CO2)	%	5.5	12
Oxygen (O2)	%	14.5	7.4
Particulate Matter (PM)	lb/hr	2.27	5.64
Carbon Monoxide, Dry(CO)	ppm-v	27.57	36.53
Carbon Monoxide, Dry	lb/hr	1.24	1.86
Nitrogen Oxides (NOx)*	ppm-v	*55*	120.67
Nitrogen Oxides (NOx)	lb/hr	*4.08*	10.05
Volatile Organic Compounds (VOC)	lb/hr	0.17	0.20
Sulfur Dioxide (SO2)	lb/hr	1.84	5.07
Hydrochloric Acid (HCl)	lb/hr	1.16	3.82
Organic POHCs DRE	%	99.99	99.99

* Low fire NOX estimated from step down test results.

TABLE 5A
DRE CALCULATION
LOW FIRE SENARIO

FUEL FEED RATE(lb/hr): 3118

CONSTITUENT	FUEL CONTENT	CONSTIT. FEED RATE	TREATED FUEL EMISSION	UNTREAT FUEL EMISSION	TREATED EMISSION INCREASE	DRE (less-background)	DRE (zero-background)
	(mg/kg)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(%)	(%)
PAHs							
Naphthalene	724.8	2.26	4.321E-04	5.500E-04	-1.179E-04	100.0000%	99.9809%
Acenaphthylene	23.0	0.07	7.036E-06	1.600E-03	-1.593E-03	100.0000%	99.9902%
Acenaphthene	596.1	1.86	1.957E-05	7.700E-04	-7.504E-04	100.0000%	99.9989%
Fluorene	512.2	1.60	1.598E-05	1.500E-04	-1.340E-04	100.0000%	99.9990%
Phenanthrene	2121.7	6.62	8.735E-05		8.735E-05	99.9987%	99.9987%
Anthracene	546.8	1.70	9.309E-05		9.309E-05	99.9945%	99.9945%
Fluoranthene	1327.4	4.14	1.478E-05	1.160E-03	-1.145E-03	100.0000%	99.9996%
Pyrene	911.1	2.84	6.006E-06	7.700E-04	-7.640E-04	100.0000%	99.9998%
Benzo(a)anthracene	238.7	0.74	4.996E-06		4.996E-06	99.9993%	99.9993%
Chrysene	250.4	0.78	4.996E-06	1.500E-04	-1.450E-04	100.0000%	99.9994%
Benzo(b)fluoranthene	113.0	0.35	4.996E-06		4.996E-06	99.9986%	99.9986%
Benzo(k)fluoranthene	104.9	0.33	4.996E-06		4.996E-06	99.9985%	99.9985%
Benzo(a)pyrene	104.0	0.32	4.996E-06		4.996E-06	99.9985%	99.9985%
Dibenzo(a,h)anthracene	0.9	0.00	4.996E-06		4.996E-06	99.8220%	99.8220%
Benzo(g,h,i)perylene	21.3	0.07	4.996E-06		4.996E-06	99.9925%	99.9925%
Indeno(1,2,3-c,d)pyrene	25.4	0.08	4.996E-06		4.996E-06	99.9937%	99.9937%
Total PAH	7621.7	23.76	7.159E-04		-4.434E-03	100.000%	99.9970%
CHLOROPHENOLS							
Pentachlorophenol	211.6	1.55	2.498E-05		2.498E-05	99.9984%	99.9984%
Total chlorophenols	211.6	1.55	4.996E-05		4.996E-05	99.9968%	99.9968%
OTHER							
Hydrogen Chloride (HCl)	534.6	3.91	1.160		1.160E+00	70.3470%	70.3470%
Sulfur Dioxide (SO2)	4800.0	35.13	1.840		1.840E+00	94.7618%	94.7618%
HCl in fuel determined as Cl times 1.028 Cl =			520.000				
SO2 in fuel determined as S times 2 Fuel SO2=			0.240%				

TABLE 5B
DRE CALCULATION
HIGH FIRE SENARIO

FUEL FEED RATE(lb/hr): 7318

CONSTITUENT	FUEL CONTENT (mg/kg)	CONSTIT. FEED RATE (lb/hr)	TREATED FUEL EMISSION (lb/hr)	UNTREAT FUEL EMISSION (lb/hr)	TREATED EMISSION INCREASE (lb/hr)	DRE (less-background) (%)	DRE (zero-background) (%)
PAHs							
Naphthalene	974.1	7.13	6.724E-04	5.500E-04	1.224E-04	99.9983%	99.9906%
Acenaphthylene	34.9	0.26	7.173E-06	1.600E-03	-1.593E-03	100.0000%	99.9972%
Acenaphthene	739.4	5.41	7.723E-06	7.700E-04	-7.623E-04	100.0000%	99.9999%
Fluorene	618.4	4.53	6.720E-06	1.500E-04	-1.433E-04	100.0000%	99.9999%
Phenanthrene	2452.9	17.95	5.174E-05		5.174E-05	99.9997%	99.9997%
Anthracene	645.7	4.73	5.518E-05		5.518E-05	99.9988%	99.9988%
Fluoranthene	1549.9	11.34	6.622E-06	1.160E-03	-1.153E-03	100.0000%	99.9999%
Pyrene	1034.7	7.57	5.299E-06	7.700E-04	-7.647E-04	100.0000%	99.9999%
Benzo(a)anthracene	284.7	2.08	5.299E-06		5.299E-06	99.9997%	99.9997%
Chrysene	303.4	2.22	5.299E-06	1.500E-04	-1.447E-04	100.0000%	99.9998%
Benzo(b)fluoranthene	157.8	1.15	5.299E-06		5.299E-06	99.9995%	99.9995%
Benzo(k)fluoranthene	157.8	1.15	5.299E-06		5.299E-06	99.9995%	99.9995%
Benzo(a)pyrene	137.9	1.01	5.299E-06		5.299E-06	99.9995%	99.9995%
Dibenzo(a,h)anthracene	3.8	0.03	5.299E-06		5.299E-06	99.9809%	99.9809%
Benzo(g,h,i)perylene	29.1	0.21	5.299E-06		5.299E-06	99.9975%	99.9975%
Indeno(1,2,3-c,d)pyrene	36.2	0.26	5.299E-06		5.299E-06	99.9980%	99.9980%
Total PAH	9160.7	67.04	8.553E-04		-4.295E-03	100.000%	99.9987%
CHLOROPHENOLS							
Pentachlorophenol	265.9	1.95	2.650E-05		2.650E-05	99.9986%	99.9986%
Total chlorophenols	265.9	1.95	8.802E-05		8.802E-05	99.9955%	99.9955%
OTHER							
Hydrogen Chloride (HCl)	1089.7	7.97	3.820		3.820E+00	52.0960%	52.0960%
Sulfur Dioxide (SO2)	2800.0	20.49	5.070		5.070E+00	75.2567%	75.2567%
HCl in fuel determined as Cl times 1.028 Cl =			1060.000				
SO2 in fuel determined as S times 2 Fuel SO2=			0.140%				

TABLE 6
NOx STEP DOWN TEST
NOx EMISSIONS VS. BOILER RATE

STEAM RATE (lb/hr)	NOx EMISSION (ppm)
29600	120
25000	108
19000	90
14000	65
11000	55

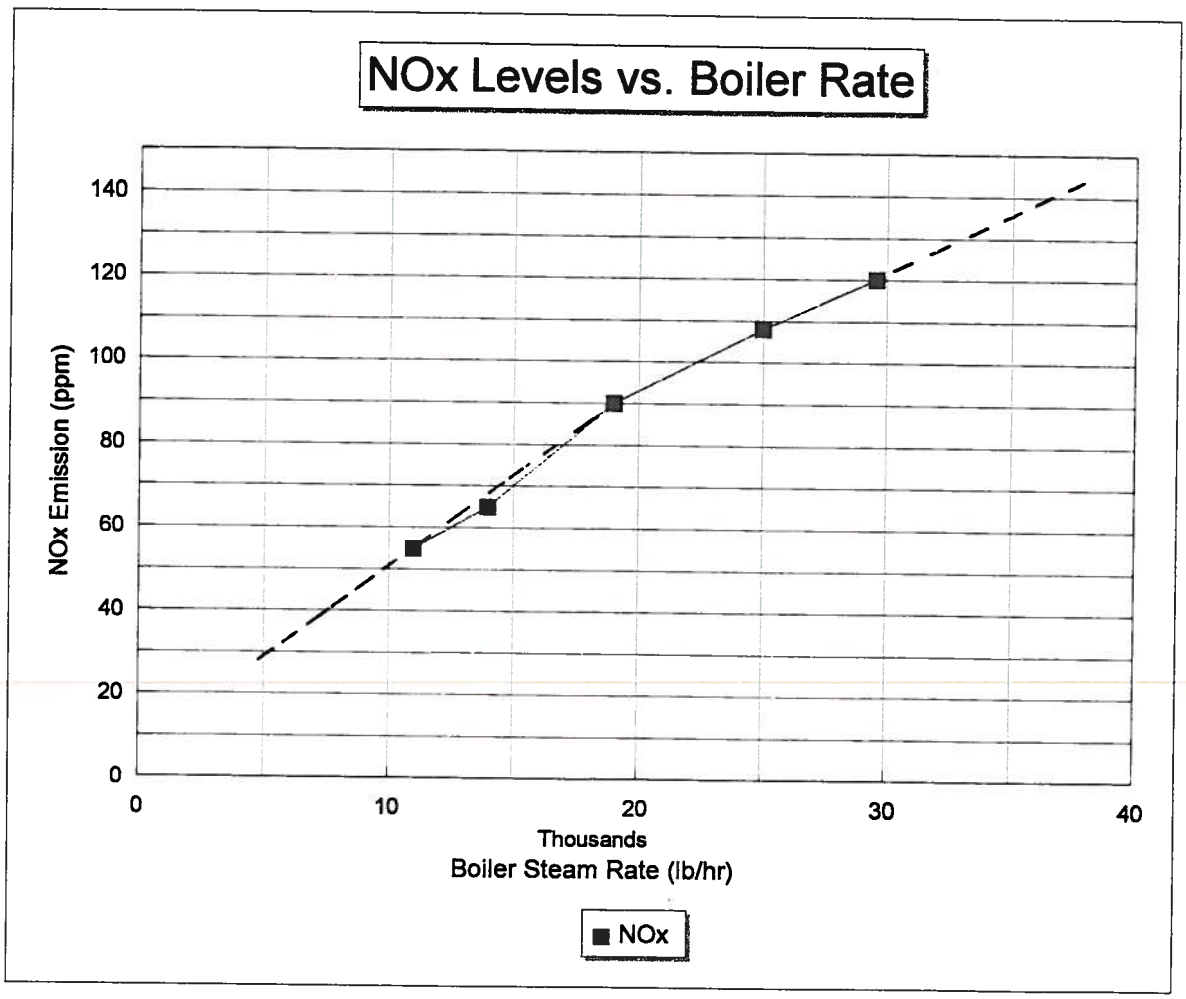
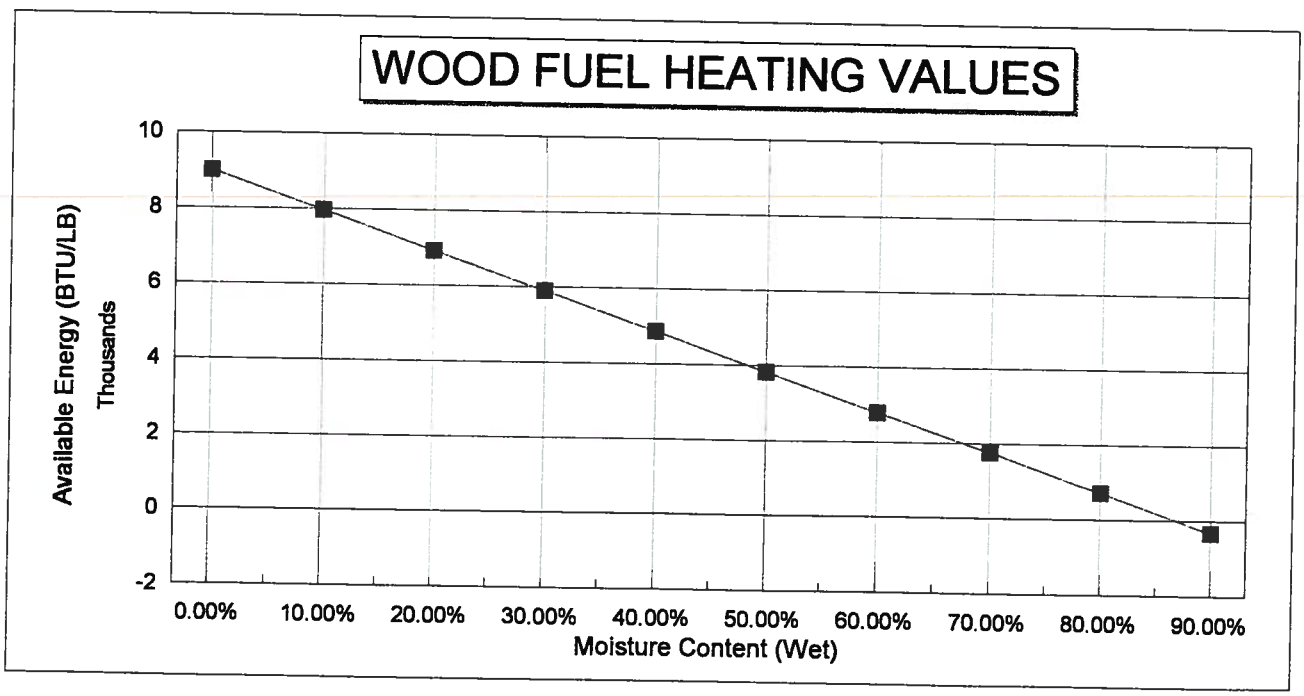


TABLE 7
Energy Available to Boiler vs. Moisture Content

Moisture Content (Wet)	Moisture Content (Dry)	Input Wood Energy	Energy to Evap & Heat Moisture	Usable Energy	Usable Fraction	Effective Combustion Efficiency	Energy in **Treated** Dry Wood
%	%	(BTU/lb)	(BTU/lb)	(BTU/lb)	%	%	(BTU/lb)
0.00%	0.00%	9000	0	9000	100.00%	70.00%	**9000**
10.00%	11.11%	8100	135	7965	98.33%	68.83%	
20.00%	25.00%	7200	270	6930	96.25%	67.38%	
30.00%	42.86%	6300	405	5895	93.57%	65.50%	
40.00%	66.67%	5400	540	4860	90.00%	63.00%	
50.00%	100.00%	4500	675	3825	85.00%	59.50%	
60.00%	150.00%	3600	810	2790	77.50%	54.25%	
70.00%	233.33%	2700	945	1755	65.00%	45.50%	
80.00%	400.00%	1800	1080	720	40.00%	28.00%	
90.00%	900.00%	900	1215	-315	-35.00%	-24.50%	

Wood Energy = (1- MC(wet)) * Energy in dry wood
Energy to Moisture = Moisture * 1350 (Heat to evaporate @1000BTU + heat to reach 400 deg.)
Usable = Input energy - Energy in Moisture
Usable Fraction = Useable energy / Input energy
Effective Efficiency (assumes boiler efficiency at 70%) = 70%* Usable Fraction



REPORT OF AIR EMISSIONS TESTING
FOR
KOPPERS INDUSTRIES
GRENADA PLANT
WOOD WASTE BOILER

Tie Plant, Mississippi
February 20 and 21, 1996

FACILITY NO. 0960-00012
EMISSION POINT NO. AA-001

Koppers Industries
436 Seventh Avenue, K-1800
Pittsburgh, Pennsylvania 15219

Contact: Stephen T. Smith
ph: 412/227-2677

Koppers Industries
P.O. Box 160
Tie Plant, MS 38960

Contact: Bob Daniel
ph: 601/226-4584

Prepared By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
601/856-3092

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092
fax : 601/853-2151

April 20, 1996

Subject: Koppers Industries - Tie Plant, Mississippi
Wood Waste Boiler - Stack Emissions Test Plan And Protocol

On February 20 and 21, 1996, Environmental Monitoring Laboratories performed air emissions testing for Koppers Industries, Inc. Testing was done to measure stack emissions of PM, SO_2, NOx, CO, HCl, and VOC (as C) from the wood waste boiler while test burning wood waste previously treated with creosote and pentachlorophenol. Additionally, emissions of POHC associated with creosote and pentachlorophenol were measured and compared to inlet quantities of those compounds to determine destruction and removal efficiency (DRE). These parameters were measured under two operating modes – low fire and high fire.

Results of emissions testing are tabulated below. The additionally measured parameters are summarized in the report that follows.

	PM		SO2	NOx	CO	HCl	VOC (as C)	% Opacity	POHC
	#/hr	gr/dscf	#/hr.	#/hr.	#/hr.	#/hr	#/hr.	hi six min.	% DRE
LOW FIRE	2.27	0.026	1.84	4.89	1.24	1.16	0.17	0.0	99.9971
HIGH FIRE	5.64	0.056	5.07	10.05	1.86	3.82	0.20	15.2	99.9985
Permit Limits	6.75	0.30	20.63	6.56	5.63	N/A	4.27	40	> 99.9

The testing project was coordinated by Mr. Stephen Smith of Koppers. Danny Russell of Environmental Monitoring Laboratories was responsible for sample collection and analysis of particulate and sulfur dioxide samples. Organic constituents samples and fuel and ash samples were shipped to Bonner Analytical in Hattiesburg, Mississippi, for analysis.

Following is a report of the test.

REPORT OF AIR EMISSIONS TESTS
FOR KOPPERS INDUSTRIES, INC.
GRENADA PLANT
WOOD WASTE BOILER

Tie Plant, Mississippi
February 20 and 21, 1996

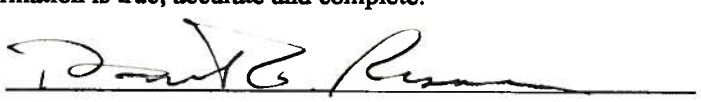
CONTENTS

1.0	TEST RESULTS	page	1
2.0	SOURCE DESCRIPTION		7
3.0	TEST PROCEDURES		8
4.0	DATA REDUCTION		9
5.0	NOMENCLATURE		25
6.0	CALIBRATION		26
7.0	APPENDICES:		27

A. Field and Laboratory Data
B. Calibrations
C. Visible Emissions Record
D. POHC Analysis Report (Bonner)
E. HCl Analysis (CAE)
F. Boiler Records (Koppers)

REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon my inquires of those responsible for obtaining the data or upon my direct acquisition of data, I believe the submitted information is true, accurate and complete.

Signed 

Daniel G. Russell

1.0 Test Results:

1.1 Mode 1: Low Fire Mode -- Approximately 15,000 pounds per hour.

1.1.1 PM/CO/NOx/SO2/HCl/VOC emissions test

Run No. ..... Date ..... Time Start ..... Time End		1 2/20/96 1205 1315	2 2/20/96 1443 1555	3 2/20/96 1715 1826	AVG. ------ ----- -----
PARTICULATE EMISSIONS	#/hr	2.32	2.57	1.92	2.27
PARTICULATE EMISSIONS	gr/dscf	0.026	0.029	0.021	0.026
PARTICULATE EMISSIONS	#/MM Btu	0.111	0.129	0.096	0.112
SO2 EMISSIONS	#/hr	1.87	1.59	2.05	1.84
SO2 EMISSIONS	ppm	18	16	20	18
SO2 EMISSIONS	#/MM Btu	0.089	0.080	0.102	0.090
CO EMISSIONS	#/hr	1.22	1.39	1.12	1.24
CO EMISSIONS	ppm	27	31	25	28
CO EMISSIONS	#/MM Btu	0.058	0.069	0.056	0.061
NOx EMISSIONS *	#/hr	4.92	4.83	4.93	4.89
NOx EMISSIONS *	ppm	66	66	66	66
NOx EMISSIONS *	#/MM Btu	0.235	0.242	0.246	0.241
VOC EMISSIONS	#/hr	0.20	0.17	0.14	0.17
VOC EMISSIONS	ppm	10	9	7	9
VOC EMISSIONS	#/MM Btu	0.009	0.008	0.007	0.008
HCl EMISSIONS	#/hr	1.10	0.93	1.46	1.16
HCl EMISSIONS	ppm	19	17	25	20
HCl EMISSIONS	#/MM Btu	0.053	0.047	0.073	0.057
HEAT INPUT	MM Btu/hr	20.96	19.97	20.07	20.33
VOLUMETRIC FLOWRATE	acfm	17440	17485	17448	17458
VOLUMETRIC FLOWRATE	dscfm	10396	10219	10431	10349
VELOCITY	ft./sec.	44.8	44.9	44.8	44.8
STACK TEMPERATURE	°F	346	359	353	353
MOISTURE	%	8.4	8.7	7.4	8.1
SAMPLE RATE	% isokinetic	95	101	100	99

Note: Listed NOx emissions were calculated based on NOx concentration measurements made at the conclusion of testing. Because the NOx analyzer failed during the first day of testing, that parameter was not measured during the low fire mode. Another analyzer was obtained and commissioned for the high fire mode testing done on the following day. At the conclusion of that testing, the boiler conditions were returned to the low fire test condition and NOx was measured. That measurement was used with the data obtained during the low fire mode to calculate the NOx emissions.

1.1.2 POHC Test

Run No.	1	2	3	AVG.
Date	2/20/96	2/20/96	2/20/96	———
Time Start	1134	1413	1646	———
Time End	1142	1622	1850	———
POHC Emissions #/hr				
Acenaphthylene	5.1971E-06	7.5760E-06	8.3352E-06	7.0361E-06
Acenapthene	1.6111E-05	1.8818E-05	2.3780E-05	1.9570E-05
Anthracene	9.7186E-05	9.4823E-05	8.7274E-05	9.3094E-05
Benzo(a)anthracene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(a)pyrene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(b)fluoranthene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(g,h,i)perylene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Benzo(k)fluoranthene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Chrysene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Dibenzo(a,h)anthracene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Fluoranthene	1.2993E-05	1.5396E-05	1.5935E-05	1.4775E-05
Fluorene	1.6111E-05	1.5396E-05	1.6425E-05	1.5978E-05
Indeno(1,2,3-c,d)pyrene	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Naphthalene	1.5799E-04	4.3086E-04	7.0751E-04	4.3212E-04
Phenanthrene	9.1470E-05	8.8713E-05	8.1881E-05	8.7354E-05
Pyrene	6.7563E-06	4.8878E-06	6.3739E-06	6.0060E-06
Pentachlorophenol	2.5986E-05	2.4439E-05	2.4515E-05	2.4980E-05
2-Chlorophenol	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4-Dichlorophenol	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
4-Chloro-3-methylphenol	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4,6-Trichlorophenol	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
2,4,5-Trichlorophenol	5.1971E-06	4.8878E-06	4.9030E-06	4.9960E-06
Total POHC	4.9737E-04	7.6445E-04	1.0358E-03	7.6586E-04

INLET POHC LOADING	#/hr	27.113	25.844	25.968	26.308
DRE	%	99.9982	99.9970	99.9960	99.9971
HEAT INPUT	MM Btu/hr	21.60	19.92	18.59	20.04
VOLUMETRIC FLOWRATE	acfm	17921	17044	17589	17518
VOLUMETRIC FLOWRATE	dscfm	10718	10190	9662	10190
VELOCITY	ft./sec.	46.0	43.8	45.2	45.0
STACK TEMPERATURE	°F	355	359	358	358
MOISTURE	%	7.0	6.6	14.3	9.3
SAMPLE RATE	% isokinetic	104	111	111	109

1.2 High Fire Mode - Approximately 31,000 pounds per hour

1.2.1 PM/CO/NOx/SO2/HCl/VOC emissions test

Run No.		4	5	6	AVG.
Date		2/21/96	2/21/96	2/21/96	------
Time Start		1023	1305	1544	----
Time End		1132	1415	1653	----
PARTICULATE EMISSIONS	#/hr	5.72	6.08	5.12	5.64
PARTICULATE EMISSIONS	gr/dscf	0.055	0.060	0.054	0.056
PARTICULATE EMISSIONS	#/MM Btu	0.116	0.128	0.108	0.118
SO2 EMISSIONS	#/hr	4.94	4.20	6.08	5.07
SO2 EMISSIONS	ppm	41	36	55	44
SO2 EMISSIONS	#/MM Btu	0.838	0.759	1.161	0.919
CO EMISSIONS	#/hr	1.96	2.41	1.22	1.86
CO EMISSIONS	ppm	37	47	25	37
CO EMISSIONS	#/MM Btu	0.040	0.051	0.026	0.039
NOx EMISSIONS	#/hr	10.16	10.09	9.88	10.05
NOx EMISSIONS	ppm	118	120	124	121
NOx EMISSIONS	#/MM Btu	0.207	0.213	0.209	0.210
VOC EMISSIONS	#/hr	0.27	0.18	0.15	0.20
VOC EMISSIONS	ppm	12	8	7	9
VOC EMISSIONS	#/MM Btu	0.006	0.004	0.003	0.004
HCl EMISSIONS	#/hr	4.38	3.04	4.05	3.82
HCl EMISSIONS	ppm	66	47	66	60
HCl EMISSIONS	#/MM Btu	1.341	0.990	1.394	1.242
HEAT INPUT	MM Btu/hr	49.19	47.34	47.23	47.92
VOLUMETRIC FLOWRATE	acfm	23864	23162	21980	23002
VOLUMETRIC FLOWRATE	dscfm	12020	11742	11126	11629
VELOCITY	ft./sec.	61.3	59.5	56.4	59.1
STACK TEMPERATURE	°F	443	429	429	434
MOISTURE	%	13.4	14.3	14.4	14.0
SAMPLE RATE	% isokinetic	100	101	101	101

1.2.2 POHC Test

Run No.	4	5	6	AVG.
Date	2/21/96	2/21/96	2/21/96	------
Time Start	0954	1235	1515	----
Time End	1158	1438	1718	----
POHC EMISSIONS #/hr				
Acenaphthylene	7.0175E-06	9.2323E-06	5.2681E-06	7.1726E-06
Acenapthene	6.4977E-06	1.1405E-05	5.2681E-06	7.7234E-06
Anthracene	6.8876E-05	6.1639E-05	3.5033E-05	5.5182E-05
Benzo(a)anthracene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(a)pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(b)fluoranthene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(g,h,i)perylene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Benzo(k)fluoranthene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Chrysene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Dibenzo(a,h)anthracene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Fluoranthene	7.5373E-06	7.0600E-06	5.2681E-06	6.6218E-06
Fluorene	7.0175E-06	7.8746E-06	5.2681E-06	6.7201E-06
Indeno(1,2,3-c,d)pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Naphthalene	8.7667E-04	9.4305E-04	1.9755E-04	6.7242E-04
Phenanthrene	6.4717E-05	5.7566E-05	3.2925E-05	5.1736E-05
Pyrene	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
Pentachlorophenol	2.5991E-05	2.7154E-05	2.6340E-05	2.6495E-05
2-Chlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4-Dichlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
4-Chloro-3-methylphenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4,6-Trichlorophenol	5.1982E-06	5.4308E-06	5.2681E-06	5.2990E-06
2,4,5-Trichlorophenol	5.1982E-06	1.1052E-04	5.2681E-06	4.0327E-05
TOTAL POHC	1.1371E-03	1.3061E-03	3.8668E-04	9.4329E-04

INLET POHC LOADING	#/hr	63.463	58.615	61.050	61.043
DRE	%	99.9982	99.9978	99.9994	99.9985
HEAT INPUT	MM Btu/hr	49.05	45.30	47.19	47.18
VOLUMETRIC FLOWRATE	acfm	24163	21847	21822	22611
VOLUMETRIC FLOWRATE	dscfm	11986	11238	11115	11446
VELOCITY	ft./sec.	62.0	56.1	56.0	58.1
STACK TEMPERATURE	°F	449	446	433	443
MOISTURE	%	14.2	11.4	13.5	13.0
SAMPLE RATE	% isokinetic	104	100	103	102

FUEL AND ASH ANALYSES

POHC	Creosote Fuel	Penta Fuel	Composite Fuel No. 1	Composite Fuel No. 2	Fly Ash	Bottom Ash
Acenaphthylene	28.2	31.3	23	34.9	ND	ND
Acenapthene	1017.8	935.9	596.1	739.4	0.02	0.01
Anthracene	851.5	967	546.8	645.7	0.01	0.07
Benzo(a)anthracene	400.3	412.6	238.7	284.7	0.01	0.02
Benzo(a)pyrene	194.8	218.8	104	137.9	ND	ND
Benzo(b)fluoranthene	207.9	227.5	113	157.8	ND	ND
Benzo(g,h,i)perylene	43.4	47.6	21.3	29.1	ND	ND
Benzo(k)fluoranthene	194.1	198.5	104.9	157.8	ND	ND
Chrysene	423.9	410.3	250.4	303.4	0.01	0.02
Dibenzo(a,h)anthracene	7.2	14.3	0.9	3.8	ND	ND
Fluoranthene	2209.5	2228.8	1327.4	1549.9	0.03	0.14
Fluorene	767.2	829.5	512.2	618.4	0.01	0.17
Indeno(1,2,3-c,d)pyrene	53.2	60.5	25.4	36.2	ND	ND
Naphthalene	8.0	522.7	724.8	974.1	0.06	1.27
Phenanthrene	3027.6	3315.2	2121.7	2452.9	0.04	0.27
Pyrene	1622.9	1562.7	911.1	1034.7	0.03	0.13
Pentachlorophenol	8.3	1233.4	211.6	265.9	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND	ND
Total POHC, mg/kg	11065.8	13216.6	7833.3	9426.6	0.220	2.100
#/#	0.01107	0.01322	0.00783	0.00943	2.20E-07	2.10E-06
OTHER						
Sulfur, % by wt.	0.23%	0.18%	0.24%	0.14%	0.65	0.049
Chlorine	——	——	——	——	2890	420
Heat value, Btu /#	5180	6860	6190	7150	——	——

2.0 Source Description:.

Koppers Industries, Inc. operates a 30,000 pound per hour Wellons wood waste boiler at their wood preserving facility in Grenada, Mississippi. The boiler provides steam for treating processes and turbine generator. Fuel is typically wood waste generated from the manufacture of treated wood products. For the test burn, fuel furnish consisted of hogged wood waste previously treated with pentachlorophenol or with creosote. For testing purposes, the fuel was mixed to contain approximately 50% penta treated and 50% creosote treated wood waste.

Tests were conducted under two operating modes: low fire and high fire. The low fire mode target steam production was 40% of capacity or 12,000 pounds per hour. Actual recorded steam rate for the period was 10,050 pounds per hour. Heat input as measured by the test data and F-factor technique was an average 20.33 MM Btu per hour. The high fire mode steam rate was an average recorded 29,600 pounds per hour and the measured heat input was 47.92 MM Btu per hour.

Steam rates, boiler combustion cell temperatures, CEM and COM data and fuel conveyor rates were recorded during the test period and those records are provided in Appendix F of this report. Additional process description and details of operation conditions during the test burn may be provided by Koppers Industries.

The boiler exhausts to the atmosphere by way of a 34.5 inch diameter vertical stack. Two sample ports at 90° are provided at a location that is 432 inches (12.5 diameters) below the stack exit and 356 inches (10.3 diameters) above an upstream stack tapered section.

3.0 Test Procedures: Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points, Method 3 to determine oxygen and carbon dioxide content of the stack gas, and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train was identical to that described in Method 5 except that the cyclone was omitted. Each test series was completed by making triplicate 60 minute sample runs. Gasses were measured by the following methods.

Sulfur dioxide was measured by using the Method 6 option of simultaneous determination with particulate by substituting 3% hydrogen peroxide for the water in the first two impingers of the Method 5 sample train.

HCl was measured by procedures described in Method 26-A, taking the option to simultaneously determine particulate. Quartz filters, teflon probe liners and quartz nozzles were used for sampling. After an aliquot of the sample from the impinger catch was analyzed forSO2, the samples were shipped to Clean Air Engineering in Palatine, Illinois, for analysis.

Heat input to the boilers was determined by continuously monitoring oxygen content of the flue gas as described in Method 3A and calculating heat input using an F-factor of 9280 scf per million Btu of heat input for the wood waste fuel.

Carbon monoxide concentration was continuously monitored as described in Method 10. A TECO Model 48H gas correlation filter NDIR was used. Instrument calibration and bias checks was performed prior to and following each series of tests, and a mid range system bias check was made following each run by directing (certified) calibration to the gas sampling probe.

Nitrogen oxides was continuously monitored as described in Method 7E using a TECO Model 10S analyzer. Instrument calibration was performed prior to and following each series of tests, and a mid range system bias check was made prior to and following each run by directing (Protocol 1) calibration to the gas sampling probe.

VOC (as carbon) concentrations was measured using Method 25A (continuous monitoring with a flame ionization detector) with a TECO Model 51 heated multiple range FID. An appropriate range was selected and calibrated using appropriate low, mid and high range concentrations of EPA Protocol 1 mixtures of propane in nitrogen. Since calibrations are to be made with propane (C3H8), results as methane (CH3) (or as carbon) are determined by increasing the measured concentration by a factor of three. A continuous trace of VOC as propane was recorded for each 60 minute test period. Instrument calibration was performed initially, and following each 60 minute test period. Any necessary adjustments was made after recording the response of the mid range calibration gas introduced at the inlet to the VOC sampling probe. The gas samples was directed to the heated FID analyzer by way of heated teflon sample line maintained at a minimum temperature of 250°F.

Instrument calibrations were made with the aid of an Environics Model 2020 gas diluter and Method 205.

Destruction and removal efficiency (DRE) of the pentachlorophenol and creosote compounds was determined by measuring the mass quantities of the associated POHC's being introduced to the boiler and emissions of those compounds from the boiler stack. The inlet loading was determined by collecting wood waste samples and analyzing for the target POHC's. Outlet concentrations was measured by collecting samples on XAD-2 resin using the Modified Method 5 (MM5) sampling train. Analyses were performed by Bonner Analytical Laboratories in Hattiesburg, Mississippi using GCMS.

4.0 DATA REDUCTION

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Collected Data:

			RUN 1	RUN 2	RUN 3	
	Date	:	**2/20/96**	**2/20/96**	**2/20/96**	
	Time start	:	**1205**	**1443**	**1715**	
	Time end	:	**1315**	**1555**	**1826**	
1.	As	: sq ft	6.4918	6.4918	6.4918	
2.	Dn	: in.	0.270	0.270	0.270	
3.	Cp	: dimensionless	0.84	0.84	0.84	
4.	Theta	: minutes	60.00	60.00	60.00	
5.	Y	: dimensionless	1.01	1.01	1.01	
6.	Pbar	: in. Hg	29.75	29.75	29.75	
7.	Pg	: in. H2O	-0.37	-0.37	-0.37	
8.	Vm	: cf (dry gas)	36.233	38.100	38.330	
9.	sqr(DP),avg	: in.H2O^.5	0.6390	0.6352	0.6382	
10.	DH	: in. H2O	1.3375	1.4750	1.4917	
11.	ts	: degrees F	346.33	359.33	352.58	352.75
12.	tm	: degrees F	73.67	73.46	71.17	
13.	Vlc	: ml	70	77	65	
14.	CO2	: percent	5.50	5.50	5.50	
15.	O2	: percent	14.30	14.50	14.60	
16.	CO	: percent	0.00	0.00	0.00	
17.	C,CO	: ppm (dry)	27.00	31.10	24.60	27.57
18.	F	: dscf	9400	9400	9400	
19.	M,PM	: milligrams	60.9	72.3	53.4	
20.	C,NOx	ppm	66	66	66	66.00
21	C,VOC	: ppm as propane	3.1	2.7	2.2	2.7
22	M,SO2	: milligrams	49.2	44.8	56.9	
23	M,HCl	: milligrams	29.00	26.20	40.50	

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.8483	29.8585	29.8597	
2. Ps : in. Hg (Pg/13.6)+Pbar	29.7228	29.7228	29.7228	
3. An : sq ft ((Dn/24)^2)(3.1416)	3.98E-04	3.98E-04	3.98E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)	36.120	38.009	38.405	37.511
5. Vwstd : scf (.04707cf/ml)(Vlc)	3.295	3.624	3.060	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	0.0836	0.0871	0.0738	0.0815
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.45	29.46	29.46	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.49	28.46	28.62	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	44.77	44.89	44.79	44.82
10. Q : cfm Vs As(60 sec/min)	17440	17485	17448	17458
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)	11345	11194	11262	11267
12. Qstd : dscfm Qstw(1-Bws)	10396	10219	10431	10349
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	208.07	219.03	224.84	217.31
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))	20.96	19.97	20.07	20.33
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	94.55	101.22	100.19	98.65

Koppers - Grenada
Wellons Wood Waste Boiler
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

Particulate Emissions	RUN 1	RUN 2	RUN 3	Avg.
16. E,PM : pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	2.32	2.57	1.92	2.27
17. C,PM : grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0260	0.0293	0.0214	0.0256
18. C'PM : grains/dscf @ 50% Xsair C'PM/(1-((1.5 O2-.133 N2 - .75 CO)/21))	0.0534	0.0622	0.0462	0.0539
19. E'PM : pounds/MM Btu E,PM/HeatInput	0.111	0.129	0.096	0.112

Carbon Monoxide Emissions				
20. E,CO : pounds/hr (C,CO*7.2708e-8)(60)(Qstd)	1.22	1.39	1.12	1.24
21. E'CO : pounds/MM Btu E,CO/Heat Input	0.058	0.069	0.056	0.061

NOx Emissions				
22. E,NOx : pounds/hr (C,NOx*1.194e-7)(60)(Qstd)	4.92	4.83	4.93	4.89
23. E'NOx : pounds/MM Btu E,NOx/Heat Input	0.235	0.242	0.246	0.241

VOC Emissions-				
24. C'VOC : ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	10.1	8.9	7.1	8.7
25. E,VOC : pounds/hr (C'VOC)(3.116e-8)(Qstd)(60)	0.20	0.17	0.14	0.17
26. E'VOC : pounds/MM Btu E,VOC/Heat Input	0.009	0.008	0.007	0.008

SO2 Emissions				
27. E,SO2 : pounds/hr (M,SO_2/Vmstd)(Qstd)(60)/(453590)	1.87	1.59	2.05	1.84
28. C,SO2 : ppm (M,SO2/Vmstd)(13.27)	18	16	20	18
29. E'SO2 : pounds/MM Btu E,SO2/Heat Input	0.089	0.080	0.102	0.090

HCl Emissions				
30. E,HCl : pounds/hr (M,Cl/Vmstd)(Qstd)(60)/(453590)	1.10	0.93	1.46	1.16
31. C,HCl : ppm (M,HCl/Vmstd)(23.949)	19.2	16.5	25.3	20.3
32. E'HCl : pounds/MM Btu E,SO2/Heat Input	0.053	0.047	0.073	0.057

PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 20, 1996

SO2 Sample Weight Determination

Collected data

RUN N0.	1	2	3
Vt-Vtb : ml	14.6	12.9	16.9
N : meq./ml	0.01015	0.01015	0.01015
Vsoln : ml	259	267	259
Va : ml	25	25	25

Calculation

RUN NO.	1	2	3
M,SO2 : N(Vt-Vtb)(Vsoln/Va)(32.03 mg/meq)	49.17	44.79	56.92

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

Collected Data:

			RUN1	RUN2	RUN3	
	Date	:	**2/20/96**	**2/20/96**	**2/20/96**	
	Time start	:	**1134**	**1413**	**1646**	
	Time end	:	**1142**	**1622**	**1850**	
1.	As	: sq ft	6.4918	6.4918	6.4918	
2.	Dn	: in.	0.220	0.220	0.220	
3.	Cp	: dimensionless	0.84	0.84	0.84	
4.	Theta	: minutes	120.00	120.00	120.00	
5.	Y	: dimensionless	1.00	1.00	1.00	
6.	Pbar	: in. Hg	29.75	29.75	29.75	
7.	Pg	: in. H2O	-0.39	-0.39	-0.39	
8.	Vm	: cf (dry gas)	57.590	59.269	55.039	
9.	sqr(DP),avg	: in.H2O^.5	0.6547	0.6218	0.6322	
10.	DH	: in. H2O	0.5233	0.5467	0.5671	
11.	ts	: degrees F	355.42	359.21	358.13	357.59
12.	tm	: degrees F	94.88	104.90	95.02	
13.	Vlc	: ml	87.5	83	185	
14.	CO2	: percent	5.50	5.50	5.50	
15.	O2	: percent	14.30	14.50	14.60	
16.	CO	: percent	0.00	0.00	0.00	
17.	C,CO	: ppm (dry)	27.00	31.10	24.60	27.57
18.	F	: dscf	9400	9400	9400	
19.	M,Species	: micrograms				
	Acenaphthylene		0.20	0.31	0.34	
	Acenapthene		0.62	0.77	0.97	
	Anthracene		3.74	3.88	3.56	
	Benzo(a)anthracene		*0.2*	*0.2*	*0.2*	
	Benzo(a)pyrene		*0.2*	*0.2*	*0.2*	
	Benzo(b)fluoranthene		*0.2*	*0.2*	*0.2*	
	Benzo(g,h,i)perylene		*0.2*	*0.2*	*0.2*	
	Benzo(k)fluoranthene		*0.2*	*0.2*	*0.2*	
	Chrysene		*0.2*	*0.2*	*0.2*	
	Dibenzo(a,h)anthracene		*0.2*	*0.2*	*0.2*	
	Fluoranthene		0.50	0.63	0.65	
	Fluorene		0.62	0.63	0.67	
	Indeno(1,2,3-c,d)pyrene		*0.2*	*0.2*	*0.2*	
	Naphthalene		6.08	17.63	28.86	
	Phenanthrene		3.52	3.63	3.34	
	Pyrene		0.26	*0.2*	0.26	
	Pentachlorophenol		*1*	*1*	*1*	
	2-Chlorophenol		*0.2*	*0.2*	*0.2*	
	2,4-Dichlorophenol		*0.2*	*0.2*	*0.2*	
	4-Chloro-3-methylphenol		*0.2*	*0.2*	*0.2*	
	2,4,6-Trichlorophenol		*0.2*	*0.2*	*0.2*	
	2,4,5-Trichlorophenol		*0.2*	*0.2*	*0.2*	

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

Calculations:		RUN1	RUN2	RUN3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar		29.7885	29.7902	29.7917	
2. Ps : in. Hg (Pg/13.6)+Pbar		29.7213	29.7213	29.7213	
3. An : sq ft ((Dn/24)^2)(3.1416)		2.64E-04	2.64E-04	2.64E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)		54.559	55.157	52.135	53.950
5. Vwstd : scf (.04707cf/ml)(Vlc)		4.119	3.907	8.708	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)		0.0702	0.0661	0.1431	0.0932
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)		29.45	29.46	29.46	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws		28.65	28.70	27.82	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))		46.01	43.76	45.16	44.97
10. Q : cfm Vs As(60 sec/min)		17921	17044	17589	17518
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)		11527	10912	11276	11238
12. Qstd : dscfm Qstw(1-Bws)		10718	10190	9662	10190
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]		208.07	219.03	224.84	217.31
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))		21.60	19.92	18.59	20.04
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)		104.32	110.93	110.59	108.61

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 20, 1996

POHC Emissions		RUN 1	RUN2	RUN3	Avg.
16. E,Species : pounds/hr (M,Species/Vmstd)(Qstd)(60)/(453590000)	Acenaphthylene	5.197E-06	7.576E-06	8.335E-06	7.036E-06
	Acenapthene	1.611E-05	1.882E-05	2.378E-05	1.957E-05
	Anthracene	9.719E-05	9.482E-05	8.727E-05	9.309E-05
	Benzo(a)anthracene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(a)pyrene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(b)fluoranthene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(g,h,i)perylene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Benzo(k)fluoranthene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Chrysene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Dibenzo(a,h)anthracene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Fluoranthene	1.299E-05	1.540E-05	1.593E-05	1.477E-05
	Fluorene	1.611E-05	1.540E-05	1.643E-05	1.598E-05
	Indeno(1,2,3-c,d)pyrene	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	Naphthalene	1.580E-04	4.309E-04	7.075E-04	4.321E-04
	Phenanthrene	9.147E-05	8.871E-05	8.188E-05	8.735E-05
	Pyrene	6.756E-06	4.888E-06	6.374E-06	6.006E-06
	Pentachlorophenol	2.599E-05	2.444E-05	2.452E-05	2.498E-05
	2-Chlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4-Dichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	4-Chloro-3-methylphenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4,6-Trichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
	2,4,5-Trichlorophenol	5.197E-06	4.888E-06	4.903E-06	4.996E-06
TOTAL		4.974E-04	7.644E-04	1.036E-03	7.659E-04

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire -
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Collected Data:

		RUN 4	RUN 5	RUN 6	
Date :		**2/21/96**	**2/21/96**	**2/21/96**	
Time start :		**1023**	**1305**	**1544**	
Time end :		**1132**	**1415**	**1653**	
1. As	: sq ft	6.4918	6.4918	6.4918	
2. Dn	: in.	0.270	0.270	0.270	
3. Cp	: dimensionless	0.84	0.84	0.84	
4. Theta	: minutes	60.00	60.00	60.00	
5. Y	: dimensionless	1.01	1.01	1.01	
6. Pbar	: in. Hg	29.82	29.82	29.82	
7. Pg	: in. H2O	-0.5	-0.5	-0.5	
8. Vm	: cf (dry gas)	43.625	43.517	41.719	
9. sqr(DP),avg	: in.H2O^.5	0.8282	0.8090	0.7671	
10. DH	: in. H2O	2.1458	2.0417	1.8458	
11. ts	: degrees F	443.17	428.75	429.08	433.67
12. tm	: degrees F	66.96	73.92	76.79	
13. Vlc	: ml	146	154	148	
14. CO2	: percent	12.00	12.00	12.00	
15. O2	: percent	7.50	7.70	7.00	
16. CO	: percent	0.00	0.00	0.00	
17. C,CO	: ppm (dry)	37.40	47.10	25.10	36.53
18. F	: dscf	9400	9400	9400	
19. M,PM	: milligrams	159.1	170.5	144.4	
21. C,NOx	: ppm	118	120	124	120.67
22. C,VOC	: ppm as propane	3.5	2.4	2.1	2.7
20. M,SO2	: milligrams	137.4	117.9	171.4	
19. M,HCl	: milligrams	121.80	85.20	114.10	

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire
PM/CO/NOx Emissions Test - February 21, 1996
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Calculations:		RUN 4	RUN 5	RUN 6	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar		29.9778	29.9701	29.9557	
2. Ps : in. Hg (Pg/13.6)+Pbar		29.7832	29.7832	29.7832	
3. An : sq ft ((Dn/24)^2)(3.1416)		3.98E-04	3.98E-04	3.98E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)		44.233	43.538	41.496	43.089
5. Vwstd : scf (.04707cf/ml)(Vlc)		6.872	7.249	6.966	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)		0.1345	0.1427	0.1437	0.1403
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)		30.22	30.23	30.20	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws		28.58	28.48	28.45	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))		61.27	59.46	56.43	59.05
10. Q : cfm Vs As(60 sec/min)		23864	23162	21980	23002
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)		13887	13697	12994	13526
12. Qstd : dscfm Qstw(1-Bws)		12020	11742	11126	11629
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]		54.54	57.04	48.67	53.41
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))		49.19	47.34	47.23	47.92
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)		100.15	100.90	101.50	100.85

Koppers - Grenada
Wellons Wood Waste Boiler - High Fire -
PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

Particulate Emissions	RUN 4	RUN 5	RUN 6	Avg.
16. E,PM : pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	5.72	6.08	5.12	5.64
17. C,PM : grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.0554	0.0603	0.0536	0.0564
18. C'PM : grains/dscf @ 50% Xsair C'PM/(1-((1.5 O2-.133 N2 - .75 CO)/21))	0.0569	0.0629	0.0529	0.0576
19. E'PM : pounds/MM Btu E,PM/HeatInput	0.116	0.128	0.108	0.118

Carbon Monoxide Emissions				
20. E,CO : pounds/hr (C,CO*7.2708e-8)(60)(Qstd)	1.96	2.41	1.22	1.86
21. E'CO : pounds/MM Btu E,CO/Heat Input	0.040	0.051	0.026	0.039

NOx Emissions				
22. E,NOx : pounds/hr (C,NOx*1.194e-7)(60)(Qstd)	10.16	10.09	9.88	10.05
23. E'NOx : pounds/MM Btu E,NOx/Heat Input	0.207	0.213	0.209	0.210

VOC Emissions-				
24. C'VOC : ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	12.1	8.4	7.4	9.3
25. E,VOC : pounds/hr (C'VOC)(3.116e-8)(Qstd)(60)	0.27	0.18	0.15	0.20
26. E'VOC : pounds/MM Btu E,VOC/Heat Input	0.006	0.004	0.003	0.004

SO2 Emissions				
26. E,SO2 : pounds/hr (M,SO_2/Vmstd)(Qstd)(60)/(453590)	4.94	4.20	6.08	5.07
27. C,SO2 : ppm (M,SO2/Vmstd)(13.27)	41	36	55	44
28. E'SO2 : pounds/MM Btu E,SO2/Heat Input	0.838	0.759	1.161	0.919

HCl Emissions				
28. E,HCl : pounds/hr (M,Cl/Vmstd)(Qstd)(60)/(453590)	4.38	3.04	4.05	3.82
29. C,HCl : ppm (M,HCl/Vmstd)(23.949)	65.9	46.9	65.9	59.6
30. E'HCl : pounds/MM Btu E,SO2/Heat Input	1.341	0.990	1.394	1.242

PM/CO/NOx/VOC/SO2/HCl Emissions Test - February 21, 1996

SO2 Sample Weight Determination

Collected data

RUN N0.	4	5	6
Vt-Vtb : ml	12.5	10.6	15.6
N : meq./ml	0.01015	0.01015	0.01015
Vsoln : ml	338	342	338
Va : ml	10	10	10

Calculation

RUN NO.	1	2	3
M,SO2 : N(Vt-Vtb)(Vsoln/Va)(32.03 mg/meq)	137.36	117.86	171.42

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

Collected Data:

			RUN 4	RUN 5	RUN 6	
	Date	:	**2/21/96**	**2/21/96**	**2/21/96**	
	Time start	:	**0954**	**1235**	**1515**	
	Time end	:	**1158**	**1438**	**1718**	
1.	As	: sq ft	6.4918	6.4918	6.4918	
2.	Dn	: in.	0.220	0.220	0.220	
3.	Cp	: dimensionless	0.84	0.84	0.84	
4.	Theta	: minutes	120.00	120.00	120.00	
5.	Y	: dimensionless	1.00	1.00	1.00	
6.	Pbar	: in. Hg	29.82	29.82	29.82	
7.	Pg	: in. H2O	-0.37	-0.37	-0.37	
8.	Vm	: cf (dry gas)	64.042	57.739	58.882	
9.	sqr(DP),avg	: in.H2O^.5	0.8345	0.7606	0.7615	
10.	DH	: in. H2O	0.8442	0.6950	0.6908	
11.	ts	: degrees F	449.42	446.04	432.92	442.79
12.	tm	: degrees F	93.63	95.98	96.06	
13.	Vlc	: ml	214.5	149	185	
14.	CO2	: percent	12.00	12.00	12.00	
15.	O2	: percent	7.50	7.70	7.00	
16.	CO	: percent	0.00	0.00	0.00	
17.	C,CO	: ppm (dry)	37.40	47.10	25.10	36.53
18.	F	: dscf	9400	9400	9400	
19.	M,Species	: micrograms				
		Acenaphthylene	0.27	0.34	*0.2*	
		Acenapthene	0.25	0.42	*0.2*	
		Anthracene	2.65	2.27	1.33	
		Benzo(a)anthracene	*0.2*	*0.2*	*0.2*	
		Benzo(a)pyrene	*0.2*	*0.2*	*0.2*	
		Benzo(b)fluoranthene	*0.2*	*0.2*	*0.2*	
		Benzo(g,h,i)perylene	*0.2*	*0.2*	*0.2*	
		Benzo(k)fluoranthene	*0.2*	*0.2*	*0.2*	
		Chrysene	*0.2*	*0.2*	*0.2*	
		Dibenzo(a,h)anthracene	*0.2*	*0.2*	*0.2*	
		Fluoranthene	0.29	0.26	*0.2*	
		Fluorene	0.27	0.29	*0.2*	
		Indeno(1,2,3-c,d)pyrene	*0.2*	*0.2*	*0.2*	
		Naphthalene	33.73	34.73	7.5	
		Phenanthrene	2.49	2.12	1.25	
		Pyrene	*0.2*	*0.2*	*0.2*	
		Pentachlorophenol	*1*	*1*	*1*	
		2-Chlorophenol	*0.2*	*0.2*	*0.2*	
		2,4-Dichlorophenol	*0.2*	*0.2*	*0.2*	
		4-Chloro-3-methylphenol	*0.2*	*0.2*	*0.2*	
		2,4,6-Trichlorophenol	*0.2*	*0.2*	*0.2*	
		2,4,5-Trichlorophenol	*0.2*	4.07	*0.2*	

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

Calculations:	RUN 4	RUN 5	RUN 6	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.8821	29.8711	29.8708	
2. Ps : in. Hg (Pg/13.6)+Pbar	29.7928	29.7928	29.7928	
3. An : sq ft ((Dn/24)^2)(3.1416)	2.64E-04	2.64E-04	2.64E-04	
4. Vmstd : dscf Vm Y(Pm/Pstd)(Tstd/Tm)	61.000	54.744	55.819	57.187
5. Vwstd : scf (.04707cf/ml)(Vlc)	10.097	7.013	8.708	
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	0.1420	0.1136	0.1350	0.1302
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	30.22	30.23	30.20	
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.48	28.84	28.55	
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	62.04	56.09	56.03	58.05
10. Q : cfm Vs As(60 sec/min)	24163	21847	21822	22611
11. Qstw : scfm Q(Ps/Pstd)(Tstd/Ts)	13969	12677	12849	13165
12. Qstd : dscfm Qstw(1-Bws)	11986	11238	11115	11446
13. Xsair : percent 100[(O2-.5CO)/(.264 N2-(O2-.5CO))]	54.54	57.04	48.67	53.41
14. HeatInput : MM Btu/hr 60 Qstd/(F 20.9/(20.9 - O2))	49.05	45.30	47.19	47.18
15. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	104.31	99.84	102.92	102.36

Koppers - Grenada
Wellons Wood Waste Boiler
POHC Emissions Test - February 21, 1996

POHC Emissions

16. E,Species : pounds/hr (M,Species/Vmstd)(Qstd)(60)/(453590000)	RUN 4	RUN 5	RUN 6	Avg.
Acenaphthylene	7.018E-06	9.232E-06	5.268E-06	7.173E-06
Acenapthene	6.498E-06	1.140E-05	5.268E-06	7.723E-06
Anthracene	6.888E-05	6.164E-05	3.503E-05	5.518E-05
Benzo(a)anthracene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(a)pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(b)fluoranthene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(g,h,i)perylene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Benzo(k)fluoranthene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Chrysene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Dibenzo(a,h)anthracene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Fluoranthene	7.537E-06	7.060E-06	5.268E-06	6.622E-06
Fluorene	7.018E-06	7.875E-06	5.268E-06	6.720E-06
Indeno(1,2,3-c,d)pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Naphthalene	8.767E-04	9.431E-04	1.976E-04	6.724E-04
Phenanthrene	6.472E-05	5.757E-05	3.293E-05	5.174E-05
Pyrene	5.198E-06	5.431E-06	5.268E-06	5.299E-06
Pentachlorophenol	2.599E-05	2.715E-05	2.634E-05	2.649E-05
2-Chlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4-Dichlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
4-Chloro-3-methylphenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4,6-Trichlorophenol	5.198E-06	5.431E-06	5.268E-06	5.299E-06
2,4,5-Trichlorophenol	5.198E-06	1.105E-04	5.268E-06	4.033E-05
TOTAL	1.137E-03	1.306E-03	3.867E-04	9.433E-04

Destruction and Removal Efficiency Calculations

Data		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
Heat Input	: MM Btu/hr.	20.96	19.97	20.07	49.05	45.30	47.19
Heat Value	: Btu/#	6670	6670	6670	6670	6670	6670
POHC Emission Rate	: #/hr	4.974E-04	7.644E-04	1.036E-03	1.137E-03	1.306E-03	3.867E-04

Calculations:	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
Fuel Rate : #/hr (Heat Input)/(heat value)	3142	2995	3009	7354	6792	7074
POHC Inlet Loading : #/hr (Fuel Rate)(POHC Content)	27.113	25.844	25.968	63.463	58.615	61.050
DRE : % 100-((Emission / Inlet Loading)(100))	99.9982	99.9970	99.9960	99.9982	99.9978	99.9994

Average DRE for Low Fire = 99.9971

Average DRE for High Fire = 99.9984

The DRE values are biased low. Analytical minimum detectable values were used for calculating emission rates where there was a none detected amount of a constituent in the stack gas sample and zero values were used for calculating inlet loading where there was a none detected amount of a constituent found in the fuel sample.

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft^2	Nozzle cross sectional area
As	ft^2	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO_2	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C,X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH (delta H)	in. H_2O	Pressure drop across meter orifice
ΔP (delta P)	in. H_2O	Stack gas velocity pressure
E,X	#/hr	Emission rate of pollutant X
E'X	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M,X	milligrams	Sample weight of pollutant X
Md	#/# mole	Dry molecular weight of stack gas
Ms	#/# mole	Wet molecular weight of stack gas
N2	percent	Nitrogen content by volume, dry basis
O_2	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(DH/13.6)
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ (theta)	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft^3	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

6.0 CALIBRATIONS:

Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required, are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, a gas meter calibration is checked in one of two ways. [1] Three calibration checks at intermediate orifice settings are performed or [2] orifice meter coefficients are used.

If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration.

Nozzles:

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration which it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NAPP, Inc.

Temperature Measuring Instruments:

Most temperature measurements are made with a type K thermocouple and an Omega digital thermocouple thermometer which has an initial calibration traceable to NBS. Other measurements are made using bimetallic dial thermometers. The thermocouples and dial thermometers are checked following or during a test series against an ASTM mercury in glass thermometer.

Barometer:

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:

Velocity head (delta P) and orifice pressure differential (delta H) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

7.0 APPENDICES

A. Field and Laboratory Data

B. Calibrations

C. Visible Emissions Record

D. POHC Analysis Report (Bonner)

E. HCl Analysis Report (CAE)

F Boiler Records (Koppers)

7.0 APPENDICES

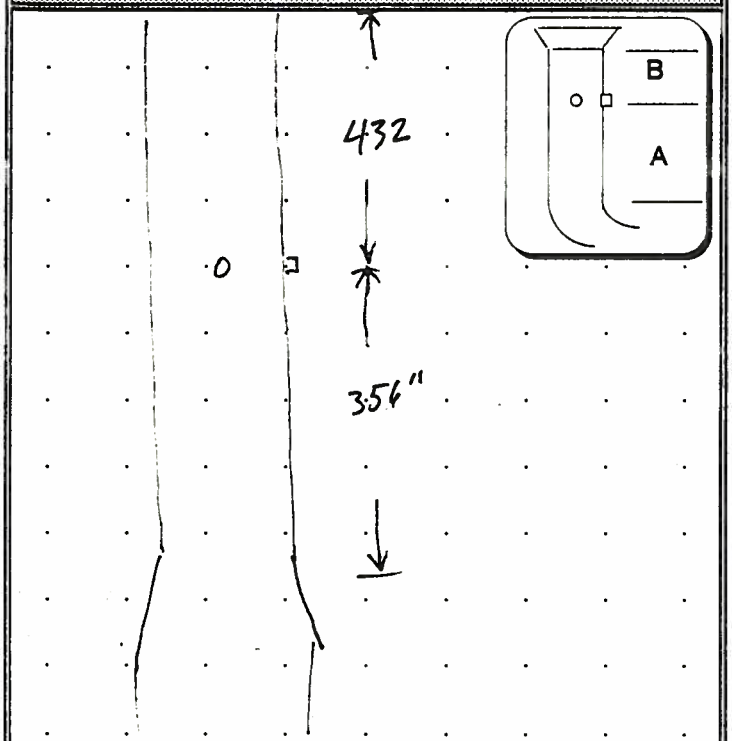
APPENDIX A.

SAMPLING AND ANALYTICAL DATA

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: KOPPERS **Date:** 2-19-96
SOURCE: BOILER
TEST FOR: YOU NAME IT
TEST OPERATORS: B MCKNIGHT

SKETCH OF STACK



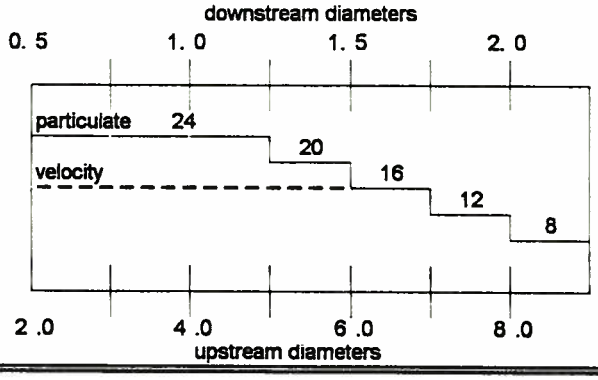
PERCENT OF DIAMETER

	points on a diameter							
	2	4	6	8	10	12	14	16
point no.								
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

STACK DIAMETER:	34.5"
Distance from ports to disturbance:	
A. to upstream disturbance	356
B. to downstream disturbance	432
Upstream diameters:	10.3
Downstream diameters:	12.52
Minimum No. sample points required:	8
No. sample points selected:	12
Port Length:	NE 8" AOD 7.5" SE
Port Type:	4" NIPPLE W 6" TO 4" REDUCER
Port Access:	CATWALK / BOARD / CHAINS

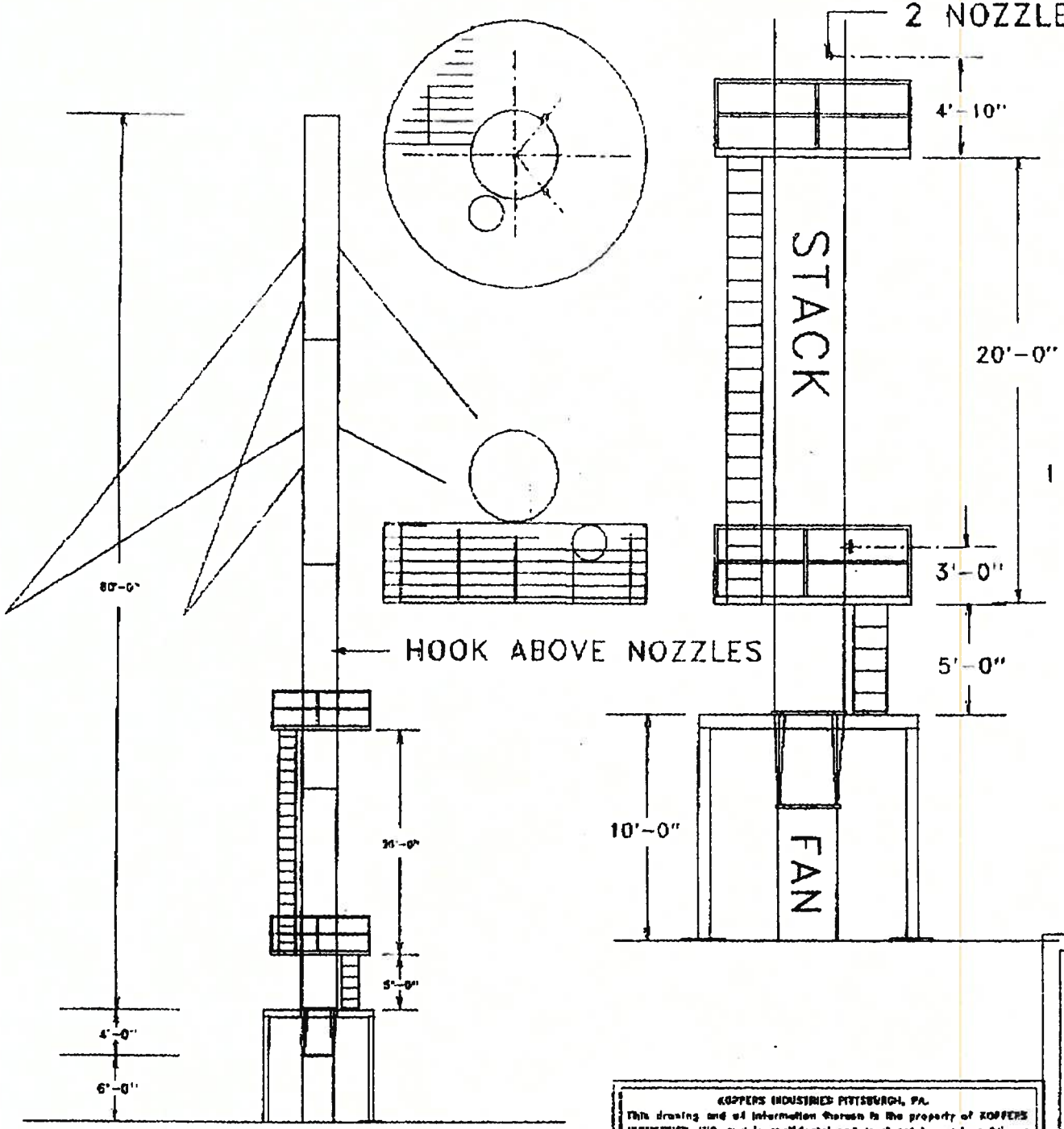
Point No.	Inches from wall	velocity head
1	1.5	.75
2	5.0	.72
3	10.2	.70
4	24.3	.52
5	29.5	.37
6	33.0	.37

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID: Pitot Cp: Stack Temp: 370

Remarks:



THIS DRAWING SHOWS MEASURMENT AND ELEVATIONS ONLY.

ALL WORK, LADDERS AND WALKWAYS WILL MEET ALL OSHA STANDARDS.

ALL METAL TO BE PRIMED AND PAINTED WITH HIGH TEMPATURE PAINT

FINISH GREY

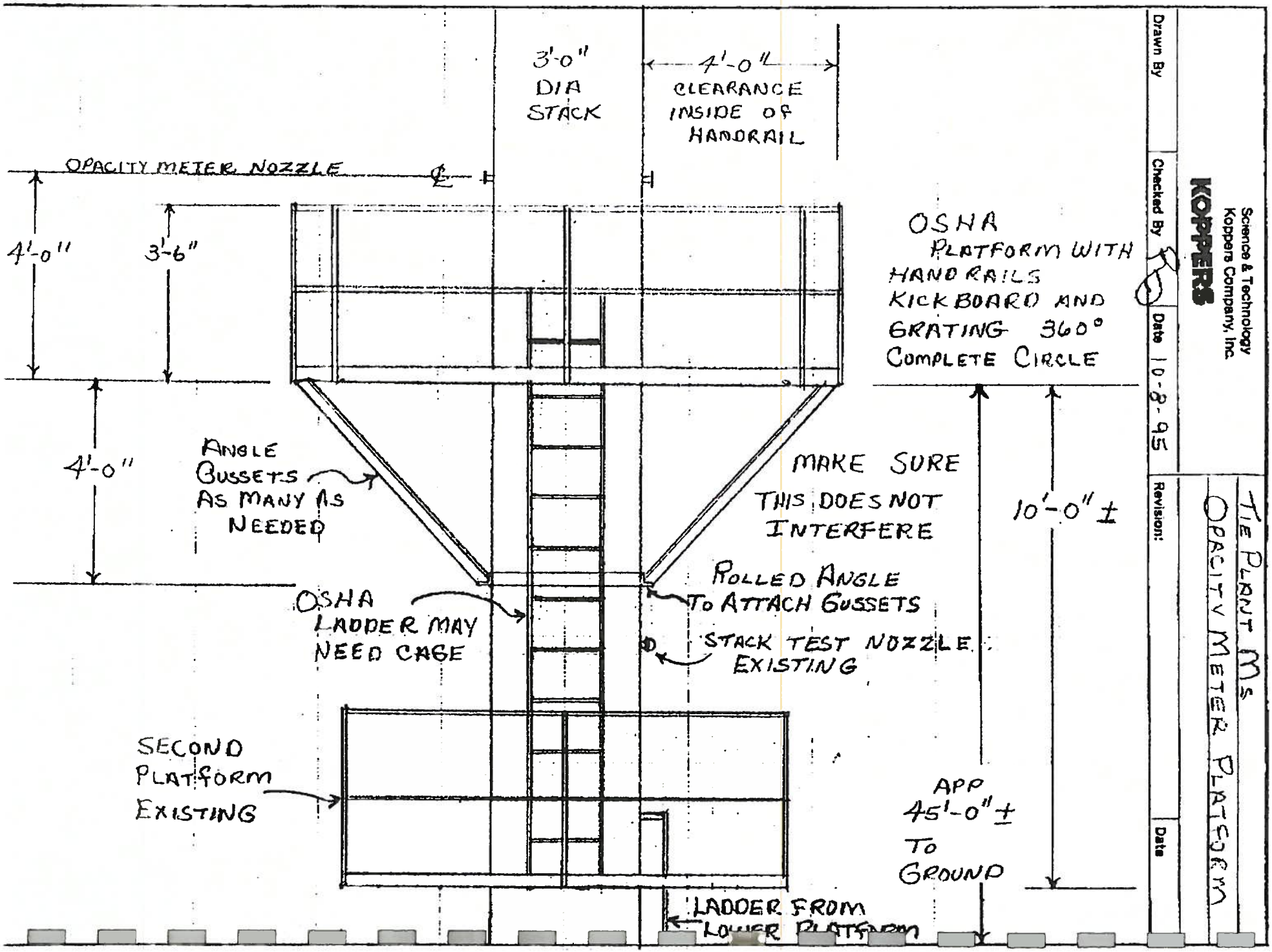
WILL NEED GUYS (6)

KOPPERS INDUSTRIES PITTSBURGH, PA.
This drawing and all information thereon is the property of KOPPERS INDUSTRIES, INC. and is confidential and must not be made public or copied unless authorized by it and is subject to return upon demand.
Copyright © Koppers Industries, Inc. 1991 -92

KOPPERS INDUSTRIES INC.
PLANT TIE PLANT, MISS.
PROJECT BOILER INDUSTRIAL FURNACE
DATE 4/20/92 SCALE U-15
BY RLD REV.
DRAWING # BIF-STACK-01

OCT 6 '95 16:13 FROM KOPPERS FLORENCE SC PAGE.003

ALL INFORMATION HEREON IS THE EXCLUSIVE PROPERTY OF KOPPERS COMPANY, INC., SCIENCE & TECHNOLOGY



OCT 8 '95 16:13 FROM KOPPERS FLORENCE SC PAGE.004

Plant Koppers Tie Plant, Ms.
Sampling Location Boiler - Woodwaste
Test For PM / SO_2 / CO / NO_x / VOC / VE / HCL
Test Operators G. McKnight / J. Winstead / L. Carnuth

RUN No. 1
Date 2-20-96
Time start 1205 end 1315

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	NO. 4	Minutes/Pt.	5.0	CO_2	[illegible]
Probe/Pitot	4 ft S.S.			O_2	14.3
Pitot Cp	.84	NOMOGRAPH		CO	24.9 ppm
Nozzle Dia.	.270	ΔH@	20	Time	
Filter No.		Meter Temp.	65		
		% H_2O	17	Condensate:	
Amb. Temp. °F	68°	C-Factor	.87	tare 200	fin 259
Bar. Press. "Hg	29.75	Stack Temp.	375 / 350	Silica gel:	
Static Press. "H_2O	-.60	Ref. ΔP	.58 / .56	tare 695	fin 706

Remarks:

Avg VOC = 3.1 ppm as C

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F in	Meter Temp. °F out	Dry Temp. °F	Imp. Temp. °F	Vac. Hg
1	00 00	731.282	0.30	1.00	325	72	70	276	55	2
2	5 00	733.9	0.38	1.20	343	71	71	260	54	2
3	10 00	736.8	0.40	1.30	350	72	71	256	54	2
4	15 00	739.8	0.45	1.50	359	72	71	255	54	2
5	20 00	742.9	0.45	1.50	357	73	72	245	55	2
6	25 00	746.0	0.42	1.40	345	74	73	252	55	2
1	30 00	749.285	0.37	1.15	349	75	74	250	52	2
2	5 00	752.0	0.40	1.30	345	75	74	256	52	2
3	10 00	754.9	0.40	1.30	343	76	74	255	52	2
4	15 00	758.0	0.50	1.65	344	77	75	258	52	2
5	20 00	761.2	0.48	1.60	349	77	75	260	52	2
6	25 00	764.5	0.37	1.15	347	78	76	256	52	2
end	60 00	767.515								

leak check: .045 → .055 = .010 cfm @ 6" Hg

+ pitot ✓ @ 6.8
− pitot ✓ @ 6.3

36.233 .6390 1.3375 346.33 73.67

Plant Koppers Tie Plant/MS
Sampling Location Woodwaste Boiler
Test For PM/SO2/CO/NOx/VOC/VE/HCL
Test Operators G.McKnight / J. Winstead / L. Carruth

RUN No. 2
Date 2-20-96
Time start 1443 end 1555

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis		Remarks:	
Sample Box	No. 3	Minutes/Pt.	5.0	CO			
Probe/Pitot	4ft S.S			O_2	14.5		
Pitot Cp	.84	NOMOGRAPH		CO	311 ppm		
Nozzle Dia.	.270	ΔH@	2.0	Time			
Filter No.		Meter Temp.	75				
		% H_2O	12	Condensate:			
Amb. Temp. °F	70°	C-Factor	98	tare 200 fin 267			
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:			
Static Press. "H_2O	-.60	Ref. ΔP	.90	tare 676 fin 696		AVG. VOC = 2.7	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F	Oven Temp. °F	Impinger Temp. °F	Vacuum in. Hg
1	00 00	767.895	0.40	1.45	357	73	73	256	6	2
2	5 00	770.6	0.35	1.25	356	73	73	255	6	2
3	10 00	773.8	0.42	1.55	361	73	73	245	6	2
4	15 00	777.0	0.45	1.65	366	74	73	256	6	2
5	20 00	780.3	0.42	1.55	360	74	73	252	6	2
6	25 00	783.6	0.38	1.40	360	74	73	245	6	2
1	30 00	786.918	0.38	1.40	359	73	73	253	6	2
2	35 00	789.9	0.36	1.30	355	74	73	245	6	2
3	40 00	792.9	0.45	1.65	360	74	73	245	6	2
4	45 00	796.3	0.44	1.60	360	75	73	256	6	2
5	50 00	799.5	0.40	1.45	359	75	73	252	6	2
6	55 00	802.6	0.40	1.45	354	75	73	256	6	2
end	60 00	805.995								

leak check: .030 ——→ .035 = .005 @ 6"Hg

+ pitot ✓ @ 6.5
- pitot ✓ @ 6.2

38.100	.6352	1.4750	359.33	73.46		

Plant Koppers Tie Plant, Ms.
Sampling Location Woodwaste Boiler
Test For PM/SO2/CO/NOx/VOC/VE/HCl
Test Operators G.M.Knight / S. Winstead / L. Carruth

RUN No. 3
Date 2-20-96
Time start 1715 end 1826

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	No. 4	Minutes/Pt.	5.0	CO2	
Probe/Pitot	4 ft s.s	NOMOGRAPH		O2	@ 14.6
Pitot Cp	.84	ΔH@	2.0	CO	24.6
Nozzle Dia.	.270	Meter Temp.	75	Time	
Filter No.		% H2O	12	Condensate:	
Amb. Temp. °F	70	C-Factor	.98	tare 200	fin 259
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H2O	-.50	Ref. ΔP	.50	tare 706	fin 712

Remarks:
VOC = 2.2

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head Δ P, in. H2O	Orifice Δ H in. H2O	Stack Temp. °F	Meter Temp. °F in	Meter Temp. °F out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1 1	00 00	805.388	0.40	1.45	353	73	72	248	66	2
2	5 00	809.1	0.38	1.40	352	73	72	252	66	2
3	10 00	812.1	0.42	1.55	350	73	72	252	66	2
4	15 00	815.3	0.42	1.55	356	73	72	260	66	2
5	20 00	818.5	0.40	1.45	353	72	71	257	66	2
6	25 00	821.5	0.40	1.45	353	72	71	253	66	2
2 1	30 00	824.678	0.38	1.40	351	70	69	250	66	2
2	5 00	827.6	0.40	1.45	351	70	69	249	66	2
3	10 00	831.1	0.40	1.45	353	70	70	247	66	2
4	15 00	833.9	0.45	1.65	353	71	70	252	66	2
5	20 00	837.2	0.42	1.55	352	71	70	250	66	2
6	25 00	840.3	0.42	1.55	354	72	70	250	66	2
end	60 00	843.718								

leak check: .070 → .079 = .009 @ 6"Hg

+ pitot ✓ @ 6.4
− pitot ✓ @ 6.2

38.330	.6382	1.4917	352.58		71.17	

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers

DATE TAKEN: 2-20-96 DATE ANALYZED: 2-26-96

DELIVERED BY: [illegible] RECEIVED BY: [illegible]

ANALYZED BY: [illegible]

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	3465	3464	[illegible]	
FILTER TARE, gms.	.5720	.5700	.6849	
	.6202	.6154	.7171	
	.6201	.6153	.7173	
FINAL WEIGHT, gms.	.6201	.6153	[illegible]	
NET GAIN, gms.	.0481	.0453	.0324	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Kop R1	Kop R2	[illegible]	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	190	160	170	
TARE WEIGHT, gms.	(87) 107.2271	(86) 108.1660	(61) [illegible]	( )
	107.2402	108.1734	[illegible]	
	107.2399	108.1730	[illegible]	
FINAL WEIGHT, gms	107.2399	108.1730	[illegible]	
NET GAIN, gms.	.0128	.0270	.0210	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	60.9	723	53.4	

Plant Koppers Tie Plant, MS
Sampling Location Woodwaste Boiler
Test For PM/SO2/NOx/VOC/VE/HCl
Test Operators G. McKnight / T. Winstead / L. Carcuth

RUN No. 4
Date 2-21-96
Time start 1023 end 1132

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis			Remarks:
Sample Box	No. 3	Minutes/Pt.	5.0	CO_2			
Probe/Pitot	4ft S.S			O_2	7.5%		
Pitot Cp	.84	NOMOGRAPH		CO	32.4 ppm		
Nozzle Dia.	.270	ΔH@	2.0	Time	NOx = 118 ppm		
Filter No.		Meter Temp.	75				
		% H_2O	12 | 15	Condensate:			AVG. VOC = 3.5 ppm
Amb. Temp. °F	65°	C-Factor	.98 | .92	tare	200	fin 338	
Bar. Press. "Hg	29.82	Stack Temp.	350 | 425	Silica gel:			
Static Press. "H_2O	-.50	Ref. ΔP	.50 | .54	tare	646	fin 694	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1	00 00	844.162	0.42	1.30	427	67	65	253	54	2
2	5 00	846.7	0.62	1.95	437	66	65	250	54	2
3	10 00	850.2	0.68	2.10	445	67	65	247	54	2
4	15 00	853.7	0.74	2.15	457	67	65	250	54	2
5	20 00	857.5	0.68	2.10	449	68	67	247	54	2
6	25 00	861.1	0.67	2.05	447	68	66	251	54	2
1	30 00	864.734	0.60	1.90	438	67	65	247	54	2
2	5 00	868.0	0.60	1.90	440	67	66	250	54	2
3	10 00	871.4	0.65	2.00	441	68	67	255	54	2
4	15 00	875.0	0.90	2.80	447	69	67	247	54	2
5	20 00	879.1	0.85	2.70	445	70	67	250	54	2
6	25 00	883.2	0.90	2.80	445	71	67	249	54	2
end	60 00	887.787								
		leak check: .027	⇒ .035	= .008 cfm @ 6" Hg						
			+ pitot / ℓ 6.5							
			− pitot / ℓ 6.4							
		43.625	.8282	2.1458	443.17		66.96			

Plant Koppers Tie Plant, MS
Sampling Location Woodwaste Boiler
Test For PM/SO2/NOx/VOC/VE/HCL
Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 5
Date 2-21-96
Time start 1305 end 1415

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	No. 4	Minutes/Pt.	5.0	CO_2	
Probe/Pitot	4 ft SS	NOMOGRAPH		O_2	7.7
Pitot Cp	.84	ΔH@	2.0	CO	47.1
Nozzle Dia.	.270	Meter Temp.	75	Time	NOx = 120 ppm
Filter No.		% H_2O	15	Condensate:	
Amb. Temp. °F	75°	C-Factor	.92	tare 200 fin 342	
Bar. Press. "Hg	29.82	Stack Temp.	425	Silica gel:	
Static Press. "H_2O	-.50	Ref. ΔP	.59	tare 712 fin 724	

Remarks:

AVG. VOC = 2.4

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp °F	Vac. in Hg
1	00 00	888.161	0.60	1.90	435	72	71	260	64	2
2	5 00	891.4	0.65	2.00	436	72	71	257	61	2
3	10 00	895.1	0.65	2.00	439	73	72	254	61	2
4	15 00	898.6	0.70	2.20	442	74	72	254	61	2
5	20 00	902.4	0.70	2.20	445	75	72	254	61	2
6	25 00	906.1	0.65	2.00	444	75	73	256	61	2
1	30 00	909.842	0.68	2.10	444	74	73	253	61	2
2	5 00	913.5	0.65	2.00	445	76	74	249	61	2
3	10 00	916.9	0.60	1.90	436	76	74	254	61	2
4	15 00	920.5	0.68	2.10	438	77	74	252	61	3
5	20 00	924.2	0.70	2.20	431	77	74	248	61	3
6	25 00	928.0	0.60	1.90	430	78	75	252	61	3
end	60 00	931.678								

leak check: .010 → .020 = .010 dm 27 ~~[illegible]~~

+ pitot @ 6.3
− pitot @ 6.3

43.517 8090 2.0417 438.75 2392

Plant Koppers Tie Plant, Ms.
Sampling Location Woodwaste Boiler
Test For PM / SOx / NOx / VOC / VE / HCL
Test Operators G. McKnight / J. Winstead / L. Carruth

RUN No. 6
Date 2-21-96
Time start 1544 end 1653

Meter Box	Nutech	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	NO. 3	Minutes/Pt.	5.0	CO_2	
Probe/Pitot	4 ft S.S	NOMOGRAPH		O_2	7.0 %
Pitot Cp	.84	ΔH@	2.0	CO	25
Nozzle Dia.	.270	Meter Temp.	75	Time	NOx = 124 ppm
Filter No.		% H_2O	15	Condensate:	
Amb. Temp. °F	75°	C-Factor	.92	tare 200 fin 338	
Bar. Press. "Hg	29.82	Stack Temp.	425	Silica gel:	
Static Press. "H_2O	-.50	Ref. ΔP	.59	tare 698 fin 708	

Remarks:
AVG = 2.1

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp °F In	Meter Temp °F Out	Oven Temp. °F	Imp. Temp °F	Vac in. Hg
1	00 00	932.188	0.55	1.75	428	77	76	250	76	2
2	5 00	935.4	0.65	2.00	428	77	76	252	66	2
3	10 00	939.0	0.50	1.55	432	78	76	246	64	2
4	15 00	942.3	0.65	2.00	436	78	76	250	66	2
5	20 00	945.8	0.68	2.10	431	78	77	247	66	2
6	25 00	949.5	0.68	2.10	428	78	77	251	66	2
1	30 00	953.422	0.55	1.75	425	77	78	251	66	2
2	5 00	956.6	0.60	1.90	431	77	76	251	66	2
3	10 00	960.1	0.60	1.90	435	77	76	240	66	2
4	15 00	963.6	0.57	1.80	427	77	76	263	66	2
5	20 00	967.0	0.50	1.55	425	78	76	252	66	2
6	25 00	970.4	0.55	1.75	423	77	76	252	66	2
Leak	60 00	973.907								

leak check: .040 → .049 = .009 cfm @ 2 "Hg

+ pitot Δ = 6.6
- pitot Δ = 6.2

41.719	.7671	1.8458	429.08	76.29	

PARTICULATE CATCH ANALYSIS

SAMPLES: Koppers

DATE TAKEN: 2-21-96 DATE ANALYZED: 2-26-96

DELIVERED BY: DR RECEIVED BY: DR

ANALYZED BY: DR

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	4	5	6	
FILTER NO.	2067	2069	2072	
FILTER TARE, gms.	.6903	.6943	.6934	
	.7774	.7876	.7702	
	.7771	.7877	.7703	
FINAL WEIGHT, gms.	.7771	.7877	.7703	
NET GAIN, gms.	.0868	.0934	.0769	

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER I.D.	Kop R 4	Kop R5	Kop R6	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	140	150	200	
TARE WEIGHT, gms.	(L) 98.8230	(56) 105.8169	(4) 98.[illegible]	( )
	98.8957	105.8945	98.0696	
	98.8953	105.8940	98.0695	
FINAL WEIGHT, gms	98.8953	105.8940	98.0695	
NET GAIN, gms.	.0723	.0771	.0675	
LESS BLANK, gms.				

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3	
filter + probe, mg.	159.1	170.5	144.4	

BARIUM CHLORIDE -- SULFURIC ACID TITRATION

SAMPLES: Hoppes - Grade

DATE TAKEN: 2-20-96 DATE ANALYZED: 2-22-96

DELIVERED BY: DGR RECEIVED BY: DGR

ANALYZED BY: DGR

(Attach chain of custody if additional exchanges occur)

Standardize $BaCl_2$

titration	H_2SO_4 normality	H_2SO_4 Volume, ml	$BaCl_2$ Volume, ml	$BaCl_2$ normality *
1				
2				

*N $BaCl_2$ = ((ml H_2SO_4)(N H_2SO_4))/(ml $BaCl_2$)

$BaCl_2$ Normality = .01015

Sample Titrations:

Sample ID	Sample Volume, ml	Aliquot Volume, ml	BaCl2 Volume, ml	Remarks
Run 1	259	25	14.6	
		25	14.6	
Run 2	267	25	12.9	
Run 3	259	25	16.9	
Run 4	338	10	12.5	
Run 5	342	10	10.6	
Run 6	338	10	15.6	
BLANK		20	< .05	

Plant Koppers Tie Plant, Ms.
Sampling Location Wood Waste Boiler
Test For POHC
Test Operators B. McKnight / C. Carruth

RUN No. 1
Date 2-20-96
Time start 1139 end 1142

Meter Box	ANDERSEN	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft tef			O_2	
Pitot Cp	84	NOMOGRAPH		CO	
Nozzle Dia.	.290	ΔH@	1.75	Time	
Filter No.		Meter Temp.	90		
		% H_2O	17	Condensate:	
Amb. Temp. °F	68	C-Factor	.75	tare 200	fin 277
Bar. Press. "Hg	29.75	Stack Temp.	375	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.51	tare 642	fin 702.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Temp. °F	Vac. in Hg
1 1	0 00	666.975	0.42	0.52	352	70	68	250	48	6
1	5 00	669.1	0.40	0.49	354	72	69	253	45	6
2	10 00	671.4	0.41	0.50	353	77	71	252	45	6
2	15 00	673.6	0.42	0.51	355	82	75	250	45	6
3	20 00	676.1	0.42	0.51	358	86	79	249	44	6
3	25 00	678.3	0.50	0.60	358	90	83	250	45	7
4	30 00	681.0	0.51	0.61	355	93	88	251	42	7
4	35 00	683.4	0.45	0.55	356	95	91	252	42	7
5	40 00	685.8	0.44	0.54	354	97	94	250	42	7
5	45 00	688.2	0.45	0.55	352	99	96	250	42	7
6	50 00	690.7	0.45	0.55	353	100	98	250	42	7
6	55 00	693.1	0.44	0.54	353	101	100	250	42	7
2 1	60/00	695.676	0.45	0.55	351	98	100	250	40	7
1	5 00	698.1	0.45	0.55	354	99	101	250	41	7
2	10 00	700.5	0.48	0.58	358	100	101	236	41	7
2	15 00	703.0	0.46	0.55	356	101	101	250	41	7
3	20 00	705.5	0.44	0.54	359	102	102	250	40	8
3	25 00	708.0	0.45	0.55	361	103	103	253	41	9
4	30 00	710.5	0.55	0.66	361	105	104	254	41	9
4	35 00	713.2	0.40	0.49	360	106	105	252	41	8
5	40 00	715.5	0.34	0.41	358	106	106	251	40	8
5	45 00	717.7	0.35	0.43	356	106	107	254	40	8
6	50 00	719.9	0.30	0.36	351	105	107	248	41	8
6	55 00	722.2	0.35	0.42	352	105	107	253	42	8
END	120/00	724.565								

LEAK CHECK: .003 → .005 = .002 cfm @ 10" Hg

+ pitot @ 6.6
− pitot @ 6.8

	57.590	.6547	52.33	355.42	94.88	

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. McKNIGHT / J. WINSTAD

RUN No. 2
Date 2-20-96
Time start 1413 end 1622

Meter Box	ANDERSON	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft.			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	220 qtz.	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	12	Condensate:	
Amb. Temp. °F	68	C-Factor	.85	tare 200 fin 267	
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.30	tare 735 fin 751	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp °F	Imp. Temp. °F	Vac in. Hg
1 1	0.00	724.855	0.40	0.56	350	90	93	249	46	5
1	5.00	727.2	0.41	0.57	353	92	93	246	45	5
2	10.00	729.7	0.42	0.60	356	95	93	250	46	10
2	15.00	732.2	0.40	0.56	356	95	93	251	45	10
3	20.00	734.9	0.40	0.56	360	102	97	251	45	14
3	25.00	737.4	0.42	0.60	362	105	100	240	45	16
4	30.00	740.1	0.45	0.64	364	106	103	241	43	16
4	35.00	742.4	0.38	0.54	364	108	108	239	43	15
5	40.00	745.1	0.38	0.54	360	110	107	251	43	14
5	45.00	747.7	0.35	0.50	360	109	107	253	43	15
6	50.00	750.2	0.35	0.50	360	108	109	259	43	15
6	55.00	752.6	0.35	0.50	359	107	109	249	43	15
2 1	60/00	755.205	0.39	0.55	355	101	105	250	40	16
1	5.00	757.6	0.39	0.55	356	101	106	244	40	16
2	10.00	760.0	0.40	0.56	358	102	105	246	41	16
2	15.00	762.4	0.40	0.56	360	102	104	250	41	15
3	20.00	764.9	0.40	0.56	363	103	104	254	41	15
3	25.00	767.4	0.39	0.55	362	103	104	256	41	16
4	30.00	769.8	0.40	0.56	361	104	105	249	41	15
4	35.00	772.3	0.40	0.56	362	104	104	252	41	15
5	40.00	774.8	0.36	0.51	360	105	105	256	42	15
5	45.00	777.3	0.34	0.48	360	104	104	251	42	15
6	50.00	779.5	0.35	0.50	360	104	106	250	42	16
6	55.00	781.8	0.36	0.51	360	103	104	252	41	15
END	120/00	784.124								

leak check: .074 → .076 = .002 dry 98"Hg

I pitot / pitot 5.9 / 5.8

59.269 .6218 .5467 359.21 104.90

Plant: Koppers Industries TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. McKnight / J. Winstead

RUN No. 3
Date 2-20-96
Time start 1646 end 1850

Meter Box	ANDERSEN	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4ft. tef.			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.220 qtz	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	12	Condensate:	
Amb. Temp. °F	75	C-Factor	.85	tare 200 fin 271	
Bar. Press. "Hg	29.75	Stack Temp.	350	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.30	tare 759.5 fin 766	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp °F	Vac in Hg
1	00 00	784.429	0.36	0.51	355	88	92	247	40	4
1	5 00	786.6	0.40	0.56	358	86	91	250	40	4
2	10 00	788.9	0.40	0.57	359	88	90	250	40	4
2	15 00	791.2	0.40	0.57	363	90	89	250	40	5
3	20 00	793.3	0.42	0.60	362	92	91	252	41	6
3	25 00	795.8	0.39	0.55	363	92	90	249	40	6
4	30 00	798.2	0.40	0.56	360	95	94	253	41	5
4	35 00	800.3	0.41	0.58	360	96	95	250	41	5
5	40 00	802.7	0.39	0.55	357	97	96	251	52	5
5	45 00	805.0	0.40	0.56	356	96	96	253	52	5
6	50 00	807.2	0.40	0.56	356	97	97	252	52	5
6	55 00	809.5	0.36	0.51	355	96	97	252	50	5
1	00/00	811.845	0.40	0.56	354	92	94	252	50	5
1	5 00	814.1	0.43	0.62	353	92	94	252	50	6
2	10 00	816.4	0.42	0.60	355	94	95	253	50	6
2	15 00	818.6	0.42	0.60	357	95	95	261	50	7
3	20 00	821.1	0.42	0.60	360	95	97	253	50	6
3	25 00	823.4	0.40	0.56	360	95	98	247	50	6
4	30 00	825.7	0.45	0.64	359	99	98	257	50	6
4	35 00	828.2	0.42	0.60	359	100	98	250	50	6
5	40 00	830.5	0.40	0.56	361	100	99	249	51	6
5	45 00	832.8	0.38	0.55	357	100	100	253	51	5
6	50 00	835.1	0.36	0.51	358	100	100	250	50	5
6	55 00	837.2	0.37	0.53	358	100	100	251	50	5
END	100/00	839.468								

leak check: .028 → .033 = .005 cfm @ 8 "Hg

+ pitot @ 6.9
- pitot @ 6.5

55.039 .6322 .5671 358.13 95.02

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. MCKNIGHT / J. MUNSTEAD

RUN No. 4
Date 2-21-96
Time start 0954 end 1158

Meter Box	ANDERSON	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 FT. SEC.	NOMOGRAPH		O_2	
Pitot Cp	.84	ΔH@	1.75	CO	
Nozzle Dia.	.220 SQ.	Meter Temp.	100	Time	
Filter No.		% H_2O	12 / 15	Condensate:	
Amb. Temp. °F	65	C-Factor	.85 / .80	tare 200 fin 383	
Bar. Press. "Hg	29.82	Stack Temp.	350 / 425	Silica gel:	
Static Press. "H_2O	-.37	Ref. ΔP	1.30 / 1.55	tare 70 fin 241.5	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp °F In	Meter Temp °F Out	Oven Temp. °F	mp. Temp °F	Vac. in. Hg
1 1	0 00	839.862	0.71	0.90	421	69	68	245	40	4
1	5 00	842.5	0.71	0.88	432	73	68	245	40	8
2	10 00	845.1	0.85	1.05	495	79	70	253	40	9
2	15 00	847.9	0.90	1.10	457	84	73	255	40	10
3	20 00	850.8	0.76	0.91	452	89	77	252	40	9
3	25 00	853.5	0.75	0.90	452	91	81	248	40	9
4	30 00	856.3	0.60	0.71	450	93	89	254	40	9
4	35 00	858.8	0.56	0.66	444	93	88	250	41	7
5	40 00	861.1	0.60	0.71	449	96	90	250	40	8
5	45 00	863.6	0.70	0.85	462	97	92	250	40	8
6	50 00	866.4	0.70	0.85	456	99	94	250	41	8
6	55 00	869.1	0.74	0.90	456	101	96	255	40	8
2 1	60/00	871.796	0.76	0.85	442	96	96	252	40	8
1	5 00	874.3	0.71	0.90	448	98	97	253	40	9
2	10 00	877.1	0.70	0.85	455	100	98	259	41	9
2	15 00	879.7	0.76	0.90	455	101	98	259	41	10
3	20 00	882.7	0.72	0.86	454	103	99	253	41	10
3	25 00	885.2	0.67	0.80	459	104	100	253	40	9
4	30 00	888.1	0.70	0.84	454	105	101	252	40	10
4	35 00	890.8	0.71	0.85	452	106	102	251	40	10
5	40 00	893.5	0.65	0.77	448	107	103	251	40	9
5	45 00	896.2	0.62	0.74	449	107	104	251	40	9
6	50 00	898.7	0.62	0.74	449	107	105	252	40	9
6	55 00	901.3	0.62	0.74	450	107	105	252	40	9
END	120/00	903.904								
		64.042	.8345	.8442	44942			93.63		

LEAK CHECK: .070 → .072 = .002 cfm @ 10" Hg

+ pitot Δ 5.9
− probe Δ 6.0

Plant: KOPPERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: D. McKNIGHT / J. WINSTEAD

RUN No. 5
Date 2-21-96
Time start 1235 end 1438

Meter Box	ANDERSON	No. Sample Pts.	6x2	Gas Analysis	
Sample Box	NO. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft. tef			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.220	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	15	Condensate:	
Amb. Temp. °F	65	C-Factor	.80	tare 200 fin 340	
Bar. Press. "Hg	29.82	Stack Temp.	450	Silica gel:	
Static Press. "H_2O	-.37	Ref. ΔP	1.55	tare 711 fin 720	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F in	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1 1	0 00	904.132	0.70	0.84	441	81	84	250	45	2
1	5 00	906.6	0.80	0.95	449	83	84	252	43	17
2	10 00	909.2	0.70	0.84	451	86	84	250	43	17
2	15 00	911.7	0.70	0.84	449	90	85	251	43	16
3	20 00	914.3	0.68	0.80	450	93	87	251	43	16
3	25 00	916.0	0.68	0.80	450	95	89	251	42	16
4	30 00	919.7	0.50	0.66	447	97	92	249	42	15
4	35 00	922.1	0.62	0.73	448	98	93	252	42	15
5	40 00	924.7	0.62	0.73	449	99	93	251	42	15
5	45 00	927.1	0.63	0.75	449	99	96	251	40	15
6	50 00	929.6	0.45	0.54	447	100	97	238	41	15
6	55 00	932.0	0.44	0.52	450	99	98	251	41	15
2 1	60/00	934.336	0.40	0.48	431	96	97	250	41	15
1	5 00	936.4	0.40	0.48	441	97	99	251	40	14
2	10 00	938.6	0.40	0.48	442	98	99	250	41	15
2	15 00	940.6	0.38	0.45	440	98	99	251	41	16
3	20 00	942.7	0.45	0.54	442	99	99	251	41	15
3	25 00	944.9	0.50	0.60	445	100	100	249	41	15
4	30 00	947.2	0.55	0.65	448	101	100	250	41	16
4	35 00	949.5	0.60	0.71	449	102	101	248	41	16
5	40 00	951.9	0.70	0.84	448	103	101	236	41	16
5	45 00	954.3	0.71	0.85	447	103	102	251	40	16
6	50 00	956.8	0.69	0.80	446	103	102	251	41	16
6	55 00	959.4	0.69	0.80	446	104	102	243	41	16
END	120/00	961.871								

leak check: .001 → .004 = .003 cfm @ 17" Hg

+ pitot — @ 6.5
− pitot — @ 6.0

57.739 .7606 .6950 446.04 95.98

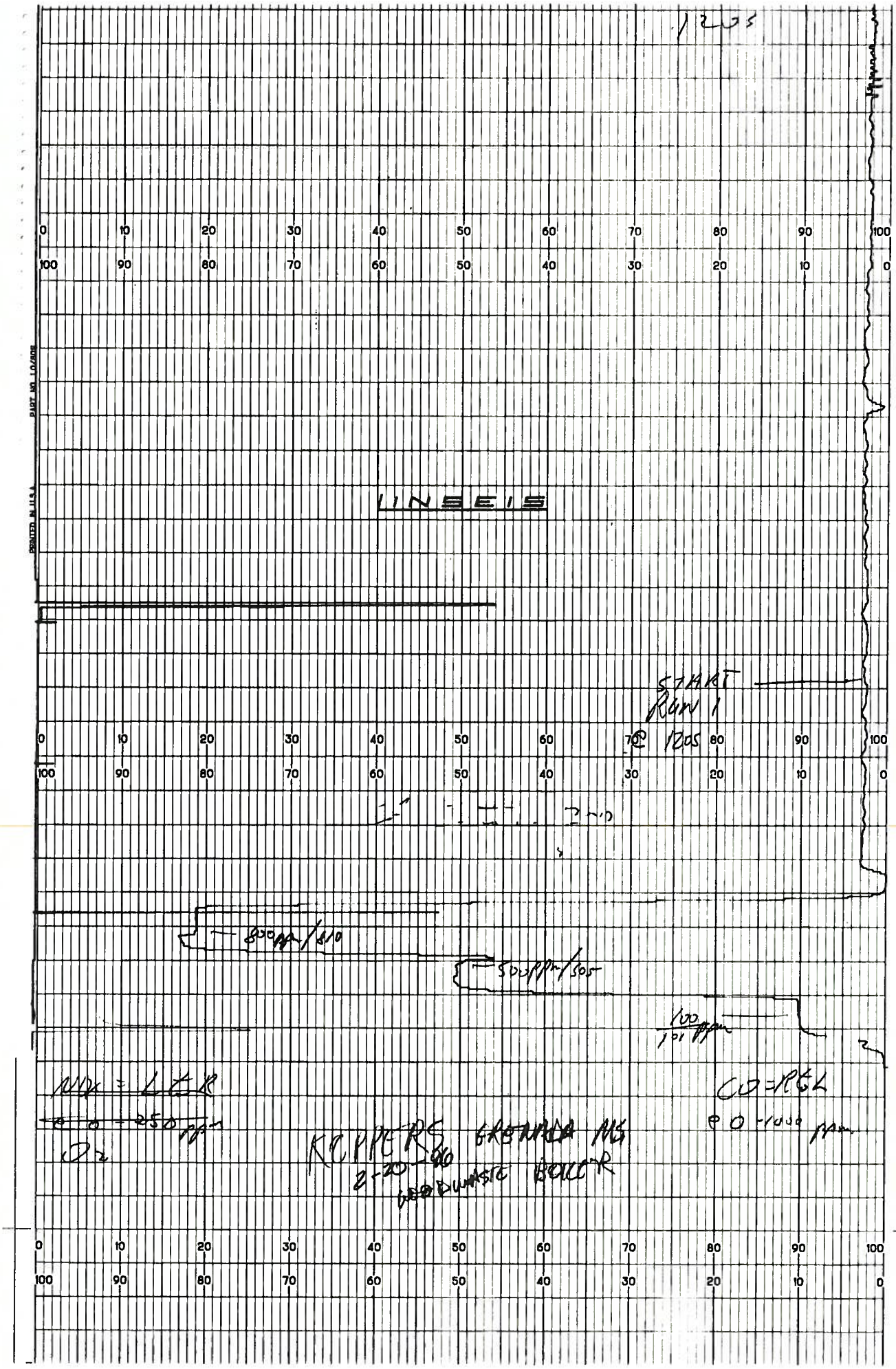
Plant: KOFFERS INDUSTRIES TIE PLANT, MS.
Sampling Location: WOODWASTE BOILER
Test For: POHC
Test Operators: B. McWIGHT / J. WINSTEAD

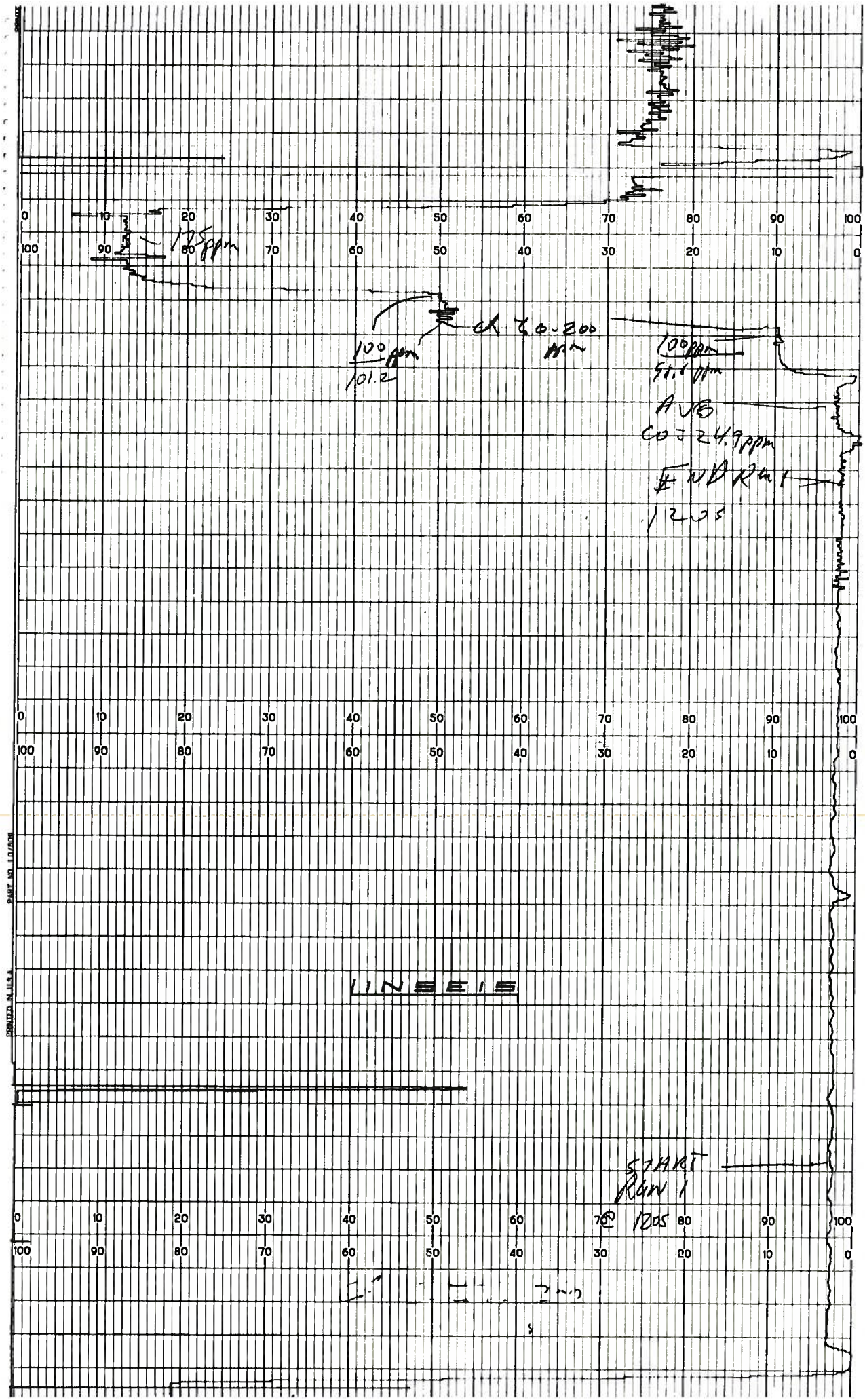
RUN No. 6
Date 2-21-96
Time start 1515 end 1718

Meter Box	ANDERSEN	No. Sample Pts.	6X2	Gas Analysis	
Sample Box	No. 1	Minutes/Pt.	10	CO_2	
Probe/Pitot	4 ft. tef.			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.220	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	15	Condensate:	
Amb. Temp. °F	65	C-Factor	.80	tare 200 fin 370	
Bar. Press. "Hg	29.82	Stack Temp.	450	Silica gel:	
Static Press. "H_2O	-.39	Ref. ΔP	1.55	tare 742 fin 757	

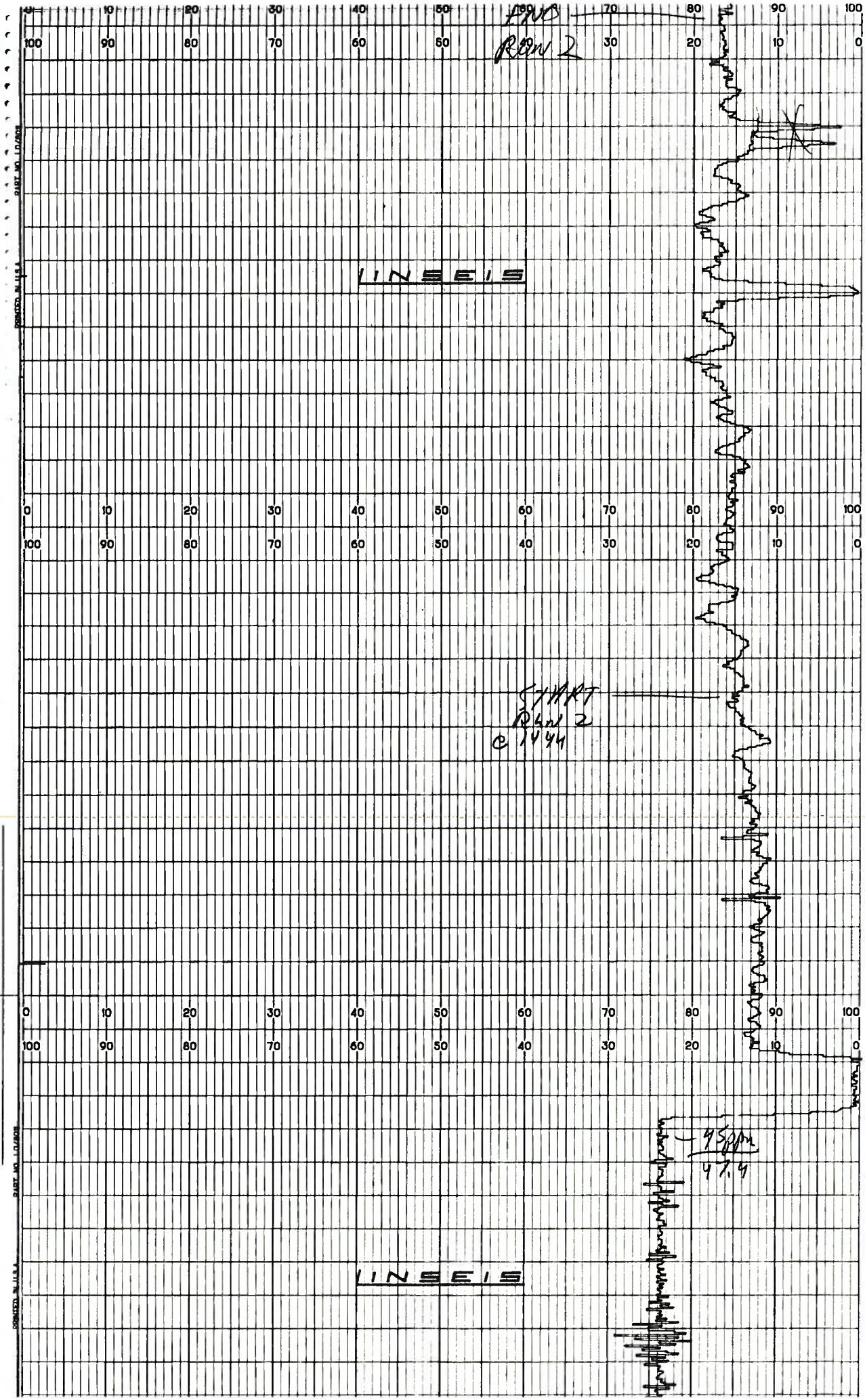
Remarks:

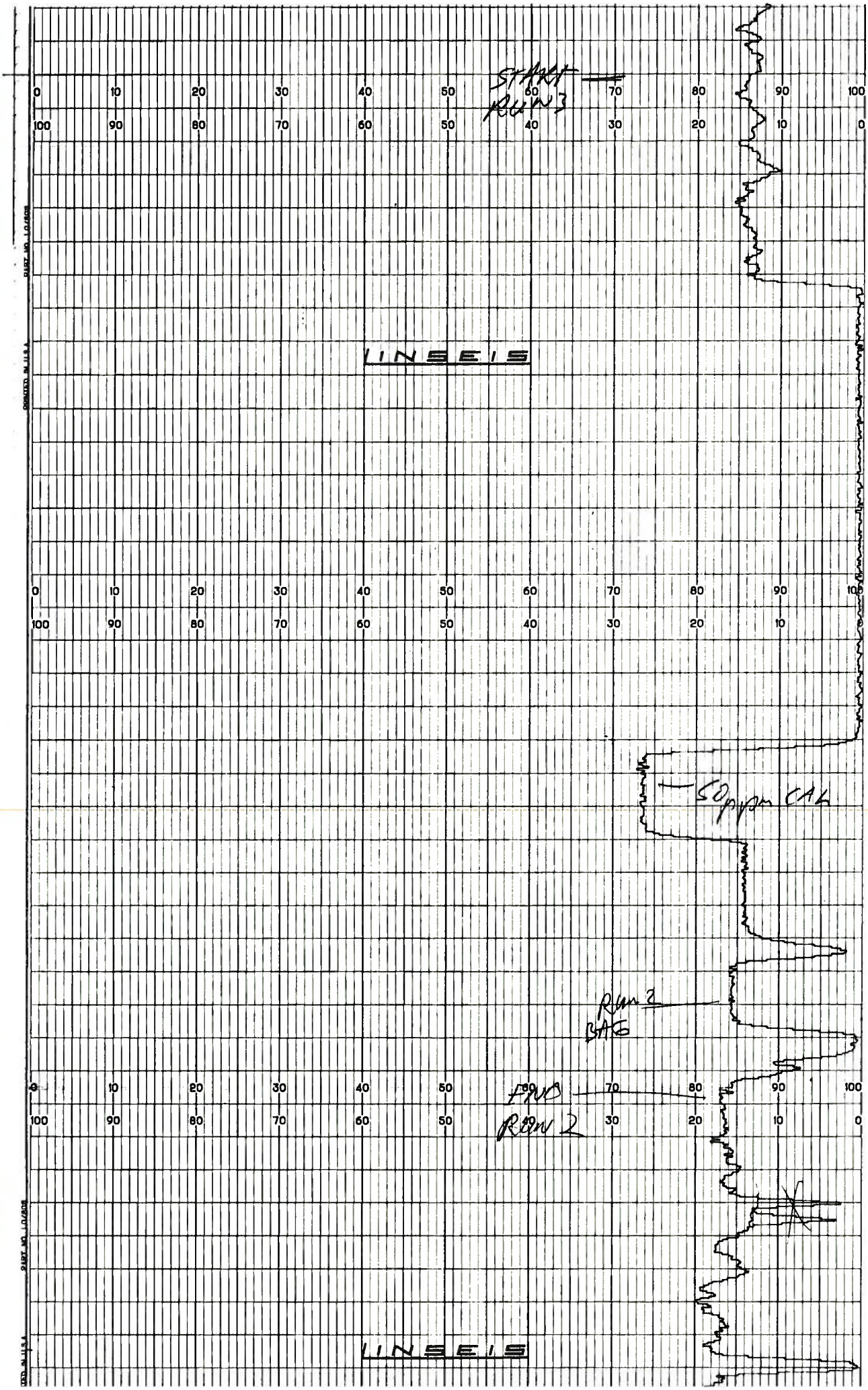
Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1 1	000	962.026	0.60	0.71	439	82	85	255	45	8
1	500	964.3	0.64	0.75	437	84	85	250	45	8
2	1000	966.8	0.65	0.77	438	88	88	250	45	10
2	1500	969.4	0.60	0.71	438	91	87	250	45	11
3	2000	971.8	0.60	0.71	438	88	94	250	45	11
3	2500	974.3	0.66	0.80	440	96	91	249	45	11
4	3000	977.0	0.65	0.77	440	98	98	250	44	11
4	3500	979.6	0.58	0.70	438	99	95	250	44	11
5	4000	982.0	0.51	0.61	433	100	96	250	44	11
5	4500	984.3	0.50	0.60	432	100	97	249	43	10
6	5000	986.6	0.52	0.62	431	100	98	250	43	10
6	5500	988.9	0.54	0.65	430	100	99	247	43	10
2 1	60/00	991.309	0.54	0.64	422	97	98	250	42	10
1	500	993.8	0.55	0.65	430	97	97	251	42	10
2	1000	996.0	0.55	0.65	429	98	98	251	42	12
2	1500	998.5	0.54	0.64	430	98	98	251	42	12
3	2000	000.9	0.52	0.63	431	99	98	252	42	12
3	2500	003.3	0.56	0.66	432	99	99	250	42	12
4	3000	005.7	0.55	0.65	434	99	99	250	42	12
4	3500	008.2	0.60	0.71	433	99	99	251	42	13
5	4000	010.6	0.64	0.75	433	100	99	251	42	14
5	4500	012.1	0.64	0.75	432	100	98	251	42	14
6	5000	015.8	0.62	0.75	427	103	93	250	42	14
6	5500	018.4	0.58	0.70	423	108	99	252	42	14
END	120/60	020.908								
			LEAK CHECK: .058	→ .060	= .002	cfm @ 15" Hg				
			+ pitot 6.5							
			− pitot 7.5							
		58.882	.7615	.6908	432.92		96.06			

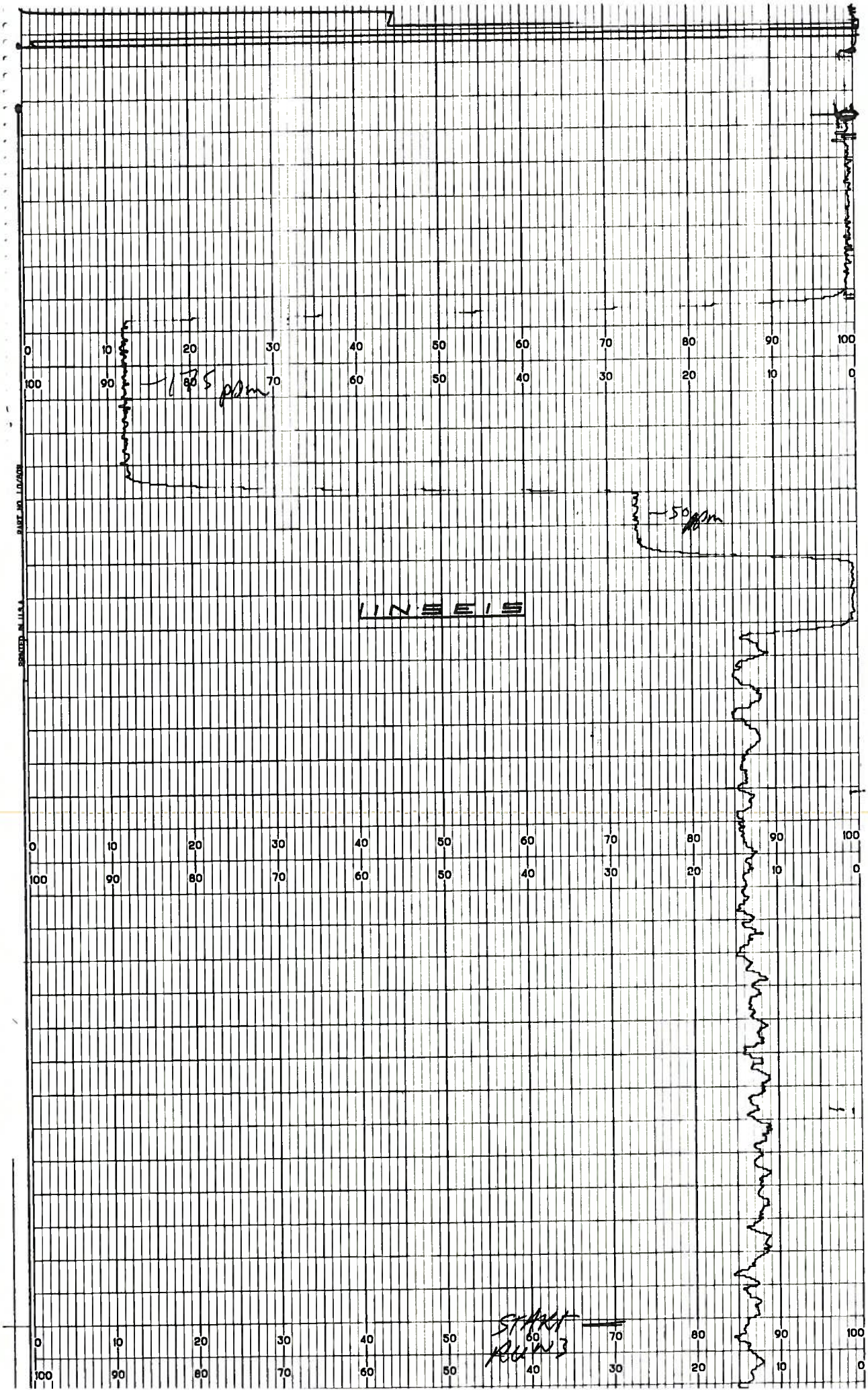

1205
LINSEIS
START
RUN 1
@ 1205
800ppm/810
500ppm/505
100/101 ppm
NOx = LER
@ 0 - 250 ppm
O2
CO = REL
@ 0 - 1000 ppm
KEPPERS GRENADA MS
2-20-96
WOODWASTE BOILER



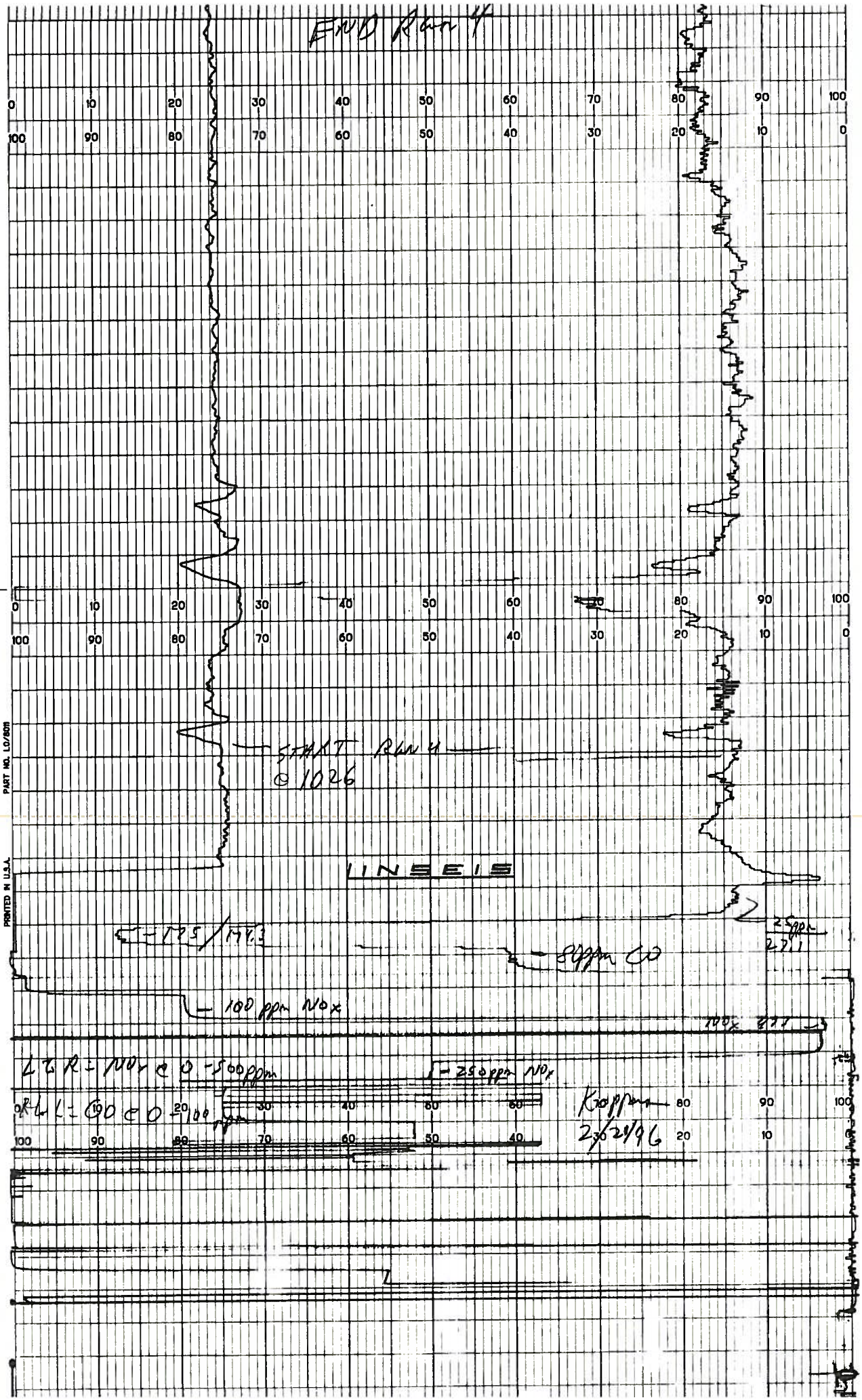
175 ppm
100 ppm
101.2
ch 60-200 ppm
100 ppm
AVG
CO = 24.9 ppm
END Run 1
1205
LINSEIS
START
Run 1
1205

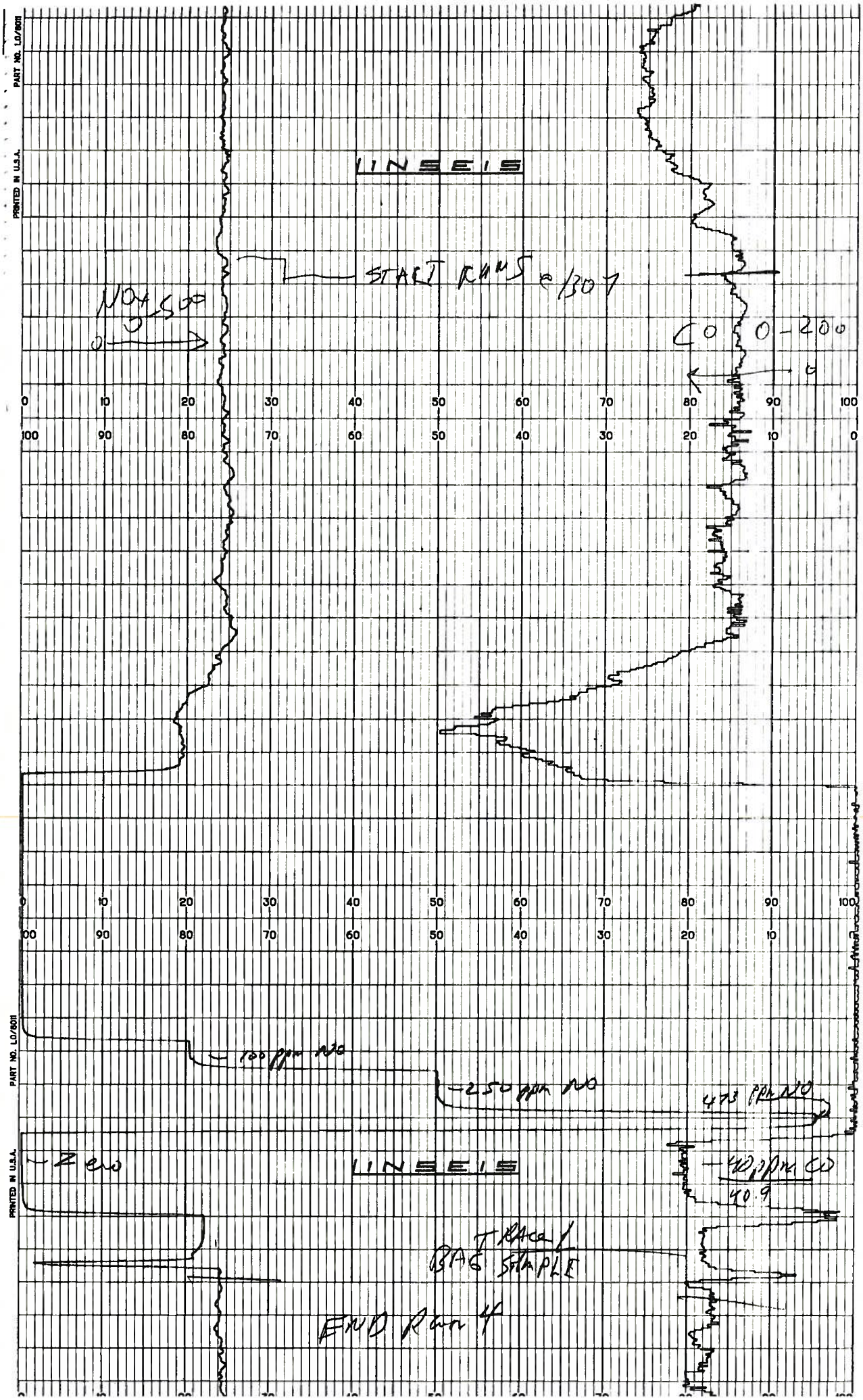

LINSEIS
LINSEIS


START
RUN 3
LINSEIS
150 ppm CAL
Run 2
BAG
END
Run 2
LINSEIS

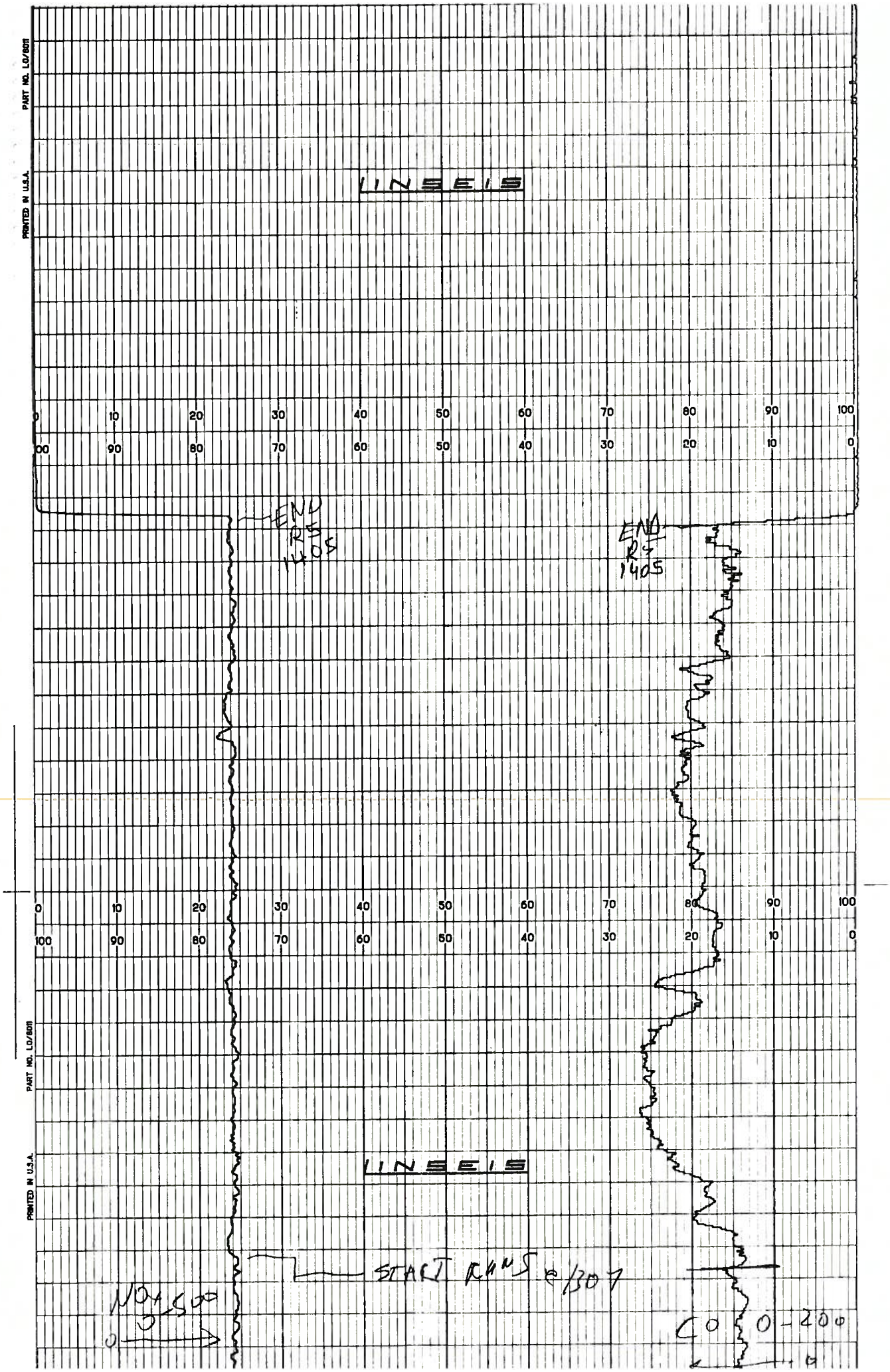


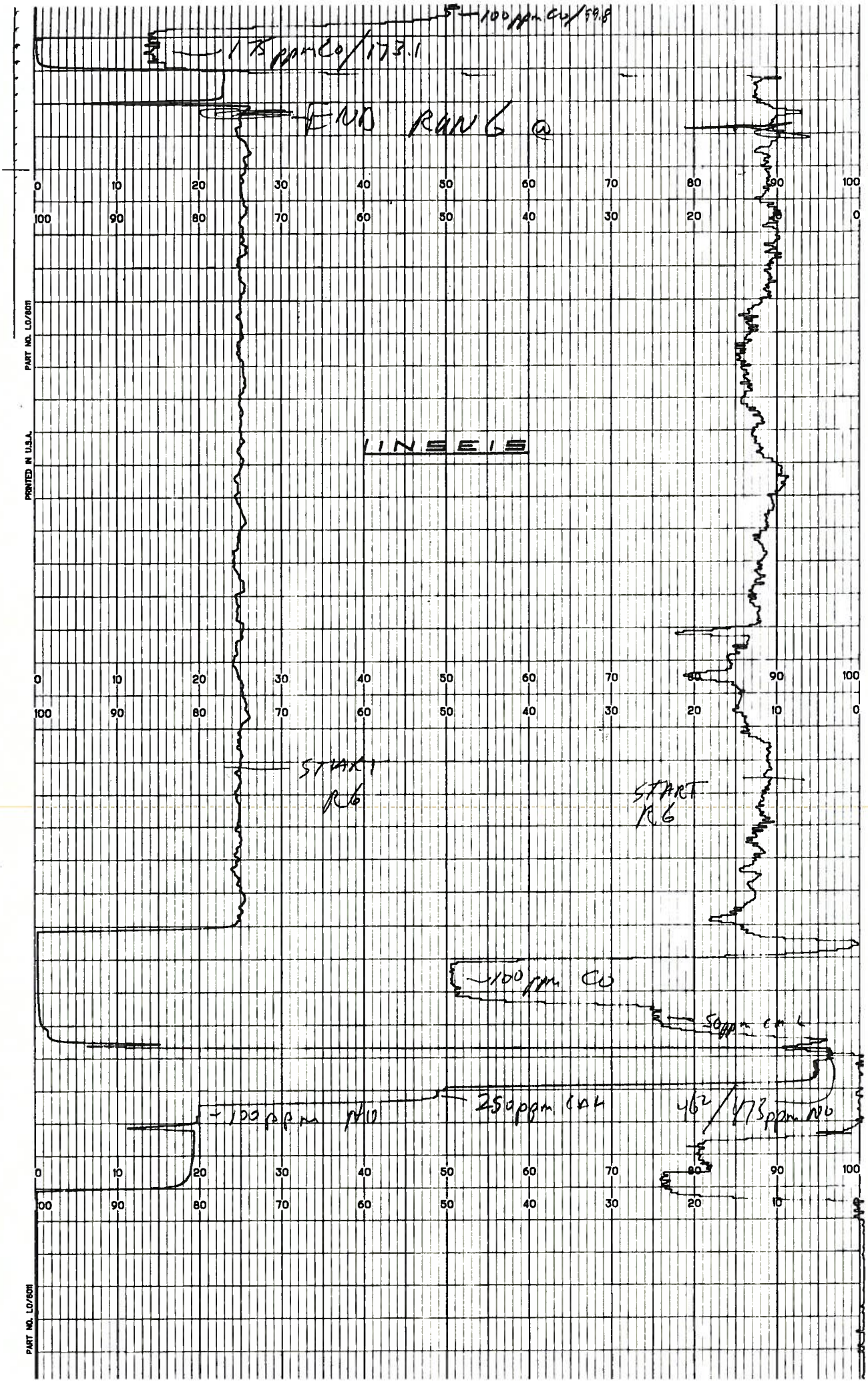
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
175 ppm
50 ppm
LINSEIS
START
RUN 3

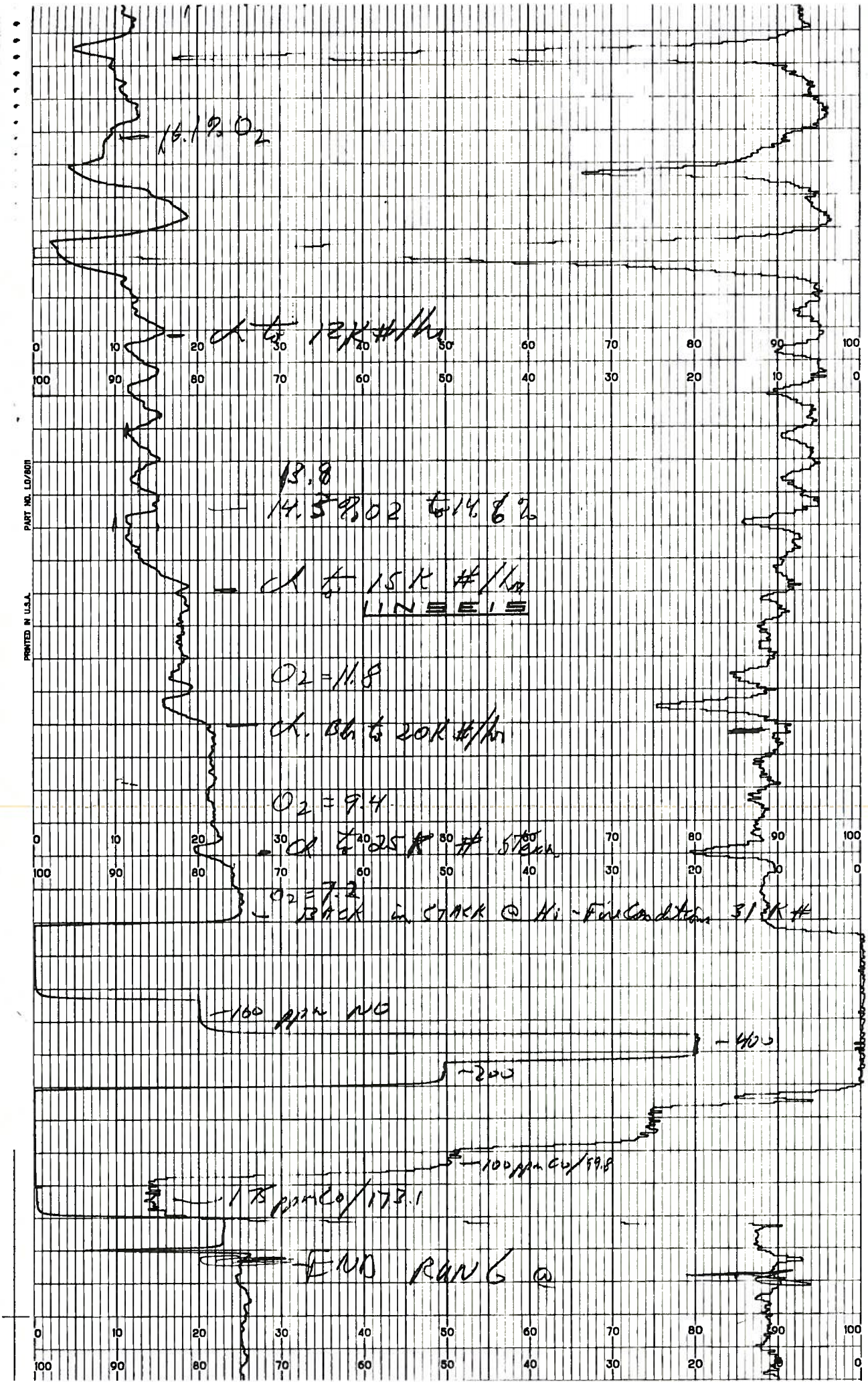

END Run 4
START Run 4
@ 1026
LINSEIS
80ppm CO
100 ppm NOx
250ppm NOx
PART NO. LO/8011
PRINTED IN U.S.A.

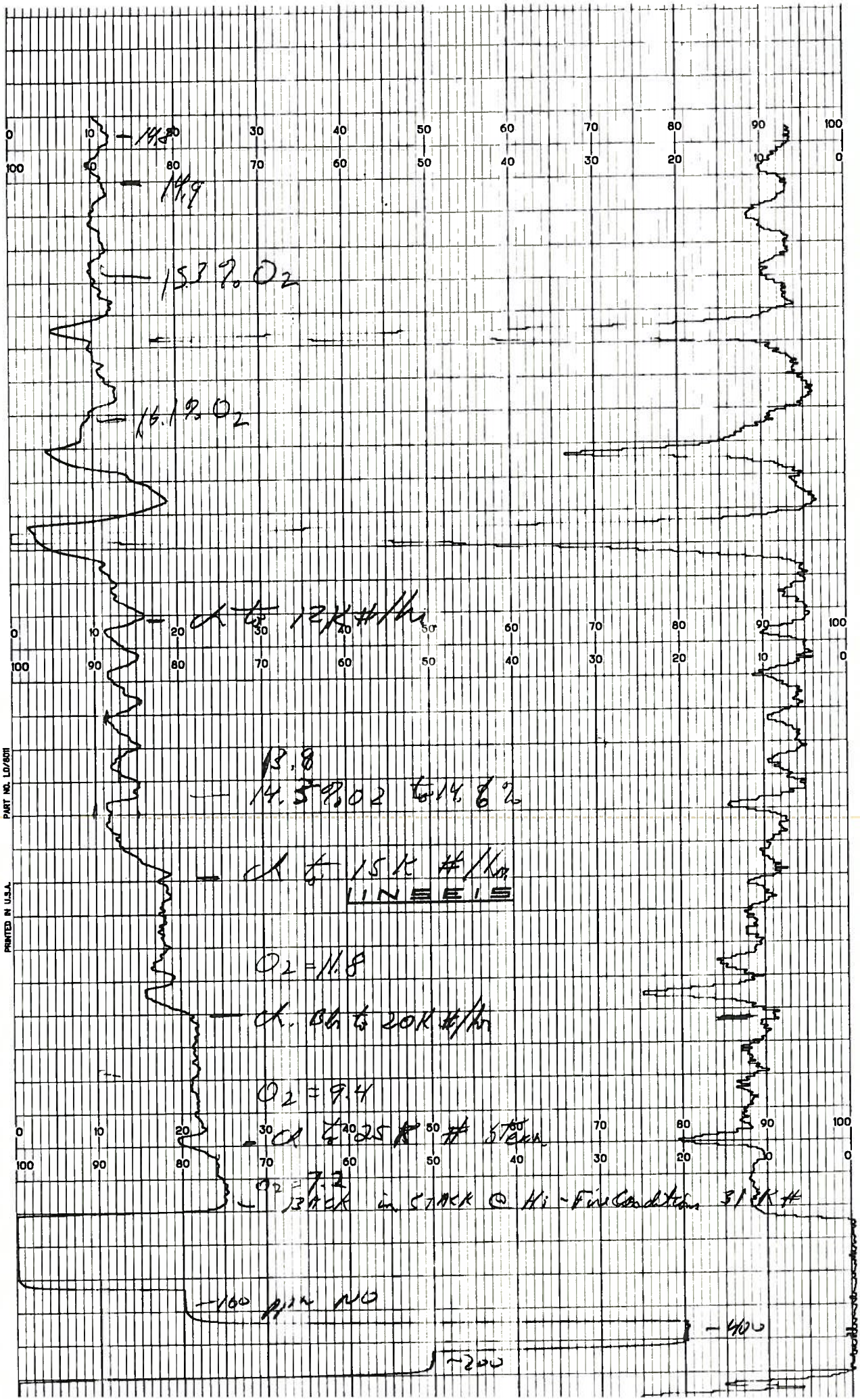


PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
START RUNS @ 1307
NOx 0-500
CO 0-200
0
100 ppm NO
250 ppm NO
473 ppm NO
Zero
LINSEIS
40 ppm CO
40.9
TRACE / BAG SAMPLE
END Run 4


PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
END RS 1405
END RS 1405
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
PART NO. LO/8011
PRINTED IN U.S.A.
LINSEIS
START RUNS e/307
NOx 0-500
CO 0-200


~100 ppm CO/59.8
~175 ppm CO/173.1
END RUN 6 @
LINE 15
START R6
START R6
~100 ppm CO
50ppm CH4
~100 ppm NH3
250ppm CH4
462/473ppm NO
PART NO. LO/6011
PRINTED IN U.S.A.
PART NO. LO/6011


16.1% O2
ch to 12K #/hr
13.8
14.5% O2 to 14.6%
ch to 15K #/hr
LINSEIS
O2 = 11.8
ch. Bl to 20K #/hr
O2 = 9.4
ch to 25K # Steam
O2 = 7.2
BACK in STACK @ Hi-Fire Condition 31K #
100 ppm NO
400
200
100 ppm CO/99.8
175 ppm CO/173.1
END RUNG @
PART NO. LO/8011
PRINTED IN U.S.A.



14.8
14.9
15.3% O2
16.1% O2
ck to 12K #/hr
13.8
14.5% O2 to 14.6%
ck to 15K #/hr
LINEEIS
O2 = 11.8
ck. Bbl to 20K #/hr
O2 = 9.4
ck to 25K # steam
O2 = 7.2
BACK in STACK @ Hi-Fire Condition 31K #
100 ppm NO
400
200
PART NO. LD/8011
PRINTED IN U.S.A.

APPENDIX B.

CALIBRATION DATA

DRY GAS METER CALIBRATION

Meter ID Andersen

Calibration Method DGM/DGM **By** GNM

Calibration Meter ID 651729 **Pbar** 29.32

Date 1/2/96

Vac.	DH	Time	Calibrating Meter			Field Meter						Y	Q	K	DH@
			Vi	Vf	Temp	Vi	Vf	Temp. in		Temp out					
in. Hg	in. H2O	min	ft³	ft³	°F	ft³	ft³	Init.	final	Init.	final				
1	5.00	8.00	143.691	153.873	64	141.776	151.828	56	78	55	59	0.997	1.24	0.716	1.798
1	4.00	9.00	153.873	164.484	60	151.828	162.527	67	76	59	65	0.995	1.17	0.752	1.631
1	3.00	10.00	164.484	174.285	58	162.527	172.592	76	88	65	72	0.999	0.99	0.73	1.730
1	2.00	13.00	174.285	184.575	56	172.592	183.341	79	87	71	77	0.994	0.82	0.729	1.733
1	1.00	17.00	184.575	194.083	56	183.341	193.311	81	84	76	81	0.996	0.58	0.733	1.716
Averages:												1.00			1.72

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)

Calibration Method DGM/DGM **By** GNM

Calibration Meter ID 651729 **Pbar** 29.32

Date 1/2/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
2	5.00	9.00	193.890	204.915	56	595.660	606.449	53	51	51	52	1.001	1.2	0.696	1.902
2	4.00	10.00	204.915	216.169	50	606.449	617.433	53	52	52	52	1.019	1.12	0.724	1.755
2	3.00	12.00	216.169	226.837	50	617.433	627.935	54	52	52	53	1.014	0.89	0.662	2.102
2	2.00	14.00	226.837	237.236	48	627.935	638.259	54	54	52	53	1.013	0.75	0.681	1.987
2	1.00	19.00	237.236	247.357	46	638.259	648.329	54	53	53	52	1.016	0.54	0.694	1.912
Averages:												1.01			1.93

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID NuTech (2298915)

Calibration Method DGM/DGM **By** WBM

Calibration Meter ID 651729 **Pbar** 29.83

Date 4/1/96

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft^3	Vf ft^3	Temp °F	Field Meter Vi ft^3	Vf ft^3	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	2.00	15.00	741.031	752.341	62	595.558	606.443	56	58	56	57	1.024	0.74	0.681	1.986
1	2.00	23.00	752.341	769.719	64	606.443	623.348	59	66	57	62	1.017	0.75	0.682	1.981
1	2.00	15.00	769.719	780.957	64	623.348	634.294	63	64	61	61	1.018	0.74	0.677	2.009
Averages:												**1.02**			**1.99**

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID Andersen

Calibration Method DGM/DGM **By** WBM

Calibration Meter ID 651729 **Pbar** 29.83

Date 4/1/96

Vac.	DH	Time	Calibrating Meter			Field Meter						Y	Q	K	DH@
			Vi	Vf	Temp	Vi	Vf	Temp. in		Temp out					
in. Hg	in. H_2O	min	ft^3	ft^3	°F	ft^3	ft^3	init.	final	init.	final				
2	2.00	16.00	704.400	717.151	62	582.336	595.218	60	80	60	65	0.993	0.79	0.72	1.757
2	2.00	15.00	717.151	729.029	59	595.218	607.481	75	89	64	75	0.995	0.8	0.73	1.736
2	2.00	15.00	729.029	740.890	61	607.481	619.748	82	94	74	84	1.004	0.81	0.73	1.723
Averages:												1.00			1.74

$Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$

$K = Q(sqrt((Pm\ Mm)/((Tm\ out)(DH))$

$Q = ((Vmí-Vmf)/min.)(TM,out/Tm,avg)(Y)$

$DH@ = 0.921/K^2$

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
242 INGLESIDE DRIVE
MADISON, MS 39110

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : DRV0116
Scott Project # : 576120

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number : ALM016008
Cylinder Pressure + : 1900 psig
Certificate Date : 1/27/95
Previous Certificate Date : None
Expiration Date : 1/27/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	90.46 ppm	±1% NIST Directly Traceable

Balance Gas: Air

+Do not use when cylinder presssure is below 150 psig.
*Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 1668	6/7/96	ALM-032015	95.5 ppm Propane in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Propane : Beckman/400/1002059	1/19/95	Flame Ionization Detector

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components
Propane

First Triad Analysis

Date: 1/27/95 Response Units: mv

Z1=0.00	R1=95.50	T1=90.50
R2=95.50	Z2=0.00	T2=90.40
Z3=0.00	T3=90.50	R3=95.50

Avg. Conc. of Cust. Cyl. 90.46 ppm

Second Triad Analysis

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4

r=1.00000	NTRM 1668
Constants:	A=-0.086524000
B=1.000900000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Analyst

MISP/P-1

951.1 ppm propane
12/95

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, Procedure G1; September, 1993.

Cylinder Number : ALM003060
Cylinder Pressure + : 1900 psig
Certificate Date : 11/29/95
Previous Certificate Date : None
Expiration Date : 11/29/98

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	937.1 ppm	±1% NIST Directly Traceable

Balance Gas: Air

+Do not use when cylinder pressure is below 150 psig.
*Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 2646	12/8/95	AAL18338	974 ppm ppm Propane in Air

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian1400/08982426	11/29/95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Propane

First Triad Analysis

Date: 11/29/95 Response Units: mv

Z1=0.00	R1=655.57	T1=630.68
R2=654.53	Z2=0.00	T2=630.68
Z3=0.00	T3=630.68	R3=656.59

Avg. Conc. of Cust. Cyl. 937.1 ppm

Second Triad Analysis

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4

r=1.00000	NTRM 2646
Constants:	A=0.637342500
B=1.484780000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Sarah Reister
Analyst

MSP/P-1

Scott Specialty Gases, Inc.

Shipped From: 3714 LAPAS DRIVE
HOUSTON TX 77023
Phone: 713-644-4820 Fax: 713-644-0244

CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING
DANNY RUSSELL
P O BOX 655

RIDGELAND MS 39158

PROJECT #: 04-43868-001
PO#: DRV0517
ITEM #: 040243 E CAL
DATE: 5/26/95

CYLINDER #: ALM055984

ANALYTICAL ACCURACY: +/- 1%
PRODUCT EXPIRATION: 5/24/96

BLEND TYPE : ACUBLEND MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
CARBON MONOXIDE	452.	PPM	453.	PPM
OXYGEN	11.	%	11.01	%
NITROGEN		BALANCE		BALANCE

2000 PSI

453

THIS PRODUCT IS TRACEABLE TO DOCUMENTATION BY BOTH THE NUMBERS IDENTIFIED ON THIS CERTIFICATE OF ANALYSIS.

ALL PRODUCTION & ANALYTICAL PROJECT & CYLINDER SERIAL

ANALYST: _____

Scott Specialty Gases

Shipped From: 3714 LAPAS DRIVE
HOUSTON TX 77023
Phone: 713-644-4820 Fax: 713-644-0244

CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING
DANNY RUSSELL
P O BOX 655

RIDGELAND MS 39158

PROJECT #: 04-48159-001
PO#: VERBAL
ITEM #: 04024315 DAL
DATE:11/20/95

CYLINDER #: ALM049763
FILL PRESSURE: 2000PSI
BLEND TYPE : CEM 1 DAILY STANDARD

ANALYTICAL ACCURACY: -
PRODUCT EXPIRATION: 11/20/96

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON MONOXIDE	950.	PPM	950.	PPM
OXYGEN	3.	%	3.00	%
NITROGEN		BALANCE		BALANCE

THIS PRODUCT IS TRACEABLE TO DOCUMENTATION BY BOTH THE NUMBERS IDENTIFIED ON THIS

ALL PRODUCTION AND ANALYTICAL PROJECT AND CYLINDER SERIAL CERTIFICATE OF ANALYSIS.

ANALYST: WILLIAM MORGAN

12/95

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, Procedure G1; September, 1993.

Cylinder Number : AAL16787
Cylinder Pressure + : 1919 psig
Certificate Date : 11/29/95
Previous Certificate Date : None
Expiration Date : 11/29/97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	87.29 ppm	±1% NIST Directly Traceable
Total Oxides of Nitrogen	87.90 ppm	Reference Value Only

Balance Gas: Nitrogen

+Do not use when cylinder pressure is below 150 psig.
*Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 1686	7/27/97	ALM048742	504.0 ppm Nitric Oxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO Nicolet FTIR/8220/AAB9300205	11/1/95	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis

Date: 11/22/95	Response Units: ppm	
Z1=0.00	R1=504.00	T1=87.33
R2=504.29	Z2=0.00	T2=87.55
Z3=0.00	T3=86.96	R3=500.12

Avg. Conc. of Cust. Cyl. 87.28 ppm

Second Triad Analysis

Date: 11/29/95	Response Units: ppm	
Z1=0.00	R1=504.00	T1=87.09
R2=499.31	Z2=0.00	T2=87.45
Z3=0.00	T3=87.35	R3=500.28

Avg. Conc. of Cust. Cyl: 87.30 ppm

Calibration Curve

Concentration=A+Bx+Cx^2+Dx^3+Ex^4	
r=0.99999	NTRM 1686
Constants:	A=0.000000000
B=1.000000000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Robert Harburn
Analyst

MBP/P-1

413 ppm NOx

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083 (810) 589-2950 FAX:(810) 589-2134

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENVIRONMENTAL MON
ATTN DANNY RUSSELL
PO BOX 655
RIDGELAND, MS 39158

Assay Laboratory
Scott Specialty Gases, Inc
1290 Combermere
Troy, MI 48083

Purchase Order : VERBAL
Scott Project # : 588696

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September, 1993.

Cylinder Number : ALM058597
Cylinder Pressure + : 1950 psig
Certificate Date : 12/1/95
Previous Certificate Date : None
Expiration Date : 12/1/97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	469.0 ppm	±1% NIST Directly Traceable
Total Oxides of Nitrogen	473.0 ppm	Reference Value Only

Balance Gas: Nitrogen

+ Do not use when cylinder presssure is below 150 psig.
* Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

	Expiration Date	Cylinder Number	Concentration
NTRM 1686	7/27/97	ALM048742	504.0 ppm Nitric Oxide in Nitrogen

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Nicolet FTIR/8220/AAB9300205	12/1/95	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis

Date: 11/22/95 Response Units: ppm

Z1=0.00	R1=504.00	T1=470.13
R2=504.29	Z2=0.00	T2=471.95
Z3=0.00	T3=469.45	R3=500.12

Avg. Conc. of Cust. Cyl. 470.5 ppm

Second Triad Analysis

Date: 12/1/95 Response Units: ppm

Z1=0.00	R1=504.00	T1=464.99
R2=504.73	Z2=0.00	T2=468.46
Z3=0.00	T3=468.99	R3=505.53

Avg. Conc. of Cust. Cyl: 467.5 ppm

Calibration Curve

$Concentration = A + Bx + Cx^2 + Dx^3 + Ex^4$

r=0.99999	NTRM 1686
Constants:	A=0.000000000
B=1.000000000	C=0.000000000
D=0.000000000	E=0.000000000

Special Notes

Robert Barker
Analyst

MSP/P-1

APPENDIX C.

VISIBLE EMISSIONS RECORD

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

R1

VISIBLE EMISSIONS EVALUATION RECORD

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

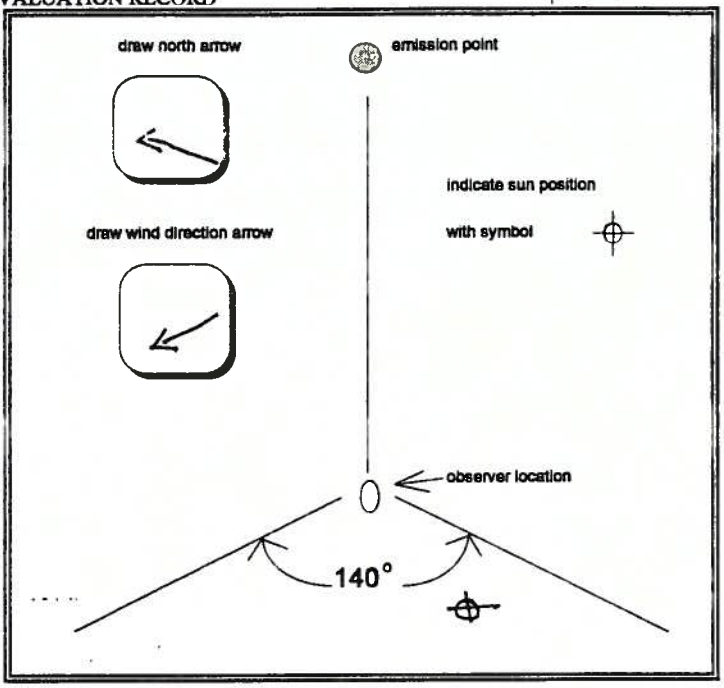
Date 2-20-96

Stack height 75'

Distance to source 150'

Direction from source Southwest

CONDITIONS	START	STOP
Time	1205	1305
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	73	73
Sky cover	Overcast	Overcast
Plume color		
Plume background	Sky, Clouds	Sky, Clouds



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

	seconds					seconds					seconds					seconds			
min	0	15	30	45	min	0	15	30	45	min	0	15	30	45	min	0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10/18/95 Signature: Larry L. Carruth

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

R

VISIBLE EMISSIONS EVALUATION RECORD

PLANT Koppers - Tie Plant, Ms

Emission Point Woodwaste Boiler

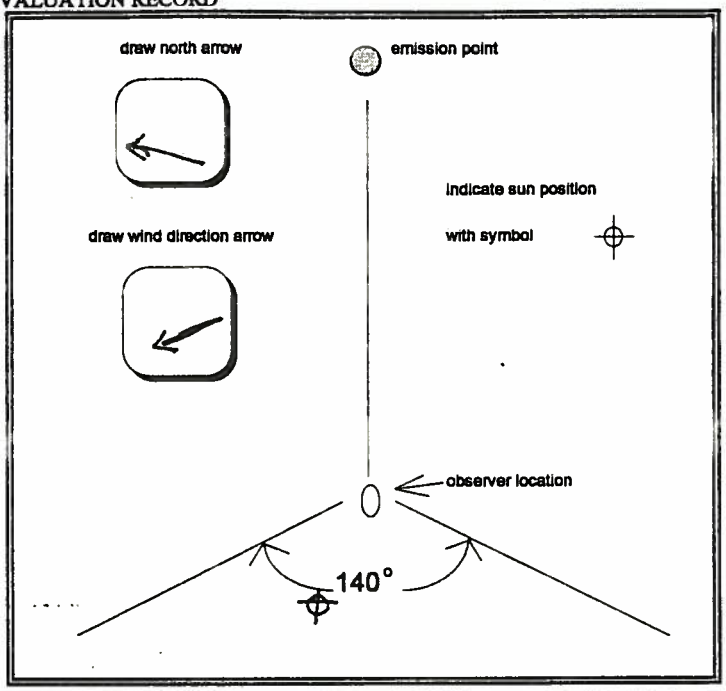
Date 2-20-96

Stack height 75'

Distance to source 150'

Direction from source Southwest

CONDITIONS	START	STOP
Time	1445	1545
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	76°	76°
Sky cover	Clear	Clear
Plume color		
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Barry L. Carruth

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

VISIBLE EMISSIONS EVALUATION RECORD

PK 5

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

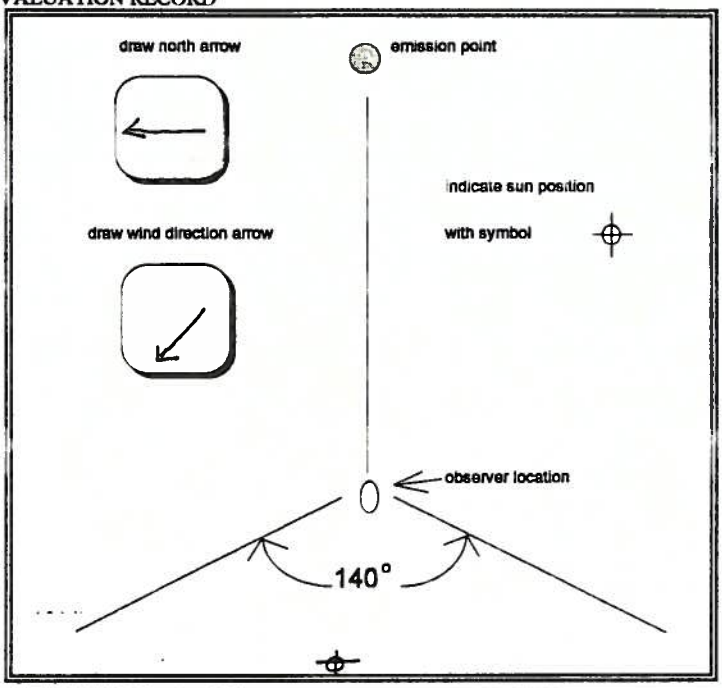
Date 2-20-96

Stack height 75'

Distance to source 130'

Direction from source West

CONDITIONS	START	STOP
Time	1717	1817
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	73°	70°
Sky cover	Clear	Clear
Plume color		
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

	seconds					seconds					seconds					seconds			
min	0	15	30	45	min	0	15	30	45	min	0	15	30	45	min	0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carruth

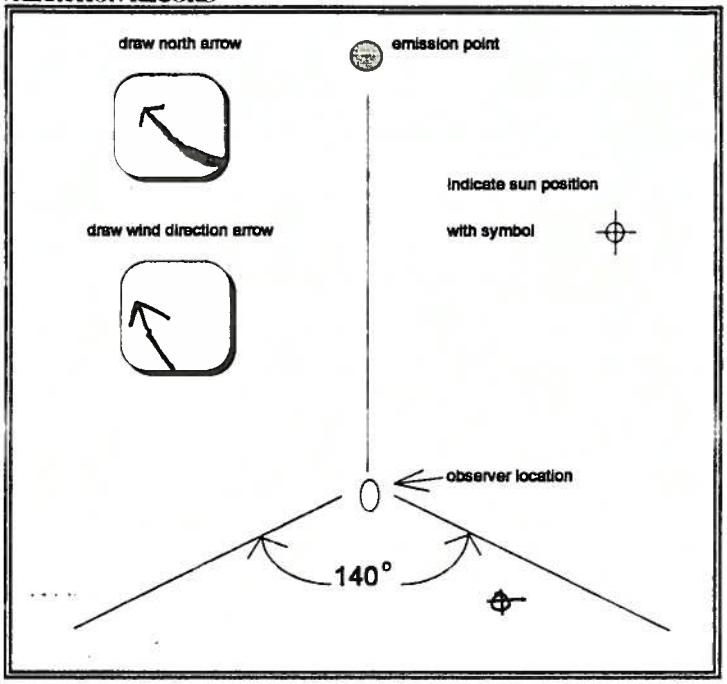
ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

R 4

VISIBLE EMISSIONS EVALUATION RECORD

PLANT	KOPPERS INDUSTRIES TIE PLANT, MS.
Emission Point	WOOD WASTE BOILER
Date	2-21-96
Stack height	75'
Distance to source	150'
Direction from source	Southwest

CONDITIONS	START	STOP
Time	1025	1125
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	65°	68°
Sky cover	Clear	Clear
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

	seconds			
min	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	10	10	10

	seconds			
min	0	15	30	45
15	5	5	5	5
16	10	10	10	10
17	10	10	10	10
18	20	20	20	20
19	20	20	15	15
20	10	35	35	35
21	0	0	0	0
22	0	0	5	5
23	0	0	0	0
24	5	5	5	5
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

	seconds			
min	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0

	seconds			
min	0	15	30	45
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carruth

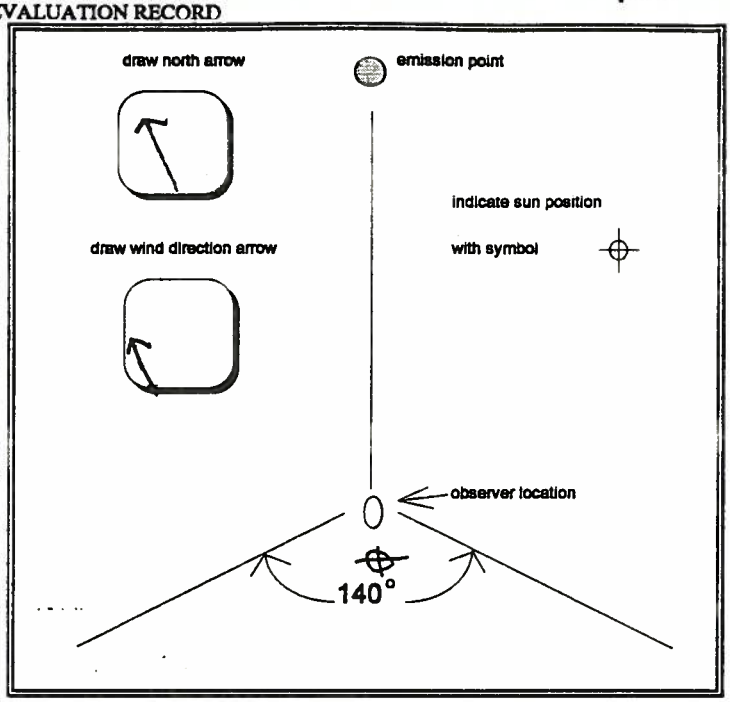
RS

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

VISIBLE EMISSIONS EVALUATION RECORD

PLANT	Koppers - Tie Plant, Ms.
Emission Point	Woodwaste Boiler
Date	2-21-96
Stack height	75'
Distance to source	150'
Direction from source	Southwest

CONDITIONS	START	STOP
Time	1306	1406
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	73°	73°
Sky cover	Clear	Clear
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45	min	seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45	0	0	0	0
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46	0	0	0	0
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47	0	0	0	0
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48	0	0	0	0
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49	0	0	0	0
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50	0	0	0	0
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51	0	0	0	0
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52	0	0	0	0
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53	0	0	0	0
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54	0	0	0	0
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55	0	0	0	0
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56	0	0	0	0
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57	0	0	0	0
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58	0	0	0	0
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59	0	0	0	0

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carroll

ENVIRONMENTAL MONITORING LABORATORIES - RIDGELAND, MISSISSIPPI - 601/856-3092

VISIBLE EMISSIONS EVALUATION RECORD

Rb

PLANT Koppers - Tie Plant, Ms.

Emission Point Woodwaste Boiler

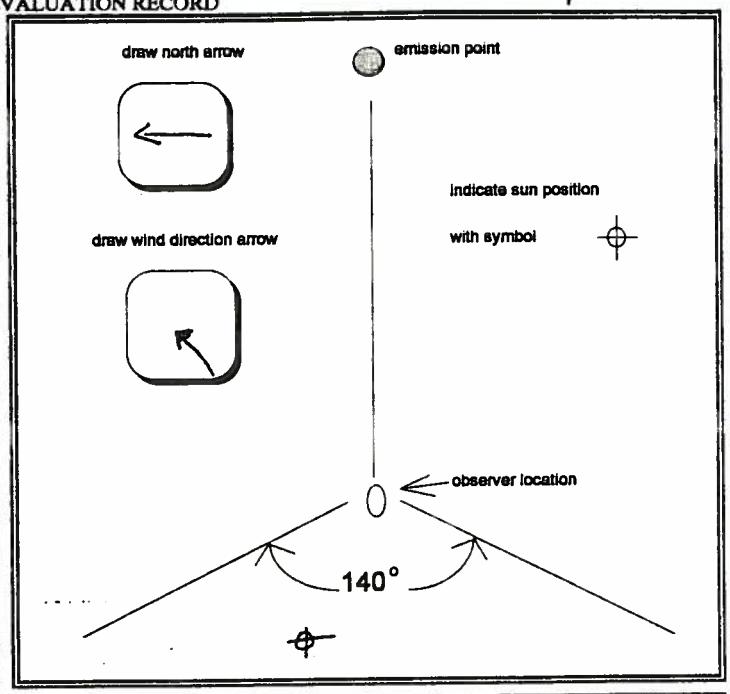
Date 2-21-96

Stack height 75'

Distance to source 125'

Direction from source West

CONDITIONS	START	STOP
Time	1547	1647
Wind direction	Southwest	Southwest
Wind speed	0-5	0-5
Ambient temp. ° F	74°	73°
Sky cover	Partly Cloudy	Partly Cloudy
Plume color	Black	Black
Plume background	Sky	Sky



Condensing water vapor? _____ Detached ☐ Attached ☐ Distance visible _____

min	seconds 0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	5	5	5	5
9	5	5	5	5
10	10	10	10	10
11	5	5	5	0
12	0	0	0	0
13	5	5	5	5
14	0	0	0	0

min	seconds 0	15	30	45
15	0	0	0	0
16	5	5	5	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	0	0	0	0
21	0	0	0	0
22	5	5	5	5
23	5	5	5	5
24	0	0	0	0
25	5	5	5	5
26	5	5	5	5
27	5	5	5	5
28	5	5	5	5
29	0	0	0	0

min	seconds 0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	10	10	10	10
38	5	5	5	5
39	5	5	5	5
40	0	0	0	0
41	0	0	0	0
42	5	5	5	5
43	5	5	5	5
44	0	0	0	0

min	seconds 0	15	30	45
45	5	5	5	5
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	5	5	5	5
58	5	5	5	5
59	5	5	5	5

Remarks: _____

Avg. opacity for period: _____ Highest six minute average: _____

Other data reduction: _____

Observer: _____ date certified: 10-18-95 Signature: Larry L. Carruth

APPENDIX D.

POHC ANALYSES REPORT

(Bonner Analytical)

BONNER ANALYTICAL TESTING COMPANY
2703 OAK GROVE ROAD
HATTIESBURG, MS 39402
PH. (601) 264-2854

Client: ENVIRONMENTAL MONITORING LABORATORY

File Number: BT30583-30588 Sample Date/Time:
Collected By: Client Date/Time Rec'd: 02-26-96 @ 1600

PROJECT: BURN STACK TESTS - KOPPER INDUSTRIES

Sample Identity	Sulfur % by wt.	Chlorine (mg/kg)	Heat Value BTU/lb	Water %
CREO	0.23	---	* 5,180	36.8
PENTA	0.18	---	6,860	19.0
C1	0.24	---	6,190	25.6
C2	0.14	---	7,150	25.8
Koppers Fly Ash	0.65	2,890	---	0.3
Bottom Ash **	0.049	420	---	0.10
Date/Time:	03-20-96/1450	03-26-96/1530	03-14-96/1500	03-13-96/1600
Analyst:	KAW	KAW	KAW	TCE
MDL:	0.01	50	30	0.1
Method #:	D-3177	D-808	D-240	D-2216

* A duplicate BTU determination yielded 4,980/lb.

** Bottom Ash received on 03-04-96 via Sunbelt Courier.

All analyses performed in accordance with 40 CFR 136 and amendments.

MDL = Method Detection Limit.

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

sr

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30576
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 1917
Analyst: dec

Koppers Industries - Grenada
KPS R1

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	6.08	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.20	0.20
Acenaphthene	0.62	0.20
Fluorene	0.62	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	3.52	0.20
Anthracene	3.74	0.20
Fluoranthene	0.50	0.20
Pyrene	0.26	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30577
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2018
Analyst: dec

Koppers Industries - Grenada
KPS R2

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	17.63	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.31	0.20
Acenaphthene	0.77	0.20
Fluorene	0.63	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	3.63	0.20
Anthracene	3.88	0.20
Fluoranthene	0.63	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30578
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2120
Analyst: dec

Koppers Industries - Grenada
KPS R3

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	28.86	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.34	0.20
Acenaphthene	0.97	0.20
Fluorene	0.67	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	3.34	0.20
Anthracene	3.56	0.20
Fluoranthene	0.65	0.20
Pyrene	0.26	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected



Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30579
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2221
Analyst: dec

Koppers Industries - Grenada
KPS R4

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	33.73	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	0.27	0.20
Acenaphthene	0.25	0.20
Fluorene	0.27	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	2.49	0.20
Anthracene	2.65	0.20
Fluoranthene	0.29	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30580
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 2322
Analyst: dec

Koppers Industries - Grenada
KPS R5

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	34.73	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	4.07	0.20
Acenaphthylene	0.34	0.20
Acenaphthene	0.42	0.20
Fluorene	0.29	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	2.12	0.20
Anthracene	2.27	0.20
Fluoranthene	0.26	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30581
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 0023
Analyst: dec

Koppers Industries - Grenada
KPS R6

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	7.50	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	ND	0.20
Acenaphthene	ND	0.20
Fluorene	ND	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	1.25	0.20
Anthracene	1.33	0.20
Fluoranthene	ND	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY
2703 Oak Grove Road
Hattiesburg, MS 39402
(601) 264-2854

Client: Environmental Monitoring Laboratories
File Number: BT30582
Collected By: Client

Sample Date/Time: NA @ NA
Date/Time Received: 022696 @ 1600
Date/Time Analyzed: 040596 @ 0125
Analyst: dec

Koppers Industries - Grenada
KPS Blank

Analytical Parameter	Results ug/mL, ppm	MDL ug/mL, ppm
2-Chlorophenol	ND	0.20
2,4-Dichlorophenol	ND	0.20
Naphthalene	ND	0.20
4-Chloro-3-methylphenol	ND	0.20
2,4,6-Trichlorophenol	ND	0.20
2,4,5-Trichlorophenol	ND	0.20
Acenaphthylene	ND	0.20
Acenaphthene	ND	0.20
Fluorene	ND	0.20
Pentachlorophenol	ND	1.00
Phenanthrene	ND	0.20
Anthracene	ND	0.20
Fluoranthene	ND	0.20
Pyrene	ND	0.20
Benzo(a)anthracene	ND	0.20
Chrysene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(a)pyrene	ND	0.20
Indeno(1,2,3-cd)pyrene	ND	0.20
Dibenzo(a,h)anthracene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20

A surrogate standard (Decafluorobiphenyl) was added to all samples anticipating analysis via HPLC, as a result, the surrogate concentration was below the working range of the GC/MS system. Therefore surrogate recovery information is not available.

MDL = Method Detection Limit.
BMDL = Below Method Detection Limit.
ND = Not Detected

Certified by: _____
Michael S. Bonner, Ph.D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30583 BATCO File # | Enviromental Monitoring COMPANY | Sawdust SAMPLE TYPE | Creosote Treated Fuel SAMPLE POINT | Collected: 022096 @ | Analyzed: 030796 @ 0010 DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	12.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	12.5	ND			ND						ND			ND		
Naphthalene	125	8.0J			ND						ND			ND		
4-Chloro-3-methylphenol	12.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	12.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	12.5	ND			ND						ND			ND		
Acenaphthylene	125	28.2J			ND						ND			ND		
Acenaphthene	125	1017.8			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	125	767.2			ND						ND			ND		
Pentachlorophenol	62.5	8.3J			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	125	3027.6			ND						ND			ND		
Anthracene	125	851.5			ND						ND			ND		
Fluoranthene	125	2209.5			ND						ND			ND		
Pyrene	125	1622.9			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	125	400.3			ND						ND			ND		
Chrysene	125	423.9			ND						ND			ND		
Benzo(b)fluoranthene	125	207.9			ND						ND			ND		
Benzo(k)fluoranthene	125	194.1			ND						ND			ND		
Benzo(a)pyrene	125	194.8			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	125	53.2J			ND						ND			ND		
Dibenzo(a,h)anthracene	125	7.2J			ND						ND			ND		
Benzo(g,h,i)perylene	125	43.4J			ND						ND			ND		
SURROGATES:																
Fluorophenol		136.8	150	91.2	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		116.1	150	77.4	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		125.9	150	83.9	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		91.1	100	91.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		75.7	100	75.7	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		96.1	100	96.1	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		119.1	150	79.4	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		124.1	100	124.1	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by:

MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30584 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
Penta Treated Fuel — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030796 @ 0111 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
2-Chlorophenol	11.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	11.5	ND			ND						ND			ND		
Naphthalene	115	522.7			ND						ND			ND		
4-Chloro-3 methylphenol	11.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	11.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	11.5	ND			ND						ND			ND		
Acenaphthylene	115	31.3J			ND						ND			ND		
Acenaphthene	115	935.9			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	115	829.5			ND						ND			ND		
Pentachlorophenol	575	1233.4			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	115	3315.2			ND						ND			ND		
Anthracene	115	967.0			ND						ND			ND		
Fluoranthene	115	2228.8			ND						ND			ND		
Pyrene	115	1562.7			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	115	412.6			ND						ND			ND		
Chrysene	115	410.3			ND						ND			ND		
Benzo(b)fluoranthene	115	227.5			ND						ND			ND		
Benzo(k)fluoranthene	115	198.5			ND						ND			ND		
Benzo(a)pyrene	115	218.8			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	115	60.5J			ND						ND			ND		
Dibenzo(a,h)anthracene	115	14.3J			ND						ND			ND		
Benzo(g,h,i)perylene	115	47.6J			ND						ND			ND		
SURROGATES:																
Fluorophenol		100.7	150	67.1	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		90.6	150	60.4	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		87.5	150	58.3	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		68.7	100	68.7	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		70.5	100	70.5	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		100.4	100	100.4	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		152.3	150	101.5	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		120.9	100	120.9	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by:

MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30585 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
C1 Fuel Mix — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030796 @ 0212 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
											131.1	150	87.4	150.8	150	100.5
2-Chlorophenol	15.0	ND			ND						ND			ND		
2,4-Dichlorophenol	15.0	ND			ND						ND			ND		
Naphthalene	150	724.8			ND						118.9	150	79.3	136.7	150	91.1
4-Chloro-3-methylphenol	15.0	ND			ND						ND			ND		
2,4,6-Trichlorophenol	15.0	ND			ND						ND			ND		
2,4,5-Trichlorophenol	15.0	ND			ND						ND			ND		
Acenaphthylene	150	23.0J			ND						62.3	100	62.3	90.9	100	90.9
Acenaphthene	150	596.1			ND						ND			ND		
Fluorene	150	512.2			ND						80.8	150	53.9	131.7	150	87.8
Pentachlorophenol	750	211.6J			ND						ND			ND		
Phenanthrene	150	2121.7			ND						ND			ND		
Anthracene	150	546.8			ND						ND			ND		
Fluoranthene	150	1327.4			ND						76.2	100	76.2	89.4	100	89.4
Pyrene	150	911.1			ND						ND			ND		
Benzo(a)anthracene	150	238.7			ND						ND			ND		
Chrysene	150	250.4			ND						ND			ND		
Benzo(b)fluoranthene	150	113.0J			ND						ND			ND		
Benzo(k)fluoranthene	150	104.9J			ND						ND			ND		
Benzo(a)pyrene	150	104.0J			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	150	25.4J			ND						ND			ND		
Dibenzo(a,h)anthracene	150	0.9J			ND						ND			ND		
Benzo(g,h,i)perylene	150	21.3J			ND						ND			ND		
SURROGATES:																
Fluorophenol		106.9	150	71.3	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		116.5	150	77.7	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		115.4	150	76.9	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		79.1	100	79.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		66.7	100	66.7	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		85.6	100	85.6	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		118.2	150	78.8	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		103.2	100	103.2	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by:

MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30586 — BATCO File #
Enviromental Monitoring — COMPANY
Sawdust — SAMPLE TYPE
C2 — Fuel Mix — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030796 @ 0314 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	15.5	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	15.5	ND			ND						ND			ND		
Naphthalene	155	974.1			ND						ND			ND		
4-Chloro-3-methylphenol	15.5	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	15.5	ND			ND						ND			ND		
2,4,5-Trichlorophenol	15.5	ND			ND						ND			ND		
Acenaphthylene	155	34.9J			ND						ND			ND		
Acenaphthene	155	739.4			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	155	618.4			ND						ND			ND		
Pentachlorophenol	775	265.9J			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	155	2452.9			ND						ND			ND		
Anthracene	155	645.7			ND						ND			ND		
Fluoranthene	155	1549.9			ND						ND			ND		
Pyrene	155	1034.7			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	155	284.7			ND						ND			ND		
Chrysene	155	303.4			ND						ND			ND		
Benzo(b)fluoranthene	155	157.8			ND						ND			ND		
Benzo(k)fluoranthene	155	142.8J			ND						ND			ND		
Benzo(a)pyrene	155	137.9J			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	155	36.2J			ND						ND			ND		
Dibenzo(a,h)anthracene	155	3.8J			ND						ND			ND		
Benzo(g,h,i)perylene	155	29.1J			ND						ND			ND		
SURROGATES:																
Fluorophenol		114.1	150	76.1	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		114.3	150	76.2	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		121.7	150	81.1	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		85.1	100	85.1	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		94.6	100	94.6	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		92.5	100	92.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		121.4	150	80.9	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		91.7	100	91.7	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

Certified by:

MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30587 — BATCO File #
Enviromental Monitoring COMPANY
Ash — SAMPLE TYPE
Koppers Flyash — SAMPLE POINT
Collected: 022096 @ — DATE
Analyzed: 030696 @ 2051 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE			BLANK			DUPLICATE			MATRIX			DUPLICATE MATRIX		
		Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. mg/Kg (ppm)	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov	Detected Concen. ng/ul in the extract	Spike Amt. ug	Spike % Recov
2-Chlorophenol	0.30	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	0.30	ND			ND						ND			ND		
Naphthalene	0.30	0.06 J			ND						ND			ND		
4-Chloro-3-methylphenol	0.30	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	0.30	ND			ND						ND			ND		
2,4,5-Trichlorophenol	0.30	ND			ND						ND			ND		
Acenaphthylene	0.30	ND			ND						ND			ND		
Acenaphthene	0.30	0.02 J			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	0.30	0.01 J			ND						ND			ND		
Pentachlorophenol	1.50	ND			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	0.30	0.04 J			ND						ND			ND		
Anthracene	0.30	0.01 J			ND						ND			ND		
Fluoranthene	0.30	0.03 J			ND						ND			ND		
Pyrene	0.30	0.03 J			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	0.30	0.01 J			ND						ND			ND		
Chrysene	0.30	0.01 J			ND						ND			ND		
Benzo(b)fluoranthene	0.30	ND			ND						ND			ND		
Benzo(k)fluoranthene	0.30	ND			ND						ND			ND		
Benzo(a)pyrene	0.30	ND			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	0.30	ND			ND						ND			ND		
Dibenzo(a,h)anthracene	0.30	ND			ND						ND			ND		
Benzo(g,h,i)perylene	0.30	ND			ND						ND			ND		
SURROGATES:																
Fluorophenol		* 17.4	150	11.6	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		* 15.7	150	10.5	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		* 4.0	150	2.7	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		* 27.0	100	27.0	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		26.4	100	26.4	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		* 6.5	100	6.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		* 0.0	150	0.0	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		* 0.4	100	0.4	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

* - surrogates do not pass

Certified by: _____
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

BONNER ANALYTICAL TESTING COMPANY

QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA
BASE NEUTRALS AND ACIDS - GC/MS ANALYSIS DATA

Chain of Custody Data Required for BATCO Data Management Summary Reports
Extraction Method - EPA 3550A Analysis Method - SW-846 Method 8270

BT30588 — BATCO File #
Enviromental Monitoring — COMPANY
Ash — SAMPLE TYPE
Bottom Ash — SAMPLE POINT
Collected: 022096 @
Analyzed: 030696 @ 2153 — DATE TIME

Compound	MDL mg/Kg (ppm)	SAMPLE Detected Concen. mg/Kg (ppm)	SAMPLE Spike Amt. ug	SAMPLE Spike % Recov	BLANK Detected Concen. mg/Kg (ppm)	BLANK Spike Amt. ug	BLANK Spike % Recov	DUPLICATE Detected Concen. mg/Kg (ppm)	DUPLICATE Spike Amt. ug	DUPLICATE Spike % Recov	MATRIX Detected Concen. ng/ul in the extract	MATRIX Spike Amt. ug	MATRIX Spike % Recov	DUPLICATE MATRIX Detected Concen. ng/ul in the extract	DUPLICATE MATRIX Spike Amt. ug	DUPLICATE MATRIX Spike % Recov
2-Chlorophenol	0.35	ND			ND						131.1	150	87.4	150.8	150	100.5
2,4-Dichlorophenol	0.35	ND			ND						ND			ND		
Naphthalene	0.35	1.27 J			ND						ND			ND		
4-Chloro-3-methylphenol	0.35	ND			ND						118.9	150	79.3	136.7	150	91.1
2,4,6-Trichlorophenol	0.35	ND			ND						ND			ND		
2,4,5-Trichlorophenol	0.35	ND			ND						ND			ND		
Acenaphthylene	0.35	ND			ND						ND			ND		
Acenaphthene	0.35	0.01 J			ND						62.3	100	62.3	90.9	100	90.9
Fluorene	0.35	0.17 J			ND						ND			ND		
Pentachlorophenol	1.75	ND			ND						80.8	150	53.9	131.7	150	87.8
Phenanthrene	0.35	0.27 J			ND						ND			ND		
Anthracene	0.35	0.07 J			ND						ND			ND		
Fluoranthene	0.35	0.14 J			ND						ND			ND		
Pyrene	0.35	0.13 J			ND						76.2	100	76.2	89.4	100	89.4
Benzo(a)anthracene	0.35	0.02 J			ND						ND			ND		
Chrysene	0.35	0.02 J			ND						ND			ND		
Benzo(b)fluoranthene	0.35	ND			ND						ND			ND		
Benzo(k)fluoranthene	0.35	ND			ND						ND			ND		
Benzo(a)pyrene	0.35	ND			ND						ND			ND		
Indeno(1,2,3-c,d)pyrene	0.35	ND			ND						ND			ND		
Dibenzo(a,h)anthracene	0.35	ND			ND						ND			ND		
Benzo(g,h,i)perylene	0.35	ND			ND						ND			ND		
SURROGATES:																
Fluorophenol		* 13.4	150	11.6	96.2	150	64.1				82.2	150	54.8	128.1	150	85.4
Phenol-d6		* 0.4	150	10.5	61.4	150	40.9				60.4	150	40.3	88.4	150	58.9
2-Chlorophenol-d4		* 0.1	150	2.7	79.9	150	53.3				67.8	150	45.2	119.5	150	79.7
1,2-Dichlorobenzene-d4		* 0.5	100	27.0	51.1	100	51.1				48.4	100	48.4	65.1	100	65.1
Nitrobenzene-d5		* 0.2	100	26.4	87.0	100	87.0				72.9	100	72.9	75.0	100	75.0
Fluorobiphenyl		* 0.1	100	6.5	63.4	100	63.4				51.9	100	51.9	83.7	100	83.7
2,4,6-Tribromophenol		* 0.0	150	0.0	148.5	150	99.0				90.6	150	60.4	150.7	150	100.5
Terphenyl-d14		* 1.4	100	0.4	91.4	100	91.4				64.9	100	64.9	106.0	100	106.0

* - surrogates do not pass

Certified by: _____
MICHAEL S. BONNER, Ph. D.
BONNER ANALYTICAL TESTING COMPANY

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention: Danny Russell

Laboratory: Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: Dr. Mike Bonner EML PO No. DR0223

Project: Kopper Industries - Grenada

Treated wood test burn stack tests on 2-20-96

Rinse is Acetone, Methylene Chloride, some H_2O

Rush ☐ Routine ☐ Fax Results ☐

No. of containers	SAMPLE ID (BT#)	Sample matrix	REMARKS	PAH – EPA 8270	Chlorinated phenols incl. pentachlorophe EPA 8270	UNITS
1	KPS R1 - Filter	solid	combine			total micrograms
1	KPS R1 - Sorbent BT30576	solid		X	X	
1	KPS R1 - Rinse	aqueous	extracts			
1	KPS R2 - Filter	solid	combine			total micrograms
1	KPS R2 - Sorbent BT30577	solid		X	X	
1	KPS R2 - Rinse	aqueous	extracts			
1	KPS R3 - Filter	solid	combine			total micrograms
1	KPS R3 - Sorbent BT30578	solid		X	X	
1	KPS R3 - Rinse	aqueous	extracts			
1	KPS R4 - Filter	solid	combine			total micrograms
1	KPS R4 - Sorbent BT30579	solid		X	X	
1	KPS R4 - Rinse	aqueous	extracts			
1	KPS R5 - Filter	solid	combine			total micrograms
1	KPS R5 - Sorbent BT30580	solid		X	X	
1	KPS R5 - Rinse	aqueous	extracts			
1	KPS R6 - Filter	solid	combine			total micrograms
1	KPS R6 - Sorbent BT30581	solid		X	X	
1	KPS R6 - Rinse	aqueous	extracts			
1	KPS Filter Blank	solid	combine			total micrograms
1	KPS Blank - Sorbent BT20582	solid		X	X	
1	KPS Rinse Blank	aqueous	extracts			

ANALYSES REQUESTED

Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Daniel G. Russell	2-23-96	RW Culpepper	2/26/96 1600
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER	Date Shipped	Received for lab by:	Date/time

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention:

Laboratory: Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: EML PO No.

Project: Kopper Industries - Grenada
Treated wood test burn stack tests on 2-20-96

Rush ☐ Routine ☐ Fax Results ☐

No. of containers	SAMPLE ID	Sample matrix	REMARKS	PAH and chl. phenols incl. penta EPA-8270	sulfur -- ASTM D-3177	chlorine - ASTM D-808	Heat value (ASTM D-240	H2O ASTM-D-2216	
1	Creo (creosote treated fuel)	solid		X	X		X	X	BT30583
1	Penta (penta treated fuel)	solid		X	X		X	X	30584
1	C1 (fuel mix)	solid		X	X		X	X	30585
1	C2 (fuel mix)	solid		X	X		X	X	30586
1	Koppers Flyash	solid		X	X	X		X	30587
0	botttom ash (to be shipped)	solid		X	X	X		X	BT 30588

SHIPPING BY SOUTHEAST COURIER

Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Daniel G. Russell	2/23/96	RW Culpepper	2/26/96 1600 RW
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER	Date Shipped	Received for lab by:	Date/time

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) 1,4-Dichlorobenzene-d4	11.90	152	798	40.00	NG/UL	-0.02
18) Napthalene-d8	14.43	136	9305	40.00	NG/UL	-0.03
33) Acenaphthene-d10	18.13	164	3411	40.00	NG/UL	-0.04
53) Phenanthrene-d10	21.20	188	4678	40.00	NG/UL	-0.03
64) Chrysene-d12	27.78	240	773	40.00	NG/UL	-0.03
72) Perylene-d12	0.00	264	0	0.00	NG/UL	-36.36
System Monitoring Compounds						%Recovery
2) 2-Fluorophenol	9.59	112	9932	358.31	NG/UL	238.87%
3) Phenol-d5	11.21	99	11611	323.98	NG/UL	215.99%
4) 2-Chlorophenol-d4	11.54	132	5876	230.89	NG/UL	153.93%
5) 1,2-Dichlorobenzene-d4	12.27	150	3079	94.72	NG/UL	94.72%
19) Nitrobenzene-d5	13.09	82	4069	32.11	NG/UL	32.11%
38) 2-Fluorobiphenyl	16.68	172	6113	51.25	NG/UL	51.25%
56) 2,4,6-Tribromophenol	19.79	330	1259	89.03	NG/UL	59.36%
66) Terphenyl-d14	24.49	244	8702	364.35	NG/UL	364.35%
Target Compounds						Qvalue
6) Phenol	11.24	94	40445	1009.93	NG/ULm	85
7) bis(2-Chloroethyl)ether	0.00	93		Not Detected		
8) 2-Chlorophenol	0.00	128		Not Detected		
9) 1,3-Dichlorobenzene	0.00	146		Not Detected		
10) 1,4-Dichlorobenzene	0.00	146		Not Detected		
11) 1,2-Dichlorobenzene	0.00	146		Not Detected		
12) Benzyl alcohol	0.00	108		Not Detected		
13) 2-Methylphenol	0.00	107		Not Detected		
14) 4-Methylphenol	0.00	107		Not Detected		
15) 2,2'oxybis(1-Chloropropane	0.00	45		Not Detected		
16) N-Nitroso-di-propylamine	0.00	70		Not Detected		
17) Hexachloroethane	0.00	117		Not Detected		
20) Nitrobenzene	0.00	77		Not Detected		
21) Isophorone	0.00	82		Not Detected		
22) 2-Nitrophenol	0.00	139		Not Detected		
23) 2,4-Dimethylphenol	0.00	122		Not Detected		
24) bis(2-Chloroethoxy)methane	0.00	93		Not Detected		
25) Benzoic acid	14.10	122	4976521	96702.33	NG/ULm	
26) 2,4-Dichlorophenol	14.19	162	12253	159.44	NG/ULm	84
27) 1,2,4-Trichlorobenzene	0.00	180		Not Detected		
28) Naphthalene	14.51	128	1443877	5545.25	NG/ULm	9
29) 4-Chloroaniline	0.00	127		Not Detected		
30) Hexachlorobutadiene	0.00	225		Not Detected		
31) 4-Chloro-3-methylphenol	0.00	107		Not Detected		
32) 2-Methylnaphthalene	15.92	142	98992	613.13	NG/ULm	98
34) Hexachlorocyclopentadiene	0.00	237		Not Detected		

(#) = qualifier out of range (m) = manual integration

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - I
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Compound	R.T.	QIon	Response	Conc Unit	Qvalue
35) 2,4,6-Trichlorophenol	16.54	196	44792	1391.80 NG/ULm	9
36) 2,4,5-Trichlorophenol	16.64	196	3754	112.99 NG/ULm	70
37) 2-Chloronaphthalene	0.00	162		Not Detected	
39) 2-Nitroaniline	0.00	65		Not Detected	
40) 2,4-Dinitrophenol	0.00	184		Not Detected	
41) 4-Nitrophenol	0.00	139		Not Detected	
42) Dimethylphthalate	0.00	163		Not Detected	
43) Acenaphthylene	17.82	152	24122	151.59 NG/ULm	96
44) 3-Nitroaniline	0.00	138		Not Detected	
45) Acenaphthene	18.20	154	18735	184.77 NG/ULm	94
46) Dibenzofuran	18.52	168	46756	338.90 NG/ULm	98
47) 2,4-Dinitrotoluene	0.00	165		Not Detected	
48) 2,6-Dinitrotoluene	0.00	165		Not Detected	
49) Diethylphthalate	18.99	149	613999	4810.95 NG/ULm	9
50) 4-Chlorophenyl-phenylether	0.00	204		Not Detected	
51) Fluorene	19.24	166	15755	145.54 NG/ULm	98
52) 4-Nitroaniline	0.00	138		Not Detected	
54) 4,6-Dinitro-2-methylphenol	0.00	198		Not Detected	
55) N-Nitrosodiphenylamine	0.00	169		Not Detected	
57) 4-Bromophenyl-phenylether	0.00	248		Not Detected	
58) Hexachlorobenzene	0.00	284		Not Detected	
59) Pentachlorophenol	0.00	266		Not Detected	
60) Phenanthrene	21.25	178	67735	421.02 NG/ULm	97
61) Anthracene	21.34	178	11193	74.19 NG/ULm	98
62) Di-n-butylphthalate	22.35	149	7446387	35963.11 NG/ULm	
63) Fluoranthene	23.75	202	12699	97.86 NG/ULm	1
65) Pyrene	24.23	202	13466	327.52 NG/ULm	92
67) Butylbenzylphthalate	25.71	149	60136	2488.05 NG/ULm	9
68) 3,3'-Dichlorobenzidiene	0.00	252		Not Detected	
69) Benzo(a)anthracene	0.00	228		Not Detected	
70) Chrysene	0.00	228		Not Detected	
71) bis(2-Ethylhexyl)phthalate	27.71	149	8923839	297095.72 NG/ULm	
73) Di-n-Octylphthalate	0.00	149		Not Detected	
74) Benzo(b)fluoranthene	0.00	252		Not Detected	
75) Benzo(k)fluoranthene	0.00	252		Not Detected	
76) Benzo(a)pyrene	0.00	252		Not Detected	
77) Indeno(1,2,3-cd)pyrene	0.00	276		Not Detected	
78) Dibenz(a,h)anthracene	0.00	278		Not Detected	
79) Benzo(g,h,i)perylene	0.00	276		Not Detected	

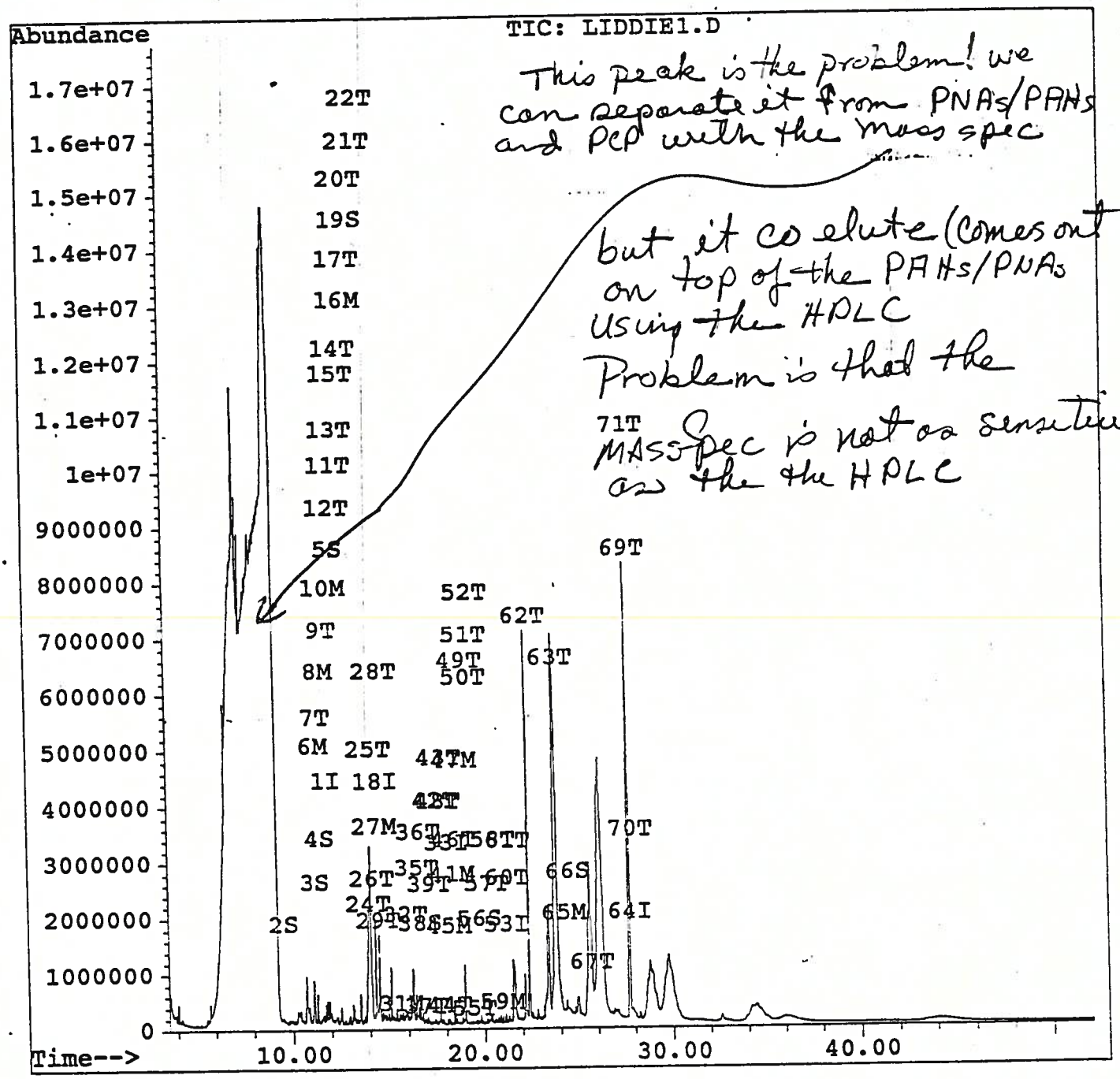
(#) = qualifier out of range (m) = manual integration

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

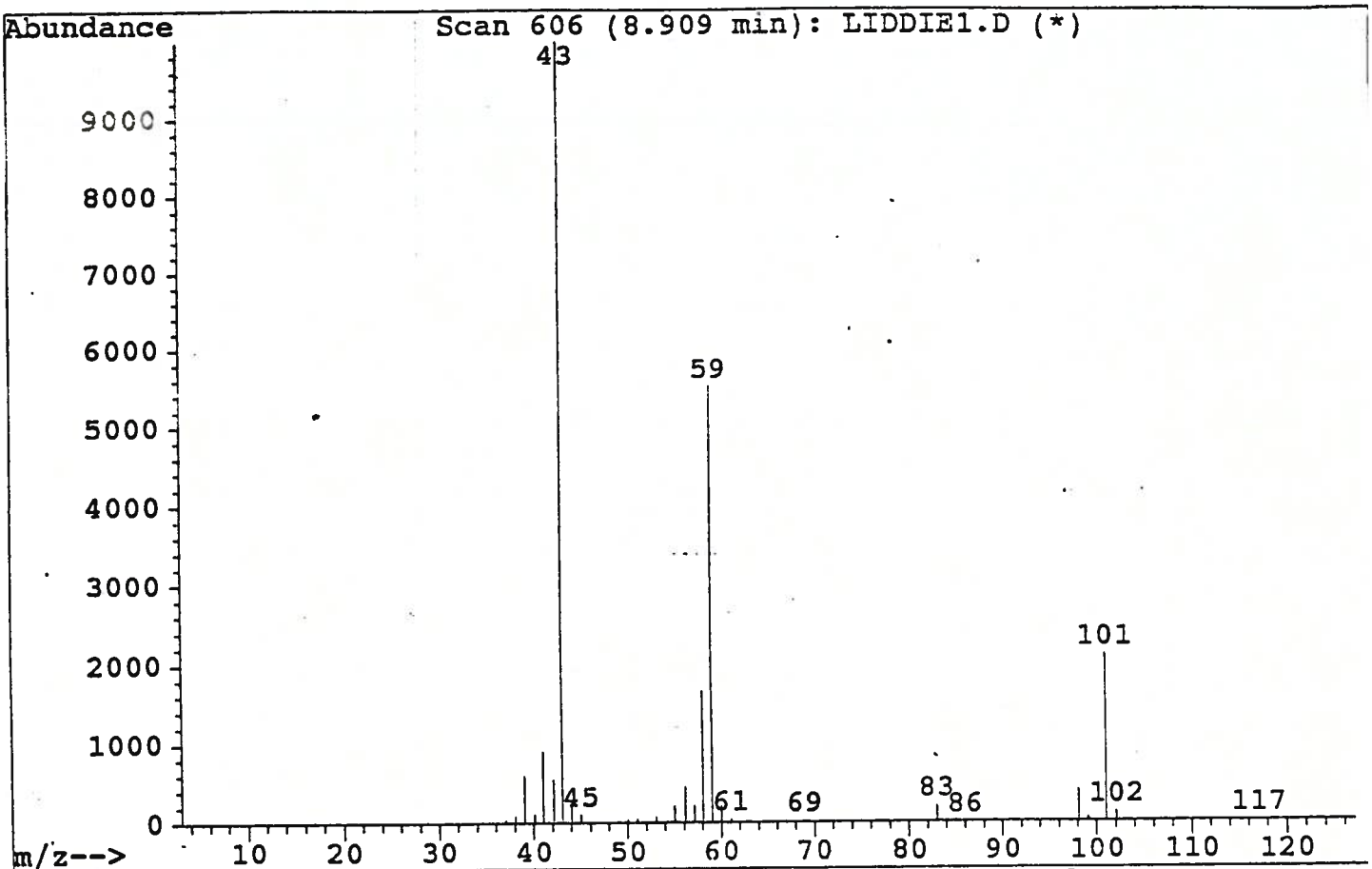
Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

1-853-215



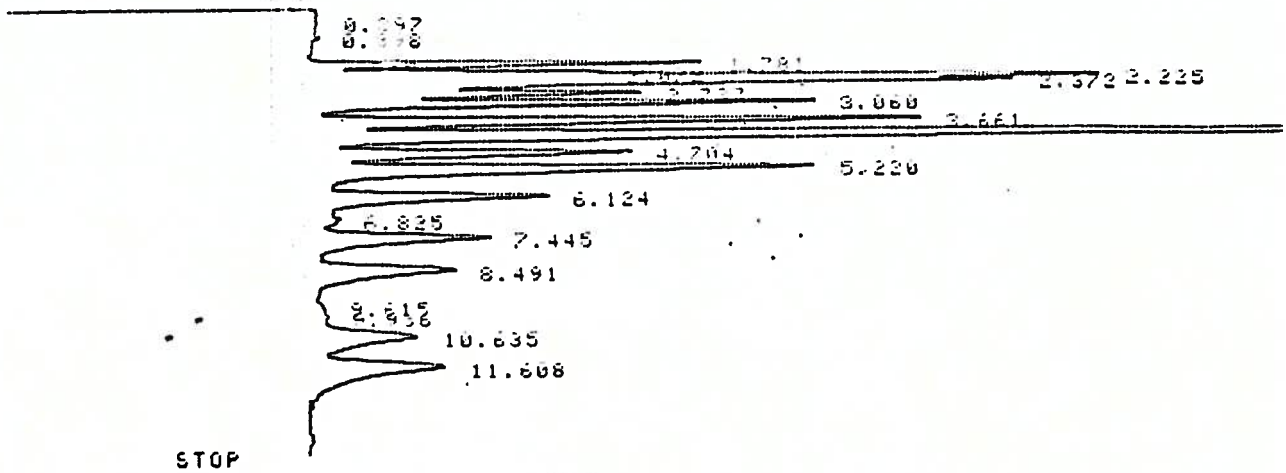
Quality : 64
ID : 2-Pentanone, 4-hydroxy-4-methyl-



200 PF
1:

* RUN # 4 JAN 1, 1901 05:28:08

START



STOP

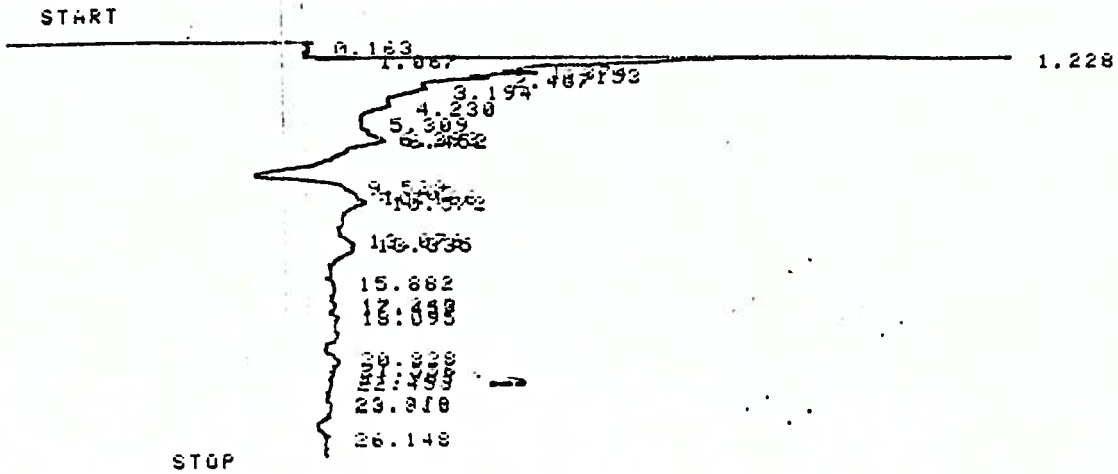
RUN# 4 JAN 1, 1901 05:28:08

HREH%

RT	HREH	TYPE	WIDTH	HREH%
.397	7708	PV	.108	.03867
.898	15624	VV	.125	.07838
1.640	5278	BV	.061	.02648
1.781	772090	VV	.146	3.87332
2.072	389131	VV	.099	1.95214
2.225	1694432	VV	.159	8.50040
2.372	1768664	VV	.167	8.87280
2.737	923975	VV	.208	4.63527
3.060	1408856	VV	.208	7.06776
3.661	1719991	VV	.210	8.62862
4.116	4305770	VV	.227	21.60060
4.704	1068472	VV	.249	5.36017
5.220	1887207	VV	.260	9.46749
6.124	983742	VV	.316	4.93511
6.825	39194	VV	.120	.19662
7.445	787810	VV	.341	3.95318
8.491	707715	VV	.386	3.55037
9.615	7308	VV	.067	.03666
9.936	15919	VV	.094	.07986
10.635	543513	VV	.399	2.72662
11.608	881174	VV	.500	4.42056

TOTHL HREH=1.9934E+07

MUL FHCTOR=1.0000E+00



RUN# 2 JAN 3, 1901 05:27:05

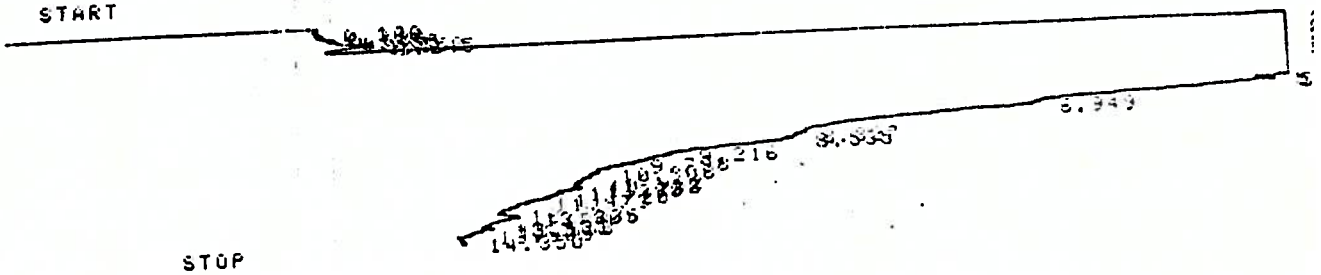
AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.067	26915	PP	.046	.87424
1.228	1572707	PV	.170	51.08378
1.874	217276	VV	.098	7.05743
2.153	532332	VV	.244	17.29090
2.457	382988	VV	.297	12.44000
3.194	38931	VV	.170	1.26453
4.230	17038	PV	.214	.55342
6.293	24274	VV	.089	.78845
6.452	36646	VV	.100	1.19031
9.529	107958	PV	.522	3.50663
9.902	11351	VV	.106	.36870
10.166	25025	VV	.127	.81285
10.572	22731	VV	.078	.73834
13.076	7520	PV	.134	.24426
15.882	8978	PV	.123	.29162
17.459	6554	VV	.064	.21288
18.095	9110	PV	.102	.29591
20.828	13376	PV	.137	.43447
21.983	7926	PV	.105	.25745
26.148	9047	VP	.086	.29386

TOTAL AREA=3078683
MUL FACTOR=1.0000E+00

Rinse Blank

* RUN # 8 JAN 3, 1901 08:02:08
START



STOP

RUN# 8 JAN 3, 1901 08:02:08

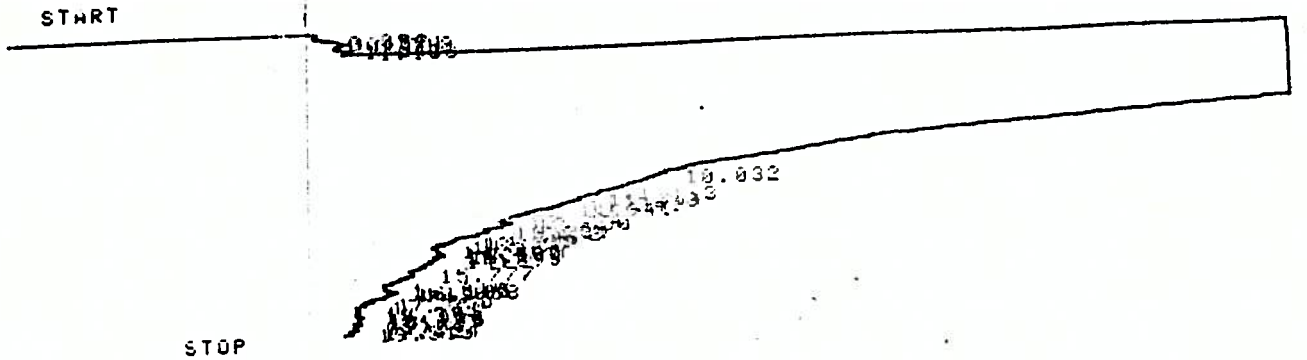
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.520	8568	VV	.071	.00390
.659	11745	VV	.083	.00534
.760	28776	VV	.104	.01310
.885	21495	VV	.072	.00978
1.152	50200	VV	.081	.02284
1.245	97216	VV	.127	.04424
1.773	8597395	VH	.094	3.91247
2.085	112973000	SHH	.249	51.41128
2.420	88931968	SHB	.598	40.47080
3.050	574406	TBP	.311	.26140
3.454	369949	TVV	.137	.16835
3.599	746630	TVP	.208	.33977
3.975	6942010	TVB	.328	3.15914
5.913	20910	PV	.057	.00952
5.968	90788	VB	.175	.04133
6.949	26446	VB	.122	.01203
8.327	18654	VV	.070	.00849
8.535	111097	VB	.252	.05056
9.216	6381	PV	.066	.00301
9.798	6422	PP	.054	.00292
10.308	5180	PV	.052	.00236
11.178	5031	VV	.031	.00229
11.237	13550	VV	.059	.00617
11.398	8044	PV	.070	.00366
11.720	7207	VV	.039	.00328
12.836	41671	VV	.133	.01896
12.905	21421	VV	.055	.00975
13.432	5718	VP	.052	.00260

TOTAL AREA=2.1974E+08
MUL FACTOR=1.0000E+00

R1

START



STOP

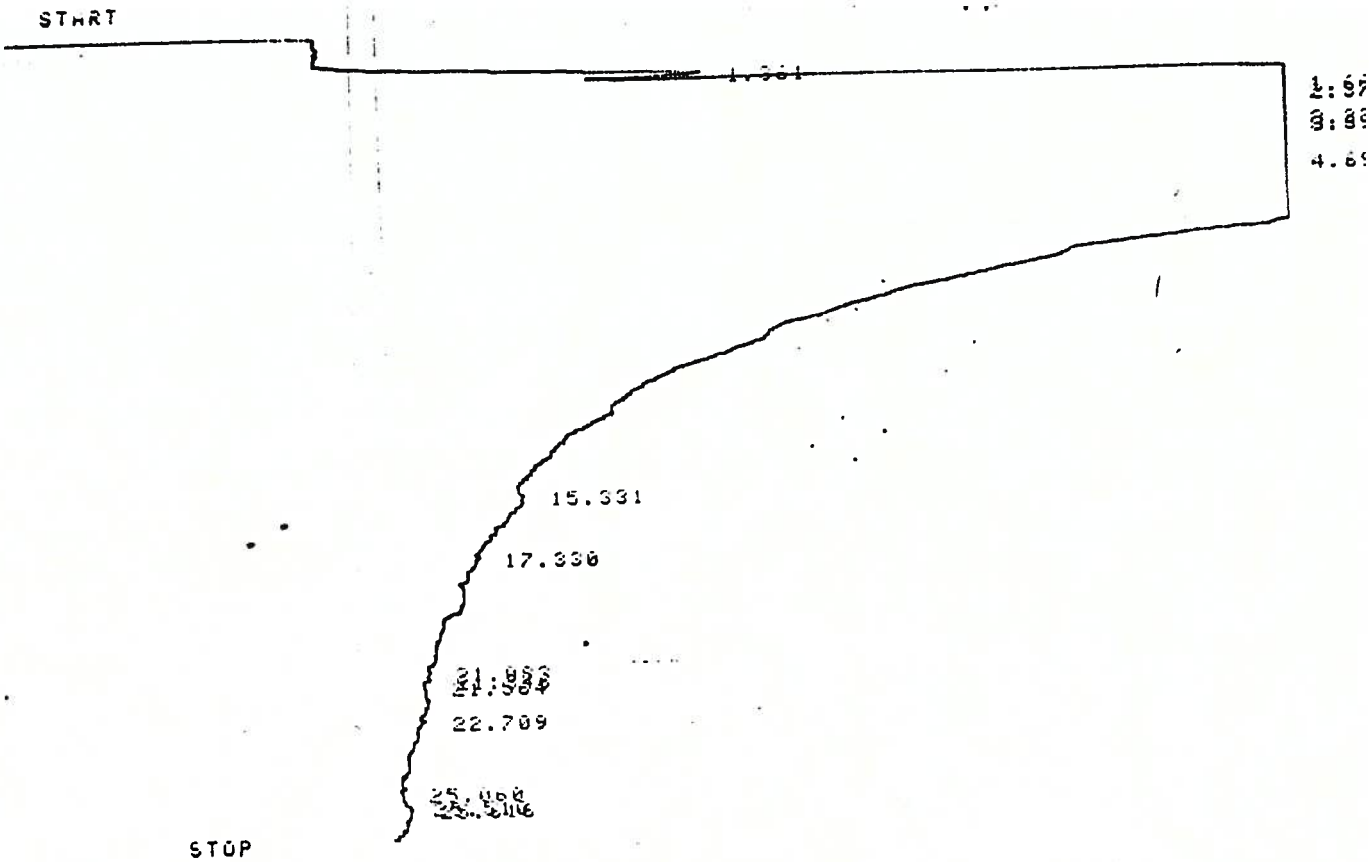
RUN# 9 JAN 3, 1981 08:18:09

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.394	7310	PV	.070	.00121
.452	7956	VV	.054	.00132
.571	32049	VV	.094	.00532
.718	34366	VV	.075	.00571
1.041	12771	VV	.043	.00212
1.183	80174	VV	.161	.01331
1.742	468772000	>SHH	.902	77.82074
2.436	8344986	TBB	.138	1.38535
3.120	26600800	SHH	.202	4.41599
3.311	41325696	SHH	.352	6.86047
3.745	56407680	SHB	.846	9.36423
4.210	376595	TBB	.176	.06252
4.755	45326	TBV	.052	.00752
10.032	6603	VV	.062	.00110
11.113	7819	VV	.068	.00130
11.354	6883	VV	.057	.00114
11.493	16076	VV	.083	.00267
11.741	17436	VV	.101	.00289
11.941	16291	VV	.082	.00270
12.330	28361	VV	.097	.00471
13.281	16653	VV	.122	.00276
13.705	6184	PV	.063	.00103
13.899	14294	VP	.081	.00237
14.056	18099	PP	.117	.00300
14.309	9936	VV	.098	.00165
14.465	9126	VV	.058	.00151
14.530	5461	VV	.037	.00091
14.670	11770	VV	.064	.00195
14.893	9305	VV	.070	.00154
15.777	12429	PV	.095	.00206
16.809	10455	VV	.069	.00174
16.865	6375	VV	.040	.00139
16.901	16538	VV	.074	.00275
17.058	33260	VV	.095	.00552
18.261	6032	VV	.069	.00100
18.520	8291	VV	.069	.00138
18.675	11274	VV	.072	.00187
18.793	8786	VV	.070	.00146
19.047	12410	VV	.077	.00206

TOTAL AREA=6.0237E+08

MUL FACTOR=1.0000E+00



RUN# 5 JAN 1, 1901 05:45:46

AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.361	1609227	PM	.309	.28732
1.662	415735200	/SHH	.200	74.22848
2.372	6168592	TBB	.153	1.10139
3.230	6346301	SHH	.093	1.13312
3.398	129149000	SHB	.437	23.05922
4.690	1010444	TBB	.221	.18041
15.331	15641	VV	.095	.00279
17.330	6726	PV	.085	.00120
21.083	5699	PV	.080	.00102
21.346	8636	VV	.079	.00154
22.709	7731	PV	.066	.00138
25.616	12499	VV	.088	.00223

TOTAL AREA=5.6008E+08
MUL FACTOR=1.0000E+00

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

Performing self test unit null

KPS R6

```
* RUN #    10      JAN  3, 1901  08:39:10
START
```

STOP

```
RUN#     10          JAN  3, 1901  08:39:10

AREA%
      RT        AREA TYPE  WIDTH      AREA%
    .758        7847   VP   .072     .00192
   1.038       16377   VV   .063     .00401
   1.170       58897   VV   .137     .01443
   1.765   339964960 /SHH   .654   83.28253
   2.400     9098528  TBB   .197    2.22890
   3.434    58393056  SHB  1.016   14.30478
   3.714      479511  TBB   .198     .11747
   4.746      187733  TBB   .179     .04599

TOTAL AREA=4.0821E+08
MUL FACTOR=1.0000E+00
```

KPS · R6

* RUN # 10 JAN 3, 1901 08:39:10
START

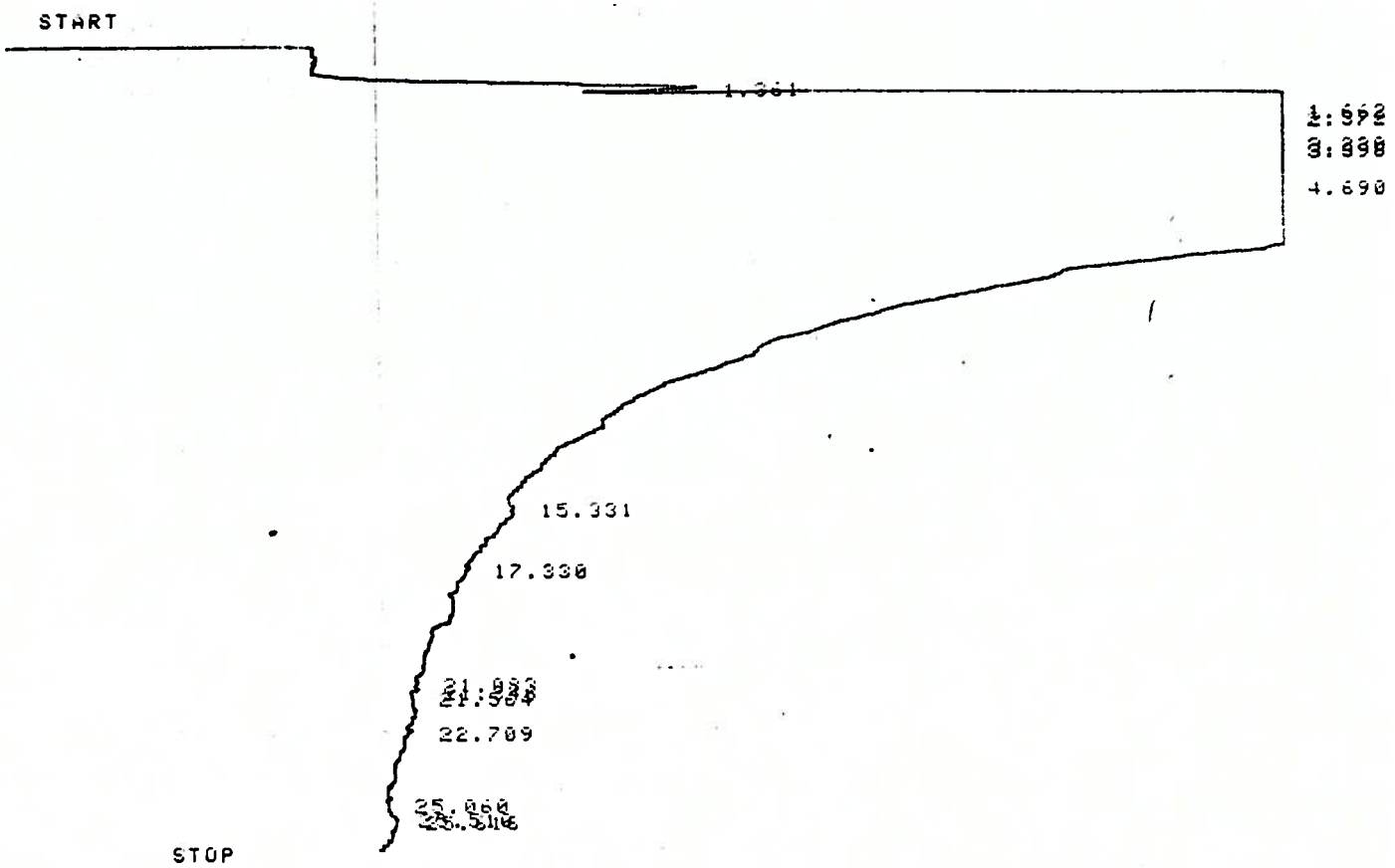
STOP

RUN# 10 JAN 3, 1901 08:39:10

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.758	7847	VP	.072	.00192
1.038	16377	VV	.063	.00401
1.170	58897	VV	.137	.01443
1.765	339964960	>SHH	.654	83.28253
2.400	9098528	TBB	.197	-2.22890
3.434	58393056	SHB	1.016	14.30478
3.714	479511	TBB	.198	.11747
4.746	187733	TBB	.179	.04599

TOTAL AREA=4.0821E+08
MUL FACTOR=1.0000E+00



RUN# 5 JAN 1, 1901 05:45:46

AREA%

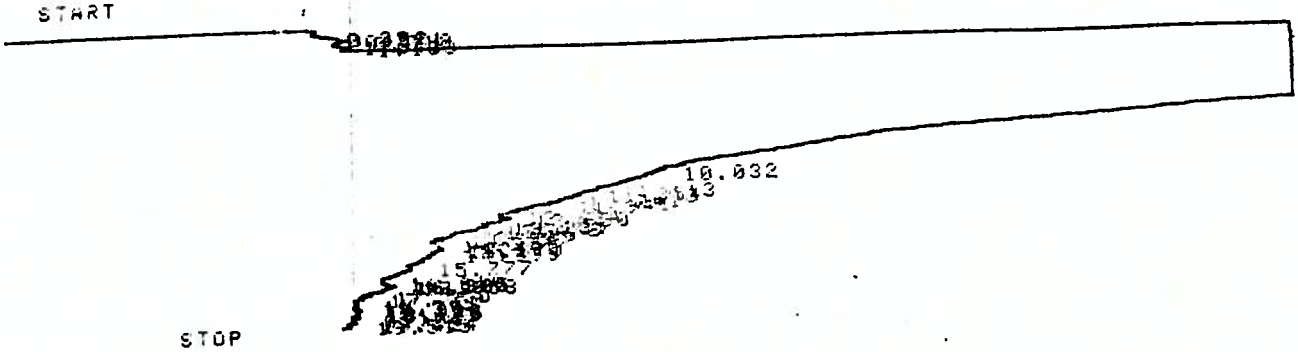
RT	AREA	TYPE	WIDTH	AREA%
1.361	1609227	PH	.309	.28732
1.662	415735200	>SHH	.800	74.22848
2.372	6168592	TBB	.153	1.10139
3.230	6346301	SHH	.093	1.13312
3.398	129149000	SHB	.437	23.05922
4.690	1010444	TBB	.221	.18041
15.331	15641	VV	.095	.00279
17.330	6726	PV	.085	.00120
21.083	5699	PV	.080	.00102
21.346	8636	VV	.079	.00154
22.709	7731	PV	.066	.00138
25.616	12499	VV	.088	.00223

TOTAL AREA=5.6008E+08
MUL FACTOR=1.0000E+00

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

Performing self test unit #1

START



STOP

RUN# 9 JAN 3, 1901 08:18:09

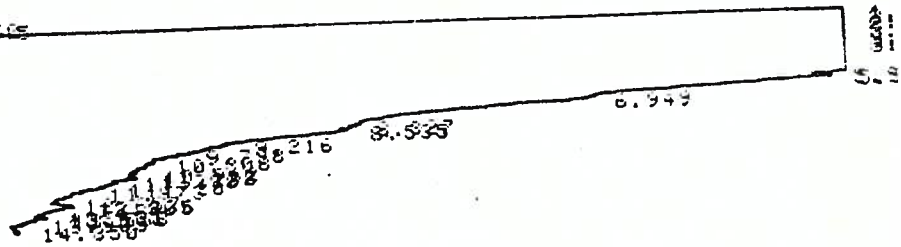
AREA%

RT	AREA	TYPE	WIDTH	AREA%
.394	7310	PV	.070	.00121
.452	7956	VV	.054	.00132
.571	32049	VV	.094	.00532
.718	34366	VV	.075	.00571
1.041	12771	VV	.043	.00212
1.183	80174	VV	.161	.01331
1.742	468772000	>SHH	.902	77.82074
2.436	8344986	TBB	.138	1.38535
3.120	26600800	SHH	.202	4.41599
3.311	41325696	SHH	.352	6.86047
3.745	56407680	SHB	.846	9.36423
4.210	376595	TBB	.176	.06252
4.755	45326	TBV	.052	.00752
10.032	6603	VV	.062	.00110
11.113	7819	VV	.068	.00130
11.354	6883	VV	.057	.00114
11.493	16076	VV	.083	.00267
11.741	17436	VV	.101	.00289
11.941	16291	VV	.082	.00270
12.830	28361	VV	.097	.00471
13.281	16653	VV	.122	.00276
13.705	6184	PV	.063	.00103
13.899	14294	VP	.081	.00237
14.056	18099	PP	.117	.00300
14.309	9936	VV	.098	.00165
14.465	9126	VV	.058	.00152
14.530	5461	VV	.037	.00091
14.670	11770	VV	.064	.00195
14.893	9305	VV	.070	.00154
15.777	12429	PV	.095	.00206
16.809	10455	VV	.069	.00174
16.865	6375	VV	.040	.00106
16.901	16538	VV	.074	.00275
17.058	33260	VV	.095	.00552
18.261	6032	VV	.069	.00100
18.520	8291	VV	.069	.00138
18.675	11274	VV	.072	.00187
18.793	8786	VV	.070	.00146
19.047	12410	VV	.077	.00206

TOTAL AREA=6.0237E+08
MUL FACTOR=1.0000E+00

Rinse Blank

* RUN # 8 JAN 3, 1901 08:02:08
START



STOP

RUN# 8 JAN 3, 1901 08:02:08

AREA%

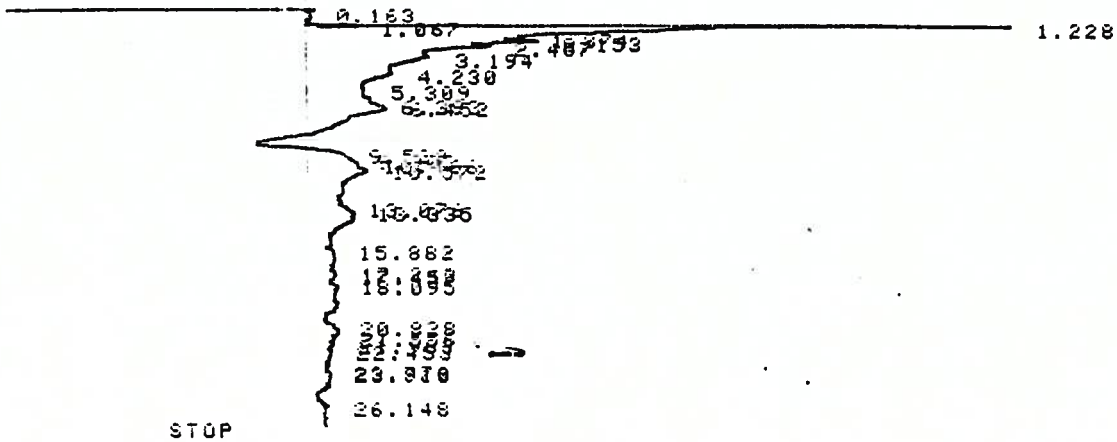
RT	AREA	TYPE	WIDTH	AREA%
.520	8568	VV	.071	.00390
.659	11745	VV	.083	.00534
.780	28776	VV	.104	.01310
.885	21495	VV	.072	.00978
1.152	50200	VV	.081	.02284
1.245	97216	VV	.127	.04424
1.773	8597395	VH	.094	3.91247
2.085	112973000	SHH	.249	51.41128
2.420	88931968	SHB	.598	40.47080
3.050	574406	TBP	.311	.26140
3.454	369949	TVV	.137	.16835
3.599	746630	TVP	.208	.33977
3.975	6942010	TVB	.228	3.15914
5.913	20910	PV	.057	.00952
5.968	90788	VB	.175	.04132
6.949	26446	VB	.122	.01203
8.327	18654	VV	.070	.00849
8.535	111097	VB	.252	.05056
9.216	8381	PV	.066	.00381
9.798	6422	PP	.054	.00292
10.308	5180	PV	.052	.00236
11.178	5031	VV	.031	.00229
11.237	13550	VV	.059	.00617
11.398	8044	PV	.070	.00366
11.720	7207	VV	.039	.00328
12.836	41671	VV	.133	.01896
12.905	21421	VV	.055	.00975
13.432	5718	VP	.052	.00260

TOTAL AREA=2.1974E+08
MUL FACTOR=1.0000E+00

R1

* RUN # 2 JAN 3, 1901 05:27:05

START



STOP

RUN# 2 JAN 3, 1901 05:27:05

AREA%

RT	AREA	TYPE	WIDTH	AREA%
1.067	26915	PP	.046	.87424
1.228	1572707	PV	.170	51.08378
1.874	217276	VV	.098	7.05743
2.153	532332	VV	.244	17.29090
2.457	382988	VV	.297	12.44000
3.194	38931	VV	.170	1.26453
4.230	17038	PV	.214	.55342
6.293	24274	VV	.089	.78845
6.452	36646	VV	.100	1.19031
9.529	107958	PV	.522	3.50663
9.902	11351	VV	.106	.36870
10.166	25025	VV	.127	.81285
10.572	22731	VV	.078	.73834
13.076	7520	PV	.134	.24426
15.882	8978	PV	.123	.29162
17.459	6554	VV	.064	.21288
18.095	9110	PV	.102	.29591
20.828	13376	PV	.137	.43447
21.983	7926	PV	.105	.25745
26.148	9047	VP	.086	.29386

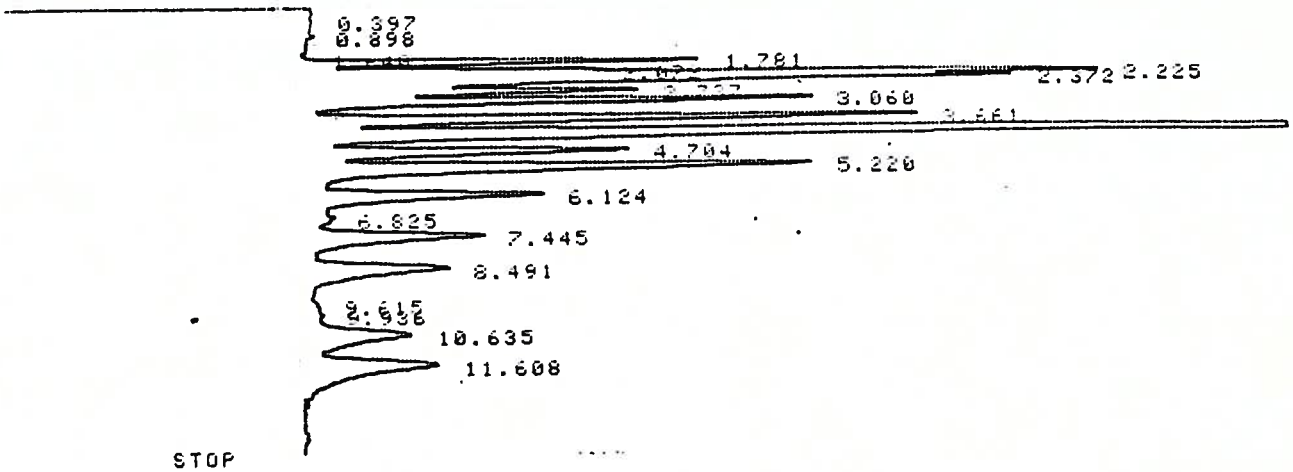
TOTAL AREA=3078683

MUL FACTOR=1.0000E+00

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

200 ppb
1:0

* RUN # 4 JAN 1, 1901 05:28:08
START



STOP

RUN# 4 JAN 1, 1901 05:28:08

AREA%

RT	AREA	TYPE	WIDTH	AREA%
.397	7708	PV	.108	.03867
.898	15624	VV	.125	.07838
1.640	5278	BV	.061	.02648
1.781	772090	VV	.146	3.87332
2.072	389131	VV	.099	1.95214
2.225	1694432	VV	.159	8.50040
2.372	1768664	VV	.187	8.87260
2.737	923975	VV	.208	4.63527
3.060	1408856	VV	.208	7.06776
3.661	1719991	VV	.210	8.62862
4.116	4305770	VV	.237	21.60060
4.704	1068472	VV	.249	5.36017
5.220	1887207	VV	.280	9.46749
6.124	983742	VV	.316	4.93511
6.825	39194	VV	.120	.19662
7.445	787810	VV	.341	3.95218
8.491	707715	VV	.386	3.55037
9.615	7308	VV	.067	.03666
9.936	15919	VV	.094	.07986
10.635	543512	VV	.399	2.72662
11.608	881174	VV	.500	4.42056

TOTAL AREA=1.9934E+07
MUL FACTOR=1.0000E+00

Quantitation Report

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Compound	R.T.	QIon	Response	Conc Unit	Qvalue
35) 2,4,6-Trichlorophenol	16.54	196	44792	1391.80 NG/ULm	93
36) 2,4,5-Trichlorophenol	16.64	196	3754	112.99 NG/ULm	70
37) 2-Chloronaphthalene	0.00	162		Not Detected	
39) 2-Nitroaniline	0.00	65		Not Detected	
40) 2,4-Dinitrophenol	0.00	184		Not Detected	
41) 4-Nitrophenol	0.00	139		Not Detected	
42) Dimethylphthalate	0.00	163		Not Detected	
43) Acenaphthylene	17.82	152	24122	151.59 NG/ULm	96
44) 3-Nitroaniline	0.00	138		Not Detected	
45) Acenaphthene	18.20	154	18735	184.77 NG/ULm	94
46) Dibenzofuran	18.52	168	46756	338.90 NG/ULm	98
47) 2,4-Dinitrotoluene	0.00	165		Not Detected	
48) 2,6-Dinitrotoluene	0.00	165		Not Detected	
49) Diethylphthalate	18.99	149	613999	4810.95 NG/ULm	96
50) 4-Chlorophenyl-phenylether	0.00	204		Not Detected	
51) Fluorene	19.24	166	15755	145.54 NG/ULm	98
52) 4-Nitroaniline	0.00	138		Not Detected	
54) 4,6-Dinitro-2-methylphenol	0.00	198		Not Detected	
55) N-Nitrosodiphenylamine	0.00	169		Not Detected	
57) 4-Bromophenyl-phenylether	0.00	248		Not Detected	
58) Hexachlorobenzene	0.00	284		Not Detected	
59) Pentachlorophenol	0.00	266		Not Detected	
60) Phenanthrene	21.25	178	67735	421.02 NG/ULm	97
61) Anthracene	21.34	178	11193	74.19 NG/ULm	98
62) Di-n-butylphthalate	22.35	149	7446387	35963.11 NG/ULm	99
63) Fluoranthene	23.75	202	12699	97.86 NG/ULm	1
65) Pyrene	24.23	202	13466	327.52 NG/ULm	92
67) Butylbenzylphthalate	25.71	149	60136	2488.05 NG/ULm	97
68) 3,3'-Dichlorobenzidiene	0.00	252		Not Detected	
69) Benzo(a)anthracene	0.00	228		Not Detected	
70) Chrysene	0.00	228		Not Detected	
71) bis(2-Ethylhexyl)phthalate	27.71	149	8923839	297095.72 NG/ULm	
73) Di-n-Octylphthalate	0.00	149		Not Detected	
74) Benzo(b)fluoranthene	0.00	252		Not Detected	
75) Benzo(k)fluoranthene	0.00	252		Not Detected	
76) Benzo(a)pyrene	0.00	252		Not Detected	
77) Indeno(1,2,3-cd)pyrene	0.00	276		Not Detected	
78) Dibenz(a,h)anthracene	0.00	278		Not Detected	
79) Benzo(g,h,i)perylene	0.00	276		Not Detected	

(#) = qualifier out of range (m) = manual integration

Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

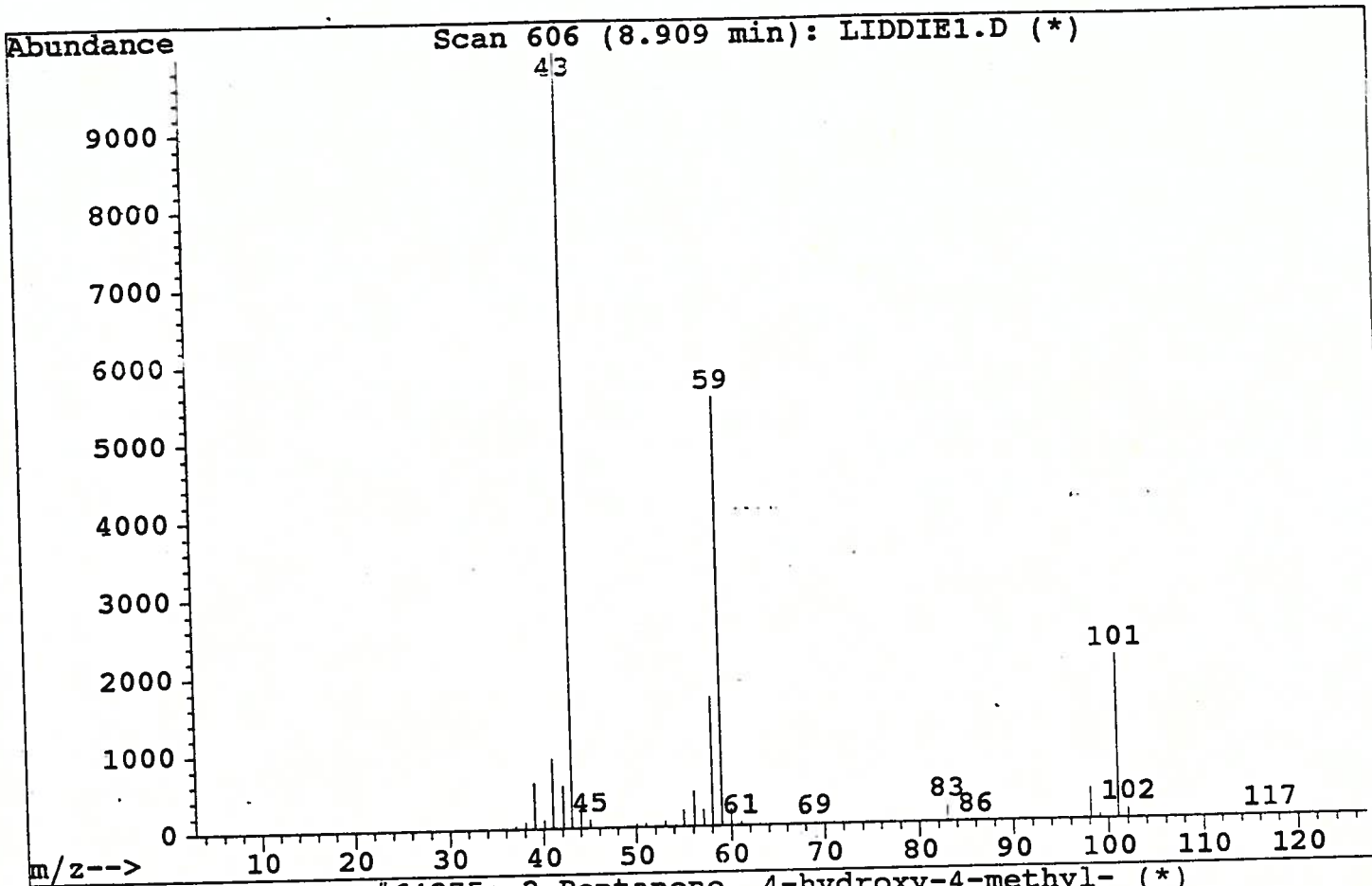
Operator: dec
Inst : 5971 - In
Multiplr: 1.00

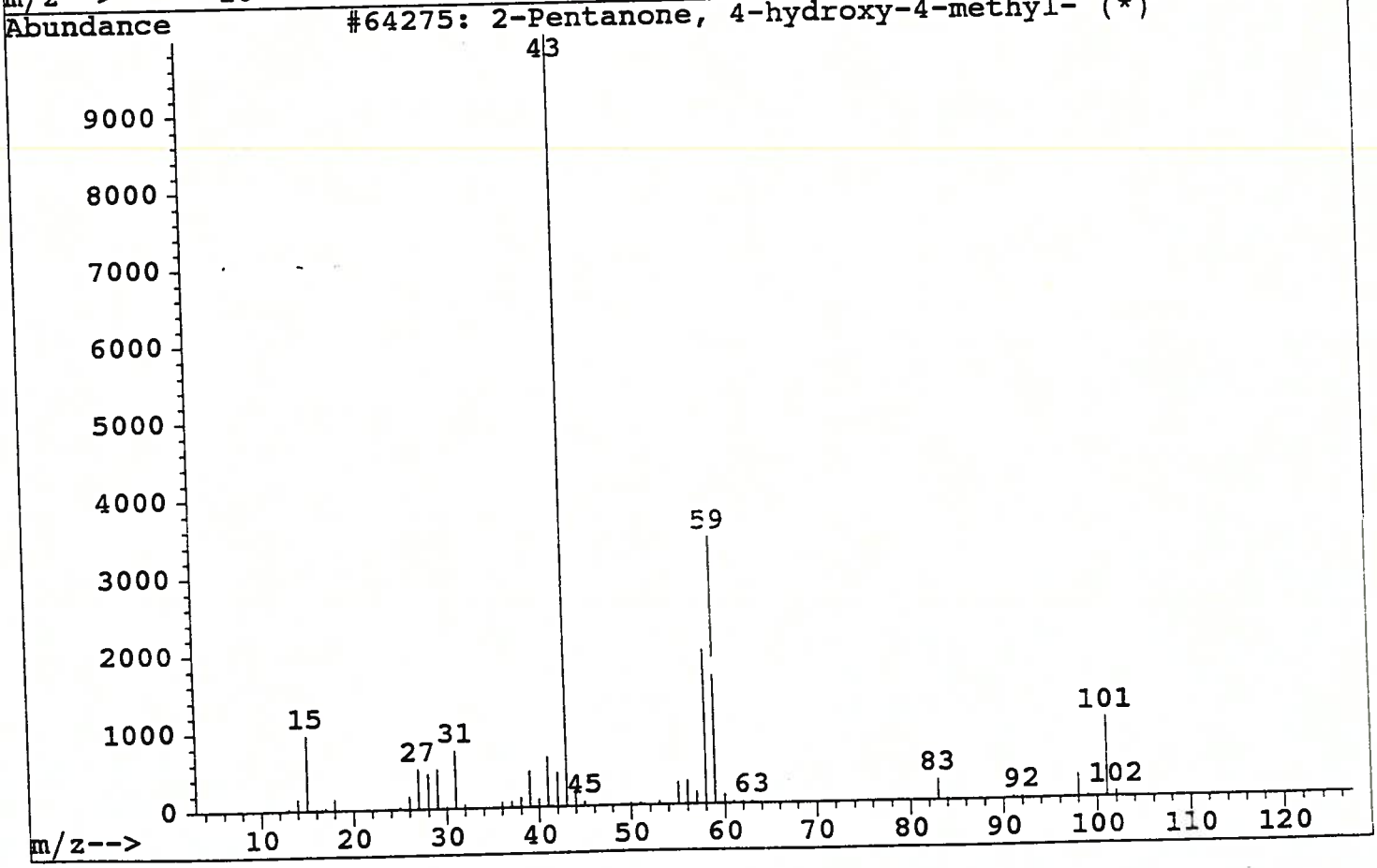
Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) 1,4-Dichlorobenzene-d4	11.90	152	798	40.00 NG/UL	-0.02
18) Napthalene-d8	14.43	136	9305	40.00 NG/UL	-0.08
33) Acenaphthene-d10	18.13	164	3411	40.00 NG/UL	-0.04
53) Phenanthrene-d10	21.20	188	4678	40.00 NG/UL	-0.03
64) Chrysene-d12	27.78	240	773	40.00 NG/UL	-0.03
72) Perylene-d12	0.00	264	0	0.00 NG/UL	-36.36
System Monitoring Compounds					%Recovery
2) 2-Fluorophenol	9.59	112	9932	358.31 NG/UL	238.87%
3) Phenol-d5	11.21	99	11611	323.98 NG/UL	215.99%
4) 2-Chlorophenol-d4	11.54	132	5876	230.89 NG/UL	153.93%
5) 1,2-Dichlorobenzene-d4	12.27	150	3079	94.72 NG/UL	94.72%
19) Nitrobenzene-d5	13.09	82	4069	32.11 NG/UL	32.11%
38) 2-Fluorobiphenyl	16.68	172	6113	51.25 NG/UL	51.25%
56) 2,4,6-Tribromophenol	19.79	330	1259	89.03 NG/UL	59.36%
66) Terphenyl-d14	24.49	244	8702	364.35 NG/UL	364.35%
Target Compounds					Qvalue
6) Phenol	11.24	94	40445	1009.93 NG/ULm	85
7) bis(2-Chloroethyl)ether	0.00	93		Not Detected	
8) 2-Chlorophenol	0.00	128		Not Detected	
9) 1,3-Dichlorobenzene	0.00	146		Not Detected	
10) 1,4-Dichlorobenzene	0.00	146		Not Detected	
11) 1,2-Dichlorobenzene	0.00	146		Not Detected	
12) Benzyl alcohol	0.00	108		Not Detected	
13) 2-Methylphenol	0.00	107		Not Detected	
14) 4-Methylphenol	0.00	107		Not Detected	
15) 2,2'oxybis(1-Chloropropane	0.00	45		Not Detected	
16) N-Nitroso-di-propylamine	0.00	70		Not Detected	
17) Hexachloroethane	0.00	117		Not Detected	
20) Nitrobenzene	0.00	77		Not Detected	
21) Isophorone	0.00	82		Not Detected	
22) 2-Nitrophenol	0.00	139		Not Detected	
23) 2,4-Dimethylphenol	0.00	122		Not Detected	
24) bis(2-Chloroethoxy)methane	0.00	93		Not Detected	
25) Benzoic acid	14.10	122	4976521	96702.33 NG/ULm	76
26) 2,4-Dichlorophenol	14.19	162	12253	159.44 NG/ULm	84
27) 1,2,4-Trichlorobenzene	0.00	180		Not Detected	
28) Naphthalene	14.51	128	1443877	5545.25 NG/ULm	99
29) 4-Chloroaniline	0.00	127		Not Detected	
30) Hexachlorobutadiene	0.00	225		Not Detected	
31) 4-Chloro-3-methylphenol	0.00	107		Not Detected	
32) 2-Methylnaphthalene	15.92	142	98992	613.13 NG/ULm	98
34) Hexachlorocyclopentadiene	0.00	237		Not Detected	

(#) = qualifier out of range (m) = manual integration

Library Searched : C:\DATABASE\NBS75K.L
Quality : 64
ID : 2-Pentanone, 4-hydroxy-4-methyl-

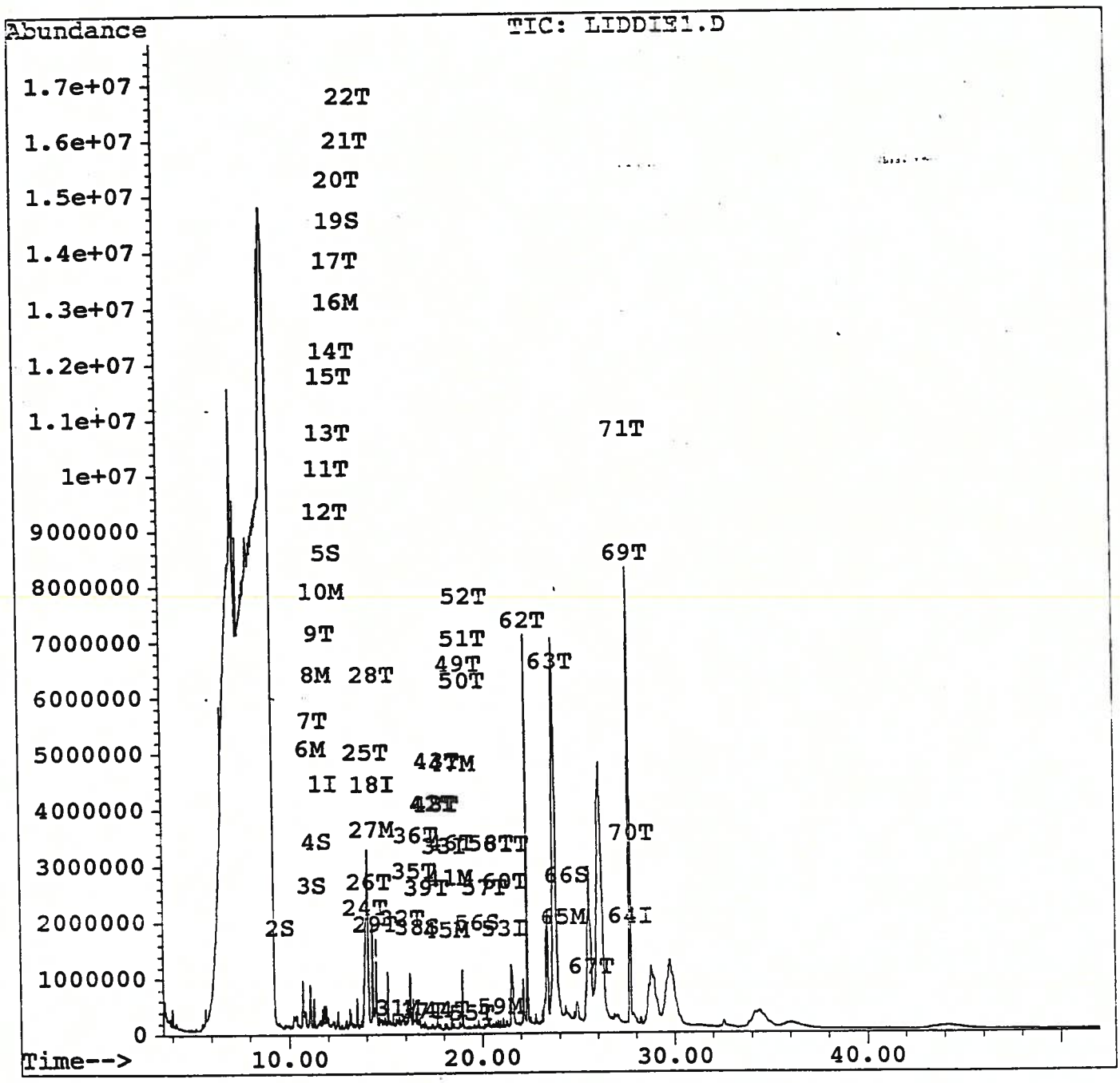




Data File : C:\HPCHEM\1\DATA\LIDDIE1.D
Acq Time : 25 Mar 96 4:50 pm
Sample : PAH Sample
Misc : 1ul offscale sample
Quant Time: Mar 26 8:32 1996

Operator: dec
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8270.M
Title : BNA 625 FIVE POINT CALIBRATION
Last Update : Thu Feb 15 08:52:20 1996
Response via : Multiple Level Calibration



CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

PAGE____ OF ____

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention: Danny Russell

Laboratory:
Bonner Analytical

Please return copy of chain of custody with analytical report

Attention: Dr. Mike Bonner EML PO No. DR0223

Project: Kopper Industries - Grenada
Treated wood test burn stack tests on 2-20-96

Rush ☐ Routine ☐ Fax Results ☐

ANALYSES REQUESTED

PAH -- EPA 8270
Chlorinated phenols incl. pentachlorophe
EPA
8270

No. of containers	SAMPLE ID	Sample matrix	REMARKS	UNITS
1	KPS R1 - Filter	solid	combine	total micrograms
1	KPS R1 - Sorbent	solid		X X
1	KPS R1 - Rinse	aqueous	extracts	
1	KPS R2 - Filter	solid	combine	total micrograms
1	KPS R2 - Sorbent	solid		X X
1	KPS R2 - Rinse	aqueous	extracts	
1	KPS R3 - Filter	solid	combine	total micrograms
1	KPS R3 - Sorbent	solid		X X
1	KPS R3 - Rinse	aqueous	extracts	
1	KPS R4 - Filter	solid	combine	total micrograms
1	KPS R4 - Sorbent	solid		X X
1	KPS R4 - Rinse	aqueous	extracts	
1	KPS R5 - Filter	solid	combine	total micrograms
1	KPS R5 - Sorbent	solid		X X
1	KPS R5 - Rinse	aqueous	extracts	
1	KPS R6 - Filter	solid	combine	total micrograms
1	KPS R6 - Sorbent	solid		X X
1	KPS R6 - Rinse	aqueous	extracts	
1	KPS Filter Blank	solid	combine	total micrograms
1	KPS Blank - Sorbent	solid		X X
1	KPS Rinse Blank	aqueous	extracts	

Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Daniel G. Russell	2-23--96		
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER	Date Shipped	Received for lab by:	Date/time

APPENDIX E.

HCl ANALYSES REPORT

(CAE)

Clean Air Engineering
March 22, 1996

Mr.Danny Russell
Environmental Monitoring Laboratories
Post Office Box 655
Ridgeland. MS 39158

RE:		
	Purchase Order #:	DR0222.1
	CAE Lab #:	26699
	Type of Analysis:	Method 26 & Method 14
	No. of Samples:	17
	Date Received:	February 26, 1996
	Date Reported:	March 20, 1996

Dear Mr. Russell:

Enclosed please find results of analysis performed by Clean Air Engineering. If you should have any questions, please contact me at 847/991-3300 extension 2040

Thank you for choosing Clean Air Engineering for your Method 26 and Method 14 analysis.

Respectfully submitted,
CLEAN AIR ENGINEERING, INC.

Ronald Young

Ronald P. Young PhD
Project Manager

Encl.

cc: File 26699

RPY/mlc

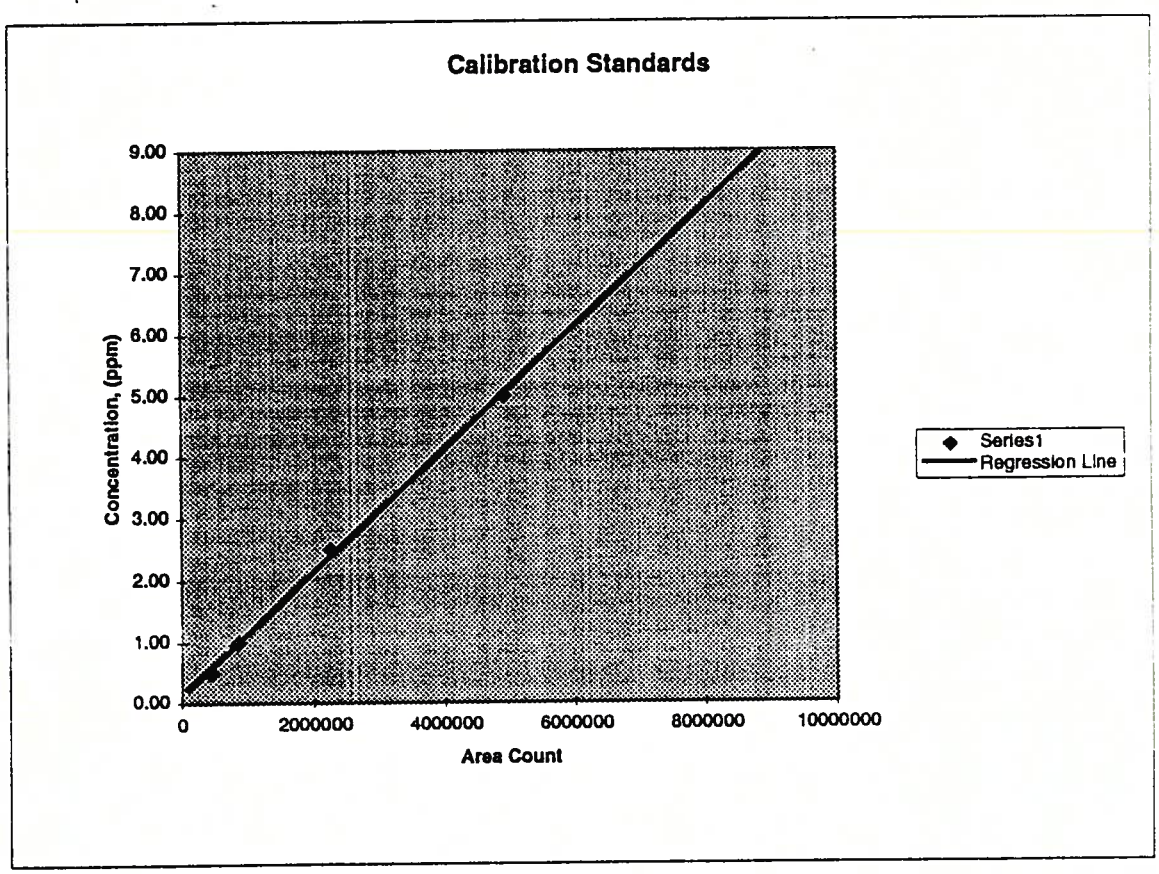
Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699
Analyte: Chloride
Date: 3/20/1996

Standards

Standard Concentration, (ppm)	Integrator Area Counts			Response Factor
	Trial 1	Trial2	Average	
0.50	427506	424634	426070	1.17E-06
1.00	836717	838076	837397	1.19E-06
2.50	2248893	2252777	2250835	1.11E-06
5.00	4900527	4917983	4909255	1.02E-06
Average Response Factor				1.12E-06
Std. Dev. Response Factor				7.89E-08
RMS Dev. Response Factor				7.0%

Regression Analysis of Standards		
Area Counts	Actual Concentration	Regression Concentration
426070	0.50	0.576
837397	1.00	0.986
2250835	2.50	2.394
4909255	5.00	5.044
Slope	9.968E-07	
Y-Intercept	0.1509	
Coefficient of Fit	0.9984	



Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699

Analyte: Chloride
Date: 3/20/1996

Sample Identification	Sample Description	Area Count Trial 1	Area Count Trial 2	Average Area Count	Original Volume (ml)	Aliquot Concentration, (ppm)	Dilution Factor	Sample Concentration, (ppm)	Total Mass Sample (mg)	Duplicate % Deviation	Spike Area Count	Spike % Recovery
26699-01	PCA BLANK	0		0	200	< 0.05	1	< 0.05				
26699-02	PCA RUN 1	2879424		2879424	432	3.02	10	30.2	13.1			
26699-03	PCA RUN 2	1156300		1156300	409	1.30	40	52.1	21.3			
26699-04	PCA RUN 3	1493205	1535773	1514489	422	1.66	25	41.5	17.5	2.81%		
26699-05	PCA RUN 4	611741		611741	467	0.76	25	19.0	8.88		2661154	96.0%
26699-06	PCA RUN 5	710327		710327	420	0.86	25	21.5	9.02			
26699-07	PCA RUN 6	190913		190913	474	0.34	25	8.53	4.04			
26699-14	KOPPERS BLANK	0		0	200	< 0.05	1	< 0.05				
26699-08	KOPPERS RUN 1	4916333		4916333	230	5.05	25	126.3	29.0			
26699-09	KOPPERS RUN 2	935111	971623	953367	238	1.10	100	110.1	26.2	3.83%		
26699-10	KOPPERS RUN 3	1614568		1614568	230	1.76	100	176.0	40.5		3284791	100.9%
26699-11	KOPPERS RUN 4	3609745		3609745	325	3.75	100	374.9	121.8			
26699-12	KOPPERS RUN 5	2439850		2439850	330	2.58	100	258.3	85.2			
26699-13	KOPPERS RUN 6	3366964	3375393	3371179	325	3.51	100	351.1	114.1	0.25%		
		Area Count	Area Count	Average		Detected		Expected		Percent		
Audit Samples		Trial 1	Trial 2	Area Count		Concentration, (ppm)		Concentration, (ppm)		Difference		
Internal		4994553	5002698	4998626		5.13		5.0		-2.67%		

Analyst: Winfred Ivy
Analytical Chemist

Reviewed By:

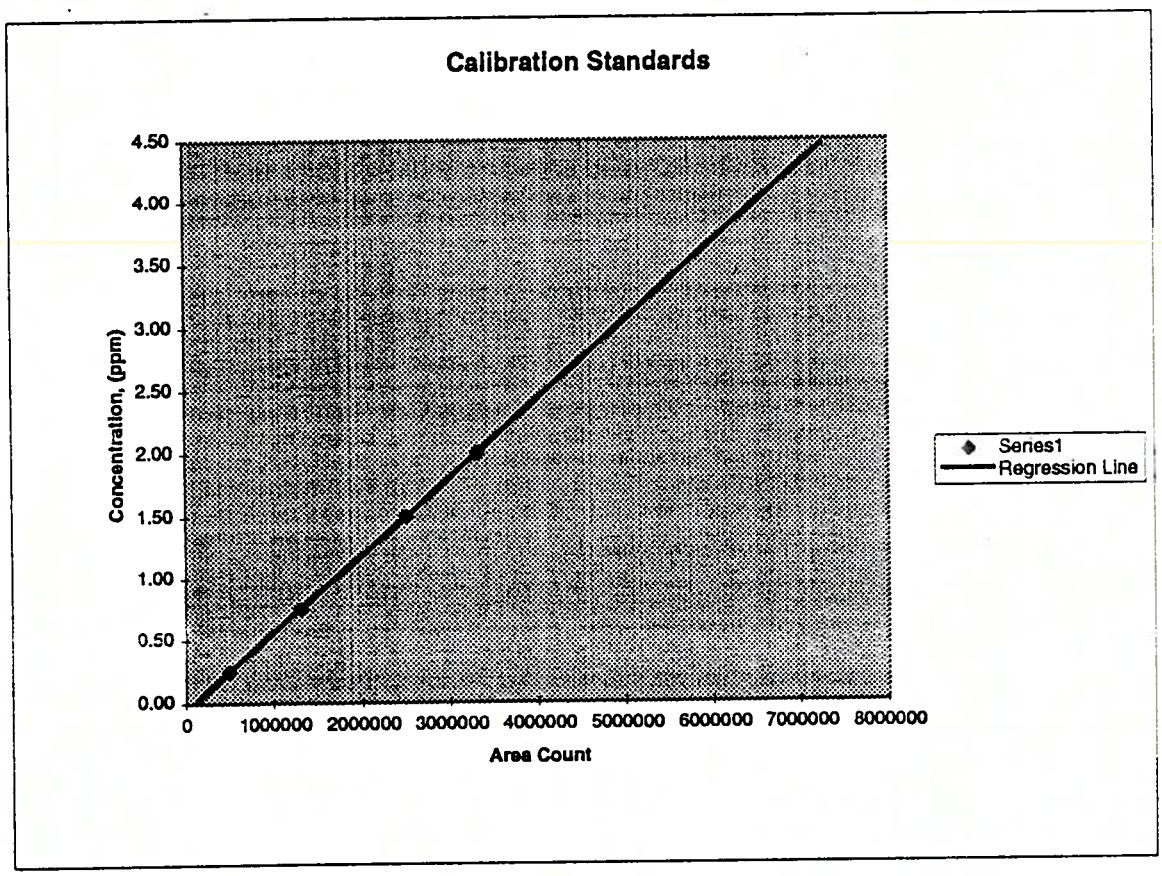
Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699
Analyte: Fluoride
Date: 3/20/1996

Standards

Standard Concentration, (ppm)	Integrator Area Counts			Response Factor
	Trial 1	Trial2	Average	
0.25	497963	463788	480876	5.20E-07
0.75	1314323	1301535	1307929	5.73E-07
1.50	2502803	2480306	2491555	6.02E-07
2.00	3328048	3296715	3312382	6.04E-07
Average Response Factor				5.75E-07
Std. Dev. Response Factor				3.92E-08
RMS Dev. Response Factor				6.8%

Regression Analysis of Standards		
Area Counts	Actual Concentration	Regression Concentration
480876	0.25	0.246
1307929	0.75	0.759
2491555	1.50	1.493
3312382	2.00	2.002
Slope	6.204E-07	
Y-Intercept	-0.0526	
Coefficient of Fit	0.9999	



Chromatographic Data Reduction

Client: EML
CAE Project No: 86-26699

Analyte: Fluoride
Date: 3/20/1996

Sample Identification	Sample Description	Area Count Trial 1	Area Count Trial 2	Average Area Count	Original Volume (ml)	Aliquot Concentration, (ppm)	Dilution Factor	Sample Concentration, (ppm)	Total Mass Sample (mg)	Duplicate % Deviation	Spike Area Count	Spike % Recovery
26699-14	DI H2O BLANK	0		0	200	< 0.05	1	< 0.05				
26699-15	NEWSPRINT RUN 1	990662		990662	497	0.56	1	0.56	0.28			
26699-16	NEWSPRINT RUN 2	714504	714768	714636	500	0.39	1	0.39	0.20	0.04%		
26699-17	NEWSPRINT RUN 3	845189		845189	485	0.47	1	0.47	0.23		2177229	105.9%
		Area Count	Area Count	Average		Detected		Expected		Percent		
Audit Samples		Trial 1	Trial 2	Area Count		Concentration, (ppm)		Concentration, (ppm)		Difference		
Internal		3271105	3289482	3279794		1.98		2.0		0.89%		

Analyst: _____
Winfred Ivy
Analytical Chemist

Reviewed By: _____

HCl

CAE LAB#

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS

ENVIRONMENTAL MONITORING LABORATORIES
POST OFFICE BOX 655
RIDGELAND, MISSISSIPPI 39158

PHONE: 601/856-3092
FAX: 601/853-2151 Attention: Danny Russell

Laboratory:
Clean Air Engineering

Please return copy of chain of custody with analytical report
Attention: Winfred Ivy EML PO No. DR0222.1

Project: Koppers Industries boiler stack tests for HCl emissions on 2-20-96

Rush ☐ Routine ☑ Fax Results ☑

No. of containers	SAMPLE ID	Sample matrix	REMARKS	ANALYSES REQUESTED: HCl by Method 26 *	UNITS
1	Koppers Run 1	aqueous	~ 3% peroxide	X	mg/liter
1	Koppers Run 2	aqueous	~ 3% peroxide	X	mg/liter
1	Koppers Run 3	aqueous	~ 3% peroxide	X	mg/liter
1	Koppers Run 4	aqueous	~ 3% peroxide	X	mg/liter
1	Koppers Run 5	aqueous	~ 3% peroxide	X	mg/liter
1	Koppers Run 6	aqueous	~ 3% peroxide	X	mg/liter
1	BLANK *	aqueous	~ 3% peroxide	X	mg/liter

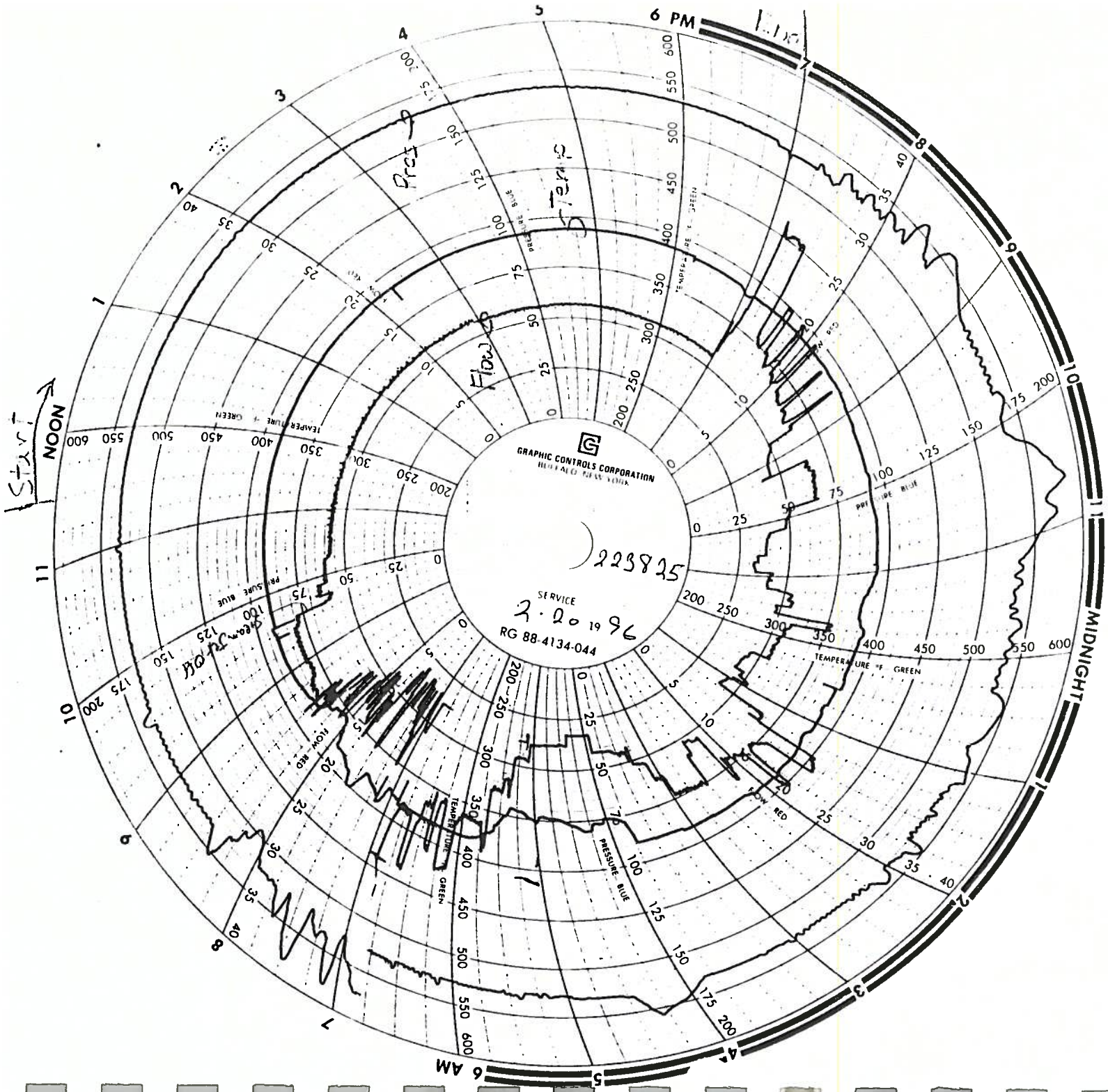
* Use same solution blank as marked for Newsprint blank

Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Daniel G. Russell	2/23/96		
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
Relinquished by: (print name; initial)	Date/time	Received by: (print name; initial)	Date/time
COURIER: Fed Ex	Date Shipped	Received for lab by:	Date/time: 2/26/96 1315

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/21/96 00:00 TO 02/22/96 23:59

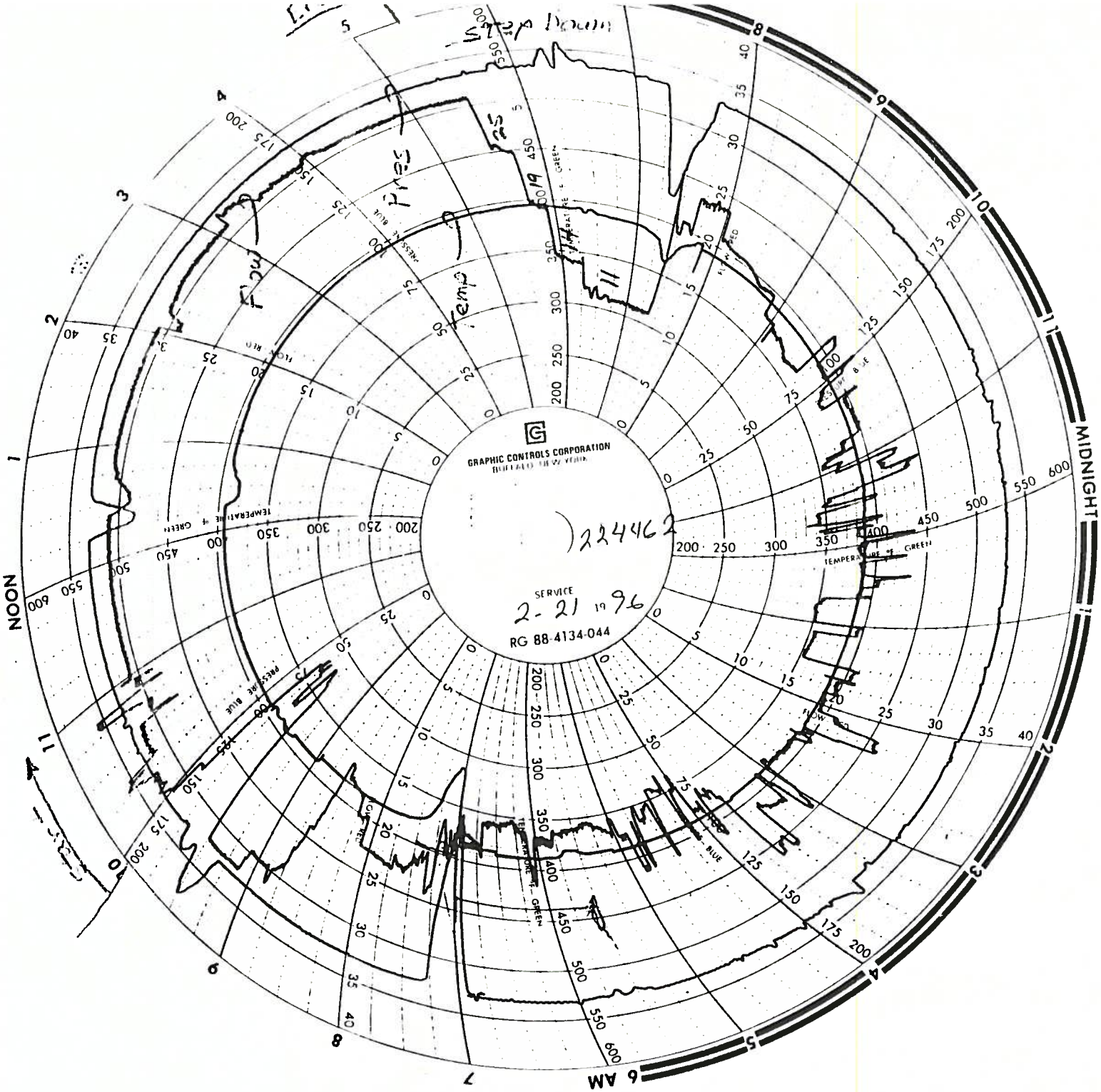
Date/ Time	O2	CO	CO_7	Opacity	Cell 1	Cell 2
	%	ppm	ppm	%	F	F
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.2	76.2	117.0	0.9	1856	1656
02-21-96 08:00	9.2	11.5	25.3	2.4	1870	1926
02-21-96 09:00	9.3	15.5	30.8	5.0	1888	1966
02-21-96 10:00	7.1	20.3	19.5	3.8	2123	2219
02-21-96 11:00	7.7	9.4	9.9	1.0	2085	2192
02-21-96 12:00	8.3	23.7	29.6	1.9	2057	2000
02-21-96 13:00	7.6	21.7	22.6	1.2	2027	2131
02-21-96 14:00	7.2	11.4	11.6	1.5	2079	2191
02-21-96 15:00	6.9	11.8	11.7	2.1	2080	2239
02-21-96 16:00	7.2	3.4	3.8	1.4	2115	2234
02-21-96 17:00	10.9	7.8	13.7	0.2	1789	1864
02-21-96 18:00	15.8	21.1	87.2	0.0	1258	1281
02-21-96 19:00	12.8	155.9	325.4	3.4	1391	1555
02-21-96 20:00	12.1	21.9	34.8	0.0	1627	1575
02-21-96 21:00	12.6	20.8	35.8	0.0	1573	1506
02-21-96 22:00	12.1	15.5	25.3	0.0	1595	1562
02-21-96 23:00	12.7	21.6	38.8	0.1	1564	1505
02-22-96 00:00	12.7	24.2	42.1	0.0	1555	1479
02-22-96 01:00	12.2	20.6	34.3	0.1	1587	1510
02-22-96 02:00	11.3	15.1	23.4	0.1	1686	1657
02-22-96 03:00	11.6	6.3	12.6	0.0	1679	1635
02-22-96 04:00	12.9	8.6	16.3	0.0	1520	1479
02-22-96 05:00	13.1	58.5	118.7	0.6	1448	1499
02-22-96 06:00	12.8	26.0	48.0	0.3	1479	1543
02-22-96 07:00	12.8	13.8	25.3	0.0	1499	1500
02-22-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-22-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999


6 PM
MIDNIGHT
6 AM
NOON
GRAPHIC CONTROLS CORPORATION
223825
SERVICE
2-20-96
RG 88-4134-044
TEMPERATURE °F GREEN
PRESSURE BLUE
FLOW RED

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/20/96 00:00 TO 02/21/96 23:59

Date/ Time	O2 %	CO ppm	CO_7 ppm	Opacity %	Cell 1 F	Cell 2 F
02-20-96 00:00	14.4	37.9	95.0	0.1	1287	1283
02-20-96 01:00	13.8	47.5	103.5	0.2	1429	1329
02-20-96 02:00	14.3	203.4	445.0	0.8	1737	1084
02-20-96 03:00	15.8	203.5	602.1	1.2	1496	934
02-20-96 04:00	15.9	221.0	643.8	2.3	1398	882
02-20-96 05:00	14.9	168.2	458.1	2.5	1197	1186
02-20-96 06:00	15.0	134.7	420.3	4.4	1214	1211
02-20-96 07:00	15.2	98.0	308.5	1.4	1236	1182
02-20-96 08:00	10.0	155.0	205.6	1.0	1566	1370
02-20-96 09:00	13.0	125.5	110.2	0.0	1485	1405
02-20-96 10:00	14.8	22.3	52.5	0.1	1343	1236
02-20-96 11:00	14.8	22.7	52.1	0.1	1301	1246
02-20-96 12:00	14.6	20.1	44.1	0.0	1264	1259
02-20-96 13:00	14.3	15.2	32.1	0.0	1278	1258
02-20-96 14:00	14.3	17.6	36.9	0.0	1272	1252
02-20-96 15:00	14.4	22.8	48.6	0.0	1267	1237
02-20-96 16:00	14.3	17.3	36.3	0.0	1252	1243
02-20-96 17:00	14.6	16.2	35.7	0.0	1269	1236
02-20-96 18:00	14.7	52.5	111.8	0.7	1327	1221
02-20-96 19:00	11.7	38.0	80.7	2.0	1578	1651
02-20-96 20:00	14.8	45.5	137.9	0.2	1325	1315
02-20-96 21:00	14.7	39.0	107.5	0.2	1319	1246
02-20-96 22:00	16.5	157.8	501.3	1.4	1073	1054
02-20-96 23:00	14.9	57.7	174.0	0.3	1229	1207
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.9	188.6	294.8	2.3	1840	1408
02-21-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999


GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
122462
SERVICE
2-21 1996
RG 88-4134-044
NOON
MIDNIGHT
6 AM
TEMPERATURE °F GREEN
PRESSURE BLUE
FLOW RED

2.6 hr 34 / 890 / 76 # / 110 / 104

825 / 89

Log - Day 1

2/20/96

	(x 400) Steam Totalizer	Flow MLB/hr	Conveyor Fuel Timer	@ ~8:30 Turbine Runaway, Kiln Off
9:30	223,625 / 223,095	16	14881.1	- Ash Bin Empty
9:40	223,409	13		Steam Jet turned off
11:35	223,958	12.3	14882.5	
1:00	223,993	11.4	14883.0	
1:40	224010	11.4	1483.2	
1:42	End of test #1			
2:13	Start of test 2			
3:15	224050	11.2	14883.7	
4:13	224074	11.2	14884.0	
4:22	End of test 2			
5:30	224106	11.1	14884.5	
6:52	End of test 3			
	224141	11.0	14884.7	

34 / 400 / 12,000

	Test 1 HC #1	Test 1 HC #2	Test #1 Conv Temps		
1:00	1151	1175	1280	1265	GRN-A
1:40	1154	1173	1296	1276	GRN-F-
3:15	1141	1165	1270	1237	
4:13	1152	1176	1276	1248	
5:30	1149	1168	1248	1235	
6:52	1139	1157	1324	1122	

Turbine / Generator @ ~ 200 KW during test

LOG - Day 2 - 2/21/96

Time	Steam Totalizer (x 400)	Steam Rate (MLB/hr)	Fuel Consumer Timer (HR)	New Temp Probes 1	New Temp Probes 2	Exist Probes 1	Exist Probes 2	
9:20 am	224601	32.0	14890.8	1736	1765	2171	2283	
9:30-9:45	Bring turbine off, clean vac. jet strainer, bring back on line.							
	Turbine Generator set @ ~ 620 KW							
9:52	Start test 1							
9:54	224629	33.0	14891.1	1751	1772	2158	2304	
10:43	224692	28.0	14891.7	1659	1696	2045	2109	
12:08	224797	31.00	14892.8	1697	1717	2095	2195	
12:40	Start test 2							
12:41	224837	31.	14893.2	1645	1664	2068	2048	
2:05	224940	30.8	14894.5	1682	1700	2053	2141	
2:40	End of Test 2							
2:44	224987	31.0	14895.0	1692	1716	2107	2195	
3:20	Start test 3							
3:20	225033	31.0	14895.5	1698	1716	2031	2233	
4:02	225086	31.	14896.0	1690	1713	2142	2217	
5:13	225173	31	14896.8	1680	1701	2102	2224	NOX
5:20	End Test 3		Ave:	[illegible]	[illegible]			120 pp
~~DROP TO 25~~								
5:22	225184	31	14896.9	1674	1695			
5:25	DROP TO	25						
5:28	190	25	897.0	1567	1583	1893	2013	108
5:35	Drop to	20.						
5:45	225204	19	14897.1	1404	1409	1630	1678	90
5:48	Drop to	15						
6:03	225215	14	97.2	1248	1239	1409	1434	55-75 65
6:10	Drop to	12						
6:40	225231	11.0	97.3	1120	1101	1219	1238	50-60

2.6 hr 890 / 34 / 78 / 110 / 104

814 / 825 / 89

Log - Day 1

2/20/96

	(x 400) Steam Totalizer	Flow MLB/hr	Conveyor Fuel ~~Bit~~ imer	@~8:30 Turbine Running, Kiln Off
9:30	7:00 am 223,825 / 223,895	16	14881.1	- Ash Bin Empty
9:40	223,909	13		Steam Jet turned off
11:35	223,958	12.3	14882.5	
1:00	223,993	11.4	14883.0	
1:40	224010	11.4	1483.2	
1:42	End of test #1			
2:13	Start of test 2			
3:15	224050	11.2	14883.7	
4:13	224074	11.2	14884.0	
4:22	End of test 2			
5:30	224106	11.1	14884.5	
6:52	End of test 3			
	224141	11.0	14884.7	

34 / 400 / 12,800

	Start POHC Temps #1	Start POHC Temps #2	Test #1 Lower Temps ①	Test #1 Lower Temps ②	
1:00	1151	1175	1280	1265	GRN-F-1
1:40	1154	1173	1296	1276	GRN-F-2
3:15	1141	1165	1270	1237	
4:13	1152	1176	1246	1248	
5:30	1149	1168	1248	1235	
6:52	1139	1157	1324	1122	
Ave:	1148	1169	1277	1230	
	1158		1254		

Turbine / Generator @ ~ 200 KW during test

LOG - Day 2 - 2/21/96

Time	Steam Total Flow (x 400)	Steam Rate (M LB/Hr)	Fuel Conveyor Timer (1 HR)	New Temp Probes 1	New Temp Probes 2	Exist Probes 1	Exist Probes 2	
5:30			88.5					
7:20 am	224661	32.0	14890.8	1736	1765	2171	2283	
9:30-9:45	Bring turbine off, clean vac. jet strainer, bring back on line. Turbine Generator net @ ~ 620 KW							
9:52	Start test 1							
→ 9:54	224629	33.0	14891.1	1751	1772	2158	2304	
10:43	224692	28.0	14891.7	1659	1656	2045	2109	
12:08	224797	31,100	14892.8	1697	1717	2095	2195	
12:40	Start test 2							
12:41	224837	31.	14893.2	1645	1664	2068	2048	
2:05	224940	30.8	14894.5	1682	1700	2053	2141	
2:40	End of Test 2							
2:44	224987	31.0	14895.0	1692	1716	2107	2195	
3:20	Start test 3							
3:20	225033	31.0	14895.5	1698	1706	2031	2233	
4:02	225086	31.5	14896.0	1650	1713	2142	2217	
5:13	225193	31	14896.8	1690	1701	2102	2224	NOX
5:20	End Test 3			Ave: 1688	1710	2089	2185	120 ppm
				1699		2137		
~~DROP TO 25~~ 5:22	225184	31	14896.9	1674	1695			
5:25 DROP to 25								
5:28	190	25	897.0	1567	1583	1893	2013	108
5:35	Drop to	20.						
5:45	225204	19	14897.1	1404	1409	1630	1678	90
5:48	Drop to	15						
6:03	225215	14	97.2	1248	1239	1409	1434	~~60~~ 55-75 65
6:10	Drop to 12							
6:40	225231	11.0	973	1120	1101	1219	1238	50-60

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 20 / 96 SCENARIO: Low

FUEL SAMPLING DATA Composite

DATE	2/20	2/20	2/26	2/20	
TIME	11:45	1:40	4:20	5:30	
SAMPLE ID #	GRN-F-1	GRN-F-2	GRN-F-3	GRN-F-4	GRN-C1
SAMPLED BY:	SS	SS	SS	SS	

STEAM DATA

MEASURE	START					END	TOTAL/ AVERAGE
Time (hr:min)	11:39	1:40	3:05	4:13	5:30		
Flow (lb/hr)	11,300	11 400	11200	11260	11,100		
Temp. (F)	380	380	385	389	390		
Pressure (psi)	165	165	165	165	165		
Flow Totalizer	223958	224010	224050	224074	224106		

ASH DATA

	AMOUNT PRODUCED (lbs)	SAMPLE COLLECTION			
		DATE	TIME	ID #	BY (Initials)
FLY ASH	Fines Start/Stop 9:30 / 7:15 30	Not	Sampled		
BOTTOM ASH	5:30A 7:00P 200	"	"		

Penta Only Wood Sampled from grinder 9:00 AM SS GRN-Penta-1

Creo Only Wood Sampled from ground wood pile 9:00 AM SS GRN-Creo-1

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 20 / 96 SCENARIO: Low - 40%

FUEL CONVEYOR DATA

MEASURE		START				END	TOTAL/ AVERAGE
Time	hr:min	8:10	~~1:35~~ 1:65	5:00	3:00		
ConveryorTimer	min						
Converyor Speed	~~feet/min~~ ft/min						
Fuel Sampling	Lbs	15	18	14	10		
	~~Feet~~ Sec	5	5	5	5		
	Lb/Ft ~~min~~	~~180~~ 225	216	168			193
Conveyed Fuel	Lbs/hr						~~17,250~~ 13,500 = 5.64 T/hr.

FUEL BIN DATA

MEASURE	UNITS	START	END	DIFFERENCE
BIN 1	Cubic Feet	80%		
	Lbs.			
BIN 2	Cubic Feet	60%		
	Lbs			
TOTAL	Lbs.			
FUEL DENSITY	Lbs/CF			

FUEL USAGE CALCULATION

FUEL FROM CONVEYOR	PLUS FUEL IN BINS AT START	MINUS FUEL IN BINS AT END	TOTAL FUEL BURNED

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 21 / 96 SCENARIO: High

FUEL SAMPLING DATA

DATE	2/21				
TIME	10:11	1:21			
SAMPLE ID #	GRN-F-5	GRN-F-6			
SAMPLED BY:	STS	STS			

STEAM DATA

MEASURE	START					END	TOTAL/ AVERAGE
Time (hr:min)	9:52						
Flow (lb/hr)	33,000						
Temp. (F)	390 ~~465~~						
Pressure (psi)	~~39~~ 165						
Steam Totalizer	224,629						

ASH DATA

	AMOUNT PRODUCED (lbs)	SAMPLE COLLECTION			
		DATE	TIME	ID #	BY (Initials)
FLY ASH	9:50a 5:30p 300 lbs				
BOTTOM ASH	5:30a 700 lb 7:00 p				

KOPPERS INDUSTRIES, INC.
GRENADA PLANT, TIE PLANT, MS
STACK TEST RECORDS

DATE: 2 / 21 / 96 SCENARIO: _____

FUEL CONVEYOR DATA

MEASURE		START				END	TOTAL/ AVERAGE
Time	hr:min	12:10	12:15	2:55			
ConveryorTimer	min						
Converyor Speed	ft/min						
Fuel Sampling	Lbs	10.0	11.0	14			
	~~Set~~ Feet	5	5	5			
	Lb/Ft						
Conveyed Fuel	Lbs						

FUEL BIN DATA

MEASURE	UNITS	START	END	DIFFERENCE
BIN 1	Cubic Feet			
	Lbs.			
BIN 2	Cubic Feet			
	Lbs			
TOTAL	Lbs.			
FUEL DENSITY	Lbs/CF			

FUEL USAGE CALCULATION

FUEL FROM CONVEYOR	PLUS FUEL IN BINS AT START	MINUS FUEL IN BINS AT END	TOTAL FUEL BURNED

Grenada Stack Test - Test at plant of wood fuel samples.

GRN-C1

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 5:49 PM 02/20/96
RUN # 603

0.15 %Penta

GROUND BORING
(PCF AT D=43.6)
Penta=0.06
```

GRN-C1

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 5:59 PM 02/20/96
RUN # 604

0.12 %Penta

GROUND BORING
(PCF AT D=43.6)
Penta=0.05
```

GRN-C2

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 4:29 PM 02/21/96
RUN # 607

0.07 %Penta

GROUND BORING
(PCF AT D=41.6)
Penta=0.03
```

GRN-PENTA

```
WORKING-
              XROM "CROP"
C.BORNG RDY
DENSITY?
            47.60 ENTER↑
            XROM "ONLYZ"
WORKING-

  OSOMA INSTRUMENTS
Ser. No. 431 C-TIME=100
 2:26 PM 02/21/96
RUN # 606

0.22 %Penta

GROUND BORING
(PCF AT D=41.6)
Penta=0.09
```

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

2-23-96

Steve:

Moisture calculations on pentachloro wood mixture
Dry Basis calculations

$$\frac{M - M_o}{m_o} \times 100$$

Sample #1
2-20-96

$$\frac{24.12 - 17.61}{17.61} \times 100 = 37\%$$

Sample #2

2-21-96

$$\frac{40.80 - 29.79}{29.79} \times 100 = 37\%$$

M. Sylvester

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

TELECOPY

DATE: 2-22-96 TOTAL NO. OF PAGES 8

TO: STEVE SMITH

FAX NO#

FROM: Mike Sylvester

IF YOU DO NOT RECEIVE ALL PAGES, CALL

FAX NO. 601-226-4588

Steve, I will mail you a copy also. When you get some numbers on the feed rates give me a call. so I can compare.

Thanks mike

Day 1 - GRN

Cell 1,450

1250

200

FLY Ash

2,530

2,500

30

KOPPERS INDUSTRIES

Koppers Industries, Inc.
P.O. Box 160
Tie Plant, MS 38960

Telephone: (601) 226-4584
FAX: (601) 226-4588

2/22/96

Steve:

Moisture content calculations of Penta/Creo wood mixture. Calculated using Dry Basis.

$$\frac{M - M_o}{M_o} \times 100$$

Sample #1 2-20-96 (81.6 gr = Tare)

$$\frac{105.7 - 99.2}{99.2 - 81.6} = \frac{.37}{.065 \times 100} = 36.9\ 6.5\%$$

Sample #2 2-21-96 (100.0 gr = Tare)

$$\frac{140.8 - 129.8}{129.8 - 100.0} = \frac{0.37}{.084} \times 100 = 36.9\ \cancel{8.4\%}$$

Ash weights after maximum production test 2-21-96

Fly ash = 300 lbs

Bottom ash = 700 lbs

M. Sylvester

Koppers Industries
Tie Plant Road
Daily Summary

FROM 02/20/96 00:00 TO 02/21/96 23:59

Date/ Time	O2 %	CO ppm	CO_7 ppm	Opacity %	Cell 1 F	Cell 2 F
02-20-96 00:00	14.4	37.9	95.0	0.1	1287	1283
02-20-96 01:00	13.8	47.5	103.5	0.2	1429	1329
02-20-96 02:00	14.3	203.4	445.0	0.8	1737	1084
02-20-96 03:00	15.8	203.5	602.1	1.2	1496	934
02-20-96 04:00	15.9	221.0	643.8	2.3	1398	882
02-20-96 05:00	14.9	168.2	458.1	2.5	1197	1186
02-20-96 06:00	15.0	134.7	420.3	4.4	1214	1211
02-20-96 07:00	15.2	98.0	308.5	1.4	1236	1182
02-20-96 08:00	10.0	155.0	205.6	1.0	1566	1370
02-20-96 09:00	13.0	125.5	110.2	0.0	1485	1405
02-20-96 10:00	14.8	22.3	52.5	0.1	1343	1236
02-20-96 11:00	14.8	22.7	52.1	0.1	1301	1246
02-20-96 12:00	14.6	20.1	44.1	0.0	1264	1259
02-20-96 13:00	14.3	15.2	32.1	0.0	1278	1258
02-20-96 14:00	14.3	17.6	36.9	0.0	1272	1252
02-20-96 15:00	14.4	22.8	48.6	0.0	1267	1237
02-20-96 16:00	14.3	17.3	36.3	0.0	1252	1243
02-20-96 17:00	14.6	16.2	35.7	0.0	1269	1236
02-20-96 18:00	14.7	52.5	111.8	0.7	1327	1221
02-20-96 19:00	11.7	38.0	80.7	2.0	1578	1651
02-20-96 20:00	14.8	45.5	137.9	0.2	1325	1315
02-20-96 21:00	14.7	39.0	107.5	0.2	1319	1246
02-20-96 22:00	16.5	157.8	501.3	1.4	1073	1054
02-20-96 23:00	14.9	57.7	174.0	0.3	1229	1207
02-21-96 00:00	15.7	60.5	180.4	0.5	1173	1144
02-21-96 01:00	12.8	20.2	57.5	0.2	1495	1463
02-21-96 02:00	14.0	15.3	38.0	0.0	1425	1349
02-21-96 03:00	16.5	238.4	808.4	1.7	1142	1070
02-21-96 04:00	16.9	532.7	1847.5	3.9	1041	957
02-21-96 05:00	13.7	127.4	326.8	1.4	1310	1327
02-21-96 06:00	12.1	46.7	233.3	0.6	1564	1619
02-21-96 07:00	10.9	188.6	294.8	2.3	1840	1408
02-21-96 08:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 09:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 10:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 11:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 12:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 13:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 14:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 15:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 16:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 17:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 18:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 19:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999
02-21-96 20:00	-999.9	-999.9	-999.9	-9999.0	-9999	-9999

1312

1289

Low Fire Test