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Office of Air Quality
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Research Triangle Park, NC 27711

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Medical Waste Incineration Emission Test Report

Morristown Memorial Hospital
Morristown, New Jersey

DCN: 92-275-026-60-01

MEDICAL WASTE INCINERATION

EMISSION TEST REPORT

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Morristown, New Jersey

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1. PROJECT DESCRIPTION

1.1 INTRODUCTION

The United States Environmental Protection Agency (EPA) has determined that medical waste incinerator (MWI) emissions may reasonably be anticipated to contribute to the endangerment of public health and welfare. As a consequence, new source performance standards (NSPS) for new MWIs and emission guidelines for existing MWIs will be developed under Sections 111(b), 111(d), and 129 of the Clean Air Act, as amended November 1990.

The Office of Air Quality Planning and Standards (OAQPS), through its Industrial Studies Branch (ISB) and Emissions Measurement Branch (EMB), is responsible for reviewing the existing air emissions data base and gathering additional data where necessary. As a result of this review, a series of MWI emission tests are being conducted to support the regulatory development program.

The emissions that are being studied for standards development are the criteria pollutants--particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and total hydrocarbons (THC); as well as other acid gases, such as hydrogen chloride (HCl); chlorinated organics, including dioxins and furans; trace metals; and pathogens.

1.2 OBJECTIVES

The purpose of the testing program at the Morristown Memorial Hospital in Morristown, New Jersey, is to obtain uncontrolled and controlled emission data from a semi-continuous ram-fed MWI. These data will be used in the regulatory development program for MWIs.

The MWI located at Morristown Memorial Hospital was selected for emissions testing for the following reasons:

- This facility is the first known installation of a spray dryer/fabric filter air pollution control system controlling emissions from a MWI;
- The rotary kiln MWI of this facility is typical of well-designed, rotary kiln MWI's currently being installed and for which no uncontrolled emission test data are available; and

- This facility provides a unique opportunity to obtain both uncontrolled emissions test data for a rotary kiln as well as control device performance data for a spray dryer/fabric filter at one test site.

The specific objectives of the test program are:

- Determine what levels of CO, PM, SO_2, NO_x, HCl, metals, THC and polychlorinated dibenzo-p-dioxins (CDD) and polychlorinated dibenzofurans (CDF) are emitted from the combustor when burning medical wastes;

- Determine the levels of PM, acid gases, metals including mercury (Hg), and CDD/CDF emissions associated with a spray dryer/fabric filter control technology;

- Calculate the control efficiencies for PM, acid gases, metals, and CDD/CDF;

- Investigate the mercury and dioxin removal efficiency capabilities of carbon injection;

- Determine the degree of combustion of the feed wastes based on percent carbon and loss on ignition (LOI) of the bottom ash, spray dryer flyash, and fabric filter flyash;

- Determine particle size distribution of uncontrolled emissions; and

- Determine the microbial survivability based on a surrogate indicator organism that is spiked into the incinerator feed.

Key process operating variables including flue gas oxygen (O_2), carbon dioxide (CO_2), primary and secondary chamber temperatures, air flows, lime feed rates, baghouse pressure drop, and the total amount of waste charged were monitored and recorded to document the operating conditions during each test.

The test program included an internal quality control program. The goal of the quality assurance/quality control (QA/QC) activities was to ensure that the results are of known precision and accuracy, and that they are complete, representative, and comparable.

1.3 TEST MATRIX

The sampling and analytical matrix that was performed is presented in Table 1-1. Both manual emissions tests and CEMs were employed for the Morristown Memorial Hospital MWI test program. In addition to flue gas sampling, incinerator bottom ash, spray dryer flyash, and fabric filter flyash samples were also taken. Each of the tests are briefly described in the following paragraphs.

Tests were conducted under two operating conditions. The first condition called for normal operation of the incinerator and SD/FF. Three test runs were conducted at a frequency of one 4-hour run per day. All test runs at each sampling location were conducted simultaneously. The second condition called for carbon to be injected into the lime slurry at a rate of 4 lb/hr. This was done to examine the effects of in-duct carbon injection on flue gas mercury removal. Three test runs were conducted under this condition at a frequency of one 4-hour run per day. The carbon used for all tests was a coal-based carbon manufactured by American Norit with a surface area of 900 m^2/gram. The carbon was mixed into the lime slurry and introduced to flue gas in the spray dryer prior to the baghouse.

Total PM emissions along with a series of 13 metals [lead (Pb), chromium (Cr), cadmium (Cd), mercury (Hg), nickel (Ni), arsenic (As), beryllium (Be), antimony (Sb), barium (Ba), silver (Ag), thallium (Tl), copper (Cu), and aluminum (Al)], were determined using a single sample train. Particulate loading on the filter and front half (nozzle/probe, filter holder) rinse were determined gravimetrically. Metals analyses were then completed on the filter front half rinses and back half impinger catches using atomic absorption (AA) and inductively coupled argon plasma (ICAP) techniques. Mercury emissions were also determined by EPA Method 101A so that a comparison of results between the multi-metals train and the Method 101A train could be made.

Flue gas samples for CDD/CDF were collected using EPA Method 23. Flue gas was extracted isokinetically and CDD/CDF was collected on a filter and a chilled adsorbent trap. Recovery procedures were completed using toluene rinses as per the latest update of EPA CDD/CDF testing methodology. The analysis was completed using

TABLE 1-1. MORRISTOWN MEMORIAL HOSPITAL MWI TEST MATRIX

Sample Location	Number of Runs	Sample Type	Sample Method	Sample Duration	Analysis Method	Laboratory
Spray Dryer Inlet	6	Particulate/Metals (As, Cd, Cr, Hg, Ni, Pb, Be, Sb, Ba, Ag, Tl, Cu, Al)	EPA Method 5/ Combined Metals Train	4 hours	Gravimetric/Atomic Absportion/ICAP	Radian
	6	Hg	EPA Method 101A	4 hours	Atomic Absorption	
	6	CDD/CDF	EPA Method 23 and GC/MS Method 8290	4 hours	Gas Chromatography and High Resolution MS for CDD/CDF	Triangle Labs, Inc.
	6	HCl	EPA Method 26	Three 1-hour samples per run	Ion Chromatography	Radian
	3	Indicator Spores	EPA Draft Method	4 hours	Microbial Draft Method	American Type Culture Collection
	6	HCl NO_x SO_2 O_2/CO_2 THC CO	HCl CEM EPA Method 7E EPA Method 6C EPA Method 3A EPA Method 25A EPA Method 10	Continuous	NDIR CEM Chemiluminescence CEM UV Analyzer CEM Zirconium Oxide Cell/NDIR CEM FID CEM NDIR CEM	Radian
	4	PSD	Diagnostic Technique/ EPA Method 202	0.25 hour	Gravimetric	Radian

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TABLE 1-1. CONTINUED

Sample Location	Number of Runs	Sample Type	Sample Method	Sample Duration	Analysis Method	Laboratory
Baghouse Outlet	6	Particulate/Metals (As, Cd, Cr, Hg, Ni, Pb, Be, Sb, Ba, Ag, Tl, Cu, Al)	EPA Method 5/ Combined Metals Train	4 hours	Gravimetric/Atomic Absorption /ICAP	Radian
	6	CDD/CDF	EPA Method 23 and GC/MS Method 8290	4 hours	Gas Chromatography and High Resolution MS for CDD/CDF	Triangle Labs, Inc.
	6	HCl	EPA Method 26	Three 1-hour samples per run	Ion Chromatography SW 846 9057	Radian
	6	O_2/CO_2 THC HCl SO_2	EPA Method 3A EPA Method 25A HCl CEM EPA Method 6C	Continuous	Zirconium Oxide Cell/NDIR CEM FID CEM (heated) NDIR CEM UV Analyzer CEM	Radian
	3	Speciated HC	EPA Method 18	3 injections per hour	Gas Chromatograph/Flame Ionization Detector (GC/FID)	Radian
	3	CO	EPA Method 10	Continuous	NDIR CEM	Radian
	3	NO_x	EPA Method 7E	Continuous	Chemiluminescence CEM	Radian
	6	Hg	EPA Method 101A	4 hours	Atomic Absorption	Radian
Stack	3	Opacity	EPA Method 9	1 hour		Radian

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TABLE 1-1. CONTINUED

Sample Location	Number of Runs	Sample Type	Sample Method	Sample Duration	Analysis Method	Laboratory
Rotary Kiln	6	Kiln Bottom Ash	Representative Composite Sample	1 day	LOI, Carbon, Metals	Radian, McCoy Labs
	6	Kiln Bottom Ash	Representative Composite Sample	1 day	Dioxins/Furans	Triangle Labs, Inc.
	3	Kiln Bottom Ash	Representative Composite Sample	1 day	Microbial Draft Method	American Type Culture Collection
Spray Dryer	6	Spray Dryer Catch	Representative Composite Sample	1 day	LOI, Carbon, Metals	Radian, McCoy Labs
	6	Spray Dryer Catch	Representative Composite Sample	1 day	Dioxins/Furans	Triangle Labs, Inc.
	3	Spray Dryer Catch	Representative Composite Sample	1 day	Microbial Draft Method	American Type Culture Collection

TABLE 1-1. CONTINUED

Sample Location	Number of Runs	Sample Type	Sample Method	Sample Duration	Analysis Method	Laboratory
Baghouse	6	Fabric Filter Catch	Representative Composite Sample	1 day	LOI, Carbon, Metals	Radian, McCoy Labs
	6	Fabric Filter Catch	Representative Composite Sample	1 day	Dioxins/Furans	Triangle Labs, Inc.
	3	Fabric Filter Catch	Representative Composite Sample	1 day	Microbial Draft Method	American Type Culture Collection
Lime Injection	6	Lime Slurry Feed	Representative Composite Sample	1 day	Metals, Lime	Radian, McCoy Labs
	6	Lime Slurry Feed	Representative Composite Sample	1 day	Dioxins/Furans	Triangle Labs, Inc.
	6	Slurry Water Supply	Representative Composite Sample	1 day	Metals, Lime, Chlorine	Radian, McCoy Labs
	6	Slurry Water Supply	Representative Composite Sample	1 day	Dioxins/Furans	Triangle Labs, Inc.

high resolution gas chromatography coupled with high resolution mass spectrometry detection (HRGC/HRMS).

Hydrogen chloride, hydrogen bromide (HBr), and hydrogen fluoride (HF) concentrations in the stack gas were determined using EPA Method 26. Flue gas was extracted from the stack and passed through an acidified collection solution which stabilized the respective halogen ions (Cl^-, Br^-, F^-). The quantity of ions collected was determined using ion chromatography (IC) analyses.

Gaseous emissions (NO_x, CO, SO_2, THC, and HCl) were measured using CEMs continuously during the day at the spray dryer inlet. The diluent gases (O_2, CO_2) were measured using CEMs at all times when tests were being performed so that the emission results could be normalized to a reference O_2 or CO_2 basis. The O_2 and CO_2 results were also used for flue gas molecular weight calculations for stack gas flow rate calculations. Gaseous emissions of SO_2, THC, HCl, O_2, and CO_2 were measured at the baghouse outlet using an additional CEM system.

Three types of microbial survivability tests were performed on the incinerator. These tests were intended to evaluate the effectiveness of the MWI in destroying microbial elements in the waste. Indicator spore spikes were loaded onto material commonly found in the medical waste stream and then charged into the incinerator to determine the ability of the indicator organisms to survive in the combustion gases and the incinerator bottom ash. Surrogate indicator spore spikes were also encased in insulated double pipe containers. Spores were added when no carbon was injected and no spores were added when the carbon was injected. Flue gas testing for spore emissions were conducted simultaneously with the other emissions testing. The next day following the daily burn cycle, ash samples and pipe samples were recovered and subsequently analyzed for spore viability. Direct ash sampling and pipe sampling were conducted daily. Flue gas samples were collected isokinetically and passed through a circulating phosphate buffer solution. Following the test, the buffer solution samples were analyzed for viable spores using microbiological identification, culturing, and quantification techniques outlined in the EPA draft method "Microbial Survivability Test for Medical Waste Incinerator Emissions." Ash samples and pipe samples were analyzed

as outlined in the EPA draft method "Microbial Survivability Test for Medical Waste Incinerator Ash."

In addition to the flue gas samples, incinerator bottom ash, baghouse flyash, and spray dryer flyash were also sampled during the test program. Daily composites were directed to laboratories for LOI/carbon content analyses as well as metals, CDD/CDF, and microbes.

Additional descriptions of the sampling and analytical procedures are provided in Section 5.

1.4 PROCESS DESCRIPTION

The MWI at the Morristown Memorial Hospital is comprised of a rotary kiln and a ram feeder. Waste is fed to the kiln at approximately 800 lb/hr and is ignited by an auxiliary burner at the charging end. Ash falls from the discharge end of the kiln, where it is sprayed with water and collected into an ash cart. Combustion gas flows from the kiln to a secondary chamber with a gas residence time of 2.5 seconds at 2000°F.

The flue gas then flows to a waste heat recovery boiler which cools the gas to approximately 400°F. The cooled gases proceed to the emission control system which consists of a spray dryer and a baghouse. Lime slurry is injected into the spray dryer by a rotary atomizer. Lime and ash that fall to the bottom are collected. After the gas passes through the spray dryer it enters the baghouse where the fly ash, unreacted lime, and reacted lime are also collected. The gas stream subsequently passes to the stack through an induced draft fan.

1.5 DESCRIPTION OF REPORT CONTENTS

Section 1 of this report provides an introduction to the medical waste testing program conducted at Morristown Memorial Hospital in Morristown, New Jersey. This section includes the test objective, an overview of the emissions measurement program, a brief process description, and this description of the report contents.

Section 2 gives a summary of the test results. Included in the contents of this section are the emissions test log, CDD/CDF results, toxic metals results, PM/PSD emissions results, halogen results, CEM results, microbial results, and ash LOI and carbon results.

Section 3 details the process and operation of the Morristown MWI and gives process results. (This section is being provided by Midwest Research Institute (MRI).)

Section 4 provides a detailed description and drawings of the sample locations.

Section 5 presents detailed descriptions of sampling and analytical procedures. The descriptions that are covered in this section are the CDD/CDF testing method, the PM and toxic metals testing method, PSD method, microbial draft testing method, the manual halogen emissions testing method, EPA Methods 1 through 4, CEM methods, and process sampling procedures.

Section 6 provides the details of the QA/QC procedures used on this program and the QC results. Included in this section is a summary of QA/QC objectives, QC procedures for the manual flue gas sampling methods, QC procedures for the ash sampling, analytical QC procedures and QA parameters, and CEM QC procedure and QA parameters.

Appendices containing the actual field data sheets and computer data listings are contained in a separate volume.

2. SUMMARY OF RESULTS

This section provides results of the test program conducted at the Morristown Memorial Hospital from November 18 through 23, 1991. Included in this section are:

- The results of manual flue gas tests conducted for CDD/CDF, toxic metals, Hg, PM, PSD, microbes, and halogens;
- The results of continuous emissions monitoring for O_2, CO_2, CO, NO_x, SO_2, THC, and HCl gases; and
- The results from analyses of incinerator bottom ash, spray dryer ash, and baghouse ash.

The test conditions were defined by the injection of carbon into the lime slurry. Condition 1 was conducted with the process running under normal steady-state conditions without carbon being introduced into the lime slurry. Condition 2 was conducted the same as Condition 1, but with a carbon concentration present in the lime slurry that produced a carbon injection rate of 4 lb/hr into the spray dryer. Test Runs 1 through 3 were operated under Condition 1, and test Runs 4 through 6 were operated under Condition 2.

2.1 EMISSIONS TEST LOG

Six test runs were conducted over six test days. Flue gas sample locations were at the spray dryer inlet and baghouse outlet. One test run was conducted on each day with all sampling trains operated concurrently. Gas concentrations were monitored with the CEM instruments during the testing period. Table 2-1 presents the emissions test log. This table shows the test date, run number, test type, and run times for all the flue gas testing conducted during this period.

2.2 CDD/CDF RESULTS

Simultaneous CDD/CDF emission tests were conducted at the spray dryer inlet and baghouse exit under the two operating conditions. Testing protocol followed EPA Method 23.

Daily ash samples were taken from the kiln, spray dryer, and baghouse. Scrubber water samples were also taken. These samples were analyzed for tetra- through octa-CDD/CDF isomers.

Table 2-1

Test Log
Morristown Memorial Hospital (1991)

Date	Location	Parameter	Run Number	Start Time	Stop Time
11/18/91	Spray Dryer Inlet	CDD/CDF	1	14:10	18:40
11/18/91	Spray Dryer Inlet	PM/Metals	1	14:09	18:40
11/18/91	Spray Dryer Inlet	Mercury	1	14:09	18:40
11/18/91	Spray Dryer Inlet	HCl	1A	14:08	15:08
11/18/91	Spray Dryer Inlet	HCl	1B	15:35	17:10
11/18/91	Spray Dryer Inlet	HCl	1C	17:40	18:40
11/18/91	Spray Dryer Inlet	Microbes	1	14:14	18:08
11/18/91	Baghouse Outlet	CDD/CDF	1	14:02	18:41
11/18/91	Baghouse Outlet	PM/Metals	1	14:01	18:40
11/18/91	Baghouse Outlet	Mercury	1	14:01	18:40
11/18/91	Baghouse Outlet	HCl	1A	14:00	15:00
11/18/91	Baghouse Outlet	HCl	1B	15:35	17:10
11/18/91	Baghouse Outlet	HCl	1C	17:40	18:40
11/18/91	Stack	Opacity		14:00	16:00
11/19/91	Spray Dryer Inlet	CDD/CDF	2	15:50	20:55
11/19/91	Spray Dryer Inlet	PM/Metals	2	15:50	20:55
11/19/91	Spray Dryer Inlet	Mercury	2	15:50	20:55
11/19/91	Spray Dryer Inlet	HCl	2A	15:53	17:16
11/19/91	Spray Dryer Inlet	HCl	2B	17:23	19:25
11/19/91	Spray Dryer Inlet	HCl	2C	19:55	20:55
11/19/91	Spray Dryer Inlet	Microbes	2	15:50	19:50
11/19/91	Baghouse Outlet	CDD/CDF	2	15:52	20:55
11/19/91	Baghouse Outlet	PM/Metals	2	15:51	20:55
11/19/91	Baghouse Outlet	Mercury	2	15:51	20:55
11/19/91	Baghouse Outlet	HCl	2A	15:50	16:50
11/19/91	Baghouse Outlet	HCl	2B	17:20	19:25
11/19/91	Baghouse Outlet	HCl	2C	19:55	20:55
11/20/91	Spray Dryer Inlet	CDD/CDF	3	12:30	22:50
11/20/91	Spray Dryer Inlet	PM/Metals	3	12:30	22:50
11/20/91	Spray Dryer Inlet	Mercury	3	12:30	22:50

Table 2-1, continued

Test Log
Morristown Memorial Hospital (1991)

Date	Location	Parameter	Run Number	Start Time	Stop Time
11/20/91	Spray Dryer Inlet	HCl	3A	12:30	13:30
11/20/91	Spray Dryer Inlet	HCl	3B	13:50	21:22
11/20/91	Spray Dryer Inlet	HCl	3C	21:32	22:32
11/20/91	Spray Dryer Inlet	Microbes	3	12:30	16:54
11/20/91	Spray Dryer Inlet	PSD	1	21:31	21:51
11/20/91	Baghouse Outlet	CDD/CDF	3	12:30	22:50
11/20/91	Baghouse Outlet	PM/Metals	3	12:30	22:50
11/20/91	Baghouse Outlet	Mercury	3	12:30	22:50
11/20/91	Baghouse Outlet	HCl	3A	12:30	13:30
11/20/91	Baghouse Outlet	HCl	3B	14:00	21:20
11/20/91	Baghouse Outlet	HCl	3C	21:35	22:35
11/21/91	Spray Dryer Inlet	CDD/CDF	4	12:45	17:50
11/21/91	Spray Dryer Inlet	PM/Metals	4	12:45	17:50
11/21/91	Spray Dryer Inlet	Mercury	4	12:45	17:50
11/21/91	Spray Dryer Inlet	HCl	4A	12:45	14:20
11/21/91	Spray Dryer Inlet	HCl	4B	14:45	16:15
11/21/91	Spray Dryer Inlet	HCl	4C	16:37	17:37
11/21/91	Spray Dryer Inlet	PSD	2	14:30	14:45
11/21/91	Baghouse Outlet	CDD/CDF	4	12:45	17:50
11/21/91	Baghouse Outlet	PM/Metals	4	12:45	17:50
11/21/91	Baghouse Outlet	Mercury	4	12:45	17:50
11/21/91	Baghouse Outlet	HCl	4A	12:45	14:20
11/21/91	Baghouse Outlet	HCl	4B	14:45	16:15
11/21/91	Baghouse Outlet	HCl	4C	16:40	17:40
11/22/91	Spray Dryer Inlet	CDD/CDF	5	12:00	18:45
11/22/91	Spray Dryer Inlet	PM/Metals	5	12:00	18:45
11/22/91	Spray Dryer Inlet	Mercury	5	12:00	18:45
11/22/91	Spray Dryer Inlet	HCl	5A	12:00	13:25
11/22/91	Spray Dryer Inlet	HCl	5B	13:36	17:10
11/22/91	Spray Dryer Inlet	HCl	5C	17:45	18:45

Table 2-1, continued

Test Log
Morristown Memorial Hospital (1991)

Date	Location	Parameter	Run Number	Start Time	Stop Time
11/22/91	Spray Dryer Inlet	PSD	3	12:45	13:00
11/22/91	Baghouse Outlet	CDD/CDF	5	12:15	18:44
11/22/91	Baghouse Outlet	PM/Metals	5	12:00	18:44
11/22/91	Baghouse Outlet	Mercury	5	12:00	18:44
11/22/91	Baghouse Outlet	HCl	5A	12:15	13:15
11/22/91	Baghouse Outlet	HCl	5B	13:34	17:20
11/22/91	Baghouse Outlet	HCl	5C	17:45	18:45
11/23/91	Spray Dryer Inlet	CDD/CDF	6	09:30	13:50
11/23/91	Spray Dryer Inlet	PM/Metals	6	09:30	13:50
11/23/91	Spray Dryer Inlet	Mercury	6	09:35	13:50
11/23/91	Spray Dryer Inlet	HCl	6A	09:30	10:30
11/23/91	Spray Dryer Inlet	HCl	6B	11:10	12:25
11/23/91	Spray Dryer Inlet	HCl	6C	12:45	13:45
11/23/91	Spray Dryer Inlet	PSD	4	10:40	10:55
11/23/91	Baghouse Outlet	CDD/CDF	6	09:30	13:50
11/23/91	Baghouse Outlet	PM/Metals	6	09:30	13:50
11/23/91	Baghouse Outlet	Mercury	6	09:30	13:50
11/23/91	Baghouse Outlet	HCl	6A	09:30	10:30
11/23/91	Baghouse Outlet	HCl	6B	11:10	12:25
11/23/91	Baghouse Outlet	HCl	6C	12:45	13:45

Tables 2-2 through 2-5 present the flue gas mass flow rates of CDD/CDF, flue gas concentrations, and removal efficiencies for each of the six runs. All CDD/CDF congeners were detected in every run in the inlet flue gas throughout the program. 2378 TCDD was detected in only one of the six runs at the baghouse outlet. Runs 3 and 5 showed substantially higher CDD/CDF at the inlet with total CDD/CDF at 223.0 and 212.3 ng/dscm versus 101.88, 91.19, 182.6, and 46.0 ng/dscm for Runs 1, 2, 4, and 6, respectively. All test runs showed a decrease in CDD/CDF concentrations from the spray dryer inlet to the baghouse outlet. Average inlet CDD/CDF concentrations ranged from 0.763 ng/dscm for 2378 TCDF for Condition 1 to 0.141 ng/dscm for Condition 2. The average concentration of 2378 TCDF for Conditions 1 and 2 at the baghouse outlet was 0.342 and 0.009 ng/dscm, respectively. Average inlet mass rates of 2378 TCDF for the two conditions were 4.427 and 0.813 μg/hr, respectively. Removal efficiencies of 2378 TCDF for Conditions 1 and 2 were 37.17 and 95.39 percent, respectively. Removal efficiencies of total CDD/CDF for Conditions 1 and 2 were 83.97 and 98.29 percent, respectively. Removal efficiencies were substantially higher for all runs in test Condition 2 with carbon injection compared to runs in Condition 1 with no carbon injection.

The CDD/CDF concentrations normalized to 7 percent O_2 for each test condition are shown in Tables 2-6 and 2-7. The results show the same trends as discussed with uncorrected values. The normalized concentration of 2378 TCDD at the outlet for Condition 1 was 0.014 ng/dscm. The concentration of 2378 TCDD at the outlet for Condition 2 was below the detection limit.

The 2378 Toxic Equivalencies corrected to 7 percent O_2 for each run in test Condition 1 and 2 are presented in Tables 2-8 and 2-9.

The flue gas sample parameters are shown in Table 2-10. Values for sampling rate, metered volume, stack temperature, gas $O_2/CO_2/H_2O$ concentrations, stack gas flow rates, and isokinetics are shown.

Daily ash samples were collected from the kiln, baghouse, and spray dryer at the end of the test run and composited into a single sample per test run. The ash was passed through a one-half inch mesh sieve to remove large pieces of glass, metal, or other large objects. The shifted ash was sorted in a pre-cleaned stainless steel drum and

TABLE 2-2. CDD/CDF INLET AND OUTLET STACK GAS EMISSIONS AND REMOVAL EFFICIENCIES FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

CONGENER	RUN 1			RUN 2			RUN 3			Average		
	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)
DIOXINS												
2378 TCDD	0.117	(0.070)	>40.18	0.090	(0.023)	>74.38	0.142	0.091	36.42	0.116	0.030	74.08
Other TCDD	0.507	1.135	-123.88	0.513	0.205	60.09	1.540	0.362	76.49	0.853	0.567	33.51
12378 PCDD	0.293	0.162	44.56	0.295	(0.045)	>84.74	0.595	(0.068)	>88.58	0.394	0.054	86.29
Other PCDD	2.438	2.386	2.12	2.014	0.387	80.79	4.581	0.407	91.11	3.011	1.060	64.79
123478 HxCDD	0.410	0.209	49.09	0.500	0.068	86.36	1.203	0.045	96.24	0.704	0.107	84.76
123678 HxCDD	0.566	0.301	46.75	0.616	0.068	88.91	1.294	0.068	94.75	0.825	0.146	82.33
123789 HxCDD	1.014	0.440	56.60	1.167	0.114	90.25	2.976	0.091	96.96	1.719	0.215	87.50
Other HxCDD	5.032	3.452	31.40	5.412	0.933	82.77	13.160	0.882	93.29	7.868	1.756	77.69
1234678-HpCDD	8.972	2.549	71.59	9.106	0.591	93.50	25.363	0.430	98.31	14.480	1.190	91.78
Other HpCDD	9.947	3.244	67.39	9.875	0.682	93.09	26.010	0.475	98.17	15.277	1.467	90.40
Octa-CDD	43.103	4.634	89.25	36.295	1.433	96.05	94.334	1.199	98.73	57.911	2.422	95.82
Total CDD	72.397	18.581	74.33	65.882	4.550	93.09	171.199	4.118	97.59	103.159	9.083	91.20
FURANS												
2378 TCDF	8.777	7.414	15.53	2.693	0.523	80.57	1.812	0.407	77.52	4.427	2.781	37.17
Other TCDF	41.932	47.959	-14.37	22.572	11.079	50.92	52.796	19.730	62.63	39.100	26.256	32.85
12378 PCDF	3.121	2.317	25.76	2.309	0.364	84.23	3.364	0.385	88.57	2.931	1.022	65.14
23478 PCDF	8.582	6.719	21.71	7.054	1.297	81.62	10.611	1.380	86.99	8.749	3.132	64.20
Other PCDF	63.386	51.666	18.49	45.914	14.036	69.43	100.933	18.598	81.57	70.078	28.100	59.90
123478 HxCDF	20.479	12.279	40.04	22.957	3.640	84.14	49.949	3.394	93.21	31.128	6.438	79.32
123678 HxCDF	5.266	3.244	38.40	6.413	0.955	85.10	13.458	0.882	93.44	8.379	1.694	79.78
234678 HxCDF	21.454	8.341	61.12	21.931	3.185	85.48	51.502	2.715	94.73	31.629	4.747	84.99
123789 HxCDF	0.566	0.301	46.75	2.565	(0.114)	>95.56	1.242	(0.136)	>89.05	1.458	0.100	93.11
Other HxCDF	43.902	25.647	41.58	41.810	9.623	76.98	109.008	9.842	90.97	64.907	15.038	76.83
1234678-HpCDF	38.032	16.681	56.14	43.092	4.095	90.50	105.074	2.715	97.42	62.066	7.830	87.38
1234789-HpCDF	14.238	3.475	75.59	16.160	1.137	92.96	38.691	0.611	98.42	23.029	1.741	92.44
Other HpCDF	55.195	24.327	55.93	61.817	6.370	89.70	85.276	2.104	97.53	67.429	10.934	83.79
Octa-CDF	186.063	27.570	85.18	175.704	6.142	96.50	543.487	3.846	99.29	301.751	12.520	95.85
Total CDF	510.991	237.940	53.44	472.989	62.561	86.77	1167.20	66.745	94.28	717.061	122.415	82.93
Total CDD+CDF	583.388	256.521	56.03	538.871	67.111	87.55	1338.40	70.863	94.71	820.221	131.498	83.97

Note: Condition 1 is no carbon injection.
( ) = Estimated maximum possible concentration.

TABLE 2-3. CDD/CDF INLET AND OUTLET STACK GAS EMISSIONS AND REMOVAL EFFICIENCIES FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

	RUN 4			RUN 5			RUN 6			Average		
CONGENER	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Outlet (ug/hr)	Removal Efficiency (%)	Inlet (ug/hr)	Average Outlet (ug/hr)	Removal Efficiency (%)
DIOXINS												
2378 TCDD	0.105	[0.011]	>89.53	0.078	[0.011]	>85.85	0.039	(0.007)	>82.02	0.074	[0.001]	>98.6
Other TCDD	0.828	0.034	95.91	1.347	0.000	100.00	0.766	0.009	98.84	0.980	0.014	98.55
12378 PCDD	0.368	(0.011)	>97.01	0.350	[0.011]	>96.85	0.130	0.009	93.14	0.282	0.003	98.95
Other PCDD	1.865	0.011	99.40	3.277	0.102	96.89	1.168	0.080	93.14	2.103	0.064	96.94
123478 HxCDD	0.723	0.014	98.13	0.945	0.045	95.21	0.273	(0.022)	>91.93	0.647	0.020	96.97
123678 HxCDD	0.828	0.020	97.55	1.114	0.045	95.94	0.324	0.045	86.28	0.755	0.037	95.14
123789 HxCDD	1.708	0.045	97.36	2.331	0.090	96.12	0.597	0.089	85.09	1.545	0.075	95.15
Other HxCDD	7.383	0.124	98.32	11.929	0.452	96.21	3.868	0.467	87.92	7.726	0.348	95.50
1234678-HpCDD	16.026	0.271	98.31	23.573	0.679	97.12	5.192	0.645	87.57	14.930	0.532	96.44
Other HpCDD	18.522	0.226	98.78	25.774	0.611	97.63	5.581	0.712	87.24	16.626	0.516	96.90
Octa-CDD	66.470	0.745	98.88	93.124	1.832	98.03	22.065	1.669	92.44	60.553	1.415	97.66
Total CDD	114.826	1.500	98.69	163.842	3.857	97.65	40.003	3.747	90.63	106.224	3.035	97.14
FURANS												
2378 TCDF	1.169	(0.113)	>90.33	0.868	0.068	92.18	0.402	0.045	88.94	0.813	0.037	95.39
Other TCDF	30.096	2.821	90.63	40.837	1.290	96.84	15.043	0.912	93.94	28.659	1.674	94.16
12378 PCDF	2.102	0.068	96.78	2.072	0.045	97.82	0.727	0.022	96.94	1.634	0.045	97.24
23478 PCDF	6.962	0.226	96.76	7.901	0.113	98.57	2.336	0.111	95.24	5.733	0.150	97.38
Other PCDF	67.653	2.415	96.43	76.675	1.176	98.47	20.430	0.467	97.71	54.919	1.353	97.54
123478 HxCDF	35.206	0.632	98.21	47.663	0.498	98.96	11.811	0.467	96.04	31.560	0.532	98.31
123678 HxCDF	9.590	0.181	98.12	11.268	(0.136)	>98.79	3.115	0.156	95.00	7.991	0.112	98.60
234678 HxCDF	38.753	0.722	98.14	57.895	0.566	99.02	12.071	0.490	95.94	36.240	0.592	98.37
123789 HxCDF	1.012	0.023	97.77	1.062	0.023	97.87	0.350	(0.018)	>94.86	0.808	0.015	98.14
Other HxCDF	79.646	1.602	97.99	85.457	0.860	98.99	22.364	0.828	96.30	62.489	1.097	98.25
1234678-HpCDF	76.848	0.925	98.80	98.953	1.086	98.90	24.142	1.135	95.30	66.648	1.049	98.43
1234789-HpCDF	29.163	0.293	98.99	37.561	0.430	98.86	8.047	0.378	95.30	24.924	0.367	98.53
Other HpCDF	115.995	1.264	98.91	153.610	1.425	99.07	32.968	1.380	95.82	100.858	1.356	98.66
Octa-CDF	428.248	1.647	99.62	446.842	3.620	99.19	79.564	3.783	95.25	318.218	3.017	99.05
Total CDF	922.441	12.931	98.60	1068.66	11.334	98.94	233.371	10.191	95.63	741.492	11.486	98.45
Total CDD+CDF	1037.27	14.432	98.61	1232.51	15.192	98.77	273.374	13.938	94.90	847.716	14.521	98.29

Note: Condition 2 is with carbon injection.
( ) = Estimated maximum possible concentration.

TABLE 2–4. CDD/CDF INLET AND OUTLET STACK GAS CONCENTRATIONS FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

CONGENER	INLET CONCENTRATION a (ng/dscm, as measured)				OUTLET CONCENTRATION a (ng/dscm, as measured)			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
DIOXINS								
2378 TCDD	0.020	0.015	0.024	0.020	(0.009)	(0.003)	0.011	0.007
Other TCDD	0.089	0.087	0.257	0.144	0.140	0.024	0.043	0.069
12378 PCDD	0.051	0.050	0.099	0.067	0.020	(0.005)	(0.008)	0.011
Other PCDD	0.426	0.341	0.763	0.510	0.295	0.046	0.048	0.130
123478 HxCDD	0.072	0.085	0.201	0.119	0.026	0.008	0.005	0.013
123678 HxCDD	0.099	0.104	0.216	0.140	0.037	0.008	0.008	0.018
123789 HxCDD	0.177	0.197	0.496	0.290	0.054	0.013	0.011	0.026
Other HxCDD	0.879	0.916	2.193	1.329	0.426	0.110	0.105	0.214
1234678–HpCDD	1.567	1.540	4.227	2.445	0.315	0.070	0.051	0.145
Other HpCDD	1.737	1.671	4.335	2.581	0.401	0.081	0.056	0.179
Octa–CDD	7.527	6.140	15.721	9.796	0.572	0.170	0.142	0.295
Total CDD	12.643	11.146	28.531	17.440	2.295	0.539	0.489	1.108
FURANS								
2378 TCDF	1.533	0.456	0.302	0.763	0.916	0.062	0.048	0.342
Other TCDF	7.323	3.819	8.799	6.647	5.923	1.312	2.343	3.193
12378 PCDF	0.545	0.391	0.561	0.499	0.286	0.043	0.046	0.125
23478 PCDF	1.499	1.193	1.768	1.487	0.830	0.154	0.164	0.382
Other PCDF	11.069	7.767	16.821	11.886	6.381	1.663	2.208	3.417
123478 HxCDF	3.576	3.884	8.324	5.261	1.516	0.431	0.403	0.784
123678 HxCDF	0.920	1.085	2.243	1.416	0.401	0.113	0.105	0.206
234678 HxCDF	3.747	3.710	8.583	5.347	1.030	0.377	0.322	0.577
123789 HxCDF	0.099	(0.434)	0.207	0.247	0.037	(0.013)	(0.016)	0.022
Other HxCDF	7.667	7.073	18.167	10.969	3.167	1.140	1.169	1.825
1234678–HpCDF	6.642	7.290	17.511	10.481	2.060	0.485	0.322	0.956
1234789–HpCDF	2.486	2.734	6.448	3.889	0.429	0.135	0.073	0.212
Other HpCDF	9.639	10.458	14.212	11.436	3.004	0.755	0.250	1.336
Octa–CDF	32.493	29.724	90.576	50.931	3.405	0.728	0.457	1.530
Total CDF	89.237	80.017	194.522	121.259	29.385	7.410	7.926	14.907
Total CDD+CDF	101.880	91.163	223.054	138.699	31.680	7.949	8.415	16.015

Note: Condition 1 is no carbon injection.
a Standard conditions are defined as 1 atm and 68 F.
( ) = Estimated maximum possible concentration.

TABLE 2-5. CDD/CDF INLET AND OUTLET STACK GAS CONCENTRATIONS FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

	INLET CONCENTRATION a (ng/dscm, as measured)				OUTLET CONCENTRATION a (ng/dscm, as measured)			
CONGENER	Run 4	Run 5	Run 6	Average	Run 4	Run 5	Run 6	Average
DIOXINS								
2378 TCDD	0.019	0.013	0.007	0.013	[0.001]	[0.001]	[0.001]	0.000
Other TCDD	0.146	0.232	0.129	0.169	0.004	0.000	0.001	0.003
12378 PCDD	0.065	0.060	0.022	0.049	(0.001)	[0.001]	0.001	0.001
Other PCDD	0.328	0.564	0.197	0.363	0.001	0.012	0.009	0.008
123478 HxCDD	0.127	0.163	0.046	0.112	0.002	0.005	(0.003)	0.003
123678 HxCDD	0.146	0.192	0.055	0.131	0.002	0.005	0.005	0.004
123789 HxCDD	0.301	0.402	0.101	0.268	0.005	0.011	0.011	0.009
Other HxCDD	1.300	2.055	0.652	1.335	0.015	0.053	0.055	0.041
1234678-HpCDD	2.821	4.061	0.875	2.586	0.033	0.079	0.076	0.063
Other HpCDD	3.261	4.440	0.940	2.880	0.027	0.071	0.084	0.061
Octa-CDD	11.702	16.042	3.717	10.487	0.091	0.213	0.197	0.167
Total CDD	20.215	28.224	6.738	18.392	0.182	0.449	0.443	0.359
FURANS								
2378 TCDF	0.206	0.149	0.068	0.141	(0.014)	0.008	0.005	0.009
Other TCDF	5.298	7.035	2.534	4.956	0.343	0.150	0.108	0.200
12378 PCDF	0.370	0.357	0.122	0.283	0.008	0.005	0.003	0.005
23478 PCDF	1.226	1.361	0.394	0.993	0.027	0.013	0.013	0.018
Other PCDF	11.910	13.208	3.441	9.520	0.293	0.137	0.055	0.162
123478 HxCDF	6.198	8.211	1.990	5.466	0.077	0.058	0.055	0.063
123678 HxCDF	1.688	1.941	0.525	1.385	0.022	(0.016)	0.018	0.019
234678 HxCDF	6.822	9.973	2.033	6.276	0.088	0.066	0.058	0.070
123789 HxCDF	0.178	0.183	0.059	0.140	0.003	0.003	(0.002)	0.002
Other HxCDF	14.022	14.721	3.767	10.837	0.195	0.100	0.098	0.131
1234678-HpCDF	13.529	17.046	4.066	11.547	0.112	0.126	0.134	0.124
1234789-HpCDF	5.134	6.470	1.355	4.320	0.036	0.050	0.045	0.043
Other HpCDF	20.421	26.461	5.553	17.478	0.154	0.166	0.163	0.161
Octa-CDF	75.393	76.975	13.402	55.257	0.200	0.421	0.447	0.356
Total CDF	162.396	184.092	39.309	128.599	1.572	1.319	1.205	1.365
Total CDD+CDF	182.611	212.316	46.047	146.991	1.755	1.771	1.649	1.725

Note: Condition 2 is with carbon injection.
a Standard conditions are defined as 1 atm and 68 F.
( ) = Estimated maximum possible concentration.

TABLE 2-6. CDD/CDF INLET AND OUTLET STACK GAS CONCENTRATIONS FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

CONGENER	INLET CONCENTRATION (ng/dscm, adjusted to 7% O2)				OUTLET CONCENTRATION (ng/dscm, adjusted to 7% O2)			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
DIOXINS								
2378 TCDD	0.029	0.022	0.032	0.028	(0.018)	(0.006)	0.020	0.014
Other TCDD	0.126	0.123	0.346	0.198	0.287	0.050	0.080	0.139
12378 PCDD	0.072	0.071	0.134	0.092	0.041	(0.011)	(0.015)	0.022
Other PCDD	0.604	0.483	1.030	0.706	0.602	0.094	0.090	0.262
123478 HxCDD	0.101	0.120	0.271	0.164	0.053	0.017	0.010	0.026
123678 HxCDD	0.140	0.148	0.291	0.193	0.076	0.017	0.015	0.036
123789 HxCDD	0.251	0.280	0.669	0.400	0.111	0.028	0.020	0.053
Other HxCDD	1.246	1.299	2.960	1.835	0.871	0.226	0.194	0.430
1234678-HpCDD	2.222	2.185	5.704	3.370	0.643	0.143	0.095	0.294
Other HpCDD	2.464	2.370	5.850	3.561	0.819	0.165	0.105	0.363
Octa-CDD	10.676	8.709	21.216	13.534	1.170	0.347	0.264	0.594
Total CDD	17.932	15.809	38.504	24.082	4.691	1.102	0.906	2.233
FURANS								
2378 TCDF	2.174	0.646	0.407	1.076	1.872	0.127	0.090	0.696
Other TCDF	10.387	5.416	11.874	9.226	12.107	2.683	4.342	6.377
12378 PCDF	0.773	0.554	0.757	0.695	0.585	0.088	0.085	0.253
23478 PCDF	2.126	1.693	2.386	2.068	1.696	0.314	0.304	0.771
Other PCDF	15.701	11.017	22.700	16.473	13.043	3.399	4.093	6.845
123478 HxCDF	5.072	5.509	11.234	7.272	3.100	0.881	0.747	1.576
123678 HxCDF	1.304	1.539	3.027	1.957	0.819	0.231	0.194	0.415
234678 HxCDF	5.314	5.262	11.583	7.386	2.106	0.771	0.598	1.158
123789 HxCDF	0.140	(0.615)	0.279	0.345	0.076	(0.028)	(0.030)	0.044
Other HxCDF	10.874	10.032	24.517	15.141	6.475	2.330	2.166	3.657
1234678-HpCDF	9.420	10.340	23.632	14.464	4.211	0.991	0.598	1.933
1234789-HpCDF	3.527	3.878	8.702	5.369	0.877	0.275	0.134	0.429
Other HpCDF	13.672	14.833	19.179	15.895	6.141	1.542	0.463	2.716
Octa-CDF	46.087	42.160	122.233	70.160	6.960	1.487	0.846	3.098
Total CDF	126.571	113.494	262.511	167.525	60.066	15.148	14.689	29.968
Total CDD+CDF	144.503	129.303	301.01	191.607	64.757	16.249	15.60	32.201

Note: Condition 1 is no carbon injection.
( ) = Estimated maximum possible concentration.

TABLE 2-7. CDD/CDF INLET AND OUTLET STACK GAS CONCENTRATIONS FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

CONGENER	INLET CONCENTRATION (ng/dscm, adjusted to 7% O2)				OUTLET CONCENTRATION (ng/dscm, adjusted to 7% O2)			
	Run 4	Run 5	Run 6	Average	Run 4	Run 5	Run 6	Average
DIOXINS								
2378 TCDD	0.024	0.018	0.009	0.017	[0.003]	[0.003]	[0.001]	0.000
Other TCDD	0.193	0.319	0.176	0.229	0.008	0.000	0.002	0.005
12378 PCDD	0.086	0.083	0.030	0.066	(0.003)	[0.003]	0.002	0.002
Other PCDD	0.435	0.777	0.268	0.493	0.003	0.023	0.018	0.014
123478 HxCDD	0.168	0.224	0.063	0.152	0.003	0.010	(0.005)	0.006
123678 HxCDD	0.193	0.264	0.074	0.177	0.005	0.010	0.010	0.008
123789 HxCDD	0.398	0.553	0.137	0.363	0.011	0.020	0.020	0.017
Other HxCDD	1.721	2.828	0.888	1.812	0.030	0.100	0.104	0.078
1234678-HpCDD	3.735	5.588	1.192	3.505	0.064	0.150	0.143	0.119
Other HpCDD	4.317	6.110	1.281	3.903	0.054	0.135	0.158	0.116
Octa-CDD	15.491	22.078	5.065	14.211	0.177	0.406	0.371	0.318
Total CDD	26.761	38.843	9.182	24.929	0.357	0.855	0.832	0.684
FURANS								
2378 TCDF	0.272	0.206	0.092	0.190	(0.027)	0.015	0.010	0.017
Other TCDF	7.014	9.682	3.453	6.716	0.671	0.286	0.203	0.387
12378 PCDF	0.490	0.491	0.167	0.383	0.016	0.010	0.005	0.010
23478 PCDF	1.623	1.873	0.536	1.344	0.054	0.025	0.025	0.034
Other PCDF	15.767	18.178	4.689	12.878	0.575	0.261	0.104	0.313
123478 HxCDF	8.205	11.300	2.711	7.405	0.150	0.110	0.104	0.121
123678 HxCDF	2.235	2.671	0.715	1.874	0.043	(0.030)	0.035	0.036
234678 HxCDF	9.032	13.726	2.771	8.509	0.172	0.125	0.109	0.135
123789 HxCDF	0.236	0.252	0.080	0.189	0.005	0.005	(0.004)	0.005
Other HxCDF	18.562	20.260	5.133	14.652	0.381	0.191	0.184	0.252
1234678-HpCDF	17.910	23.459	5.542	15.637	0.220	0.241	0.252	0.238
1234789-HpCDF	6.797	8.905	1.847	5.850	0.070	0.095	0.084	0.083
Other HpCDF	27.033	36.417	7.567	23.673	0.301	0.316	0.306	0.308
Octa-CDF	99.806	105.935	18.263	74.668	0.392	0.802	0.840	0.678
Total CDF	214.981	253.354	53.568	173.968	3.077	2.512	2.263	2.618
Total CDD+CDF	241.742	292.197	62.75	198.897	3.434	3.367	3.096	3.301

Note: Condition 2 is with carbon injection.
( ) = Estimated maximum possible concentration.

TABLE 2-8. CDD/CDF AVERAGE FLUE GAS TOXIC EQUIVALENCIES CORRECTED TO 7% O2 FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

CONGENER	Toxic Equivalency Factor a	INLET TOXIC EQUIVALENCIES (ng/dscm @ 7% O2)				OUTLET TOXIC EQUIVALENCIES (ng/dscm @ 7% O2)			
		Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
DIOXINS									
2378 TCDD	1.00000	0.029	0.022	0.032	0.028	(0.018)	(0.006)	0.020	0.014
Other TCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12378 PCDD	0.50000	0.036	0.035	0.067	0.046	0.020	(0.006)	(0.007)	0.011
Other PCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
123478 HxCDD	0.10000	0.010	0.012	0.027	0.016	0.005	0.002	0.001	0.003
123678 HxCDD	0.10000	0.014	0.015	0.029	0.019	0.008	0.002	0.001	0.004
123789 HxCDD	0.10000	0.025	0.028	0.067	0.040	0.011	0.003	0.002	0.005
Other HxCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.01000	0.022	0.022	0.057	0.034	0.006	0.001	0.001	0.003
Other HpCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Octa-CDD	0.00100	0.011	0.009	0.021	0.014	0.001	0.000	0.000	0.001
Total CDD		0.147	0.142	0.300	0.197	0.070	0.019	0.033	0.041
FURANS									
2378 TCDF	0.10000	0.217	0.065	0.041	0.108	0.187	0.013	0.009	0.070
Other TCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12378 PCDF	0.05000	0.039	0.028	0.038	0.035	0.029	0.004	0.004	0.013
23478 PCDF	0.50000	1.063	0.846	1.193	1.034	0.848	0.157	0.152	0.386
Other PCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
123478 HxCDF	0.10000	0.507	0.551	1.123	0.727	0.310	0.088	0.075	0.158
123678 HxCDF	0.10000	0.130	0.154	0.303	0.196	0.082	0.023	0.019	0.041
234678 HxCDF	0.10000	0.531	0.526	1.158	0.739	0.211	0.077	0.060	0.116
123789 HxCDF	0.10000	0.014	(0.062)	0.028	0.034	0.008	(0.003)	(0.003)	0.004
Other HxCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1234678-HpCDF	0.01000	0.094	0.103	0.236	0.145	0.042	0.010	0.006	0.019
1234789-HpCDF	0.01000	0.035	0.039	0.087	0.054	0.009	0.003	0.001	0.004
Other HpCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Octa-CDF	0.00100	0.046	0.042	0.122	0.070	0.007	0.001	0.001	0.003
Total CDF		2.678	2.415	4.330	3.141	1.732	0.379	0.330	0.814
Total CDD+CDF		2.825	2.558	4.630	3.338	1.802	0.398	0.363	0.854

a North Atlantic Treaty Organization, Committee on the Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I-TEF) Methods of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds. Report No. 176, August 1988.

Note: Condition 1 is no carbon injection.
( ) = Estimated maximum possible concentration

TABLE 2-9. CDD/CDF AVERAGE FLUE GAS TOXIC EQUIVALENCIES CORRECTED TO 7% O2 FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

CONGENER	Toxic Equivalency Factor a	INLET TOXIC EQUIVALENCIES (ng/dscm @ 7% O2)				OUTLET TOXIC EQUIVALENCIES (ng/dscm @ 7% O2)			
		Run 4	Run 5	Run 6	Average	Run 4	Run 5	Run 6	Average
DIOXINS									
2378 TCDD	1.00000	0.024	0.018	0.009	0.017	[0.003]	[0.003]	[0.001]	0.000
Other TCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12378 PCDD	0.50000	0.043	0.041	0.015	0.033	(0.001)	[0.001]	0.001	0.001
Other PCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
123478 HxCDD	0.10000	0.017	0.022	0.006	0.015	0.000	0.001	(0.000)	0.001
123678 HxCDD	0.10000	0.019	0.026	0.007	0.018	0.000	0.001	0.001	0.001
123789 HxCDD	0.10000	0.040	0.055	0.014	0.036	0.001	0.002	0.002	0.002
Other HxCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.01000	0.037	0.056	0.012	0.035	0.001	0.002	0.001	0.001
Other HpCDD	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Octa-CDD	0.00100	0.015	0.022	0.005	0.014	0.000	0.000	0.000	0.000
Total CDD		0.196	0.242	0.068	0.169	0.004	0.006	0.006	0.006
FURANS									
2378 TCDF	0.10000	0.027	0.021	0.009	0.019	(0.003)	0.002	0.001	0.002
Other TCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12378 PCDF	0.05000	0.024	0.025	0.008	0.019	0.001	0.001	0.000	0.001
23478 PCDF	0.50000	0.811	0.937	0.268	0.672	0.027	0.013	0.012	0.017
Other PCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
123478 HxCDF	0.10000	0.820	1.130	0.271	0.741	0.015	0.011	0.010	0.012
123678 HxCDF	0.10000	0.223	0.267	0.072	0.187	0.004	(0.003)	0.003	0.004
234678 HxCDF	0.10000	0.903	1.373	0.277	0.851	0.017	0.013	0.011	0.014
123789 HxCDF	0.10000	0.024	0.025	0.008	0.019	0.001	0.001	(0.000)	0.000
Other HxCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1234678-HpCDF	0.01000	0.179	0.235	0.055	0.156	0.002	0.002	0.003	0.002
1234789-HpCDF	0.01000	0.068	0.089	0.018	0.058	0.001	0.001	0.001	0.001
Other HpCDF	0.00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Octa-CDF	0.00100	0.100	0.106	0.018	0.075	0.000	0.001	0.001	0.001
Total CDF		3.181	4.206	1.006	2.797	0.071	0.046	0.043	0.053
Total CDD+CDF		3.377	4.448	1.074	2.966	0.074	0.052	0.049	0.059

a North Atlantic Treaty Organization, Committee on the Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I-TEF) Methods of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds. Report No. 176, August 1988.

Note: Condition 2 is with carbon injection.

( ) = Estimated maximum possible concentration

TABLE 2-10. SUMMARY OF CDD/CDF FLUE GAS SAMPLING PARAMETERS
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Spray Dryer Inlet							
	Run 1	Run 2	Run 3	Average	Run 4	Run 5	Run 6	Average
Total Sample Time (min)	240	240	240	240	240	240	240	240
Average Sampling Rate (dscfm)	0.43	0.68	0.68	0.60	0.64	0.66	0.67	0.66
Dry Standard Meter Volume (dscf)	104	163	164	143	153	158	162	157
Dry Standard Meter Volume (dscm)	2.9	4.6	4.6	4.1	4.3	4.5	4.6	4.5
Average Stack Temperature (F)	407	408	405	407	409	401	407	406
Oxygen Concentration (% V)	11.1	11.1	10.6	10.9	10.4	10.8	10.7	10.6
Carbon Dioxide Concentration (% V)	6.4	7.8	6.7	7.0	6.6	6.5	6.5	6.5
Percent Moisture (% V)	15.8	15.3	14.8	15.3	14.4	13.7	13.3	13.8
Volumetric Flow Rate (dscfm)	3370	3479	3531	3460	3343	3416	3494	3418
Volumetric Flow Rate (dscmm)	95.4	98.5	100.0	98.0	94.7	96.8	98.9	96.8
Percent Isokinetic (%)	102.6	102.0	101.1	NA	99.6	101.0	100.8	NA
	Bag House Outlet							
	Run 1	Run 2	Run 3	Average	Run 4	Run 5	Run 6	Average
Total Sample Time (min)	240	240	240	240	240	240	240	240
Average Sampling Rate (dscfm)	0.51	0.55	0.55	0.54	0.55	0.56	0.56	0.56
Dry Standard Meter Volume (dscf)	123	131	131	129	129	134	134	132
Dry Standard Meter Volume (dscm)	3.5	3.7	3.7	3.6	3.6	3.8	3.8	3.7
Average Stack Temperature (F)	279	292	293	288	293	291	292	292
Oxygen Concentration (% V)	14.1	14.1	13.4	13.9	13.8	13.6	13.5	13.6
Carbon Dioxide Concentration (% V)	5.0	5.0	5.3	5.1	5.2	5.0	5.3	5.2
Percent Moisture (% V)	14.7	14.7	14.6	14.6	15.0	13.3	13.3	13.8
Volumetric Flow Rate (dscfm)	4765	4968	4956	4897	4842	5055	4978	4958
Volumetric Flow Rate (dscmm)	135.0	140.7	140.4	138.7	137.1	143.2	141.0	140.4
Percent Isokinetic (%)	92.7	94.4	94.9	NA	96.7	94.9	96.5	NA

NA : Not applicable

allowed to cool. An approximately one liter bottle was filled and sent to the laboratory for CDD/CDF analyses.

Ash samples were analyzed for the same CDD/CDF isomers that the flue gas samples were analyzed for. All CDD/CDF congeners were detected in the test run samples. Tables 2-11 and 2-12 gives CDD/CDF concentrations and toxic equivalencies in the baghouse residue for Condition 1 and 2. The average total CDD/CDF concentrations were 24.2 and 32.7 parts per billion for Conditions 1 and 2. Test Run 5 had the highest total CDD/CDF concentration at 44.7 ppb.wt. Run 5 also showed the highest removal efficiency of 98.77 percent for total CDD/CDF in the flue gas.

Tables 2-13 through 2-16 present the CDD/CDF concentrations and toxic equivalencies in the bottom ash and spray dryer residue. Total CDD/CDF values for Conditions 1 and 2 in the bottom ash were 96.5 and 73.1 ppb.wt, and 9.2 and 6.2 ppb.wt in the spray dryer residue, respectively.

Table 2-17 presents the CDD/CDF make-up water and lime slurry tank analysis results. Spray dryer make-up water was sampled every test day. However, only one sample was analyzed with the results assumed to represent all test days. Results are given in units of parts per trillion by weight (ppt,wt). All congeners were present below the detection limit except for octa-CDD and CDF which were detected at very low levels.

2.3 TOXIC METALS RESULTS

2.3.1 Overview

A single sampling train was used to determine emission rates of a series of 13 metals [aluminum (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), silver (Ag), thallium (Tl)], and particulate matter (PM). Mercury was also sampled by Method 101A and will be discussed in Section 2.5. Three sampling runs were performed under both test conditions (without carbon injection and with carbon injection) in order to ensure representative test results.

Sampling locations, method, and QA/QC are discussed in Sections 4, 5, and 6, respectively. The average metals emission rates and removal efficiencies are summarized in Section 2.3.3. The results for each individual run are presented in Section 2.3.4.

TABLE 2-11. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN BAGHOUSE RESIDUE FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	0.003	0.002	0.003	0.003	1.00000	0.003	0.002	0.003	0.003
Other TCDD	0.034	0.011	0.038	0.028	0.00000	0.000	0.000	0.000	0.000
12378 PCDD	0.014	0.007	0.014	0.012	0.50000	0.007	0.003	0.007	0.006
Other PCDD	0.124	0.052	0.101	0.092	0.00000	0.000	0.000	0.000	0.000
123478 HxCDD	0.029	0.011	0.022	0.021	0.10000	0.003	0.001	0.002	0.002
123678 HxCDD	0.036	0.013	0.023	0.024	0.10000	0.004	0.001	0.002	0.002
123789 HxCDD	0.080	0.028	0.085	0.064	0.10000	0.008	0.003	0.008	0.006
Other HxCDD	0.399	0.140	0.241	0.260	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.644	0.219	0.395	0.419	0.01000	0.006	0.002	0.004	0.004
Other Hepta-CDD	0.656	0.247	0.400	0.434	0.00000	0.000	0.000	0.000	0.000
Octa-CDD	2.490	1.070	1.220	1.593	0.00100	0.002	0.001	0.001	0.002
Total CDD	4.508	1.799	2.541	2.949		0.033	0.013	0.028	0.025
FURANS									
2378 TCDF	0.040	0.020	0.042	0.034	0.10000	0.004	0.002	0.004	0.003
Other TCDF	1.350	0.631	1.438	1.140	0.00000	0.000	0.000	0.000	0.000
12378 PCDF	0.096	0.047	0.086	0.076	0.05000	0.005	0.002	0.004	0.004
23478 PCDF	0.264	0.104	0.192	0.187	0.50000	0.132	0.052	0.096	0.093
Other PCDF	2.470	1.019	1.782	1.757	0.00000	0.000	0.000	0.000	0.000
123478 HxCDF	1.300	0.522	0.845	0.889	0.10000	0.130	0.052	0.085	0.089
123678 HxDCF	0.392	0.208	0.282	0.294	0.10000	0.039	0.021	0.028	0.029
234678 HxCDF	1.180	0.463	0.793	0.812	0.10000	0.118	0.046	0.079	0.081
123789 HxCDF	0.041	0.017	0.030	0.029	0.10000	0.004	0.002	0.003	0.003
Other HxCDF	3.008	1.380	1.921	2.103	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDF	3.300	1.770	2.170	2.413	0.01000	0.033	0.018	0.022	0.024
1234789-HpCDF	0.942	0.373	0.669	0.661	0.01000	0.009	0.004	0.007	0.007
Other Hepta-CDF	4.448	1.977	2.941	3.122	0.00000	0.000	0.000	0.000	0.000
Octa-CDF	13.140	3.910	6.050	7.700	0.00100	0.013	0.004	0.006	0.008
Total CDF	31.970	12.441	19.240	21.217		0.488	0.203	0.334	0.341
Total CDD+CDF	36.478	14.240	21.781	24.166		0.521	0.216	0.362	0.366

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I - TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

TABLE 2-12. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN BAGHOUSE RESIDUE FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	0.003	0.002	0.001	0.002	1.00000	0.003	0.002	0.001	0.002
Other TCDD	0.031	0.039	0.029	0.033	0.00000	0.000	0.000	0.000	0.000
12378 PCDD	0.015	0.012	0.006	0.011	0.50000	0.007	0.006	0.003	0.005
Other PCDD	0.113	0.157	0.081	0.117	0.00000	0.000	0.000	0.000	0.000
123478 HxCDD	0.030	0.028	0.012	0.024	0.10000	0.003	0.003	0.001	0.002
123678 HxCDD	0.039	0.037	0.020	0.032	0.10000	0.004	0.004	0.002	0.003
123789 HxCDD	0.083	0.065	0.029	0.059	0.10000	0.008	0.006	0.003	0.006
Other HxCDD	0.363	0.442	0.232	0.346	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.705	0.733	0.300	0.579	0.01000	0.007	0.007	0.003	0.006
Other Hepta-CDD	0.755	0.857	0.352	0.655	0.00000	0.000	0.000	0.000	0.000
Octa-CDD	2.570	3.710	1.010	2.430	0.00100	0.003	0.004	0.001	0.002
Total CDD	4.707	6.083	2.073	4.288		0.036	0.032	0.015	0.027
FURANS									
2378 TCDF	0.039	0.030	0.013	0.027	0.10000	0.004	0.003	0.001	0.003
Other TCDF	1.431	1.210	0.443	1.028	0.00000	0.000	0.000	0.000	0.000
12378 PCDF	0.078	0.073	0.034	0.061	0.05000	0.004	0.004	0.002	0.003
23478 PCDF	0.306	0.259	0.104	0.223	0.50000	0.153	0.130	0.052	0.112
Other PCDF	2.976	2.719	1.062	2.252	0.00000	0.000	0.000	0.000	0.000
123478 HxCDF	1.460	1.290	0.506	1.085	0.10000	0.146	0.129	0.051	0.109
123678 HxDCF	0.445	0.371	0.160	0.325	0.10000	0.045	0.037	0.016	0.033
234678 HxCDF	1.590	1.180	0.526	1.099	0.10000	0.159	0.118	0.053	0.110
123789 HxCDF	0.040	0.027	0.012	0.026	0.10000	0.004	0.003	0.001	0.003
Other HxCDF	3.085	3.062	1.187	2.444	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDF	3.450	3.790	1.280	2.840	0.01000	0.035	0.038	0.013	0.028
1234789-HpCDF	1.440	1.050	0.392	0.961	0.01000	0.014	0.011	0.004	0.010
Other Hepta-CDF	5.700	5.860	1.898	4.486	0.00000	0.000	0.000	0.000	0.000
Octa-CDF	13.040	17.690	4.040	11.590	0.00100	0.013	0.018	0.004	0.012
Total CDF	35.080	38.610	11.656	28.449		0.576	0.489	0.196	0.420
Total CDD+CDF	39.787	44.693	13.729	32.736		0.612	0.521	0.211	0.448

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I - TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

TABLE 2-13. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN BOTTOM ASH FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	(0.015)	0.009	0.018	0.015	1.00000	(0.015)	0.009	0.018	0.015
Other TCDD	3.764	0.183	0.253	1.400	0.00000	0.000	0.000	0.000	0.000
12378 PCDD	0.165	0.077	0.108	0.117	0.50000	0.083	0.039	0.054	0.058
Other PCDD	3.875	0.587	0.761	1.741	0.00000	0.000	0.000	0.000	0.000
123478 HxCDD	0.351	0.184	0.242	0.259	0.10000	0.035	0.018	0.024	0.026
123678 HxCDD	0.359	0.126	0.155	0.213	0.10000	0.036	0.013	0.016	0.021
123789 HxCDD	0.893	0.418	0.499	0.603	0.10000	0.089	0.042	0.050	0.060
Other HxCDD	5.447	1.082	1.364	2.631	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDD	3.740	2.150	1.790	2.560	0.01000	0.037	0.022	0.018	0.026
Other Hepta-CDD	4.930	2.200	1.890	3.007	0.00000	0.000	0.000	0.000	0.000
Octa-CDD	12.200	11.780	6.480	10.153	0.00100	0.012	0.012	0.006	0.010
Total CDD	35.740	18.796	13.560	22.699		0.308	0.154	0.186	0.216
FURANS									
2378 TCDF	0.349	0.148	0.263	0.253	0.10000	0.035	0.015	0.026	0.025
Other TCDF	16.591	7.422	11.507	11.840	0.00000	0.000	0.000	0.000	0.000
12378 PCDF	0.465	0.311	0.491	0.422	0.05000	0.023	0.016	0.025	0.021
23478 PCDF	1.100	0.696	1.090	0.962	0.50000	0.550	0.348	0.545	0.481
Other PCDF	7.495	9.733	12.759	9.996	0.00000	0.000	0.000	0.000	0.000
123478 HxCDF	5.030	5.490	6.440	5.653	0.10000	0.503	0.549	0.644	0.565
123678 HxDCF	1.400	1.160	1.310	1.290	0.10000	0.140	0.116	0.131	0.129
234678 HxCDF	2.860	2.800	2.920	2.860	0.10000	0.286	0.280	0.292	0.286
123789 HxCDF	0.078	0.079	0.104	0.087	0.10000	0.008	0.008	0.010	0.009
Other HxCDF	0.182	9.161	10.466	6.603	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDF	7.600	12.080	7.050	8.910	0.01000	0.076	0.121	0.071	0.089
1234789-HpCDF	1.310	1.030	0.878	1.073	0.01000	0.013	0.010	0.009	0.011
Other Hepta-CDF	7.850	8.260	6.052	7.387	0.00000	0.000	0.000	0.000	0.000
Octa-CDF	10.400	26.440	12.610	16.483	0.00100	0.010	0.026	0.013	0.016
Total CDF	62.710	84.810	73.940	73.820		1.644	1.489	1.765	1.633
Total CDD+CDF	98.450	103.606	87.500	96.519		1.953	1.643	1.952	1.849

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I – TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

( ) = Estimated maximum possible concentration

TABLE 2-14. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN BOTTOM ASH FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	0.007	0.012	0.016	0.012	1.00000	0.007	0.012	0.016	0.012
Other TCDD	0.178	0.285	0.193	0.219	0.00000	0.000	0.000	0.000	0.000
12378 PCDD	0.046	0.099	0.114	0.086	0.50000	0.023	0.050	0.057	0.043
Other PCDD	0.431	0.764	0.723	0.639	0.00000	0.000	0.000	0.000	0.000
123478 HxCDD	0.088	0.236	0.202	0.175	0.10000	0.009	0.024	0.020	0.018
123678 HxCDD	0.073	0.157	0.122	0.117	0.10000	0.007	0.016	0.012	0.012
123789 HxCDD	0.199	0.543	0.383	0.375	0.10000	0.020	0.054	0.038	0.038
Other HxCDD	0.661	1.394	1.033	1.029	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.511	2.370	1.510	1.464	0.01000	0.005	0.024	0.015	0.015
Other Hepta-CDD	2.869	2.460	1.660	2.330	0.00000	0.000	0.000	0.000	0.000
Octa-CDD	3.830	10.440	5.910	6.727	0.00100	0.004	0.010	0.006	0.007
Total CDD	8.892	18.760	11.866	13.173		0.075	0.189	0.165	0.143
FURANS									
2378 TCDF	0.110	0.185	0.206	0.167	0.10000	0.011	0.019	0.021	0.017
Other TCDF	4.600	8.885	8.744	7.410	0.00000	0.000	0.000	0.000	0.000
12378 PCDF	0.165	0.385	0.463	0.338	0.05000	0.008	0.019	0.023	0.017
23478 PCDF	0.364	0.917	0.920	0.734	0.50000	0.182	0.459	0.460	0.367
Other PCDF	4.661	11.428	10.997	9.029	0.00000	0.000	0.000	0.000	0.000
123478 HxCDF	2.110	6.800	4.970	4.627	0.10000	0.211	0.680	0.497	0.463
123678 HxDCF	0.488	1.340	1.250	1.026	0.10000	0.049	0.134	0.125	0.103
234678 HxCDF	1.030	3.080	2.270	2.127	0.10000	0.103	0.308	0.227	0.213
123789 HxCDF	0.037	0.125	0.105	0.089	0.10000	0.004	0.013	0.011	0.009
Other HxCDF	3.495	9.895	9.295	7.562	0.00000	0.000	0.000	0.000	0.000
1234678-HpCDF	4.570	7.760	12.170	8.167	0.01000	0.046	0.078	0.122	0.082
1234789-HpCDF	(0.260)	7.760	0.940	2.987	0.01000	(0.003)	0.078	0.009	0.030
Other Hepta-CDF	2.668	1.590	7.540	3.933	0.00000	0.000	0.000	0.000	0.000
Octa-CDF	5.250	17.810	12.180	11.747	0.00100	0.005	0.018	0.012	0.012
Total CDF	29.810	77.960	72.050	59.940		0.621	1.804	1.507	1.311
Total CDD+CDF	38.702	96.720	83.916	73.113		0.696	1.993	1.672	1.454

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I – TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

( ) = Estimated maximum possible concentration

TABLE 2-15. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN SPRAY DRYER RESIDUE FOR CONDITION 1; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 1 (ppb)	RUN 2 (ppb)	RUN 3 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	(0.001)	0.001	(0.001)	0.001	1.000	(0.001)	0.001	(0.001)	0.001
Other TCDD	0.006	0.008	0.006	0.007	0.000	0.000	0.000	0.000	0.000
12378 PCDD	0.004	0.004	0.004	0.004	0.500	0.002	0.002	0.002	0.002
Other PCDD	0.027	0.021	0.022	0.023	0.000	0.000	0.000	0.000	0.000
123478 HxCDD	0.008	0.008	0.009	0.008	0.100	0.001	0.001	0.001	0.001
123678 HxCDD	0.011	0.009	0.010	0.010	0.100	0.001	0.001	0.001	0.001
123789 HxCDD	0.021	0.018	0.021	0.020	0.100	0.002	0.002	0.002	0.002
Other HxCDD	0.105	0.100	0.100	0.101	0.000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.233	0.197	0.187	0.206	0.010	0.002	0.002	0.002	0.002
Other Hepta-CDD	0.239	0.188	0.199	0.209	0.000	0.000	0.000	0.000	0.000
Octa-CDD	1.180	1.420	0.731	1.110	0.001	0.001	0.001	0.001	0.001
Total CDD	1.833	1.975	1.290	1.699		0.010	0.010	0.009	0.010
FURANS									
2378 TCDF	0.007	0.004	0.013	0.008	0.100	0.001	0.000	0.001	0.001
Other TCDF	0.202	0.098	0.436	0.245	0.000	0.000	0.000	0.000	0.000
12378 PCDF	0.020	0.012	0.027	0.020	0.050	0.001	0.001	0.001	0.001
23478 PCDF	0.059	0.034	0.072	0.055	0.500	0.029	0.017	0.036	0.027
Other PCDF	0.543	0.275	0.721	0.513	0.000	0.000	0.000	0.000	0.000
123478 HxCDF	0.280	0.172	0.375	0.276	0.100	0.028	0.017	0.038	0.028
123678 HxDCF	0.108	0.055	0.128	0.097	0.100	0.011	0.006	0.013	0.010
234678 HxCDF	0.329	0.184	0.359	0.291	0.100	0.033	0.018	0.036	0.029
123789 HxCDF	0.076	0.007	0.012	0.031	0.100	0.008	0.001	0.001	0.003
Other HxCDF	0.727	0.379	0.927	0.678	0.000	0.000	0.000	0.000	0.000
1234678-HpCDF	1.140	0.657	1.100	0.966	0.010	0.011	0.007	0.011	0.010
1234789-HpCDF	0.268	0.175	0.265	0.236	0.010	0.003	0.002	0.003	0.002
Other Hepta-CDF	1.292	0.738	1.305	1.112	0.000	0.000	0.000	0.000	0.000
Octa-CDF	3.060	2.620	3.160	2.947	0.001	0.003	0.003	0.003	0.003
Total CDF	8.109	5.410	8.898	7.472		0.127	0.071	0.143	0.114
Total CDD+CDF	9.942	7.385	10.188	9.171		0.137	0.081	0.152	0.123

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I - TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

( ) = Estimated maximum possible concentration

TABLE 2-16. CDD/CDF CONCENTRATIONS AND 2378 TOXIC EQUIVALENT CONCENTRATIONS IN SPRAY DRYER RESIDUE FOR CONDITION 2; MORRISTOWN HOSPITAL (1991)

	CDD/CDF ASH CONCENTRATIONS				2378 TOXIC EQUIVALENCIES				
CONGENER	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)	Toxic Equiv. Factor a	RUN 4 (ppb)	RUN 5 (ppb)	RUN 6 (ppb)	Average (ppb)
DIOXINS									
2378 TCDD	0.000	(0.001)	0.001	0.001	1.000	0.000	(0.001)	0.001	0.001
Other TCDD	0.003	0.005	0.007	0.005	0.000	0.000	0.000	0.000	0.000
12378 PCDD	0.002	0.003	0.002	0.002	0.500	0.001	0.001	0.001	0.001
Other PCDD	0.016	0.028	0.026	0.023	0.000	0.000	0.000	0.000	0.000
123478 HxCDD	0.005	0.007	0.005	0.006	0.100	0.000	0.001	0.001	0.001
123678 HxCDD	0.006	0.009	0.008	0.008	0.100	0.001	0.001	0.001	0.001
123789 HxCDD	0.011	0.018	0.014	0.014	0.100	0.001	0.002	0.001	0.001
Other HxCDD	0.054	0.098	0.089	0.080	0.000	0.000	0.000	0.000	0.000
1234678-HpCDD	0.103	0.183	0.169	0.152	0.010	0.001	0.002	0.002	0.002
Other Hepta-CDD	0.100	0.176	0.157	0.144	0.000	0.000	0.000	0.000	0.000
Octa-CDD	0.468	0.921	1.050	0.813	0.001	0.000	0.001	0.001	0.001
Total CDD	0.769	1.449	1.528	1.249		0.005	0.008	0.007	0.007
FURANS									
2378 TCDF	0.005	0.007	0.004	0.005	0.100	0.001	0.001	0.000	0.001
Other TCDF	0.146	0.214	0.119	0.160	0.000	0.000	0.000	0.000	0.000
12378 PCDF	0.012	0.016	0.010	0.013	0.050	0.001	0.001	0.000	0.001
23478 PCDF	0.036	0.050	0.029	0.039	0.500	0.018	0.025	0.015	0.019
Other PCDF	0.328	0.503	0.260	0.364	0.000	0.000	0.000	0.000	0.000
123478 HxCDF	0.166	0.259	0.161	0.195	0.100	0.017	0.026	0.016	0.020
123678 HxDCF	0.051	0.081	0.052	0.061	0.100	0.005	0.008	0.005	0.006
234678 HxCDF	0.156	0.271	0.173	0.200	0.100	0.016	0.027	0.017	0.020
123789 HxCDF	0.006	0.006	0.006	0.006	0.100	0.001	0.001	0.001	0.001
Other HxCDF	0.377	0.623	0.347	0.449	0.000	0.000	0.000	0.000	0.000
1234678-HpCDF	0.463	0.796	0.576	0.612	0.010	0.005	0.008	0.006	0.006
1234789-HpCDF	0.130	0.211	0.161	0.167	0.010	0.001	0.002	0.002	0.002
Other Hepta-CDF	0.577	0.983	0.683	0.748	0.000	0.000	0.000	0.000	0.000
Octa-CDF	1.390	2.500	1.980	1.957	0.001	0.001	0.003	0.002	0.002
Total CDF	3.843	6.520	4.561	4.975		0.064	0.101	0.064	0.076
Total CDD+CDF	4.612	7.969	6.089	6.223		0.070	0.109	0.071	0.083

a North Atlantic Treaty Organization, Committee on Challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds: International Toxicity Equivalency Factor (I – TEF) Methods of Risk Assessment for Complex Mixtures Of Dioxins and Related Compounds. Report No. 176, August 1988.

( ) = Estimated maximum possible concentration

TABLE 2-17. CDD/CDF CONCENTRATIONS IN MAKE-UP WATER AND LIME SLURRY FOR RUN 1 MORRISTOWN MEMORIAL HOSPITAL (1991)

CONGENER	MAKE-UP WATER RUN 1 (ppt.wt)	LIME SLURRY TANK RUN 1 (ppt.wt)
2378 TCDD	[0.008]	[0.500]
Other TCDD	0.000	0.000
12378 PCDD	[0.005]	[0.600]
Other PCDD	0.000	0.000
123478 HxCDD	[0.005]	[1.500]
123678 HxCDD	[0.003]	[0.900]
123789 HxCDD	(0.010)	[1.300]
Other HxCDD	0.000	0.830
1234678-HpCDD	0.030	5.200
Other Hepta-CDD	0.020	3.300
Octa-CDD	0.140	20.800
Total CDD	0.196	30.130
FURANS		
2378 TCDF	[0.005]	[0.400]
Other TCDF	0.008	0.000
12378 PCDF	[0.005]	[0.500]
23478 PCDF	[0.003]	[0.500]
Other PCDF	0.000	0.000
123478 HxCDF	[0.005]	[0.900]
123678 HxDCF	[0.003]	[0.600]
234678 HxCDF	0.006	0.620
123789 HxCDF	[0.005]	[1.000]
Other HxCDF	0.000	0.000
1234678-HpCDF	0.004	[0.900]
1234789-HpCDF	[0.005]	[1.600]
Other Hepta-CDF	0.005	0.000
Octa-CDF	0.009	(2.300)
TOTAL CDF	0.032	2.890
TOTAL CDD+CDF	0.228	33.020

[ ] : Minimum detection limit.
( ) : Estimated maximum possible concentration.

Concentrations at dry, standard conditions, adjusted to 7 percent O_2, and emission rates are shown. The metals to PM ratios are presented in Section 2.3.5, flue gas metals by sample fraction are presented in Section 2.3.6, metals concentrations in ash samples is presented in Section 2.3.7, and metals in make-up water and lime slurry are presented in Section 2.3.8.

2.3.2 Metals Data Reduction

The values reported in the following toxic metals results include detection limits for metals which were not detected in the samples. Since the samples were analyzed in three separate fractions (see Section 5 for details), guidelines for mathematically handling detection limits were required. The guidelines used for this report are:

- If a metal was detected in any fraction of the sample train but not in all fractions, only the detected values were used to determine total sample mass (i.e., non detects = zero).
- If a metal was not detected in any fraction of a sample train, the sum of the non-detects for each fraction was used as the overall sample detection limit.

For the purpose of calculating average results:

- If a metal was detected in one or more of the test runs but not all, only those runs for which a detected result was obtained were used in calculating the average. Runs where the metal was not detected were not included for averaging.
- If the metal was not detected in any of the three runs, then the average results were reported as not detected at the average detection limit.

The ash samples were analyzed for the same series of metals as the emission test samples. These results are reported in Section 2.3.7.

2.3.3 Metals Emissions

Tables 2-18 and 2-19 present the metals emissions results for Conditions 1 and 2, respectively. During Condition 1, where carbon was not injected into the lime slurry, Al had the highest average mass rate at the inlet of 98.4 g/hr, followed by Cu with a mass rate of 25.4 g/hr. Thallium was not detected in any of the samples at the spray dryer

TABLE 2-18. AVERAGE METALS EMISSION RATES AND REMOVAL EFFICIENCIES;
MORRISTOWN MEMORIAL HOSPITAL (1991)
* WITHOUT CARBON INJECTION *

Condition Location	Without Carbon Injection											
	Run 1			Run 2			Run 3			Average Emissions		
	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)
Aluminum	52.4	0.507	99.0%	96.2	0.431	99.6%	147	0.785	99.5%	98.4	0.574	99.4%
Antimony	2.59	0.0567	97.8%	2.60	0.0242	99.1%	1.89	0.0238	98.7%	2.36	0.0349	98.5%
Arsenic	0.0450	[0.00322]	>92.9%	0.0521	[0.00318]	>93.9	0.0665	[0.00307]	>95.4%	0.0545	[0.00316]	>94.2%
Barium	12.2	0.0258	99.8%	11.2	0.0160	99.9%	18.0	0.0637	99.6%	13.8	0.0352	99.7%
Beryllium	0.00544	0.00114	79.0%	0.00808	[0.000798]	>90.1%	0.00651	[0.000662]	>89.8%	0.00668	0.00114	82.9%
Cadmium	2.14	0.00797	99.6%	1.57	0.00346	99.8%	2.60	0.0105	99.6%	2.10	0.00730	99.7%
Chromium	0.541	0.0162	97.0%	0.476	0.0122	97.4%	0.733	0.0142	98.1%	0.583	0.0142	97.6%
Copper	22.2	0.105	99.5%	27.7	0.0631	99.8%	26.3	0.0980	99.6%	25.4	0.0887	99.7%
Lead	16.4	0.0170	99.9%	15.2	0.00457	100%	16.1	0.0499	99.7%	15.9	0.0238	99.9%
Mercury	9.51	4.67	50.9%	2.73	2.76	NA	23.4	17.6	24.6%	11.9	8.35	29.6%
Nickel	0.327	0.0134	95.9%	0.534	0.0214	96.0%	0.463	0.00573	98.8%	0.441	0.0135	96.9%
Silver	0.0148	0.0138	6.97%	0.0190	0.00975	48.8%	0.0578	0.0154	73.4%	0.0305	0.0130	57.5%
Thallium	[0.125]	[0.0802]	NA	[0.123]	[0.0798]	NA	[0.123]	[0.0770]	NA	[0.123]	[0.0770]	NA

NA = Not Applicable
[ ] = Minimum Detection Limit

TABLE 2-19. AVERAGE METALS EMISSION RATES AND REMOVAL EFFICIENCIES;
MORRISTOWN MEMORIAL HOSPITAL (1991)
* WITH CARBON INJECTION *

Condition Location	With Carbon Injection											
	Run 4			Run 5			Run 6			Average Emissions		
	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)
Aluminum	106	0.379	99.6%	49.4	0.445	99.1%	72.5	0.364	99.5%	76.1	0.396	99.5%
Antimony	4.57	0.0226	99.5%	2.27	0.0221	99.0%	4.23	0.0193	99.5%	3.69	0.0214	99.4%
Arsenic	0.0792	[0.00303]	>96.2%	0.0159	[0.00317]	>80.0%	0.0321	[0.00313]	>90.2%	0.0424	[0.00311]	>92.7%
Barium	16.3	0.0171	99.9%	9.95	0.0225	99.8%	9.83	0.0169	99.8%	12.0	0.0188	99.8%
Beryllium	0.00794	[0.000760]	>90.4%	0.00785	[0.000796]	>89.9%	0.00692	[0.000784]	>88.7%	0.00757	[0.000780]	>89.7%
Cadmium	2.48	0.00367	99.9%	1.90	0.00419	99.8%	2.54	0.00310	99.9%	2.31	0.00366	99.8%
Chromium	0.809	0.00660	99.2%	0.666	0.0130	98.1%	0.652	0.0156	97.6%	0.709	0.0117	98.3%
Copper	35.8	0.0410	99.9%	31.1	0.0853	99.7%	30.4	0.0583	99.8%	32.4	0.0615	99.8%
Lead	20.1	0.0117	99.9%	22.4	0.0135	99.9%	19.7	0.00807	100%	20.7	0.0111	99.9%
Mercury	11.5	1.84	83.9%	10.6	0.436	95.9%	14.9	1.40	90.6%	12.3	1.23	90.0%
Nickel	0.824	0.00233	99.7%	0.481	0.00659	98.6%	0.515	0.00734	98.6%	0.607	0.00542	99.1%
Silver	0.00739	0.0136	NA	0.00193	0.0106	NA	0.00103	0.0127	NA	0.00345	0.0123	NA
Thallium	[0.178]	[0.0760]	NA	[0.0991]	[0.0796]	NA	0.0200	[0.0784]	>-292%	0.0200	[0.0778]	>-289%

NA = Not Applicable
[ ] = Minimum Detection Limit

inlet during these emissions tests. At the baghouse outlet, Hg was the most prevalent element collected during Condition 1 with an average emission rate of 8.35 g/hr, followed by Al with an average emission rate of 0.574 g/hr. Low levels of Ag were detected at both the spray dryer inlet and baghouse outlet locations. The emission rate at the outlet averaged 0.012 g/hr, which was higher than the average inlet emission rate of .0035. This may be due to trace amounts of silver introduced to the flue gas in the lime slurry at the spray dryer (see Table 2-32). Arsenic and Tl were not detected during any of the runs at the baghouse outlet.

During Condition 2, where carbon was injected into the lime slurry, Al had the highest average mass rate of the metals at the spray dryer inlet with 76.1 g/hr, followed by Cu with 32.4 g/hr. Consistent with Condition 1, Tl was the only metal not detected in any of the runs at the spray dryer inlet. At the baghouse outlet, Hg was the most prevalent element collected with an average emission rate of 1.23 g/hr. Arsenic, Be, and Tl were not collected in detectable amounts for any of the runs at the baghouse outlet. A detectable amount of Tl occurred during only one of the runs at the inlet or outlet.

The emission mass rates at the spray dryer inlet for all of the metals varied only slightly between conditions. This was also true for all of the metals at the baghouse outlet, except Hg. Therefore, all of the elements maintained basically the same removal efficiency with and without carbon injected into the lime slurry, except Hg. During Condition 1, Hg had a removal efficiency of 29.6 percent; whereas, during Condition 2, the removal efficiency increased to 90.0 percent. The results of this test show that the injection of carbon into the spray dryer positively effects the removal of Hg from the flue gas.

Sample results for Hg showed a negative removal efficiency for Run 2 which can be attributed to round-off error. A removal efficiency for Tl could not be calculated for most of the runs because all of the results were detection limits. All of the average removal efficiencies for Condition 2 were greater than 89 percent except for Ag and Tl. A removal efficiency is misleading for Tl because such a small amount is detected. This is also true of the removal efficiencies associated with Ag. Although it is detected during all the runs, the removal efficiencies are misleading because the values reported are only slightly higher than detection limits.

2.3.4 Metals Flue Gas Concentrations

Table 2-20 reports the flue gas concentrations for each of the 6 runs at the spray dryer inlet and baghouse outlet in μg/dscm. Table 2-21 contains the same data except corrected to μg/dscm at 7 percent O_2. Oxygen concentrations were calculated from CEM data averaged over the same time period as the manual testing was performed.

2.3.5 Flue Gas Metals to Particulate Matter Ratios

A summary of the ratio of total metals to PM for the emission tests without carbon injection is presented in Table 2-22. Metals to PM ratios are given in units of milligrams of metal to grams of PM collected by the sampling train. The metal with the highest ratio at the inlet was Al with an average of 19.8 mg/g and the lowest particulate ratio was Tl, which was not detected. At the outlet, the largest ratio was contributed to Hg, 363 mg/g. Such a large ratio occurred because without carbon injection, Hg is not substantially removed from the flue gas; whereas, the amount of PM is greatly decreased by the emission controls.

Table 2-23 presents a summary of the ratio by weight of total metals to PM for the emission tests with carbon injection. Average spray dryer inlet ratios ranged from 0.000804 mg/g for Ag to 13.7 mg/g for Al. Average ratios at the baghouse outlet ranged from non-detected metals to 166 mg/g of Hg.

A comparison between the spray dryer inlet ratios of both conditions shows that the ratios for each metal do not differ significantly. A comparison of the ratios at the baghouse outlet displays the same conclusion for all the metals except Hg. Without carbon injection, the average Hg ratio increases from 2.41 mg/g at the spray dryer inlet to 363 mg/g at the baghouse outlet. Whereas, with carbon injection, the average Hg ratio increases from 1.99 mg/g at the spray dryer inlet to 166 mg/g at the baghouse outlet. The metals/particulate ratio increases going from inlet to outlet for most of the metals; and for some, this increase is several orders of magnitude.

2.3.6 Flue Gas Metals by Sample Fraction and Sample Parameters

Table 2-24 presents the metal amounts in the inlet flue gas samples by fraction for each run. The highest proportion of Hg and Ag was consistently collected in the nitric acid impingers (Impingers 1-3), although Hg was the only metal to have a large majority of its total mass collected in the nitric acid impingers. All other metals detected, except

TABLE 2-20. METALS CONCENTRATIONS; MORRISTOWN MEMORIAL HOSPITAL (1991)

Toxic Metals Concentration (ug/dscm)

Without Carbon Injection								
Metals	Run 1		Run 2		Run 3		Average Concentrations	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Aluminum	8540	63.9	16000	53.3	22900	97.0	15813	71.4
Antimony	422	7.15	433	2.99	294	2.94	383	4.36
Arsenic	7.33	[0.405]	8.66	[0.394]	10.4	[0.380]	8.8	[0.393]
Barium	1993	3.25	1860	1.98	2810	7.87	2221	4.37
Beryllium	0.887	0.144	1.34	[0.0987]	1.02	[0.0818]	1.08	0.144
Cadmium	348	1.00	260	0.427	406	1.29	338	0.91
Chromium	88.2	2.05	79.1	1.51	114	1.75	94	1.77
Copper	3620	13.2	4600	7.80	4100	12.1	4107	11.0
Lead	2680	2.14	2520	0.565	2510	6.16	2570	2.96
Mercury	1550	588	453	341	3650	2180	1884	1036
Nickel	53.3	1.69	88.8	2.64	72.2	0.709	71.5	1.678
Silver	2.41	1.74	3.17	1.21	9.02	1.90	4.87	1.61
Thallium	[20.3]	[10.1]	[20.4]	[9.87]	[19.2]	[9.52]	[19.97]	[9.83]
With Carbon Injection								
	Run 4		Run 5		Run 6		Average Concentrations	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Aluminum	17000	47.0	7590	52.0	11500	42.8	12030	47
Antimony	730	2.80	349	2.59	672	2.27	584	2.55
Arsenic	12.7	[0.375]	2.44	[0.371]	5.09	[0.367]	6.7	[0.371]
Barium	2610	2.12	1530	2.63	1560	1.98	1900	2.2
Beryllium	1.27	[0.0941]	1.21	[0.0930]	1.10	[0.0921]	1.19	[0.0931]
Cadmium	396	0.455	292	0.490	403	0.364	364	0.44
Chromium	129	0.818	102	1.51	104	1.83	112	1.39
Copper	5720	5.08	4780	9.97	4830	6.84	5110	7.3
Lead	3210	1.45	3440	1.58	3130	0.948	3260	1.3
Mercury	1830	228	1630	50.9	2360	164	1940	148
Nickel	132	0.288	74.0	0.770	81.8	0.861	95.8	0.64
Silver	1.18	1.69	0.297	1.24	0.164	1.50	0.5	1.47
Thallium	[28.5]	[9.41]	[15.2]	[9.30]	3.18	[9.21]	3.18	[9.31]

[] = Detection limit

TABLE 2-21. METALS CONCENTRATIONS; MORRISTOWN MEMORIAL HOSPITAL (1991)

Toxic Metals Concentration (ug/dscm @ 7% O2)

Without Carbon Injection								
Metals	Run 1		Run 2		Run 3		Average Concentrations	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Aluminum	12100	131	22700	109	30900	180	21900	140
Antimony	599	14.6	614	6.12	397	5.45	537	8.73
Arsenic	10.4	[0.828]	12.3	[0.805]	14.0	[0.704]	12.2	[0.779]
Barium	2820	6.65	2640	4.05	3790	14.6	3083	8.4
Beryllium	1.26	0.294	1.91	[0.202]	1.37	[0.152]	1.51	0.294
Cadmium	494	2.05	369	0.874	549	2.40	471	1.77
Chromium	125	4.18	112	3.09	154	3.25	131	3.50
Copper	5134	27.0	6520	15.9	5530	22.4	5728	21.8
Lead	3801	4.37	3570	1.16	3390	11.4	3587	5.7
Mercury	2200	1200	643	697	4930	4040	2591	1979
Nickel	75.6	3.4	126	5.40	97.5	1.31	99.7	3.39
Silver	3.42	3.55	4.49	2.46	12.2	3.52	6.7	3.18
Thallium	[28.8]	[20.6]	[28.9]	[20.2]	[26.0]	[17.6]	[27.9]	[19.5]

With Carbon Injection								
Metals	Run 4		Run 5		Run 6		Average Concentrations	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Aluminum	22500	92.0	10400	99.1	15700	80.4	16200	90
Antimony	966	5.49	481	4.92	916	4.27	787	4.89
Arsenic	16.7	[0.735]	3.36	[0.706]	6.94	[0.690]	9.0	[0.710]
Barium	3460	4.15	2110	5.00	2130	3.72	2567	4.3
Beryllium	1.68	[0.184]	1.66	[0.177]	1.50	[0.173]	1.61	[0.178]
Cadmium	524	0.890	401	0.933	549	0.683	492	0.84
Chromium	171	1.60	141	2.88	141	3.43	151	2.64
Copper	7570	9.94	6580	19.0	6580	12.9	6910	13.9
Lead	4250	2.84	4730	3.00	4260	1.78	4413	2.5
Mercury	2420	446	2240	97.0	3220	309	2627	284
Nickel	174	0.564	102	1.47	111	1.62	129.2	1.22
Silver	1.56	3.30	0.408	2.36	0.223	2.81	0.7	2.82
Thallium	[37.7]	[18.4]	[21.0]	[17.7]	4.33	[17.3]	4.33	[17.8]

[] = Detection limit

TABLE 2-22. RATIO OF METALS TO PARTICULATE MATTER;
MORRISTOWN MEMORIAL HOSPITAL (1991)
* WITHOUT CARBON INJECTION *

METALS/PARTICULATE RATIO (mg metal per gram of particulate)								
Location	INLET				OUTLET			
Run	Run 1 (mg/g)	Run 2 (mg/g)	Run 3 (mg/g)	Average (mg/g)	Run 1 (mg/g)	Run 2 (mg/g)	Run 3 (mg/g)	Average (mg/g)
Aluminum	10.6	18.8	30.0	19.8	68.7	41.6	8.42	39.6
Antimony	0.522	0.508	0.385	0.472	7.68	2.34	0.255	3.43
Arsenic	0.00908	0.0102	0.0136	0.0109	[0.436]	[0.306]	[0.0329]	[0.258]
Barium	2.47	2.18	3.68	2.78	3.50	1.55	0.684	1.91
Beryllium	0.00110	0.00158	0.00133	0.00134	0.155	[0.0767]	[0.00710]	0.155
Cadmium	0.431	0.306	0.532	0.423	1.08	0.334	0.112	0.509
Chromium	0.109	0.0929	0.150	0.117	2.20	1.18	0.152	1.18
Copper	4.48	5.40	5.37	5.08	14.2	6.10	1.05	7.12
Lead	3.32	2.96	3.29	3.19	2.30	0.442	0.535	1.09
Mercury	1.92	0.532	4.78	2.41	632	266	189	363
Nickel	0.0660	0.104	0.0946	0.0883	1.81	2.06	0.0615	1.31
Silver	0.00299	0.00372	0.0118	0.00617	1.87	0.942	0.165	0.991
Thallium	[0.0251]	[0.0239]	[0.0252]	[0.0247]	[10.9]	[7.71]	[0.826]	[6.47]

[ ] = Minimum Detection Limit

TABLE 2-23. RATIO OF METALS TO PARTICULATE MATTER;
MORRISTOWN MEMORIAL HOSPITAL (1991)
* WITH CARBON INJECTION *

METALS/PARTICULATE RATIO (mg metal per gram of particulate)								
Location	INLET				OUTLET			
Run	Run 4 (mg/g)	Run 5 (mg/g)	Run 6 (mg/g)	Average (mg/g)	Run 4 (mg/g)	Run 5 (mg/g)	Run 6 (mg/g)	Average (mg/g)
Aluminum	17.7	9.66	15.7	13.7	63.5	24.0	19.6	35.7
Antimony	0.760	0.445	0.914	0.603	3.79	1.19	1.04	2.49
Arsenic	0.0132	0.00310	0.00693	0.00815	[0.507]	[0.171]	[1.68]	[0.339]
Barium	2.72	1.95	2.12	2.33	2.87	1.21	0.908	2.04
Beryllium	0.00132	0.00154	0.00149	0.00143	[0.127]	[0.0428]	[0.0422]	[0.0850]
Cadmium	0.413	0.371	0.549	0.392	0.615	0.226	0.167	0.420
Chromium	0.135	0.130	0.141	0.132	1.10	0.698	0.838	0.901
Copper	5.96	6.09	6.57	6.02	6.86	4.60	3.14	5.73
Lead	3.35	4.38	4.26	3.86	1.96	0.726	0.435	1.34
Mercury	1.91	2.08	3.21	1.99	308	23.5	75.4	166
Nickel	0.137	0.0943	0.111	0.116	0.389	0.355	0.395	0.372
Silver	0.00123	0.000378	0.000223	0.000804	2.28	0.572	0.686	1.42
Thallium	[0.0297]	[0.0194]	0.00433	0.00433	[12.7]	[4.28]	[4.22]	[8.50]

[ ] = Minimum Detection Limit

TABLE 2-24. METALS AMOUNTS IN INLET FLUE GAS - SAMPLES BY SAMPLE FRACTION; MORRISTOWN MEMORIAL HOSPITAL (1991)

Metals	Run 1				Run 2				Run 3			
	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)
Aluminum	25500	42.6		25500	47800	31.9		47800	72000	42.3		72000
Antimony	1160	96.4		1260	1230	56.3		1290	885	41.4		926
Arsenic	21.9	[0.425]		21.9	25.8	[0.427]		25.8	32.7	[0.424]		32.7
Barium	5950	1.57		5950	5550	1.90		5550	8850	2.12		8850
Beryllium	2.65	[0.106]		2.65	4.00	[0.107]		4.00	3.20	[0.106]		3.20
Cadmium	1040	0.743		1040	775	0.363		775	1280	0.53		1280
Chromium	260	3.28		263	234	1.56		236	357	2.99		360
Copper	10800	26.5		10800	13700	33.6		13700	12900	12.8		12900
Lead	8000	1.08		8000	7500	0.474		7500	7900	0.558		7900
Mercury	213	4400	8.55	4620	55.5	1290	5.03	1350	867	10600	3.86	11500
Nickel	157	2.25		159	263	1.45		264	225	2.45		227
Silver	[3.00]	7.21		7.21	4.10	5.33		9.43	28.4	[0.637]		28.4
Thallium	[50.0]	[10.6]		[60.6]	[50.0]	[10.7]		[60.7]	[50.0]	[10.6]		[60.6]

Note: Impingers 4,5 and 6 sample fractions analyzed for mercury content only

[ ] = Minimum Detection Limit

TABLE 2-24 (Continued). METALS AMOUNTS IN INLET FLUE GAS - SAMPLES BY SAMPLE FRACTION; MORRISTOWN MEMORIAL HOSPITAL (1991)

Metals	Run 4				Run 5				Run 6			
	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)
Aluminum	65400	230		65600	30200	53.7		30200	44400	43.6		44400
Antimony	2760	62.6		2820	1320	71.5		1390	2500	100		2600
Arsenic	48.9	[0.422]		48.9	9.70	[0.423]		9.70	19.7	[0.423]		19.7
Barium	10100	3.35		10100	6100	3.54		6100	6100	1.88		6100
Beryllium	4.90	[0.106]		4.90	4.80	[0.106]		4.80	4.25	[0.106]		4.25
Cadmium	1520	11.1		1530	1160	0.423		1160	1560	0.338		1560
Chromium	496	3.03		499	399	8.26		407	398	2.55		401
Copper	22000	74.7		22100	19000	21.0		19000	18700	18.9		18700
Lead	12400	26.5		12400	13700	1.08		13700	12100	0.904		12100
Mercury	148	6780	165	7090	78.5	6400	1.98	6480	30.0	9090	6.95	9130
Nickel	506	2.25		508	288	6.54		295	313	3.61		317
Silver	[6.00]	4.56		4.56	[3.00]	1.18		1.18	[3.00]	0.634		0.634
Thallium	[100]	[10.6]		[110]	[50.0]	[10.6]		[60.6]	[50.0]	12.3		12.3

Note: Impingers 4,5 and 6 sample fractions analyzed for mercury content only

Tl in Run 6, were collected in the highest proportions in the front half (filter, nozzle/probe rinse). This indicates that almost all of the Hg, and over half of the Ag in the flue gas, was in a vapor phase at the filter temperature.

The metal amounts in the outlet flue gas samples are presented in Table 2-25 by sample fraction. The highest proportion of Hg was collected in the nitric acid impingers for all runs. Most other metals were collected in the highest proportions in the front half fraction, except for Cu and Ni which had slightly more weight collected in the impingers during four of the six runs, and Cu for three of the six runs.

Sampling and flue gas parameters for the PM/metals runs at both sampling locations are shown in Tables 2-26 and 2-27. Total sampling times, sample volumes, and isokinetic results for each sampling run are presented. Appendix C contains a complete listing of these and additional sampling and flue gas parameters for each run.

2.3.7 Metals in Ash

Incinerator bottom ash, spray dryer ash, and baghouse ash were sampled daily as described in Section 5. Concentrations of the metals in the ash in units of mg/kg were determined by microwave digesting one-half gram of ash in acid and hydrogen peroxide, diluting the solution to 100 mL, and then analyzed as stated in Section 5.

The metals concentrations in the incinerator bottom ash are shown in Table 2-28. The most prevalent metal throughout all of the runs is Al with Cu being the second. Four of the metals are not detected in any of the runs, Sb, Hg, Ag, and Tl. A comparison of the metal to ash concentrations between the two conditions does not show any significant differences.

Table 2-29 presents the metals concentrations in the baghouse ash collected each day. As in the incinerator ash, Al is the most prevalent metal. Silver and Tl were not detected in any of the six samples taken. All of the metals showed no significant increase in average concentration in comparing the two conditions, except for Hg. The

TABLE 2-25. METALS AMOUNTS IN OUTLET FLUE GAS - SAMPLES BY SAMPLE FRACTION; MORRISTOWN MEMORIAL HOSPITAL (1991)

Metals	Run 1				Run 2				Run 3			
	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)
Aluminum	193	34.0		227	166	26.3		192	336	26.8		363
Antimony	13.5	11.9		25.4	10.8	[1.59]		10.8	11.0	[1.59]		11.0
Arsenic	[1.00]	[0.435]		[1.44]	[1.00]	[0.424]		[1.42]	[1.00]	[0.424]		[1.42]
Barium	8.58	2.98		11.6	5.60	1.55		7.15	27.5	1.95		29.5
Beryllium	[0.250]	0.511		0.511	[0.250]	[0.106]		[0.356]	[0.250]	[0.106]		[0.306]
Cadmium	1.90	1.67		3.57	1.33	0.212		1.54	4.35	0.487		4.84
Chromium	3.25	4.02		7.27	2.95	2.50		5.45	5.53	1.02		6.55
Copper	23.8	23.2		47.0	4.65	23.5		28.2	25.5	19.8		45.3
Lead	6.85	0.752		7.60	2.04	[0.318]		2.04	22.5	0.557		23.1
Mercury	[2.45]	2070	23.4	2090	[2.45]	1230	3.23	1230	[2.45]	8160	6.33	8170
Nickel	2.58	3.41		5.99	7.13	2.40		9.53	1.65	1.00		2.65
Silver	4.05	2.12		6.17	4.35	[0.636]		4.35	4.73	2.38		7.11
Thallium	[25.0]	[10.9]		[35.9]	[25.0]	[10.6]		[35.6]	[25.0]	[10.6]		[35.6]

Note: Impingers 4,5 and 6 sample fractions analyzed for mercury content only

[ ] = Minimum Detection Limit

TABLE 2-25 (Continued). METALS AMOUNTS IN OUTLET FLUE GAS - SAMPLES BY SAMPLE FRACTION; MORRISTOWN MEMORIAL HOSPITAL (1991)

Metals	Run 4				Run 5				Run 6			
	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)	Front Half (Total ug)	Impinger 1,2,3 (Total ug)	Impinger 4,5,6 (Total ug)	Total ug (Total ug)
Aluminum	154	23.7		178	167	32.2		199	142	23.4		165
Antimony	10.6	[1.59]		10.6	9.90	[1.60]		9.90	8.78	[1.60]		8.78
Arsenic	[1.00]	[0.425]		[1.42]	[1.00]	[0.425]		[1.42]	[1.00]	[0.425]		[1.42]
Barium	6.95	1.07		8.02	8.15	1.91		10.1	5.35	2.30		7.65
Beryllium	[0.250]	[0.106]		[0.356]	[0.250]	[0.106]		[0.356]	[0.250]	[0.106]		[0.356]
Cadmium	1.38	0.340		1.72	1.43	0.447		1.88	1.13	0.276		1.41
Chromium	2.20	0.892		3.09	1.85	3.95		5.80	1.60	5.46		7.06
Copper	8.20	11.0		19.2	6.68	31.5		38.2	4.85	21.6		26.5
Lead	5.10	0.384		5.48	5.30	0.735		6.04	3.28	0.385		3.67
Mercury	[2.45]	858	3.98	862	[2.45]	195	[0.390]	195	[2.45]	634	1.8	636
Nickel	[0.750]	1.09		1.09	[0.750]	2.95		2.95	[0.750]	3.33		3.33
Silver	5.45	0.924		6.37	4.75	[0.638]		4.75	5.78	[0.638]		5.78
Thallium	[25.0]	[10.6]		[35.6]	[25.0]	[10.6]		[35.6]	[25.0]	[10.6]		[35.6]

Note: Impingers 4,5 and 6 sample fractions analyzed for mercury content only

TABLE 2-26. METALS/PM EMISSIONS SAMPLING AND FLUE GAS PARAMETERS AT INLET MORRISTOWN MEMORIAL HOSPITAL (1991)

Run No. Date	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Average
Total Sampling Time (min)	240	240	240	240	240	240	NA
Average Sampling Rate (dscfm)	0.44	0.44	0.46	0.57	0.59	0.57	0.51
Metered Volume (dscf)	105	105	111	136	140	137	122
Metered Volume (dscm)	3.0	3.0	3.1	3.9	4.0	3.9	3.5
Average Stack Temperature (F)	408	408	407	399	409	407	406
O2 Concentration (%V)	11.1	11.1	10.6	10.4	10.8	10.7	10.8
CO2 Concentration (%V)	6.4	7.8	6.7	6.6	6.5	6.5	6.8
Stack Gas Moisture (%V)	16.2	15.9	15.8	16.1	14.3	14.4	15.5
Volumetric Flow Rate (dscfm)	3610	3539	3771	3686	3827	3708	3690
Volumetric Flow Rate (dscmm)	102.2	100.2	106.8	104.4	108.3	105.0	104.5
Percent Isokinetic	96.4	98.1	97.3	95.5	94.7	95.1	NA
Particulate Catch (grams)	2.4130	2.5373	2.4053	3.7079	3.1250	2.8438	2.8387

NA = Not Applicable

Note: The accuracy of all calculated results is limited to three significant digits. Summary tables generated by spreadsheet programs report additional digits that are not significant.

TABLE 2-27. METALS/PM EMISSIONS SAMPLING AND FLUE GAS PARAMETERS AT OUTLET MORRISTOWN MEMORIAL HOSPITAL (1991)

Run No. Date	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Average
Total Sampling Time (min)	240	240	240	239	240	240	NA
Average Sampling Rate (dscfm)	0.52	0.53	0.55	0.56	0.56	0.57	0.55
Metered Volume (dscf)	125	127	132	134	135	137	132
Metered Volume (dscm)	3.6	3.6	3.7	3.8	3.8	3.9	3.7
Average Stack Temperature (F)	285	285	285	289	270	287	284
O2 Concentration (%V)	14.1	14.1	13.4	13.8	13.6	13.5	13.8
CO2 Concentration (%V)	5.0	5.0	5.3	5.2	5.0	5.3	5.1
Stack Gas Moisture (%V)	14.7	12.3	15.0	14.7	13.7	12.0	13.7
Volumetric Flow Rate (dscfm)	4671	4761	4762	4753	5036	5012	4832
Volumetric Flow Rate (dscmm)	132.3	134.8	134.9	134.6	142.6	141.9	136.8
Percent Isokinetic	101.0	97.6	99.2	100.9	96.1	102.4	NA
Particulate Catch (grams)	0.0033	0.0046	0.0431	0.0028	0.0083	0.0041	0.0011

NA = Not Applicable

Note: The accuracy of all calculated results is limited to three significant digits. Summary tables generated by spreadsheet programs report additional digits that are not significant.

TABLE 2-28. METALS IN ASH CONCENTRATIONS - BOTTOM ASH
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Concentration (mg metal/kg ash)							
Metals	Run 1 (mg/kg)	Run 2 (mg/kg)	Run 3 (mg/kg)	Condition 1 Average (mg/kg)	Run 4 (mg/kg)	Run 5 (mg/kg)	Run 6 (mg/kg)	Condition 2 Average (mg/kg)
Aluminum	185000	194000	192000	190333	152000	79600	82200	104600
Antimony	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]
Arsenic	65.4	84.8	194	114.7	54.8	80.4	90.8	75.3
Barium	3140	4340	3760	3747	6320	10000	6680	7667
Beryllium	0.440	0.440	0.420	0.433	[0.200]	0.480	0.440	0.460
Cadmium	21.8	10.6	11.4	14.6	20.8	8.52	11.7	13.7
Chromium	49.2	51.2	53.6	51.3	36.8	57.2	72.2	55.4
Copper	8900	32200	54800	31967	14300	17400	51000	27567
Lead	208	296	404	303	476	592	430	499
Mercury	[1.96]	[1.96]	[1.96]	[1.96]	[1.96]	[1.96]	[1.96]	[1.96]
Nickel	66.8	148	160	125	71.6	74.4	476	207
Silver	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]
Thallium	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]
% Carbon	7.01	1.62	2.38	3.67	1.04	3.83	1.52	2.13
pH	9.90	9.50	10.4	9.9	9.62	10.1	10.2	10.0
Ash (in lbs)	325	256	404	328	213	241	248	234

[ ] = Minimum Detection Limit

TABLE 2-29. METALS IN ASH CONCENTRATIONS - BAGHOUSE ASH
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Concentration (mg metal/kg ash)							
Metals	Run 1 (mg/kg)	Run 2 (mg/kg)	Run 3 (mg/kg)	Condition 1 Average (mg/kg)	Run 4 (mg/kg)	Run 5 (mg/kg)	Run 6 (mg/kg)	Condition 2 Average (mg/kg)
Aluminum	15200	18400	11500	15033	12800	12800	12600	12733
Antimony	11.4	4.34	3.56	6.43	23.4	5.54	19.3	16.1
Arsenic	2.44	2.22	2.06	2.2	2.66	1.91	2.96	2.5
Barium	1510	1250	1100	1287	1110	1240	1200	1183
Beryllium	[0.200]	0.300	0.220	0.173	0.220	0.220	0.320	0.270
Cadmium	108	75.6	84.4	89.3	98.0	53.2	80.6	77.3
Chromium	20.8	16.8	15.1	17.6	17.8	15.3	17.6	16.9
Copper	1100	1230	802	1044	1380	884	1010	1091
Lead	292	162	98.8	184	224	156	159	180
Mercury	34.8	10.1	40.8	28.6	208	288	444	313
Nickel	22.2	27.4	19.5	23.0	19.8	16.5	18.8	18.4
Silver	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]
Thallium	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]
% Carbon	2.21	1.22	3.88	2.44	3.89	2.22	3.67	3.26
Ash (in lbs)	185	122	215	174.0	99.0	292	156	182.3

[ ] = Minimum Detection Limit

average concentration was 28.6 mg/kg for Condition 1 and 313.3 mg/kg for Condition 2, almost a 1000 percent increase.

The metals concentrations in the spray dryer ash are summarized in Table 2-30. Aluminum had the highest concentration of all the metals tested for Conditions 1 and 2, averaging 35,933 mg/kg and 47,200 mg/kg, respectively. Antimony, Ag, and Tl were not detected in any of the samples. Mercury was the only metal to exhibit a significant change in concentration from Condition 1 to Condition 2. It had an average concentration of 12.5 mg/kg for Condition 1 and 31.3 mg/kg for Condition 2.

2.3.8 Metals in Make-Up Water and Lime Slurry

Table 2-31 presents the amount of metals and chloride present in the water used to make the lime slurry. The detected metals were Al, Sb, As, Ba, Cr, and Cu; as well as chloride. Table 2-32 presents the concentration of metals detected in the lime slurry. The metals detected were Al, Ba, Cu, Ni, and Ag. Of these metals, only Al and Ag were introduced into the spray dryer at rates which were significant when compared to the metals in the flue gas at the spray dryer inlet. The average mass flow rate of Al in the lime slurry was approximately half of the average mass flow rate of Al in the inlet flue gas, which was 76 g/hr. The mass flow rate of Ag in the lime slurry was approximately 100 times the mass flow rate of Ag in the inlet flue gas, although the total mass flow rate of Ag into the spray dryer was only 0.3 g/hr.

2.4 PARTICULATE MATTER/PARTICLE SIZE DISTRIBUTION

2.4.1 Particulate Matter Results

Particulate matter emissions were determined from the same sampling train used for metals determinations at the spray dryer inlet and baghouse outlet. Before metals analysis, PM collected in the filter and in the front half acetone rinse (probe, nozzle, filter holder) was analyzed gravimetrically as discussed in Section 5.

The PM stack gas concentrations and mass rates for the spray dryer inlet and baghouse outlet are presented in Table 2-33. Concentrations at standard conditions, concentrations adjusted to 7 percent O_2, emission rates, and removal efficiencies are shown.

For Condition 1, where carbon was not added to the lime slurry, the PM concentration and mass rate at the spray dryer inlet averaged 0.45 grains/dscf at

TABLE 2-30. METALS IN ASH CONCENTRATIONS - SPRAY DRYER ASH
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Concentration (mg metal/kg ash)							
Metals	Run 1 (mg/kg)	Run 2 (mg/kg)	Run 3 (mg/kg)	Condition 1 Average (mg/kg)	Run 4 (mg/kg)	Run 5 (mg/kg)	Run 6 (mg/kg)	Condition 2 Average (mg/kg)
Aluminum	43800	45600	18400	35933	53200	44000	44400	47200
Antimony	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]	[3.00]
Arsenic	7.00	7.36	2.80	5.72	3.56	6.10	4.00	4.55
Barium	2400	2260	1580	2080	1940	2120	3080	2380
Beryllium	0.400	0.420	0.300	0.373	0.360	0.360	0.380	0.370
Cadmium	37.8	32.8	46.2	38.9	26.8	22.6	27.6	25.7
Chromium	20.2	26.0	18.8	21.7	23.2	20.6	26.0	23.3
Copper	1020	1080	700	933	1020	976	1300	1099
Lead	312	306	102	240	248	274	234	252
Mercury	10.1	10.6	16.7	12.5	42.0	28.0	24.0	31.3
Nickel	36.0	40.2	26.2	34.1	33.0	35.8	46.2	38.3
Silver	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]	[1.20]
Thallium	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]
% Carbon	1.72	1.57	3.68	2.32	3.18	2.92	2.67	2.92
Ash (in lbs)	17.0	15.0	98.0	43.3	13.0	10.0	8.00	10.3

[ ] = Minimum Detection Limit

TABLE 2-31. METALS IN MAKE-UP WATER CONCENTRATIONS
MORRISTOWN MEMORIAL HOSPITAL (1991)

Metal	Run 1 (ug/L)	Run 2 (ug/L)	Run 3 (ug/L)	Run 4 (ug/L)	Run 5 (ug/L)	Run 6 (ug/L)	Average Runs 1-6 (ug/L)
Aluminum	37.7	9.25	10.0	12.1	8.63	8.35	14.3
Antimony	4.13	[3.48]	[3.38]	[3.33]	[3.56]	[3.38]	4.13
Arsenic	3.04	2.47	2.62	4.02	2.53	2.34	2.84
Barium	73.6	70.1	77.9	77.8	71.3	79.4	75.0
Beryllium	[0.236]	[0.231]	[0.225]	[0.222]	[0.238]	[0.226]	[0.230]
Cadmium	[0.470]	[0.464]	[0.451]	[0.444]	[0.473]	[0.453]	[0.459]
Chromium	3.32	[1.39]	[1.35]	[1.34]	1.57	1.47	2.12
Copper	71.7	53.1	99.6	146	311	184	144
Lead	[0.706]	[0.694]	[0.678]	[0.667]	[0.711]	[0.679]	[0.689]
Mercury	[0.434]	[0.434]	[0.432]	[0.432]	[0.435]	[0.433]	[0.433]
Nickel	2.10	[0.694]	[0.678]	[0.667]	1.09	0.837	1.34
Silver	45.7	1.95	[1.35}	[1.34]	[1.42]	[1.36]	23.8
Thallium	[23.6]	[23.1]	[22.5]	[22.2]	[23.8]	[22.6]	[23.0]
Chloride	0.00881	0.00951	0.00981	0.00947	0.00925	0.0103	0.00953
% Solid	0.024%	0.017%	0.030%	NSD	0.034%	NSD	0.026%

[ ] Minimum Detection Limit
NSD = No Solid Detected

TABLE 2-32. METALS IN LIME SLURRY CONCENTRATIONS
MORRISTOWN MEMORIAL HOSPITAL (1991)

Metal	Concentration (mg metal/kg lime slurry)						
	Run 1 (mg/kg)	Run 2 (mg/kg)	Run 3 (mg/kg)	Run 4 (mg/kg)	Run 5 (mg/kg)	Run 6 (mg/kg)	Average Runs 1-6 (mg/kg)
Aluminum	146	214	80.9	42.9	29.6	113	104
Antimony	[1.50]	[1.50]	[1.50]	[1.50]	[1.50]	[1.50]	[1.50]
Arsenic	[0.400]	[0.400]	[0.400]	[0.400]	[0.400]	[0.400]	[0.400]
Barium	0.960	1.40	1.03	0.860	0.910	1.10	1.04
Beryllium	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]
Cadmium	[0.200]	[0.200]	[0.200]	[0.200]	[0.200]	[0.200]	[0.200]
Chromium	[0.600]	[0.600]	[0.600]	[0.600]	[0.600]	[0.600]	[0.600]
Copper	2.40	2.11	[0.400]	[0.400]	[0.400]	[0.400]	2.26
Lead	[0.300]	[0.300]	[0.300]	[0.300]	[0.300]	[0.300]	[0.300]
Mercury	[0.392]	[0.392]	[0.392]	[0.392]	[0.392]	[0.392]	[0.392]
Nickel	0.340	0.450	[0.300]	0.310	[0.300]	0.320	0.355
Silver	0.850	1.11	0.840	[0.600]	[0.600]	[0.600]	0.933
Thallium	[10.0]	[10.0]	[10.0]	[10.0]	[10.0]	[10.0]	[10.0]
% Hydrated Lime(w/w)	5.24%	8.35%	3.07%	1.62%	1.06%	3.75%	3.85%

[ ] Minimum Detection Limit

TABLE 2-33. PARTICULATE MATTER CONCENTRATIONS AND EMISSION RATES; MORRISTOWN MEMORIAL HOSPITAL (1991)

Date	Location	Run #	Time (min)	CONCENTRATION (grains/dscf)	(grains/dscf @ 7% O2)	(grams/dscm)	(grams/dscm @ 7% O2)	EMISSION RATE (lb/hr)	(kg/hr)	Removal Efficiency (%)
11/18/91	Inlet	1	240	0.353	0.501	0.808	1.15	10.9	4.96	
11/19/91	Inlet	2	240	0.372	0.528	0.852	1.21	11.3	5.12	
11/20/91	Inlet	3	240	0.334	0.450	0.764	1.03	10.8	4.89	
Condition 1 Averages				0.353	0.493	0.808	1.13	11.0	4.99	
11/21/91	Inlet	4	240	0.419	0.555	0.959	1.27	13.2	6.01	
11/22/91	Inlet	5	240	0.343	0.472	0.786	1.08	11.2	5.11	
11/23/91	Inlet	6	240	0.321	0.438	0.735	1.00	10.2	4.63	
Condition 2 Averages				0.361	0.488	0.827	1.12	11.5	5.25	
11/18/91	Outlet	1	240	0.000410	0.000838	0.000930	0.00190	0.0162	0.00738	99.9%
11/19/91	Outlet	2	240	0.000560	0.00114	0.00128	0.00262	0.0228	0.0104	99.8%
11/20/91	Outlet	3	240	0.00504	0.00934	0.0115	0.0214	0.205	0.0932	98.1%
Condition 1 Averages				0.002003	0.003775	0.00458	0.00862	0.0814	0.03698	99.2%
11/21/91	Outlet	4	239	0.000320	0.000626	0.00074	0.00145	0.0131	0.00598	99.9%
11/22/91	Outlet	5	240	0.000950	0.001809	0.00217	0.00413	0.0409	0.01857	99.6%
11/23/91	Outlet	6	240	0.000460	0.000864	0.00106	0.00199	0.0199	0.00903	99.8%
Condition 2 Averages				0.000577	0.001100	0.00132	0.00252	0.0246	0.01119	99.8%

NOTE: Removal efficiency is based on the inlet and outlet emission rates. [(1-out/in) x 100]

7 percent O_2 and 11.0 lb/hr, respectively. At the baghouse outlet, the average concentration and emission rate was 0.0038 grains/dscf at 7 percent O_2 and 0.081 lb/hr, respectively.

For Condition 2, where carbon was added to the lime slurry, the average PM concentration at the spray dryer inlet was 0.49 grains/dscf at 7 percent O_2. The average emission rate for the three runs was 0.025 lb/hr.

The results at the spray dryer inlet recorded for both conditions were very similar; therefore, the removal efficiencies should not be biased. The results at the baghouse outlet for both conditions were also similar except for Run 3 which had a significantly higher emission rate. This might be explained by the fact that during the test day the "cake" that forms on the baghouse bags was lost due to a pressure drop across the baghouse. This would decrease the filtering performance of the baghouse. Aside from this occurrence, the average removal efficiencies for both conditions was above 99 percent.

A summary of the sampling and flue gas parameters for the PM runs is given in Tables 2-26 and 2-27 for the spray dryer inlet and baghouse outlet, respectively. Appendix A.2 presents a detailed listing of the calculated results for each sampling run. The gravimetric PM analytical results are included in Appendix E.2.

2.4.2 Particle Size Distribution Results

Four PSD test runs were conducted during the Morristown Memorial Hospital MWI test program. An eight stage Andersen MK III in-stack cascade impactor sampling device was used (see Section 5 for PSD method). The PSD sampling location was at the spray dryer inlet. Following a test, the impactor was inspected to determine if there was adequate particle loading on each of the filter stages. A properly loaded impactor has distinct particulate "piles" under each stage's acceleration jets (holes). An under-loaded impactor is evidenced by clean, undisturbed filters while an over-loaded impactor has particulate piles which overlap and appear to have "broken-up" (evidence of PM re-entrainment). An assessment of the quality of particulate loading was made by the recovery technician, and all of the runs met the recovery QC objectives. The test results for these runs are reported in the following section.

2.4.2.1 Overview

The figures in this section present the log-normal plot of the particle cut size (Dp_{50}) at each impactor stage versus the mass fraction of particulate less than that Dp_{50} for each PSD run. Linear regressions analyses were conducted and the correlation coefficients (R^2) are shown on each figure. The mass median particle size is calculated from the graphical representation of the linear regression. It is a particle size that represents a point on the distribution in which half of the weight of the particles collected would be aerodynamically larger than, and half of the weight of the particles collected would be aerodynamically smaller than. A weight percentage of the particles collected less than 10 μm is also calculated from the linear regression.

2.4.2.2 Particle Size Distribution Results

Table 2-34 presents the Run 1 PSD results. Run 1 was conducted at the end of the third day of testing. The results are presented graphically in Figure 2-1. Approximately 71 percent of the total PM was less than 10 μm. The mass median particle size for Run 1 is approximately 2.3 μm.

Table 2-35 presents the results from PSD Run 2. This run was conducted during the fourth day of testing, November 21, 1991. The Run 2 PSD results are presented graphically in Figure 2-2. Slightly larger particle sizes were found in this run, as approximately 49 percent of the particles were less than 10 μm; as well as a mass median particle size of 11.0 μm.

Table 2-36 presents the results for PSD Run 3 which was conducted on the fifth day of testing, November 22, 1991. The graphical representation of this distribution, illustrated in Figure 2-3, shows a mass median particle size of 9.6 μm and has 51 percent of the total PM less than 10 μm.

Table 2-37 presents the results from Run 4 conducted on the sixth day of testing, November 23, 1991. Figure 2-4 shows the particle size distribution of this run. The mass median particle size as 11.1 μm, and approximately 48 percent of the weight was less than 10 μm.

Table 2-38 is a summary of the PSD results for the 4 test runs. Run 1 appears to be different in size distribution from Runs 2, 3, and 4.

TABLE 2-34. PSD RUN 1 RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

DATE:	11/20/91						
STAGE	Dp50 (microns)	Net Weight (grams)	Mass Fraction	Mass Fract. Less Than	Interval Geometric Midpoint (microns)	dM/dlog DP (gr/dscf)	CONC (gr/dscf)
Preim & 1	17.2126	0.00637	0.2026	0.7974 *	29.3365	5.698E-02	0.026387
2	11.2808	0.00144	0.0458	0.7516	13.9346	3.251E-02	0.005965
3	7.3596	0.00272	0.0865	0.6651	9.1117	6.075E-02	0.011267
4	5.1957	0.00276	0.0878	0.5773	6.1837	7.561E-02	0.011433
5	3.0731	0.00237	0.0754	0.5019	3.9959	4.305E-02	0.009818
6	1.7399	0.00223	0.0709	0.4310	2.3123	3.739E-02	0.009238
7	1.0579	0.00130	0.0413	0.3896	1.3567	2.492E-02	0.005385
8	0.6562	0.00215	0.0684	0.3212	0.8332	4.294E-02	0.008906
BACK-UP		0.01010	0.3212	0.0000 *	0.0573	1.975E-02	0.041838
TOTAL		0.03144	1.0000				0.130237

* these values asume top end and bottom end dp50s of 50 and .005 um.

TABLE 2-35. PSD RUN 2 RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

DATE:	11/21/91						
STAGE	Dp50 (microns)	Net Weight (grams)	Mass Fraction	Mass Fract. Less Than	Interval Geometric Midpoint (microns)	dM/dlog DP (gr/dscf)	CONC (gr/dscf)
Preim & 1	17.3944	0.01505	0.4421	0.5579 *	29.4910	1.839E-01	0.084348
2	11.4000	0.00110	0.0323	0.5256	14.0818	3.360E-02	0.006165
3	7.4373	0.00216	0.0635	0.4621	9.2079	6.526E-02	0.012106
4	5.2506	0.00193	0.0567	0.4054	6.2490	7.153E-02	0.010817
5	3.1055	0.00190	0.0558	0.3496	4.0380	4.669E-02	0.010649
6	1.7581	0.00147	0.0432	0.3064	2.3366	3.334E-02	0.008239
7	1.0689	0.00085	0.0250	0.2814	1.3708	2.204E-02	0.004764
8	0.6627	0.00069	0.0203	0.2612	0.8416	1.863E-02	0.003867
BACK-UP		0.00889	0.2612	0.0000 *	0.0576	2.348E-02	0.049824
TOTAL		0.03404	1.0000				0.190777

* these values asume top end and bottom end dp50s of 50 and .005 um.

TABLE 2-36. PSD RUN 3 RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

DATE:	11/22/91						
STAGE	Dp50 (microns)	Net Weight (grams)	Mass Fraction	Mass Fract. Less Than	Interval Geometric Midpoint (microns)	dM/dlog DP (gr/dscf)	CONC (gr/dscf)
Preim & 1	17.6739	0.01386	0.4510	0.5490 *	29.7270	1.839E-01	0.079370
2	11.5831	0.00046	0.0150	0.5340	14.3080	3.360E-02	0.002634
3	7.5568	0.00125	0.0407	0.4933	9.3558	6.526E-02	0.007158
4	5.3349	0.00170	0.0553	0.4380	6.3494	7.153E-02	0.009735
5	3.1553	0.00145	0.0472	0.3908	4.1028	4.669E-02	0.008304
6	1.7861	0.00118	0.0384	0.3524	2.3740	3.334E-02	0.006757
7	1.0857	0.00074	0.0241	0.3283	1.3925	2.204E-02	0.004238
8	0.6728	0.00150	0.0488	0.2795	0.8546	1.863E-02	0.008590
BACK-UP		0.00859	0.2795	0.0000 *	0.0580	2.348E-02	0.049191
TOTAL		0.03073	1.0000				0.175978

* these values asume top end and bottom end dp50s of 50 and .005 um.

TABLE 2-37. PSD RUN 4 RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

DATE:	11/23/91						
STAGE	Dp50 (microns)	Net Weight (grams)	Mass Fraction	Mass Fract. Less Than	Interval Geometric Midpoint (microns)	dM/dlog DP (gr/dscf)	CONC (gr/dscf)
Preim & 1	17.5700	0.01162	0.4602	0.5398 *	29.6395	1.839E-01	0.0658
2	11.5150	0.00064	0.0253	0.5145	14.2239	3.360E-02	0.0036
3	7.5124	0.00175	0.0693	0.4451	9.3008	6.526E-02	0.0099
4	5.3035	0.00154	0.0610	0.3842	6.3121	7.153E-02	0.0087
5	3.1367	0.00160	0.0634	0.3208	4.0787	4.669E-02	0.0091
6	1.7757	0.00146	0.0578	0.2630	2.3601	3.334E-02	0.0083
7	1.0794	0.00049	0.0194	0.2436	1.3844	2.204E-02	0.0028
8	0.6690	0.00032	0.0127	0.2309	0.8498	1.863E-02	0.0018
BACK-UP		0.00583	0.2309	0.0000 *	0.0578	2.348E-02	0.0330
TOTAL		0.02525	1.0000				0.1431

* these values asume top end and bottom end dp50s of 50 and .005 um.

TABLE 2–38. SUMMARY OF PARTICLE SIZE DISTRIBUTION RESULTS; MORRISTOWN MEMORIAL HOSPITAL (1991)

RUN NO.	MASS MEDIAN PARTICLE SIZE (um)	WEIGHT PERCENTAGE LESS THAN 10um (%)	TOTAL PM CONCENTRATION (grains/dscf)
1	2.3	71	0.130
2	11.0	49	[1]0.191
3	9.6	51	0.176
4	11.1	48	0.143
AVERAGE	**8.5**	**55**	**0.160**

TABLE 2–39. PSD FLUE GAS AND SAMPLING PARAMETERS
MORRISTOWN MERMORIAL HOSPITAL (1991)

FLUE GAS AND SAMPLING PARAMETERS	RUN 1	RUN 2	RUN 3	RUN 4	AVERAGE
Total Sampling Time (min.)	20.0	15.0	15.0	15.0	NA
Average Stack Temperature (°F)	410	410	410	410	410
Average Sampling Rate (dscfm)	0.200	0.198	0.192	0.194	0.196
Standard Metered Volume,Vm(std) (dscf)	4.00	2.96	2.89	2.91	3.19
Standard Metered Volume,Vm(std) (dscm)	0.121	0.090	0.087	0.088	0.097
Stack Moisture (%V)	0.149	0.147	0.139	0.140	0.144
Percent Isokinetic	104.5	103.0	101.8	102.9	NA

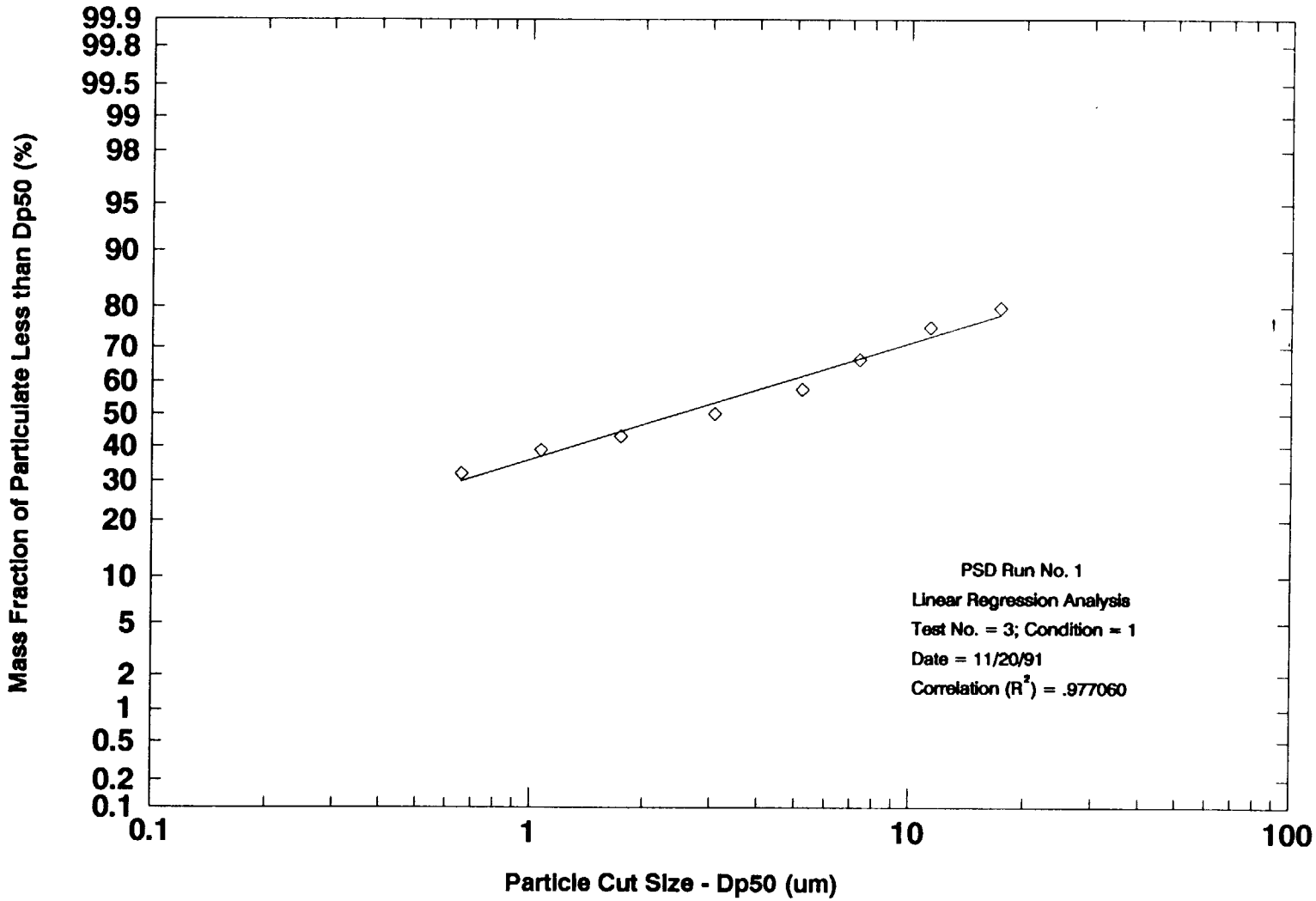

FIGURE 2-1. Run 1 PSD Results - Log Particle Size vs Mass Fraction Less Than Particle Size. Morristown Memorial Hospital (1991)

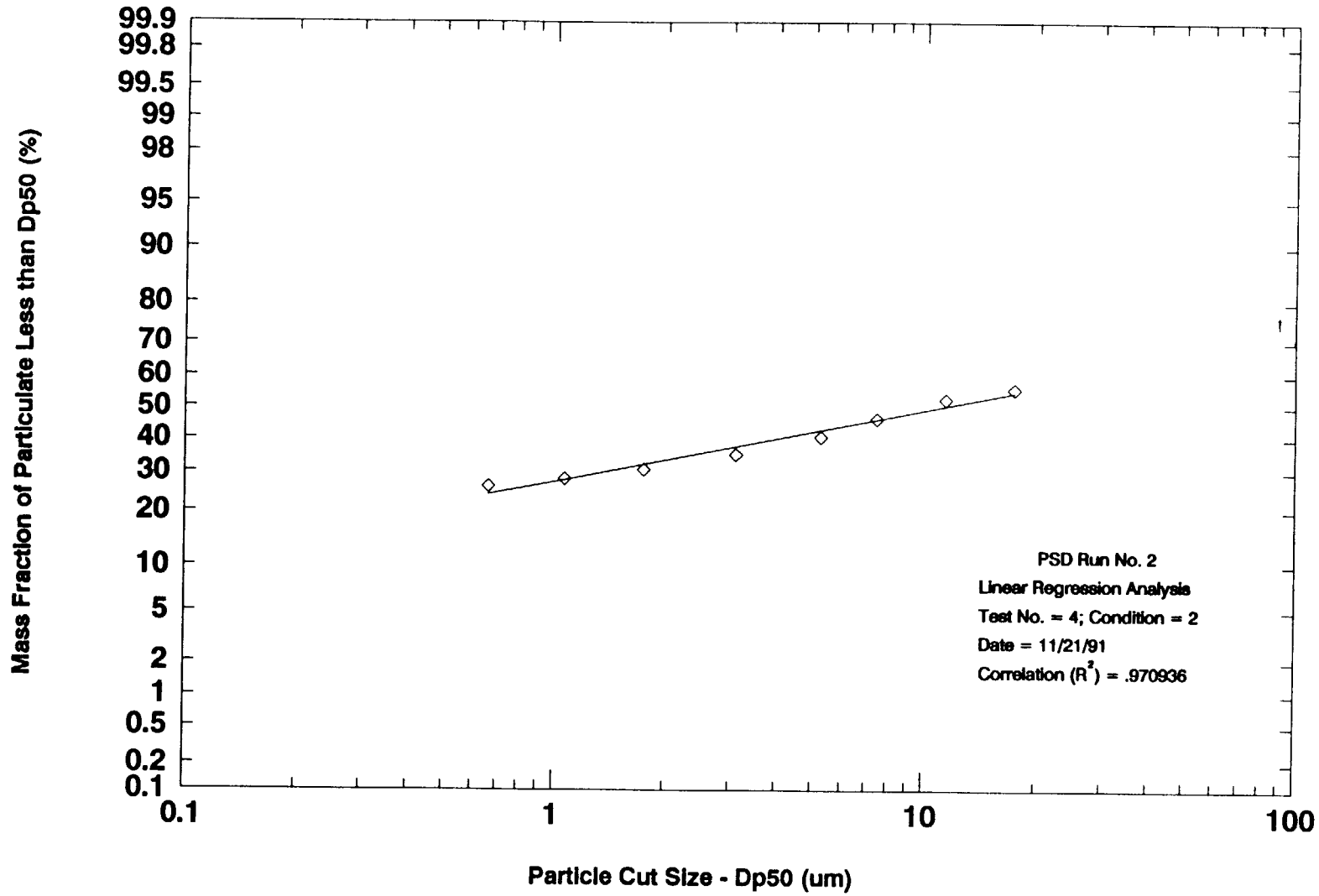

FIGURE 2-2. Run 2 PSD Results - Log Particle Size vs Mass Fraction Less Than Particle Size. Morristown Memorial Hospital (1991)

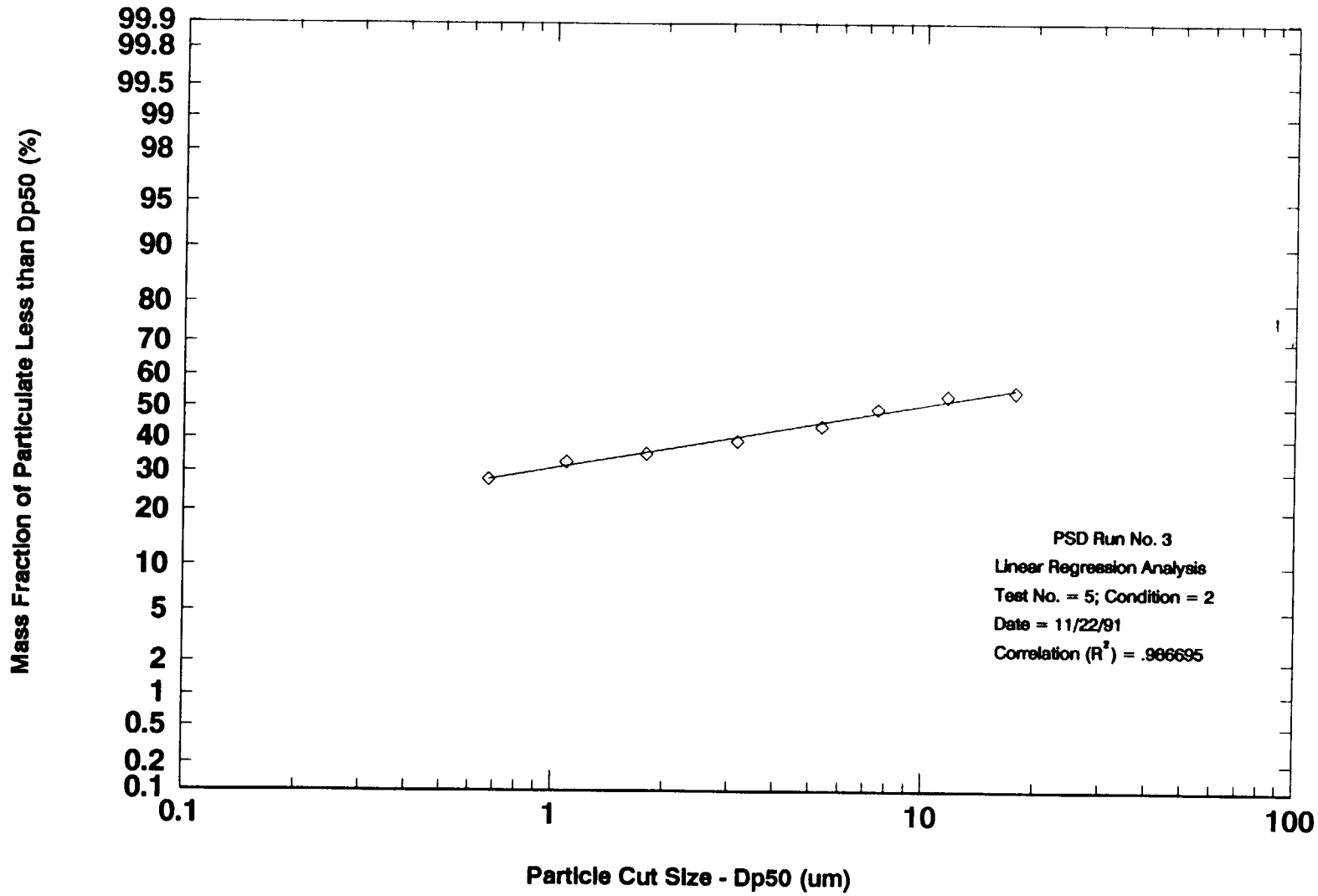

FIGURE 2-3. Run 3 PSD Results - Log Particle Size vs Mass Fraction Less Than Particle Size. Morristown Memorial Hospital (1991)

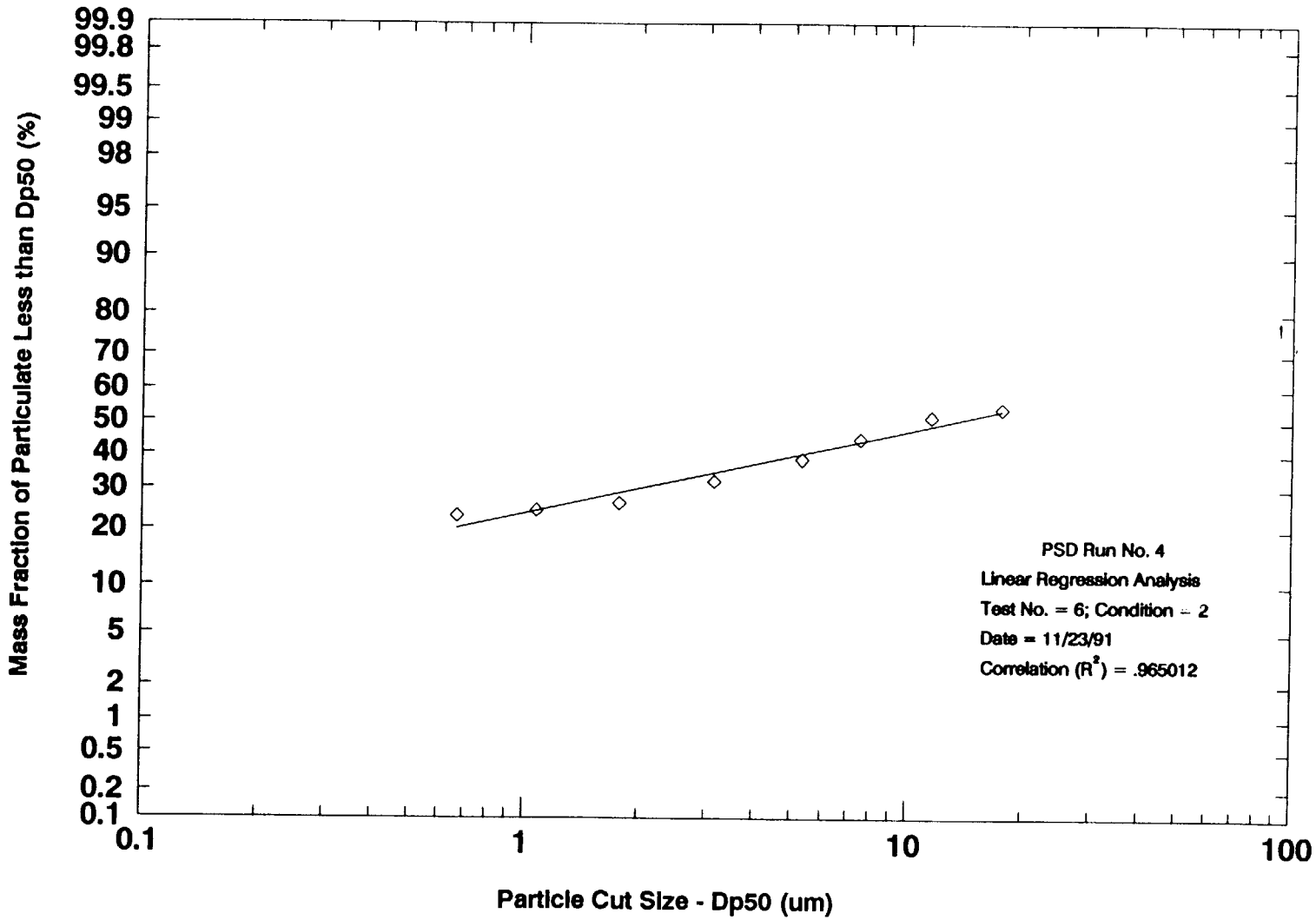

FIGURE 2-4. Run 4 PSD Results - Log Particle Size vs Mass Fraction Less Than Particle Size. Morristown Memorial Hospital (1991)

Table 2-39 is a summary of the PSD flue gas and sampling parameters, including the isokinetic sampling ratios. All of the sampling parameters are consistent throughout the four runs, and the isokinetic ratios are all within ± 10 percent of 100 percent.

2.5 MERCURY EMISSIONS BY METHOD 101A

A Hg Method 101A sampling train was performed at the Morristown Memorial Hospital to further validate the Hg values from the toxic metal train. A comparison of the Method 101A Hg values to the multi-metals Hg values is discussed in more detail in Section 2.5.6.

2.5.1 Overview

A single sampling train was used to determine emission rates of Hg by Method 101A. Three sampling runs were performed under both test conditions (without carbon injection and with carbon injection) in order to ensure representative test results. Sampling locations, method, and QA/QC are discussed in Sections 4, 5, and 6, respectively. The results for each individual run are presented in Section 2.5.3. Concentrations at dry standard conditions, adjusted to 7 percent O_2, emission rates, and removal efficiencies are reported. The sample and flue gas parameters are presented in Section 2.5.4. The detected Hg weights separated by analytical filter digestion is discussed in Section 2.5.5. A comparison of the Hg collected in Method 101A versus the toxic metals trains is presented in Section 2.4.6.

2.5.2 Mercury Data Reduction

The values reported in the following Hg results were calculated using the same guidelines that are outlined for the metals in Section 2.3.2.

2.5.3 Mercury Emissions

Table 2-40 presents a summary of the Hg total weights, standard concentrations, concentrations corrected to 7 percent O_2, and emission rate results for each test condition.

For Condition 1, where carbon was not injected into the lime slurry, the Hg emission rate at the spray dryer inlet ranged from 5.20 to 19.8 g/hr with an average of 9.28 g/hr. At the baghouse outlet the emission rate ranged from 3.56 to 20.2 g/hr with an average of 10.4 g/hr.

TABLE 2-40. SUMMARY OF MERCURY 101A RESULTS
MORRISTOWN MEMORIAL HOPSITAL (1991)

Condition	Run	Location								RE (%)
		Inlet (total ug)	Outlet (total ug)	Inlet (ug/dscm)	Outlet (ug/dscm)	Inlet (ug/dscm @ 7% O2)	Outlet (ug/dscm @ 7% O2)	Inlet (g/hr)	Outlet (g/hr)	
Without Carbon	1	2630	3450	902	943	1280	1930	5.20	7.51	-44.5%
	2	1480	1640	492	449	698	918	2.88	3.56	-23.5%
	3	9760	9350	3350	2480	4520	4600	19.8	20.2	-2.10%
Average		4623	4813	1581	1291	2166	2483	9.28	10.4	-12.2%
With Carbon	4	1500	998	502	264	664	516	3.10	2.13	31.3%
	5	4680	326	1630	83.7	2240	159	9.48	0.719	92.4%
	6	6470	697	2250	177	3070	332	13.2	1.48	88.8%
Average		4217	674	1461	175	1991	336	8.60	1.44	83.2%

For Condition 2, where carbon was injected into the lime slurry, the Hg emission rate at the spray dryer inlet ranged from 3.10 to 13.2 g/hr with an average of 8.6 g/hr. At the baghouse outlet, the mass emission rate ranged from 0.72 to 2.13 g/hr with an average of 1.44 g/hr.

The removal efficiencies during the emission tests without carbon injection display a slight Hg gain across the emission controls. A recent study on the precision of Method 101A when measuring exhaust gases from a municipal waste combustor (EPA 450/4-92-013) reported an average relative standard deviation (RSD) of the method of 15.6% when used without carbon injection. Assuming that the same RSD applies to Runs 1, 2, and 3 of this test program, all pairs of O_2-corrected Hg concentrations at the inlet and outlet agree within 2.6 standard deviations. The apparent gain in Hg concentrations over the control device in Runs 1-3 may therefore be due primarily to inherent variability in the sampling method.

The removal efficiencies during the emission tests with carbon injection present an average removal efficiency of 83.2 percent. Therefore, from the Method 101A Hg results, it is apparent that carbon injection into the spray dryer positively affects the removal of Hg in the flue gas.

2.5.4 Mercury Sample Parameters

Sampling and flue gas parameters for the Method 101A sampling trains at the inlet are shown in Table 2-41, and Table 2-42 presents the parameters for the runs performed at the outlet. Total sampling times, sample volume, and isokinetic results for each sampling run are presented. All of the runs were within the ±10 percent isokinetic range. Appendix C contains a complete listing of these and additional sampling and flue gas parameters for each run.

2.5.5 Mercury Amounts by Sample Fraction

Table 2-43 presents the detected weights of Hg specific to both sample fractions and reports the amount of total weight detected by the first and second filter digestions. The first digestion is performed on the first analytical filter with 8N HCl, and the second digestion is performed on the second analytical filter with aqua regia (3/4 HCl and 1/4 HNO_3). Further details of this process are discussed in Section 5.

The first digestion of the front half of the sample train does detect significant additional amounts of Hg at the inlet runs. None of the second filtrations add significantly to the total Hg detected, especially in the back half of the sample.

2.5.6 Mercury Emissions Comparison

Table 2-44 presents the comparison of Hg emission rates and removal efficiencies for Method 101A to multi-metal trains. During the emission tests without carbon injection, the results from the Method 101A and multi-metals do not agree, more predominantly at the inlet. The fractional results of the multi-metals sample analysis shown in Table 2-25 show that most of the Hg was captured in the first three nitric acid impingers, before the gas reached the $KMnO_4$ solution. This allows the possibility that some forms of Hg may be captured more efficiently in the HNO_3 than in the $KMnO_4$, and that the Method 101A train allows some Hg to break through. The municipal waste incinerator cited previously (EPA 450/4-92-013) also showed higher concentrations of Hg measured with the multi-metals train that with the Method 101A train. Differences in the forms of Hg present at the inlet and outlet locations could account for the difference in relative method performance at these two locations, however, speciation of Hg compounds is beyond the scope of this study.

Valuable data might be gathered in future tests by adding HNO_3 impingers to the back end of a Method 101 train, and analyzing impingers individually to further characterize Hg capture through the train fractions.

For Condition 1 at the spray dryer inlet, the average removal efficiency determined by the Method 101A train was -12.2 percent; in comparison, the multi-metals average removal efficiency was 29.7 percent.

For the emission tests with carbon injection, the results from Runs 5 and 6 display similar emission rates for both methods. The average removal efficiency determined from the Method 101A trains was 83.2 percent, and the average removal efficiency determined from the multi-metals trains was 90.0 percent; therefore, portraying more consistent results than the first three runs.

TABLE 2-41. MERCURY 101A SAMPLING AND FLUE GAS PARAMETERS AT THE SPRAY DRYER INLET; MORRISTOWN MEMORIAL HOSPITAL (1991)

Run No. Date	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Average
Total Sampling Time (min)	240	240	240	240	240	240	NA
Average Sampling Rate (dscfm)	0.43	0.44	0.43	0.44	0.42	0.42	0.43
Metered Volume (dscf)	103	106	103	106	102	101	103
Metered Volume (dscm)	2.9	3.0	2.9	3.0	2.9	2.9	2.9
Average Stack Temperature (F)	409	410	410	412	410	407	410
O2 Concentration (%V)	11.1	11.1	10.6	10.4	10.8	10.7	10.8
CO2 Concentration (%V)	6.4	7.8	6.7	6.6	6.5	6.5	6.8
Stack Gas Moisture (%V)	15.6	15.3	14.1	13.6	13.9	14.2	14.4
Volumetric Flow Rate (dscfm)	3393	3447	3473	3639	3422	3459	3472
Volumetric Flow Rate (dscmm)	96.1	97.6	98.4	103.0	96.9	98.0	98.3
Percent Isokinetic	101.2	102.7	94.2	96.7	99.0	97.8	NA

NA = Not Applicable

Note: The accuracy of all calculated results is limited to three significant digits. Summary tables generated by spreadsheet programs report additional digits that are not significant.

TABLE 2-42. MERCURY 101A SAMPLING AND FLUE GAS PARAMETERS AT THE BAGHOUSE OUTLET; MORRISTOWN MEMORIAL HOSPITAL (1991)

Run No. Date	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Average
Total Sampling Time (min)	240	240	240	239	240	240	NA
Average Sampling Rate (dscfm)	0.54	0.54	0.56	0.56	0.57	0.58	0.56
Metered Volume (dscf)	129	129	133	134	138	139	134
Metered Volume (dscm)	3.7	3.7	3.8	3.8	3.9	3.9	3.8
Average Stack Temperature (F)	285	285	285	289	270	287	284
O2 Concentration (%V)	14.1	14.1	13.4	13.8	13.6	13.5	13.8
CO2 Concentration (%V)	5.0	5.0	5.3	5.2	5.0	5.3	5.1
Stack Gas Moisture (%V)	14.3	14.4	14.4	14.6	13.4	13.7	14.1
Volumetric Flow Rate (dscfm)	4687	4664	4790	4758	5051	4932	4814
Volumetric Flow Rate (dscmm)	132.7	132.1	135.6	134.7	143.0	139.7	136.3
Percent Isokinetic	97.6	98.9	99.6	100.9	97.4	101.0	NA

NA = Not Applicable

Note: The accuracy of all calculated results is limited to three significant digits. Summary tables generated by spreadsheet programs report additional digits that are not significant.

TABLE 2-43. COMPARISON OF MERCURY 101A DATA TO DIGESTED LAB FILTERS; MORRISTOWN MEMORIAL HOSPITAL (1991)

Run	Front Half					Back Half				
	Total ug without Lab Filters	Total ug with 1st Lab Filter	% Diff.	Total ug with 2nd Lab Filter	% Diff.	Total ug without Lab Filters	Total ug with 1st Lab Filter	% Diff.	Total ug with 2nd Lab Filter	% Diff.
Inlet 1	134	147	9.09%	150	1.73%	2480	2480	0.0%	2480	0.0%
Inlet 2	48.2	51.3	6.01%	52.0	1.35%	1430	1430	0.0%	1430	0.0%
Inlet 3	976	1030	5.24%	1060	2.83%	8690	8690	0.0%	8700	0.115%
Cond. 1 Avg.	**386**	**410**	**6.78%**	**421**	**1.97%**	**4200**	**4200**	**0.0%**	**4200**	**0.0383%**
Inlet 4	219	231	5.07%	233	1.17%	1270	1270	0.0%	1270	0.0%
Inlet 5	1640	1690	2.96%	1700	0.588%	2980	2980	0.0%	2980	0.0%
Inlet 6	132	143	7.82%	144	0.865%	6320	6320	0.0%	6320	0.0%
Cond. 2 Avg.	**664**	**688**	**5.28%**	**693**	**0.874%**	**3523**	**3520**	**0.0%**	**3520**	**0.0%**
Outlet 1	0.378	1.50	74.8%	1.66	9.60%	3450	3450	0.0%	3450	0.0%
Outlet 2	0.293	0.701	58.2%	0.701	0.0%	1640	1640	0.0%	1640	0.0%
Outlet 3	2.88	3.99	27.8%	3.99	0.0%	9340	9340	0.0%	9340	0.0%
Cond. 1 Avg.	**1.18**	**2.06**	**53.6%**	**2.12**	**3.20%**	**4810**	**4810**	**0.0%**	**4810**	**0.0%**
Outlet 4	0.378	0.566	33.2%	0.566	0.0%	993	998	0.452%	998	0.0%
Outlet 5	[0.206]	[0.835]	0%	0.159	100.0%	326	326	0.0%	326	0.0%
Outlet 6	[0.206]	0.320	>36%	0.320	0.0%	696	697	0.0754%	697	0.0%
Cond. 2 Avg.	**0.378**	**0.443**	**23.1%**	**0.348**	**33.33%**	**672**	**673**	**0.176%**	**673**	**0.0%**

[ ] = Not detected at the limit shown

a The greater weight is used as a reference point for the calculation of % Difference.

TABLE 2-44. COMPARISON FOR MERCURY EMISSION RATES AND REMOVAL EFFICIENCIES METHOD 101A VERSUS TOXIC METALS; MORRISTOWN MEMORIAL HOSPITAL (1991)

Condition	Run	Method 101A			Toxic Metal Trains		
		Inlet (g/hr)	Outlet (g/hr)	RE (%)	Inlet (g/hr)	Outlet (g/hr)	RE (%)
Without Carbon	1	5.20	7.51	-44.5%	9.51	4.67	50.9%
	2	2.88	3.56	-23.5%	2.7	2.76	-1.1%
	3	19.8	20.2	-2.10%	23.4	17.6	24.6%
	Average	9.28	10.4	-12.2%	11.9	8.35	29.7%
With Carbon	4	3.10	2.13	31.3%	11.4	1.84	83.8%
	5	9.48	0.719	92.4%	10.6	0.436	95.9%
	6	13.2	1.48	88.8%	14.9	1.40	90.6%
	Average	8.60	1.44	83.2%	12.3	1.23	90.0%

2.6 HALOGEN GAS EMISSIONS

Hydrogen chloride (HCl), HF, and HBr gas concentrations were manually sampled at the spray dryer inlet and the baghouse outlet, following EPA Method 26 procedures. In this method, flue gas is extracted from the sample location and passed through acidified water. The halogen gases solubilize and form halide ions. Ion chromatography was used to detect the chloride (Cl^-), bromide (Br^-), and fluoride (F^-) ions present in the sample. Three 1-hour samples were collected during each of the 6 test runs. The results are reported as a concentration (ppmv) and an emission rate (lb/hr) at dry standard conditions. Since a flow rate is not calculated using EPA Method 26, the corresponding flue gas flow rates determined from the CDD/CDF sampling trains were used in the calculation of emission rates.

The results for all 3 halogens from Runs 1 and 2 at the inlet and Runs 1B and 1C at the baghouse outlet were rejected and not reported. A comparison of the Method 26 and the HCl CEM data shows that these results are obvious outliers at a 90 percent confidence level.

2.6.1 Hydrogen Chloride Emissions Results

Table 2-45 presents a summary of HCl spray dryer inlet and baghouse outlet concentrations and emission rates determined by manual sampling and provides the HCl removal efficiencies for the emission control system. The removal efficiencies for the six runs conducted on the first two days could not be calculated because the spray dryer inlet results were outside acceptable control limits.

For Condition 1, where carbon was not added to the lime slurry, the HCl concentration at the spray dryer inlet ranged from 398.6 to 952.7 ppmvd at 7 percent O_2, with an average of 723.7 ppmvd at 7 percent O_2. The HCl mass rate entering the spray dryer ranged from 5.9 to 14.1 lb/hr with an average of 10.8 lb/hr. At the baghouse outlet, the HCl concentration ranged from 3.9 to 8.5 ppmvd at 7 percent O_2 with an average of 6.0 ppmvd at 7 percent O_2. The HCl emission rate at the baghouse outlet ranged from 0.06 to 0.12 lb/hr with an average of 0.08 lb/hr.

TABLE 2-45. SUMMARY OF HYDROGEN CHLORIDE RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

RUN NO.	SPRAYDRYER INLET					BAGHOUSE OUTLET					
	O2 CONC. (% VOL.)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	O2 CONC. (% VOL)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	REMOVAL EFFICIENCY (%)
1A	11.1	95.4	b	b	b	14.1	135.0	3.70	7.56	0.100	NA
1B	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
1C	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
AVERAGE			NA	NA	NA			3.70	7.56	0.100	NA
2A	11.1	98.5	b	b	b	14.1	140.7	4.17	8.52	0.118	NA
2B	11.1	98.5	b	b	b	14.1	140.7	2.63	5.38	0.074	NA
2C	11.1	98.5	b	b	b	14.1	140.7	3.32	6.79	0.094	NA
AVERAGE			NA	NA	NA			3.37	6.90	0.095	NA
3A	10.6	100.0	607	820	12.2	13.4	140.4	2.12	3.93	0.060	99.5
3B	10.6	100.0	295	399	5.92	13.4	140.4	2.39	4.42	0.067	98.9
3C	10.6	100.0	706	953	14.2	13.4	140.4	2.79	5.17	0.078	99.4
AVERAGE			536	724	10.8			2.43	4.51	0.068	99.3
COND. 1 AVG.	**10.9**	**98.0**	**536**	**724**	**10.8**	**13.9**	**138.7**	**3.02**	**5.97**	**0.084**	**99.3**
4A	10.4	94.7	892	1181	16.9	13.8	137.1	3.24	6.34	0.089	99.5
4B	10.4	94.7	866	1146	16.4	13.8	137.1	29.2	57.1	0.803	95.1
4C	10.4	94.7	1015	1343	19.3	13.8	137.1	7.64	15.0	0.210	98.9
AVERAGE			924	1224	17.5			13.4	26.1	0.367	97.8
5A	10.8	96.8	656	902	12.7	13.6	143.2	[0.026]	[0.049]	[0.0007]	>99.99
5B	10.8	96.8	571	786	11.1	13.6	143.2	[0.026]	[0.050]	[0.0008]	>99.99
5C	10.8	96.8	836	1151	16.2	13.6	143.2	[0.025]	[0.047]	[0.0007]	>99.99
AVERAGE			688	946	13.3			[0.026]	[0.049]	[0.0007]	>99.99
6A	10.7	98.9	724	986	14.4	13.5	141.0	[0.023]	[0.044]	[0.0007]	>99.99
6B	10.7	98.9	493	672	9.79	13.5	141.0	[0.023]	[0.043]	[0.0007]	>99.99
6C	10.7	98.9	1043	1421	20.7	13.5	141.0	[0.026]	[0.049]	[0.0007]	>99.99
AVERAGE			753	1026	14.9			[0.024]	[0.045]	[0.0007]	>99.99
COND. 2 AVG.	**10.6**	**96.8**	**788**	**1065**	**15.3**	**13.6**	**140.4**	**13.4**	**26.1**	**0.367**	**99.27**

a The flow rates determined by the CDD/CDF sampling trains were used for HCl emission rate calculations.
b The results are not reported because the data are not within acceptable control limits.
c [] = Not detected at the limit shown.
d Detection limits are not considered when calculating averages.

For Condition 2 where carbon was added to the lime slurry, the HCl concentration at the spray dryer inlet ranged from 672.1 to 1420.9 ppmvd at 7 percent O_2, with an average of 1065.4 ppmvd at 7 percent O_2. The mass emission rate entering the spray dryer ranged from 9.8 to 20.7 lb/hr with an average of 15.3 lb/hr. The HCl concentration leaving the baghouse ranged from less than 0.04 ppmvd at 7 percent O_2 to 57.1 ppmvd at 7 percent O_2 with an average of 26.1 ppmvd at 7 percent O_2. The mass emission rate at the baghouse outlet ranged from less than 0.0007 lb/hr to 0.8 lb/hr with an average of 0.37 lb/hr.

The mass flow rate of HCl into the spray dryer was approximately 42% higher during Condition 2 than Condition 1, but the difference was not great enough to significantly effect the removal efficiencies. Based on the results from Runs 5 and 6, carbon injection appears to improve HCl removal in the flue gas; however, the results from Run 4 are similar to the results obtained without carbon injection. Therefore, it cannot be concluded with confidence that carbon injection improves removal of HCl in the emission control system.

In addition to Method 26, the flue gas was analyzed for HCl using a CEM monitor as discussed in Section 5. Table 2-46 summarizes the CEM HCl results, including HCl removal efficiencies based on ppmvd corrected to 7 percent O_2. The HCl data is corrected to a dry basis using an average moisture percentage taken from the other manual trains. The values reported are averages of the CEM data that correspond to the exact time in which the Method 26 trains were run.

For the runs without carbon injection, the HCl concentration at the spray dryer inlet ranged from 798.3 to 1087.9 ppmvd at 7 percent O_2 with an average of 913.0 ppmvd at 7 percent O_2. At the baghouse outlet, the HCl concentration ranged from 8.37 to 20.19 ppmvd at 7 percent O_2 with an average of 15.6 ppmvd at 7 percent O_2.

For the runs with carbon injection, the HCl concentration at the spray dryer inlet ranged from 961.9 to 1090.1 ppmvd at 7 percent O_2 with an average of 1013.7 ppmvd at 7 percent O_2. At the baghouse outlet, the concentration ranged from 10.6 to 30.7 ppmvd at 7 percent O_2 with an average for the 3 runs of 18.6 ppmvd at 7 percent O_2.

TABLE 2–46. SUMMARY OF HCl CEM RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

RUN NO.	SPRAYDRYER INLET					BAGHOUSE OUTLET					
	O2 (%V) [a]	H2O (%V)	HCl (ppmV)	HCl (ppmVd) [b]	HCl (ppmVd @7% O2)	O2 (%V)	H2O (%V)	HCl (ppmV)	HCl (ppmVd)	HCl (ppmVd @7% O2)	REMOVAL EFFICIENCY (%) [c]
1	11.1	15.9	643	764	1088	14.2	14.6	7.57	8.87	18.3	98.3%
2	11.2	15.5	471	557	798	14.2	13.8	8.36	9.69	20.2	97.5%
3	10.7	14.9	535	629	853	13.6	14.7	3.77	4.42	8.37	99.0%
COND. 1 AVG.	11.0	15.4	550	650	913	14.0	14.4	6.56	7.66	15.6	98.3%
4	10.4	14.7	703	824	1090	14.2	14.8	12.5	14.7	30.6	97.2%
5	10.7	13.9	606	704	962	13.8	13.4	6.44	7.44	14.5	98.5%
6	10.6	14.0	629	731	989	13.9	13.0	4.67	5.36	10.6	98.9%
COND. 2 AVG.	10.6	14.2	646	753	1014	14.0	13.7	7.91	9.17	18.6	98.2%

a The O2 results are averaged from CEM values corresponding to the three daily HCl runs.
b The HCl data is corrected to a dry basis using an average moisture percentage from the manual trains.
c Removal Efficiency is based on HCl values corrected to 7% O2.

During Condition 1, the HCl removal efficiency ranged from 97.5 to 99.0 percent and averaged 98.3 percent for the 3 runs. During Condition 2, the HCl removal efficiency ranged from 97.5 to 98.9 percent and averaged 98.3 percent. At the spray dryer inlet, an average increase of 11.0 percent in the HCl concentration occurs from Condition 1 to Condition 2; whereas, at the baghouse outlet, an average increase of 18.9 percent in the HCl concentration occurs from Condition 1 to Condition 2. An increase of HCl at the spray dryer inlet is reflected as a similar increase at the baghouse outlet. From this data, one could conclude that the injection of carbon does not increase the removal of HCl in the emission control system.

Table 2-47 presents a comparison of the manual and CEM HCl concentrations (ppmvd at 7 percent O_2). The CEM values are data averages that correspond to the exact time periods during which the manual sampling was conducted. At the spray dryer inlet, the percent difference between the manual results and the CEM results ranged from -15.5 to 107.1, with an average difference of -1.7 percent. At the baghouse outlet, the percent difference ranged from -77.3 to 302.0 with an average difference of 42.3 percent.

Figure 2-5 presents a graphical representation of the manual and CEM HCl concentrations at the spray dryer inlet. This table illustrates the common trend between the results of both methods. Figure 2-6 presents a graphical representation of the manual and CEM HCl concentrations at the baghouse outlet. Here the common trend between the two methods is discernable, but is not as obvious at the baghouse outlet as it is at the spray dryer inlet. Actual correlation between methods on individual runs is weak for both locations.

2.6.2 Hydrogen Fluoride Emission Results

Table 2-48 presents a summary of HF inlet and outlet concentrations and emission rates determined by manual sampling, as well as providing emission control removal efficiencies. The removal efficiencies could not be calculated for the first six runs for reasons discussed previously.

For Condition 1, the HF concentrations at the spray dryer inlet ranged from less than 0.7 ppmvd at 7 percent O_2 to 1.3 ppmvd at 7 percent O_2 with an average of 1.3 ppmvd at 7 percent O_2. The HF emission rate entering the spray dryer ranged from

TABLE 2-47. COMPARISON OF MANUAL AND CEM HCl RESULTS; MORRISTOWN MEMORIAL HOSPITAL (1991)

TEST RUN NUMBER	SPRAYDRYER INLET			BAGHOUSE OUTLET		
	MANUAL (ppmVd @7% O2)	CEM (ppmVd @7% O2)	% DIFF.	MANUAL (ppmVd @7% O2)	CEM (ppmVd @7% O2)	% DIFF.
1A	b	734[a]	NA	7.56	1.72	−77.3%
1B	b	1060	NA	b	23.8	NA
1C	b	1470	NA	b	29.5	NA
AVERAGE	NA	1088	NA	7.56	18.3	143%
2A	b	781	NA	8.52	13.1	54.0%
2B	b	767	NA	5.38	20.2	275%
2C	b	847	NA	6.79	27.3	302%
AVERAGE	NA	798	NA	6.90	20.2	193%
3A	820	779	−4.9%	3.93	7.71	96.3%
3B	399	825	107%	4.42	7.03	59.0%
3C	953	954	0.1%	5.17	10.4	101%
AVERAGE	724	853	17.9%	4.51	8.37	85.7%
4A	1181	998	−15.5%	6.34	6.26	−1.31%
4B	1146	1064	−7.1%	57.1	59.8	4.59%
4C	1343	1208	−10.1%	15.0	25.9	73.4%
AVERAGE	1224	1090	−10.9%	26.1	30.6	17.2%
5A	902	794	−12.0%	[0.049]	6.19	NA
5B	786	832	5.8%	[0.050]	8.11	NA
5C	1151	1260	9.4%	[0.047]	29.1	NA
AVERAGE	946	962	1.6%	[0.049]	14.5	NA
6A	986	888	−10.0%	[0.044]	5.48	NA
6B	672	1056	57.2%	[0.043]	24.1	NA
6C	1421	1023	−28.0%	[0.049]	2.31	NA
AVERAGE	1026	989	−3.6%	[0.045]	10.6	NA
TOTAL AVERAGE	980	963	−1.7%	12.0	17.1	42.3%

a The CEM HCl data is corrected to a dry basis using an average moisture percentage from the manual trains.

b The results are not reported because the data is not within acceptable control limits.

c [] = Not detected at the limit shown.

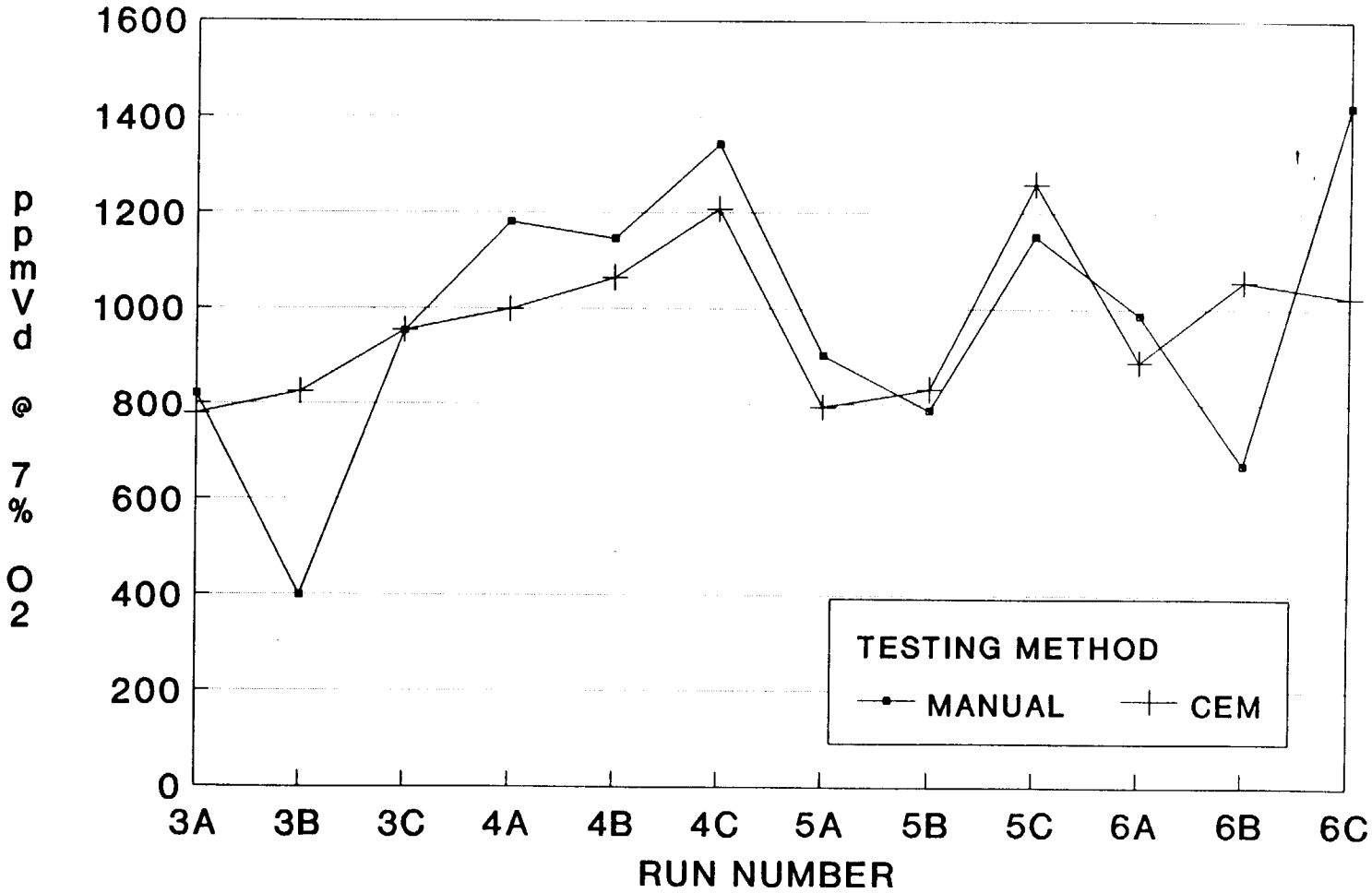

Figure 2-5. HCl Results Comparison - Spray Dryer Inlet Morristown Memorial Hospital (1991)

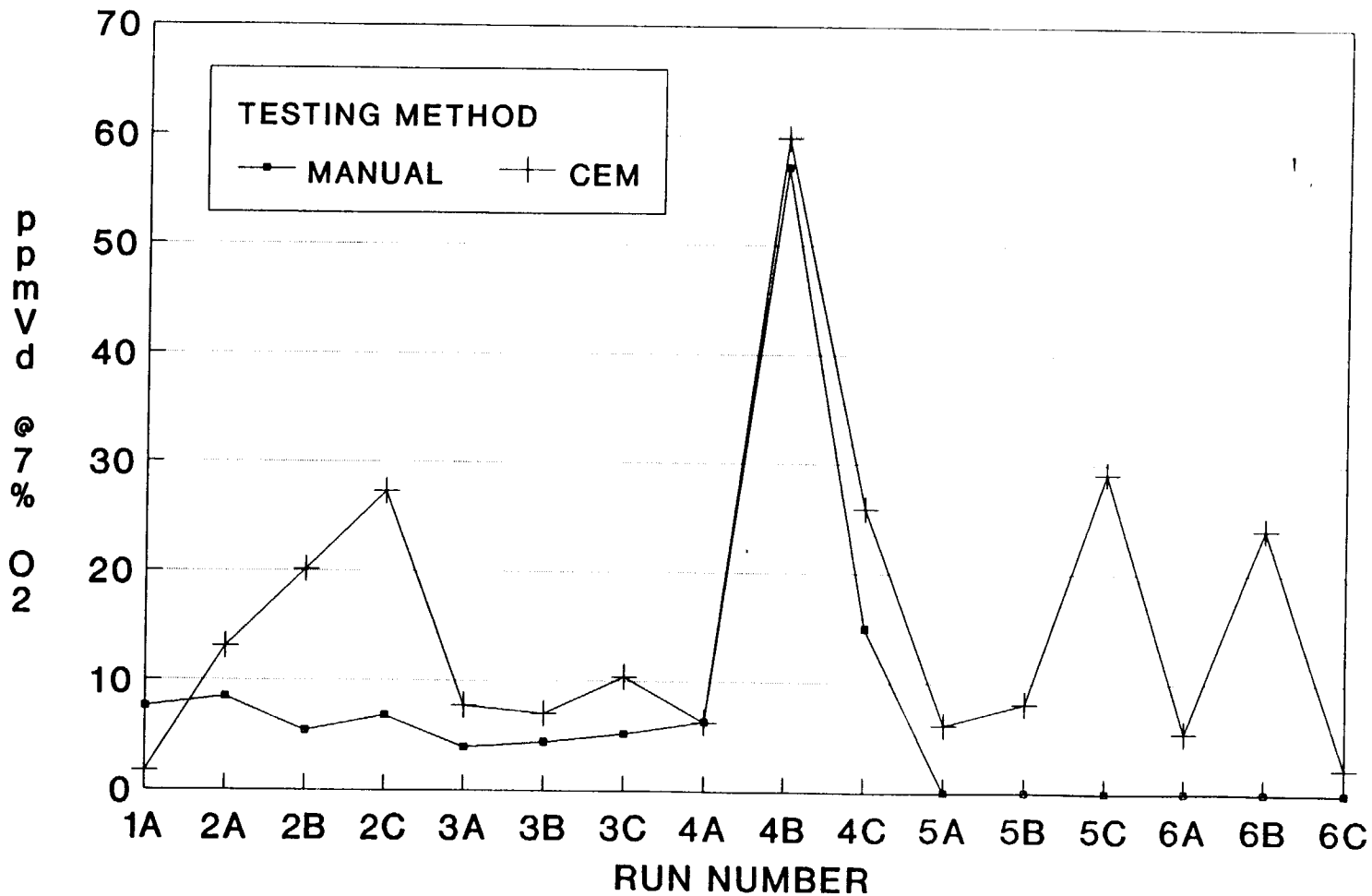

Figure 2-6. HCl Results Comparison - Baghouse Outlet
Morristown Memorial Hosptial (1991)

TABLE 2-48. SUMMARY OF HYDROGEN FLUORIDE REMOVAL RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

RUN NO.	SPRAYDRYER INLET					BAGHOUSE OUTLET					
	O2 CONC. (% VOL)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	O2 CONC. (% VOL)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	REMOVAL EFFICIENCY (%)
1A	11.1	95.4	b	b	b	14.1	135.0	(1.56)	(3.20)	(0.0232)	NA
1B	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
1C	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
AVERAGE			NA	NA	NA			1.565	3.198	0.023	NA
2A	11.1	98.5	b	b	b	14.1	140.7	[0.308]	[0.629]	[0.0048]	NA
2B	11.1	98.5	b	b	b	14.1	140.7	[0.270]	[0.552]	[0.0042]	NA
2C	11.1	98.5	b	b	b	14.1	140.7	[0.254]	[0.520]	[0.0039]	NA
AVERAGE			NA	NA	NA			[0.277]	[0.567]	[0.0043]	NA
3A	10.6	100.0	(0.994)	(1.342)	(0.011)	13.4	140.4	[0.246]	[0.457]	[0.0038]	65.2
3B	10.6	100.0	[0.721]	[0.972]	[0.008]	13.4	140.4	[0.332]	[0.615]	[0.0051]	c
3C	10.6	100.0	[0.540]	[0.729]	[0.006]	13.4	140.4	[0.225]	[0.417]	[0.0035]	c
AVERAGE			0.994	1.34	0.011			[0.268]	[0.496]	[0.0041]	65.2
COND. 1 AVG.	**10.9**	**98.0**	**0.994**	**1.34**	**0.011**	**13.9**	**138.7**	**1.565**	**3.198**	**0.023**	**65.2**
4A	10.4	94.7	11.1	14.7	0.115	13.8	137.1	[0.284]	[0.556]	[0.0043]	96.3
4B	10.4	94.7	3.87	5.13	0.040	13.8	137.1	[0.164]	[0.321]	[0.0025]	93.9
4C	10.4	94.7	5.40	7.15	0.056	13.8	137.1	[0.178]	[0.349]	[0.0027]	95.2
AVERAGE			6.79	8.98	0.071			[0.209]	[0.409]	[0.0032]	95.1
5A	10.8	96.8	3.44	4.73	0.037	13.6	143.2	[0.168]	[0.320]	[0.0027]	92.8
5B	10.8	96.8	4.03	5.55	0.043	13.6	143.2	[0.173]	[0.329]	[0.0027]	93.7
5C	10.8	96.8	5.84	8.03	0.062	13.6	143.2	[0.163]	[0.310]	[0.0026]	95.9
AVERAGE			4.43	6.10	0.047			[0.168]	[0.320]	[0.0027]	94.1
6A	10.7	98.9	[0.238]	[0.324]	[0.003]	13.5	141.0	[0.154]	[0.288]	[0.0024]	c
6B	10.7	98.9	1.82	2.48	0.020	13.5	141.0	[0.152]	[0.285]	[0.0024]	88.1
6C	10.7	98.9	2.67	3.64	0.029	13.5	141.0	[0.170]	[0.320]	[0.0026]	90.9
AVERAGE			2.24	3.06	0.024			[0.159]	[0.298]	[0.0025]	89.5
COND. 2 AVG.	**10.6**	**96.8**	**4.77**	**6.42**	**0.050**	**13.6**	**140.4**	**[0.178]**	**[0.342]**	**[0.0028]**	**93.3**

a The flow rates determined by the CDD/CDF sampling trains were used for HCl emission rate calculations.
b The results are not reported because the data does not fall within acceptable control limits.
c The removal efficiency is not calculated because both inlet and outlet results are non-detects.
d [] = Not detected at the limit shown; () = Less than five times the detection limit.
e Detection limits are not considered when calculating averages.

less than 0.006 lb/hr to 0.01 lb/hr with and average of 0.01 lb/hr. The HF concentrations exiting the baghouse ranged from less than 0.4 ppmvd at 7 percent O_2 to 3.2 ppmvd at 7 percent O_2 with an average of 2.2 ppmvd at 7 percent O_2. The HF emission rate at the baghouse outlet ranged from less than 0.004 lb/hr to 0.02 lb/hr with an average of 0.016 lb/hr.

For Condition 2, the HF concentration at the spray dryer inlet ranged from less than 0.3 ppmvd at 7 percent O_2 to 14.7 ppmvd at 7 percent O_2 with an average of 6.4 ppmvd at 7 percent O_2. The emission rate of HF entering the spray dryer ranged from less than 0.003 lb/hr to 0.1 lb/hr with an average of 0.05 lb/hr. The HF concentration at the baghouse outlet ranged from less than 0.3 ppmvd at 7 percent O_2 to less than 0.6 ppmvd at 7 percent O_2 with an average of less than 0.34 ppmvd at 7 percent O_2. At the baghouse outlet, the HF emission rate ranged from less than 0.002 lb/hr to less than 0.004 lb/hr with an average of less than 0.003 lb/hr.

A comparison of the emission rates for both conditions at the spray dryer inlet cannot be made because only one detectable value at the inlet is reported. The baghouse outlet emission rates for both conditions are consistent. During Condition 1, HF was not detected in any of the 9 samples. The removal efficiency of the only reported run during Condition 2 ranged from 88.1 to 96.3 percent. With only one valid removal efficiency for Condition 1, it cannot be concluded with confidence that the injection of carbon into the lime slurry improves the HF removal efficiency of the emission control system.

2.6.3 Hydrogen Bromide Results

Table 2-49 summarizes the HBr spray dryer inlet and baghouse outlet concentrations and emission rates, as well as the removal efficiencies for the emission control system. The removal efficiencies could not be calculated for the first six runs for reasons discussed previously.

For Condition 1, the HBr concentration at the spray dryer inlet ranged from 8.4 to 14.4 ppmvd at 7 percent O_2 with an average of 11.0 ppmvd at 7 percent O_2. The HBr emission rate at the spray dryer inlet ranged from 0.28 to 0.47 lb/hr with an average of 0.36 lb/hr. At the baghouse outlet, the HBr concentration ranged from less than 0.042 ppmvd at 7 percent O_2 to 2.01 ppmvd at 7 percent O_2 with an average of

TABLE 2-49. SUMMARY OF HYDROGEN BROMIDE RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

RUN NO.	SPRAYDRYER INLET					BAGHOUSE OUTLET					
	O2 CONC. (% VOL)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	O2 CONC. (% VOL)	FLUE GAS FLOW (dscmm)	GAS CONC. (ppmV)	GAS CONC. (ppmV @7% O2)	EMISSION RATE (lb/hr)	REMOVAL EFFICIENCY (%)
1A	11.1	95.4	b	b	b	14.1	135.0	[0.034]	[0.070]	[0.0021]	NA
1B	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
1C	11.1	95.4	b	b	b	14.1	135.0	b	b	b	NA
AVERAGE			NA	NA	NA			[0.034]	[0.070]	[0.0021]	NA
2A	11.1	98.5	b	b	b	14.1	140.7	[0.023]	[0.048]	[0.0015]	NA
2B	11.1	98.5	b	b	b	14.1	140.7	[0.020]	[0.042]	[0.0013]	NA
2C	11.1	98.5	b	b	b	14.1	140.7	0.168	0.343	0.011	NA
AVERAGE			NA	NA	NA			0.168	0.343	0.011	NA
3A	10.6	100.0	10.7	14.4	0.474	13.4	140.4	0.287	0.532	0.018	96.2
3B	10.6	100.0	7.54	10.2	0.335	13.4	140.4	0.357	0.661	0.022	93.4
3C	10.6	100.0	6.19	8.36	0.276	13.4	140.4	1.08	2.01	0.068	75.5
AVERAGE			8.13	11.0	0.362			0.576	1.07	0.036	88.3
COND. 1 AVG.	**10.9**	**98.0**	**8.13**	**11.0**	**0.362**	**13.9**	**138.7**	**0.474**	**0.886**	**0.030**	**88.3**
4A	10.4	94.7	5.80	7.68	0.244	13.8	137.1	0.348	0.680	0.021	91.3
4B	10.4	94.7	9.64	12.8	0.406	13.8	137.1	0.277	0.541	0.017	95.8
4C	10.4	94.7	2.73	3.61	0.115	13.8	137.1	0.256	0.502	0.016	86.4
AVERAGE			6.06	8.02	0.255			0.293	0.574	0.018	91.2
5A	10.8	96.8	9.34	12.8	0.402	13.6	143.2	[0.013]	[0.024]	[0.0008]	>99.8
5B	10.8	96.8	7.32	10.1	0.315	13.6	143.2	[0.013]	[0.025]	[0.0008]	>99.7
5C	10.8	96.8	2.15	2.96	0.093	13.6	143.2	[0.012]	[0.023]	[0.0008]	>99.2
AVERAGE			6.27	8.63	0.270			[0.013]	[0.024]	[0.0008]	>99.6
6A	10.7	98.9	[0.018]	[0.024]	[0.0008]	13.5	141.0	[0.012]	[0.022]	[0.0007]	c
6B	10.7	98.9	[0.020]	[0.027]	[0.0009]	13.5	141.0	[0.011]	[0.021]	[0.0007]	c
6C	10.7	98.9	2.70	3.68	0.119	13.5	141.0	[0.013]	[0.024]	[0.0008]	>99.3
AVERAGE			2.70	3.68	0.119			[0.012]	[0.022]	[0.0007]	>99.3
COND. 2 AVG.	**10.6**	**96.8**	**5.67**	**7.66**	**0.242**	**13.6**	**140.4**	**0.293**	**0.574**	**0.018**	**95.9**

a The flow rates determined by the CDD/CDF sampling trains were used for HCl emission rate calculations.
b The results are not reported because the data is not within acceptable control limits.
c The removal efficiency is not calculated because both inlet and outlet results are non-detectible.
d [] = Not detected at the limit shown; () = Less than five times the detection limit.
e Detection limits are not considered when calculating averages.

0.89 ppmvd at 7 percent O_2. The emission rate of HBr exiting the baghouse ranged from less than 0.0013 lb/hr to 0.068 lb/hr with an average of 0.030 lb/hr.

For Condition 2, the HBr concentration at the spray dryer inlet ranged from less than 0.024 ppmvd at 7 percent O_2 to 12.8 ppmvd at 7 percent O_2 with an average of 7.7 ppmvd at 7 percent O_2. The emission rate of HBr entering the spray dryer ranged from less than 0.0008 lb/hr to 0.41 lb/hr with an average of 0.24 lb/hr. At the baghouse outlet, the concentration of HBr ranged from less than 0.021 ppmvd at 7 percent O_2 to 0.68 ppmvd at 7 percent O_2 with an average of 0.57 ppmvd at 7 percent O_2. The mass emission rate of HBr exiting the baghouse ranged from less than 0.0007 lb/hr to 0.021 lb/hr, averaging 0.018 lb/hr.

At the spray dryer inlet, the results for Conditions 1 and 2 are similar enough not to bias the removal efficiencies between the two conditions. In comparing the results at the baghouse outlet from both conditions, the average HBr emission rates for each condition showed little difference, 0.03 lb/hr for Condition 1 and 0.018 lb/hr for Condition 2. Although the average removal efficiency during carbon injection was 7.6 percentage points higher than the removal efficiency without carbon injection, there is not enough evidence to show that carbon injection actually improves the removal of HBr through the emission control system.

2.7 CEM RESULTS

Continuous emissions monitoring was conducted at the spray dryer inlet and baghouse outlet during all test runs. The CEMs were operated from the beginning to the end of the test run. Monitoring was performed using an extractive sample system and instrument methods to measure NO_x, CO, SO_2, THC, and HCl concentrations. The diluent gases (O_2, CO_2) were measured using CEMs at all times so that emission results could be normalized to a reference 7 percent O_2. Concentrations of NO_x, SO_2, CO, CO_2, and O_2 were measured on a dry basis. The THC concentrations were monitored on a wet basis, by allowing the sample stream to bypass the gas conditioners. All CEM data were recorded as one minute averages over each sampling interval.

Two additional CEM analyzers were used during this program to monitor HCl concentrations at the inlet and outlet. These systems used separate gas extractive

systems employing dilution probe techniques. The resulting concentrations were measured on a ppm by volume, wet basis.

A leak was detected in the inlet sample line for the NO_x, SO_2, CO, CO_2, THC, and O_2 analyzers at the end of the second test run. The O_2 values for these two test runs were assumed to be 3 percent lower than the outlet O_2 values. This assumption was based on the average difference between inlet and outlet O_2 values for Runs 3 through 6. The measured values for NO_x, SO_2, CO, CO_2, and THC for Runs 1 and 2 were corrected for the leakage using the assumed O_2 averages.

The one minute CEM values were averaged over the sampling interval for each test run. The averages summarized in Tables 2-50 and 2-51 present actual and normalized values, respectively. Actual concentrations are presented as they were measured (NO_x, SO_2, CO, CO_2, and O_2 on a dry basis; THC and HCl-wet and dry). Each one minute CEM reading was corrected to 7 percent O_2 based on the corresponding O_2 value. Averages of the corrected values were then calculated.

The SO_2 concentrations decreased from the inlet to the outlet for both test conditions. The average concentrations for Conditions 1 and 2 at the inlet were 10.5 and 17.8 ppmv (at 7 percent O_2) on a dry basis. The outlet concentrations were 9.2 and 3.9 ppmv. The removal was 78 percent for Condition 2 with carbon injection compared to 12.4 percent for Condition 1. The CO concentrations were very low for all runs, showing good combustion efficiency. The measured concentrations were lower at the inlet than at the outlet. Records of the responses of the inlet and outlet CO monitors to QC gases show that the outlet monitor responded with a slightly lower value that the inlet monitor. The actual difference in CO concentrations at these locations, therefore, is probably not significant. CO concentrations were less than 3 ppmv at the outlet for all runs. The CO analyzer used had a scale of 0 to 500 ppm and hence readings near the zero scale might be biased toward the lower end. The CO_2 concentrations (at 7% O_2) were not significantly different between inlet and outlet. The outlet analyzer was off line for Runs 1 and 2. The averages for the 2 test conditions at the inlet and outlet were 9.7, 8.8, 9.9, and 9.9 percent, respectively. The NO_x concentrations (at 7% O_2) were almost the same at the inlet and outlet. The HCl concentrations decreased from the inlet to the outlet and are discussed in more detail in Section 2.6.

Table 2-50

Continuous Emissions Monitoring Test Averages
Morristown Memorial Hospital (1991)

Date	Run Number	O_2 (%V, dry)	CO (ppmv, dry)	CO_2 (%V, dry)	SO_2 (ppmv, dry)	NO_x (ppmv, dry)	H_2O (%)	THC (ppmv, wet)	THC (ppmv, dry)	HCl (ppmv, wet)	HCl (ppmv,dry)
Spray Dryer Inlet Data											
11-18-91	1	11.1	15.5	6.4	5.9	60.3	15.9	3.9	4.6	663.1	788.5
11-19-91	2	11.1	8.5	7.8	9.5	57.0	15.5	2.5	3.0	498.1	589.5
11-20-91	3	10.6	7.1	6.7	7.1	65.2	14.9	1.2	1.4	524.9	616.8
Condition 1 Avg		**10.93**	**10.37**	**6.97**	**7.5**	**60.83**	**15.4**	**2.53**	**3.0**	**562.0**	**664.3**
11-21-91	4	10.4	6.4	6.6	17.8	63.5	14.7	2.8	3.3	673.0	788.9
11-22-91	5	10.8	8.7	6.5	16.0	61.3	13.9	2.5	2.9	586.0	680.6
11-23-91	6	10.7	4.7	6.5	6.0	58.6	14.0	0.5	0.6	593.1	689.7
Condition 2 Avg		**10.63**	**6.6**	**6.53**	**13.27**	**61.13**	**14.2**	**1.93**	**2.3**	**617.4**	**719.6**
Baghouse Outlet Data											
11-18-91	1	14.1	1.0	[a]	2.6	49.6	14.6	1.1	1.3	9.2	10.8
11-19-91	2	14.1	0.3	[a]	9.3	45.7	13.8	0.7	0.8	8.5	9.9
11-20-91	3	13.4	0.5	5.3	1.7	47.5	14.7	0.9	1.1	3.7	4.3
Condition 1 Avg		**13.87**	**0.6**	**5.3**	**4.53**	**47.6**	**14.4**	**0.9**	**1.1**	**7.13**	**8.3**
11-21-91	4	13.8	0.1	5.2	2.8	47.1	14.8	1.2	1.4	10.5	12.3
11-22-91	5	13.6	1.5	5.0	2.6	45.6	13.4	1.2	1.4	5.6	6.5
11-23-91	6	13.5	0.6	5.3	0.6	46.4	13.0	1.1	1.3	4.0	4.6
Condition 2 Avg		**13.63**	**0.73**	**5.17**	**2.0**	**46.4**	**13.7**	**1.17**	**1.4**	**6.7**	**7.8**

[a] Instrument off line.

Note: Data for 11/18/91 and 11/19/91 were corrected for inleakage.
O_2 was made to be 3 prcent lower than the outlet O_2 (3 percent is the average difference in inlet and outlet O_2 for 11/19 through 11/23/91). CO, CO_2, SO_2, NO_x, and THC were corrected for the new O_2 level.

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Table 2-51

Continuous Emissions Monitoring Test Averages
Normalized to 7 Percent Oxygen
Morristown Memorial Hospital (1991)

Concentration, ppmv, dry at 7% O_2							
Date	Run Number	CO	CO_2	SO_2	NO_x	THC	HCl
Spray Dryer Inlet Data							
11-18-91	1	21.9	9.0	8.4	85.2	6.5	1118.4
11-19-91	2	12.0	11.0	13.5	81.1	4.3	836.1
11-20-91	3	9.7	9.1	9.6	88.4	1.9	832.4
Condition 1 Avg.		**14.5**	**9.7**	**10.5**	**84.9**	**4.2**	**926.2**
11-21-91	4	8.4	8.7	23.4	83.7	4.4	1044.4
11-22-91	5	11.9	9.0	22.0	84.4	4.0	936.7
11-23-91	6	6.4	8.8	8.1	79.6	0.8	939.9
Condition 2 Avg		**8.9**	**8.8**	**17.8**	**82.6**	**3.1**	**973.9**
Baghouse Outlet Data							
11-18-91	1	2.0	[a]	5.2	101.0	2.7	22.1
11-19-91	2	0.6	[a]	19.1	93.9	1.6	20.2
11-20-91	3	0.9	9.9	3.2	88.2	2.0	7.9
Condition 1 Avg		**1.2**	**9.9**	**9.2**	**94.4**	**2.2**	**16.4**
11-21-91	4	0.2	10.3	5.5	92.7	2.7	24.1
11-22-91	5	2.9	9.6	5.1	87.4	2.7	12.4
11-23-91	6	1.2	10.0	1.2	87.8	2.4	8.6
Condition 2 Avg		**1.4**	**9.9**	**3.9**	**89.3**	**2.7**	**14.9**

[a]Instrument off line.

Note: Data for 11/18/91 and 11/19/91 were corrected for inleakage.
O_2 was made to be 3 percent lower than the outlet O_2 (3 percent is the average difference in inlet and outlet O_2 for 11/19 through 11/23/91). CO,CO_2, SO_2, NO_x, and THC were corrected for the new O_2 level.

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2.8 MICROBIAL SURVIVABILITY RESULTS

This section provides the background and test matrix for microbial survivability testing and presents the test results for microbial survivability in emissions, in ash, and in ash pipes.

2.8.1 Background and Test Matrix

One of the objectives of this test program was to further develop testing methods to determine microbial survivability in incinerator processes. As part of the MWI test program at Morristown Memorial, testing was conducted to determine microbial survivability based on a surrogate indicator organism that was spiked into the incinerator feed during test Runs 1, 2, and 3. The surrogate indicator organism was the soil spore Bacillus stearothermophilus (B. stearothermophilus). This organism was chosen because it survives at high temperatures and it is easy to culture and identify. Also, it is non-pathogenic and is not commonly found in medical waste streams.

Two types of testing were performed. The purpose of the first test method was to determine microbial survivability in the combustion gases (emissions) and the bottom ash, spray dryer residue, and baghouse ash. For these tests, a known quantity of B. stearothermophilus in solution was absorbed onto materials commonly found in the medical waste stream and introduced into the incinerator at regular intervals during each run. Emissions testing was conducted at the incinerator exit upstream of the air pollution control system following the EPA draft method "Microbial Survivability Test for Medical Waste Incinerator Emissions." This testing was performed concurrently with other emissions testing (PM/Metals, CDD/CDF, halogens, and CEMs) during the burn periods. Ash samples were taken following each test run after the ash was cool enough to handle. The ash was sampled and analyzed as described in the EPA Draft Method "Microbial Survivability Test for Medical Waste Incinerator Ash."

The second Microbial Survivability test method utilized freeze dried spores encapsulated in metal pipes which were insulated with high temperature ceramic insulation and wrapped in wire mesh. This test was used to aid in the assessment of microbial survivability in the ash. Each pipe sample also contained five temperature indicating pellets. The pellets were selected to melt at specific temperatures between

400°F and 1200°F. They were used to record the maximum sample temperature reached in the incinerator.

Complete details of the microbial spiking, recovery and analysis procedures are given in Section 5.3.

Three test runs were performed at the rated incinerator operating conditions over a period of three days. At the start of each four-hour test run, liquid spores were poured into a plastic garbage bag containing absorbent materials and two dry spore pipe samples. The bag was then charged into the incinerator with the normal waste stream. This procedure was repeated each hour during the test, until a total of four bags of wet spores and eight dry spore pipe samples had been charged into the incinerator. A final dry spore pipe sample was charged into the incinerator at the end of the fourth testing hour, bringing the total number of pipe samples per test to nine.

Table 2-52 summarizes the spore spiking times, the total weight fed to the incinerator, and the total ash weights generated during each test run.

2.8.2 Overall Microbial Survivability

By comparing the number of spores spiked to the incinerator with the number of viable spores exiting in both the stack gas and incinerator ash, an overall microbial survivability value can be determined as follows:

$$MS = \left(\frac{S_e + A_e}{S_s}\right) \times 100$$

MS	=	spore microbial survivability (wet)
S_e	=	Number of viable spores detected exiting the stack
A_e	=	Number of viable spores detected in the incinerator ash
S_s	=	Number of viable spores spiked in the waste feed

This is an adaptation of the destruction efficiency (DE) calculation presented in the reference test protocol which calculates DE based only on stack emissions and a separate DE based on spores in ash. By combining the two DE estimates, a more complete estimate of Microbial Survivability (1 - DE) is obtained. The total number of spores in the ash was calculated by multiplying the number of spores found in 1 gram of ash by

Table 2-52
Summary of Incinerator Feed and Ash Generation
Morristown Memorial Hospital (1991)

Test Day	Date	Run Number	Time	Wet Spore[a] Samples	Dry (Pipe) Spore[b] Samples	Total Waste Feed (lbs)	Total Ash Weight (lbs)		
							Bottom	Spray Dryer	Baghouse
1	11/18/91	1	1408	1	2				
			1506	1	2				
			1601	1	2		325	17	185
			1703	1	2				
			1803	0	1				
2	11/19/91	2	1552	1	2				
			1700	1	2				
			1756	1	2		256	15	122
			1851	1	2				
			1958	0	1				
3	11/20/91	3	1234	1	2				
			1331	1	2				
			1431	1	2		404	98	215[c]
			1648	1	2				
			2155	0	1				

[a] Each wet spore sample contained approximately 3.5 x 10E11 spores in 500 ml of solution.
[b] Each dry spore contained approximately 1 x 10E7 freeze-dried spores.
[c] Filter cake was removed during run on 11/20/91. Total ash dropped was 859 lbs in 1.5 hours. The 215 lbs shown in the table does not included any of the ash from cake removal.

the total weight of ash removed from the incinerator per day. The analytical results are shown in Appendix E.3.

Table 2-53 presents the overall survivability of the indicator spores. No viable spores were found either in the stack gas samples or in the incinerator ash. Flue gas microbial survivability are further discussed in the following sections.

2.8.3 Microbial Survivability in Emissions

Microbial Survivability in emissions tests were conducted to quantify the number of viable spores exiting the stack during each test run. The formulas normally used for calculating the number of viable spores existing in the stack, S_e are shown in Appendix F, and in the EPA draft method in Appendix K.

Approximately 1.5 liters of impinger collection solution was generated for each run. These run samples were recovered in a disinfected mobile laboratory, sealed, and sent to the analytical laboratory.

For each run performed, 9 aliquots were prepared for analysis: three 10 ml aliquots, three 100 ml aliquots, and 3 equal aliquots of a remaining filterable amount of sample. Both a first and second count on each aliquot were performed. The first count was conducted after approximately 24 hours incubation, and the second after approximately a 48 hour incubation period. Previous research has shown that the spore count does not increase after the 48-hour count incubation period. No viable spores were seen in any of the run samples after the 48-hour incubation period.

The Microbial Survivability sampling and flue gas parameters are shown in Table 2-54.

2.8.4 Microbial Survivability in Ash

Incinerator bottom ash was removed from the incinerator after each run and stored in a pre-cleaned, disinfected covered steel hopper. A composite ash sample was prepared by first removing large pieces of metal and glass from the hopper, then mixing the remaining ash and placing samples into clean, amber glass sample bottles. Spray dryer ash and baghouse ash were similarly composited into bottles after each run. The composite samples were then submitted to the laboratory for culturing, and enumeration of B. stearothermophilus.

Table 2-53

Overall Microbial Survivability
Morristown Memorial Hospital (1991)

Test Day	Date	Run Number	Number of Indicator Spores Spiked	Number Indicator Spores Exiting the Stack	Number of Indicator Spores in Ash	Spore Survivability (%)
1	11/18/91	1	14 x 10E11	0	0	0
2	11/19/91	2	14 x 10E11	0	0	0
3	11/20/91	3	14 x 10E11	0	0	0

TABLE 2-54. SUMMARY OF FLUE GAS SAMPLING PARAMETERS
FOR INDICATOR SPORE EMISSIONS
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Run 1	Run 2	Run 3	Average
Total Sample Time (min)	231	240	151	207
Average Sampling Rate (dscfm)	0.61	0.58	0.61	0.60
Dry Standard Meter Volume (dscf)	140	140	91.4	123.8
Dry Standard Meter Volume (dscm)	3.96	3.96	2.59	3.50
Average Stack Temperature (F)	413	411	410	411
Oxygen Concentration (% V)	11.1	11.1	10.6	10.9
Carbon Dioxide Concentration (% V)	6.4	7.8	6.7	7.0
Percent Moisture (% V)	15.9	15.5	14.9	15.4
Volumetric Flow Rate (dscfm)	3512	3414	3617	3514
Volumetric Flow Rate (dscmm)	99.5	96.7	102	99.4
Percent Isokinetic (%)	96.6	95.7	93.8	NA

NA : Not applicable

No viable spores were found in any ash sample from the Morristown MWI tests. Three ash aliquots of approximately one gram were prepared from each sample. Six serial dilutions were prepared on each ash aliquot and triple plated. A summary of the analytical data is shown in Appendix E.3.

2.8.5 Microbial Survivability in Pipes

Pipe samples were loaded into the incinerator during each test run. The pipes were recovered the following morning during bottom ash sampling. Approximately half of the samples charged into the incinerator were recovered. The rest were lost, probably after becoming imbedded in the masses of molten glass which roll through the incinerator. Pipe samples which were recovered were removed from their insulating wrappings. The condition of the temperature indicating pellets was noted and the inner containers were sent to the laboratory for analysis. The analysis results from the recovered pipes are shown in Table 2-55.

Table 2-55

Spore Pipe Sample Recovery and Analysis Results

Run Number	Date	Sample Number	Charge Time	Sample Recovery	Maximum Temp.	Spores Cultured
1	11/18/91	10	1408	Yes	< 1200	0
1	11/18/91	11	1408	Yes	< 1000	0
1	11/18/91	12	1506	Yes	[a]	0
1	11/18/91	13	1506	Yes	> 1200	0
1	11/18/91	14	1601	Yes	> 1200	0
1	11/18/91	16	1601	Yes	> 1200	0
1	11/18/91	17	1703	No	> 1200	--
1	11/18/91	18	1703	No	[d]	--
1	11/18/91	19	1803	Yes	> 1200	0
2	11/19/91	20	1552	No	[d]	--
2	11/19/91	21	1552	Yes	< 1200	0
2	11/19/91	22	1700	No	[d]	--
2	11/19/91	23	1700	No	[d]	--
2	11/19/91	24	1756	No	[d]	--
2	11/19/91	26	1756	No	[d]	--
2	11/19/91	27	1851	No	[d]	--
2	11/19/91	28	1851	No	[d]	--
2	11/19/91	29	1958	No	[d]	--
3	11/20/91	30	1234	Yes	[d]	0
3	11/20/91	31	1234	Yes[c]	[d]	0
3	11/20/91	32	1331	Yes	[d]	0
3	11/20/91	33	1331	No	[d]	--
3	11/20/91	34	1431	No	[d]	--
3	11/20/91	36	1431	Yes	> 1200	0
3	11/20/91	37	1648	No	[d]	--
3	11/20/91	38	1648	Yes	[d]	0

Table 2-55 (Continued)

Run Number	Date	Sample Number	Charge Time	Sample Recovery	Maximum Temp.	Spores Cultured
3	11/20/91	39	2155	No	[d]	--
1	11/18/91	71[a]	1631	Yes	>1200	1
3	11/20/91	72[a]	2120	Yes	>1200	0
--	--	81[b]	--	Yes	ambient	TNTC[e]
--	--	82[b]	--	Yes	ambient	TNTC

[a] Pipe samples 71 and 71 were empty sample blanks.
[b] Pipe samples 81 and 82 were field blank control samples, which were not charged into the incinerator.
[c] One sample was recovered from Run 3 without the sample identification tag. It was arbitrarily identified as No. 31.
[d] Temperature pellets not recovered.
[e] TNTC = to numerous to count.

3. PROCESS DESCRIPTION AND SUMMARY OF PROCESS OPERATION DURING TEST AT MORRISTOWN MEMORIAL HOSPITAL

3.1 INTRODUCTION

The Madison Avenue Division of the Morristown Memorial Hospital (MMH) is a 657-bed hospital located in Morristown, New Jersey. Wastes generated at MMH, including red bag and general waste, sharps, and a small amount of pathological waste, are incinerated in an onsite incineration system; cafeteria waste, batteries, and cardboard are segregated for separate disposal. The system, which began operation in September 1991, was custom designed and sized by ThermAll, Inc. The incinerator consists of a rotary kiln, or primary combustion chamber (PCC), followed by a secondary combustion chamber (SCC). After the SCC, most of the energy provided by the waste and fuel is extracted in a waste heat recovery boiler (WHRB). The cooled exhaust gas is then routed sequentially through spray dryer/fabric filter air pollution control equipment for acid gases, particulate matter, and metals control; an induced-draft (ID) fan; and a 30-meter (m) (100-foot [ft]) stack. Most operating parameters are automatically monitored, recorded, and controlled by the Programmable Logic Controller (PLC).

The following sections in this chapter present a description of the incineration system, summarize the pretest activities needed to ensure the success of the emissions test program, and summarize the process operation during the test program. Process log data forms from the test are included in Appendix B.

3.2 PROCESS DESCRIPTION FOR MMH INCINERATION SYSTEM

The main components of the MMH incineration system are the waste charging system, the rotary kiln, the SCC, the WHRB, the bottom ash removal system, and the air pollution control equipment (APCE). The APCE consists of a spray dryer followed by a fabric filter. Figure 3-1 is a schematic of the incinerator and WHRB. Figure 3-2 shows the APCE. Each component is discussed in the following subsections.

The incineration system is located inside a 9.1-m (30-ft) high open area next to the boiler room. A large portion of the floor area (approximately 1/3) is allocated for staging the carts containing the waste. The base of the kiln is about 2.4 m (8 ft) above the floor, and the SCC and WHRB are parallel to each other above the kiln. The spray

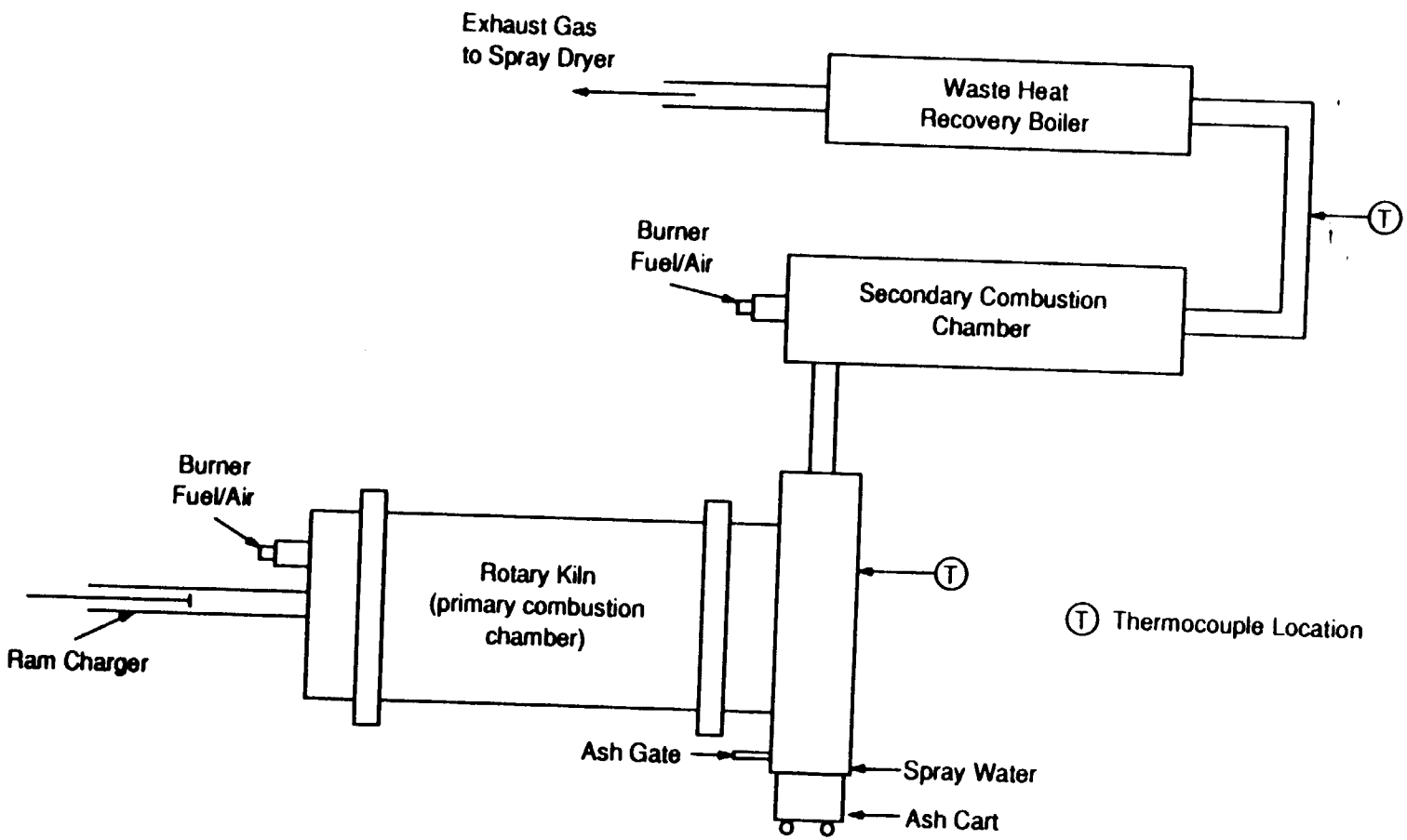

Figure 3-1. Schematic of medical waste incinerator/waste heat recovery boiler system at Morristown Memorial Hospital.

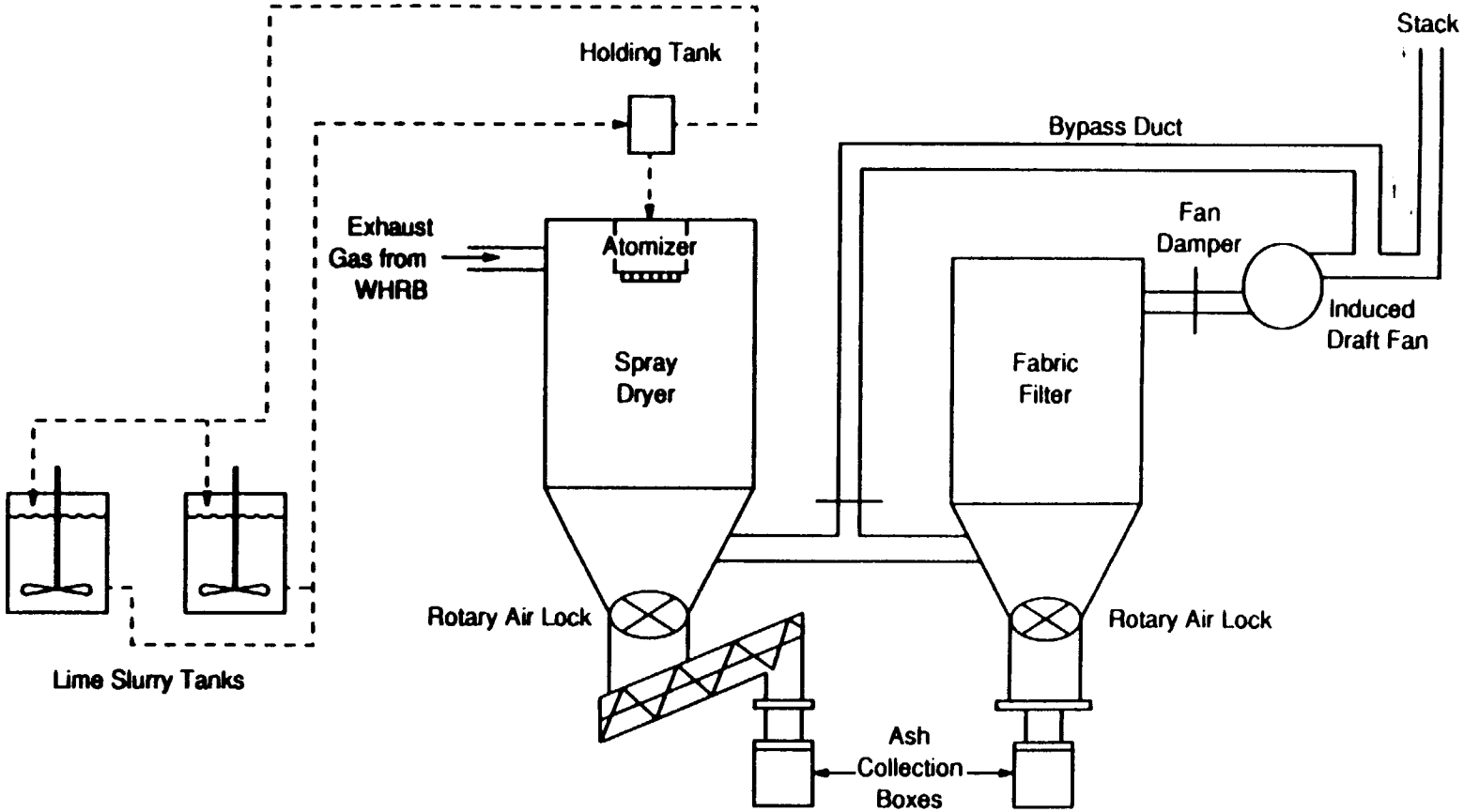

Figure 3-2. Schematic of spray dryer/fabric filter air pollution control equipment at Morristown Memorial Hospital.

dryer is situated about 1.8 m (6 ft) from the discharge end of the kiln, and the fabric filter is a few feet away from the spray dryer and in line with it and the kiln. Two hydrated lime slurry feed tanks for the spray dryer also are located in this room. Exhaust gas from the fabric filter is routed through an ID fan and a stack that discharges above the roof of the 8-story hospital building. The stack contains two side-by-side flues--one for the medical waste incinerator (MWI) and one for the boilers.

3.2.1 Incinerator

The incinerator is a rotary kiln followed by a SCC. The incinerator is designed for a heat input rate of 10.5 x 10^6 kilojoules per hour (kJ/hr) (10 x 10^6 British thermal units per hour [Btu/hr]). This heat input rate roughly corresponds to a capacity of 454 kilograms per hour (kg/hr) (1,000 pounds per hour [lb/hr]) for waste with a higher heating value of 23,200 kJ/kg (10,000 Btu/lb). The State Solid Waste Permit limits the feed rate to 363 kg/hr (800 lb/hr). The State Air Permit limits the feed rate to 354 kg/hr (780 lb/hr). The PLC ensures that the State Air Permit limit is not exceeded, as described in Section 3.2.4.

3.2.1.1 Rotary Kiln. The rotary kiln is 7.9 m (26 ft) long, 2.6 m (8.4 ft) in diameter, and is refractory-lined. It also is oriented at a 1.5° angle from the horizontal, and it rotates at about one revolution/minute. Under these conditions, ash is discharged about 45 minutes (min) after waste is introduced to the kiln. The primary (kiln) burner, which was designed for 4.2 x 10^6 kJ/hr (3.99 x 10^6 Btu/hr) and a 10:1 turndown ratio, is located beside the ram charger at the waste feed end of the kiln. The burner typically is fired with natural gas. (The burner does have the capability to fire with fuel oil.) The burner modulates to maintain the primary chamber setpoint temperature. Burner combustion air is controlled by a damper and enters through the burner. When the burner is not firing, the air damper is about 10 percent open. Control of air damper position and fuel feed rate are synchronized.

The kiln is designed to operate with 230-percent stoichiometric (theoretical) air when feeding 354 kg/hr (780 lb/hr) of waste. The setpoint to stop waste feed is a minimum of 8 percent oxygen (O_2) in the kiln. Virtually all air for combustion of the organics in the waste enters through the mechanical seal at the charge end. Draft in the kiln is monitored by a pressure transducer and is maintained at the desired setpoint by PLC control of the ID fan damper.

A water spray above the burner is activated when the exhaust gas from the kiln exceeds a setpoint temperature, and it continues until the temperature falls below another setpoint. During the test, these setpoint temperatures typically were 813°C (1495°F) and 807°C (1485°F), respectively. The design maximum flow rate is 8.7 liters (L)/min (2.3 gallons [gal]/min).

3.2.1.2 Secondary Combustion Chamber. The SCC is cylindrical in shape and has a volume of 18.8 cubic meters (m^3) (660 cubic feet [ft^3]) based on an internal length of 7.9 m (26 ft) and a diameter of 1.7 m (5.7 ft). The burner, which has a capacity of 6.3 x 10^6 kJ/kg (6 x 10^6 Btu/hr) and a 10:1 turndown ratio, is located at the upstream end of the SCC and is fueled with natural gas. The burner modulates to maintain the setpoint temperature. Combustion air is introduced through the burner. The exhaust gas temperature is monitored by a thermocouple in the 3-m (10-ft) transition duct between the end of the SCC and the WHRB. The design combustion gas flow rate is 547 actual cubic meters per minute (acmm) (19,320 actual cubic feet per minute [acfm]), at a temperature of 1093°C (2000°F), which yields a residence time of 2 seconds (sec).

3.2.2 Bottom Ash Removal System

At the discharge end of the kiln is a "rear panel." Exhaust gases pass out through the top of the panel to the SCC, and ash is discharged through an opening in the floor of the rear panel into an ash cart. Just above the base of the rear panel is a horizontal ash gate. To prevent air leakage and/or escape of combustion gases, the ash cart is lifted into position and held against the base of the rear panel by two hydraulic cylinders. Both the ash gate and the cart movement are controlled by local, manual controls. The ash gate must be closed before the cart can be lowered. A series of water injection nozzles are located between the ash gate and the base of the rear panel. The PLC automatically controls water spray into the ash cart in proportion with the amount of waste fed. A manual control is also available to spray water as long as the button is depressed.

3.2.3 Waste Charging System

The incinerator is equipped with an automatic waste charging system that minimizes operator handling of the waste and, in conjunction with the PLC, ensures that the feed rate does not exceed 354 kg/hr (780 lb/hr). The major components of the waste charging system are the scale, elevator, hopper/chute, conveyor belt, ram hopper, and ram. Wastes are transported to the incinerator in identical, wheeled, plastic "skip" carts that have a 0.76-m^3 (1-yd^3) capacity. After the carts are weighed, they are rolled onto the elevator. When the elevator reaches the top of its travel, the waste is dumped

into a hopper/chute. At the bottom of the discharge of the hopper/chute is a conveyor belt that transports the waste to the ram hopper; when the ram hopper door opens, the belt advances and waste is dropped into the ram hopper. The ram hopper door closes; the waste feed gate on the kiln face opens; and the ram then pushes the waste into the rotary kiln. The PLC controls the process once the operator presses the "up" button on the elevator.

To ensure that the 354-kg/hr (780-lb/hr) limit is not exceeded, the PLC maintains a rolling, "first-in, first-out" (FIFO) stack of 60 weights, which correspond with each minute in the past hr. The sum of the 60 weights for the 60-min period represents the weight charged during the previous hr. The PLC utilizes an interlock to prohibit charging if the FIFO sum is greater than 354 kg (780 lb). More detail on this control system is presented in the following paragraphs.

Each minute the PLC records whatever weight, including zero, that it finds in a special register. During the first four runs, the cart weight was transferred to this register once the elevator started to lift the cart. However, as noted in Section 3.4, problems with the hydraulic system during Runs 3 and 4 caused some carts to come back down before the waste had been dumped. Consequently, some charges were recorded in the FIFO stack before the cart had actually been dumped. Double counting was avoided by reweighing an empty cart, then rolling the full one back onto the elevator. To remedy this problem, the programming was changed after Run 4 so that the weight would be placed in the register after the cart had dumped the waste and was on its way back down. Both programming methods are acceptable because the entire elevator cycle takes more than 60 sec. Therefore, a weight can not be displaced from the register by another weight before it has been added to the FIFO stack.

The carts are weighed on a floor scale that has previously been tared with an empty cart. The operator also manually records the weight on a log and indicates whether it is red bag or brown bag waste. The operator then opens the gate to the elevator and rolls the cart onto it. The opening only clears the top of the cart by a couple of inches (in.). This feature is designed to limit charge sizes (volumes).

When a cart is rolled onto the elevator and the operator pushes the "up" button, its weight plus that in the FIFO stack is checked to determine whether the total exceeds

780 lbs. If it does, the elevator does not activate until enough time passes for enough weight to fall out of the FIFO stack so the total weight is less than 354 kg (780 lb). The elevator then lifts the cart to the top of its travel and starts to dump the waste into the hopper/chute.

The waste is dumped by tipping the cart in a series of steps. A photoelectric cell at the top of the hopper determines whether the chute is full. If it is not, the cart is tipped to the next step. When the chute is full, the cart is not tipped further until the waste level in the chute falls below the photoelectric cell. After all of the waste has been dumped (the cart has been tipped almost completely upside down), the elevator brings the empty cart back to the floor.

The hopper/chute feeds a conveyor belt that transfers the waste a distance of about 1.8 m (6 ft) to the ram hopper. Another photoelectric cell is located at the end of the conveyor where it meets the ram hopper. When waste is present in front of the photocell and the ram hopper door is open, the conveyor is indexed to run for a predetermined time (2.5 sec) to control the amount of waste feed to the ram hopper. This cycle of waste feed to the charge ram hopper continues until the photocell indicates that no waste is on the feed belt. If the 354 kg/hr (780 lb/hr) charge limit has not been reached and the feed belt is empty, an alarm will sound, indicating a demand for waste.

The ram, the ram hopper cover door, and the guillotine door on the kiln are actuated by hydraulic cylinders. The ram feeder cycle is 90 sec. Typically, the ram is activated remotely (by the PLC) but local, manual control is used when the sequence does not proceed properly (e.g., when waste blocks the ram hopper door, preventing it from closing properly). Interlocks prevent the ram from operating if, among other things, the kiln rotation stops, the SCC temperature falls below 840°C (1550°F), the spray dryer outlet temperature exceeds 149°C (300°F), the stack carbon monoxide (CO) concentration corrected to 7 percent O_2 exceeds 50 ppm for 1 min, or the kiln temperature either falls below 677°C (1250°F) or exceeds 832°C (1530°F). The feed cycle will continue to operate automatically--one ram charge after another--until the PLC halts charging as a result of any of the interlocks previously mentioned. If the 354 kg/hr (780 lb/hr) limit is reached, the PLC will prevent waste from being loaded to the

hopper/chute, which essentially shuts down charging once the residual waste in the hopper/chute is charged.

3.2.4 Waste Heat Recovery Boiler

The WHRB is rated at 3,100 kg/hr (6,831 lb/hr) of steam at 125 pounds per square inch gauge (psig). The WHRB is operated at 100 psig. Exhaust gas enters the WHRB at about 980°C (1800°F) and leaves at about 230°C (450°F). The boiler does not have an auxiliary burner. The automatic soot blower activates every 30 min, and it operated normally throughout the test period.

3.2.5 Air Pollution Control Equipment

The APCE consist of a spray dryer followed by a fabric filter. A hydrated lime slurry is injected at the top of the spray dryer for hydrogen chloride (HCl) control. The fabric filter controls particulate matter and metals emissions.

3.2.5.1 Spray Dryer. The spray dryer is a large cylindrical vessel with a conical base. A slurry of hydrated lime and water is injected through a rotary atomizer that is centrally located just below the roof of the vessel. Hot gases from the WHRB also enter the top of the vessel. As the gases and slurry mix, all of the water evaporates, and the gas is cooled to about 141°C (285°F). The hydrated lime slurry feed rate is automatically controlled by the PLC. The control setpoint is the spray dryer outlet temperature. The water contained in the hydrated lime slurry is used to cool the gas; consequently, the slurry feed rate is increased or decreased as necessary to maintain the desired outlet temperature. For this system, the hydrated lime concentration is not independently controlled; as the slurry feed rate changes to maintain temperature, the hydrated lime feed rate to the system also varies. Consequently, the initial hydrated lime concentration of the slurry mix tank is an important factor that must be considered carefully in conjunction with the estimated slurry feed rate necessary to maintain temperature.

The reaction between the hydrated lime and acid gases occurs by: (1) contact between the gases and suspended particles of hydrated lime, (2) contact between the acid gases and the hydrated lime deposited on the walls of the spray dryer, the duct connecting spray dryer and fabric filter, and the fabric filter, and (3) passage of the acid gases through the hydrated lime filter cake deposited on the fabric filter. The

instantaneous slurry feed rate can drop to zero with no apparent loss of control of acid gases as long as the hydrated lime feed rate is adequate on average.

The slurry is mixed in two large (1.7 m [5.5 ft] diameter by 1.8 m [6 ft] height) open-topped fiberglass tanks. A uniform slurry is maintained in both tanks by agitators that are powered by 3-horsepower (hp) motors. The operator flips a two-position switch to select the tank that will be used during operation. A premium hydrated lime is used, with no coarse material to settle or plug screens or equipment. To further prevent clogging, the spray dryer feed line is located about 15 to 20 centimeters (cm) (6 to 8 in.) above the base of the tank. The hydrated lime purchased by MMH contains 95.1 percent calcium hydroxide, which is typical of commercial hydrated lime. It is purchased in 22.7-kg (50-lb) bags and manually poured into the tanks. This procedure results in hydrated lime dust in the incinerator room. The hospital is adding a ventilation hood and filter to control the dust and protect personnel.

The slurry is pumped to a 18.9-L (5-gal) holding tank on top of the spray dryer. According to ThermAll, about 40 percent of the flow from the holding tank is directed to the rotary atomizer, and the remaining 60 percent is recirculated to the slurry mixing tanks. According to the flow monitor in the system, the average slurry feed rate to the spray dryer is about 4.9 L/min (1.3 gal/min), but this monitor is not believed to be accurate.

The hospital records the amount of hydrated lime and water added to the tank to determine the hydrated lime concentration, and monitors and records tank height to determine the hydrated lime usage. The flow meter provides a relative indication of feed line plugging, alerting the operator to the need for remedial action to avert a shutdown. If the flow to the spray dryer is inadequate, the temperature of the flue gas to the fabric filter will rise. At a flue gas temperature of 149°C (300°F) to the fabric filter, the PLC will stop the incinerator from feeding waste, as described in Section 3.2.3.

During the tests, average slurry feed rates were estimated to be about 2.6 L/min (0.7 gal/min), based on changes in the level (measured utilizing automatic level gauges) in the slurry mixing tanks. The tests also showed that the gas was cooled from about 204°C (400°F) to 141°C (285°F) in the spray dryer. The measured slurry feed rate is less than the amount needed to achieve this reduction in exhaust gas temperatures. Higher

slurry feed rates are not needed, however, because a considerable amount of ambient air is entrained into the spray dryer around the rotary atomizer.

A small amount of residue is discharged from the base of the spray dryer. During the emissions tests, the average discharge rate was about 12 kg/test (27 lb/test). A screw conveyor transfers this residue to a cardboard box that is lined with a plastic bag. When the box is full, it is handled in the same manner described below for the boxes of residue from the fabric filter.

3.2.5.2 Fabric Filter. The fabric filter is a pulse-jet baghouse operated under negative pressure. It consists of one square compartment with 11 rows of bags and 11 bags per row. The bag length is 3 m (10 ft), the diameter is 11.4 cm (4.5 in.), and the material is P-84. All bags were replaced 2 weeks before the test.

The bag cleaning system is designed to keep the differential pressure across the fabric filter between 747 and 996 Pascals (Pa) (3 and 4 inches water column [in. w.c.]). When the differential pressure reaches 996 Pa (4 in. w.c.), one row is pulsed. If, after 15 sec, the differential pressure is still above 747 Pa (3 in. w.c.), another row will be pulsed. Typically, two pulses are enough, but additional rows would be pulsed if necessary. The differential pressure returns to 996 Pa (4 in. w.c.) after about 45 to 75 min. At this point, the next row(s) would be pulsed. Therefore, completing the cleaning cycle could be as long as 7.5 hr, if two rows are pulsed every 75 min.

Draft through the system is maintained by a single ID fan downstream of the fabric filter; an automatically controlled damper in the duct after the fan is used to control the airflow rate.

The system contains a bypass duct around the fabric filter and the ID fan. This bypass is needed to allow natural draft to continue to exhaust the incinerator on the loss of the ID fan when the incinerator shuts down. The damper in the bypass opens and the dampers before the fabric filter and after the ID fan close to bypass the pressure drop across the fabric filter and fan. The dampers are designed to assume these positions in the event of a power failure, and they are activated by the PLC under certain conditions. For example, an exhaust gas temperature out of the spray dryer that exceeds a nominal 204°C (400°F) is one limit that causes the PLC to shut down the incinerator and activate

the bypass. This action is taken to protect the temperature-sensitive bags in the fabric filter.

The fabric filter residue is currently discharged through a rotary valve into a 0.14-m^3 (5-ft^3) cardboard box that is lined with a plastic bag. This arrangement is being used temporarily while more permanent equipment is fitted to the hopper. The hopper was initially provided with a metal cart. However, the metal cart required modification and will be fitted with a high-temperature fabric skirt between the hopper collar and the cart to contain the dust without creating an air lock.

When the box (or cart) is full, the operator removes a sample of residue for the Environmental Protection Agency (EPA) Toxicity Characteristic Leaching Procedure (TCLP) test and for 2,3,7,8-TCDD analysis, as required by the State of New Jersey. The residue is classified on the basis of quadruplicate analysis of 4 weeks of composite daily grab samples. Residue samples taken in October 1991 have been analyzed and classified as nonhazardous. An analysis of quarterly composites of daily grab samples has confirmed the classification. After the residue was sampled during the test period, the operator closed the plastic bag, sealed the box with tape, and stored the box, pending receipt of the sample analysis. The metal cart, when it is used, will be emptied into a roll-off, with dust suppression as required.

During Run 3 and a few minutes after completing Run 6, the differential pressure across the fabric filter began to fluctuate more rapidly over a wider range than normal. These events are discussed further in Sections 3.4.1.3 and 3.4.1.6, but in both cases it appears that the hopper was full of residue, possibly due to bridging across the hopper, which resulted in an ineffective cleaning cycle; consequently, the cycles became more frequent.

3.3 PRETEST ACTIVITIES

Pretest meetings and activities were conducted on November 7 and November 13 through 17, 1991. At that time, the MMH incinerator was in a start-up mode, having operated for only 2 months. The MMH personnel were still becoming familiar with the equipment, and operation was provided to a great extent by ThermAll personnel. The State of New Jersey compliance emission pretest and test, which were to have established operating parameter setpoints for the air permit, had not been performed. The EPA, State of New Jersey, and MMH agreed to substitute the EPA emission test for the compliance emission pretest and test.

The main objectives of the pretest were to: (1) identify control setpoints, and, if necessary, determine whether changes could be made to match conditions established in other EPA tests, (2) conduct some preliminary tests to measure the levels of HCl present at the control system inlet and outlet so that the desired hydrated lime concentration in the slurry could be calculated to meet the design stoichiometric ratio (SR), and (3) determine procedures for recording key process operating parameters and set up data logging equipment. These activities are summarized below.

The key operating parameter setpoints that were established for the tests are presented in Table 3-1. Values for each setpoint except for the SCC temperature are the same as those that were used by MMH at the time of the pretest. The SCC temperature setpoint was 954°C (1750°F), but EPA requested that this be raised to 982°C (1800°F)--the value that was used in other EPA tests. The hospital agreed to this change.

ThermAll indicated that the design SR was 2:1 and, in the absence of emissions data, the unit has been operating with a slurry concentration of 9 percent hydrated lime, based upon design calculations. Since the HCl concentration was unknown, ThermAll assumed a value and estimated that about a 9 weight percent hydrated lime slurry should be prepared (i.e., 340 kg [750 lb] of hydrated lime and 3,360 kg [7,410 lb] of water. This mass of water is based on 1.5 m [5 ft] of water in the 1.7-m [5.5-ft] diameter tank). This slurry was prepared for November 16, and Radian monitored the outlet HCl concentration using a Continuous Emission Monitoring System (CEMS). The hospital and ThermAll wanted to see if similar results could be achieved with a lower hydrated

TABLE 3-1. OPERATING SETPOINTS DURING THE TEST

Parameter	Setpoint value
PCC temperature, °C (°F)	774 (1425)
SCC temperature, °C (°F)	982 (1800)
Spray dryer outlet temperature, °C (°F)	138 (280)
PCC draft, Pa (in. w.c.)	-50 (-0.20)[a]
PCC minimum 0_2, percent	8
PCC idle temperature, °C (°F)	538 (1000)
SCC idle temperature, °C (°F)	649 (1200)
PCC water quench on, °C (°F)	813 (1495)[b]
SCC water quench off, °C (°F)	807 (1485)[b]
Fabric filter pulse on, Pa (in. w.c.)	996 (4)
Fabric filter pulse off, Pa (in. w.c.)	747 (3)

[a]For some runs, the PCC draft setpoint was -45 Pa (-0.18 in. w.c.)

[b]For Run 1, the PCC water quench turned on at a setpoint temperature of 799°C (1470°F) and turned off at a setpoint temperature of 793°C (1460°F).

lime concentration (i.e., lower SR). Therefore, the trial on November 17 used about a 4.5 weight percent slurry (i.e., 170 kg [350 lb] of hydrated lime in 1.5 m [5 ft] of water). This trial ended with 30 min of operation on pure water. The fabric filters were given a complete cleaning during this test to minimize hydrated lime filter cake. Excellent HCl control efficiency was achieved, as no measurable HCl outlet emissions were noted during either trial.

These preliminary results were used to decide on the hydrated lime slurry concentration for Run 1. The EPA representatives desired to use an SR of 2.0:1. The hospital/ThermAll representatives agreed that 2.0 was a good starting point but desired to push the SR slightly lower, if possible, to test the system at a lower SR and, consequently, in the future conserve hydrated lime. Based on the preliminary tests indicating no measurable HCl emissions, a decision was made to use a 4.5 weight percent hydrated lime slurry for Run 1. The estimated SR for this calculation was somewhere between 1.2:1 and 2:1 depending upon whether the average or maximum measured flow rates and concentrations were used in the calculation.

The data acquisition system (DAS) generates an hourly report of several key parameters, including the PCC and SCC temperatures. During the test, a more frequent record of these temperatures was needed. ThermAll indicated that 1-min readings could overload the DAS. Therefore, MRI agreed to supply a data logger to record these temperatures.

The DAS also maintains a 60-min rolling record that shows each charge weight (in the carts, not the ram hopper) and the number of minutes (from the current minute) since it was charged. The hospital can display this record on a computer screen. ThermAll indicated that a hard copy could be generated by using the print screen command to dump the screen contents to a printer. Midwest Research Institute agreed to supply a printer for this purpose.

Standard procedure at MMH is for housekeeping staff to deliver the filled waste carts to the incinerator room. The incinerator operators avoid handling waste since it is inefficient and risks injury from sharps that might inadvertently have been placed in a bag. When sharps containers are available, they are evenly distributed by including no more than one or two in each cart; this practice helps achieve uniform charges and

emissions. The carts are charged such that the 354 kg/hr (780 lb/hr) limit is reached in 40 to 45 min.

Midwest Research Institute indicated that, for purposes of the test, a steady, consistent charge rate (i.e., evenly timed charges of similar weight) was preferred and that the rate should be as close as possible to the maximum hourly rate allowed. The facility agreed and indicated they would instruct the waste handlers to work with the test personnel monitoring the charging rate to assure as steady a charge rate as practicable. Consequently, during the pretest and test, the operators handled the waste more than they normally would.

For the runs with activated carbon, ThermAll requested that the carbon be mixed into the slurry rather than injected dry into the duct. The EPA agreed to this procedure.

3.4 PROCESS OPERATION DURING TESTING

The test program at MMH consisted of two test conditions and three runs at each condition. The operating parameters for each condition were identical to normal operation except that activated carbon was added to the slurry during Runs 4 through 6, the SCC temperature setpoint was increased from 954° (1750°F) to 982°C (1800°F), and an effort was made to introduce uniform charges at regular intervals (i.e., to avoid charging up to the 354 kg/hr [780 lb/hr] ceiling in 40 min and then being unable to charge for 20 min.

Table 3-2 shows the incinerator process parameters, and Table 3-3 shows the APCE process parameters that were monitored during the tests. The charge rates are presented for both the total test period (TTP) and the actual sampling period (ASP). The TTP is the time from the start of the test to the end of the test, including downtime caused by process malfunctions and the time for port changes. The ASP includes only the time when sampling occurred.

The target charging rate was 354 kg/hr (780 lb/hr), the permit ceiling. For Runs 1 and 2 and the first traverse of Run 3, the charging rate during the ASP was between 328 and 334 kg/hr (723 and 735 lb/hr), or about 6 to 7 percent below the maximum allowed rate. A major reason for this shortfall was that many times the system would hold a cart on the elevator for several min because its weight plus that in the 60-min FIFO stack exceeded 354 kg [780 lb]. Sometimes the DAS screen of the FIFO stack

TABLE 3-2. INCINERATOR PROCESS DATA SUMMARY FOR MORRISTOWN MEMORIAL HOSPITAL

Run No.	Test date	Secondary chamber temperature setpoint, °F	Average testing charge rate, lb/hr		Ash, %	Average chamber temperatures, °F		Average primary chamber draft, in., w.c.	Natural gas consumption, ft^3/hr
			TTP[a]	ASP[b]		Primary	Secondary		
1	11/18/91	1800	748	723	9.2	1476	1798	-0.19	1,965[c]
2	11/19/81	1800	720	734	7.0	1457	1789	-0.17	2,195
3	11/20/91	1800	500	789	7.8	1444	1787	-0.19	2,376[d]
4	11/21/91	1800	688	663	6.1	1451	1787	-0.19	2,096[e]
5	11/22/91	1800	616	638	6.0	1438	1786	-0.19	2,321[f]
6	11/23/91	1800	713	716	8.0	1445	1787	-0.20	2,405[g]

[a]Total testing period, including downtime and the time between traverses.
[b]Actual sampling period.
[c]Includes the natural gas consumption during the time between traverses.
[d]Does not include the first 10 min of natural gas consumption in the second traverse before the downtime.
[e]Includes the natural gas consumption during the downtime in the first traverse and during the time between traverses.
[f]Does not include the first 5 min of natural gas consumption in the second traverse before the downtime.
[g]Includes the natural gas consumption during the time between traverses.

TABLE 3-3. SPRAY DRYER AND FABRIC FILTER PROCESS DATA SUMMARY FOR MORRISTOWN MEMORIAL HOSPITAL

Run No.	Test date	Spray dryer inlet temperature, °F			Fabric filter outlet temperature, °F			Average baghouse pressure drop, in. w.c.,	Hydrated lime slurry feed rate, gal/hr		Hydrated lime feed rate, lb/hr[a]	Activated carbon feed rate, lb/hr
		Ave.	Min.	Max.	Ave.	Min.	Max.		Tank level	Flow meter		
1	11/18/91	408	398	415	285	277	293	3.4	44	79	23	--
2	11/19/91	408	396	418	285	278	292	3.4	41	80	34	--
3	11/20/91	407	394	420	285	275	294	3.4	46	97	37	--
4	11/21/91	408	399	421	289	280	301	3.4	45	86	34	2.8
5	11/22/91	409	399	418	281	272	298	3.6	41	87	31	2.5
6	11/23/91	407	396	414	287	278	294	3.4	44	86	32	2.5

[a]Hydrated lime feed rate is based on the tank level. The hydrated lime concentration in the slurry is about 6 weight percent for Run 1; it is about 9 weight percent for Runs 2 through 6.

was checked and enough weight was removed from the cart to bring the total to just under 354 kg (780 lb), thus allowing the charge to proceed. The hourly charging rates could have been increased slightly if this procedure were followed every time a cart was held. Many of the smaller charges noted in the charging record were due to this procedure.

The highest charging rate, 358 kg/hr (789 lb/hr), occurred during Run 3. This rate is higher than 354 kg (780 lb/hr) because a process malfunction interrupted the ASP of the second traverse. In the 10 min before the interruption, two loads were charged at an hourly rate that, if continued, would have been about 445 kg/hr (980 lb/hr). After the second traverse resumed there was a 10-min gap before a charge was introduced. Then 345 kg (760 lb) were charged in 40 min, and another 345 kg (760 lb) were charged in the 60 min after that. Consequently, the average hourly charging rate during the last 110 min of the second traverse was about 377 kg/hr (830 lb/hr). Combining these rates with the 334 kg/hr (735 lb/hr) rate for the first traverse resulted in an overall rate during the ASP for this run of 358 kg/hr (789 lb/hr). At no time, however, did the actual charge rate to the kiln exceed 354 kg/hr (780 lb/hr).

The average charging rates during Runs 4 and 6 were lower than the others (about 10 to 15 percent below the maximum allowed) because there were problems with the hydraulic system that powered the elevator. These problems are discussed in the summaries for these runs.

For Runs 3 through 6, there are several discrepancies between the charges recorded in the operator log and those in the printout of the values in the FIFO stack. One discrepancy is that a printout is unavailable for short portions of some runs. Other discrepancies may have occurred when the elevator took a cart part of the way up but did not dump it--either the cart was sent back up and the weight was recorded in the operator log again, or weight was removed and the lower weight was not recorded. A few times the operator may have accidentally forgotten to record charges. Average TTP and ASP charging rates in Table 3-2 are based on the printout values except where the printout is unavailable; then the values in the operator log were used. Copies of both logs are presented in Appendix B.

The target SCC temperature was 982°C ± 10°C (1800°F ± 50°F). Table 3-2 shows that the average temperature ranged from 974°C (1786°F) in Run 5 to 981°C (1798°F) in Run 1. Except for a few minutes during each of Runs 3 through 6, the temperature remained in this range. Typically, the temperature only dropped below 954°C (1750°F) after a 10- to 20-min interval with little or no waste being charged. It is likely that a minor adjustment in the control programming would have enabled the continuously modulating burner to achieve a slightly higher average temperature and to maintain the temperature above 959°C (1750°F) at all times. The temperatures never exceeded 1010°C (1850°F). Figures 3-3 through 3-8 show the kiln and SCC temperature profiles during the ASP for each run.

3.4.1 Test Run Summaries

The following paragraphs summarize each test run by describing the quantity of waste charged during both the TTP and the ASP, the charge sizes, the hydrated lime feed rate, any process malfunctions that resulted in temperature excursions or downtime, and any monitoring or data collection problems. Temperature excursions are any period when the temperature in the SCC was below 954°C (1750°F) or above 1010°C (1850°F).

3.4.1.1 Run 1. Run 1 was conducted on November 18, 1991. The average charge rate for the TTP was 339 kg/hr (748 lb/hr), while that for the ASP was 328 kg/hr (723 lb/hr). Charge sizes ranged between 14 and 55 kg/load (31 and 122 lb/load). The data logger for recording the kiln and SCC temperatures was not operative. Therefore, the temperatures monitored by the PLC were manually recorded every 5 min. During the ASP, the SCC temperatures ranged from 958° to 1009°C (1756° to 1849°F), and the combustion air damper was, on average, open about 56 percent. About 5 min before the end of the test, the ash water quench was manually activated to extinguish flames in the ash container. There were no process malfunctions during the TTP, and operation continued normally during the 40-min port change.

Before the test, a 4.5 weight percent hydrated lime slurry was prepared in an empty tank by mixing 159 kg (350 lb) of hydrated lime with 1.5 m (5 ft) of water; the target SR was slightly under 2:1. After about 4 hr of operation (but before the start of emissions testing), another two bags (45 kg [100 lb]) of hydrated lime were added to the remaining slurry in the tank (approximately 1.3 m [50 in.]) because the outlet HCl

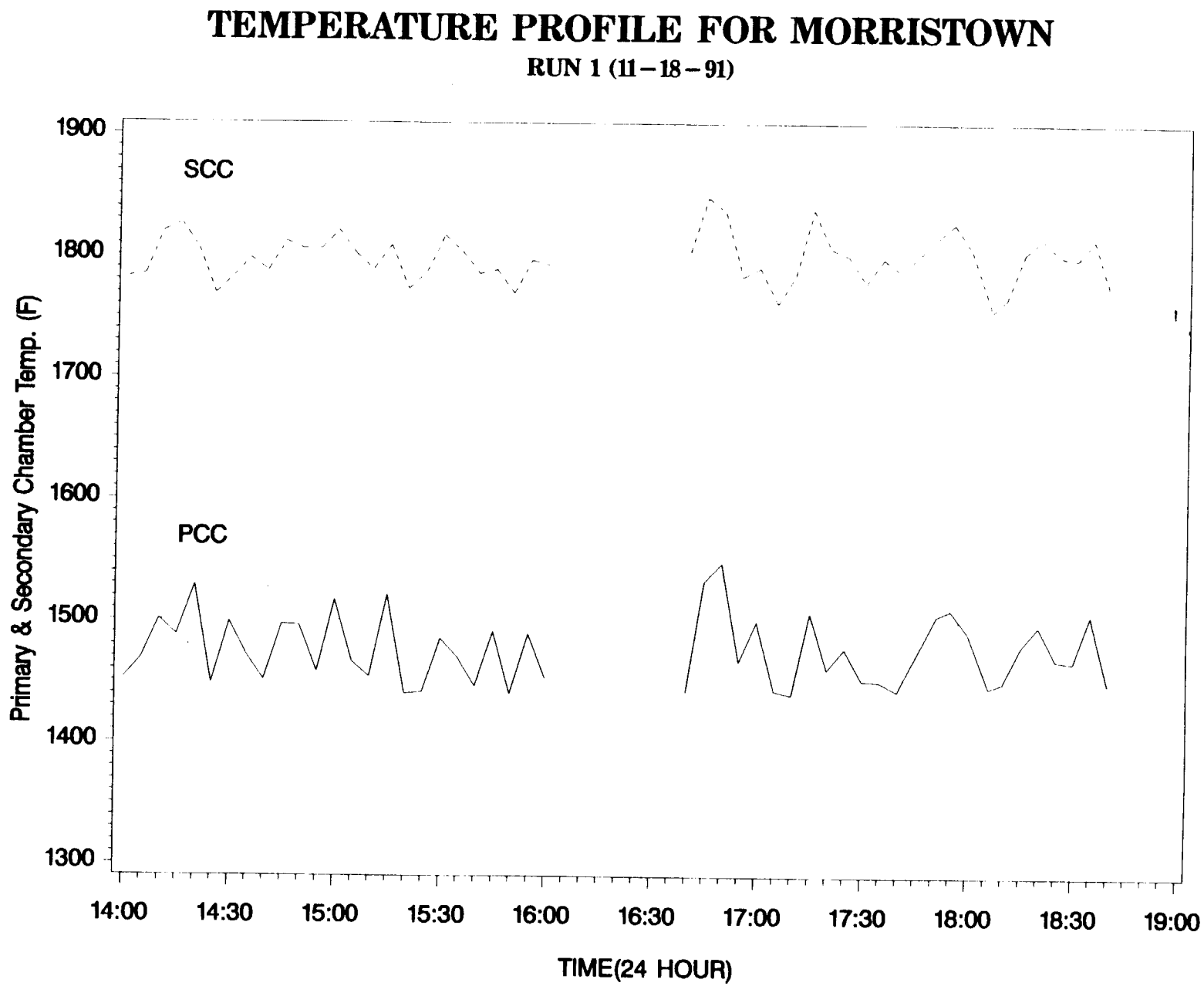

Figure 3-3. Temperature profiles for Run 1 (11-18-91).

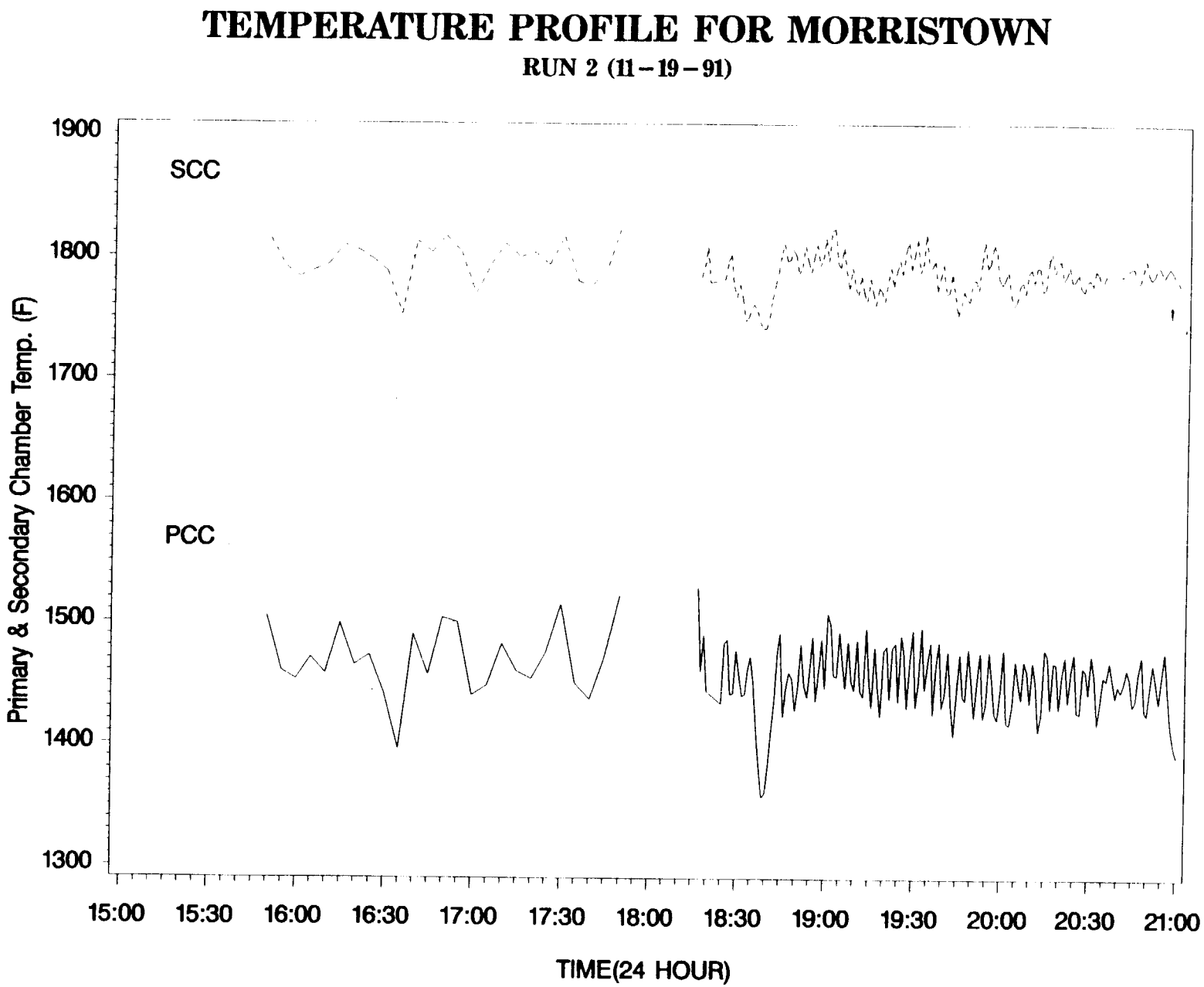

Figure 3-4. Temperature profiles for Run 2 (11-19-21).

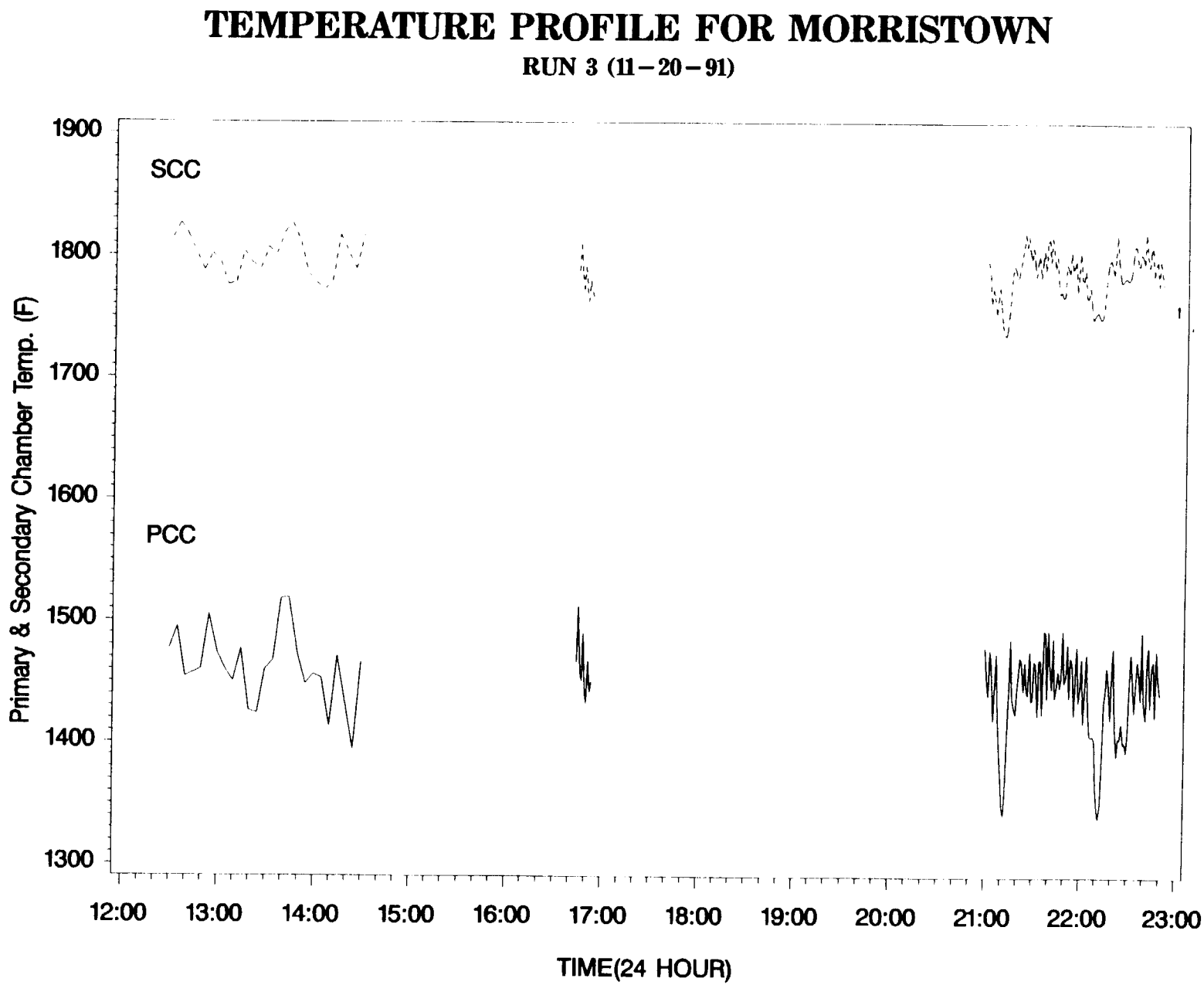

Figure 3-5. Temperature profiles for Run 3 (11-20-91).

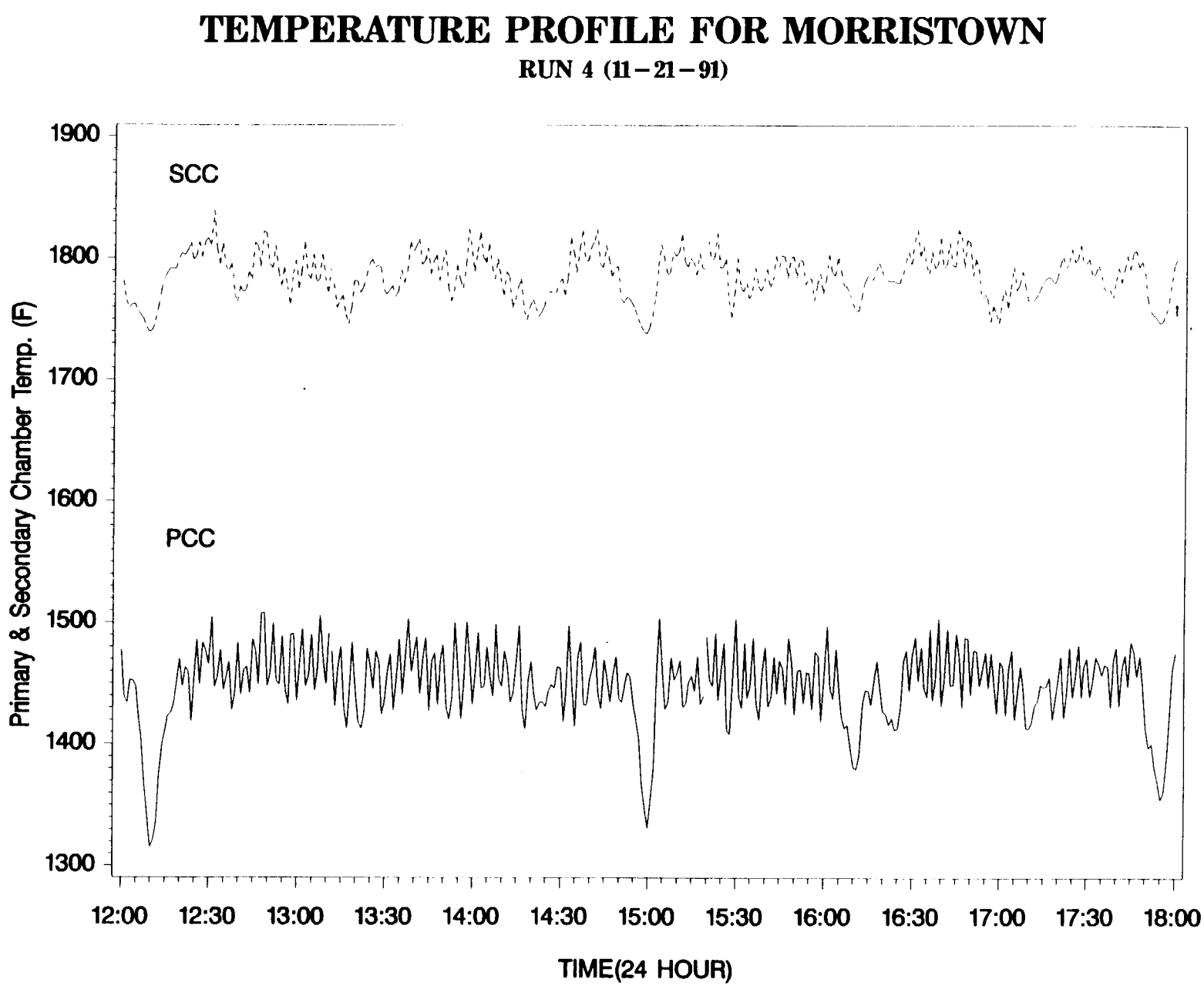

Figure 3-6. Temperature profiles for Run 4 (11-21-91).

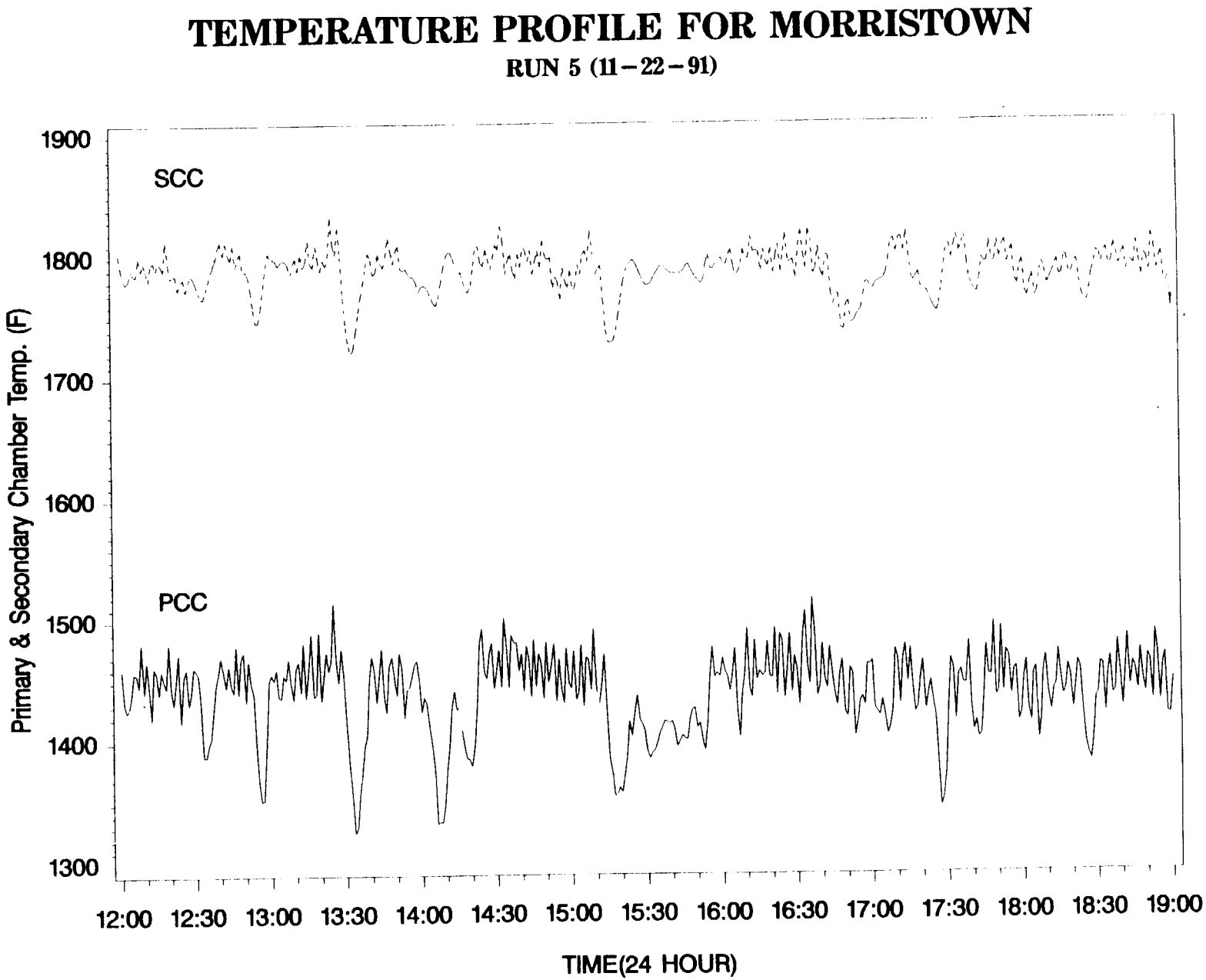

Figure 3-7. Temperature profiles for Run 5 (11-22-91).

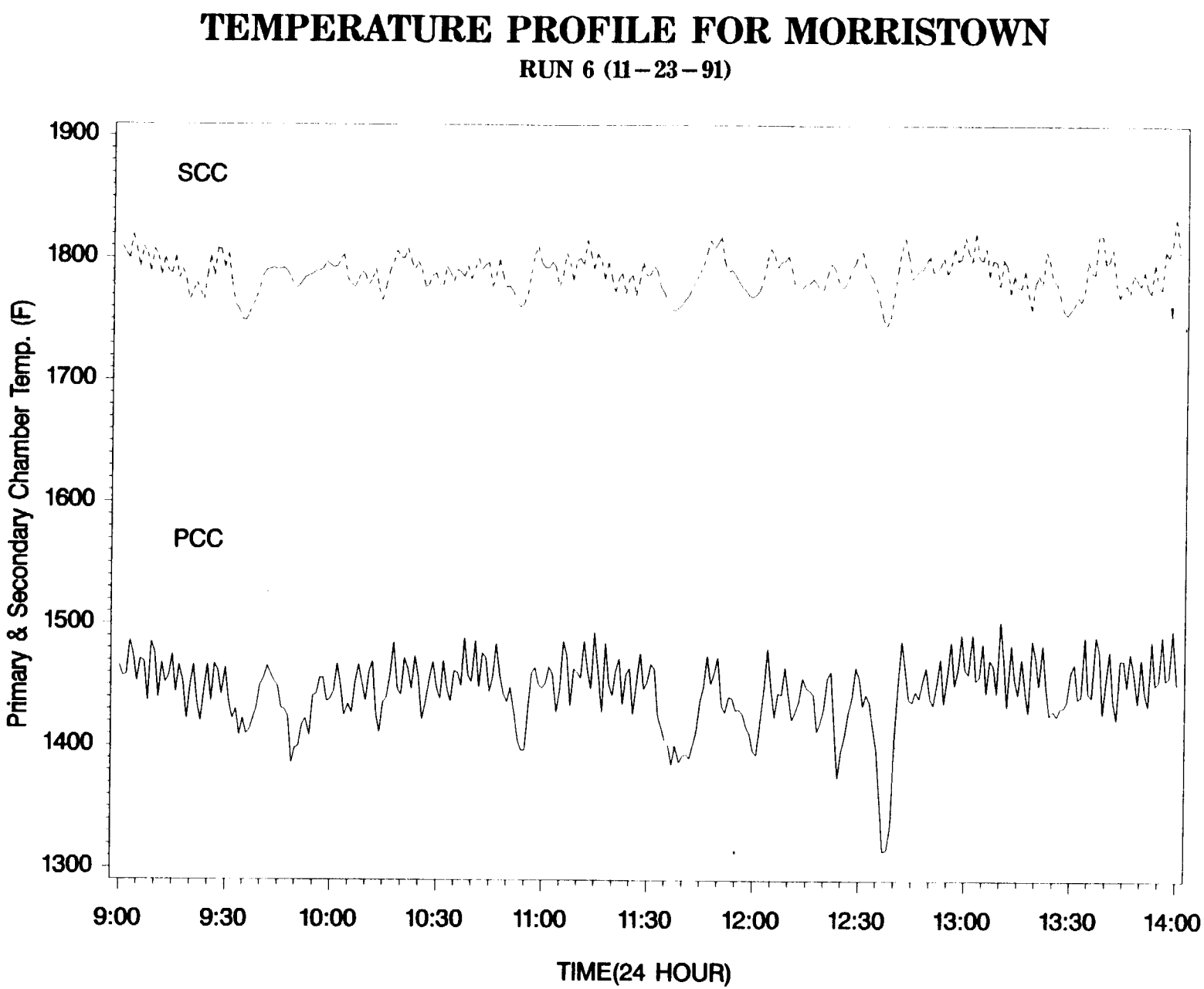

Figure 3-8. Temperature profiles for Run 6 (11-23-91).

monitor showed "breakthrough" (about 80 ppm). The resulting concentration for Run 1 was approximately 6 percent hydrated lime, by weight. The average hydrated lime feed rate for Run 1 was 10.4 kg/hr (23 lb/hr).

3.4.1.2 Run 2. Run 2 was conducted on November 19, 1991. The average charge rate for the TTP was 326 kg/hr (720 lb/hr), while that for the ASP was 333 kg/hr (734 lb/hr). Charge sizes ranged between 24 and 41 kg/load (53 and 90 lb/load). The data logger was inoperative during the first traverse, so temperatures monitored by the PLC were manually recorded every 5 min. During the second traverse, however, the data logger was working. In the SCC, temperatures ranged from 956° to 998°C (1753° to 1829°F), and the combustion air damper was, on average, about 66 percent open during the ASP.

Before the test started there was a problem with the waste conveyor belt that took about 5 hr to repair. During this time, hydrated lime slurry was prepared in an empty tank by mixing 340 kg (750 lb) of hydrated lime with 1.5 m (5 ft) of water for a concentration of about 9 weight percent; the target SR was 2:1. The hydrated lime concentration was increased from that used in Run 1 for two reasons. First, preliminary calculations of the results from Run 1 indicated the SR for the previous day was closer to 1:1 than to 2:1; the EPA wanted to run the tests near 2:1 to assure good performance of the system. ThermAll and the hospital also wanted to ensure no "breakthrough." Secondly, during Run 1 some "breakthrough" of HCl emissions at the outlet were noted during some of the periods when higher levels of HCl at the control device inlet were indicated by the CEMS; this was an indication that insufficient hydrated lime was available to handle peak HCl concentrations. Consequently, a decision was made to increase the hydrated lime slurry concentration to the original design value (approximately 9 percent by weight), which should result in an SR in the range of 1.75:1 to 2.0:1. The average hydrated lime feed rate for the run was 15.4 kg/hr (34 lb/hr).

There were no process malfunctions during the TTP, and operation continued normally during the 65-min port change. During the port change, the draft set-point was changed from -50 Pa (-0.20 in. w.c.) to -45 Pa (-0.18 in. w.c.).

3.4.1.3 Run 3. Run 3 was conducted on November 20, 1991. The average charge rate for the TTP was 227 kg/hr (500 lb/hr), while that for the ASP was 358 kg/hr

(789 lb/hr). Charge sizes ranged between 19 and 51 kg/load (42 and 114 lb/load). The kiln and SCC temperatures monitored by the PLC were manually recorded during the first traverse because the data logger was inoperative. During the second traverse, however, the data logger was working. In the SCC, temperatures ranged from 946° to 997°C (1735° to 1827°F), and the combustion air damper was, on average, about 69 percent open during the ASP. The SCC temperatures were below 954°C (1750°F) two times during the ASP for a total of 6 min. Both times waste had not been charged for about 20 min because the 354 kg/hr (780 lb/hr) limit was reached in a 40-min period. Kiln temperatures also dropped significantly (about 38°C [100°F]) during these two periods.

At 13:30, about 1 hr into the ASP, the strip chart record indicated a trend in the fabric filter pressure. The differential pressure never remained at normal levels (i.e., <747 Pa [<3 in. w.c.]) after a pulse and consequently the fabric filter cleaning pulses were occurring much more frequently than normal--almost continuously. The fabric filter pressure meter lines were checked during the port change (at about 14:40), but no problems were evident. At 14:50, testing was suspended because the system lost air pressure at the ID fan damper. As a result, the ID fan tripped off and the gas flow went to bypass around the fabric filter. When the differential pressure dropped to zero in the fabric filter due to loss of flow, a large amount of residue dropped off the bags. The massive quantity of material discharged from the hopper suggests that the earlier fluctuations in the differential pressure may have occurred because the hopper was full (possibly material had bridged over the discharge valve) and the material was simply carried right back up onto the bags after each pulse. Both the fan and fabric filter were back on line by 15:00, but charging was suspended until 15:45 to fully empty the fabric filter hopper. The fabric filter appeared to operate normally for the rest of the day.

The second traverse started at 16:45. At 16:55, the unit shut down because of a low WHRB water alarm. The problem was that the pressure at the WHRB water pump had dropped. There are three boilers, including the new WHRB, that draw makeup from water flowing through a loop. Water is maintained under pressure in the loop by two boiler feed water pumps. An oversized backup pump is also available. One of the boilers was off line because hospital steam demand did not require its use. Experience

had shown that only one boiler feed water pump is required to maintain pressure in the loop under those hospital steam demand conditions. Apparently, the boiler and the new WHRB coincidentally attempted to draw substantial quantities of makeup water in response to hospital steam demand. Pressure in the loop dropped. To restore pressure quickly so that EPA could resume testing, the oversized backup pump was used. The backup pump was turned off as soon as pressure was restored. The system returned to normal operation and continued to operate on one pump for the rest of the test, with the second pump held in reserve.

Before the second traverse could resume, a towel that had been wrapped around one of the inlet probes was sucked into the duct and lodged in the rotary atomizer. After the towel was extracted, the rotary atomizer would not restart. The atomizer wheel was then removed and found to be clogged; during the down-time, the slurry in the atomizer hardened. After cleaning, the atomizer wheel was reinstalled, and the unit was back on line at 19:30. The second traverse resumed at 21:00 and was completed without further incident.

There was a 63-min gap in the printout of the charges recorded in the FIFO stack (14:00 to 15:03), during which the operator log showed nine charges. Before the test, slurry was mixed in an empty tank by adding 340 kg (750 lb) of hydrated lime to 1.5 m (5 ft) of water, resulting in a slurry concentration of 9 weight percent; the average hydrated lime feed rate for the run was 17 kg/hr (37 lb/hr).

3.4.1.4 Run 4. Run 4 was conducted on November 21, 1991. The average charge rate for the TTP was 312 kg/hr (688 lb/hr), while that for the ASP was 301 kg/hr (663 lb/hr). Charge sizes ranged between 8 and 40 kg/load (17 and 88 lb/load). During the ASP, the SCC temperatures ranged from 948° to 996°C (1738° to 1824°F), and the SCC combustion air damper was, an average, about 64 percent open. The kiln's combustion air damper opened slightly (about 5 percent) for a few min at the end of the test.

The hydraulic system was unable to generate design power levels during this run. Several times the elevator brought the cart back down before it had dumped the waste. Typically, this occurred when the ram charged while the elevator was lifting the cart; the common hydraulic pumping unit did not have enough power to drive both mechanisms.

There also was a leak from a hydraulic fitting on the feeder line. At 16:00, this fitting was tightened to slow the leak. Charging was suspended for 10 min while the repair was performed, but testing continued. ThermAll suspected the leak was only a minor maintenance problem, but that the power loss was due to deteriorating seals. A special, fire-retardant hydraulic fluid is being used in the pumping system supplied by ThermAll, but the elevator system provided by another vendor was installed with seals for use with regular fluid.

To compensate for the reduced power output, an effort was made to charge less waste in the carts while increasing the frequency of charges. This effort may have reduced the number of carts that did not dump, but there were still enough delays that the hourly charge rate for this run was about 10 percent below the average rate for the first three runs.

There were two low temperature excursions for a total of 6 min during the ASP. The first excursion occurred at the end of a 20-min period during which only 36 kg (80 lb) had been charged, and the second occurred at the end of a 17-min period in which only 34 kg (75 lb), had been charged. In one case, the problems with the charging system hydraulics delayed a charge. In the other case, the charge had to wait for the weight to drop off the FIFO stack. Kiln temperatures dropped significantly (about 100°F) during the first case but not during the second.

Before the test, 0.9 m (3 ft) of water, 204 kg (450 lb) of hydrated lime, and 27 kg (59 lb) of activated carbon were added to the tank that still had 0.6 m (2 ft) of slurry left from Run 3. This resulted in a hydrated lime concentration of 9 weight percent. The basis for the amount of carbon added was a target value of 250 milligrams of carbon per dry standard cubic meter of flue gas. Based upon flue gas measurements from previous runs, it was determined that the target carbon feed rate was 1.5 kg/hr (3.2 lb/hr). Based upon hydrated lime slurry feed rates from previous runs, it was determined that a carbon concentration in the slurry of about 0.7 weight percent should result in the desired carbon feed rate. To conserve the limited supply of carbon, this tank was only used from 12:18, 22 min before the start of the test, to the end of the test at 17:50. It was not used during the idle phase overnight. During the test, the average hydrated lime feed rate was 15 kg/hr (34 lb/hr), and the carbon feed rate was 1.3 kg/hr (2.8 lb/hr).

At 13:09, testing was halted because a momentary power failure caused the spray dryer to shut down. At 13:25, before sampling was resumed, the test crew reported that the flue gas flows were low. A check revealed that the draft was zero because the setpoint had not been reset after the equipment was back on line. The flow rate returned to normal once the setpoint was set to -45 Pa (-0.18 in. w.c.). Ten min later it was reset at -50 Pa (-0.20 in. w.c.) to match the setting at the start of the test.

Five charges in the operator log were not in the printout of charges recorded in the FIFO stack. Two of the additional charges may have been due to double counting by the operator. One charge may have been a case where the cart had not dumped, some weight was removed from the cart, the cart was reweighed, and the operator wrote the new weight down without crossing off the old weight. Two charges were not in the printout because they would have occurred during separate 1-min gaps in the printout; these two charges were included when determining the average TTP and ASP charging rates.

3.4.1.5 Run 5. Run 5 was conducted on November 22, 1991. The average charge rate for the TTP was 279 kg/hr (616 lb/hr), while that for the ASP was 289 kg/hr (638 lb/hr). During the ASP, charge sizes ranged between 19 and 42 kg/load (41 and 92 lb/load), the SCC temperatures ranged from 939° to 1001°C (1722° to 1833°F), and the SCC combustion air damper was, on average, about 72 percent open. There was enough carbon/hydrated lime slurry leftover from Run 4 that a new batch did not have to be prepared for Run 5. The average hydrated lime feed rate for the test was 14 kg/hr (31 lb/hr), and the average carbon feed rate was 1.1 kg/hr (2.5 lb/hr).

The fitting in the hydraulic system that was leaking during Run 4 was replaced at mid-morning, delaying the first charge of the day until 10:28. However, as expected, this repair did not improve the performance of the charging system. After a malfunction at 14:10, 5 min before the end of the first traverse, it was decided to make two changes to reduce the strain on the hydraulic system. First, the 41-kg (90-lb) cart was abandoned in favor of manually loading just the waste into the "skip." To prevent bags from snagging on the wheel locks (and thus not dumping into the chute when the skip was tipped upside down), the inside of the skip was lined with cardboard. Second, charge sizes during the second traverse were limited to about 23 kg/load (50 lb/load), and an

attempt was made to reduce the interval between charges to 4 min. This method of operation was used only for Run 5 and was discontinued by the end of the run at the request of the hospital in the interest of safety. Except for EPA's interest in completing the emissions test, the hospital would have shut the unit down until repairs could have been effected.

The average charge size for this run was lower than the others for three reasons. First, there was a 14-min gap between charges (12:19 to 12:33) at the beginning of the test because nearly 354 kg (780 lb) of waste was added in the 45 min before the test, and a 12-min gap occurred a few minutes later (12:42 to 12:54). Second, the loader malfunction at 14:10 and the delay for subsequent modifications to the skip prevented one or two charges from being added before the end of the first traverse. Third, although the target charge sizes of 23 kg/load (50 lb/load) were achieved during the second traverse, the interval between charges was a little longer than the desired 4 min.

At 15:10, about 5 min into the second traverse, the hydraulic cylinder operating the ram became disconnected from the ram head (a bolt loosened). Charging was suspended until 15:52 while the equipment was repaired. Between 15:15 and 16:35, slurry was pumped from the tank without carbon in order to conserve the carbon. Emissions sampling resumed at 16:50, after the kiln had been operating normally for about an hour.

Temperatures in the SCC were below 954°C (1750°F) on three occasions for a total of 11 min. In each case, the temperature excursions occurred after a relatively long delay between charges.

There were five discrepancies between the operator log and the printout of charges recorded in the FIFO stack during the TTP. Two charges in the printout were not in the operator log; possibly the operators inadvertently did not record them. The charge after the loader malfunction at 14:10 was higher in the operator log than in the printout. Weight was probably removed before the charge was sent up the second time, but the change was not noted on the operator log. Two charges in the operator log are each about 4.5 kg (10 lb) lower than the corresponding charges in the printout; it is not clear why.

3.4.1.6 Run 6. Run 6 was conducted on November 23, 1991. Despite the continuing hydraulic system problems, the average charge rates for the TTP and ASP were 324 kg/hr (713 lb/hr) and 325 kg/hr (716 lb/hr), respectively. Charge sizes ranged between 10 and 54 kg/load (21 and 119 lb/load). For this run, waste was again loaded using the carts, and the target charge size at the start of the run was about 23 kg/load (50 lb/load). After the loader failed to lift a cart at 12:35 (about 25 percent of the way through the second traverse), the charging strategy was revised to charge about 18 kg/load (40 lb/load) at 3-min intervals. Since it would be difficult to maintain this frequency, 36 kg (80 lb) of sharps containers were weighed along with 18 kg (39 lb) of bagged waste at 12:37. The sharps containers were removed from the cart before it was wheeled onto the elevator, but the total of 54 kg (119 lb) was recorded in the FIFO stack. These containers were then manually added to the ram hopper in charges between 12:50 and 13:12.

Before the test, an additional 0.3 m (1 ft) of water, 68 kg (150 lb) of hydrated lime, and 5 kg (11 lb) of activated carbon were added to the slurry left at the end of Run 5. This resulted in a hydrated lime concentration of about 9 weight percent and a carbon concentration of about 0.7 weight percent. During the ASP, the SCC temperatures ranged from 952° to 994°C (1745° to 1822°F), and the temperature was below 954°C (1750°F) two times for a total of 2 min. The SCC combustion air damper was, on average, about 71 percent open. The average hydrated lime feed rate during the test was 15 kg/hr (32 lb/hr), and the average carbon feed rate was 1.1 kg/hr (2.5 lb/hr).

There were six discrepancies between the operator log and the printout of charges recorded in the FIFO stack, in addition to the charge with the 36 kg (80 lb) of sharps containers. In four cases, the operator log shows charges 4.5 to 16 kg (10 to 35 lb) lower than the printout, while the operator log is 8.6 kg (19 lb) higher in one case. The reason for these differences is not known, but the impact on the average hourly charge rate is less than 5 percent. Finally, there is a 6-min gap in the printout of the FIFO stack record during which a charge is noted in the operator log.

4. SAMPLING LOCATIONS

The sampling locations used during the test program at Morristown Memorial Hospital are described in this section. Flue gas samples were collected at the spray dryer inlet and at the baghouse outlet. Ash samples were collected from the kiln ash hopper, the spray dryer ash conveyor, and the baghouse ash conveyor. Samples of the slurry makeup water and the lime slurry were also collected.

4.1 SPRAY DRYER INLET

The layout for sampling ports at the spray dryer inlet duct is shown in Figure 4-1. Ports A and B were 4-inch diameter pipe nipples located one equivalent diameter upstream of a bend and about 4 diameters downstream of a disturbance. These ports were used for combined metals and Method 101A sampling. Twenty-four sample points were used.

Ports C and D were 4-inch diameter pipe nipples located 2 diameters downstream and 2 1/2 diameters upstream of a disturbance. These ports were used for CDD/CDF sampling. Twenty-four point traverses were performed at these ports.

Ports E and F were used for microorganism and PSD sampling. For microorganism sampling, only Port E was used. These ports were 4-inch pipe nipples located 2 diameters downstream and one diameter upstream of disturbances. Twenty-four point traverses were performed at these ports also. The traverse point layout used at Ports A/B, C/D, and E/F is shown in Figure 4-2.

Ports G, H, and I are 2-inch pipe nipples that were used for CEM, HCl CEM, and Method 26 sampling. The probes for these measurements were located at a single point 7 inches into the duct.

4.2 BAGHOUSE EXIT (STACK)

The sample point layout for the baghouse exit is shown in Figure 4-3. Sampling ports were located after the induced draft fan, and prior to the stack entrance. These ports were located more than 8 diameters downstream of the ID fan and 1.6 diameters upstream of a bend. In order to fit a dual probe train into the port, Ports A and B were

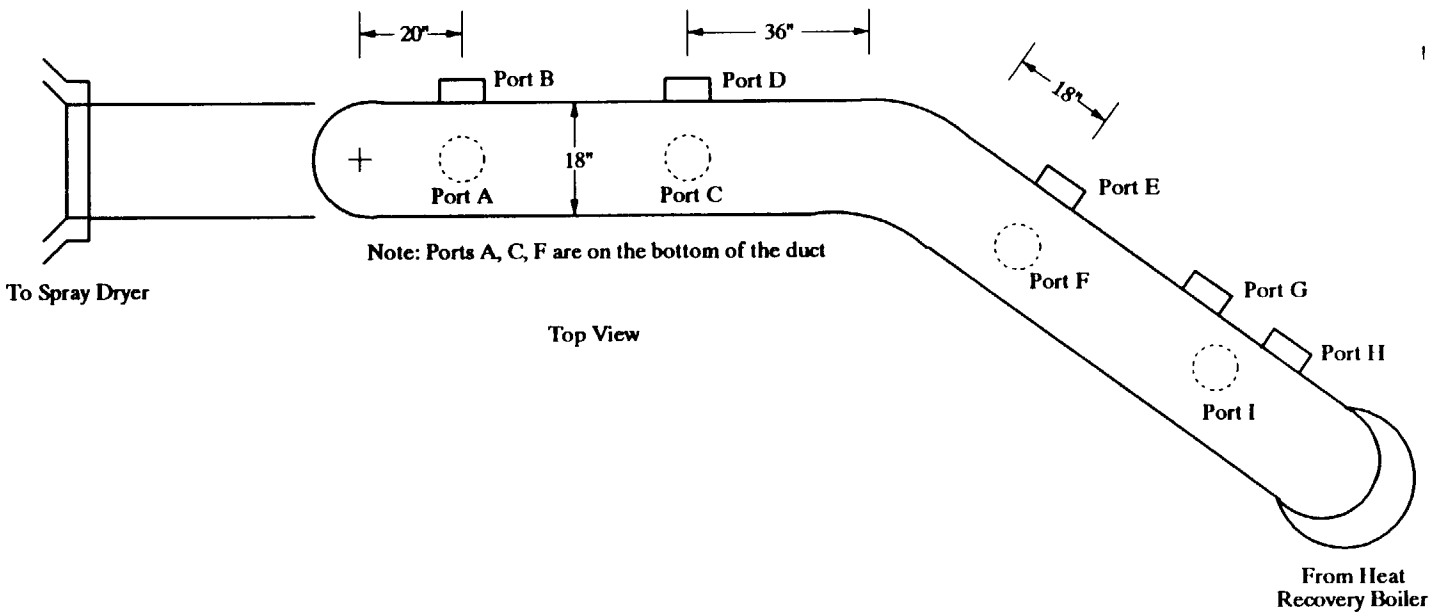

Figure 4-1. Sample Port Locations at the Spray Dryer Inlet

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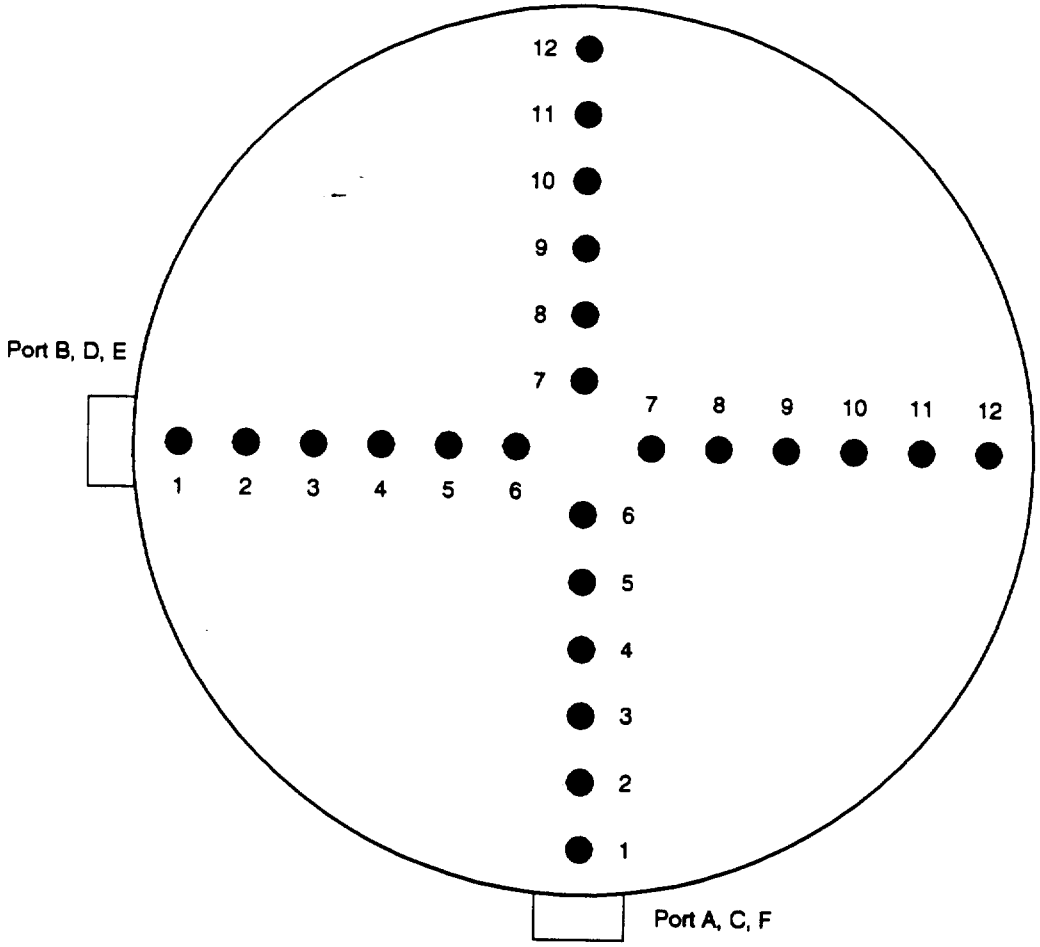

Duct Diameter = 18"

Traverse Point Number	Distance % of Diameter	Distance Inches
1	2.1	0.50
2	6.7	1.20
3	11.8	2.12
4	17.7	3.19
5	25.0	4.50
6	35.6	6.41
7	64.4	11.59
8	75.0	13.50
9	82.3	14.80
10	88.2	15.88
11	93.3	16.79
12	97.9	17.50

Figure 4-2. Spray Dryer Inlet Traverse Point Layout

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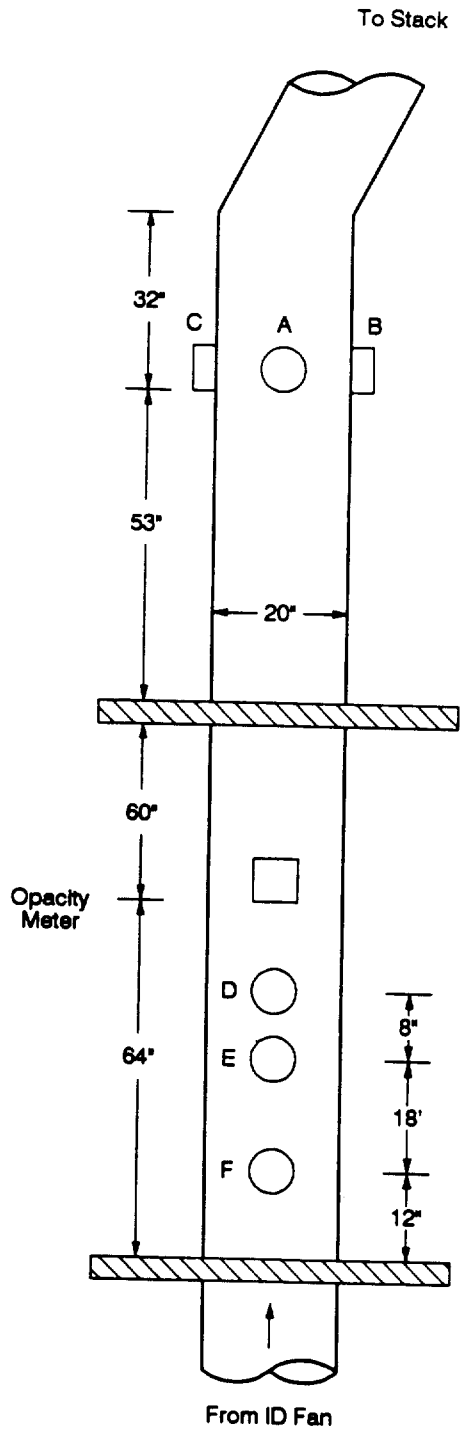

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Figure 4-3. Sample Port Location of the Exhaust Stack

4-inch nipples. A dual probe/hot box assembly was used for metals and Method 101A, and a separate probe/box assembly was used for CDD/CDF sampling at Ports A and B.

A 16-point traverse was performed at this location. The point layout used is shown in Figure 4-4.

Ports D, E, and F were 2-inch nipples that were used for CEM, HCl CEM, and Method 26 sampling. The probes for these tests were located at a single point 8 inches into the duct.

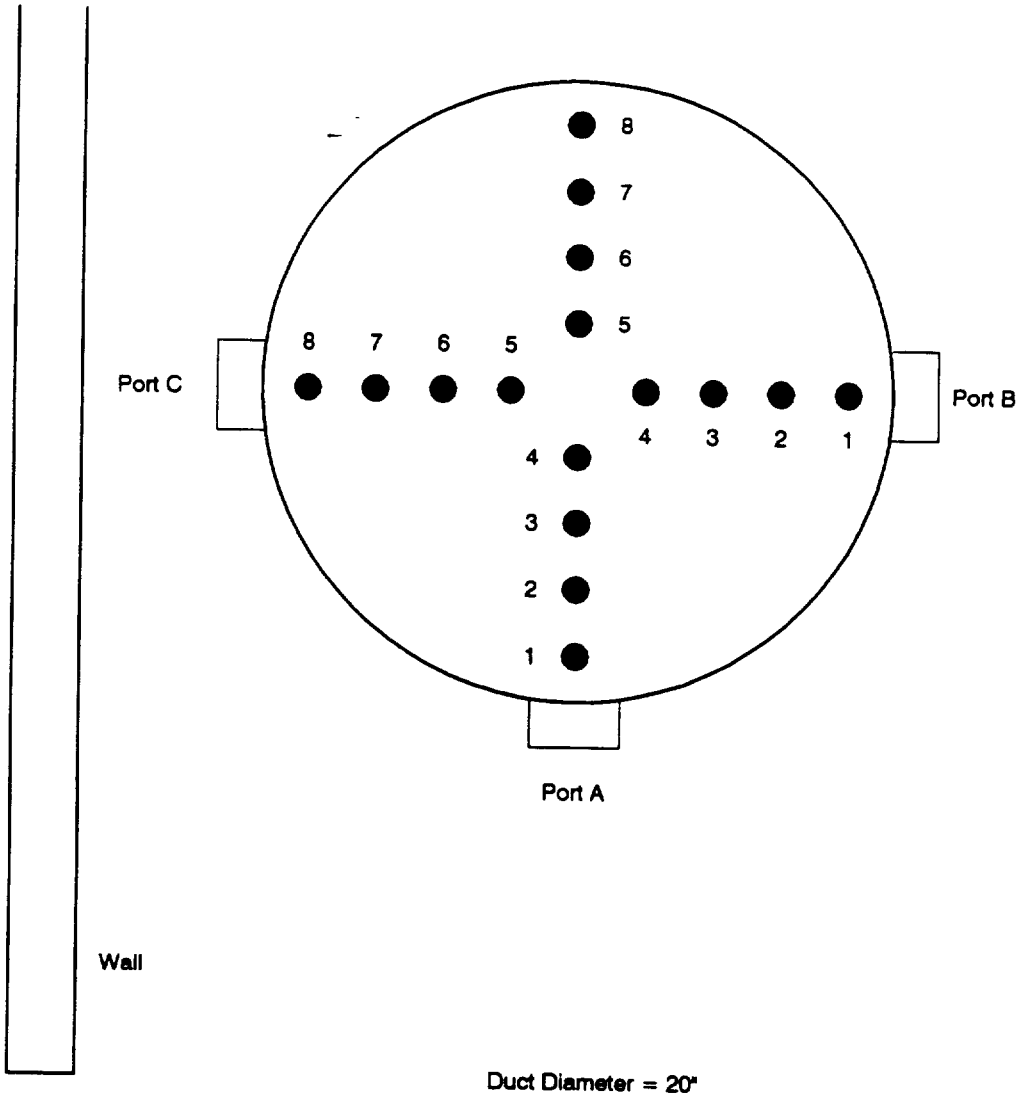
4.3 ASH SAMPLING LOCATIONS

The kiln ash, spray dryer ash, and baghouse ash were collected into separate containers. The kiln ash was collected into a wheel cart and emptied daily. The weight of ash collected each test day was measured, and the total ash was transferred to a mixing table where it was mixed, coned and quartered, and representative aliquots were collected.

The spray dryer and baghouse ashes were collected into separate plastic trash bags. A clean bag was installed prior to each test run, and the total ash generated each day was collected and weighed. Depending on the volume generated, the ashes were mixed, divided, and placed in sample jars.

4.4 WATER AND SLURRY SAMPLES

Scrubber solution makeup water was sampled from a tap or valve in the water supply line. Slurry samples was collected from a tap in the slurry injection line after the spray dryer slurry pump and before the spray dryer.



Duct Diameter = 20"

Traverse Point Number	Distance % of Diameter	Distance Inches
1	3.2	0.64
2	10.5	2.10
3	19.4	3.88
4	32.3	6.46
5	67.7	13.54
6	80.6	16.12
7	89.5	17.90
8	96.8	19.36

Figure 4-4. Traverse Point Layout at the Exhaust Stack

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5. SAMPLING AND ANALYTICAL PROCEDURES BY ANALYTE

The sampling and analytical procedures used for the Morristown Memorial Hospital Medical Waste Incinerator (MWI) test program were the most recent revisions of the published EPA methods. Where published methods were not available, state-of-the-art sampling and analytical methods were used. In this section, descriptions of each sampling and analytical method by analyte are provided.

A summary of the sampling methods that were used is included in Table 5-1. Sampling times, minimum sampling volumes, and detection limits are summarized for the manual sampling methods in Table 5-2.

5.1 CDD/CDF EMISSIONS TESTING METHOD

The sampling and analytical method used for determining flue gas emissions of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans (CDD/CDF) was EPA Method 23.

Sample recovery techniques incorporated the latest EPA development of replacing the methylene chloride rinses with toluene rinses.

5.1.1 CDD/CDF Sampling Equipment

The CDD/CDF sampling method used the sampling train shown in Figure 5-1. Basically, the sampling system was similar to a Method 5 train with the exception of the following:

- All components (quartz probe/nozzle liner, all other glassware, filters) were pre-cleaned using solvent rinses and extraction techniques; and
- A condensing coil and an XAD-II® resin absorption module are located between the filter and impinger train.

5.1.2 CDD/CDF Equipment Preparation

In addition to the standard EPA Method 5 requirements, the CDD/CDF sampling method included several unique preparation steps which ensured that the sampling train components were not contaminated with organics that may interfere with analysis. The glassware, glass fiber filters, and absorbing resin were cleaned and the filters and resin were checked for residuals before they were packed.

TABLE 5-1. TEST METHODS USED FOR MORRISTOWN MEMORIAL HOSPITAL MWI

Analyte	Method	
CDD/CDF	EPA Method 23 with GC/MS Method 8290	
Mercury	EPA Method 101A	
Particulates Lead Mercury Arsenic Nickel Cadmium Chromium Beryllium Antimony Barium Silver Thallium	EPA/EMSL Multi-Metals Train	
SO_2	EPA Instrument Methods	6C
O_2/CO_2		3A
CO		10
NO_x		7E
THC		25A
HCl	NDIR CEM Analyzer	
HCl	EPA Method 26	
HBr	EPA Method 26	
HF	EPA Method 26	
Particle Size Distribution	Diagonistic Technique/ EPA Method 202	
Loss On Ignition	Modified ASTM D 3174	
Carbon	ASTM D 3178-84	
Microorganisms in Emissions	EPA Draft Method "Microbial Survivability Tests for MWI Emissions."	
Microorganisms in Pipe Test and Direct Ash Test	EPA Draft Method "Microbial Survivability Tests for MWI Ash."	

TABLE 5-2. SAMPLING TIMES, MINIMUM SAMPLING VOLUMES AND DETECTION LIMITS FOR THE MORRISTOWN MEMORIAL HOSPITAL MWI TESTS

Sampling Train	Sampling Time (hours)	Minimum Sample Volume (dscf)	Analyte	Detection Limit: Flue Gas[a] (μg/dscm)	Detection Limit: Analytical (μg/ml)
CDD/CDF	4[b]	120	CDD/CDF	0.3 ng/dscm	0.01 ng[c]
PM/Metals	4[b]	120	PM	0.006 gr/dscf	25-50 mg
			As	3.2	0.002
			CD	1.2	0.006
			CR	1.8	0.015
			Pb	4.9	0.002
			Hg	2.2	0.25
			Ni	4.2	0.015
			Be	0.4	0.0003
			Ba	0.7	0.002
			Sb	13.6	0.032
			Ag	6.9	0.007
			Tl	11.8	0.040
101A	4	120	Hg	2.2	0.02
HCl/HBr/HF	1	120 liters[d]	Cl^-	28	0.11
			Br^-	32	0.127
			F^-	100	0.40[e]
Microorganisms	4	30	Indicator Spores	30 viable spores / dscm[f]	1 viable spore / aliquot

[a]Flue gas detection limit is calculated conservatively by summing the front half and back half detection limits. Solution volume for front half and back half fractions are typically 300 ml and 150 ml, respectively.
[b]An average sampling rate of 0.5 ft^3/min was used to calculate sampling time.
[c]Based on average detection limits for tetra-octa CDD/CDF congeners.
[d]An average sampling rate of 2 liters/min was used to calculate the sample volume.
[e]Detection limit based on 100 ml aliquot. Method is still under development. Actual limit may vary.
[f]The indicator spore will be Bacillus Stearothermophilus.

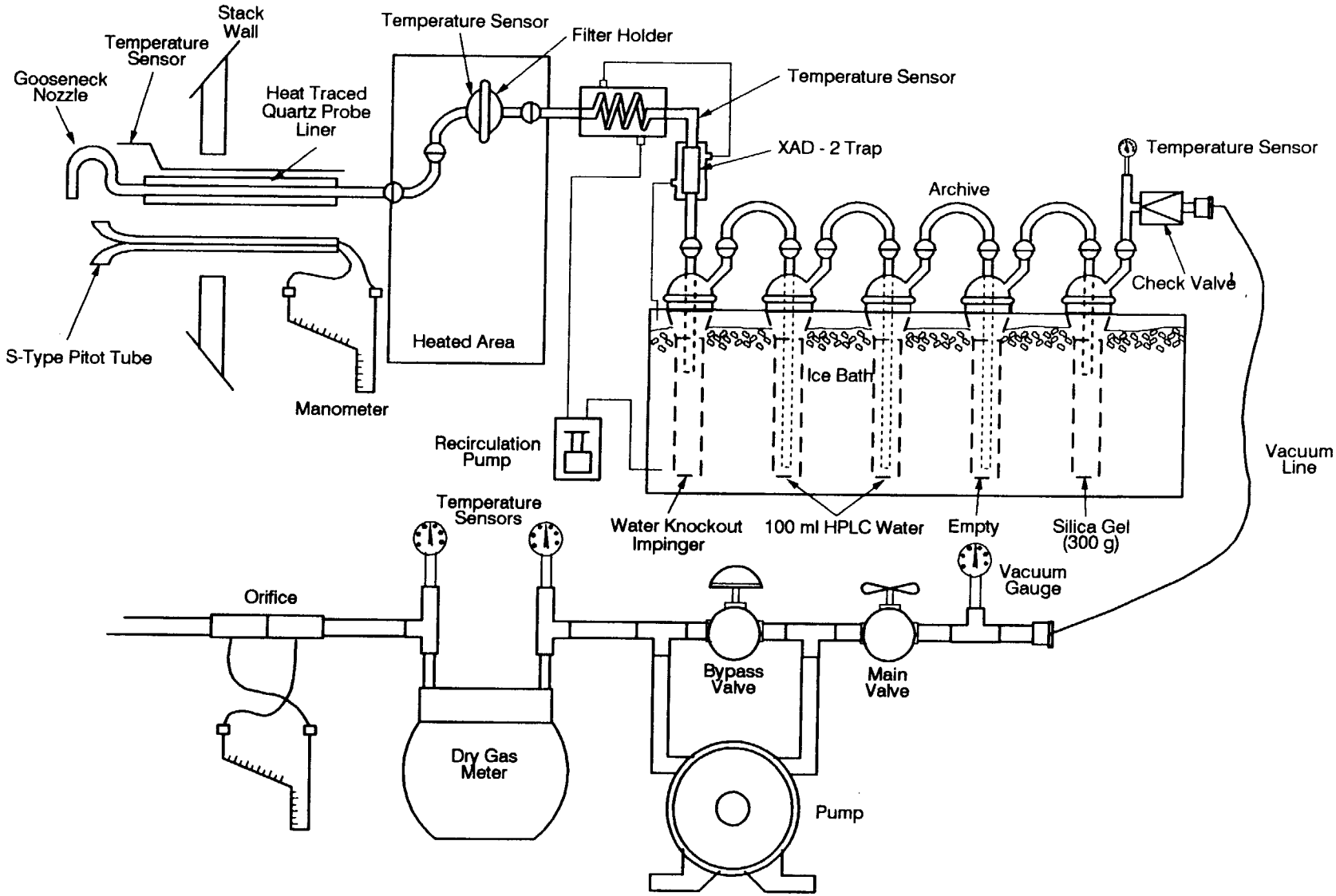

Figure 5-1. CDD/CDF Sampling Train Configuration

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5.1.2.1 Glassware Preparation. Glassware was cleaned as shown in Table 5-3. Glassware was washed in soapy water, rinsed with distilled water, baked, and then rinsed with acetone followed by methylene chloride. Clean glassware was allowed to dry under a hood loosely covered with foil to prevent laboratory contamination. Once the glassware was dry, the air exposed ends were sealed with methylene chloride-rinsed aluminum foil. All the glass components of the sampling train including the glass nozzles plus any sample bottles, flasks, petri dishes, graduated cylinders, and pipets that were used during sampling and recovery were cleaned according to this procedure. Non-glass components (such as the Teflon®-coated filter screens and seals, tweezers, Teflon® squeeze bottles, nylon probe brushes, and nylon nozzle brushes) were cleaned following the same procedure except that no baking was performed.

5.1.2.2 XAD-II® Resin and Filters Preparation. XAD-II® absorbing resin and glass fiber filters were pre-cleaned by separate procedures according to the specified method. Only pesticide grade solvents and HPLC grade water were used to prepare for organic sampling, and to recover these samples. The lot number, manufacturer and grade of each reagent used was recorded in the laboratory notebook.

To prepare the filters, a batch of 50 was placed in a soxhlet pre-cleaned by extraction with toluene. The soxhlet was charged with fresh toluene and refluxed for 16 hours. After the extraction, the toluene was analyzed as described in Sections 5.2 and 5.3 of the reference method for the presence of Tetrachloro Dibenzo-p-Dioxins (TCDD) or Tetrachloro Dibenzofurans (TCDF). If these analytes were found, the filters were re-extracted until no TCDD or TCDF was detected. The filters were then dried completely under a clean nitrogen (N_2) stream. Each filter was individually checked for holes, tears, creases or discoloration, and if found, was discarded. Acceptable filters were stored in a pre-cleaned petri dish, labeled by date of analyses and sealed with Teflon® tape.

To prepare the absorbing resin, the XAD-II® resin was cleaned in the following sequential order:

- Rinsed with HPLC grade water, discarded water;
- Soaked in HPLC grade water overnight, discarded water;

TABLE 5-3. CDD/CDF GLASSWARE CLEANING PROCEDURE (Train Components, Sample Containers and Laboratory Glassware)

NOTE: USE VITON® GLOVES AND ADEQUATE VENTILATION WHEN RINSING WITH SOLVENTS

1. Soak all glassware in hot soapy water (Alconox®).
2. Tap water rinse to remove soap.
3. Distilled/deionized H_2O rinse (X3).[a]
4. Bake at 450°F for 2 hours.[b]
5. Acetone rinse (X3), (pesticide grade).
6. Methylene chloride (X3), (pesticide grade)
7. Cap glassware with clean glass plugs or methylene chloride rinsed aluminum foil.
8. Mark cleaned glassware with color-coded identification sticker.
9. Glassware is rinsed immediately before using with acetone and methylene chloride (laboratory proof).

[a] (X3) = three times.
[b] Step (4) has been added to the cleanup procedure to replace the dichromate soak specified in the reference method. Radian has demonstrated in the past that it sufficiently removes organic artifacts. It is not used for probe liners and non-glass components of the train that cannot withstand 450°F (i.e., teflon-coated filter screen and seals, tweezers, teflon squeeze bottles, nylon probe and nozzle brushes).

- Extracted in soxhlet with HPLC grade water for 8 hours, discarded water;
- Extracted with methanol for 22 hours, discarded solvent;
- Extracted with methylene chloride for 22 hours, discarded solvent;
- Extracted with methylene chloride for 22 hours, retain an aliquot of solvent for gas chromatography analysis of TCDDs and TCDFs; and
- Dried resin under a clean N_2 stream.

Once the resin was completely dry, it was checked for the presence of methylene chloride, TCDDs and TCDFs as described in Section 3.1.2.3.1 of the reference method. If TCDDs or TCDFs were found, the resin was re-extracted. If methylene chloride was found, the resin was dried until the excess solvent was removed. The absorbent was used within four weeks of cleaning.

The cleaned XAD-II® resin was spiked with five CDD/CDF internal standards. Due to the special handling considerations required for the CDD/CDF internal standards, the spiking was performed by Triangle Laboratories. For convenience and to minimize contamination, Triangle Laboratories also performed the resin and filter cleanup procedures and loaded the resin into the glass traps.

5.1.2.3 CDD/CDF Method 5 Equipment Preparation. The remaining preparation included calibration and leak checking of all sampling train equipment. This included: meterboxes, thermocouples, nozzles, pitot tubes, and umbilicals. Referenced calibration procedures were followed when available. The results were properly documented in a laboratory notebook or project file and retained. If a referenced calibration technique for a particular piece of apparatus was not available, then a state-of-the-art technique was used.

5.1.3 CDD/CDF Sampling Operations

5.1.3.1 Preliminary Measurements. Prior to sampling, preliminary measurements were required to ensure isokinetic sampling. These include determining the traverse point locations, performing a preliminary velocity traverse, cyclonic flow check and moisture determination. These measurements were used to calculate a "K factor." The K factor was used to determine an isokinetic sampling rate from stack gas flow readings taken during sampling.

Measurements were made of the duct inside diameter, port nozzle length, and the distances to the nearest upstream and downstream flow disturbances. These measurements were then used to determine sampling point locations by following EPA Reference Method 1 guidelines. The distances were marked on the sampling probe using an indelible marker.

5.1.3.2 Assembling the Train. Assembly of the CDD/CDF sampling train components was completed in the recovery trailer and final train assembly was performed at the stack location. First, the empty, clean impingers were laid out in the proper order in the recovery trailer. Each ground glass joint was carefully inspected for hairline cracks. The first impinger was a knockout impinger which has a short tip. The purpose of this impinger was to collect condensate which forms in the coil and XAD-II® resin trap. The next two impingers were modified tip impingers which each contained 100 ml of HPLC grade water. The fourth impinger was empty, and the fifth impinger contained 200 to 300 grams of blue indicating silica gel. After the impingers were loaded, each impinger was weighed, the initial weight and contents of each impinger were recorded on a recovery data sheet. The impingers were connected together using clean glass U-tube connectors and arranged in the impinger bucket as shown in Figure 5-2. The height of all the impingers was approximately the same to obtain a leak-free seal. The open ends of the train were sealed with methylene chloride-rinsed aluminum foil, or clean ground glass caps.

The second step was to load the filter into the filter holder in the recovery trailer. The filter holder was then capped off and placed with the resin trap and condenser coil (capped) into the impinger bucket. A supply of pre-cleaned foil and socket joints was also placed in the bucket in a clean plastic bag for the convenience of the samplers. Sealing greases were not used to avoid contamination of the sample. The train components were transferred to the sampling location and assembled as previously shown in Figure 5-1.

5.1.3.3 Sampling Procedures. After the train was assembled, the heaters were turned on for the probe liner and heated filter box and the sorbent module/condenser coil recirculating pump was turned on. When the system reached the appropriate temperature, the sampling train was ready for pre-test leak checking. The temperature

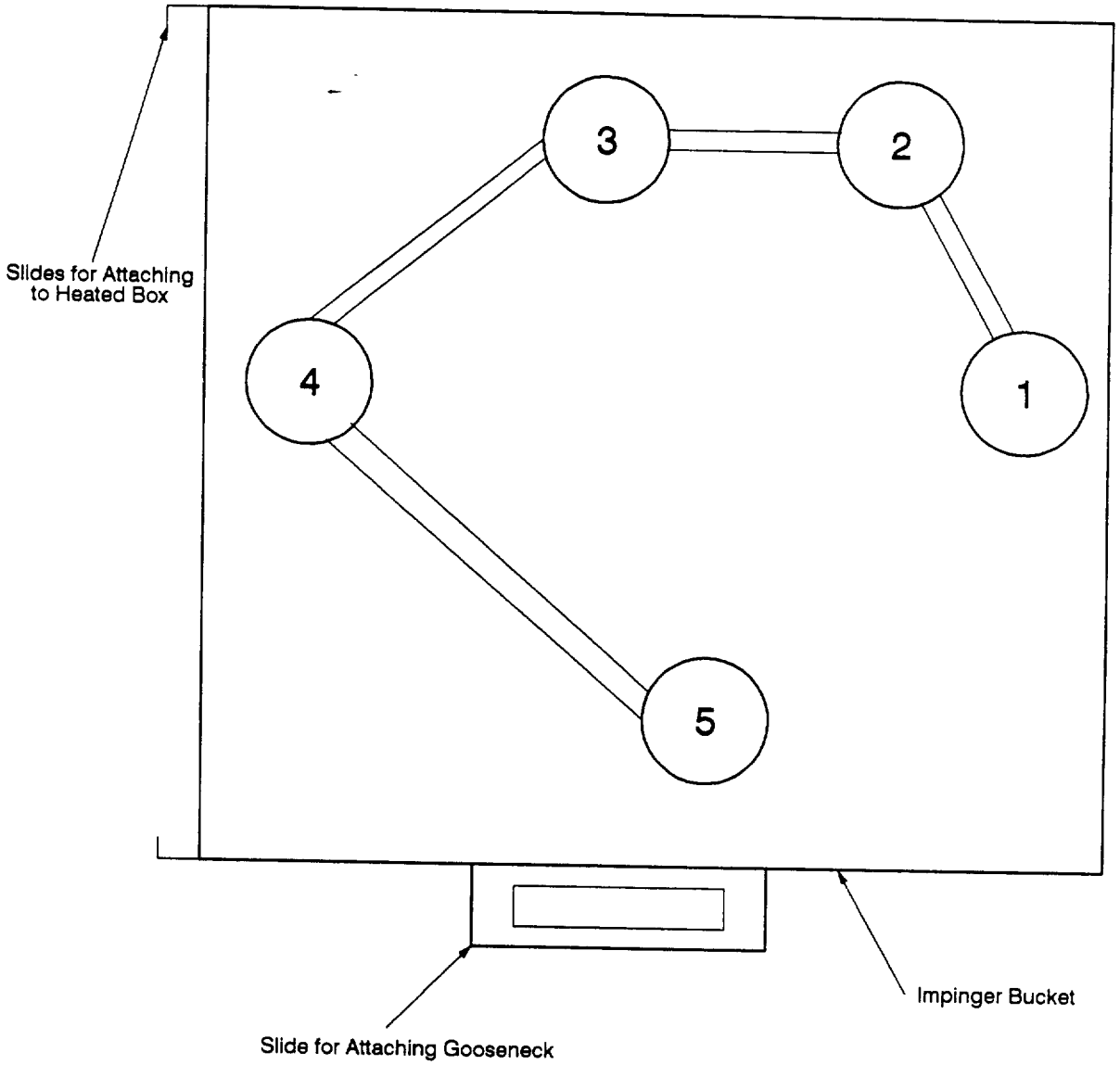

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Figure 5-2. Impinger Configuration for CDD/CDF Sampling
(optional knock out impinger not shown)

of the sorbent module resin must not exceed 50°C (120°F) at any time and during testing it must not exceed 20°C (68°F). The filter skin temperature was maintained at 120 ±14°F (248 ±25°F). The probe temperature was maintained above 100°C (212°F).

The sampling trains were leak checked at the start and finish of sampling. (Method 5/23 protocol only requires post-test leak checks and recommends pre-test leak checks.) Radian protocol also incorporates leak checks before and after every port change. An acceptable pre-test leak rate is less than 0.02 acfm (ft^3/min) at approximately 15 inches of mercury ("Hg). If during testing, a piece of glassware needed to be emptied or replaced, a leak check was performed before the glassware piece was removed, and after the train was re-assembled.

To leak check the assembled train, the nozzle end was capped off and a vacuum of 15 inches Hg was pulled in the system. When the system was evacuated, the volume of gas flowing through the system was timed for 60 seconds. After the leak rate was determined, the cap was slowly removed from the nozzle end until the vacuum dropped off, and then the pump was turned off. If the leak rate requirement was not met, the train was systematically checked by first capping the train at the filter, at the first impinger, etc., until the leak was located and corrected.

After a successful pre-test leak check had been conducted, all train components were at their specified temperatures, initial data were recorded (DGM reading), the test was initiated. Sampling train data were recorded periodically on standard data forms. A checklist for CDD/CDF sampling is included in Table 5-4. A sampling operation that is unique to CDD/CDF sampling is that the gas temperature entering the resin trap must be below 68°F. The gas was cooled by a water jacket condenser through which ice water was circulated.

The leak rates and sampling start and stop times were recorded on the sampling task log. Also, any other events that occurred during sampling were recorded on the task log such as sorbent module heat excursions, pitot cleaning, thermocouple malfunctions, heater malfunctions or any other unusual occurrences.

At the conclusion of the test run, the sample pump (or flow) was turned off, the probe was removed from the duct, a final DGM reading was taken, and a post-test leak check was completed. The procedure is identical to the pre-test procedure, however, the

TABLE 5-4. CDD/CDF SAMPLING CHECKLIST

Before test starts:

1. Check impinger set to verify the correct order, orientation and number of impingers. Verify probe markings, and remark if necessary.

2. Check that you have all the correct pieces of glassware. Have a spare probe liner, probe sheath, meter box and filter ready to go at location.

3. Check for data sheets and barometric pressure.

4. Bag sampling equipment for CO_2/O_2 needs to be ready except when using CEMs for CO_2/O_2 determinations.

5. Examine meter box - level it, zero the manometers and confirm that the pump is operational.

6. Verify the filter is loaded correctly and as tight as possible; place filter in line with the train and leak check at 15 inches Hg.

7. Add probe to train.

8. Check thermocouples - make sure they are reading correctly.

9. Conduct pitot leak check, recheck manometer zero.

10. Do final leak check; record leak rate and vacuum on sampling log.

11. Turn on variacs and check to see that the heat is increasing.

12. Check that cooling water is flowing and on. Add ice to impinger buckets.

13. Check isokinetic K-factor - make sure it is correct. (Refer to previous results to confirm assumptions). (Two people should calculate this independently to double check it.)

TABLE 5-4. CDD/CDF SAMPLING CHECKLIST, continued

4. Check completeness of data sheet. Verify the impinger bucket identification is recorded on the data sheets. Note any abnormal conditions.

5. Leak check function (level, zero, etc.) of pitot tubes and inspect for tip damage.

6. Disassemble train, cap sections, and take each section and all data sheets down to recovery trailer.

7. Probe recovery (use 950 ml bottles)
   a) Bring probes into recovery trailer (or other enclosed area).
   b) Wipe the exterior of the probe to remove any loose material that could contaminate the sample.
   c) Carefully remove the nozzle/probe liner and cap it off with pre-rinsed aluminum foil.
   d) For acetone rinses (all trains)
      - Attach precleaned cyclone flask to probe to catch rinses
      - Wet all sides of probe interior with acetone
      - While holding the probe in an inclined position, put precleaned probe brush down into probe and brush it in and out
      - Rinse the brush, while in the probe, with acetone
      - Do this at least 3 times until all the particulate has been recovered.
      - Recover acetone into a pre-weighed, pre-labeled sample container
   e) Follow the procedure outlined in (d) using toluene, except do not brush. Recover the solvent into the same acetone recovery bottle.

8. Cap both ends of nozzle/probe liner for the next day, and store in dry safe place.

9. Make sure data sheets are completely filled out, legible, and give them to the Crew Chief.

vacuum should be at least one inch Hg higher than the highest vacuum attained during sampling. An acceptable leak rate is less than 4 percent of the average sample rate or 0.02 acfm (whichever is lower). If a final leak rate did not meet the acceptable criterion, the test run may still be accepted upon approval of the test administrator. If so, the measured leak rate was reduced by subtracting the allowable leak rate from it and then multiplied for the period of time in which the leak occurred. This "leaked volume" was then subtracted from the measured gas volume in order to determine the final gas sample volume.

Final decisions on the acceptability of a run were at the discretion of the EPA Test Monitor.

5.1.4 CDD/CDF Sample Recovery

To facilitate transfer from the sampling location to the recovery trailer, the sampling train was disassembled into the following sections: the probe liner, filter holder, filter to condenser glassware, condenser sorbent module, and the impingers in their bucket. Each of these sections were capped with methylene chloride-rinsed aluminum foil or ground glass caps before removal to the recovery trailer. Once in the trailer, field recovery followed the scheme shown in Figure 5-3. The samples were recovered and stored in cleaned amber glass bottles to prevent light degradation.

For the Morristown test program, all CDD/CDF recovery rinses were completed using toluene instead of methylene chloride. This is the most recent development in EPA CDD/CDF testing methodology. The solvents used for train recovery were all pesticide grade. The use of the highest grade reagents for train recovery was essential to prevent the introduction of chemical impurities which interfere with the quantitative analytical determinations.

Field recovery resulted in the sample components listed in Table 5-5. The sorbent module was stored in coolers on ice at all times. The samples were shipped to the analytical laboratory by truck accompanied by written information designating target analyses.

5.1.5 CDD/CDF Analytical Procedures

The analytical procedure that was used to obtain CDD/CDF concentrations from a single flue gas sample was high resolution gas chromatography (HRGC) and high

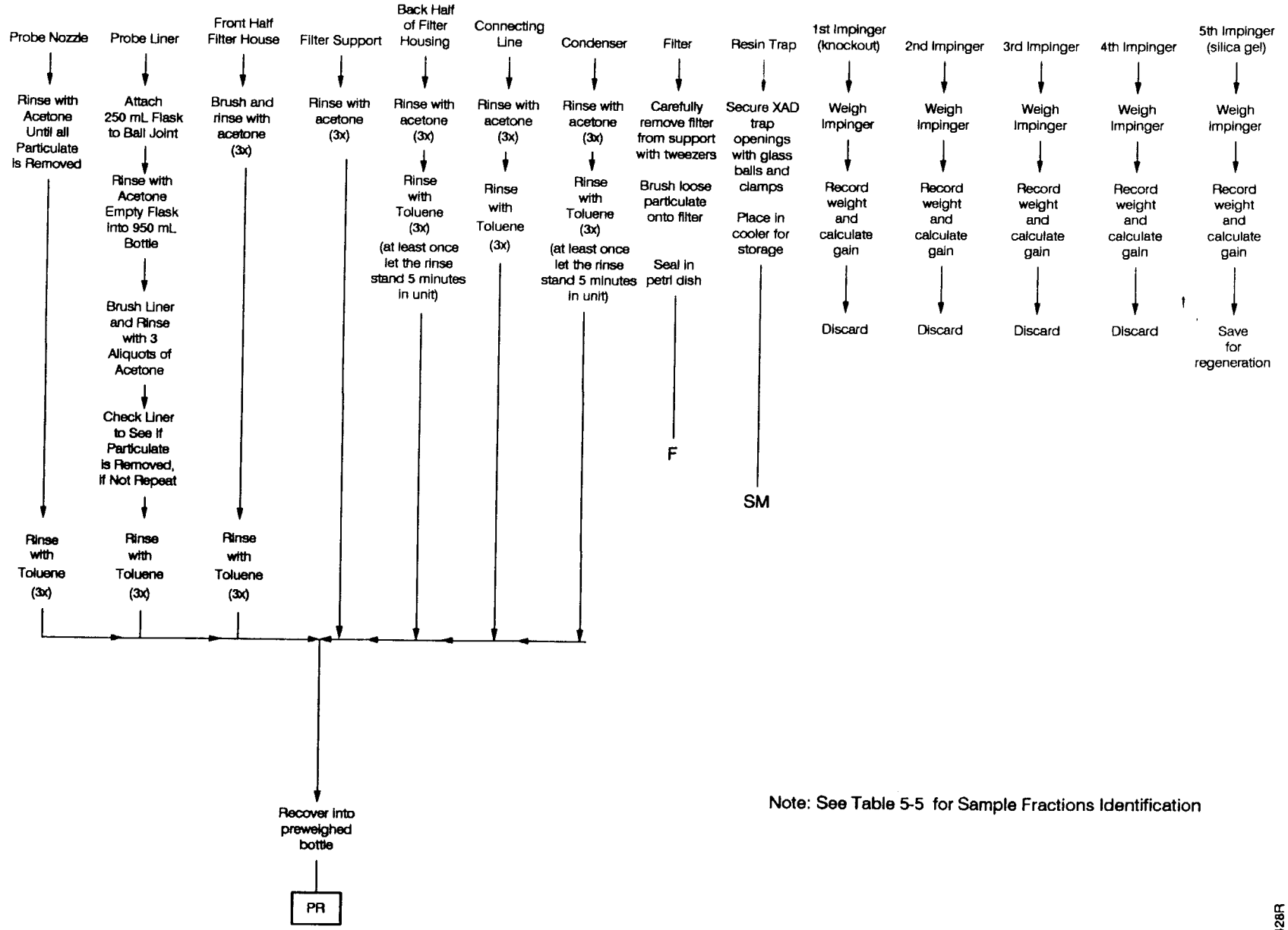

Figure 5-3. CDD/CDF Field Recovery Scheme

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TABLE 5-5. CDD/CDF SAMPLE FRACTIONS SHIPPED TO ANALYTICAL LABORATORY

Container/ Component	Code	Fraction
1	F	Filter(s)
2	PR[a]	Acetone and toluene rinses of nozzle/probe, cyclone, front half/back half filter holder, filter support, connecting glassware, condenser
3	SM	XAD-II® resin trap (sorbent module)

[a] Rinses include acetone and toluene recovered into the same sample bottle.

resolution mass spectrometry (HRMS) (resolution from 8000-10000 m/e). The target CDD/CDF congeners are listed in Table 5-6. The analyses were performed by Triangle Laboratories, Inc., by Method 8290X.

The flue gas samples were analyzed in one pooled fraction according to the scheme in Figure 5-4. For the CDD/CDF analysis, isotopically-labeled surrogate compounds and internal standards were added to the samples before the extraction process was initiated. The internal standards and surrogates that were used are described in detail in EPA Method 23.

Data from the mass spectrometer was recorded and stored on a computer file as well as printed on paper. Results such as amount detected, detection limit, retention time, and internal standard and surrogate standard recoveries were calculated by computer. The chromatograms were retained by the analytical laboratory and also included in the analytical report delivered to Radian Corporation.

5.1.5.1 Preparation of Samples for Extraction. Upon receiving the sample shipment, the samples were checked against the Chain-of-Custody forms and then assigned an analytical laboratory sample number. Each sample component was reweighed to determine if leakage occurred during travel. Color, appearance, and other particulars of the samples were noted. Samples were extracted within 21 days of collection.

5.1.5.2 Calibration of GC/MS System. A five-point calibration of the GC/MS system was performed to demonstrate instrument linearity over the concentration range of interest. Relative response factors were calculated for each congener or compound of interest. The response factors were verified on a daily basis using a continuing calibration standard consisting of a mid-level mixed isomer standard. The instrument performance was accepted only if the measured response factors for the labeled and unlabeled compounds and the ion-abundance ratios were within the allowable limits specified in the method (52200, 52201 FR 891220).

5.1.6 CDD/CDF Analytical Quality Control

All quality control procedures specified in the test method were followed. Blanks were used to determine analytical contamination, calibration standards were used for instrument calibration and linearity checks, internal standards were used to determine

TABLE 5-6. CDD/CDF CONGENERS ANALYZED

DIOXINS:

2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD)
Total tetrachlorinated dibenzo-p-dioxins (TCDD)
1,2,3,7,8 pentachlorodibenzo-p-dioxin (1,2,3,7,8 PeCDD)
Total pentachlorinated dibenzo-p-dioxins (PeCDD)
1,2,3,4,7,8 hexachlorodibenzo-p-dioxin (1,2,3,4,7,8 HxCDD)
1,2,3,6,7,8 hexachlorodibenzo-p-dioxin (1,2,3,6,7,8 HxCDD)
1,2,3,7,8,9 hexachlorodibenzo-p-dioxin (1,2,3,7,8,9 HxCDD)
Total hexachlorinated dibenzo-p-dioxins (HxCDD)
1,2,3,4,6,7,8 heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8 HpCDD)
Total heptachlorinated dibenzo-p-dioxins (HpCDD)
Total octachlorinated dibenzo-p-dioxins (OCDD)

FURANS:

2,3,7,8 tetrachlorodibenzofurans (2,3,7,8 TCDF)
Total tetrachlorinated dibenzofurans (TCDF)
1,2,3,7,8 pentachlorodibenzofuran (1,2,3,7,8 PeCDF)
2,3,4,7,8 pentachlorodibenzofuran (2,3,4,7,8 PeCDF)
Total pentachlorinated dibenzofurans (PeCDF)
1,2,3,4,7,8 hexachlorodibenzofuran (1,2,3,4,7,8 HxCDF)
1,2,3,6,7,8 hexachlorodibenzofuran (1,2,3,6,7,8 HxCDF)
2,3,4,6,7,8 hexachlorodibenzofuran (2,3,4,6,7,8 HxCDF)
1,2,3,7,8,9 hexachlorodibenzofuran (1,2,3,7,8,9 HxCDF)
Total hexachlorinated dibenzofurans (HxCDF)
1,2,3,4,6,7,8 heptachlorodibenzofuran (1,2,3,4,6,7,8 HpCDF)
1',2,3,4,7,8,9 heptachlorodibenzofuran (1',2,3,4,7,8,9 HpCDF)
Total heptachlorinated dibenzofurans (HpCDF)
Total octachlorinated dibenzofurans (OCDF)

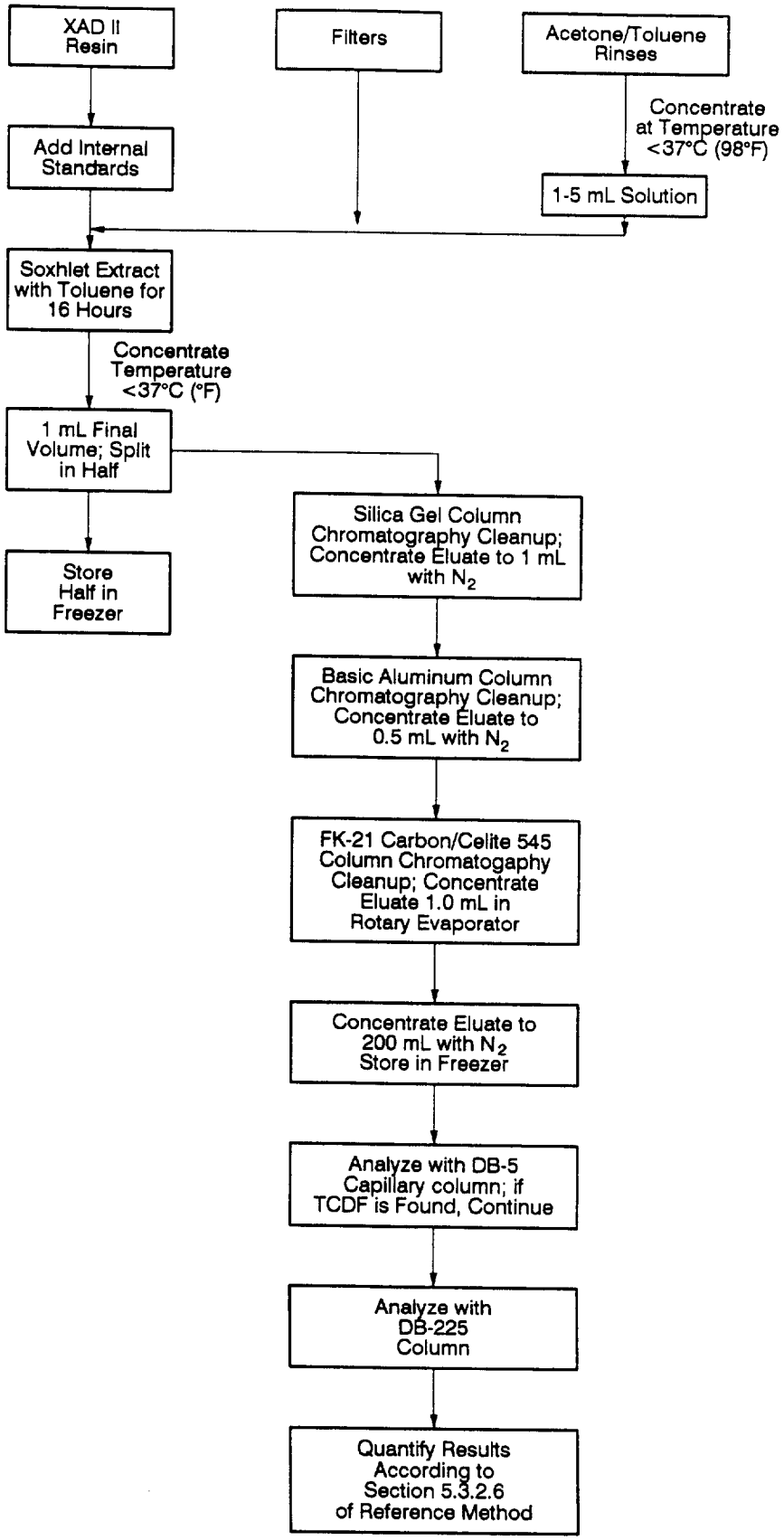

Figure 5-4. Extraction and Analysis Schematic for CDD/CDF Samples

isomer recoveries and adjust response factors for matrix effects, surrogate standards were used to measure the collection efficiency of the sampling methodology and an alternate standard was used as a column efficiency check.

5.1.6.1 CDD/CDF Quality Control Blanks. Three different types of sample blanks were analyzed for CDD/CDF concentrations. The type of blanks that were required are shown in Table 5-7.

Reagent blanks of 1000 ml of each reagent used at the test site were saved for potential analysis. Each reagent blank was of the same lot as was used during the sampling program. Each lot number and reagent grade was recorded on the field blank label and in the laboratory notebook.

A field blank was collected from a set of CDD/CDF glassware that had been used to collect at least one sample and had been recovered. The train was re-loaded and left at a sampling location during a test run. The train was then recovered. The purpose of the field blank was to measure the level of contamination that occurred from handling, loading, recovering, and transporting the sampling train. The field blanks were analyzed with the flue gas samples. If they were unsatisfactory in terms of contamination, reagent blanks would have been analyzed to determine the specific source of contamination.

In addition to the two types of blanks that were required for the sampling program, the analytical laboratory analyzed a method blank with each set of flue gas samples. This consisted of preparing and analyzing reagent water by the exact procedure used for the samples analysis. The purpose of this was to verify that there was no laboratory contamination of the field samples.

5.1.6.2 Quality Control Standards and Duplicates. Recoveries of the internal standards must be between 40 to 130 percent for the tetra- through hexa-chlorinated compounds and the range is 25 to 130 percent for the hepta- and octa-chlorinated homologues. If these requirements were not met, the data was accepted if the signal to noise ratio was greater than or equal to ten. If these requirements were met, the results for the native (sampled) species were adjusted according to the internal standard recoveries.

TABLE 5-7. CDD/CDF BLANKS COLLECTED

Blank	Collection	Analysis
Field Blanks	One run collected and analyzed for each sampling location.	Analyze with flue gas samples.
Method Blank	At least one for each analytical batch	Analyze with each analytical batch of flue gas samples
Reagent Blanks	One 1000 ml sample for each reagent and lot.	Archive for potential analysis.

Surrogate standard recoveries must be between 70 to 130 percent. If the recoveries of all standards were less than 70 percent, the project director was notified immediately to determine if the surrogate results will be used to adjust the results of the native species.

Duplicate analysis was performed for every ten samples. The purpose of this was to evaluate the precision of the combined sample preparation and analytical methodology.

5.2 PARTICULATE MATTER AND METALS EMISSIONS TESTING METHOD

Particulate matter (PM) was collected using Method 5 in combination with the EMB multi-metals back half. The metals sampling train was performed according to an EPA Emission Measurement Branch (EMB) draft protocol entitled "Methodology for the Determination of Metals Emissions in Exhaust Gases from Incineration Processes." This method is applicable for the determination of particulates and Pb, Ni, Zn, P, Cr, Cu, Mn, Se, Be, Tl, Ag, Sb, Ba, Cd, As, and Hg emissions from various types of incinerators. Analyses of the Morristown MWI test samples was performed for As, Cd, Cr, Hg, Ni, Pb, Sb, Ag, Ba, Be, and Tl.

PM emissions were also determined from this sampling train. Particulate concentrations were based on the weight gain of the filter and the front half acetone rinses (probe, nozzle, and filter holder). After the gravimetric analyses have been completed, the sample fractions were then analyzed for the target metals as discussed in Section 5.2.5.

5.2.1 Particulate Matter/Metals Sampling Equipment

The methodology used the sampling train shown in Figure 5-5. The 7-impinger train consisted of a quartz nozzle/probe liner followed by a heated filter assembly with a Teflon® filter support, a series of impingers and the usual EPA Method 5 meterbox and vacuum pump. The sample was not exposed to any metal surfaces in this train. The contents of the sequential impingers were: two impingers with a 5 percent nitric acid (HNO_3)/10 percent hydrogen peroxide (H_2O_2) solution, two impingers with a 4 percent potassium permanganate ($Kmno_4$)/10 percent sulfuric acid (H_2SO_4) solution, and an impinger containing silica gel. The second impinger containing HNO_3/H_2O_2 was of the Greenburg-Smith design; the other impingers had straight tubes. The impingers were

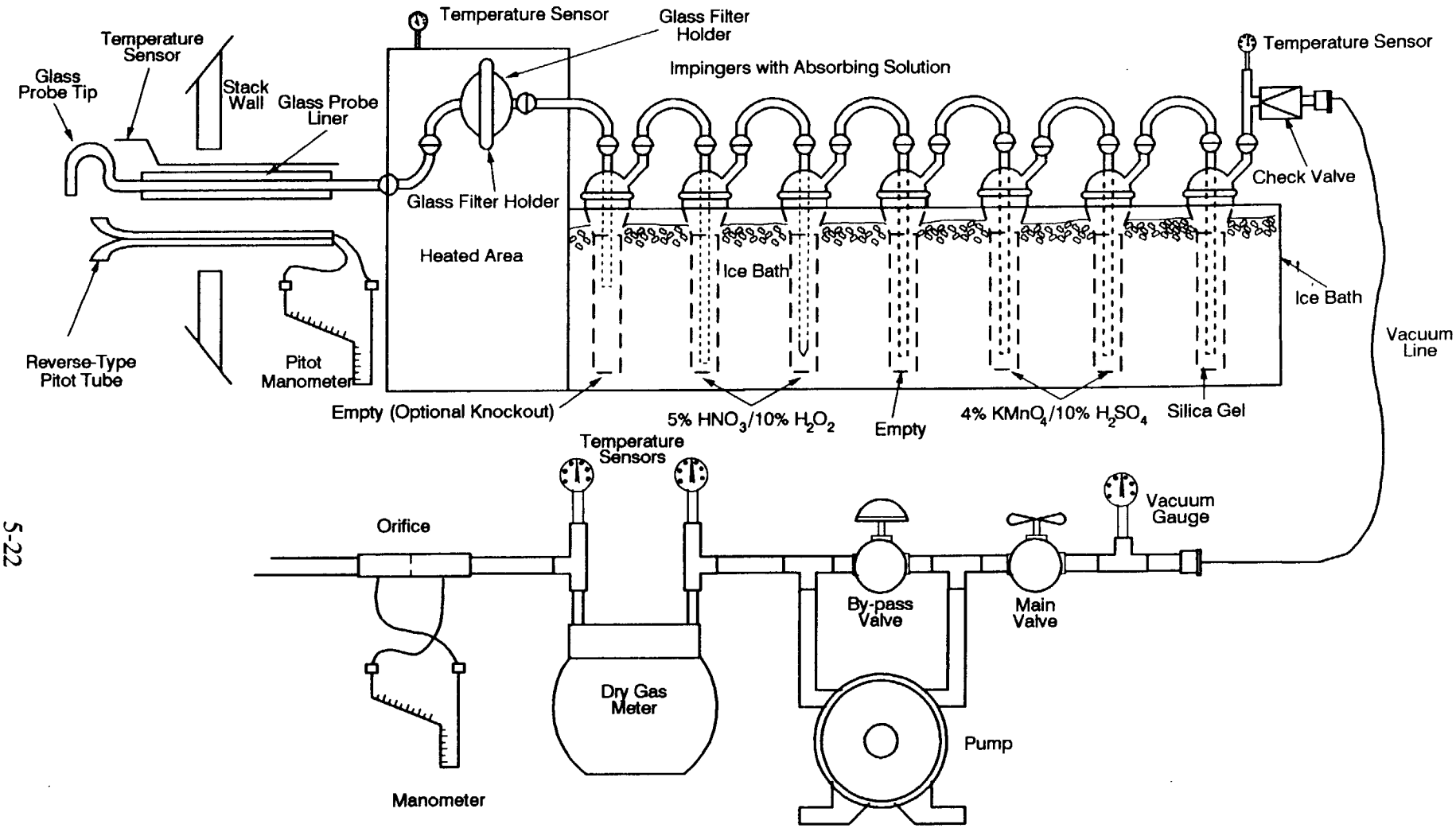

Figure 5-5. Schematic of Multiple Metals Sampling Train

connected together with clean glass U-tube connectors and were arranged in an impinger bucket as shown in Figure 5-6. Sampling train components were recovered and analyzed in separate front and back half fractions according to the described method.

5.2.2 Particulate Matter/Metals Sampling Equipment Preparation

5.2.2.1 Glassware Preparation. Glassware was washed in hot soapy water, rinsed with tap water (3X) and then rinsed with deionized distilled water (3X). The glassware was then subjected to the following series of soaks and rinses:

- Soaked in a 10 percent nitric acid solution for a minimum of 4 hours;
- Rinsed with deionized distilled water rinse (3X); and
- Rinsed with acetone rinse.

The cleaned glassware was allowed to air dry in a contamination-free environment. The ends were covered with parafilm. All glass components of the sampling train plus any sample bottles, pipets, Erlenmeyer flasks, petri dishes, graduated cylinders, and other laboratory glassware used during sample preparation, recovery and analysis were cleaned according to this procedure.

5.2.2.2 Reagent Preparation. The sample train filters were Pallflex Tissuequartz 2500QAS filters. The acids and hydrogen peroxide were Baker "Instra-analyzed" grade or equivalent. The peroxide was purchased specifically for this test site and was kept cold until it was opened.

The reagent water was Baker "Analyzed HPLC" grade or equivalent. The lot number, manufacturer and grade of each reagent that was used was recorded in the laboratory notebook.

The HNO_3/H_2O_2 absorbing solution and the acidic $KMnO_4$ absorbing solution was prepared fresh daily according to Sections 4.2.1 and 4.2.2 of the reference method. The analyst wore both safety glasses and protective gloves when the reagents were mixed and handled. Each reagent had its own designated transfer and dilution glassware. This glassware was marked for identification with a felt tip glass marking pen and used only for the reagent for which it was designated.

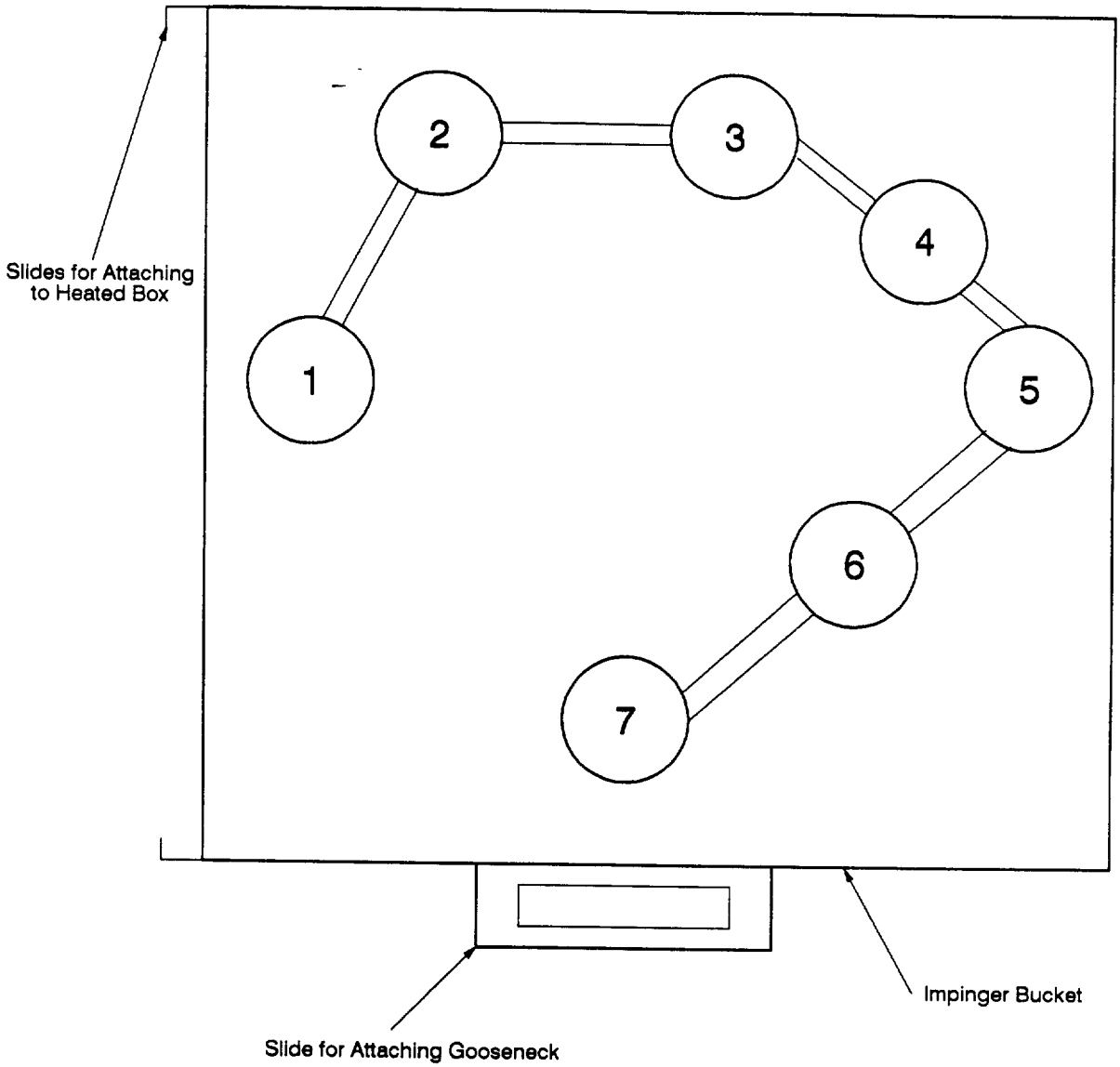

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Figure 5-6. Impinger Configuration for PM/Metals Sampling

5.2.2.3 Equipment Preparation. The remaining preparation included calibration and leak checking of all train equipment as specified in EPA Method 5. This equipment includes the probe nozzles, pitot tubes, metering system, probe heater, temperature gauges, leak check metering system, and barometer. A laboratory field notebook was maintained to record these calibration values.

5.2.3 Particulate Matter/Metals Sampling Operations

The sampling operations used for PM/Metals testing was virtually the same as those for the CDD/CDF tests as discussed in Section 5.1.2. The only differences were that there is no condenser coil so coil temperatures were recorded and glass caps, Teflon® tape, or parafilm were used to seal off the sample train components rather than foil. Detailed instructions for assembling the metals sampling train are found beginning on page 14 of the reference method.

5.2.4 Particulate Matter/Metals Sample Recovery

Recovery procedures began as soon as the probe was removed from the stack and the post-test leak check was completed.

To facilitate transfer from the sampling location to the recovery trailer, the sampling train was disassembled into three sections: the nozzle/probe liner, filter holder, and impingers in their bucket. Each of these sections was capped with Teflon® tape or parafilm before removal to the recovery trailer.

Once in the trailers, the sampling train was recovered as separate front and back half fractions. A diagram illustrating front half and back half sample recovery procedures is shown in Figure 5-7. No equipment with exposed metal surfaces was used in the sample recovery procedures. The weight gain in each of the impingers was recorded to determine the moisture content in the flue gas. Following weighing of the impingers, the front half of the train was recovered, which included the filter and all sample-exposed surfaces forward of the filter.

The probe liner was rinsed with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces were wetted. The acetone was quantitatively collected into the appropriate bottle. This rinse was followed by

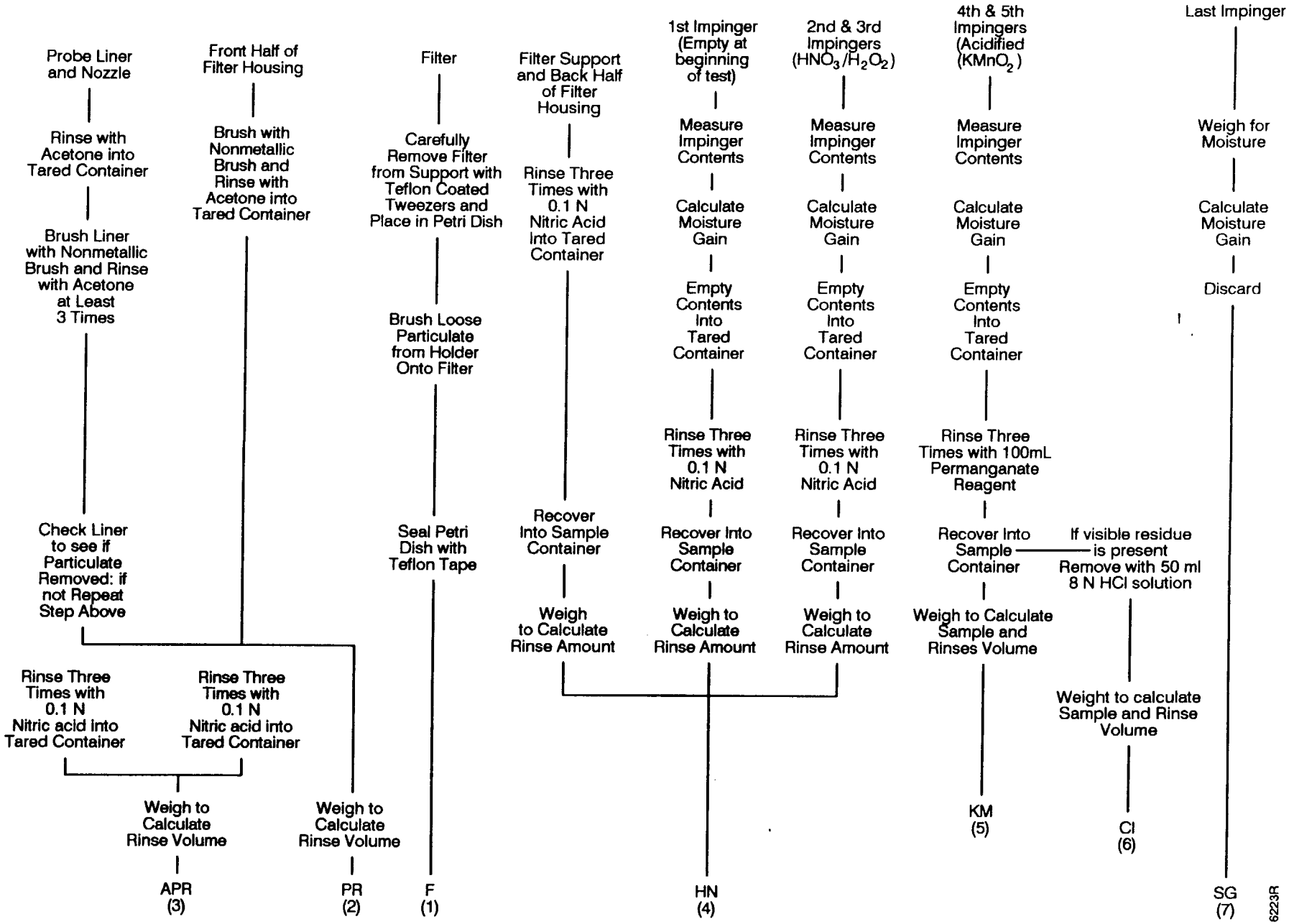

Figure 5-7. Metals Sample Recovery Scheme

additional brush/rinse procedures using a non-metallic brush; the probe was held in an inclined position and acetone was squirted into the upper end as the brush was pushed through with a twisting action. All of the acetone and particulate were caught in the sample container. This procedure was repeated until no visible particulate remains and finished with a final acetone rinse of the probe and brush. The front half of the filter was also rinsed with acetone until all visible particulate was removed. After all front half acetone washes were collected, the cap was tightened, the liquid level marked and the bottle weighed to determine the acetone rinse volume. The method specifies a total of 100 ml of acetone may be used for rinsing these components. However, Radian feels that a thorough rinse requires more reagent. An acetone reagent blank of approximately the same volume as the acetone rinses was analyzed with the samples.

The nozzle/probe liner, and front half of the filter holder were rinsed three times with 0.1N HNO_3 and placed into a separate amber bottle. It was capped tightly, the weight of the combined rinse was recorded and the liquid level marked. The filter was placed in a clean, well-marked glass petri dish and sealed with Teflon® tape.

Prior to recovering the back half impingers, the contents were weighed for moisture control determinations. Any unusual appearance of the filter or impinger contents was noted.

The contents in the knockout impinger was recovered into a pre-weighed, pre-labeled bottle with the contents from the HNO_3/H_2O_2 impingers. These impingers and connecting glassware were rinsed thoroughly with 0.1N HNO_3, the rinse was combined in the impinger contents bottle, and a final weight was taken.

The impingers that contained the acidified potassium permanganate solution were poured together into a pre-weighed, pre-labeled bottle. The impingers and connecting glassware were rinsed with at least 100 ml of the acidified $KMnO_4$ solution (from the same batch used for sampling) a minimum of three times. Rinses were then added to the sample recovery bottle. A final 50 ml 8N HCl rinse was conducted and placed into the sample recovery bottle. A final weight was recorded and the liquid level marked on the bottle. The bottle cap was loosely tightened to allow venting.

After final washing, the silica gel from the train was saved in a bag for regeneration after the job was completed. The ground glass fittings on the silica gel

impinger were wiped off after sample recovery to assure a leak tight fit for the next test.

A reagent blank was recovered in the field for each of the following reagents:

- Acetone blank - 100 ml sample size;
- 0.1N nitric acid blank - 1000 ml sample size;
- 5 percent nitric acid/10 percent hydrogen peroxide blank - 200 ml sample size;
- Acidified potassium permanganate blank - 1000 ml sample size; this blank should have a vented cap;
- 8N hydrochloric acid blank - 50 ml sample size;
- Dilution water; and
- Filter blank - one each.

Each reagent blank was of the same lot as the solvents and acids that were used during the sampling program. Each lot number and reagent grade was recorded on the field blank label.

The liquid level of each sample container was marked on the bottle in order to determine if any sample loss occurred during shipment. If sample loss occurred, the sample may be voided or a method may be used to incorporate a correction factor to scale the final results depending on the volume of the loss.

Approximate detection limits for the various metals of interest are summarized in Table 5-8.

5.2.5 Particulate Analysis

The same general gravimetric procedure described in Method 5, Section 4.3 was followed. Both filters and precleaned beakers were weighed to a constant weight before use in the field. The same balance used for taring was used for weighing the samples.

The acetone rinses were evaporated under a clear hood at 70°F in a tared beaker to dryness. The residue was desiccated for 24 hours in a desiccator containing fresh silica gel at room temperature. The filter was also desiccated under the same conditions to a constant weight. Weight gain was reported to the nearest 0.1 mg. Each replicate weighing must agree to within 0.5 mg or 1 percent of total weight less tare weight,

TABLE 5.8 APPROXIMATE DETECTION LIMITS FOR METALS OF INTEREST USING EMB DRAFT METHOD

Metal	Method[a]	Analytical Detection Limits ($\mu g/ml$)	Instack Method Detection Limits[b] Front Half (300 ml sample size) ($\mu g/m^3$)	Instack Method Detection Limits[b] Back Half (150 ml sample size) ($\mu g/m^3$)
Chromium	ICAP	0.007	1.7	0.8
Cadmium	ICAP	0.004	1.0	0.5
Arsenic[d]	GFAAS	0.001	0.3	0.1
Lead[d]	GFAAS	0.001	0.2	0.1
Mercury	CVAAS	0.0002	0.05	0.03[c]
Nickel	ICAP	0.015	3.6	1.8
Barium	ICAP	0.002	0.5	0.3
Beryllium	ICAP	0.0003	0.07	0.04
Silver	ICAP	0.007	1.7	0.9
Antimony	ICAP	0.032	7.7	3.8
Thallium	ICAP	0.040	9.6	4.8
Copper	ICAP	0.006	1.4	0.7
Aluminum	ICAP	0.035	8.4	4.2

[a] ICAP = Inductively Coupled Argon Plasma
GFAAS = Graphite Furnace Atomic Absorption Spectroscopy
CVAAS = Cold Vapor Atomic Absorption Spectroscopy

[b] These detection limits are based on a stack gas sample volume of 1.25 m^3. If 5 m^3 are collected, the instack method detection limits are 1/4 of the values indicated.

[c] The detection limit for mercury is the same in the HNO_3/H_2O_2 fraction as it is in the $KMnO_4$ fraction.

[d] If Fe and Al are present, samples will be diluted which may raise analytical detection limits.

whichever is greater, between two consecutive weighings, and must be at least 6 hours apart.

5.2.6 Metals Analytical Procedures

A diagram illustrating the sample preparation and analytical procedure for the target metals is shown in Figure 5-8.

The front half fractions were digested with concentrated nitric acid and hydrofluoric (HF) acid in a microwave pressure vessel. The microwave digestion takes place over a period of approximately 10 to 12 minutes in intervals of 1 to 2 minutes at 600 watts. Both the digested filter and the digested probe rinses were combined to yield the front half sample fraction. The fraction was diluted to a specified volume with water and divided for analysis by applicable instrumentation.

The absorbing solutions from the HNO_3/H_2O_2 impingers were combined. An aliquot was removed for the analysis of Hg by Cold Vapor Atomic Absorption Spectroscopy (CVAAS) and the remainder was acidified and reduced to near dryness. The sample was then digested in a microwave digestion, with 50 percent HNO_3 and 3 percent H_2O_2. After the fraction had cooled, it was filtered and diluted to a specified volume with water.

Each sample fraction was analyzed by Inductively Coupled Argon Plasma Spectroscopy (ICAP) using EPA Method 200.7. All target metals except Hg, iron and Al, were quantified. If iron and Al were present, the sample was diluted to reduce their interferences on As and Pb. If As or Pb levels were less than 2 ppm, Graphite Furnace Atomic Absorption Spectroscopy (GFAAS) was used to analyze for these elements by EPA Methods 7060 and 7421. Matrix modifiers such as specific buffering agents may be added to these aliquots to react with and tie up interfering agents. The total volume of the absorbing solutions and rinses for the various fractions was measured and recorded in the field notebook.

To prepare for Hg analysis by CVAAS, an aliquot from the $KMnO_4$ impingers, HNO_3/H_2O_2 impingers, filter digestion, and front half rinses was digested with acidic reagents at 95°C in capped BOD bottles for approximately 3 hours. Hydroxylamine hydrochloride solution and stannous chloride were added immediately before analysis.

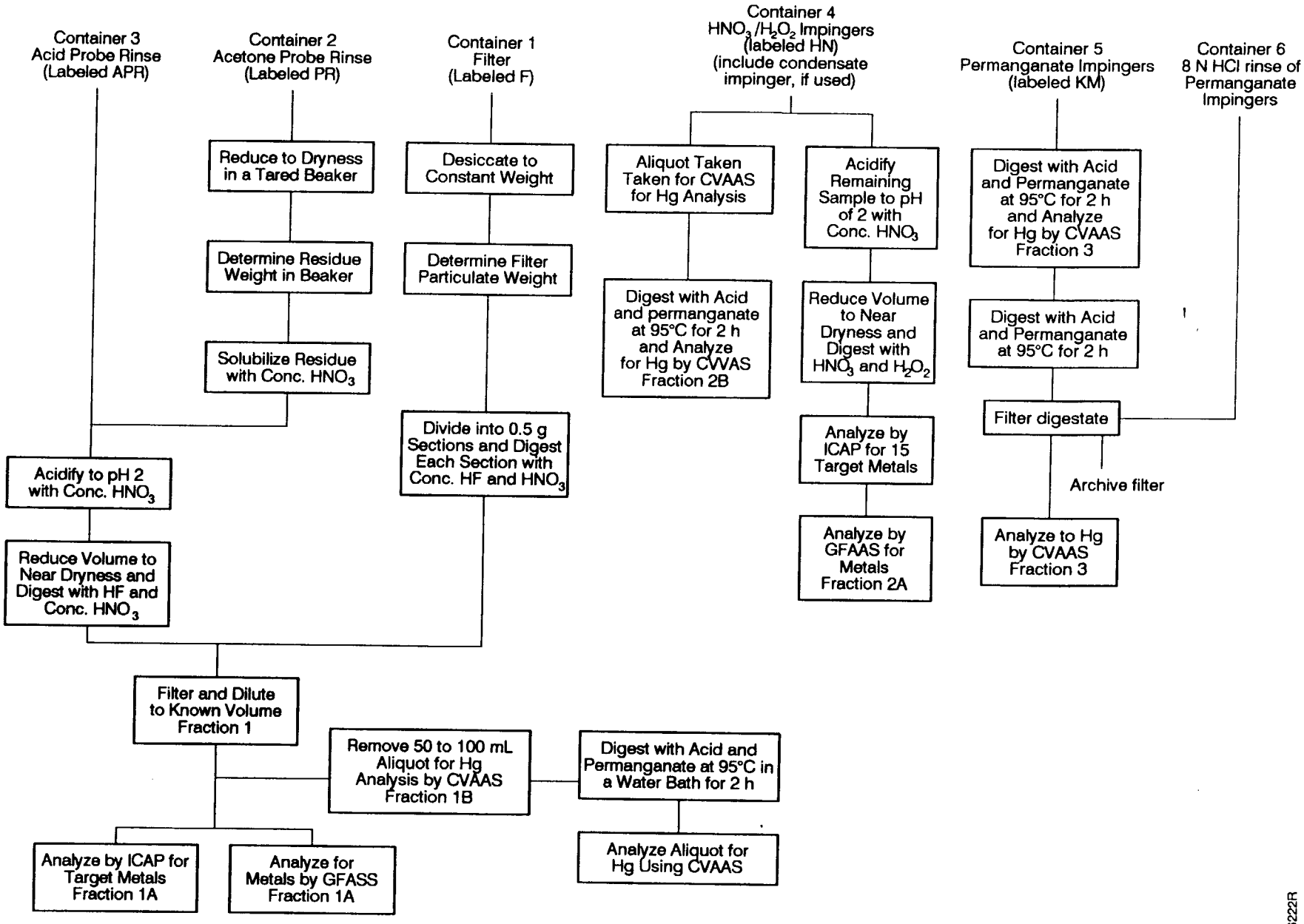

Figure 5-8. Metals Sample Preparation and Analysis Scheme

Cold vapor AAS analysis for Hg follows the procedure outlined in EPA Method 7470 or in Standard Methods for Water and Wastewater Analysis, Method 303F.

5.2.7 Quality Control for Metals Analytical Procedures

All quality control procedures specified in the test method were followed. All field reagent blanks were processed, digested and analyzed as specified in the test method. To ensure optimum sensitivity in measurements, the concentrations of target metals in the solutions were at least 10 times the analytical detection limits.

5.2.7.1 ICAP Standards and Quality Control Samples. The quality control procedures included running two standards for instrument checks (or frequency of 10 percent), two calibration blank runs (or frequency of 10 percent), one interference check sample at the beginning of the analysis (must be within 10 percent or analyze by standard addition), one quality control sample to check the accuracy of the calibration standards (must be within 10 percent of calibration), one duplicate analysis and one standard addition for every 10 samples (must be within 5 percent of average or repeat all analysis).

Standards less than 1 μg/ml of a metal were prepared daily; those with concentrations greater than this were made weekly or bi-monthly.

5.2.7.2 Graphite Furnace Standards and Quality Control Samples. Standards used for GFAAS analysis were matrix matched with the samples analyzed and the matrix modifiers that were added. Standards less than 1 μg/ml of a metal were prepared daily; those with concentrations greater than this were made weekly or bi-monthly. A minimum of five standards made the standard curve. Quality control samples were prepared from a separate 10 μg/ml standard by diluting it into the range of the samples.

All samples were analyzed in duplicate. A matrix spike on one front half sample and one back half sample for each 10 field samples were analyzed. If recoveries of less than 75 percent or greater than 120 percent were obtained for the matrix spike, each sample was analyzed by the method of additions. One quality control sample was analyzed to check the accuracy of the calibration standards. The results must be within 10 percent or the calibration was repeated.

5.2.7.3 Mercury Standards and Quality Control. An intermediate Hg standard was prepared weekly; working standards were prepared daily. The calibration curve was

made with at least six points. Quality control samples were prepared from a separate 10 μg/ml standard by diluting it into the range of the samples.

A quality control sample must agree within 10 percent of the calibration, or the calibration was repeated. A matrix spike on one of every 10 samples from the HNO_3/H_2O_2 back half sample fraction must be within 20 percent or the samples were analyzed by the method of standard addition.

5.3 MERCURY EMISSIONS BY METHOD 101A

Mercury emissions testing by Method 101A is specified in 40 CFR Part 61, Appendix B. Basically, the method calls for isokinetic extraction of flue gas through a sample train similar to the standard EPA Method 5 train. Method 101A states that the use of a filter is optional and may be employed in cases where the flue gas contains large quantities of PM.

The sample stream passed through the filter (optional) and bubble through acidified potassium permanganate solution ($KMnO_4$). Not counting blanks, there were two fractions of the sample train, the probe rinse/impinger catch and the filter. Following sample recovery, the $KMnO_4$ and filter solutions were shipped back to the laboratory for analysis. The analytical preparation procedures basically consisted of filtering the $KMnO_4$ solutions and analyzing the filtrate by CVAAS. Studies recently conducted by EPA show that after a certain sample hold time, the analytical filtering procedures may remove a certain portion of the collected Hg contained in the magnesium dioxide precipitate, which tends to form in the highly saturated $KMnO_4$ solution. This may be the case only when visible precipitate is present. For this test program, the analytical filter was archived.

The following sections will briefly describe Method 101A testing procedures.

5.3.1 Method 101A Sampling Equipment

The Method 101A sampling train, including the use of the optional heated filter, is shown in Figure 5-9. The front half of this train is similar to an EPA Method 5 train incorporating all isokinetic sampling apparatus. A glass nozzle and probe liner were used so that the sample stream does not touch any metal surfaces. Typically, 4 impingers were used with the first 3 containing 50 ml, 100 ml, and 100 ml, respectively, of acidified 4 percent $KMnO_4$. The last impinger was filled with silica gel to remove water prior to

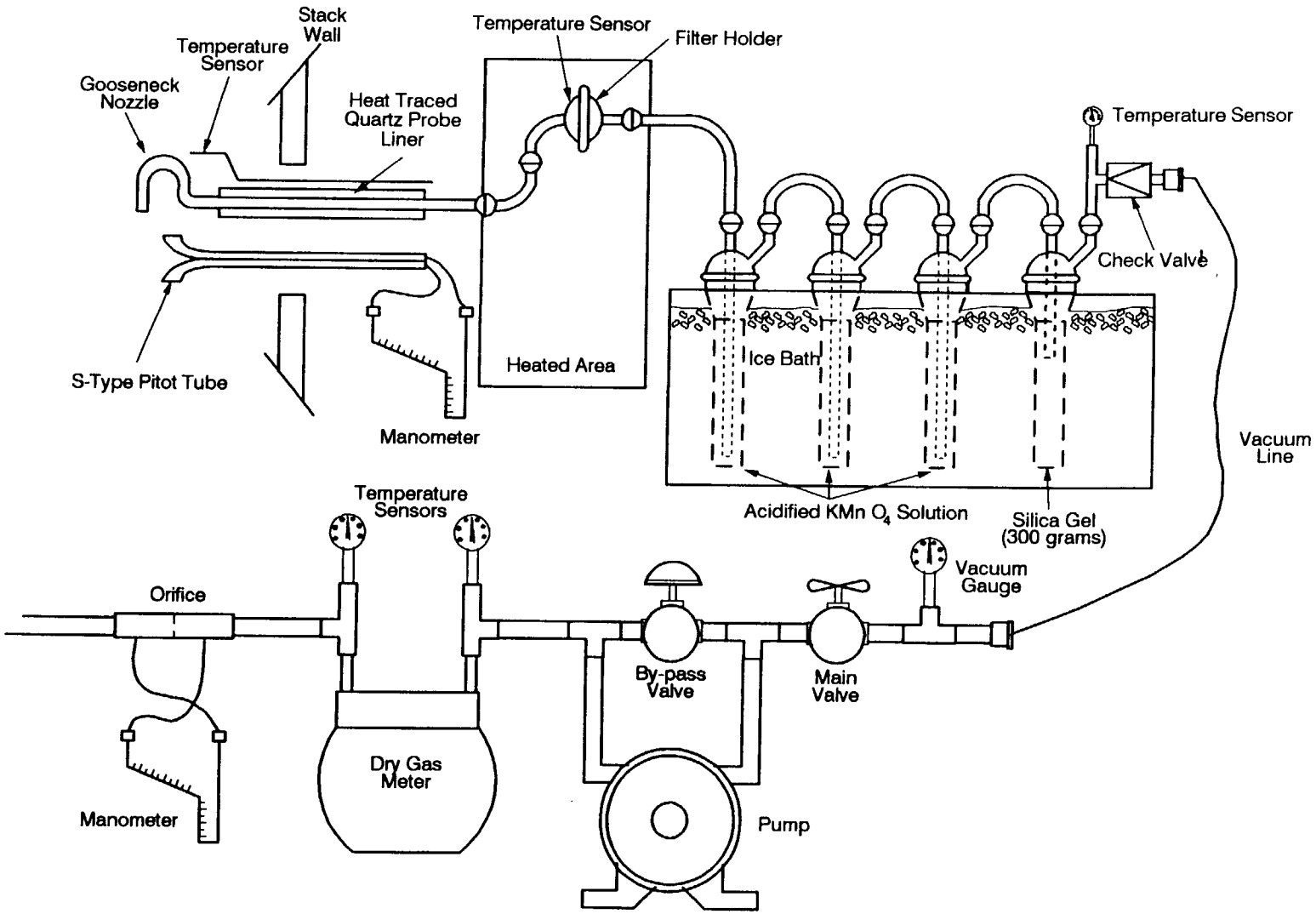

Figure 5-9. EPA Method 101A Sampling Train

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the sampling train meter and pump. All reagent preparation followed strict QA/QC guidelines as dictated in the Method 101A protocol.

5.3.2 Equipment Preparation

All sampling equipment was calibrated in accordance with EPA Method 5 guidelines. This included dry gas meters, pitot tubes, nozzle orifice, and others.

All glassware was cleaned as follows:

- Soaked in 10% HNO_3 acid bath;
- Rinsed 3 times with 50% HNO_3;
- Rinsed 3 times with tap water;
- Rinsed 3 times with 8N HCl;
- Rinsed 3 times with tap water; and
- Rinsed 3 times with deionized/distilled (or equivalent) water.

Glassware was then sealed with Parafilm™, wrapped in bubble wrap, packed, and shipped to the testing facility.

All nozzles and probe liners were cleaned on site by following the above rinsing procedures. Nozzles were then calibrated on site.

5.3.3 Reagent Preparation

The following reagents were needed during sampling operations:

- 8N HCl = 67 ml concentrated HCl/100 ml deionized (DI) H_2O;
- 4 percent $KMnO_4$ = see Section 5.2.2.2; and
- 50 percent HNO_3 = Add equal parts acid to DI H_2O very slowly using extreme caution.

Blank samples were taken of all reagents used to determine if Hg contamination was present.

5.3.4 Sample Operation

The Method 101A sample train was operated similar to an EPA Method 5 train. Care was taken to determine the proper isokinetic sample rate. Sampling rates should never exceed 1.0 cfm. Temperatures of the stack gas, oven (filter skin), silica gel impinger, and inlet and outlet to the gas meter were monitored. Additional recordings

of dry gas meter readings, velocity head (ΔH), orifice pressure (Δp), and sample vacuum were taken.

Leak checks of the sampling train were performed prior to the test, following train removal from a port (port change), after the train had been sited in the next port, and following completion of the test. The maximum acceptable leak rate was 0.02 cfm or 4 percent of the average sample rate, whichever is less.

5.3.5 Sample Recovery

The Method 101A flue gas samples were recovered as shown in Figure 5-10. The first step after completion of the post-test leak check was to dismantle and seal the train into the following components:

- Probe nozzle and liner,
- Filter holder, and
- Impinger train.

These components were transported back to the laboratory trailer for recovery operations. The impingers were then weighed to determine flue gas moisture levels. Two sample bottles were collected from each flue gas sample.

The contents of the $KMnO_4$ impingers were poured into a 1000-ml sample bottle. The nozzle and probe were then brushed/rinsed three times with fresh 4 percent $KMnO_4$ and deionized water and added to the 1000-ml bottle. The front half filter holder was also rinsed into the same sample bottle. If any visible deposits were left on these pieces of glassware, a small amount (approximately 50 ml) of 8N HCl was used to rinse them, and the rinse was added to a separate sample bottle.

A second sample bottle was collected only from those Method 101A trains that used a sample filter. The filter was carefully placed in a 150 ml sample jar and 20 to 40 ml of fresh 4 percent $KMnO_4$ was added. Any residual filter pieces left on the filter holder must be quantitatively removed using a sharpened edge blade and/or nylon bristle brush and added to this container. A filter and reagent blank were also collected. Following recovery operations, the samples were fully labeled, logged in the sample log book, and chain of custody forms were filled out.

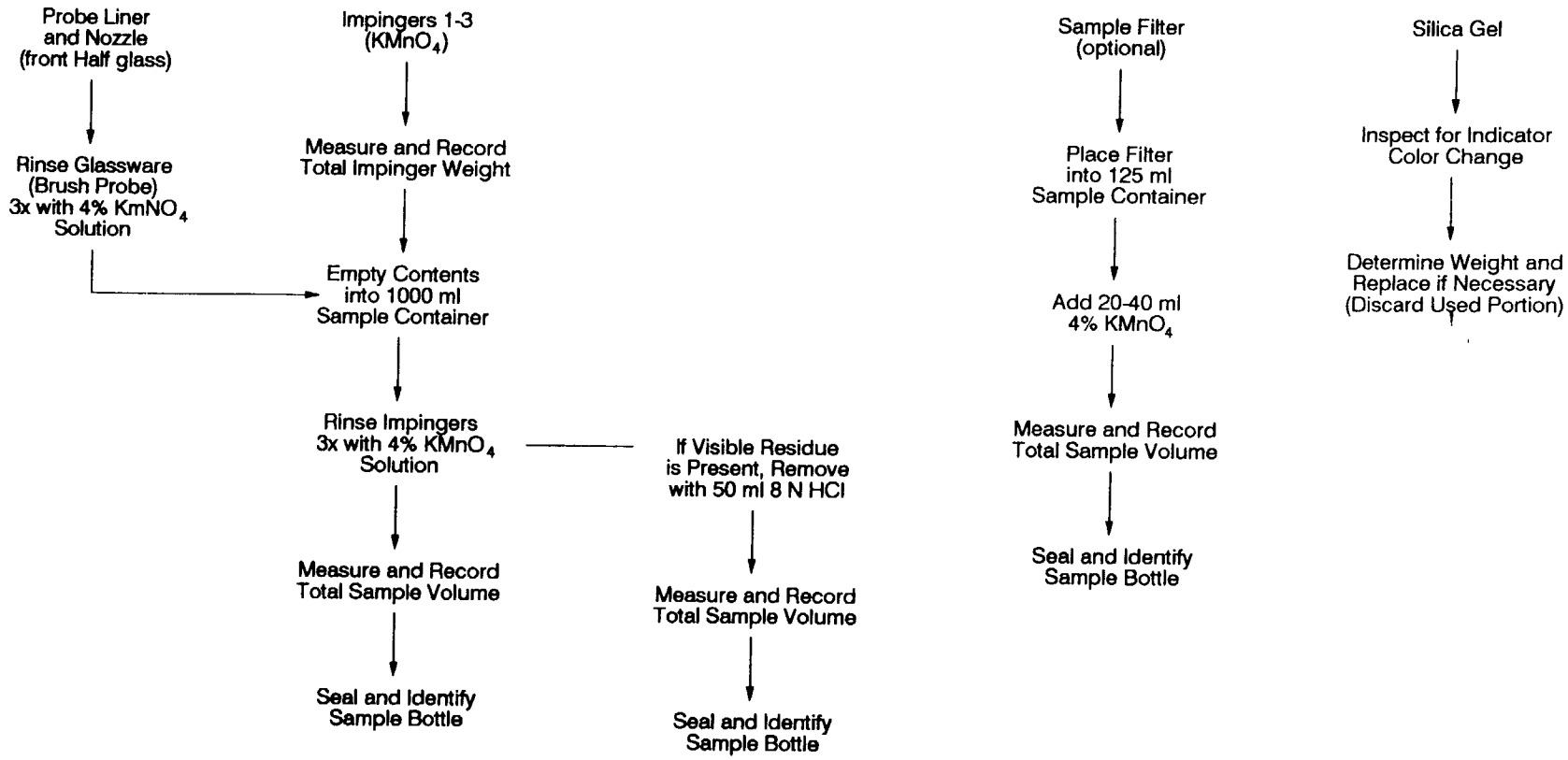

Figure 5-10. Method 101A Sample Recovery Scheme

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5.3.6 Analytical Preparation

A simplified diagram of the sample preparation and analysis scheme for the 101A Hg analysis is shown in Figure 5-11. After the samples were recovered by the laboratory, the chain of custody forms were signed and fluid levels checked to determine if any sample loss occurred during transport. As stated in the previous section, there were two sample containers if a filter was used: one for the front half rinse/impinger contents, and one for the filter/$KMnO_4$ digestion. However, all sample fractions were combined and analyzed together.

Prior to analysis, the front half rinse/impinger sample were filtered. The filter was washed and the rinsings were combined with the filtrate for analysis. Normally, at this point the filter was discarded. However, recent concern has risen regarding this procedure. It seems that if visible precipitate in the $KMnO_4$ was present, a portion of the sampled Hg contained in the precipitate may be lost if the filter is discarded. For this test program, all analytical filters were archived pending a decision on analytical procedure. If sample hold time is kept to a minimum (i.e., < 7 days), the precipitate has typically not formed and this matter is not as critical. If, however, precipitate has formed and is visible on the filter, a digestion of the filter in 8N HCl may be warranted. If this procedure is completed, the digestion solution is again filtered with the filtrate added to the original $KMnO_4$ filtrate. However, at this time, the analytical filter from each sample was archived.

The sample from the sample filter/$KMnO_4$ was transferred to a beaker and placed in a steam bath and evaporated down to where most of the liquid had disappeared (not dryness). Twenty ml of concentrated HNO_3 was then added and placed on a hot plate (with watch glass cover) and heated for 2 hours at 70°C. This solution was allowed to cool and was then filtered. The filtrate was combined with the front half rinse/impinger sample filtrate prior to analysis.

5.3.7 Analysis

The final combined $KMnO_4$ sample was brought up to a fixed volume using deionized/distilled (DI) water. A 5 ml aliquot was removed and placed in 25 ml of DI

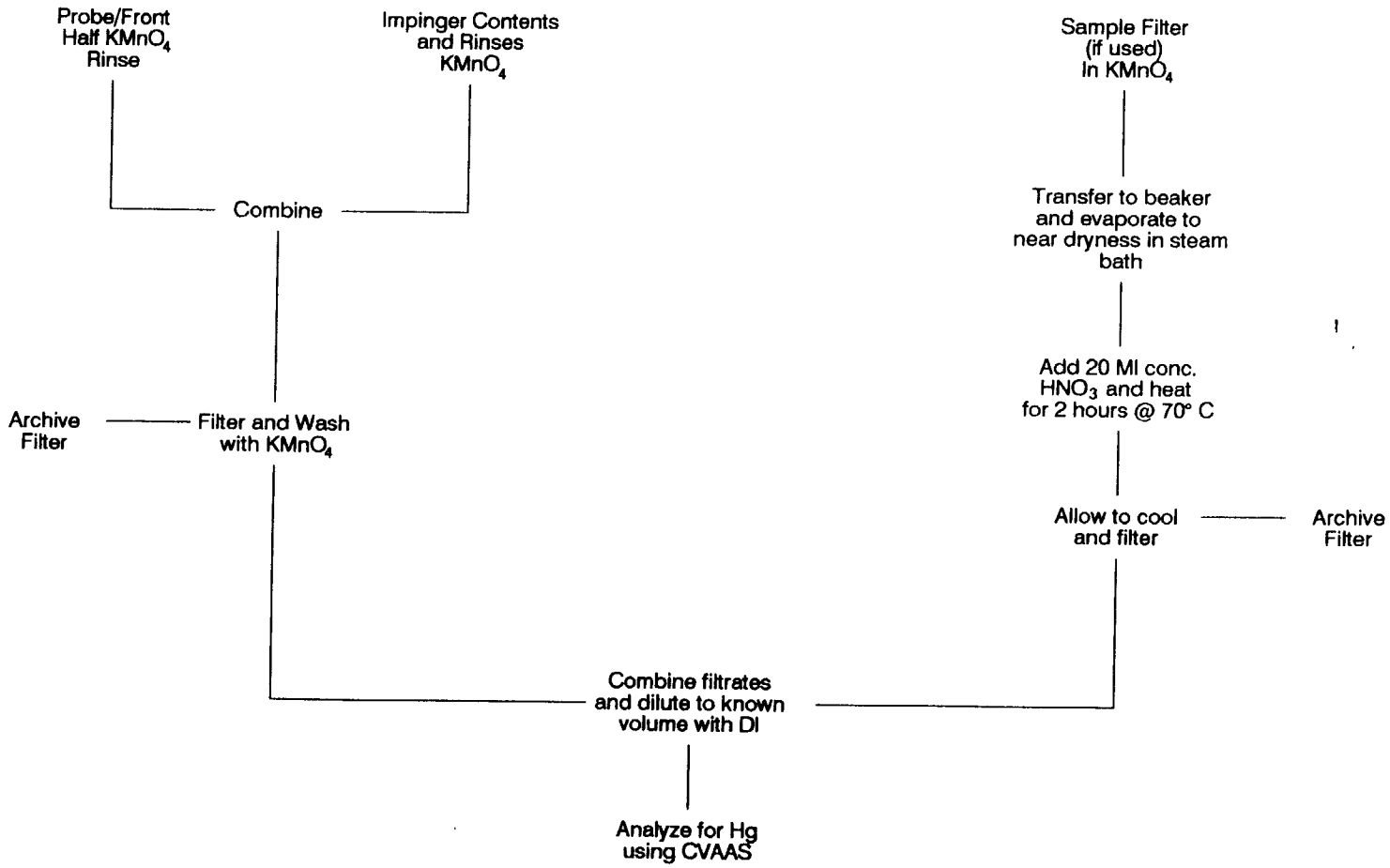

Figure 5-11. Method 101 A
Sampling Preparation and Analysis Scheme

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H_2O already located in the aeration bottle. Then 5 ml of 15 percent HNO_3 was added and followed by addition of 5 ml of 5 percent $KMnO_4$. The solution was mixed thoroughly with the exit arm stopcock closed. The reducing agents, sodium chloride hydroxylamine and tin (II), were then added as specified in the method and aeration was initiated. Absorbance was then read at 253.7 nm.

5.4 HYDROGEN CHLORIDE/HYDROGEN BROMIDE/HYDROGEN FLUORIDE EMISSIONS TESTING BY EPA METHOD 26

Hydrogen Chloride (HCl), Hydrogen Bromide (HBr), and Hydrogen Fluoride (HF) sampling was accomplished using a single sampling train. The procedure followed the EPA Method 26 entitled "The Determination of HCl Emissions from Municipal and Hazardous Waste Incinerators." In this method, an integrated gas sample was extracted from the stack and passed through acidified water. In acidified water, HCl solubilizes and forms Chloride (Cl^-) ions. Ion chromatography (IC) was used to detect the Cl^- ions present in the sample. For this test program, the presence of Bromide (Br^-) and Fluoride (F^-) ions was also detected by IC.

5.4.1 HCl/HBr/HF Sampling Equipment

A diagram of the HCl/HBr/HF sampling train is shown in Figure 5-12. The sampling train consisted of a quartz probe with a pallflex Teflon/glass filter to remove particulate matter, and a series of chilled midget impingers and a DGM system. Because the high temperatures of the stack and the shortness of the sampling probe kept sample gas in the probe above the acid dewpoint, the probe was not heated. The train consisted of an optional knockout impinger followed by two impingers containing 0.1 N H_2SO_4 to collect HCl, HBr and HF, two impingers containing 0.1 N NaOH to capture any pollutants present in the flue gas that might cause DGM damage, and finally one silica gel impinger.

5.4.2 HCl/HBr/HF Sampling Preparation

5.4.2.1 Equipment Preparation. Sampling preparation included calibration and leak checking of all train equipment. This included meterboxes, thermocouples, and umbilicals. Referenced calibration procedures were followed when available, and the results properly documented and retained. If a referenced calibration technique for a particular piece of apparatus was not available, then a state-of-the-art technique was used.

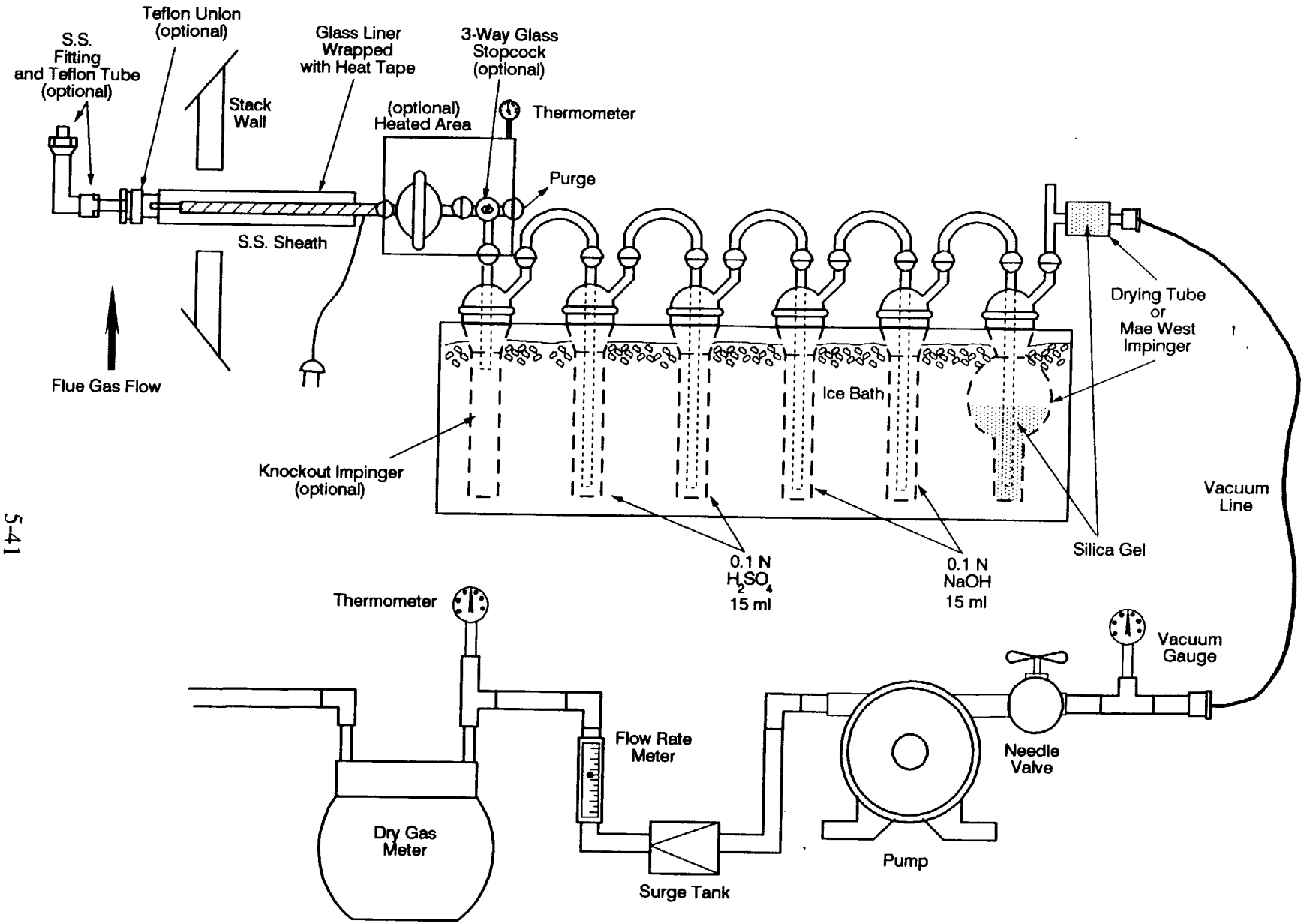


Figure 5-12. Chlorine Sample Train Configuration

5.4.2.2 Assembling the Train. Assembly of the sampling train was done both in the recovery trailer and at the stack location. First, the empty clean impingers were assembled and laid out in the proper order. The optional knockout impinger was not being used for testing at this facility. The first two impingers contained 15 to 20 ml each of 0.1 N H_2SO_4 each, followed by two impingers filled with 15 to 20 ml each of 0.1 N NaOH, and finally an impinger containing 20 to 30 grams of silica gel. When the impingers were loaded, they were wrapped with Teflon® tape to secure the two sections of the impinger. The impingers were connected together using U-tube connectors and arranged in the impinger bucket. The height of all the impingers was approximately the same to easily obtain a leak free seal. The open ends of the train were sealed with aluminum foil.

5.4.3 HCl/HBr/HF Sampling Operations

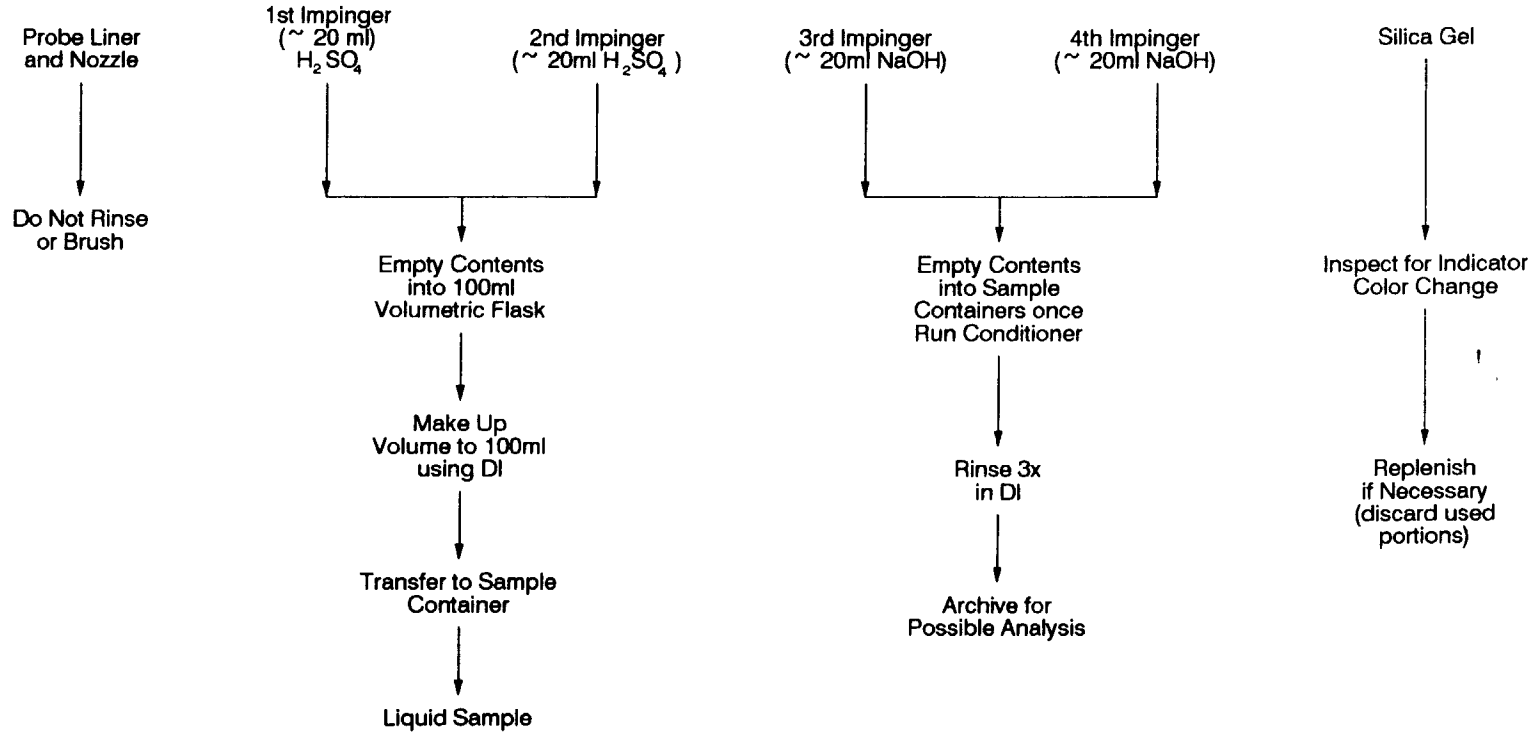
Prior to sampling, the HCl/HBr/HF train was leak checked as required by Method 26 protocol. The leak checking procedure is the same as that discussed in Section 5.1. The leak rate, sampling start and stop times, and any other events were recorded on the sampling task log. Upon completion of a sampling run, the leak check procedure was repeated. Sampling train data were recorded every five minutes, and included readings of the DGM, DGM temperature, flow rate meter, and vacuum gauge.

5.4.4 HCl/HBr/HF Sample Recovery

The impingers were disconnected from the probe and filter and moved to the recovery trailer. Once in the trailer, the contents of the two acidified impingers were quantitatively recovered with deionized distilled water and placed into a clean sample bottle. The sample bottle was sealed, mixed, labeled and the fluid level marked. The contents of the second set of impingers (containing the 0.1 N NaOH) was discarded for every triplicate series except for one. These were archived for possible future analyses. The sample recovery scheme is shown in Figure 5-13.

5.4.5 HCl/HBr/HF Analytical Procedures

Before analysis, the samples were checked against the chain-of-custody forms and then given an analytical laboratory sample number. Then, each sample was examined to determine if any leakage occurred and any color or other particulars of the samples were noted.



Figrue 5-13. HCl/HBr/HF Sample Recovery Scheme

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The Ion Chromatographic (IC) conditions are described by the type of analytical column and whether suppressed or nonsuppressed IC was used. Prior to sample analysis, a stable baseline was established and water samples were injected until no Cl^-, Br^-, or F^- appears in the chromatogram. Then, the IC was calibrated using standards spanning the appropriate concentration range, starting with the lowest concentration standard. Next, a QC check sample was injected in duplicate, followed by a water blank and the field samples. The calibration standards were re-injected at the end of the analysis to allow compensation for any drift in the instrument response during analysis of the field samples. The Cl^-, Br^-, and F^- sample concentrations were calculated from either the respective ion peak area or peak height and the calibration curve.

5.4.6 HCl/HBr/HF Analytical Quality Control

The IC was calibrated with a minimum of three concentrations, not including zero. A correlation coefficient of greater than or equal to 0.995 must be achieved to have an acceptable calibration. At least 10 percent of the total number of samples was analyzed in duplicate. Ion concentrations in the duplicates must agree to within ±20 percent.

5.5 EPA METHODS 1-4

5.5.1 Traverse Point Location By EPA Method 1

The number and location of sampling traverse points necessary for isokinetic and flow sampling will be dictated by EPA Method 1 protocol. These parameters were based upon how much duct distance separates the sampling ports from the closest downstream and upstream flow disturbances. The minimum number of traverse points for a circular duct less than 24 inches is 4 (8 total sample points). Several sets of perpendicular sampling ports were established in the incinerator outlet. Traverse point locations were determined for each port depending on the distances to duct disturbances (see Section 3).

5.5.2 Volumetric Flow Rate Determination by EPA Method 2

Volumetric flow rate was measured according to EPA Method 2. A Type K thermocouple and S-type pitot tube was used to measure flue gas temperature and velocity, respectively. All of the isokinetically sampled methods that were used incorporate Method 2 (CDD/CDF and PM/Metals).

5.5.2.1 Sampling and Equipment Preparation. For EPA Method 2, the pitot tubes were calibrated before use following the directions in the method. Also, the pitots were leak checked before and after each run.

5.5.2.2 Sampling Operations. The parameters that were measured included the pressure drop across the pitots, stack temperature, stack static and ambient pressure. These parameters were measured at each traverse point, as applicable. A computer program was used to calculate the average velocity during the sampling period.

5.5.3 O_2 and CO_2 Concentrations by EPA Method 3A

The O_2 and CO_2 concentrations were determined by CEMs following EPA Method 3A. Flue gas was extracted from the duct and delivered to the CEM system through heated Teflon® tubing. The sample stream was then conditioned (particulate and moisture removed) and directed to the analyzers. The O_2 and CO_2 concentrations were, therefore, determined on a dry basis. Average concentrations were calculated to coincide with each respective time period of interest. More information on the CEM system will be given in Section 5.6.

5.5.4 Average Moisture Determination by EPA Method 4

The average flue gas moisture content of the flue gas was determined according to EPA Method 4. Before sampling, the initial weight of the impingers was recorded. When sampling was completed, the final weights of the impingers were recorded, and the weight gain was calculated. The weight gain and the volume of gas sampled was used to calculate the average moisture content (percent) of the flue gas. The calculations were performed by computer. Method 4 was incorporated in the techniques used for all of the manual sampling methods that were used during the test.

5.6 CONTINUOUS EMISSIONS MONITORING (CEM) METHODS

EPA Methods 3A, 7E, 6C, and 10 are continuous monitoring methods for measuring CO_2, O_2, NO_x, SO_2, and CO concentrations. Total hydrocarbons were analyzed by EPA Method 25A. Flue gas HCl concentrations were also monitored using CEM procedures using state-of-the-art equipment and procedures. A diagram of the CEM system is shown in Figure 5-14.

Two extractive systems were used to obtain flue gas samples for the CEM systems. One system was for HCl monitoring and the other system was for all other CEMs. For

the main CEM extraction system, samples were withdrawn continuously at a single point from the incinerator outlet duct and transferred to the CEM trailer through heat-traced Teflon® line. The flue gas was conditioned (temperature lowered and moisture removed) before the flue gas stream was split using a manifold to the various analyzers. Hydrocarbon measurements were made on a wet basis, therefore, its sample stream bypasses the gas conditioner.

5.6.1 CEM Sampling Equipment

5.6.1.1 Sample Probes. The main CEM probe consisted of a stainless steel tubing assembly which was attached directly to the heat trace tubing. The probe was placed approximately at a point of average velocity in the stack determined by a prior velocity traverse.

5.6.1.2 Heated Lines. Heated sample lines were used to transfer the flue gas samples to the instrument trailer for O_2, CO_2, NO_x, SO_2, CO, and THC analyses. These lines were heated in order to prevent condensation. Condensate could clog sample lines or provide a medium for the flue gas sample to react and change composition.

All heat trace lines contained three 3/8-inch Teflon® tubes. One tube carried the sample, one tube was used for calibration and QC gases, and the other was available as a backup. Calibration gases were then be directed up to the sampling probe and through the entire sampling/conditioning system.

5.6.1.3 Gas Conditioning. Special gas conditioners were used to reduce the moisture content of the flue gas. A Radian designed gas conditioning system utilized a chiller system to cool a series of glass cyclones. An antifreeze liquid system was used to chill the glass cyclones. The hot flue gas was chilled by heat conduction through the glass wall causing the moisture to condense into droplets. The droplets and any particulate were flung outward toward the glass walls by the centrifugal force, impacted the glass walls, and fell to the bottom of the cyclone where the were drained from the system. In this manner, both moisture and particulate matter were effectively removed from the flue gas sample stream. This system operated under positive pressure eliminating the possibility of a leak. The gas conditioner was located in the CEM trailer.

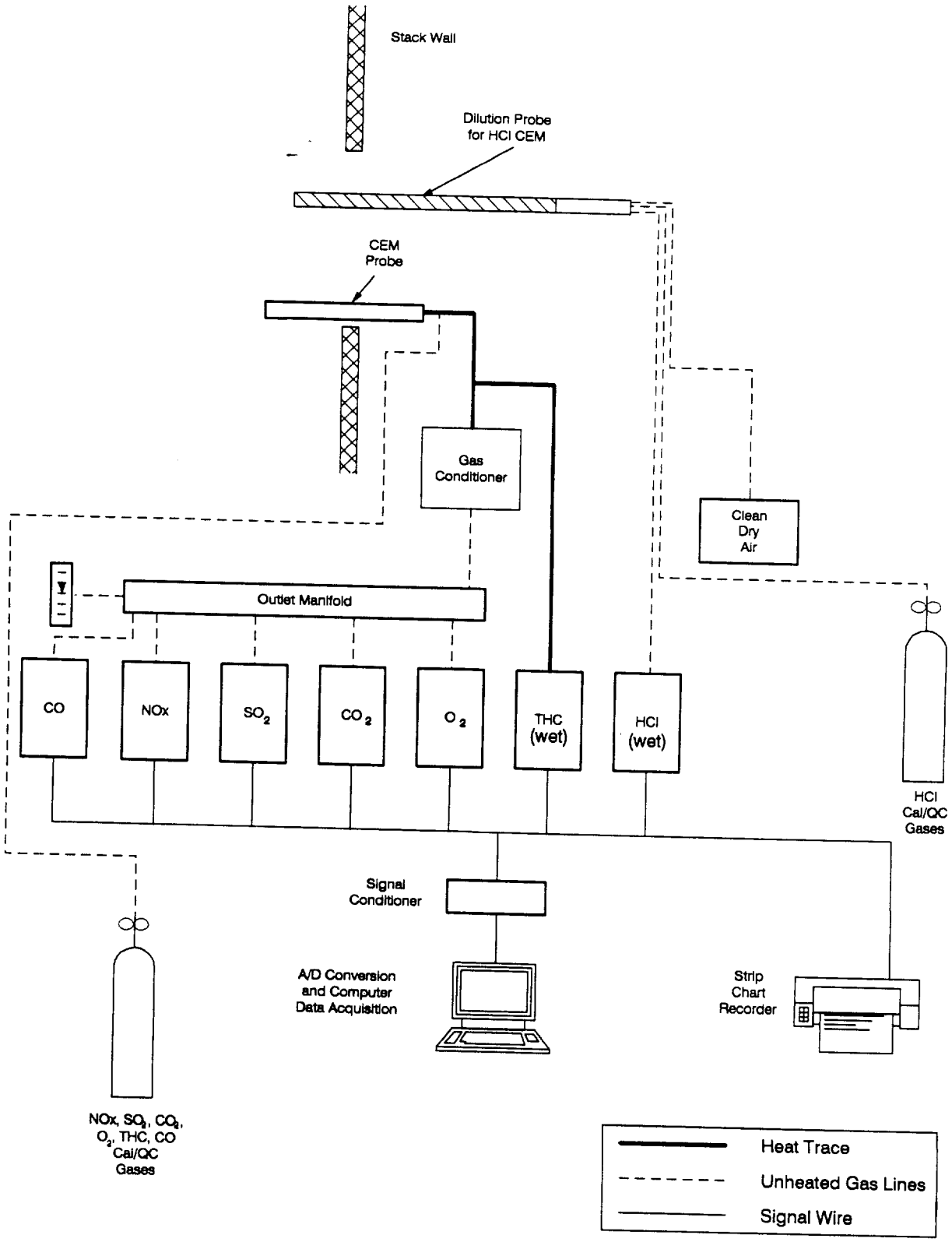

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Figure 5-14. Schematic of CEM System
(2 CEM systems were used)

5.6.1.4 HCl CEM Sample System. HCl flue gas concentrations were monitored using a CEM analyzer as well as by manual test runs. The HCl CEM sampling system used a GMD Model 797 dilution probe. A nominal dilution ratio of 200:1 was used.

5.6.2 CEM Principles of Operation

5.6.2.1 Sulfur Dioxide Analysis. The Western 721A SO_2 analyzer is essentially a continuous spectrophotometer in the ultraviolet range. Sulfur dioxide selectively absorbs ultraviolet (UV) light at a wavelength of 202.5 nm. To take advantage of this property of SO_2, the analyzer emits UV light at 202.5 nm and measures the absorbance (A) of the radiation through the sample cell by the decrease in intensity. Beer's law, $A = abc$, is used to convert the absorbance into SO_2 concentration (A = absorbance, a = absorbitivity, b = path length, c = concentration). Sulfur dioxide measurements were performed using EPA Method 6C.

5.6.2.2 Nitrogen Oxide Analysis. The principle of operation of this instrument was a chemiluminescent reaction in which ozone (O_3) reacted with nitric oxide (NO) to form oxygen (O_2) and nitrogen dioxide (NO_2). During this reaction, a photon is emitted which is detected by a photomultiplier tube. The instrument is capable of analyzing total oxides of nitrogen ($NO + NO_2$) by thermally converting NO_2 to NO in a separate reaction chamber prior to the photomultiplier tube, if desired. Nitrogen oxide measurements were performed using EPA Method 7E.

5.6.2.3 Oxygen Analysis. The Thermox WDG III measures O_2 using an electrochemical cell. Porous platinum electrodes are attached to the inside and outside of the cell which provide the instrument voltage response. Zirconium oxide contained in the cell conducts electrons when it is hot due to the mobility of O_2 ions in its crystal structure. A difference in O_2 concentration between the sample side of the cell and the reference (outside) side of the cell produces a voltage. This response voltage is proportional to the logarithm of the oxygen concentration ratio. A linearizer circuit board is used to make the response linear. Reference gas is ambient air at 20.9 percent O_2 by volume. Oxygen measurements were performed using EPA Method 3A.

5.6.2.4 Carbon Dioxide Analysis. Non-dispersive infrared (NDIR) CO_2 analyzers emit a specific wavelength of infrared radiation through the sample cell which is selectively absorbed by CO_2 molecules. The intensity of radiation which reaches the end

of the sample cell is compared to the intensity of radiation through a CO_2-free reference cell. A reference cell is used to determine background absorbance which is subtracted from the sample absorbance. The detector uses two chambers filled with CO_2 which are connected by a deflective metallic diaphragm. One side receives radiation from the sample cell and the other side receives radiation from the reference cell. Since more radiation is absorbed in the sample cell than in the reference cell, less radiation reaches the sample side of the detector. This causes a deflection of the diaphragm due to increased heat from radiation absorption on the reference side. Deflection of the diaphragm creates an electrical potential which is proportional to absorbance. Absorbance is directly proportional to CO_2 concentration in the gas. Carbon dioxide measurements were performed using EPA Method 3A.

5.6.2.5 CO Analysis. A TECO Model 48 analyzer was used to monitor CO emissions. TECO analyzers measure CO using the same principle of operation as CO_2 analysis. Detection of CO was achieved by alternately passing an infrared (IR) beam between reference CO gas and reference CO free gas contained in the filter wheel. The "chopped" beam passes through the sample cell to the detector. The difference in IR beam strength caused by the absorption of the IR beam is proportional to the CO concentration. Carbon monoxide measurements will be performed using EPA Method 10.

5.6.2.6 Total Hydrocarbon Analysis. A Ratfisch Model 54 was used to monitor total hydrocarbon (THC) emissions. By allowing the THC sample stream to bypass the gas conditioners, concentrations were determined on a wet basis. All analyses employ flame ionization detectors (FID). As the flue gas enters the detector the hydrocarbons are combusted in a hydrogen flame. The ions and electrons formed in the flame enter an electrode gap, decrease the gas resistance, and permit a current flow in an external circuit. The resulting current is proportional to the instantaneous concentration of the total hydrocarbons. This method is not selective between species. EPA Method 25A applies to the continuous measurement of total gaseous organic concentrations of primarily alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The results are reported on a methane basis and methane is used as the calibration gas.

5.6.2.7 HCl CEM Analysis. HCl flue gas concentrations were continuously monitored using an NDIR/GFC instrument manufactured by Thermo Electron Corporation (TECO Model 15). Detection of HCl was achieved by alternately passing an IR beam between reference HCl gas and reference HCl free gas contained in the filter wheel. The "chopped" beam passes through the sample cell to the detector. The difference in IR beam strength caused by the absorption of the IR beam is proportional to the HCl concentration.

5.6.3 CEM Calibration

All the CEM instruments were checked for linearity once during the test program (and linearized, if necessary) using a minimum of three certified calibration gases (zero and two upscale points). Radian performed these multipoint calibrations with three general categories of certified gases: zero gas (generally N_2), a midrange concentration, and a high scale concentration (span gas). The criterion for acceptable linearity is a correlation coefficient (R^2) of greater than or equal to 0.998, where the independent variable is cylinder gas concentration and the dependent variable is instrument response. If an instrument did not meet these requirements, it was linearized by adjusting potentiometers on the linearity card within the instrument or by other adjustments, if necessary.

The CEM analyzers were calibrated before each test run (test day) on a two point basis: zero gas (generally N_2), and a high-range span gas. These calibrations were used to calculate response factors used for sample gas concentration determinations. Instrument drift (zero and span) as a percent of span was also determined using these calibrating for each test run.

After each initial calibration, midrange gases for all instruments were analyzed, with no adjustment permitted, as a quality control (QC) check. If the QC midrange gas concentration observed was within ± 2 percent of full scale, the calibration was accepted and the operator began sampling. If the QC check did not fulfill this requirement, another calibration was performed and linearization was performed if deemed necessary. Calibration procedures are further detailed in the daily operating procedure (Section 5.6.5).

Hydrogen chloride CEMS were also operated at both the inlet and the outlet to the baghouse. This system typically used a separate extractive system as it employed dilution probe techniques.

Table 5-9 lists the concentration of all calibration and QC gases used on this test program.

5.6.4 Data Acquisition

The data acquisition system consisted of a Dianachart PC Acquisitor data logger, a signal conditioner, and a 386 Desktop computer. All instrument outputs were connected in parallel to stripchart recorders and the data acquisition system. The stripchart recorders are a back-up system to the data logger. The PC Acquisitor scans the instrument output and logs digitized voltages. A Radian computer program translates the digitized voltages into relevant concentrations in engineering units (ppmv, %V, etc.). The computer program has several modes of operation: calibration, data acquisition, data reduction, data view, data edit, and data import. The import function is used to combine other data files for comparison and correlation.

5.6.5 Daily Operating Procedure

The following is a detailed standard operating procedure for calibrating and operating the CEM system:

1. Turn on computer and printer, put printer on line, and load the CEM.EXE program. Be sure that the CEM instruments have been on for at least 20 hours.

2. Synchronize DAS clock with sample location leaders and the test leader.

3. Turn on strip chart recorders (SCR) and make appropriate notes on charts and in logbook (write down all procedures and observations in logbook and on SCRs as the day progresses).

4. Turn on the gas conditioners and blow back compressor. Blow back the system.

TABLE 5-9. CEM OPERATING RANGES AND CALIBRATION GASES

Analyte	Gas Concentration
CO_2	
Instrument	Beckman 865
Range	0-20%
Span Gas Value	18%
Zero Gas	N_2
Midrange QC Gas Value	10%
Low Range QC Gas Value	5%
CO	
Instrument	TECO 48
Range	0-100, 0-200, 0-5000 ppm
Span Gas Value	1000, 180 or 90 ppm[a]
Zero Gas	N_2
Midrange QC Gas Value	180 ppm
Low Range QC Gas Value	90 ppm
O_2	
Instrument	Thermox WDG III
Range	0-25%
Span Gas Value	20%
Zero Gas	0.2% O_2
Midrange QC Gas Value	10%
Low Range QC Gas Value	5%

TABLE 5-9. CEM OPERATING RANGES AND CALIBRATION GASES, continued

Analyte	Gas Concentration
SO_2	
Instrument	Western 721A
Range	0-500 or 0-5000 ppm
Span Gas Value	200 or 50 ppm
Zero Gas	N_2
Midrange QC Gas	100 ppm
Low Range QC Gas	30 ppm
NO_x	
Instrument	TECO 10AR
Range	0-250 ppm
Span Gas Value	200 ppm
Zero Gas	N_2
Midrange QC Gas Value	100 ppm
Low Range QC Gas Value	50 ppm
THC	
Instrument	Beckman 402
Range	0-10, 0-50, 0-100 ppm
Span Gas Value	100 ppm as methane
Zero Gas	N_2
Midrange QC Gas Value	45 ppm as methane
Low Range QC Gas Value	25 ppm as methane
HCl	
Instrument	TECO Model 15
Range	0-2000 ppm
Span Gas Value	1800 ppm
Zero Gas	N_2
Midrange QC Gas Value	900 ppm
Low Range QC Gas Value	100 ppm

5. Open all calibration gas cylinders so that they may be introduced to the instruments via control panel valves.

6. Perform daily pre-test leak check on CEMS by introducing ultra high purity nitrogen to the system. Zero all instruments except the Thermox O_2 analyzers. Make adjustments to the zero potentiometers as required to zero the instruments. Be sure to check and maintain all flows throughout calibration and operation.

7. Record the zero values in the computer calibration routine.

8. Introduce 2.0 percent O_2 to set the low scale response for the Thermox O_2 analyzers and repeat Step 7 for these instruments.

9. Introduce the mixed span gases for O_2, CO_2, and CO. Make adjustments as required to these instruments.

10. Enter these values in the computer calibration routine.

11. Introduce the NO_x span gas.

12. Make adjustments to the NO_x instruments as required and enter the value into the computer calibration routine.

13. Introduce the SO_2 span gas for the SO_2 analyzer, repeat Step 12 for the SO_2 analyzer. (Note that all calibration gases are passed through the entire sampling system.)

14. Switch the Western SO_2 analyzer range to 0-500 ppm, introduce the span gas for this range and repeat Step 12 for this instrument.

15. Check the calibration table on the computer, and make a hardcopy. Put the computer in the standby mode.

16. Introduce QC gases to instruments in the same sequence as the calibration gases. Record three minutes of data for each, once the responses have stabilized. If the QC gas response is not within ± 2 percent of the instrument range, the operator should recalibrate the instrument, or perform other corrective actions.

17. Begin sampling routine, with the computer on standby.

18. Start the data acquisition system when signaled by radio that system is in stack.

19. Carefully check all flows and pressures during the operation of the instruments and watch for apparent problems in any of the instruments, such as unusual readings or unreasonable fluctuations. Check the gas conditioning system periodically and drain the traps.

20. Stop the data acquisition system at the end of the test when signaled.

21. Perform final leak check of system.

22. Perform the final calibration (Repeat Steps 6-16) except make no adjustments to the system.

23. Check for drift on each channel.

5.7 MICROBIAL SURVIVABILITY TESTING

The Morristown Memorial Hospital Medical Waste Incinerator was charged with waste containing indicator spores which measure the ability of microbes to survive the incineration process. This directly reflects microbial destruction efficiency for that incinerator. The first test method is aimed at determining microbial survivability in the combustion gases and the ash. In this method, absorbent materials normally found in the medical waste were inoculated with a known quantity of spores on solution. Direct ash sampling and flue gas testing were conducted in order to determine the destruction efficiency.

The second test method used spiked spore samples encased in insulated metal containers charged to the incinerator with the waste stream. These tests were designed for comparison with the direct ash sampling method and should provided another assessment of microbial survivability and destruction efficiency. The primary microbe container was a 3/8-inch diameter stainless steel tube capped at both ends. The tube contained a known quantity (approximately 1×10^7 spores) of freeze dried spores. The tube was wrapped in a 1/2-inch thick blanket of high temperature ceramic insulation and contained by a wire mesh outer wrap. Following the test, each sample was cultured in a laboratory to determine the destruction efficiency based on the number of viable spores remaining in the ash. Testing procedures followed an EPA draft method entitled "Microbial Survivability Test for Medical Waste Incinerator Ash." The following sections detail both spiking procedures (emissions/ash and pipe) as well as the spore flue gas sampling and analytical techniques.

5.7.1 Spiking Procedure for Emissions and Ash Microbial Loading

In order to conduct emissions and ash testing for microbe survivability, a series of waste materials inoculated with indicator spores were charged into the incinerator. Absorbent materials, such as paper towels, disposable diapers, and toilet paper were inoculated with a known quantity of B. stearothermophilus wet spores. Bags of this simulated medical waste were loaded into the incinerator with a normal charge of regular medical waste four times during each test run, at one-hour intervals. The first bag was charged into the incinerator at the same time emissions tests were started at the incinerator outlet. Direct ash samples were collected from the incinerator bottom ash after each test run when the ash had cooled sufficiently (usually overnight). Ash samples were also taken from the spray dryer residue and the baghouse filter ash collected during each test run.

5.7.1.1 Equipment. A "wet spore" culture solution was prepared by the University of Alabama. The culture inoculum was divided by the supplier into twelve 500 ml bags containing approximately 3.5×10^{11} spores each. One bag of spore culture solution was used to inoculate each hourly charge of simulated medical waste. Four charges were used during each of three microbe survivability test runs at the incinerator.

5.7.1.2 Spiking Preparation and Procedure. The spiked waste sample was prepared so that approximately 1.4×10^{12} spores were charged into the incinerator per test run. Sample bags of simulated medical waste were inoculated by pouring a single bag of prepared wet spore solution into a garbage bag filled with absorbent materials. Inoculation was done immediately prior to charging each bag into the incinerator. Spore solution bags were kept on ice until they were used.

5.7.2 Indicator Spore Flue Gas Sampling

Flue gas was extracted from the incinerator stack during the test periods to determine spore emissions. The testing procedure followed the previously mentioned draft EPA method. Flue gas samples were collected isokinetically in a pH-buffered solution in impingers (no filter). The recovered samples were divided into different volume aliquots. These samples are cultured and colonies were identified using gram stains and possibly other biochemical tests to establish cellular morphology. The

colonies identified as the indicator organism are then counted. The following sections describe the flue gas sampling techniques.

5.7.2.1 Equipment. A schematic of the spore sampling train is shown in Figure 5-15. Flue gas samples were extracted isokinetically through a quartz nozzle/probe system housed in a water-cooled sheath. A smaller tube was located inside the sampling probe to deliver a buffered solution at the nozzle end of the probe. This allows the gas sample stream to be immediately buffered, preventing acid condensate from killing viable spores. From the probe, the sample stream was delivered to a series of chilled impingers. The first two contained 200 ml and 100 ml, respectively, of phosphate-buffered solution to collect indicator spores. The third impingers serves as water knock-out (empty), and the fourth contains silica gel. In between the third and fourth impinger, a small amount of quartz wool is placed to collect PM. This material was rinsed into the impinger catch during recovery operations. The remainder of the sampling train is identical to a Method 5 system. (Meter box containing pump, meter, velocity, and sampling pressure manometers, etc.)

A Peristaltic pump was used to deliver the pH-buffer solution to the probe tip. The pump was capable of accurately metering a 10 to 20 ml/flow rate.

5.7.2.2 Sampling Preparation. All equipment used for sampling and sample recovery, which came into contact with the sample, were disinfected with 30 percent H_2O_2 and alcohol and washed before each run. The nozzle/probe liner, impingers, impinger connections, and the nozzle/probe brush were first washed using the same procedure as discussed in Section 5.3.4.2. Following washing, all components were disinfected with H_2O_2 and alcohol. After completing this procedure, all components were sealed with Parafilm® to prevent contamination. Additional sample containers, recovery items, and analytical equipment were sterilized by autoclaving or another equivalent method. Some of the items which required sterilization were wash bottles, two liter glass sample storage bottles, incubation tubes, petri dishes, filter units, reagent water (sterile deionized), and buffering reagent.

The train was assembled by first antiseptically adding the buffer solution to the first two impingers. Silica gel was added to the fourth impinger and the impinger train was connected to the meter box via an umbilical line. A pre-test leak check on the

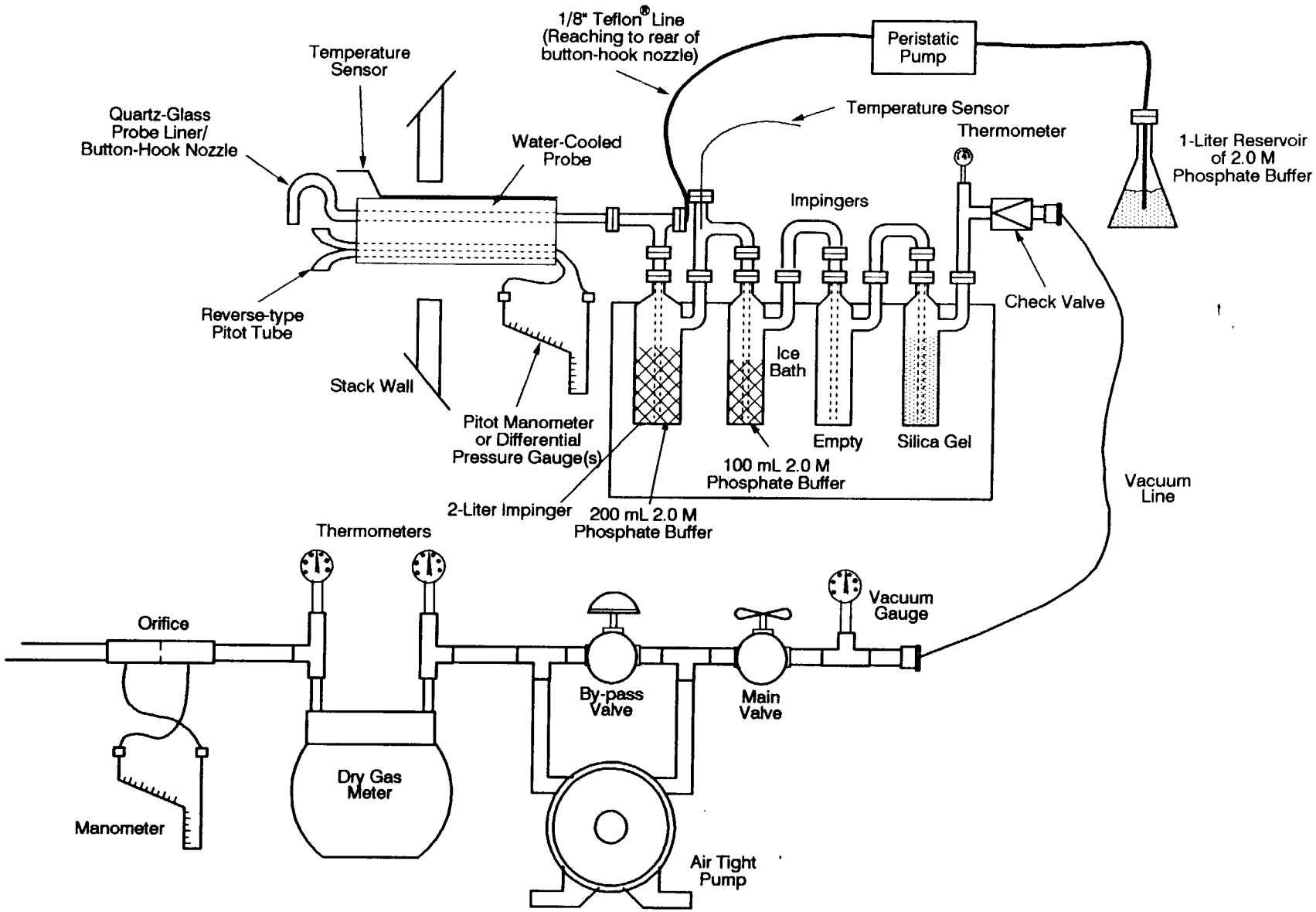

Figure 5-15. Sampling Train for Determination of Indicator Spore Emissions

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impinger train was conducted. Results of the leak checks and other QA procedures are reported in Section 6.

5.7.2.3 Flue Gas Sampling. Before inserting the probe into the stack, the nozzle cap was removed and alignment of the nozzle and pitot tube were checked. The probe cooling water flow was started and adjusted. The buffering system pump was then started, making sure that the probe was slightly inclined so that the buffer solution drained into the first impinger. The probe was inserted into the duct and located at the first sampling traverse point. Isokinetic sampling commenced in accordance with Method 5 guidelines. All sampling parameters (ΔP, gas meter readings, stack temperature, meter temperatures, meter ΔH, meter vacuum, first impinger temperature, and silica gel impinger temperature) were periodically monitored, adjusted, and recorded throughout the test run.

After completion of the test run, the probe was removed from the stack and the flow of buffering solution was stopped. The final meter reading was recorded and the sample train was leak checked.

5.7.2.4 Sample Recovery. Sample recovery procedures are summarized in Figure 5-16. After the probe had cooled, the probe cooling water was turned off. The nozzle tip was inspected for port scrapings and any external matter was removed, if found. The probe was disconnected from the impinger train. The probe and probe buffer delivery tube were rinsed and brushed with sterile buffer solution. All rinses were collected in a sterile sample bottle.

The impingers were weighed and the contents were antiseptically transferred to the sample bottle containing the nozzle and probe rinsings. The pH of the sample was adjusted, if necessary to between 6.0 and 7.5 with 1.0 N NaOH. The level of liquid in the sample bottle was marked to determine later if leakage occurred during transport. The bottle was then packed in ice so that sample temperatures were maintained at or below 4°C (39°F), for shipment to the laboratory.

5.7.3 Direct Ash Sampling for Indicator Spores

Direct ash sampling provides an indication of the ability of the indicator organism to survive the incineration process. Prior to the first test run, the retention time of the incinerator was determined to be approximately 40 minutes. At the start of each test

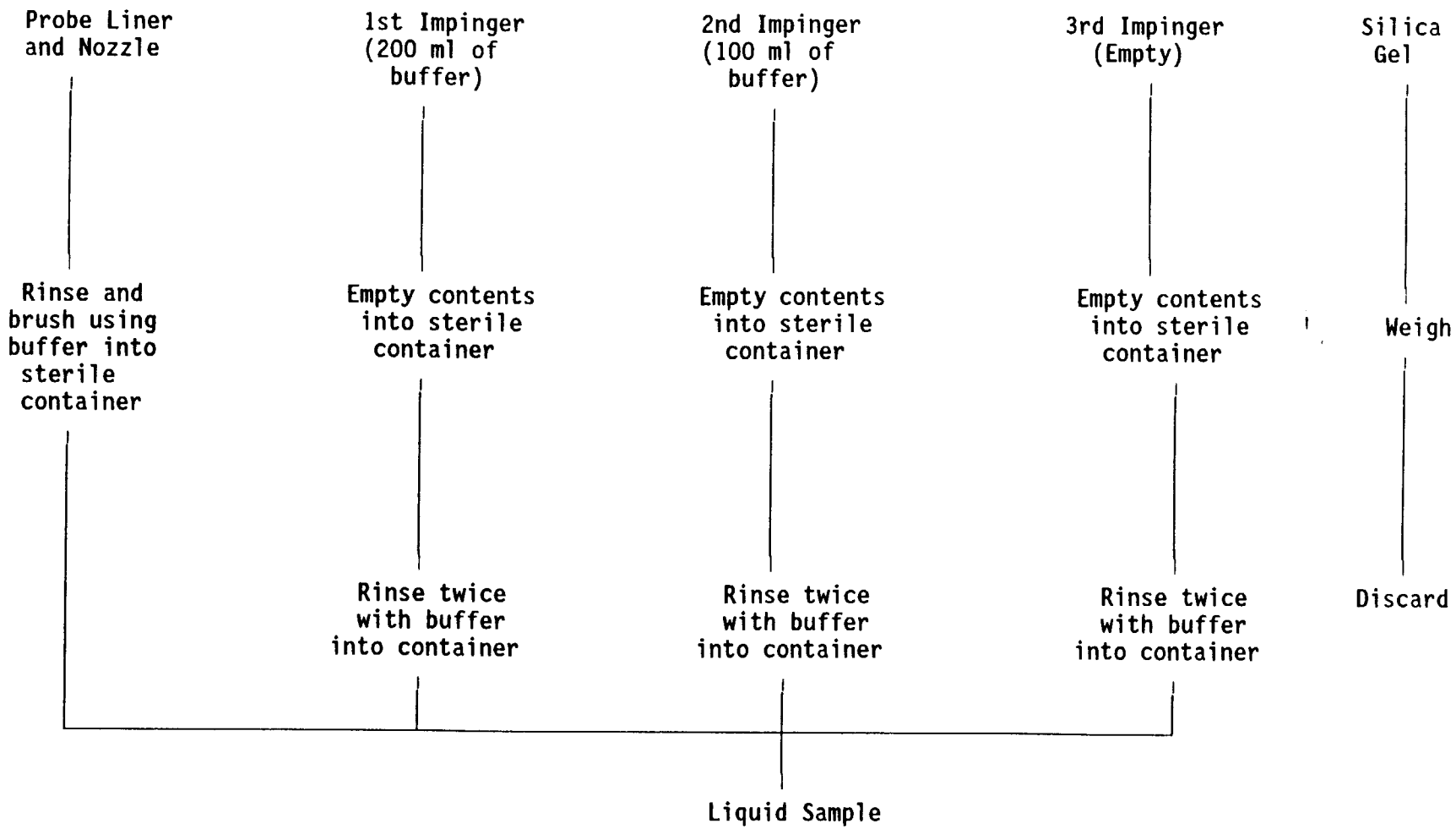

Figure 5-16. Sample Recovery Scheme for Microbial Viability Testing

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run, new ash containers were attached to the spray dryer residue outlet and the baghouse ash outlet. Spray dryer and baghouse ash containers were cardboard boxes lined with new polyethylene bags. The spray dryer residue from each run was collected in a single container. The quantity of baghouse residue varied greatly between runs, and always required multiple containers. New containers were added to the baghouse outlet during the test run as needed.

At approximately 40 minutes (one retention time) after the first bag of wet spore culture solution was charged into the incinerator, a clean ash hopper was attached to the bottom ash discharge of the incinerator. The ash hopper was clean and disinfected with 30 percent H_2O_2 before each microbe survivability test.

At the end of each test, the containers of ash were removed from the spray dryer, baghouse, and incinerator discharge after waiting for the 40-minute retention time. The spray dryer residue was thoroughly mixed in the container and samples were taken directly from the container for analysis. Since the baghouse ash was in multiple containers, a thief was used to composite the samples of baghouse ash.

The incinerator bottom ash was allowed to cool, usually overnight. Large pieces of metal and masses of fused glass then were removed from the hopper. The remaining ash was well-stirred in the hopper with a sterilized shovel, and samples were taken for analysis.

One sample is transported to the laboratory for analysis and the second sample is used to determine the pH of the material and is then archived as a backup sample. Laboratory samples are tested in accordance with the proposed draft method found Appendix I.5.

5.7.3.1 Equipment. Ash samples are taken using a disinfected sample thief and placed in sample containers for transport to the laboratory. These samples are stored on ice. The pH of the ash is determined by adding a known amount of deionized water to a weighed aliquot of ash and measuring the pH by specific ion electrode.

5.7.4 Pipe Spiking Procedures

Samples of B. stearothermophilus were cultured according to the draft method found in Appendix I.5. Colonies of B. stearothermophilus were then gram stained to ensure correct cellular morphology and further identified using biochemical tests as

needed. The B. stearothermophilus spores are then enumerated. Known quantities of spores, contained in insulated pipes, were charged into the incinerator.

5.7.4.1 Spiking Equipment. A diagram of the pipe sample assemblies used for the pipe test is shown in Figure 5-17. The indicator organisms are freeze-dried spores (lyophilized) that were prepared by American Type Culture Collection in Rockville, Maryland. A small amount of lyophilized material equalling approximately 1×10^7 spores was prepared and packaged in the inner metal containers.

The inner metal container consists of a 3-inch piece of 3/8 stainless steel tubing capped on both ends with Swagelock™ caps. This inner container was wrapped in the outer container which is either a 2 inch diameter steel pipe nipple about 6 inches in the insulated mesh. Each inner container was identified with an unique identification number. Thermal insulation was used to maintain the inner container's position in the center and to protect it from thermal shock.

5.7.4.2 Spiking Preparation. The inner container and caps were cleaned and disinfected before use. This procedure consists of soaking the containers for at least one hour in 1.0 H HNO_3, washing with laboratory detergent, rinsing 3 times with tap water, 3 times with sterilized deionized water, and finally rinsing with 90 percent isopropyl alcohol.

The spiked sample was prepared by placing a known amount of spores (targeted at 1×10^7) inside the inner container and then sealed using the end caps. The inner container was placed in outer container with enough ceramic insulation to position it in the center.

5.7.4.3 Spiking Procedure. The Morristown Memorial Hospital MWI is a continuous feed, rotary kiln incinerator. The incinerator is normally run on a one-shift basis. Waste incineration is started each morning after a warm-up period lasting approximately one hour. All test runs were conducted after normal incineration had started and measured process variables had stabilized. Nine pipes were charged into the incinerator during each test run. Two pipes were charged at the beginning of each of the first four hours of each run. A single pipe was charged at the beginning of the fifth hour. Two blank (empty) pipes were charged at random times during the three test runs. A total of eight pipe samples were charged into the incinerator by placing them into the

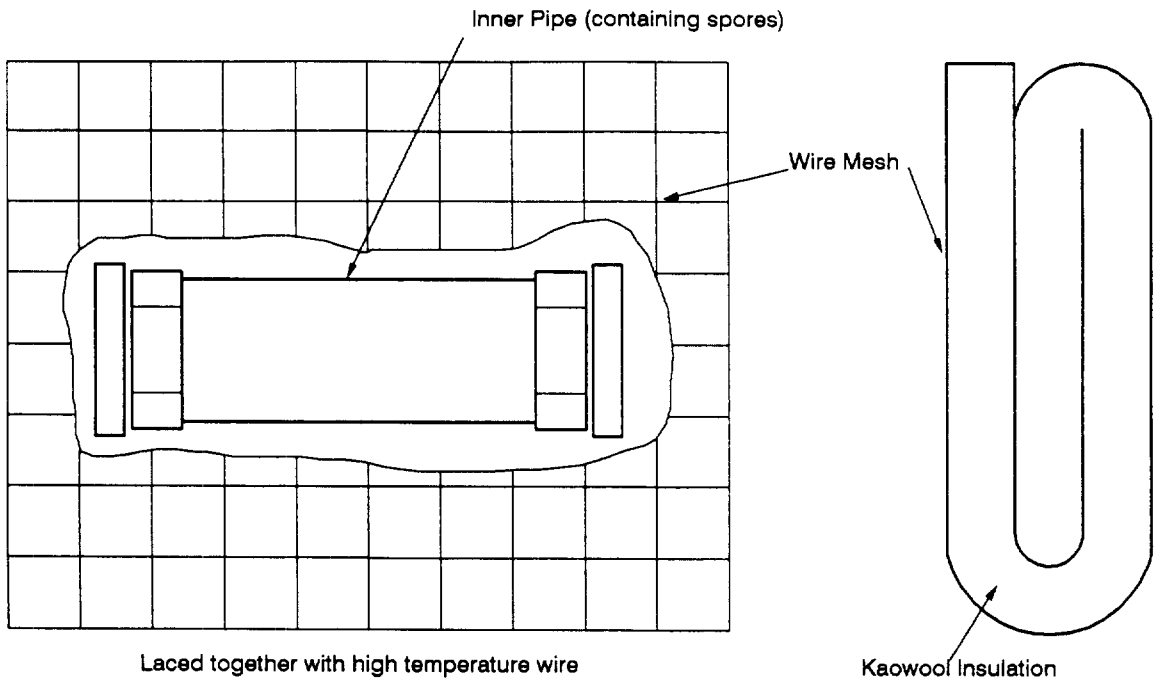

Figure 5-17. Modified (Mesh) Ash Quality Assembly
Morristown Memorial Hospital (1991)

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wet spore solution sample bags. The wet spore solution was poured over the pipe sample insulation as well as onto the absorbent materials in the bags. The ninth pipe sample was charged without placing it in the wet spore solution sample bag.

5.7.4.4 Sample Recovery. The pipes were recovered from the bottom ash hopper following a cool down period the morning following the test run. Approximately half of the pipe samples could not be found and recovered. Because of the high temperatures and continuous ignition of the waste in the incinerator, semi-molten glass forms into large log-shaped masses which roll across the incinerator floor. It is suspected that the lost pipe samples become entrained in these masses of glass and were locked inside when the glass cooled. At least one of the samples was recovered when one end of the pipe was noticed protruding from a mass of solid glass. The mass was broken with a hammer to free the sample.

The high temperatures and heavy agitation due to kiln rotation also caused many of the thermal insulation packages to break open. Several of the pipes were retrieved without insulation, and several pieces of insulation were retrieved without pipes. The inner pipes recovered were identified and placed in labeled bags. Insulation recovered was placed in separate bags. The pipe samples were maintained at or below 4°C (30°F) in an ice cooler with care to protect them from contamination from melting ice or cross-contamination from other samples or spike materials.

5.7.5 Microbial Analysis

The quantity of viable spores were determined from the pipe samples, flue gas samples, and the direct ash samples. Sample preparation for the three sample types is discussed below.

5.7.5.1 Pipe Sample and Ash Analytical Preparation Procedure. The sample preparation and analysis scheme for the pipe and ash samples are presented in Figures 5-18 and 5-19. The analysis was performed within 96 hours after sample recovery. The contents of the inner container of the pipe and the direct ash samples were transferred to separate sterile incubation tubes. The inside of the sample containers were rinsed with sterile phosphate buffer solution into the respective incubation tube. Any glassware used for this transfer procedure was rinsed with sterile

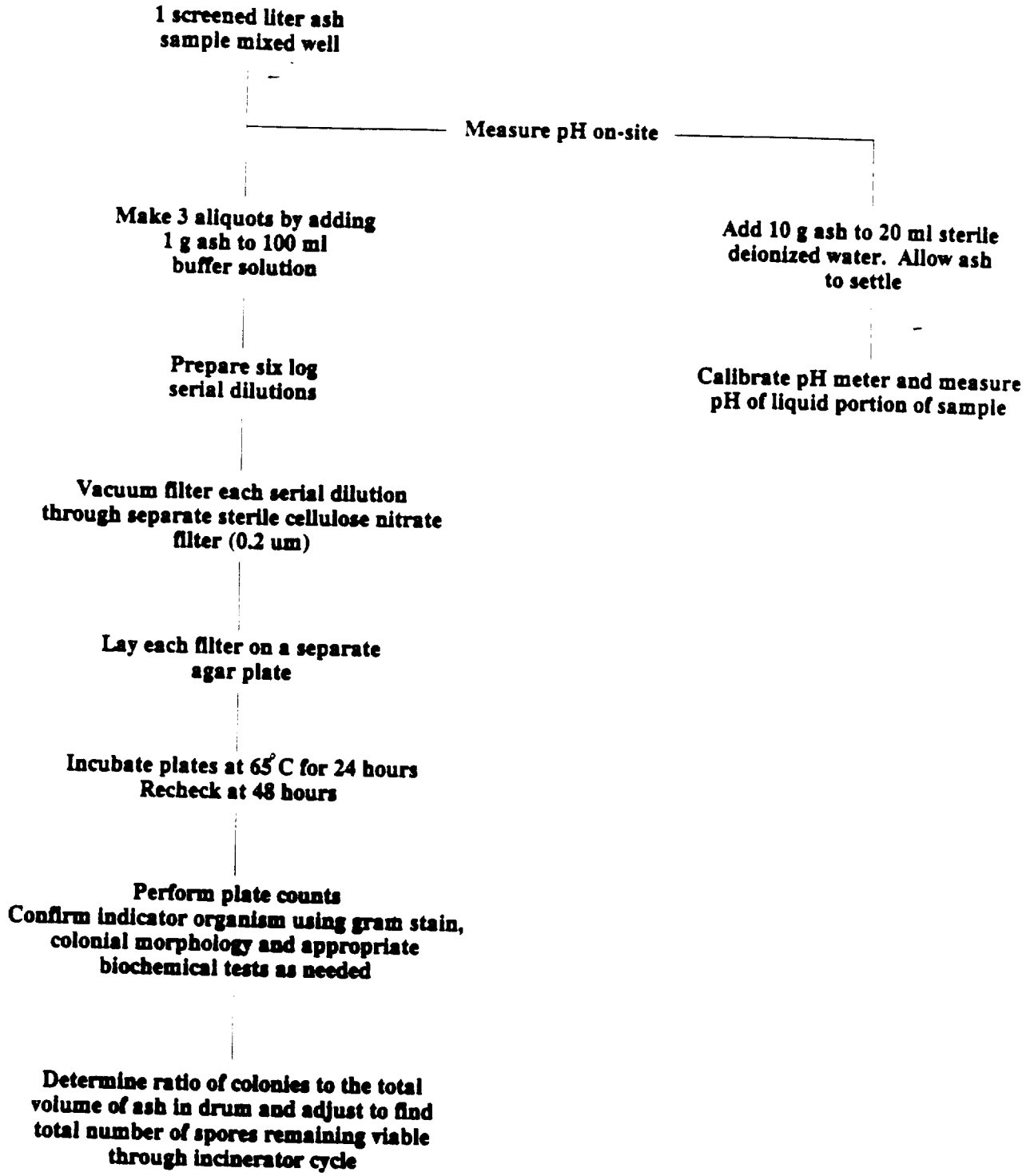

Figure 5-18. Sample and Analysis Scheme for Microbial Testing of Ash Samples

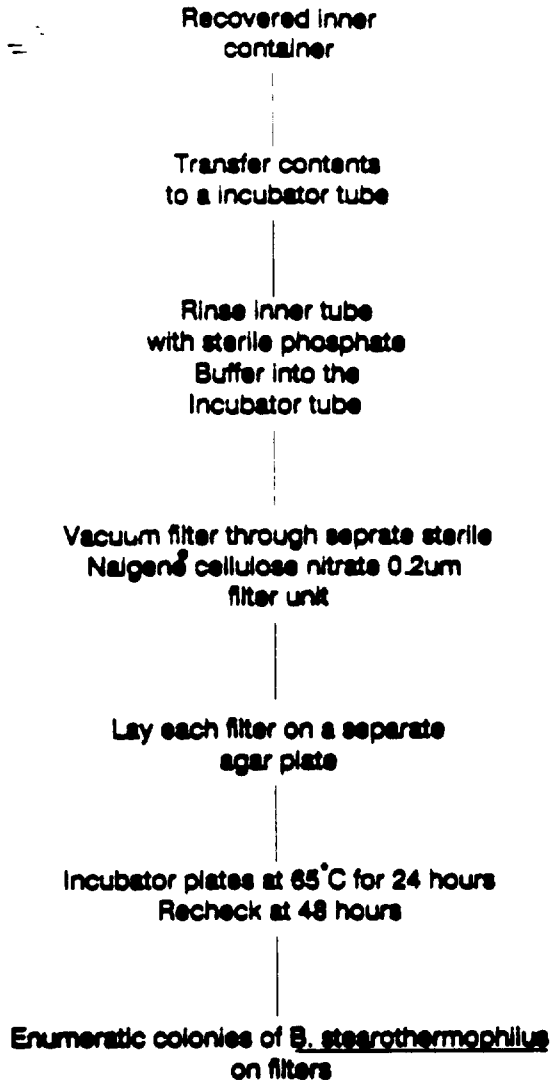

Figure 5-19. Analysis Scheme for Pipe Sample Microbial Viability Tests

deionized water into the respective incubation tubes. The direct ash samples were mixed and aseptically added to 100 mls of sterile deionized water before further processing.

5.7.5.2 Flue Gas Sample Analytical Preparation Procedure. The sample preparation and analysis scheme is presented in Figure 5-20. The level of each sample was checked to determine if leakage during shipment occurred. Each sample contained approximately 1.5 to 2.0 liters of sample. The sample was then aliquoted and prepared as shown in Figure 5-20. Three 10 ml aliquots, three 100 ml aliquots and three equal volume of the remaining solution was prepared. The aliquots were placed in sterile incubation tubes, one set was processed without heat treatment, the other with heat treatment. Each aliquot was then filtered and placed onto agar plates as discussed in the following sections.

5.7.5.3 Colonial Enumeration and Identification Procedure. Agar plates were prepared by pouring the molten trypticase soy agar into a sufficient number of petri dishes for both sample and field blanks. The media was allowed to harden. Each sample was then filtered through a separate vacuum filter unit employing a sterile cellose nitrate filter (0.2 μm). The incubation tubes were rinsed with sterile deionized water and poured through the filter as well. Each filter was removed from the filtering unit using sterile forceps and placed face up on an agar plate. The plates were incubated in an air convection incubator at 55°C (131°F) for 18 to 24 hours prior to colonial examination. The plates were removed from the incubator and colonies of B. stearothermophilus were quantified. A variety of tests including a gram stain and biochemical procedures were used to confirm that the colonies are B. stearothermophilus.

5.7.5.4 Indicator Spore Analytical Quality Control. The QA/QC procedures followed during spore enumeration and verification procedures (analysis) are documented in Table 5-10. An aliquot from one batch of the wet spore spiking slurry was sent to the analytical laboratory to verify the manufacturer's count.

Field blanks from a flue gas (impinger) sample as well as two charged pipe samples were analyzed to check for contamination during preparation or recovery procedures. Duplicate impinger samples from two test runs were analyzed.

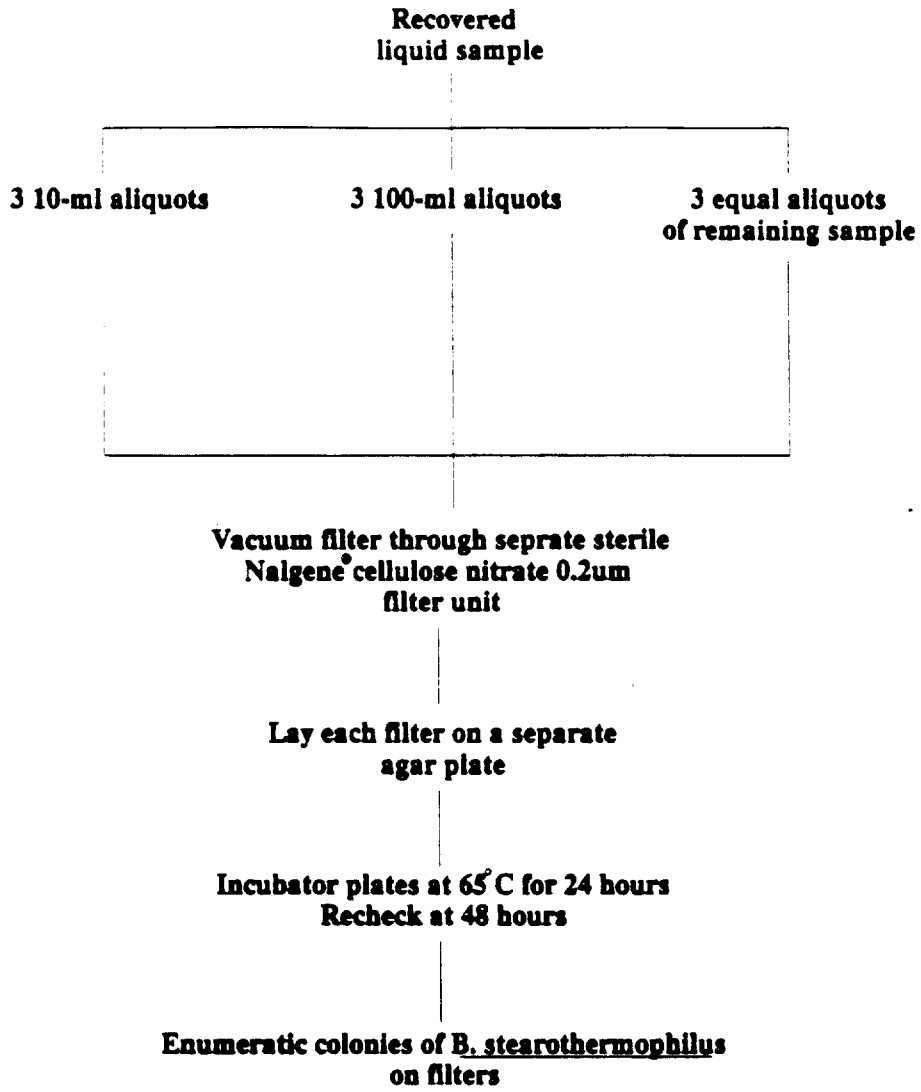

Figure 5-20. Sample Preparation and Analysis Scheme for Microbial Testing

TABLE 5-10. INDICATOR SPORE TESTING QA/QC CHECKS

Sample Type	Number	QA/QC Check
Wet Spores	1	Verify manufacturer's wet spore count by sending an aliquot from one slurry to RTI for count.
Field Blank - Impinger Sample	1	Prepare train through leak check, run buffer solution for 2 hours, collect 1 field blank sample
Field Blank - Pipe Sample	2	Fully prepare pipe sample without placing spore charge inside to check for handling contamination
Duplicates - Impinger Sample	2	Complete duplicate analyses on 2 impinger samples from 2 test runs
Control - Pipe Samples	2	Prepare pipe samples for transportation to field, but do not charge into incinerator. Analyze for viable spores.
Pre-Test Ash Blank	1	Collect ash samples using the test procedures prior to any spiking of indicator spores

A blank ash sample was collected prior to the test program to check for the presence of indicator spores in the background ash prior to any spiking. Two charged pipe control samples were prepared and taken to the test site, but not charged into the incinerator. These were analyzed with the other samples to ensure microbe survivability during test preparation, transportation, and handling of the samples.

5.8 PARTICULATE SIZE DISTRIBUTION SAMPLING METHODS

Particle size distribution measurements were obtained with Anderson Mark III in-stack cascade impactors employing a pre-separator. A schematic of the sampling train is shown in Figure 5-21. The impactor consists of eight stages plus a final filter. Each stage has a number of concentric round jets offset on each succeeding stage such that the one plate serves both as jet and impaction surface. The Anderson MK III is operated in the range from 0.3 to 0.7 acfm and the flue gas was sampled isokinetically (100 ±20 percent) with a recommended weight gain of 50 mg.

The impactor was prepared by loading the substrates into the impactor and recording the identification number and tare weight. The stage order was checked as the stages were assembled. The impinger train was prepared according to EPA Method 5. Then, the impactor and pre-separator/nozzle were attached to the probe and the probe attached to impinger train. Once assembled, the sampling train was leak checked at 15 in. Hg. The leak rate has to be below 0.02 cfm.

Prior to sampling, a preliminary velocity traverse was conducted to determine a point of average velocity. The nozzle was then selected to ensure both isokinetic sampling as well as to give the desired particle separation. The impactor was preheated to approximately stack temperature prior to placing it inside the duct. Sampling was conducted at a single point of average velocity at a fixed sampling rate. The sampling rate was not adjusted during the run.

After sampling was completed, the impactor was cooled and each stage carefully recovered. Particles from the nozzle, pre-separator, and rinse were added to the first stage catch. Each substrate was examined for particle bounce, overloading, and re-entrainment. The substrates were weighed to a constant weight as detailed in Section 5.2.

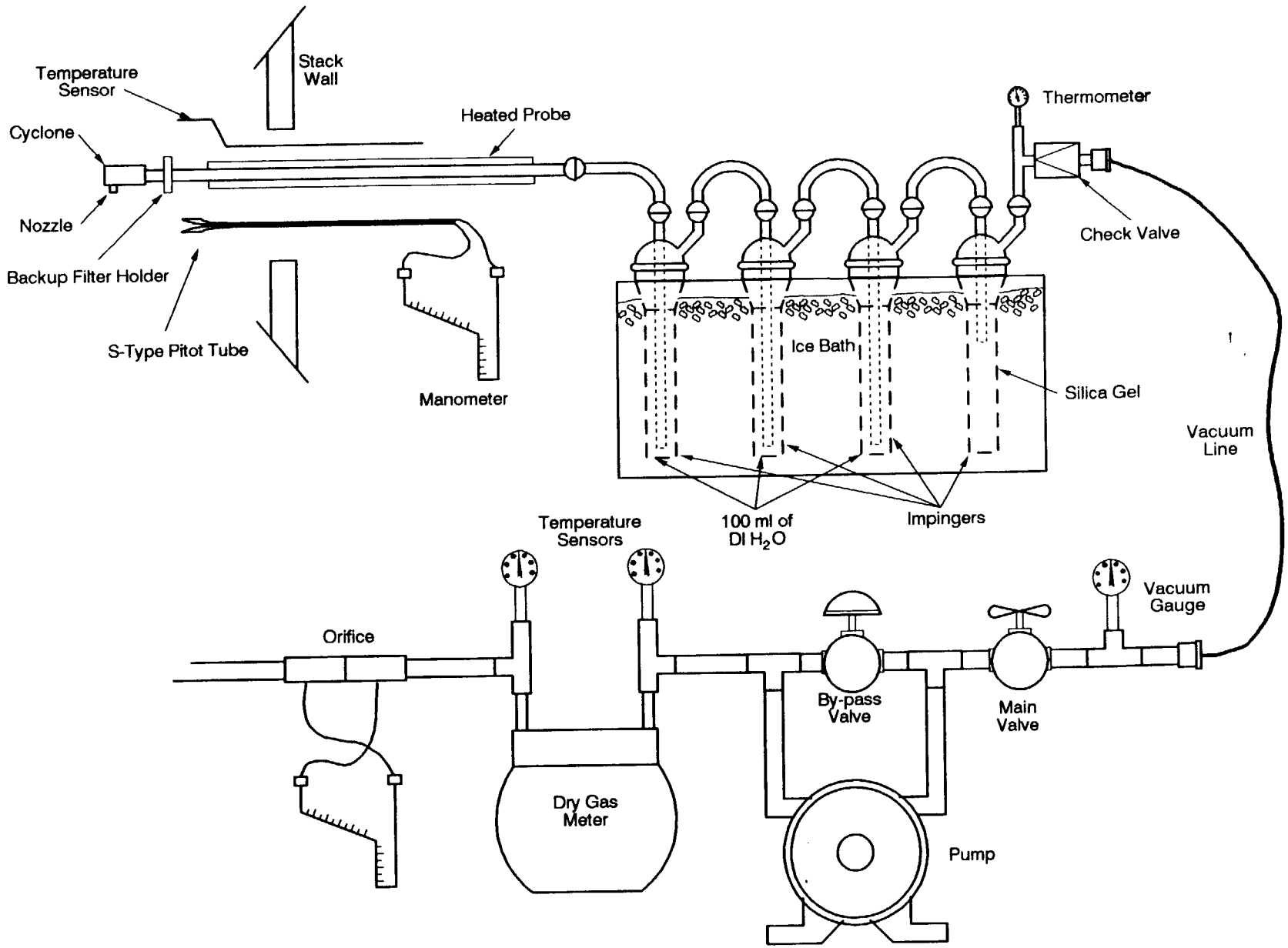

Figure 5-21. PM/CPM Sampling Train

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5.9 PROCESS SAMPLING PROCEDURE

Ash samples were collected from the incinerator discharge, the baghouse, and the spray dryer. Representative samples were collected from the drums by means of a sample thief. Laboratory samples were collected in 1 liter bottles using a 3 foot sample thief. Sample replicates were sent to respective laboratories for analyses of pathogens, loss-on-ignition, carbon, metals, and CDD/CDF. Lime samples were also collected and analyzed for metals and CDD/CDF.

6. QUALITY ASSURANCE/QUALITY CONTROL

Specific QA/QC procedures were strictly adhered to during this test program to ensure the production of useful and valid data. A detailed presentation of QC procedures for all manual flue gas sampling, process sample collection, and CEM operations can be found in the Morristown Test Plan. This section will report the test program QA parameters so that the degree of data quality may be ascertained.

Six days of testing were conducted at Morristown Memorial Hospital. All runs were completed successfully at two different operating conditions. The incinerator and APCD operating conditions were not varied throughout the runs with the exception of carbon injection rates. Incinerator charging rates were all within 11% of the average rate for all six runs. Combustion chamber temperatures did not vary more than 2% during the tests. Lime slurry feed rates were held within 13% of the average rate for all the runs, and the baghouse pressure drop was held within 5%. The first three runs (Runs 1, 2, and 3) were conducted with no carbon injection (baseline). The last three runs (Runs 4, 5, and 6) were performed at a carbon injection rate of 4 lb/hr.

In summary, the data was of acceptable quality throughout the project. Post-test leak checks for all sampling trains were within acceptable limits, except for Run 3 at the spray dryer inlet for the CDD/CDF sampling train. All post-test calibration checks of the dry gas meters were within acceptable limits. Manual isokinetic sampling trains at the inlet and outlet met the isokinetic criterion of ±10 percent out of 100 percent for all test runs. Dioxin field blank at the inlet to the spray dryer showed only a slight detection of the target CDD/CDF compounds. All of the critical recovery percentages met the acceptable criterion. The precision, accuracy, and completeness criteria met the pre-set goals.

Metals blank results showed some contamination, which is discussed in Section 6.2.2. Method spike recovery values for the metals analyzed were all within acceptable limits except for silver in the ash analysis, which is discussed in section 6.4.2. The manual halogen gas tests met acceptable reagent blank and field blank levels, as well as acceptable method spike results.

The CEM results showed good calibration drift values and QC gas responses. All CEM QC procedures and objectives were followed as described in the Morristown Test Plan.

Section 6.1 presents the QA/QC definitions and data quality objectives. Section 6.2 presents manual flue gas sampling and recovery QA parameters. Section 6.3 discusses the QC procedures for ash sampling and Section 6.4 presents method-specific analytical QA parameters. Section 6.5 discusses the CEM QA parameters.

6.1 QA/QC DEFINITIONS AND OBJECTIVES

The overall QA/QC objective is to ensure precision, accuracy, completeness, comparability, and representativeness for each major measurement parameter called for in this test program. For this test program, quality control and quality assurance can be defined as follows:

- Quality Control: The overall system of activities whose purpose is to provide a quality product or service. QC procedures are routinely followed to ensure high data quality.

- Quality Assurance: A system of activities whose purpose is to provide assurance that the overall quality control is being done effectively. Assessments can be made from QA parameters on what degree of data quality was achieved.

- Data Quality: The characteristics of a product (measurement data) that bear on its ability to satisfy a given purpose. These characteristics are defined as follows:

  - Precision - A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation and in this report will be expressed as the relative standard deviation or coefficient of variation.

  - Accuracy - The degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, can be expressed as the difference between two values, X-T, the ratio X/T, or the difference as a percentage of the reference or true value, 100 (X-T)/T.

  - Completeness - A measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under prescribed test conditions.

- Comparability - A measure of the confidence with which one data set can be compared with another.

- Representativeness - The degree to which data accurately and precisely represent a characteristic of a population, variations of a parameter at a sampling point, or an environmental condition.

A summary of the data quality is presented in Table 6-1.

6.2 MANUAL FLUE GAS SAMPLING AND RECOVERY PARAMETERS

The following section will report method-specific sampling QA parameters so that insight can be gained into the quality of the emissions test data produced from manual tests during the test program.

6.2.1 Dioxin/Furan Sampling Quality Assurance

Table 6-2 lists both the pre-test and post-test leak checks completed on the CDD/CDF sampling trains. The acceptance criterion is that all post-test leak checks must be less than 0.02 cfm or 4 percent of the average sampling rate (whichever is less). All of the leak rates were lower than 0.02 cfm, except for Run 3 at the spray dryer inlet. The sample volume was leak corrected for this run.

Table 6-3 presents the isokinetic sampling rates for CDD/CDF, PM/metals, microorganisms, and Hg sampling trains. The acceptance criterion is that the average sampling rate must be within 10 percent of 100 percent isokinetic. Isokinetic rates were within the 10 percent criterion for all of the test runs.

All dry gas meters were fully calibrated within the last six months against an EPA approved intermediate standard. The full calibration factor or meter Y was used to correct actual metered sample to true sample volume. To verify the full calibration, a post-test calibration was performed. The full and post-test calibration coefficients must be within 5 percent to meet Radian's internal QA/QC acceptance criterion. As can be seen from Table 6-4, the post-test calibration factor for all meter boxes used for CDD/CDF, PM/metals, and Hg were well within the 5 percent criterion of the full calibration factor.

Field blanks were collected at the spray dryer inlet and outlet to verify the absence of any sample contamination. The CDD/CDF sampling train was fully prepared, taken to the sample location, leak checked, and then recovered. Table 6-5 compares the CDD/CDF analytical results for the MM5 field blanks versus average

Table 6-1

Summary of Data Quality

Criteria	Control Limits	Remarks
Manual Sampling		
Isokinetics	100 ±10 percent	Criterion met for all runs
Dry Gas Meter Calibration Factor	Post-test average calibration factor agree ±5 percent of pre-test factor	Within ±5 percent for all dry gas meters
Final Leak Rate (after each port)	≤0.02 acfm or 4 percent of sampling rate	Sample volume adjusted for Run 3 at inlet for CDD/CDF train
CEM Measurements		
Linearity	R >0.9980 or ±2 percent of full scale	SO_2 analyzer linearity was 0.9961 but within ±2 percent of full scale, all other analyzers had linearity >0.998
Daily Drift (zero and span)	±5 percent of full scale	O_2/CO_2 inlet data was drift corrected for Runs 2 and 5, SO_2 outlet data drift corrected for Run 3, (all drifts were between 3 to 5 percent)
Daily QC Check (midrange)	±5 percent	THC and HCl analyzers did not meet this criterion on some occasions
Line Leak Check	≤0.5 percent	Leak detected in inlet sampling line for O_2/CO_2, SO_2, NO_x, CO, and THC at the end of Run 2, data was corrected for Runs 1 and 2 based on O_2 values for Runs 3 through 6
CDD/CDF Analytical Results		
Internal Standard Recoveries	40-130 percent tetra- through hexa-chlorinated compounds	Some compounds had recoveries less than 40 percent but more than 20 percent and hence they were not re-analyzed
	25-130 percent hepta- through octa-chlorinated homologues	Criterion satisfied for all analysis

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Table 6-1, continued

Criteria	Control Limits	Remarks
Surrogate Standard Recoveries	70-130 percent	Met for all Modified Method 5 analysis, recoveries were less than 70 percent for a few congeners in ash analysis
Field Blank	<10 times the detection limit	The inlet field blank showed only a slight detection for furans from penta through hepta congeners
Laboratory Proof Blank	<10 times the detection limit	The ash and sludge lab blanks showed slight detection for some CDD/CDF congeners
Metals Analytical Results		
Laboratory Proof Blank		All metals were below detection limit in the blanks
Matrix Spikes	100 ±20 percent	Satisfied on all occasions except for Ag in the ash sample
Cold Vapor Mercury Analysis		
Matrix Spike Duplicate	100 ±20 percent	Satisfied
Halogen Matrix Spikes	100 ±20 percent	Satisfied

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TABLE 6-2. LEAK CHECK RESULTS FOR CDD/CDF SAMPLE TRAINS
MORRISTOWN HOSPITAL (1991)

Date	Run Number	Location	Maximum Vacuum	Port	Avg. Sample Rate (acfm)	4% Sample Rate (acfm)	Measured Leak Rate	Vacuum (in. Hg)
11/18/91	1	Inlet	5	A	0.484	0.019	0.006	6
			4.5	B	0.429	0.017	0.007	8
11/18/91	1	Outlet	7	A	0.508	0.020	0.002	10
			9	B	0.564	0.023	0.002	10
11/19/91	2	Inlet	9.5	A	0.705	0.028	0.012	12
			10	B	0.730	0.029	0.005	13
11/19/91	2	Outlet	4	A	0.593	0.024	0.004	6.5
			4	B	0.552	0.022	0.005	10
11/20/91	3	Inlet	6	A	0.756	0.030	0.05*	7
			7.5	B	0.700	0.028	0.015	10
11/20/91	3	Outlet	10	A	0.577	0.023	0.002	11
			9	B	0.579	0.023	0.002	12
11/21/91	4	Inlet	10	A	0.624	0.025	0.012	12
			14	B	0.731	0.029	0.010	14
11/21/91	4	Outlet	6	A	0.562	0.022	0.006	10
			6	B	0.574	0.023	0.010	10
11/22/91	5	Inlet	7.5	A	0.699	0.028	0.015	15
			10	B	0.692	0.028	0.007	12
11/22/91	5	Outlet	5.5	A	0.586	0.023	0.015	9
			4.5	B	0.586	0.023	0.010	10
11/23/91	6	Inlet	9.5	A	0.694	0.028	0.013	10
			12.5	B	0.749	0.030	0.016	15
11/23/91	6	Outlet	4	A	0.591	0.024	0.002	8.5
			4.5	B	0.582	0.023	0.010	10

*Sample volume was leak corrected.

TABLE 6-3. ISOKINETIC SAMPLING RATES FOR CDD/CDF, TM, M101A, AND MICROORGANISM TEST RUNS; MORRISTOWN HOSPITAL (1991)

Date	Run Number	Location	CDD/CDF Isokinetic Sample Rate (%)	Toxic Metals Isokinetic Sample Rate (%)	Mercury Isokinetic Sample Rate (%)	Microorganisms Isokinetic Sample Rate (%)
11/18/91	1	Inlet	102.57	96.37	101.22	96.91
		Outlet	92.66	100.97	97.63	a
11/19/91	2	Inlet	101.98	98.07	102.69	95.67
		Outlet	94.37	97.62	98.88	a
11/20/91	3	Inlet	101.08	97.29	98.79	93.79
		Outlet	94.87	99.23	99.62	a
11/21/91	4	Inlet	99.57	95.53	96.74	a
		Outlet	96.74	100.94	100.89	a
11/22/91	5	Inlet	100.97	94.71	98.96	a
		Outlet	95.08	96.06	97.63	a
11/23/91	6	Inlet	100.77	95.09	97.82	a
		Outlet	96.47	102.37	100.99	a

a No test at this location.

TABLE 6-4. DRY GAS METER POST-TEST CALIBRATION RESULTS
MORRISTOWN HOSPITAL (1991)

Meter Box ID	Sample Trains	Location	Full Calibration Factor	Post-Test Calibration Factor	Post-Test Deviation (%)[1]
N-34	CDD/CDF	Inlet	1.0115	1.0118	0.03
N-32	CDD/CDD	Outlet	1.0159	1.0058	-1.00
A-35	Metals	Inlet	1.0010	1.0053	0.43
N-33	Metals	Outlet	0.9987	0.9948	-0.39
8	Mercury	Inlet	1.0075	0.9953	-1.23
18	Mercury	Outlet	0.9817	0.9839	0.22
A-36	Microorganism Mercury	Inlet Inlet	0.9968	0.9917	-0.51

[1] [(Post-Test)-(Full)]/(Full)*100

TABLE 6-5. CDD/CDF FIELD BLANK RESULTS COMPARED TO AVERAGE RUN RESULTS
MORRISTOWN HOSPITAL (1991)

	INLET			OUTLET		
COGENER	MM5 FIELD BLANK (total ng)	MM5 COND. 1 AVG. (total ng)	MM5 COND. 2 AVG. (total ng)	MM5 FIELD BLANK (total ng)	MM5 COND. 1 AVG. (total ng)	MM5 COND. 2 AVG. (total ng)
DIOXINS						
2378 TCDD	[0.003]	0.080	0.057	[0.005]	0.027	[0.004]
TOTAL TCDD	[0.003]	0.697	0.810	0.008	0.273	0.011
12378 PCDD	[0.005]	0.280	0.217	[0.005]	0.040	0.005
TOTAL PCDD	0.010	2.400	1.833	[0.005]	0.500	0.033
123478 HxCDD	0.006	0.510	0.497	[0.010]	0.047	0.012
123678 HxCDD	[0.005]	0.590	0.580	[0.005]	0.063	0.016
123789 HxCDD	0.007	1.243	1.187	[0.008]	0.093	0.033
TOTAL HxCDD	0.040	8.000	8.200	(0.007)	0.967	0.217
1234678-HpCDD	0.150	10.433	11.467	(0.040)	0.517	0.237
TOTAL Hepta-CDD	0.280	21.400	24.233	(0.070)	1.153	0.467
Octa-CDD	0.760	41.100	46.500	0.180	1.053	0.630
FURANS						
2378 TCDF	[0.008]	7.733	0.623	[0.005]	1.203	0.033
TOTAL TCDF	0.030	25.233	22.633	[0.005]	12.633	0.777
12378 PCDF	(0.008)	2.000	1.253	[0.005]	0.443	0.020
23478 PCDF	0.020	6.033	4.400	[0.005]	1.360	0.067
TOTAL PCDF	0.090	56.800	47.800	(0.005)	14.033	0.687
123478 HxCDF	0.140	22.333	24.233	[0.008]	2.800	0.237
123678 HxCDF	(0.040)	6.033	6.133	[0.005]	0.737	0.070
234678 HxCDF	0.160	22.633	27.833	0.008	2.067	0.263
123789 HxCDF	0.003	1.083	0.620	[0.008]	0.080	0.009
TOTAL HxCDF	0.560	98.533	106.767	0.007	12.233	1.067
1234678-HpCDF	0.490	44.767	51.167	[0.008]	3.400	0.467
1234789-HpCDF	(0.220)	16.600	19.133	[0.010]	0.757	0.163
TOTAL Hepta-CDF	1.200	108.833	147.733	[0.008]	8.900	1.233
Octa-CDF	2.900	217.467	244.100	(0.020)	5.433	1.343

[ ] = minimum detection limit

( ) = estimated maximum possible concentration

Note: Condition 1 consists of Runs 1,2,3.

Condition 2 (Carbon Injection) consists of Runs 4,5,6.

Modified Method 5 (MM5) samples for the two test conditions. No 2378 TCDD or 2378 TCDF was detected in any of the field blanks. The heavier CDD/CDF isomers were detected in the MM5 field blanks, with most contamination found at the spray dryer inlet at levels much lower than detected in the actual runs. However, field blank corrections were not made on the emissions results.

6.2.2 PM/Metals Sampling Quality Assurance

Table 6-6 presents the leak check results for the PM/metals. All runs met the leak rate criterion of 0.02 cfm. The isokinetic sampling rates for the PM/metals trains were listed in Table 6-3. All isokinetic values were within 10 percent of 100 percent.

The post-test dry gas meter calibration checks for boxes used for PM/metals sampling were shown previously in Table 6-4. The results were well within the 5 percent acceptance criterion.

The metals field blank results compared to average run results are presented in Table 6-7. There was a noticeable contamination in the field blanks. Aluminium was detected at high concentrations in the inlet and outlet field blanks. The source of contamination for Al appears to be the filter itself. No blank corrections were made.

6.2.3 Mercury 101A Sampling Quality Assurance

Table 6-8 presents the leak check results for the mercury trains. All runs met the leak check criterion.

Mercury isokinetic results were shown in Table 6-3. All of the test runs met the isokinetic criterion of ± 10 percent of 100 percent.

The Hg field blank results are contained in Table 6-9. The amount of Hg detected in the field blanks was negligible in comparison to amounts detected in the run samples.

6.2.4 Halogen Flue Gas Sampling Quality Assurance

Halogen flue gas concentration tests by EPA Method 26 did not require isokinetic sampling. A constant flow of flue gas was extracted from the stack through a heated 3 foot quartz probe. The sample stream was bubbled through a series of impinger collection solutions and sent to the laboratory for analysis of Cl^-, F^-, and Br^-.

TABLE 6-6. LEAK CHECK RESULTS FOR TOXIC METALS SAMPLE TRAINS
MORRISTOWN HOSPITAL (1991)

Date	Run Number	Location	Maximum Vacuum	Port	Avg. Sample Rate (acfm)	4% Sample Rate (acfm)	Measured Leak Rate	Vacuum (in. Hg)
11/18/91	1	Inlet	3.5	A	0.512	0.020	0.008	10
			4	B	0.512	0.020	0.005	10
11/18/91	1	Outlet	2	A	0.557	0.022	0.003	17
			2	B	0.531	0.021	0.003	18
11/19/91	2	Inlet	3.5	A	0.510	0.020	0.012	20
			4	B	0.510	0.020	0.012	11
11/19/91	2	Outlet	2	A	0.549	0.022	0.010	11
			2	B	0.561	0.022	0.006	10
11/20/91	3	Inlet	4.5	A	0.561	0.022	0.005	10
			4	B	0.520	0.021	0.000	10
11/20/91	3	Outlet	2	A	0.575	0.023	0.007	15
			4	B	0.582	0.023	0.004	16
11/21/91	4	Inlet	6	A	0.641	0.026	0.005	12
			8	B	0.687	0.027	0.005	12
11/21/91	4	Outlet	4	A	0.579	0.023	0.009	11
			3.5	B	0.596	0.024	0.011	9
11/22/91	5	Inlet	5.5	A	0.653	0.026	0.005	10
			9	B	0.684	0.027	0.014	12
11/22/91	5	Outlet	2.25	A	0.585	0.023	0.006	12
			2.25	B	0.594	0.024	0.010	15
11/23/91	6	Inlet	6	A	0.635	0.025	0.004	11
			9	B	0.681	0.027	0.005	12
11/23/91	6	Outlet	3	A	0.599	0.024	0.003	11
			3.5	B	0.594	0.024	0.005	12

TABLE 6-7. METALS FIELD BLANK RESULTS COMPARED TO AVERAGE RUN RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

	Field Blank					
	Front Half (ug)	Impinger 1,2,3 (ug)	Impinger 4,5,6 (ug)	Total (ug)	Condition 1 (ug)	Condition 2 (ug)
INLET						
Metals						
Aluminium	3900	36.5		3937	48433	46733
Antimony	24.3	2.87		27.2	1159	2270
Arsenic	4.85	[0.446]		4.85	26.8	78.3
Barium	323	1.64		325	6783	7433
Beryllium	0.275	[0.111]		0.275	3.28	4.65
Cadmium	14.1	0.591		14.7	1032	1417
Chromium	11.7	3.97		15.7	286	436
Copper	131	24.7		156	12467	19933
Lead	87.8	1.14		88.9	7800	12733
Mercury	[2.45]	11.2	[0.181]	11.2	5823	22700
Nickel	12	1.77		13.8	217	373
Silver	4.48	5.49		9.97	15	2.12
Thalium	[25.0]	[11.1]		[36.1]	[60.6]	4.1
OUTLET						
Aluminium	166	16.3		182	261	180.7
Antimony	12.6	[1.68]		12.6	15.7	9.76
Arsenic	[1.00]	[0.448]		[1.45]	[1.43]	[1.42]
Barium	5.35	0.806		6.16	16.1	8.59
Beryllium	[0.25]	[0.112]		[0.362]	0.17	[0.356]
Cadmium	0.725	[0.224]		0.725	3.32	1.67
Chromium	2.63	1.14		3.77	6.42	5.32
Copper	15.4	14.7		30.1	40.2	27.96
Lead	[0.75]	[0.336]		[1.09]	10.91	5.06
Mercury	[2.45]	[1.84]	[0.517]	[4.80]	3830	564.3
Nickel	1.85	1		2.85	6.1	2.46
Silver	5.83	10.6		16.4	5.9	5.63
Thalium	[25.0]	[11.2]		[36.2]	[35.7]	[35.6]

[ ] : Minimum detection limit

TABLE 6-8. LEAK CHECK RESULTS FOR MERCURY SAMPLE TRAINS
MORRISTOWN HOSPITAL (1991)

Date	Run Number	Location	Maximum Vacuum	Port	Avg. Sample Rate (acfm)	4% Sample Rate (acfm)	Measured Leak Rate	Vacuum (in. Hg)
11/18/91	1	Inlet	3	A	0.458	0.018	0.016	10
			3	B	0.466	0.019	0.018	11
11/18/91	1	Outlet	3	A	0.585	0.023	0.001	17
			3	B	0.555	0.022	0.003	18
11/19/91	2	Inlet	2	A	0.486	0.019	0.012	10
			2	B	0.467	0.019	0.005	11
11/19/91	2	Outlet	3.25	A	0.560	0.022	0.006	13
			3.75	B	0.583	0.023	0.004	10
11/20/91	3	Inlet	2	A	0.469	0.019	0.010	10
			2	B	0.470	0.019	0.004	5
11/20/91	3	Outlet	3	A	0.592	0.024	0.007	16
			4	B	0.598	0.024	0.003	16
11/21/91	4	Inlet	2	A	0.489	0.020	0.012	12
			2	B	0.481	0.019	0.015	6
11/21/91	4	Outlet	3.5	A	0.592	0.024	0.007	10
			3.75	B	0.608	0.024	0.005	10
11/22/91	5	Inlet	2	A	0.483	0.019	0.010	10
			2	B	0.440	0.018	0.008	5
11/22/91	5	Outlet	4	A	0.617	0.025	0.008	14
			4	B	0.604	0.024	0.010	16
11/23/91	6	Inlet	2	A	0.473	0.019	0.018	10
			2	B	0.456	0.018	0.014	12
11/23/91	6	Outlet	3.75	A	0.621	0.025	0.005	13
			4.25	B	0.618	0.025	0.007	11

TABLE 6-9. MERCURY 101A FIELD BLANK AND METHOD RESULTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

Mercury Fraction	Field Blank		Method Blank
	Inlet (total ug)	Outlet (total ug)	(total ug)
Front Half	1.59	[0.206]	[0.361]
Front Half- 1st Filter	1.16	[0.285]	[0.254]
Front Half- 2nd Filter	[0.123]	[0.123]	[0.143]
Back Half	(0.826)	3.98	[2.77]
Front Half- 1st Filter	(0.525)	(0.484)	[0.245]
Front Half- 2nd Filter	[0.188]	[0.188]	[0.123]

[ ] : Minimum detection limit.
( ) : Estimated maximum possible concentration.

Leak checks were completed before and after each halogen test run. They were conducted by establishing approximately 10 inches of vacuum on the train, plugging the end of the probe, turning off the flow, and checking for any detectable vacuum loss over a 30-second period. There was no quantitation of leak rate. All halogen tests met the post-test leak check criterion.

Halogen field blank and reagent blank results are shown in Table 6-10. Cl^- was detected at low concentration in the spray dryer inlet field blank. There was no detection of halogen ions in the outlet field blank and method blanks. Figures 6-1 and 6-2 show a graph of ppmv versus run number. Any manual HCl results outside the control limit of ±3 times the standard deviation based on CEM HCl results were not reported.

6.2.5 Microbial Survivability in Emissions Quality Assurance

The post-test dry gas meter calibration check for the microbial emissions meter is shown in Table 6-4. Post-test calibration factors were within the 5 percent acceptance criterion at 0.32 percent.

Table 6-11 presents the leak check results for microbial survivability in emissions test runs. All leak checks met the "0.02 cfm or 4 percent of sample rate" acceptance criterion.

Microbial emission testing isokinetic results are presented in Table 6-3. All run met the isokinetic criterion of ±10 percent of 100 percent.

Control samples of the wet spore solution and the dry spore pipes were analyzed along with the test samples. The results of these analyses are shown in Table 6-12.

Approximately 20 ml of the spore solution was submitted for confirmation analysis. The confirmation count of viable spores was 3.7×10^8 spores/ml. The manufacturer's count of the same solution was 7.0×10^8 spores/ml.

Viable spores cultured from the dry spore confirmation sample were too numerous to count. The EPA protocol for dry spore spike analysis does not require dilution and enumeration of the spores.

TABLE 6-10. HALOGEN FIELD, METHOD, AND REAGENT BLANK RESULTS; MORRISTOWN MEMORIAL HOSPITAL (1991)

BLANK TYPE	ANALYTE a		
	Cl- (total mg)	Br- (total mg)	F- (total mg)
INLET FIELD BLANK	0.515	[0.00457]	[0.0144]
OUTLET FIELD BLANK	[0.00399]	[0.00445]	[0.0140]
METHOD BLANK 1	[0.00576]	[0.00642]	[0.202]
METHOD BLANK 2	[0.00351]	[0.00391]	[0.0123]
REAGENT BLANK 1	[0.00391]	[0.00436]	[0.0137]
REAGENT BLANK 2	[0.00357]	[0.00398]	[0.0125]
REAGENT BLANK 3	[0.00389]	[0.00433]	[0.0136]
REAGENT BLANK 4	[0.00382]	[0.00425]	[0.0134]
REAGENT BLANK 5	[0.00325]	[0.00362]	[0.0144]
LAB PROOF BLANK 1	[0.00300]	[0.00334]	[0.0105]
LAB PROOF BLANK 2	[0.00285]	[0.00318]	[0.0100]

a: Values are reported as respective anions.
[] = Minimum detection limit.

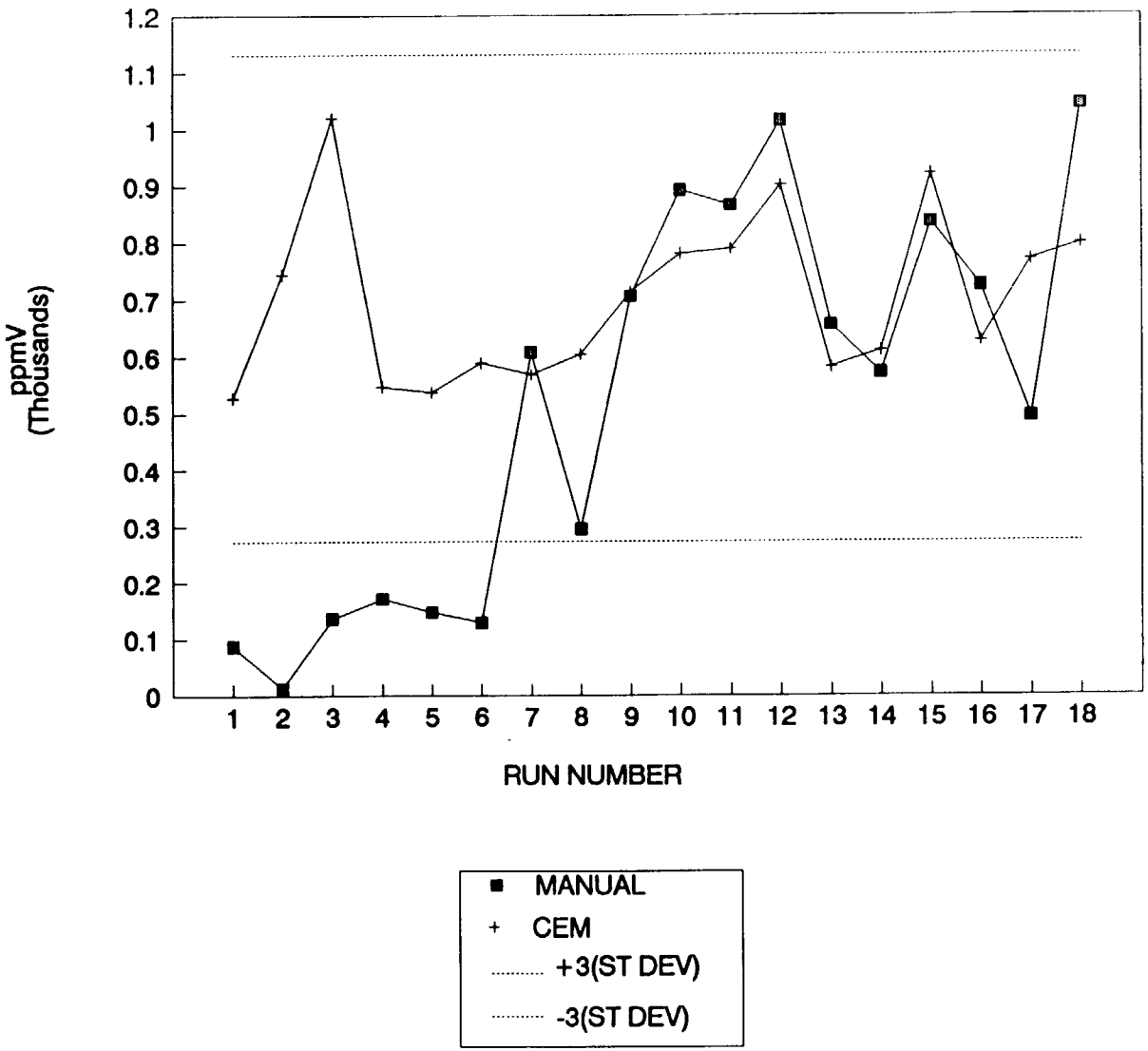

FIGURE 6-1. SPRAY DRYER INLET HCl RESULTS WITH CONTROL LIMITS

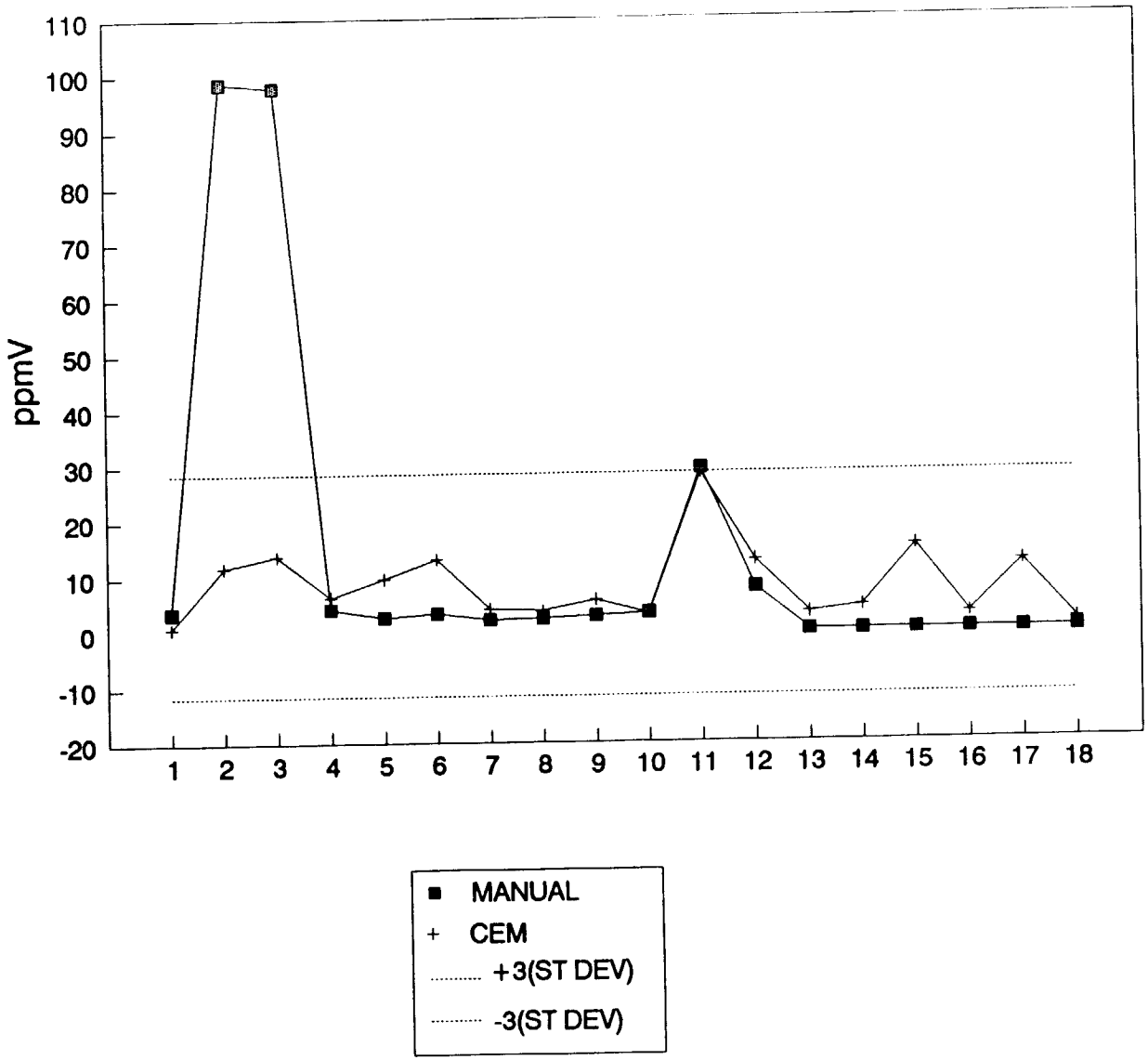

FIGURE 6-2. BAGHOUSE OUTLET HCl RESULTS WITH CONTROL LIMITS

TABLE 6-11. LEAK CHECK RESULTS FOR MICROORGANISMS SAMPLE TRAINS
MORRISTOWN HOSPITAL (1991)

Date	Run Number	Location	Maximum Vacuum	Port	Avg. Sample Rate (acfm)	4% Sample Rate (acfm)	Measured Leak Rate	Vacuum (in. Hg)	Leak Corrected (Y or N)
11/18/91	1	Inlet	22	A	0.663	0.027	0.004	7	N
11/19/91	2	Inlet	3.5	A	0.644	0.026	0.011	7	N
11/20/91	3	Inlet	2.5	A	0.671	0.027	0.008	4	N

Table 6-12

Spore Spike Solution Confirmation Analysis
Morristown Memorial Hospital (1991)

Sample ID	Manufacturer's Count (spore/ml)	Confirmation Average (viable spores/ml)	Confirmation Count Standard Deviation (viable spores/ml)
Wet Spore Solution	7.0×10^8 spore/ml	3.7×10^8 spore/ml	5.3×10^7 spores/ml
Dry Spore Solution	1×10^7 spore/sample	TNTC	--

Note: All confirmation values were taken from the average of the 10 ml, 48 hour counts.

TNTC = Too Numerous To Count

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6.3 QC PROCEDURES FOR ASH AND PIPE SAMPLING

As stated in Section 5.3, the incinerator waste charges were spiked with B. stearothermophillus in both wet and dry forms. Solutions of B. stearothermophillus (wet spores) were spiked to the incinerator to coincide with simultaneous emissions testing and daily ash sampling. A pre-aliquoted stock solution of wet spores of approximately 500 ml was deposited onto paper waste material and placed in a new, clean plastic garbage bags for each spike. This package was then added to the normal waste loads at regular spiking intervals. Freeze-dried quantities of B. stearothermophillus (dry spores) were placed in sealed pipes (See Figure 5-12) to determine the viability of "thermally shaded" microbial matter.

For both wet and dry spore spiking procedures, only pre-cleaned/disinfected materials were used for handling, application, and transport. The wet spore aliquots were divided and sealed by the manufacturer. This prevented any losses of material during shipment or sample preparation. (The empty solution container was also placed in the spiked waste charge.) The spiked charge was tied closed and deposited upright into the incinerator. Personnel handling the spiking material used disposable plastic gloves to prevent any cross-contamination.

The inner containers for the pipe samples were acid washed and alcohol disinfected. These were then sealed in clean plastic bags and shipped to the dry spore manufacturer for charging. All inner containers were thermally sterilized by the spore manufacturer immediately prior to charging. The containers were sealed after being charged with spores and shipped back to Radian.

In conjunction with the wet spore/microbial survivability tests, ash was collected from the incinerator bottom, spray dryer, and baghouse after each test run. The ash was analyzed for viable indicator spores, as well as metals, CDD/CDF, carbon, loss on ignition, and moisture content. All of the bottom ash from each test run was collected in a disinfected steel hopper. After removing large objects from the hopper, the remaining ash was mixed well with a disinfected shovel, and five one-liter samples were taken and placed in pre-cleaned, amber glass bottles.

Ash from the spray dryer and baghouse was collected during each run in cardboard boxes lined with new plastic garbage bags. Following each run, the ash from the spray dryer was mixed well, and five one-liter samples were taken from the bag.

Baghouse ash from each run filled several boxes. Samples from each run were composited by using a thief to remove ash from each box and mixing the ash removed in a separate container. The composite sample was placed into five one-liter bottles.

All material used for sampling, sample compositing, and sample aliquoting was disinfected with 30 percent H_2O_2 to prevent any sample contamination.

During the ash removal process, the pipe samples were also recovered. The outer containers were allowed to cool and then opened. The inner container was removed and placed in a clean, dry Ziplock baggie, labeled and kept in a clean environment prior to shipment to the laboratory.

6.4 ANALYTICAL QUALITY ASSURANCE

The following section reports QA parameters for the CDD/CDF, metals, halogen, and Hg analytical results.

6.4.1 CDD/CDF Analytical Quality Assurance

6.4.1.1 Flue Gas (MM5) Analytical Procedure. The full screen analyses were conducted using a DB-5 GC column which allows for the separation of each class of chlorination (i.e., tetras, petra, etc.) and fully resolves 2378 TCDD from the other TCDD isomers. The confirmation analysis, performed on a DB-225 GC column, is needed to fully resolve the 2378 TCDF from the other TCDF isomers. The 2378 TCDD and total TCDD isomers are also reported on the confirmation analysis. The final results for 2378 TCDF and other TCDF emission parameters were taken from the confirmation analysis. All other CDD/CDF results were taken from the full screen analysis unless directed otherwise by the analytical "case narratives" which are shown in Appendix E.1.

A component of the CDD/CDF analytical laboratory's QA/QC program is adding isotopically labeled standards to each sample during various stages of analysis to determine recovery efficiencies and to aid in the quantitation of "native" CDD/CDF on the XAD absorbent trap prior to the sampling session. (Toluene surrogates are added to species. Four different type standards are added. Surrogate standards are usually spiked in the sample prior to extraction.) Recovery of these compounds allows for the

evaluation of overall sample collection efficiency and analytical matrix effects. Internal standards are spiked after the sampling session but prior to extraction. Alternate standards are also spiked at this stage. Recovery percentage of internal standards are used in quantifying the flue gas native CDD/CDF isomers. Recovery of alternate standards allows for extraction/fractionation efficiencies to be determined. Finally, recovery standards are added after fractionation, just prior to the HRGC/HRMS analysis. Internal standards recovery are determined relative to recovery standards recovery. Recovery standards recovery efficiencies are not typically reported with the analytical results.

Poor recovery percentage of the various standards can reveal poor data quality. In some cases, if an analysis with a poor recovery is also accompanied by a suitable QA/QC "flag", the sample result can be validated. A full discussion of the analytical QA/QC program cannot be presented in this summary report, but can be found in Triangle's CDD/CDF Data User Manual.

6.4.1.2 CDD/CDF Standard Recoveries. Table 6-13 presents the CDD/CDF method blank results. The few congeners that were detected were present at very low concentrations. No 2378 TCDD or 2378 TCDF were detected. Tables 6-14, and 6-15, present the standard recovery values for the MM5 flue gas samples, respectively. Both full screen (FS) and confirmation (C) values are presented. Confirmation analyses were only completed when positive detections of 2378 TCDD or 2378 TCDF were found in the full screen (DB-5) analysis. The analytical acceptance criterion for internal standard recoveries is 40 percent to 130 percent for tetra- through hexa-chlorinated compounds, while the range is 25 percent to 130 percent for hepta- and octa-chlorinated compounds. Recoveries outside of these limits may still be acceptable if other identification criteria are met.

The majority of the CDD/CDF internal standard recoveries for the spray dryer inlet and baghouse outlet met the acceptable criteria. A few isomers in the tetra-chlorinated compounds range showed less than 40 percent recoveries. The recoveries for hepta- and octa-chlorinated compounds were all well within the 25 to 130 percent range.

TABLE 6-13: CDD/CDF METHOD BLANK RESULTS

CONGENER	TLI M23 BLANK (total ng)	TLI WATER BLANK (total ng)	TLI ASH BLANK (total ng)	TLI SLUDGE BLANK (total ng)
DIOXINS				
2378 TCDD	[0.008]	[.008]	[0.300]	[0.200]
Other TCDD	0.000	0.000	1.200	0.000
12378 PCDD	[0.005]	[0.008]	[0.300]	[0.100]
Other PCDD	0.000	0.000	1.400	0.000
123478 HxCDD	[0.005]	[0.008]	[0.500]	[0.200]
123678 HxCDD	[0.005]	[0.005]	[0.300]	(0.100)
123789 HxCDD	[0.005]	[0.005]	[0.400]	[0.200]
Other HxCDD	0.010	0.030	2.200	0.250
1234678-HpCDD	0.030	0.130	2.500	2.300
Other Hepta-CDD	0.020	0.080	1.600	1.400
Octa-CDD	0.140	0.640	11.700	9.800
Total CDD	0.200	0.880	20.600	13.850
FURANS				
2378 TCDF	[0.005]	(0.003)	[0.200]	[0.200]
Other TCDF	0.008	0.007	0.000	0.000
12378 PCDF	[0.005]	[0.005]	[0.200]	[0.100]
23478 PCDF	[0.003]	[0.003]	[0.200]	[0.100]
Other PCDF	0.000	0.000	0.000	0.000
123478 HxCDF	[0.005]	[0.005]	[0.300]	(0.150)
123678 HxDCF	[0.003]	[0.003]	[0.300]	[0.100]
234678 HxCDF	0.006	(0.006)	0.200	0.350
123789 HxCDF	[0.005]	[0.005]	[0.400]	[0.200]
Other HxCDF	0.000	0.024	0.000	0.000
1234678-HpCDF	0.004	[0.003]	[0.300]	(0.440)
1234789-HpCDF	[0.005]	[0.005]	[0.500]	[0.200]
Other Hepta-CDF	0.005	0.006	0.000	0.000
Octa-CDF	0.009	[0.008]	[0.600]	1.300
TOTAL CDF	0.032	0.046	0.200	1.870
TOTAL CDD+CDF	0.232	0.926	20.800	15.720

[ ] : Minimum detection limit.
( ) : Estimated maximum possible concentration.

TABLE 6-14. STANDARDS RECOVERIES FOR THE CDD/CDF MODIFIED METHOD 5 INLET ANALYSES; MORRISTOWN HOSPITAL (1991)

	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Field Blank	TLI
Full Screen Analyses								
Surrogate Standards Recovery (%)								
37Cl-TCDD	115.0	105.0	115.0	106.0	107.0	117.0	116.0	85.4
13Cl2-PeCDF 234	139.0	135.0	121.0	127.0	113.0	118.0	107.0	117.0
13Cl2-HxCDF 478	120.0	126.0	128.0	128.0	129.0	132.0	121.0	107.0
13Cl2-HxCDD 478	130.0	120.0	132.0	123.0	140.0	135.0	135.0	128.0
13Cl2-HpCDF 789	109.0	119.0	111.0	103.0	107.0	116.0	108.0	97.8
Alternate Standards Recovery (%)								
13Cl2-HxCDF 789	84.9	78.8	89.2	86.3	90.5	99.8	84.8	71.1
13Cl2-HxCDF 234	106.0	82.6	103.0	102.0	112.0	109.0	98.3	69.4
Internal Standards Recovery (%)								
13Cl2-2378-TCDF	15.1	21.6	39.0	28.4	39.1	69.6	72.8	17.7
13Cl2-2378-TCDD	17.4	2[illegible].5	38.3	30.2	40.7	62.4	60.6	24.8
13Cl2-PeCDF 123	49.4	57.4	59.9	59.2	68.0	71.7	71.3	57.9
13Cl2-PeCDD 123	77.7	85.1	69.4	101.0	78.3	99.8	81.7	75.9
13Cl2-HxCDF 678	82.5	73.1	89.6	85.5	87.9	94.8	83.4	69.4
13Cl2-HxCDD 678	90.4	81.0	86.4	92.3	89.9	98.1	102.0	79.9
13Cl2-HpCDF 678	95.6	104.0	105.0	118.0	117.0	103.0	90.4	74.4
13Cl2-HpCDD 678	88.1	103.0	94.7	96.0	103.0	104.0	91.0	90.3
13Cl2-OCDD	85.7	118.0	93.5	110.0	124.0	121.0	74.2	103.0
Confirmation Data								
Surrogate Standards Recovery (%)								
37Cl-TCDD	93.0	89.3	92.7	88.2	88.6	90.0	86.7	a
Internal Standards Recovery (%)								
13Cl2-2378-TCDF	21.7	28.4	48.7	33.4	46.1	68.4	67.2	a
13Cl2-2378-TCDD	25.8	32.2	48.2	35.8	47.5	73.8	70.9	a

a No confirmation recovery done on sample.

TABLE 6-15. STANDARDS RECOVERIES FOR THE CDD/CDF MODIFIED METHOD 5 OUTLET ANALYSES; MORRISTOWN HOSPITAL (1991)

	Run 1 11/18/91	Run 2 11/19/91	Run 3 11/20/91	Run 4 11/21/91	Run 5 11/22/91	Run 6 11/23/91	Field Blank	TLI
Full Screen Analyses								
Surrogate Standards Recovery (%)								
37Cl-TCDD	102.0	119.0	107.0	113.0	120.0	111.0	114.0	85.4
13Cl2-PeCDF 234	127.0	125.0	119.0	129.0	129.0	110.0	123.0	117.0
13Cl2-HxCDF 478	114.0	122.0	113.0	123.0	122.0	115.0	117.0	107.0
13Cl2-HxCDD 478	125.0	139.0	128.0	128.0	133.0	114.0	119.0	128.0
13Cl2-HpCDF 789	110.0	118.0	108.0	121.0	116.0	102.0	108.0	97.8
Alternate Standards Recovery (%)								
13Cl2-HxCDF 789	85.0	84.1	85.7	91.3	74.3	89.4	83.5	71.1
13Cl2-HxCDF 234	87.9	87.3	90.3	95.4	81.4	95.5	92.4	69.4
Internal Standards Recovery (%)								
13Cl2-2378-TCDF	22.6	35.1	38.2	29.6	36.6	55.9	38.0	17.7
13Cl2-2378-TCDD	26.7	36.4	39.2	31.5	37.3	52.8	37.4	24.8
13Cl2-PeCDF 123	56.7	59.1	60.9	60.1	53.6	62.5	52.6	57.9
13Cl2-PeCDD 123	79.2	77.9	92.0	107.0	70.8	72.4	86.2	75.9
13Cl2-HxCDF 678	84.3	82.5	89.0	82.9	71.7	92.4	84.9	69.4
13Cl2-HxCDD 678	85.9	84.3	90.4	93.9	74.2	96.2	92.1	79.9
13Cl2-HpCDF 678	93.7	89.5	89.6	102.0	70.3	97.6	87.9	74.4
13Cl2-HpCDD 678	93.9	90.2	86.8	111.0	68.0	88.2	86.2	90.3
13Cl2-OCDD	85.5	80.2	76.8	116.0	55.6	69.3	72.5	103.0
Confirmation Data								
Surrogate Standards Recovery (%)								
37Cl-TCDD	87.3	89.7	86.9	88.3	95.1	85.9	a	a
Internal Standards Recovery (%)								
13Cl2-2378-TCDF	31.1	41.5	42.7	33.9	42.5	58.1	a	a
13Cl2-2378-TCDD	36.7	42.5	42.5	38.6	45.5	61.5	a	a

a No confirmation recovery done on sample.

TABLE 6-16. STANDARDS RECOVERY RESULTS FOR CDD/CDF BOTTOM ASH AND SCRUBBER WATER ANALYSES; MORRISTOWN HOSPITAL (1991)

	BOTTOM ASH						MAKE-UP WATER
	RUN 1 11/18/91	RUN 2 11/19/91	RUN 3 11/20/91	RUN 4 11/21/91	RUN 5 11/22/91	RUN 6 11/23/91	11/18/91
Full Screen Analysis							
Surrogate Standards Recovery (%)							
37Cl-TCDD	100.0	59.5	52.1	57.0	44.1	46.6	73.0
13C12-PeCDF 234	112.0	76.4	81.1	65.7	84.3	72.6	126.0
13C12-HxCDF 478	76.4	107.0	106.0	94.2	105.0	97.3	83.9
13C12-HxCDD 478	88.8	101.0	96.7	94.7	100.0	97.5	103.0
13C12-HpCDF 789	58.2	60.5	62.1	29.3	73.0	102.0	81.8
Alternate Standards Recovery (%)							
13C12-HxCDF 789	67.2	73.0	70.5	75.2	77.3	85.0	88.5
13C12-HxCDF 234	74.0	90.3	87.3	79.2	90.1	92.4	87.7
Internal Standards Recovery (%)							
13C12-2378-TCDF	82.2	53.5	47.6	48.3	39.4	37.2	81.5
13C12-2378-TCDD	95.0	70.2	58.1	63.6	50.1	42.4	91.9
13C12-PeCDF 123	118.0	79.7	83.8	69.9	80.7	63.2	131.0
13C12-PeCDD 123	128.0	72.1	81.4	62.8	74.8	94.1	146.0
13C12-HxCDF 678	74.6	91.9	89.4	85.4	84.5	82.6	94.4
13C12-HxCDD 678	75.6	84.4	78.9	84.1	77.5	88.2	97.1
13C12-HpCDF 678	50.9	99.4	107.0	76.6	102.0	99.2	95.4
13C12-HpCDD 678	63.5	78.5	86.7	27.5	93.4	93.6	103.0
13C12-OCDD	70.9	86.2	102.0	82.2	126.0	92.1	123.0
Confirmation Data							
Surrogate Standards Recovery (%)							
37Cl-TCDD	81.6	53.9	51.9	53.7	48.5	52.4	a
Internal Standards Recovery (%)							
13C12-2378-TCDF	81.6	53.0	54.8	50.0	44.2	51.8	a
13C12-2378-TCDD	80.7	59.5	56.8	57.8	48.3	58.3	a

a No confirmation recovery done on sample.

TABLE 6-17. STANDARDS RECOVERY RESULTS FOR CDD/CDF BAGHOUSE RESIDUE ANALYSES; MORRISTOWN HOSPITAL (1991)

	BAGHOUSE RESIDUE					
	RUN 1 11/18/91	RUN 2 11/19/91	RUN 3 11/20/91	RUN 4 11/21/91	RUN 5 11/22/91	RUN 6 11/23/91
Full Screen Analysis						
Surrogate Standards Recovery (%)						
37Cl-TCDD	55.1	71.0	64.7	57.5	73.0	65.3
13C12-PeCDF 234	82.3	76.7	74.5	92.0	73.2	74.6
13C12-HxCDF 478	94.8	97.5	91.7	89.6	94.7	93.7
13C12-HxCDD 478	103.0	106.0	98.8	100.0	103.0	101.0
13C12-HpCDF 789	65.6	57.4	59.4	108.0	49.9	80.3
Alternate Standards Recovery (%)						
13C12-HxCDF 789	78.1	80.4	76.7	80.7	74.8	81.0
13C12-HxCDF 234	87.5	89.4	83.0	88.0	85.4	88.4
Internal Standards Recovery (%)						
13C12-2378-TCDF	48.4	55.9	58.7	57.0	61.7	63.6
13C12-2378-TCDD	61.9	79.9	75.8	59.1	74.9	62.9
13C12-PeCDF 123	83.3	64.5	75.7	80.2	63.5	67.0
13C12-PeCDD 123	92.6	73.9	70.4	100.0	67.4	79.2
13C12-HxCDF 678	87.4	78.3	83.3	82.0	67.2	82.5
13C12-HxCDD 678	88.0	88.4	83.7	83.0	68.8	83.2
13C12-HpCDF 678	85.0	61.9	65.7	99.6	33.4	69.9
13C12-HpCDD 678	86.2	69.3	70.6	105.0	34.7	71.8
13C12-OCDD	91.7	269.1	75.5	111.0	18.1	52.6
Confirmation Data						
Surrogate Standards Recovery (%)						
37Cl-TCDD	58.3	77.6	66.7	69.2	72.4	75.4
Internal Standards Recovery (%)						
13C12-2378-TCDF	56.1	66.8	63.0	68.2	71.9	79.2
13C12-2378-TCDD	63.9	80.7	73.0	74.9	75.2	82.0

TABLE 6-18. STANDARDS RECOVERY RESULTS FOR CDD/CDF SPRAY DRYER RESIDUE ANALYSES; MORRISTOWN HOSPITAL (1991)

	SPRAY DRYER RESIDUE					
	RUN 1 11/18/91	RUN 2 11/19/91	RUN 3 11/20/91	RUN 4 11/21/91	RUN 5 11/22/91	RUN 6 11/23/91
Full Screen Analysis						
Surrogate Standards Recovery (%)						
37Cl-TCDD	55.5	55.2	50.1	57.6	52.1	49.6
13C12-PeCDF 234	75.8	92.1	57.6	92.6	82.7	84.5
13C12-HxCDF 478	88.7	82.5	74.2	76.7	81.1	68.2
13C12-HxCDD 478	109.0	96.0	86.3	99.9	102.0	88.7
13C12-HpCDF 789	88.6	61.6	43.1	70.8	65.9	64.3
Alternate Standards Recovery (%)						
13C12-HxCDF 789	81.9	75.2	62.8	77.2	77.7	67.5
13C12-HxCDF 234	88.7	77.3	67.5	75.9	78.8	67.2
Internal Standards Recovery (%)						
13C12-2378-TCDF	44.5	51.0	40.9	52.0	44.0	40.9
13C12-2378-TCDD	50.9	66.2	54.9	68.2	62.3	55.5
13C12-PeCDF 123	51.8	84.0	53.5	84.3	76.5	75.9
13C12-PeCDD 123	85.6	125.0	73.5	110.0	98.8	94.0
13C12-HxCDF 678	67.5	80.2	62.8	69.9	73.0	60.0
13C12-HxCDD 678	80.6	84.0	71.4	80.8	83.5	71.2
13C12-HpCDF 678	73.4	75.1	51.8	68.4	72.0	64.3
13C12-HpCDD 678	86.5	82.7	54.6	80.8	82.5	78.6
13C12-OCDD	83.6	85.5	45.1	75.9	82.3	92.7
Confirmation Data						
Surrogate Standards Recovery (%)						
37Cl-TCDD	62.7	58.8	53.8	57.1	55.6	53.1
Internal Standards Recovery (%)						
13C12-2378-TCDF	53.4	60.3	52.4	57.3	51.2	48.3
13C12-2378-TCDD	65.1	66.8	57.0	65.8	61.0	55.1

TABLE 6-19. STANDARDS RECOVERY RESULTS FOR CDD/CDF BLANK ANALYSES; MORRISTOWN HOSPITAL (1991)

	TLI Water Blank	TLI Ash Blank	TLI Sludge Blank	RUN 1 Sludge
Full Screen Analysis				
Surrogate Standards Recovery (%)				
37Cl-TCDD	58.5	40.6	35.8	67.4
13C12-PeCDF 234	93.5	73.2	69.9	80.3
13C12-HxCDF 478	72.7	70.5	86.3	92.8
13C12-HxCDD 478	98.2	99.8	97.3	105.0
13C12-HpCDF 789	75.4	56.7	95.0	83.4
Alternate Standards Recovery (%)				
13C12-HxCDF 789	80.1	68.5	82.0	87.0
13C12-HxCDF 234	81.5	68.3	81.8	91.0
Internal Standards Recovery (%)				
13C12-2378-TCDF	53.7	36.8	29.0	72.1
13C12-2378-TCDD	58.6	49.0	33.3	67.1
13C12-PeCDF 123	77.8	75.6	48.3	76.1
13C12-PeCDD 123	74.4	88.5	78.6	89.7
13C12-HxCDF 678	69.9	73.9	69.7	91.5
13C12-HxCDD 678	79.3	87.0	82.6	87.8
13C12-HpCDF 678	69.7	66.0	77.5	85.7
13C12-HpCDD 678	79.7	78.2	92.0	85.9
13C12-OCDD	83.9	86.5	85.7	74.0
Confirmation Data				
Surrogate Standards Recovery (%)				
37Cl-TCDD	a	a	a	75.3
Internal Standards Recovery (%)				
13C12-2378-TCDF	a	a	a	79.8
13C12-2378-TCDD	a	a	a	84.3

a No confirmation recovery done on sample.

All CDD/CDF data was inspected and released as valid by the Triangle Laboratory QA officer.

Tables 6-16, 6-17, 6-18, and 6-19 present the recovery standards for the kiln ash, spray dryer,baghouse ash, and method blank samples. All isomers showed recoveries that were within the acceptance criterion.

6.4.2 Metals Analytical Quality Assurance

The analytical methods used for the flue gas samples, the ash samples, and the metals samples are fully discussed in Section 5. The following paragraph will briefly report metals analytical QA parameters.

Table 6-20 presents the metals method blank results for the ash and flue gas samples. No metals were detected in the ash blank or flue gas method blank.

Table 6-21 presents the method and matrix spike results for the metals analysis. All spiked recoveries were within the QA allowance of ±20 percent of 100 percent. Silver, in the matrix spike for the ash sample, had low recoveries probably due to the presence of anions precipitating the Ag out of solution. No matrix corrections were applied.

6.4.3 Mercury 101A Analytical Quality Assurance

Table 6-9 presents the method blank Hg 101A analysis. No Hg was detected in the blank. Table 6-22 presents the matrix spike and duplicate results. The front half second filter and back half second filter showed less than 90 percent recovery in the matrix spike. The recoveries in the matrix spike duplicate were within the 100 ±10 percent criterion.

6.4.4 Halogen Analytical Quality Assessment

The matrix spike recoveries are shown in Table 6-23. Results for all 3 ions were within the 100 ±20 percent criteria.

6.5 CEM QUALITY ASSURANCES

Flue gas was analyzed for O_2, CO_2, CO, SO_2, NO_x, and THC, using EPA Methods 10, 3A, 6C, 7E, and 25A, respectively. Additional CEM analyzer was also employed for real time HCl gas concentrations. The following section will report the CEM QA parameters specific for each of those methods and analyzers.

6.5.1 CEM Data Overview

Daily QA/QC procedures were performed on the CEM sampling system and instruments. These included calibration drift checks and corrections (if necessary) , QC gas challenges, sample system bias checks, response time checks, leak checks, sample systems blow back, probe maintenance, filter replacement, conditioner inspection and maintenance, and others. The aim was to ensure a quality data product. Details of the CEM QC procedures and objectives are fully outlined in the Morristown Test Plan. The following sections will report QA parameters specific to the previously mentioned QA/QC procedures and also data variation.

Table 6-24 presents the CEM internal QA/QC checks along with their respective acceptance criteria which were conducted at the Morristown MWI tests.

6.5.2 Calibration Drift Checks

All CEM analyzers were calibrated daily with a zero gas (generally nitrogen), and a high-range span gas. Calibrations were performed prior to and at the completion of each test run. By comparing the post-test calibration to the pre-test calibration, the calibration drift was determined (zero drift and span drift).

Daily drift criteria between calibrations for both zero and span was ±5 percent of full scale. Although Method 10 for CO allows ±10 percent of full scale drift, the CO drift requirements were ±5 percent for this test program, to ensure the quality of data produced. The HCl drift criteria was set at ±10 percent of full scale. This was because the calibration routines using the HCl dilution probe necessitate a constant sample gas temperature. While testing a fluctuating process like MWIs, this can be difficult to achieve. Pre-test calibrations are typically conducted after the incinerator has reached full operating temperature. The gas temperature during the post-test calibrations may have differed enough to produce false calibration drift estimates. However, the constant temperature problem was minimized during this test program by the use of a CEM probe heater which minimizes probe gas temperature fluctuations. The zero and span calibration drift results for each CEM analyzer on each test day are listed in Table 6-25. The span drift for the O_2 inlet monitor was outside the ±3 percent limit for Runs 2 and 4. The span drift for the CO_2 inlet monitor was excessive for Runs 2 and 5 and the span

Table 6–20

Metals Ash and Flue Gas Method Blank Results
Morristown Memorial Hospital (1991)

Metal	Lime Slurry Method Blank (mg/kg)	Make-up Water Method Blank (total ug)	Flue Gas Method Blank			
			Ash Method Blank (mg/kg)	Front Half (total ug)	Impingers 1,2,3 (total ug)	Impingers 4,5,6 (total ug)
Aluminum	[4.45]	[12.1]	(8.90)	[8.75]	[3.73]	
Antimony	[1.50]	[1.50]	[3.00]	[3.75]	[1.60]	
Arsenic	[0.400]	[0.832]	[0.800]	[1.00]	[0.427]	
Barium	[0.240]	[0.499]	(0.480)	(0.350)	[0.107]	
Beryllium	[0.100]	[0.208]	[0.200]	[0.250]	[0.107]	
Cadmium	[0.200]	[0.416]	[0.400]	[0.500]	[0.213]	
Chromium	[0.600]	[1.25]	[1.20]	[1.50]	[0.640]	
Copper	[0.400]	[0.832]	[0.800]	[1.00]	[0.427]	
Lead	[0.300]	[0.624]	[0.600]	[0.750]	[0.320]	
Mercury	[1.96]	[0.392]	[1.96]	[2.45]	[3.13]	[0.815]
Nickel	[0.300]	[0.624]	[0.600]	(1.45)	[0.320]	
Silver	[0.600]	[1.25]	[1.20]	(3.98)	(2.29)	
Thallium	[10.0]	[10.0]	[20.0]	[25.0]	[10.7]	
Chloride		[0.0000600]				

NOTE: Impingers 4,5 and 6 sample fractions analyzed for mercury content only.

[ ] = Minimum Detection Limit.

( ) = Estimated Value

Table 6-21
Metals Method and Matrix Spike Results
Morristown Memorial Hospital (1991)

Metal	Metals Trains					
	Method Spike (% rec)			Method Spike Duplicate (% rec)		
	Front Half	Impingers 1,2,3	Impingers 4,5,6	Front Half	Impingers 1,2,3	Impingers 4,5,6
Aluminum	99.5%	102%		114%	99.8%	
Antimony	98.8%	92.6%		99.7%	89.2%	
Arsenic	105%	93.4%		87.4%	96.4%	
Barium	86.7%	90.9%		87.0%	90.7%	
Beryllium	98.0%	96.0%		100%	95.6%	
Cadmium	112%	99.0%		113%	99.3%	
Chromium	105%	98.5%		107%	98.7%	
Copper	91.5%	94.6%		91.8%	94.3%	
Lead	101%	94.4%		94.8%	96.0%	
Mercury	103%	91.0%	97.6%	99.6%	91.0%	96.8%
Nickel	106%	98.3%		110%	98.3%	
Silver	36.4%	12.1%		64.1%	19.2%	
Thallium	94.6%	93.4%		94.1%	99.1%	

Metal	Lime Slurry		Make-up Water		Ash Samples	
	Matrix Spike	Matrix Spike Dup	Method Spike	Method Spike Dup	Matrix Spike	Matrix Spike Dup
Aluminum	94.5%	100%	98.8%	99.4%	NA	NA
Antimony	99.0%	98.0%	86.2%	87.5%	83.7%	86.7%
Arsenic	95.2%	97.0%	93.6%	102%	87.8%	93.8%
Barium	90.4%	87.8%	90.7%	90.3%	67.5%	88.5%
Beryllium	93.0%	91.8%	94.4%	94.6%	82.0%	83.5%
Cadmium	93.8%	90.4%	98.8%	97.8%	93.4%	92.8%
Chromium	95.2%	91.3%	97.9%	97.2%	90.8%	90.2%
Copper	90.3%	91.9%	94.0%	98.5%	90.4%	90.4%
Lead	108%	104%	101%	101%	84.6%	90.4%
Mercury	109%	104%	96.6%	92.6%	95.0%	97.2%
Nickel	93.8%	92.8%	97.0%	97.4%	92.2%	92.0%
Silver	47.0%	68.8%	30.4%	16.0%	2.50%	1.52%
Thallium	95.3%	94.3%	99.4%	101%	38.7%	40.5%
Chloride			101%	101%		

Note: Impingers 4,5 and 6 sample fractions analyzed for mercury content only

Table 6–22
Mercury 101A Matrix Spike Results
Morristown Memorial Hospital (1991)

Mercury Fraction	Matrix Spike (% Recovery)	Matrix Spike Duplicate (% Recovery)
Front Half	102%	97.9%
Front Half – 1st Filter	97.0%	100%
Front Half – 2nd Filter	89.8%	94.9%
Back Half	103%	101%
Back Half – 1st Filter	92.7%	94.7%
Back Half – 2nd Filter	83.5%	92.1%

TABLE 6-23. HALOGEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATES RECOVERY RESULTS; MORRISTOWN MEMORIAL HOSPITAL (1991)

ANALYTE	INLET RUN 1A		INLET RUN 2B		OUTLET RUN 3A		OUTLET RUN 4A		INLET RUN 5A		INLET RUN 6B	
	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)	MATRIX SPIKE RECOVERY (%)	MATRIX SPIKE DUPLICATE RECOVERY (%)
Cl-	102.0%	100.0%	93.6%	95.0%	96.4%	97.2%	94.4%	94.4%	101.0%	100.0%	102.0%	98.4%
F-	105.0%	102.0%	108.0%	105.0%	86.7%	87.4%	113.0%	112.0%	102.0%	102.0%	114.0%	106.0%
Br-	115.0%	118.0%	125.0%	125.0%	105.0%	105.0%	108.0%	106.0%	95.3%	98.4%	86.8%	105.0%

TABLE 6-24. CEM INTERNAL QA/QC CHECKS

Check	Frequency	Criteria
Multipoint Linearity Check (Calibration Error)	Every 3rd Day 3 point for O_2, CO_2, NO_x, SO_2, HCl 4 point for CO, THC	±2% Span
Sample System Bias	Once/Site	< 5% Span
Response Time	Once/Site	85% of time for stable SO_2 measurements
NO_x Convertor	Once/Site	> 90% conversion efficiency
Initial Leak Check	Once/Site	< 4% of Total flow while under vacuum
Daily Leak Checks	Before Each Test Run	< 0.5% O_2 with 0.2% O_2 gas
Stratification Test	Once/Site	Within 10% of average
Calibration Drift	Daily	< ±3% Span zero and upscale gas (can use ±10 ppm limit for HCl if less restrictive)

TABLE 6-25. DAILY CALIBRATION DRIFTS
MORRISTOWN MEMORIAL HOSPITAL (1991)

Drift Calibration Gas Parameters	Date	Run Number	Inlet Zero Instrument Drift (% of span)	Inlet Span Instrument Drift (% of span)	Outlet Zero Instrument Drift (% of span)	Outlet Span Instrument Drift (% of span)
Parameter: O2	11/18/91	1	0.50	0.00	0.13	0.39
Zero Calibration Gas: 0.2% O2	11/19/91	2	0.70	4a	0.06	0.00
Full Scale: 0-25%	11/20/91	3	1.50	2.00	0.20	0.47
	11/21/91	4	-1.30	3 a	0.11	1.46
	11/22/91	5	-0.70	-1.00	0.05	0.73
	11/23/91	6	0.90	0.00	0.06	-0.82
Parameter: CO	11/18/91	1	0.65	0.50	0.16	0.00
Zero Calibration Gas: N2	11/19/91	2	-0.12	1.00	0.00	0.00
Full Scale: 0-500ppm	11/20/91	3	-0.46	0.00	-0.06	0.20
	11/21/91	4	-1.52	-0.25	-0.20	0.00
	11/22/91	5	-0.15	-0.60	0.00	0.00
	11/23/91	6	-0.77	-0.30	-0.20	0.00
Parameter: CO2	11/18/91	1	-0.01	0.60	b	b
Zero Calibration Gas: N2	11/19/91	2	0.06	4.10	b	b
Full Scale: 0-20%	11/20/91	3	0.48	0.10	0.17	2.20
	11/21/91	4	0.00	2.70	-0.05	0.60
	11/22/91	5	0.08	-5.10	0.06	-0.60
	11/23/91	6	0.14	-1.20	-0.01	1.50
Parameter: SO2	11/18/91	1	0.00	0.00	-0.87	-0.30
Zero Calibration Gas: N2	11/19/91	2	0.00	0.00	2.10	-1.20
Full Scale: 0-500ppm	11/20/91	3	-2.00	0.00	-3.25	-3.20
	11/21/91	4	2.00	0.00	-0.30	1.40
	11/22/91	5	0.00	0.00	-0.30	-1.00
	11/23/91	6	0.00	0.00	-0.16	-1.50
Parameter: NOx	11/18/91	1	0.08	-0.60	0.05	-0.50
Zero Calibration Gas: N2	11/19/91	2	-0.16	-0.70	0.03	-1.60
Full Scale: 0-1000ppm	11/20/91	3	-0.04	-0.50	0.03	-0.50
	11/21/91	4	0.12	-0.10	0.09	-0.10
	11/22/91	5	0.05	-0.40	0.05	-0.50
	11/23/91	6	0.06	0.00	-0.06	0.30
Parameter: THC	11/18/91	1	0.94	-2.25	0.16	0.58
Zero Calibration Gas: N2	11/19/91	2	-0.68	-0.70	-1.65	0.00
Full Scale: 0-100ppm	11/20/91	3	0.55	-1.96	-0.49	-4.17
	11/21/91	4	0.49	-0.36	0.34	-0.76
	11/22/91	5	0.32	-2.66	1.89	1.37
	11/23/91	6	1.32	2.08	-0.54	2.56
Parameter: HCl	11/18/91	1	1.29	4.71	-0.85	1.37
Zero Calibration Gas: N2	11/19/91	2	2.06	1.07	0.00	0.00
Full Scale: 0-2000ppm	11/20/91	3	0.18	0.01	0.00	-2.78
	11/21/91	4	-0.23	0.14	0.59	-0.86
	11/22/91	5	0.22	-0.28	0.77	0.09
	11/23/91	6	0.39	-0.40	-0.19	1.33

drift for the SO_2 outlet monitor was -3.2 for Run 3. The CEM data was drift corrected for these test runs.

6.5.3 Daily QC Gas Challenges

After initial calibration, mid-range QC gases for all instruments were analyzed with no adjustment as a quality control check of daily calibrations. The calibration was considered acceptable if the difference between the measured response and the certified concentration was within ±2 percent of full scale of the analyzer full range. Post test QC gases were analyzed after the test run (with no adjustment) as well.

The results of the daily QC gas challenges are all shown in Table 6-26.

6.5.4 Multipoint Linearity Check

Multipoint linearity can be determined for each CEM analyzer based on the response of the calibration and QC gases. A linearity calibration is important because flue gas concentrations are determined from a two point linear regression analysis (zero calibration and span calibration gas) bracketing the expected flue gas concentrations. Multipoint calibrations can be performed with either three or four certified gases depending on the instrument: a zero gas, a low scale gas concentration, a mid-range concentration, and a high scale concentration (span gas). The QC criterion for acceptable linearity was a correlation coefficient (r) of greater than or equal to 0.998, where the independent variable is the cylinder gas concentration and the dependent variable is the instrument response.

CEM linearity was calculated for both the inlet and outlet instruments from calibration and QC gas data from November 18, 1991 and are listed in Table 6-27. All linearity checks met the acceptance criteria except the SO_2 CEM which had an "r" value of 0.9961, but was within ±2 percent of full scale. The CO_2 outlet linearity was calculated based on November 21 calibration data. Linearity can be calculated for any test day by using the calibration and QC data included in Appendix D.4.

6.5.5 Response Time

CEM response time was determined on November 17, 1991 and the results are shown in Appendix D.5. Response time for the Morristown test program was defined as the amount of time taken for the SO_2 analyzer to reach 85 percent of a QC gas value

TABLE 6-26. QC GAS RESPONSES
MORRISTOWN MEMORIAL HOSPITAL (1991)

Date	Parameter	True Concentration	Inlet		Outlet	
			Measured Concentration	Percent Difference a	Measured Concentration	Percent Difference a
11/18/91	O2 b	10	9.6	-1.60	9.9	-0.40
		5	4.7	-1.20	4.9	-0.40
11/19/91		10	10.4	1.60	10.4	1.60
11/20/91		10	9.7	-1.20	10.0	0.00
		5	4.8	-0.80	5.0	0.00
11/21/91		10	9.8	-0.80	10.0	0.00
		5	4.7	-1.20	5.0	0.00
11/22/91		5	4.5	-2.00	5.0	0.00
11/23/91		5	4.7	-1.20	5.0	0.00
11/18/91	CO c	100	100.3	0.06	100.0	0.00
		50	51.1	0.22	48.6	-0.28
11/19/91		100	100.5	0.10	104.5	0.90
11/20/91		100	99.1	-0.18	99.9	-0.02
		50	54.5	0.90	48.3	-0.34
11/21/91		50	47.9	-0.42	45.0	-1.00
11/22/91		50	50.6	0.12	45.8	-0.84
11/23/91		50	50.2	0.04	46.5	-0.70
11/18/91	CO2 b	10	9.8	-1.00		
		5	4.9	-0.50		
11/19/91		10	10.6	3.00		
11/20/91		10	9.9	-0.50	10.3	1.50
		5	5.0	0.00	5.2	1.00
11/21/91		10	9.9	-0.50	10.3	1.50
		5	5.0	0.00	5.1	0.50
11/22/91		5	4.9	-0.50	5.0	0.00
11/23/91		5	5.0	0.00	5.2	1.00

a Percent Difference = [(measured - true)/span]*100
b in units of percent by volume
c in units of ppm by volume

TABLE 6-26. (Continued)

Date	Parameter	True Concentration	Inlet Measured Concentration	Inlet Percent Difference a	Outlet Measured Concentration	Outlet Percent Difference a
11/18/91	SO2 c	80	71.0	-1.80	71.4	-1.72
11/19/91		80	72.0	-1.60	67.3	-2.54
11/20/91		80	68.8	-2.24	66.5	-2.70
11/21/91		80	75.0	-1.00	75.6	-0.88
11/22/91		80	71.5	-1.70	72.7	-1.46
11/23/91		80	70.1	-1.98	76.2	-0.76
11/18/91	NOx c	80	82.2	0.22	82.4	0.24
11/19/91		80	79.0	-0.10	75.5	-0.45
11/20/91		80	79.4	-0.06	81.9	0.19
11/21/91		80	81.8	0.18	82.4	0.24
11/22/91		80	79.7	-0.03	80.8	0.08
11/23/91		80	80.5	0.05	81.4	0.14
11/18/91	THC (wet) c	48.6	46.5	-2.10	45.7	-2.90
		10	10.0	0.00	9.1	-0.90
11/19/91		48.6	46.8	-1.80	43.8	-4.80
11/20/91		48.6	45.9	-2.70	43.9	-4.70
		10	9.6	-0.40	4.7	-5.30
11/21/91		10	9.2	-0.80	9.5	-0.50
11/22/91		10	9.8	-0.20	9.1	-0.90
11/23/91		10	9.4	-0.60	9.0	-1.00
11/18/91	HCl (wet) c	177	213.2	1.81		
		48.6			42.2	-3.20
11/19/91		177	193.6	0.83		
		48.6			46.8	-0.90
11/20/91		48.6			43.8	-2.40
11/21/91		177	215.8	1.94		
11/22/91		177	201.6			
		48.6			49.2	0.30
11/23/91		48.6			46.4	-1.10

a Percent Difference = [(measured - true)/span]*100

b in units of percent by volume

c in units of ppm by volume

Table 6-27

CEM Linearity Results
Morristown Memorial Hospital (1991)

Parameter	Inlet	Outlet
O_2	0.9995	0.9999
CO	0.9999	0.9998
CO_2	0.9999	0.9980
SO_2	0.9961	0.9961
NO_x	0.9999	0.9999
THC	0.9999	0.9999
HCl	0.9998	0.9999

JBS343

when the gas was directed through the entire sampling system. Both inlet and outlet extractive systems had response times of approximately 2 minutes.

6.5.7 Stratification Checks

Because the size of the ducts sampled were small, stratification of CEM gases in the ducts was assumed to be negligible.

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park, NC 27711

EMB Report 91-MWI-8
Volume II
December 1991

Air

Medical Waste Incineration Emission Test Report

Morristown Memorial Hospital
Morristown, New Jersey

DCN: 91-275-026-60-

MEDICAL WASTE INCINERATION

EMISSION TEST REPORT

Morristown Memorial Hospital
Morristown, New Jersey

VOLUME II

Appendices

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February 18, 1992

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RADIAN CORPORATION

EPA METHOD 1

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT: Morristown Memorial Hospital

DATE: 11-15-91

SAMPLING LOCATION: Spray Dryer Inlet Duct [redacted] (All) } 3 sets of Ports Used (Labeled 1, 2 & 3 (A & B))

INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE (DISTANCE A): 21 1/2"

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE (DISTANCE B): 4 1/2"

INSIDE STACK DIMENSIONS (DISTANCE (A) - (B)): 17" I.D.

NEAREST UPSTREAM DISTURBANCE: 1 = 32" 2 = 32" 3 = 19"

NEAREST DOWNSTREAM DISTURBANCE: 1 = 18" 2 = 17" 3 = 14"

CALCULATOR: RLM

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	FRACTION OF INSIDE STACK DIMENSIONS	INSIDE STACK DIMENSIONS	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 AND 5)
1	2.1	17"	0.357 ≅ 1/2"	4 1/2"	5"
2	6.7	↑	1.137 = 1 1/8"	↑	5 5/8"
3	11.8	↑	2.006 = 2"	↑	6 1/2
4	17.7	↑	3.009 = 3"	↑	7 1/2
5	25.0	↑	4.25 = 4 1/4"	↑	8 3/4
6	35.6	↑	6.052 = 6"	↑	10 1/2
7	64.4	↑	10.948 = 11"	↑	15 1/2"
8	75.0	↑	12.75 = 12 3/4"	↑	17 1/4"
9	82.3	↑	13.991 = 14"	↑	18 1/2"
10	88.2	↑	14.994 = 15"	↑	19 1/2"
11	93.3	↓	15.861 = 15 7/8"	↓	20 3/8"
12	97.9	17"	16.643 = 16 1/2"	4 1/2"	21"

Revision: 3/90

RADIAN CORPORATION

EPA METHOD 1

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT: Morristown Memorial Hospital

DATE: 11-15-91

SAMPLING LOCATION: Baghouse Outlet Duct (Both)

INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE (DISTANCE A): 24"

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE (DISTANCE B): 5"

INSIDE STACK DIMENSIONS (DISTANCE (A) - (B)): 19" ID

NEAREST UPSTREAM DISTURBANCE: Upper = 147" Lower = 17"

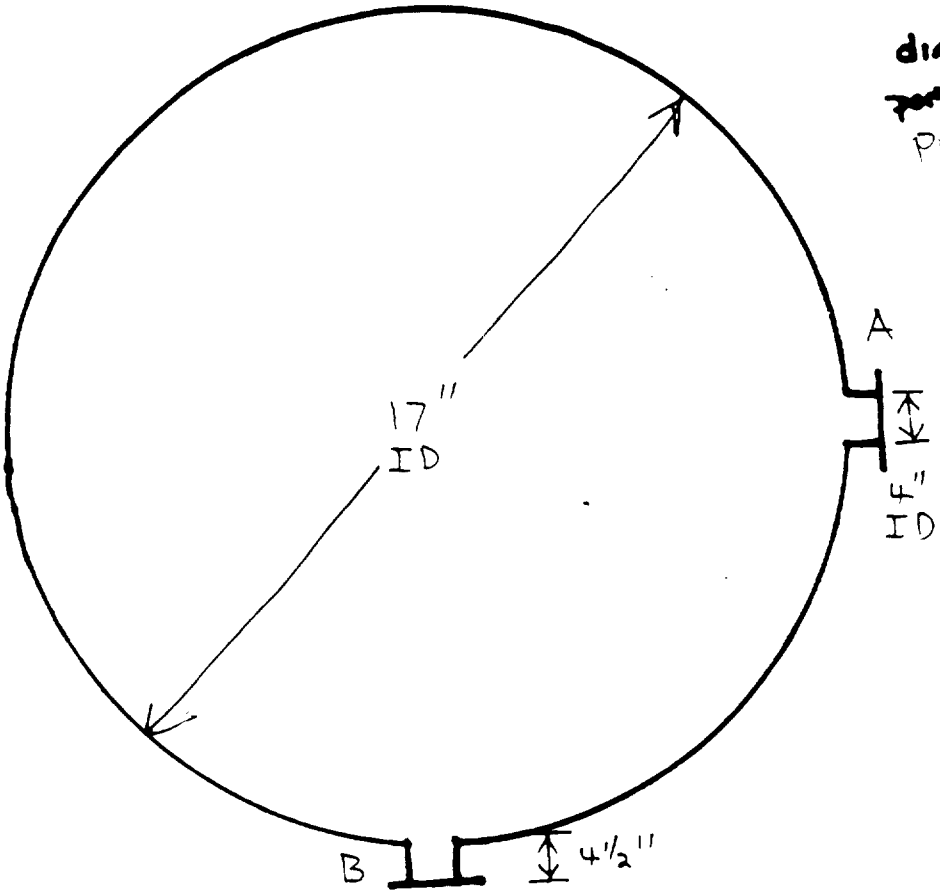
NEAREST DOWNSTREAM DISTURBANCE: Upper = 25" Lower = 147"

CALCULATOR: RLM

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	FRACTION OF INSIDE STACK DIMENSIONS	INSIDE STACK DIMENSIONS	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 AND 5)
1	2.1	19"	0.399 ≅ 1/2"	5"	5 1/2"
2	6.7	↑	1.273 = 1 1/4"	↑	6 1/4"
3	11.8		2.242 = 2 1/4"		7 1/4"
4	17.7		3.363 = 3 3/8"		8 3/8"
5	25.0		4.75 = 4 3/4"		9 3/4"
6	35.6		6.764 = 6 3/4"		11 3/4"
7	64.4		12.236 = 12 1/4"		17 1/4"
8	75.0		14.25 = 14 1/4"		19 1/4"
9	82.3		15.637 = 15 5/8"		20 5/8"
10	88.2		16.758 = 16 3/4"		21 3/4"
11	93.3	↓	17.727 = 17 3/4"	↓	22 3/4"
12	97.9	19"	18.601 = 18 1/2"	5"	23 1/2"

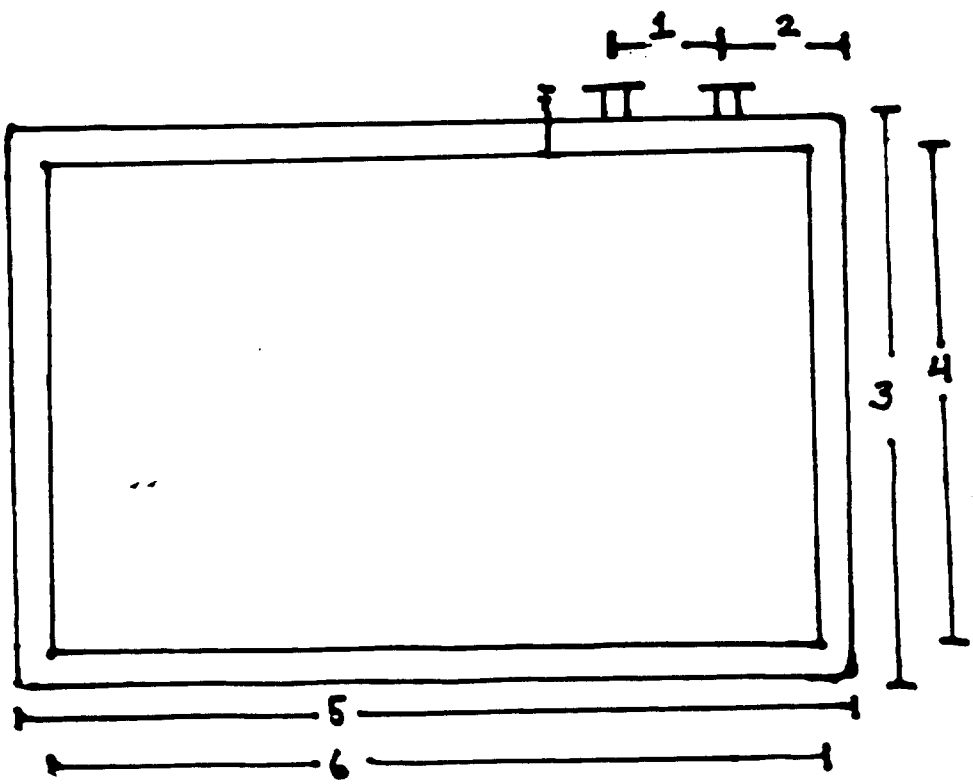
Revision: 3/90



diameter = 17" ID
port depth = 21½"
Port ID = 4"

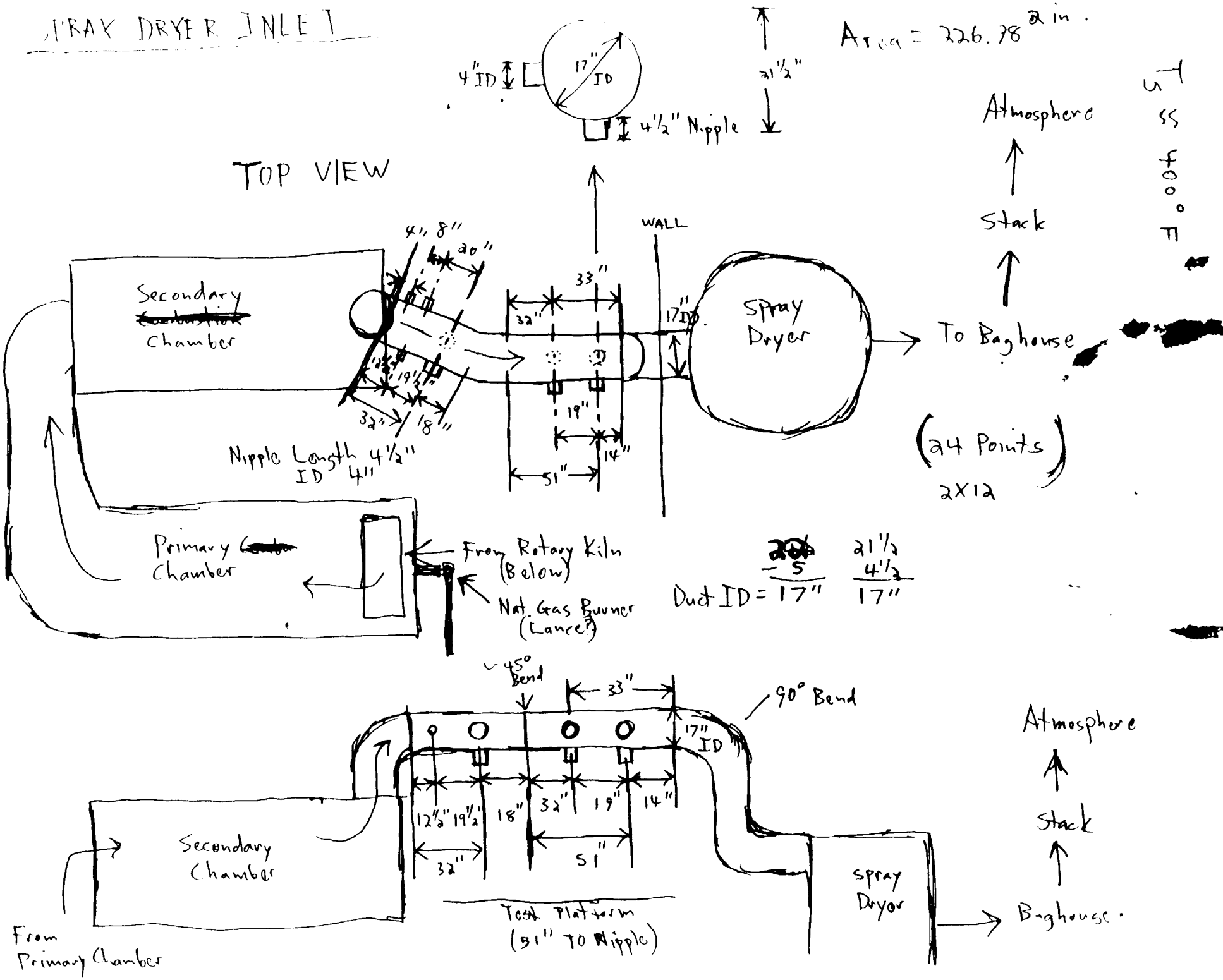
PLANT Morristown Mem. Hospital
LOCATION Spray Dryer Inlet (1)
DATE 11-15-91

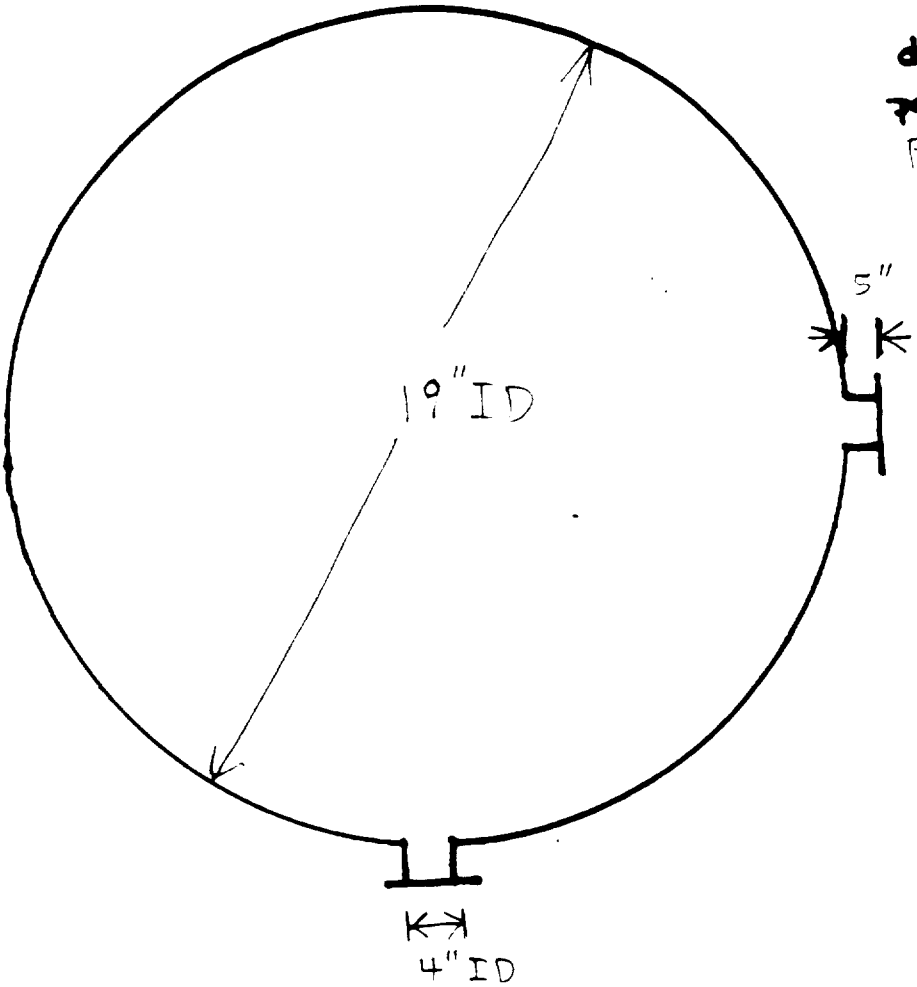
NEAREST OBSTRUCTION Ports	1 (A&B)	2 (A&B)	3 (A&B)
UPSTREAM –	32"	32"	17"
DOWNSTREAM –	18"	19"	14"



1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____

SPRAY DRYER INLET



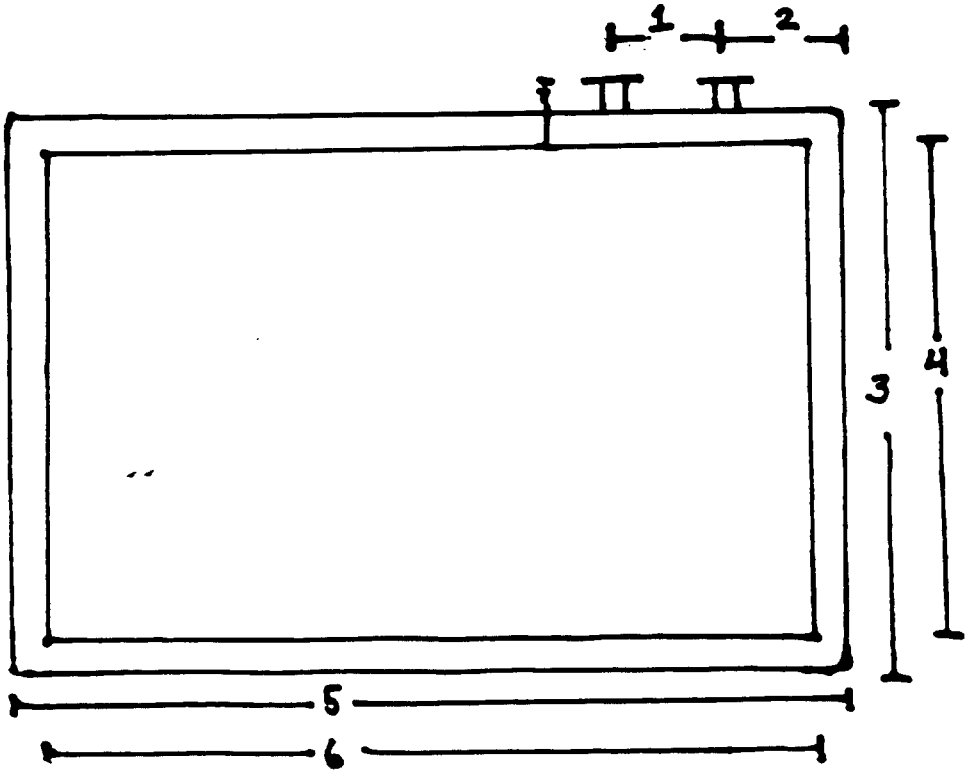


diameter = 19" ID
port depth = 5"
port ID = 4"

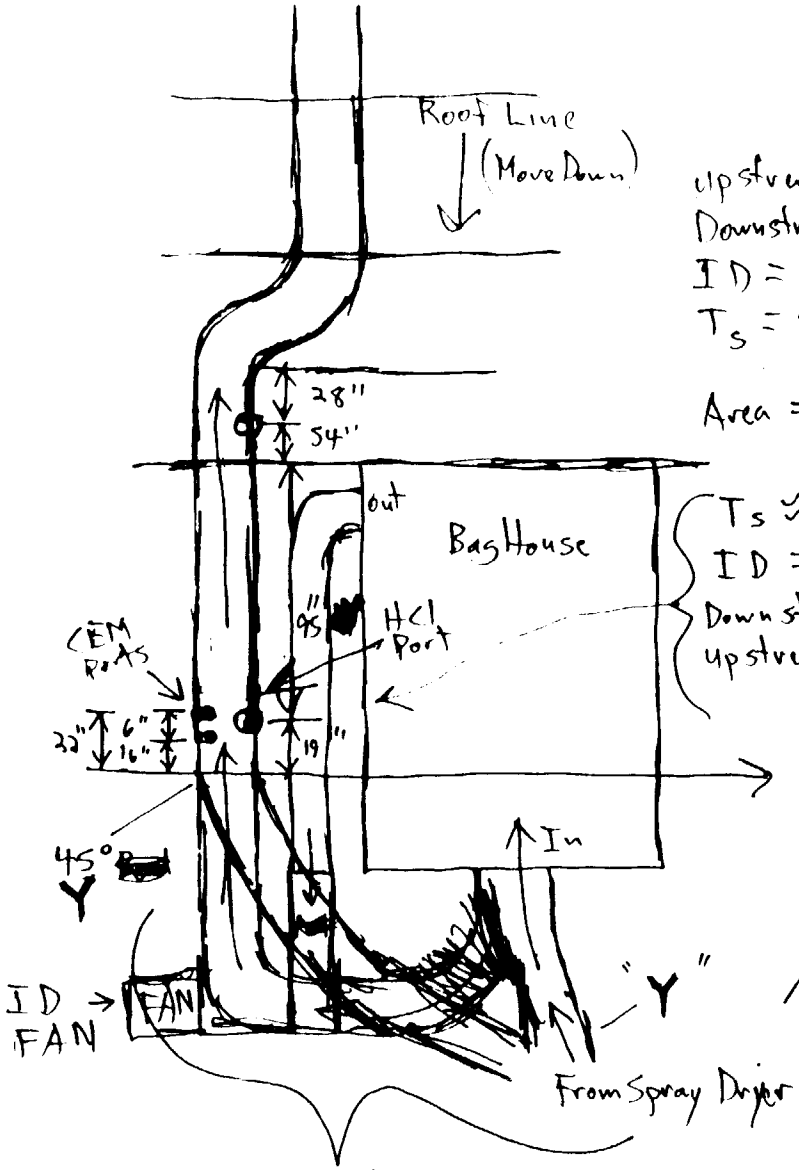
PLANT Morristown Mem. Hospi
LOCATION Baghouse Outlet
DATE 11-15-91

NEAREST OBSTRUCTION

Ports -	UPPER	LOWER
UPSTREAM -	147" (7.94 Dia)	17"
DOWNSTREAM -	25" (1.47 Dia)	149"

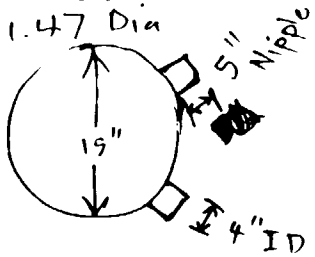


1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____



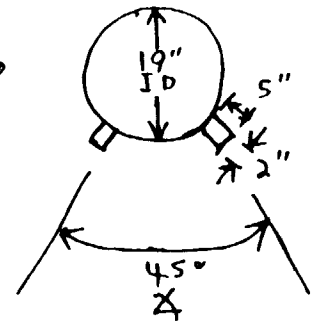
upstream = 149[redacted]" = 7.8[redacted] Dia.
Downstream = 28" = 1.47 Dia
ID = 19"
T_s = .

Area = 283.528 ^{2}in.



19" + 5" = 24" Total Duct Depth

$T_s \approx 285°$
ID = 19"
Down stream = (95[redacted] + 54") = 149[redacted]" = 7.8[redacted] Dia
upstream = 19" = 1 Dia.



24" Total Duct Depth

(24 points
2 X 12)

Use Same Points
Both Locations

Atmosphere
↑
STACK
↑
ID FAN
↑
[redacted]house

Feed → Rotary Kiln → 2nd dary Combustion Chamber → Chamber → Spray Dryer → [redacted]house

(Process Diagram)

VELOCITY TRAVERSE

PLANT Morristown Memorial Hospital
DATE 11-15-91
LOCATION Baghouse Outlet (Stack)
STACK I.D. 17"
BAROMETRIC PRESSURE, in. Hg 30.0
STACK GAUGE PRESSURE, in. H_2O
OPERATORS RLM

4.049

$\sqrt{\ } = 62.6$
% H_2O = 15.5
= 7,395

SCHEMATIC OF TRAVERSE POINT LAYOUT

Q std = 4400

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	
A- 1	[illegible]	278	.88
2	.80	287	[illegible]
3	.80	292	[illegible]
4	.75	292	[illegible]
5	[illegible]	292	[illegible]
6	[illegible]	293	.92
7	.88	292	.94
8	.95	292	[illegible]
9	.89	292	[illegible]
10	[illegible]	291	.92
11	.81	290	[illegible]
12	.65	285	[illegible]
B- 1	.79	284	.89
2	.82	284	.91
3	.81	284	.9
4	.87	286	.93
5	.91	290	.95
6	.88	292	.94
7	.87	292	.94
8	.90	292	.95
9	.90	292	.95
10	.86	292	.93
11	.82	291	.91
12	.80	288	.89
AVERAGE			.915

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

= 62.6

EPA (Dur) 233
4 72

VELOCITY TRAVERSE

PLANT Morristown Mem. Hospital
DATE 11-15-91
LOCATION Spray Dryer Inlet Duct (13B) Measured from Ports 2 A&B
STACK I.D 17"
BAROMETRIC PRESSURE, in. Hg 30.0
STACK GAUGE PRESSURE, in. H_2O
OPERATORS RLM

$\hat{P}_{stat}$ = 3.80

7.61 x .925

875
292 / 28.3
10.2

SCHEMATIC OF TRAVERSE POINT LAYOUT

H_2O = 179 V_s = 67.7
Q_{act} = 6403

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	$\sqrt{\Delta P}$
A - 1	.28	161	.9
2	.45	219	.07
3	.66	363	.98
4	.62	341	.93
5	.67	395	.89
6	.75	406	.86
7	.86	412	.89
8	.98	415	.87
9	1.1	415	.89
10	1.2	415	.87
11	1.2	414	.81
12	1.1	415	.8
B - 1			1.12
2			1.14
3			1.1
4			1
5			.99
6			.94
7			.88
8			.82
9			.84
10			.84
11			.83
12			.74
AVERAGE			.925

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 12	.2	412
11	1.15	412
10	.96	415
9	.87	415
8	.79	415
7	[illegible]	[illegible]
6	.79	414
5	.75	[illegible]
4	.8	[illegible]
3	.76	[illegible]
2	.65	[illegible]
1	.64	[illegible]
B 12	1.25	[illegible]
11	1.3	[illegible]
10	1.2	[illegible]
9	.0	[illegible]
8	.92	[illegible]
7	[illegible]	[illegible]
6	[illegible]	[illegible]
5	.67	[illegible]
4	.7	[illegible]
3	.71	[illegible]
2	[illegible]	[illegible]
1	.55	[illegible]
AVERAGE		

EPA (Dur) 233
4 72

MODIFIED METHOD 5 DATA

1/3

PLANT Morristown
DATE 11-18-91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE M23
RUN NUMBER Run #1
OPERATOR RLM
AMBIENT TEMPERATURE 105° F
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE (P_s) -6.6 in H_2O
FILTER NUMBER (s)
MINIMUM SAMPLE VOLUME 106 Cuft.
INITIAL LEAK CHECK 0.017

PROBE LENGTH AND TYPE 2 ft Glass w/Nozzle (1pc.)
NOZZLE I D 0.17
ASSUMED MOISTURE, % 15%
SAMPLE BOX NUMBER N/A
METER BOX NUMBER N34
METER Δ HP 1.94
K FACTOR 0.7091 → used 0.71
PROBE HEATER SETTING N/A
HEATER BOX SETTING 250° F
REFERENCE Δp 0.96
DRY/GAS METER FACTOR (Y) 1.0115
FINAL LEAK CHECK 0.

(15 8 [illegible])

C Factor: 0.52

SCHEMATIC OF TRAVERSE POINT LAYOUT
READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time Min.	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Stack T_s, in °F	Orifice Pressure Differential (ΔH, in. H_2O) Desired	Actual	Temperature °F/°C (Circle One) Probe	Filter Skin	Filter Out	Recirc. Water	Absorbent Trap	Dry Gas Meter Inlet (T_m in)	Dry Gas Meter Outlet (T_m out)	Impinger Exit	Pump Vacuum in. Hg
		1410	505.715													
3 A-1	5	1415	507.19	0.38	391	0.27	0.27	N/A	230	N/A	61	61	102	103	63	2
2	10	1420	509.31	0.79	412	0.56	0.56		230		63	65	102	104	61	3
3	15	1425	511.425	0.81	411	0.58	0.58		238		63	65	102	104	62	3
4	20	1430	513.51	0.80	408	0.57	0.57		246		65	67	103	104	62	5
5	25	1435	515.7	0.76	401	0.54	0.54		246		6	66	104	104	67	4
6	30	1440	518.0	0.88	414	0.62	0.62		251			71	105	104	72	4
7	35	1445	520.1	0.83	409	0.60	0.60		244			72	106	105	74	3.5
8	40	1450	522.4	1.00	410	0.70	0.70		252			68	106	107	75	3.5
9	45	1455	525.1	1.15	413	0.81	0.81		253			68	107	107	74	4
10	50	1500	527.8	1.40	413	0.98	0.98		254			66	108	107	70	4
11	55	1505	531.0	1.55	406	1.10	1.10		253			67	109	107	73	5
12	1:00	1510	533.65	1.55	406	1.10	1.10		251			66	109	107	69	5
12	1:05	1515	536.6	1.50	404	1.05	1.05		252			66	108	108	69	4.5
11	1:10	1520	539.5	1.35	409	0.95	0.95		249			66	108	107	68	4.5
10	1:15	1525	542.2	1.40	407	0.98	0.98	N/A	248	N/A		66	109	108	72	5

P_{stat} -5.7

COMMENTS

Traverse Point Number	Sampling Time Min.	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Stack T, in °F	Orifice Pressure Differential (ΔH, in. H_2O) Desired	Actual	Temperature °F/°C (Circle One) Probe	Filter Skin	Filter Out	Recirc. Water	Absorbent Trap	Dry Gas Meter Inlet (T_m in)	Dry Gas Meter Outlet (T_m out)	Impinger Exit	Pump Vacuum in. Hg
3A-9	1:20	1530	545.0	1.30	407	0.91	0.91	N/A	242	N/A	N/A	66	109	108	72	4.5
8	1:25	1535	547.7	1.30	415	0.91	0.91		248			67	110	108	72	5
7	1:30	1540	550.0	1.20	409	0.84	0.84		252			68	109	108	76	4
6	1:35	1545	552.8	0.95	410	0.67	0.67		253			69	110	109	77	3.5
5	1:40	1550	555.0	0.92	408	0.64	0.64		248			69	109	108	77	3.5
4	1:45	1555	557.0	0.90	408	0.63	0.63		246			69	110	109	78	3.5
3	1:50	1600	559.3	0.84	401	0.59	0.59		242			69	110	109	80	4
2	1:55	1605	561.6	0.84	405	0.59	0.59		240			71	110	110	81	3.5
Stop PC 1	2:00	1610	563.840	0.84	400	0.59	0.59		234	N/A		72	109	109	82	3.5
			Mid Test Leak Rate = 0.006 @ 6 "Hg													
		V_i = 563.960			412							2 → Pre-B Traverse				
3B-1	2:05	1640	—	0.74	[illegible]	0.51	0.51		205			70	105	108	77	3
2	2:10	1645	567.8	0.70	409	0.49	0.49		230			70	106	108	75	3
3	2:15	1650	570.1	0.70	407	0.49	0.49		235			71	107	108	74	3.5
4	2:20	1655	572.2	0.62	396	0.43	0.43		233			71	107	108	85	3.6
5	2:25	1700	573.8	0.62	396	0.43	0.43		234			67	107	108	87	3.5
6	2:30	1705	575.8	0.75	397	0.53	0.53		240			64	108	108	70	3.6
7	2:35	1710	—	0.77	408	0.54	0.54		240			64	108	108	69	3.5
8	2:40	1715	580.2	0.77	407	0.54	0.54		243			63	108	108	59	3.5
9	2:45	1720	582.4	0.52	408	0.36	0.36		243			62	108	109	62	3
10	2:50	1725	584.5	1.10	407	0.77	0.77		245			62	108	109	60	4
11	2:55	1730	587.0	1.20	413	0.84	0.84		246			61	108	108	58	4.5
12	3:00	1735	589.7	1.25	414	0.88	0.88		247			60	109	109	62	4.5
12	3:05	1740	592.4	1.25	412	0.88	0.88		247			61	109	109	64	4.5
11	3:10	1745	595.0	1.15	409	0.81	0.81		254			62	109	109	90	4.5
10	3:15	1750	597.5	0.97	411	0.68	0.68		250			64	108	108	75	4.5
9	3:20	1755	599.6	0.96	411	0.67	0.67		248			59	109	109	59	4.5
8	3:25	1800		0.88	404	0.62	0.62		245	NM	N/A	58	109	109	65	4.5

P_{static} = 5.4

COMMENTS Port Change L.C. (A) 0. @ "Hg
Port Change L.C. (B) 0. @ "Hg

Traverse Point Number	Sampling Time Min.	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Stack T in. °F	Orifice Pressure Differential (ΔH, in. H_2O) Desired	Orifice Pressure Differential (ΔH, in. H_2O) Actual	Temperature °F/°C (Circle One) Probe	Filter Skin	Filter Out	Recirc. Water	Absorbent Trap	Dry Gas Meter Inlet (T_m in)	Dry Gas Meter Outlet (T_m out)	Impinger Exit	Pump Vacuum in. Hg
78	605	1805	—	0.80	404	0.56	0.56		245			71	108	109	70	4
67	610	1810	—	0.80	406	0.56	0.56		245			71	108	109	73	4
56	615	1815	—	0.80	404	0.56	0.56		245			72	109	109	75	4
95	620	1820	608.2	0.77	404	0.54	0.54		245			71	110	110	77	4
34		1825	610.4	0.71	405	0.50	0.50		244			62	108	109	63	3
3		1830	612.3	0.50	406	0.35	0.35		246			67	108	109	63	3
2		1835	613.8	0.35	408	0.25	0.25		244			72	107	108	63	3
STOP 1	240	1840	615.42	0.49	404	0.34	0.34		243			70	107	109	64	3
			Post-Test Leak Rate = 0.007 Cfm @ 8" Hg													
			109.585	0.406	406.9167								107.6667			
				RMS												
				%	105.2											
					104.5											

COMMENTS

3

RADIAN
CORPORATION

Plant Morrisville HSD

Date 11/18/91

Sampling location Inlet

Sample type CDD/CDF

Run number 1

Sample box number Inlet CDD/CDF

Clean-up person Ron

Solvent rinses 2x Meoh

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	825.5	472.5 ~~498.7~~	353.0
2	HPLC H_2O	= 100	MGS	562.9	564.2	-1.3
3	HPLC H_2O	= 100	MGS	603.1	603.8	-0.7
4	Silica Gel	= 200	MGS	784.6	752.9	31.7
5						
6						
7						

Total Weight Gain (grams) 412.7

1181671R

Moisture Recovery Form

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #2
PAGE 1 OF ____

Box N-34

PLANT	Morristown
DATE	11/19/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin/Furan
RUN NUMBER	#2
OPERATOR	[illegible]

DGMCT 1.0115
Alloy 19.4

P_{bar} = 30.01
D_{nozzle} = 0.235

K = ~~1.69~~ 1.71

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	617.565 Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	3:50	~~617.383~~									
3B-12	5	3:55	621.6	1.60	414	2.75	247	70	104	105	69	9.5
-11	10	4:00	626.2	1.50	415	2.55	264	70	105	106	72	9.5
-10	15	4:05	630.8	1.40	413	2.40	262	66	107	106	72	9.5
-9	20	4:10	634.6	1.30	414	2.20	260	65	108	106	72	9
-8	25	4:15	638.9	1.25	418	2.15	254	66	109	106	74	9
7	30	4:20	642.8	1.15	420	1.95	231	68	110	107	76	8.5
6	35	4:25	—	0.70	409	1.20	240		110	107	74	7
5	40	4:30	649.0	0.65	402	1.10	243	65	109	107	73	5
4	45	4:35	652.4	0.70	402	1.20	225	65	109	107	71	5
3	50	4:40	655.4	0.70	402	1.20	220	65	108	107	70	5.5
2	55	4:45	—	0.68	405	1.15	225	64	108	107	70	5
1	60	4:50	661.4	0.64	406	1.10	220	65	108	107	70	5
1	65	4:55	664.7	0.65	403	1.10	215	67	108	106	71	5
2	70	5:00	667.6	0.72	404	1.25	220	66	108	107	72	5
3	75	5:05	670.8	0.65	403	1.10	240	68	108	107	~~68~~ 73	5.5
4	80	5:10	673.5	0.67	406	1.15	227	66	108	106	67	5
5	85	5:15	676.7	0.69	405	1.15	235	66	109	107	70	5.5
6	90	5:20	679.7	0.65	404	1.10	230	66	109	107	71	5.5
7	95	5:25	682.8	0.92	413	1.55	231	67	109	107	69	7.0

P_{stat} = -5.0

COMMENTS

Revision 11/90

2

1, 1, 1
Dioxins

Traverse Point Number	Sampling Time Min.	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Stack T, in °F	Orifice Pressure Differential (ΔH, in. H_2O) Desired	Actual	Temperature °F/°C (Circle One) Probe	Filter Skin	Filter Out	Recirc. Water	Absorbent Trap	Dry Gas Meter Inlet (T_m in)	Dry Gas Meter Outlet (T_m out)	Impinger Exit	Pump Vacuum in. Hg
3B-8	100	5:30	686.6	1.05	414	1.80	1.80	N/A	232		N/A	67	109	107	70	8
-9	105	5:35	690.4	1.10	412	1.90	1.90		238			67	110	107	70	8
-10	110	5:40	694.1	1.10	409	1.90	1.90		242			67	112	108	71	8.5
-11	115	5:45	—	1.20	407	2.05	2.05		245			69	113	109	71	8.5
-12	120	5:50	702.132	1.25	410	2.15	2.15		234			68	114	109	72	8.5
			Mid-Test Leak Rate = 0.012 CFM @ 12 "Hg													
			Vf 703.595						Pre-Test Leak Rate = 0.012 CFM @ 12 "Hg							
3A-12	125	6:55	707.7	1.40	408	2.40	2.40		236			62	107	109	66	9.5
-11	130	7:00	712.0	1.35	407	2.30	2.30		235			63	107	108	65	10
-10	135	7:05	716.0	1.25	405	2.15	2.15		230			64	108	108	65	10
9	140	7:10	720.1	1.15	407	1.95	1.95		232			65	109	108	65	9
8	145	7:15	—	1.10	409	1.90	1.90		234			66	110	108	65	9
7	150	7:20	727.5	0.97	405	1.65	1.65		238			69	111	108	67	8
6	155	7:25	731.0	0.86	410	1.45	1.45		241			67	111	109	66	8
5	160	7:30	734.3	0.86	410	1.45	1.45		239			68	111	109	66	7.5 -5.0
4	165	7:35	737.9	0.95	407	1.60	1.60		239			68	111	109	65	8
3	170	7:40	741.0	0.88	405	1.50	1.50		237			66	111	109	73	7.5
2	175	7:45	744.8	1.00	400	1.70	1.70		236			66	111	109	73	8
1	180	7:50	748.4	0.84	407	1.45	1.45		235			67	111	109	70	8
1	185	7:55	751.6	0.81	406	1.40	1.40		236			65	111	109	70	7.5
2	190	8:00	755.0	0.75	406	1.35	1.35		235			65	111	110	69	7.5
3	195	8:05	758.0	0.77	409	1.30	1.30		235			65	110	110	67	7.5
4	200	8:10	761.4	0.80	410	1.40	1.40		236			65	110	109	67	7.5
5	205	8:15	764.9	0.90	412	1.55	1.55		230			64	110	109	67	7.5
6	210	8:20	768.2	0.93	414	1.60	1.60		227			65	110	109	68	8.5
7	215	8:25	771.8	0.87	410	1.50	1.50		231			65	110	109	69	8.5
8	220	8:30	775.5	1.00	410	1.70	1.70	NA	234		NA	66	109	108	68	9.0

COMMENTS

Traverse Point Number	Sampling Time Min.	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Stack T, in °F	Orifice Pressure Differential (ΔH, in. H_2O) Desired	Orifice Pressure Differential (ΔH, in. H_2O) Actual	Temperature °F/°C (Circle One) Probe	Filter Skin	Filter Out	Recirc. Water	Absorbent Trap	Dry Gas Meter Inlet (T_m in)	Dry Gas Meter Outlet (T_m out)	Impinger Exit	Pump Vacuum in. Hg
								NA			NA					
3A-9	225	835	779.3	0.97	404	1.65	1.65		232			64	110	108	64	9
3A-10	230	840	783.0	1.10	396	1.90	1.90		239			64	109	108	65	9
-11	235	845	787.0	1.35	408	2.30	2.30		234			65	109	108	67	10
-12	240	850	791.143	1.35	405	2.30	2.30		230			65	108	108	68	10
Stop		855														

Post-Test Leak Rate = .005 CFM @ 13" Hg

COMMENTS

RADIAN
CORPORATION

Plant Morrdtown Hosp

Date 11/19/91

Sampling location Inlet

Sample type CDD/CDF

Run number 2

Sample box number Inlet CDD/CDF

Clean-up person [illegible]

Solvent rinses 3 × HPLC H_2O

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	792.5g	445.9	346.6
2	HPLC H_2O	≈ 100	MGS	794.4g	569.9	224.5
3	HPLC H_2O	≈ 100	MGS	610.0g	608.1	1.9
4	Silica Gel	≈ 200	MGS	782.3g	732.6	49.7
5	↳ silica gel completely spent. Some burn marks on gel.					
6						
7						

1181671R

Total Weight Gain (grams) 622.7

Moisture Recovery Form

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	2' Quartz	DUCT DIMENSIONS	17"
DATE	11/20/91	NOZZLE I.D. (in)	0.235	FILTER TYPE	Pre-extracted
SAMPLING LOCATION	S. Over Inlet	METER BOX NUMBER	N-34	FILTER NUMBER	—
SAMPLE TYPE	Dilution	METER ▲ H@	1.94	ASSUMED MOISTURE (%)	16
RUN NUMBER	#3	Yd	1.0115	MOISTURE METHOD	—
OPERATOR	[illegible]	K FACTOR	1.71	MOISTURE DATA	—
AMBIENT TEMPERATURE	105°F	PROBE HEATER SETTING	—	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.85	HEATER BOX SETTING	—	O2	↓
STATIC PRESSURE (Pa)		XAD TRAP		CO2	↓ 10
INITIAL LEAKCHECK	40 10 CFM @ 14" Hg	HEIGHT OF LOCATION (ft)	⊙	FINAL LEAKCHECK	

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-Hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	1230 (Start)	794.142									
3A-1	5	1235	798.6	1.65	406	2.85	225	63	106	104	66	6
3A-1	10	1240	803.4	1.55	410	2.65	230	60	106	106	66	6
-2	15	1245	—	1.45	405	2.45	235	64	108	106	66	5.5
-2	20	1250	812.3	1.45	400	2.45	210	67	111	107	67	5.5
-3	25	1255	816.8	1.45	411	2.45	215	62	113	109	67	5.5
-3	30	1300	821.4	1.35	411	2.30	220	65	112	109	68	5.5
-4	35	1305	825.4	1.30	405	2.20	220	63	115	110	68	5.5
-4	40	1310	829.3	1.20	398	2.05	220	65	115	110	68	5
-5	45	1315	833.3	1.15	399	1.95	225	66	115	111	68	5
-5	50	1320	837.1	1.10	400	1.90	235	56	115	111	64	5
-6	55	1325	840.7	0.93	400	1.60	228	55	115	111	64	5
-6	60	1330	844.0	0.85	399	1.45	220	55	115	112	64	4.5
-7	65	1335	847.5	0.85	408	1.45	231	55	115	112	65	5
-7	70	1340	850.6	0.82	407	1.40	247	56	116	112	68	4.5
-8	75	1345	—	0.94	410	1.60	242	55	116	113	62	5
-8	80	1350	—	0.94	416	1.60	228	55	116	113	62	5
-9	85	1355	861.4	0.94	411	1.60	246	54	115	112	64	5.5
-9	90	2000	865.2	0.86	405	1.50	260	55	116	113	67	5.5
-10	95	2005	868.5	0.91	401	1.55	237	56	116	113	69	5.5

COMMENTS

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #3
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/20/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Drain
RUN NUMBER	#3
OPERATOR	MR

K=1.71

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
-10	100	2:10	872.1	0.77	398	1.30	228	56	115	113	67	4.5
-11	105	2:15	875.2	0.80	~~38~~ 402	1.35	223	54	115	113	68	4.5
-11	110	2:20	878.6	0.80	400	1.35	236	53	115	113	63	4.5
-12	115	2:25	881.7	0.72	397	1.25	246	54	115	~~113~~ 113	64	4.5
-12	120	2:30	884.891	0.78	403	1.35	251	53	115	113	65	4.5
			Mid-Test Leak Rate = 0.050 CFM @ 7 "Hg*									
			Pre-B Traverse Leak = 0.012 CFM @ 10 "Hg									
	Start @	4:45	Vi = 885.690									
3B-12	125 Stop	4:50	**889.8	1.50	409	2.55	228	70	109	111	70	7.5
-12	130 @	4:55	894.305	1.35	402	2.30	220	66	110	111	75	7
~~-11~~	~~135~~	Vi = ~~[illegible]~~	894.522									
~~-11~~		9:00										
3B-11	135	9:05	898.7	1.50	410	2.55	275	58	104	105	62	7.5
-11	140	9:10	903.0	1.45	404	2.45	271	59	107	106	67	7
-10	145	9:15	907.5	1.30	407	2.25	281	58	109	106	71	7
-10	150	9:20	911.5	1.40	410	2.40	268	59	110	106	70	7

Stop @ 2

Psta -5

COMMENTS *Leak was determined to be at a cracked U-tube (hair line crack) between 1 and 2 impingers. It is not known when the crack occurred.

**Incinerator off-line @ 4:55 (Boiler water outage) - interrupt

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #3
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/20/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#3
OPERATOR	MJ

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
3B-9	155	925	915.7	1.30	415	2.25	263	60	110	107	72	7.5
-9	160	930	919.8	1.25	413	2.15	263	59	111	107	71	7.5
-8	165	935	923.6	1.10	410	1.90	250	57	110	106	69	7
-8	170	940	927.5	1.10	416	1.90	247	57	110	107	70	7
-7	175	945	931.0	1.00	412	1.70	247	58	110	107	72	6.5
-7	180	950	934.8	0.98	408	1.65	[illegible]	57	109	106	66	6
-6	185	955	937.5	0.56	404	0.95	243	58	110	107	72	5
-6	~~185~~ 190	1000	940.3	0.56	402	0.95	238	56	109	107	72	5
-5	~~190~~ 195	1005	943.0	0.53	393	0.90	243	55	108	106	74	5
-5	200	1010	945.6	0.51	389	0.87	249	56	108	107	69	4.5
-4	205	1015	948.2	0.52	404	0.89	247	55	108	107	70	4.5
-4	210	1020	951.0	0.60	398	1.00	247	55	108	107	69	5
-3	215	1025	954.0	0.67	398	1.15	245	56	108	107	68	5
-3	220	1030	957.4	0.64	398	1.10	250	57	108	107	70	5
-2	225	1035	960.11	0.75	414	1.30	247	56	108	108	71	5
-2	230	1040	963.1	0.73	406	1.25	225	55	109	107	74	5
-1	235	1045	966.5	0.73	420	1.25	220	56	109	107	75	5
-1	240	1050	969.718	0.75	410	1.30	220	56	109	107	75	5
Stop @												

Pst -5

COMMENTS Post-Test Leak Rate = 0.195 CFM @ 10" Hg

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morrisstown
Date	~~[illegible]~~ 11/20/91
Sampling Location	Inlet
Sample Type	CDD/CDF
Run Number	3
Sample Box Number	Inlet CDD/CDF
Clean-up Person	JDL
Solvent Rinses	3 x HPLC H2O
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	829.3g	445.4g	383.9
2	HPLC H2O	~100	MGS	814.4g	577.1g	237.3
3	HPLC H2O	~100	MGS	534.6g	602.1g ~~610.6g~~ [illegible]	-67.5
4	Silica Gel	~200	MGS	849.9g	800.5g	49.4
5						
6						
7						

TOTAL WEIGHT GAIN (g) 603.1

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #4
PAGE 1 OF 3

PLANT	Morristown Hospital	PROBE LENGTH AND TYPE	2'-Quartz	DUCT DIMENSIONS	17
DATE	11/21/91	NOZZLE I.D. (in)	0.235	FILTER TYPE	—
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	N-34	FILTER NUMBER	—
SAMPLE TYPE	Dexin	METER ▲ H@	1.94	ASSUMED MOISTURE (%)	16%
RUN NUMBER	#4	Yd	1.005	MOISTURE METHOD	—
OPERATOR	MJ	K FACTOR	1.71	MOISTURE DATA	—
AMBIENT TEMPERATURE	105	PROBE HEATER SETTING	—	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.80	HEATER BOX SETTING	—	O2	8
STATIC PRESSURE (Ps)	-66	XAD TRAP	—	CO2	10
INITIAL LEAKCHECK	0.001 CFM @14" Hg	HEIGHT OF LOCATION (ft)	0	FINAL LEAKCHECK	.005 @ 1.

K=1.71

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	1245	974.592									
3A-12	5	1250	—	1.45	419	2.45	275	67	105	105	70	5
-12	10	1255	982.6	1.45	415	2.45	290	65	106	105	67	10
-11	15	100	986.5	1.20	416	2.05	290	63	107	106	70	9
-11	20	stop 105	990.0	1.15	415	1.95	285	56	107	106	70	8
-10*	25	@ 110:30	994.71	1.15	414	1.95	283	50	108	106	71	8
-10	30	1:45	998.1	1.20	418	2.05	269	52	102	104	71	8
-9	35	1:55	1002.0	1.10	413	1.90	280	52	103	104	68	8
-9	40	2:00	1006.0	1.05	415	1.85	280	51	105	104	73	8
-8	45	2:05	1009.5	0.92	412	1.55	275	55	107	105	74	7.5
-8	50	2:10	1013.0	0.85	408	1.45	276	52	107	105	77	7
-7	55	2:15	1016.0	0.76	406	1.30	271	51	107	105	75	5
-7	60	2:20	1019.0	0.73	402	1.25	266	50	108	106	74	6.5
-6	65	2:25	1022.1	0.78	403	1.35	261	50	107	106	77	7
-6	70	2:30	1025.6	0.81	405	~~1.40~~ 1.40	255	50	107	106	74	7
-5	75	2:35	1028.5	0.70	412	1.20	248	51	107	106	84	5
-5	80	2:40	1031.1	0.73	412	1.25	240	50	108	107	76	5
-4	85	2:45	1034.1	0.85	405	1.45	230	49	108	107	74	7
-4	90	2:50	1037.6	0.80	402	1.35	234	51	108	107	73	7
-3	95	2:55	1040.0	0.40	408	0.68	225	50	108	107	81	5

Psk 5.1

COMMENTS *Spray Dryer down @ 1:10 (interrupt test) - back-online, re-start Test @ 13:45

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #4
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/21/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#4
OPERATOR	JMY

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
3A-3	100	3:00	1042.4	0.38	402	0.65	223	50	108	107	80	4.5
3A-2	105	3:25	1044.0	0.23	398	0.40	228	51	108	108	80	4
-2	110	3:10	1046.0	0.21	402	0.38	236	53	108	108	78	4
-1	115	3:15	1047.6	0.21	405	0.38	237	53	108	108	77	3.5
-1	120	3:20	1049.478	0.21	408	0.38	238	54	108	109	76	3.5
Stop @		Mid-Test Leak Rate = 0.012 CFM @ 25" Hg.										
			Pre-Test Leak Rate = 0.020 @ 12" Hg									
	120	3:50	V = 1049.970									
3B-12	125	3:55	1054.3	1.60	414	2.75	270	64	105	106	72	12
-12	130	4:00	1059.0	1.50	416	2.55	280	58	106	106	75	14
-11	135	4:05	1063.3	1.45	416	2.50	290	51	106	106	71	14
-11	140	4:10	1067.3	1.35	409	2.30	286	49	107	106	73	13
-10	145	4:15	1071.6	1.25	414	2.15	274	49	107	106	74	12.5
-10	150	4:20	1075.6	1.30	416	2.20	275	50	108	107	75	12.5
-9	155	4:25	1079.6	1.25	413	2.15	275	50	109	107	74	12.5
-9	160	4:30	1084.1	1.30	417	2.20	271	50	109	107	72	12.5
-8	165	4:35	1087.7	1.20	417	2.05	273	50	109	107	74	13
-8	170	4:40	1092.0	1.20	419	2.05	270	51	109	107	76	13
-7	175	4:45	1095.5	1.20	418	2.05	269	51	110	108	77	13

Pstd c-6.

COMMENTS

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #4
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/21/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#4
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit *	Pump Vacuum (in. Hg)
-7	180	4:50	1099.7	1.15	416	1.95	269	51	109	107	78	12
-6	185	4:55	1103.2	0.57	399	0.97	256	51	109	107	75	10
-6	190	5:00	1106.0	0.57	402	0.97	248	50	109	108	81	8
-5	195	5:05	1108.8	0.68	404	1.15	237	50	109	108	78	8.5
-5	200	5:10	1111.8	0.71	404	1.20	235	50	109	108	80	9
-4	205	5:15	1115.0	0.65	402	1.10	230	51	109	108	72	8.5
-4	210	5:20	1118.0	0.65	403	1.10	232	49	109	108	78	8.5
-3	215	5:25	121.2	~~0.90~~ 0.80	407	~~1.15~~ 1.35	235	50	109	108	80	9.5
-3	220	5:30	124.3	0.80	406	1.35	242	50	109	108	82	10
-2	225	5:35	127.4	0.83	398	1.40	232	49	110	108	82	7.5
-2	230	5:40	130.9	0.85	402	1.45	225	50	109	108	85	9.5
-1	235	5:45	134.3	0.85	402	1.45	220	51	110	108	87	9
-1	240	5:50	137.710	0.88	400	1.50	220	52	110	108	85	9.5
	Stop @											
		meter Vol	162.626	RMS								
		DGV Cor	164.4462	.8719	408.9375				1072.83			
		Vol std	1530706									

Post-Test Leak Rate = 0.010 CFM @ 14 in/Hg

COMMENTS *Impinger bucket filled with ice (Ambient temp = 105°F)

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown
Date	11/2/91
Sampling Location	Inlet
Sample Type	CDD/CDF
Run Number	4
Sample Box Number	Inlet CDD/CDF
Clean-up Person	JDL
Solvent Rinses	3x HPLC H_2O
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	802.8	446.5 g	356.3
2	HPLC H_2O	~100	MGS	694.1	561.5 g	132.6
3	HPLC H_2O	~100	MGS	599.5	602.7 g	-3.2
4	Silica Gel	~200	MGS	849.5	792.6 g	56.9
5						
6						
7						

TOTAL WEIGHT GAIN (g) 542.6

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #5
PAGE 1 OF 3

PLANT	Morristown Hospital	PROBE LENGTH AND TYPE	2' Quartz	DUCT DIMENSIONS	17"Φ
DATE	11/22/91	NOZZLE I.D. (in)	0.235	FILTER TYPE	—
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	N-34	FILTER NUMBER	—
SAMPLE TYPE	Dioxin	METER ▲ H@	1.94	ASSUMED MOISTURE (%)	16
RUN NUMBER	#5	Yd	1.0115	MOISTURE METHOD	—
OPERATOR	MK	K FACTOR	1.71	MOISTURE DATA	—
AMBIENT TEMPERATURE	105	PROBE HEATER SETTING	—	O2/CO2 METHOD	CFM
BAROMETRIC PRESSURE	29.85	HEATER BOX SETTING	—	O2	↓ 8
STATIC PRESSURE (Ps)	-6.6	XAD TRAP	—	CO2	↓ 10
INITIAL LEAKCHECK	0.014 CFM @ 15"Hg	HEIGHT OF LOCATION (ft)	0	FINAL LEAKCHECK	.007 @ 12"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	12:00	138.442									
3B-12	5	Stop 12:01½	142.0	~~1.45~~ 1.50	406	~~2.45~~ 2.55	264	78	101	103	81	7
	Re-Start 12:16½			~~1.50~~	~~407~~	~~2.55~~	~~273~~	~~74~~	~~102~~	~~103~~	~~80~~	~~7~~ Vac
-12	10	12:20	146.5	1.50	407	2.55	273	74	102	103	80	7
-11	15	12:25	150.9	1.40	404	2.40	275	75	103	103	81	7
-11	20	12:30	155.3	1.35	405	2.30	273	67	106	104	75	7
-10	25	12:35	159.4	1.30	408	2.25	271	64	107	104	76	7
-10	30	12:40	163.7	1.40	409	2.40	268	64	108	105	77	7
-9	35	12:45	—	1.30	411	2.20	266	64	109	105	79	7.5 Pota
-9	40	12:55	172.3	1.25	406	2.15	263	64	109	106	81	7 -S
-8	45	1:00	—	1.10	406	1.90	257	63	109	106	78	6
-8	50	1:05	179.7	1.15	412	1.95	256	61	109	106	79	6.5
-7	55	1:10	183.4	1.05	411	1.80	253	61	109	106	80	7
-7	60	1:15	187.3	1.15	411	1.95	250	60	109	106	81	7.5
-6	65	1:20	190.4	0.65	403	1.10	245	62	109	107	83	5.5
-6	70	1:25	193.3	0.61	400	1.05	241	62	108	106	80	5
-5	75	1:30	196.1	0.61	401	1.05	234	62	108	107	81	5.5
-5	80	1:35	199.0	0.55	404	0.94	227	62	108	106	82	5
-4	85	1:40	201.8	0.59	412	1.00	227	62	107	106	81	5
-4	90	1:45	205.0	0.67	417	1.15	233	62	108	107	82	5.5

COMMENTS * Interrupt Test after 1 Min (12:01.5) to await outlet sampling team (Glassware Problem)
Re-Start Test 5C 12:16½

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RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #5
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/22/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	D.Ox
RUN NUMBER	#5
OPERATOR	TM

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
2A-3	95	1:45	208.0	0.67	403	1.15	235	61	108	107	77	5.5
-3	100	1:50	211.0	0.62	401	1.05	235	61	108	107	77	5
-3	105	1:55	213.7	0.60	405	1.05	233	61	108	107	81	5
-2	110	2:00	—	0.58	405	0.99	233	61	108	107	82	5
-1	115	2:05	219.3	0.56	404	0.96	236	62	108	107	84	5
-1	120	2:10	222.294	0.67	414	1.15	239	62	108	107	84	5
	stop @	2:15	Mid-Test Leak Rate = 0.015 CFM @ 20" Hg									
		Start 2:23	Pre- [redacted] A-Traverse Leak Rate = 0.007 CFM @ 15" Hg									
2A-12	125	2:25	222.69	1.45	408	2.45	249	70	103	104	80	10
[redacted]-12	[redacted]	@ 2:10	226.7	1.15	400	1.95	240	63	102	103	82	8
2A-12	130	Start @ 4:58.5		1.15	400	1.95	240	63	102	103	82	8
2A-11	135	5:00.5	234.6	1.25	403	2.15	259	58	102	103	80	7.5
2A-11	140	5:05.5	238.7	1.25	404	2.15	272	59	104	104	80	7.5
2A-10	145	5:10.5	242.4	1.20	408	2.05	279	60	104	103	79	8
2A-10	150	5:15.5	—	1.30	417	2.25	274	60	105	104	79	9.5
-9	155	5:20.5	250.7	1.10	414	1.90	274	62	106	104	83	9
-9	160	5:25.5	254.6	1.10	412	1.90	271	60	107	104	82	8.5
-8	165	5:30.5	258.1	0.83	408	1.40	268	61	108	105	83	7
-8	170	5:35.5		0.90	415	1.55	268	60	109	106	82	7

COMMENTS Started start A-Traverse @ 3:05 Stop @ 3:10 - Re-Start @ 4:50
(Incinerator operating problems)

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #5
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/20/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#5
OPERATOR	MJ

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger* Exit	Pump Vacuum (in. Hg)
28-7	175	5:40.5	265.0	0.75	412	1.30	266	61	110	106	84	7.5
-7	180	5:45.5	—	0.70	408	1.20	262	62	110	107	84	7
-8	185	5:50.5	271.4	0.82	408	1.40	260	60	110	107	83	8
-6	190	5:55.5	274.6	0.85	411	1.45	258	61	110	107	85	8
-5	195	6:00.5	278.3	0.80	412	1.35	253	61	110	107	84	7.5
-5	200	6:05.5	281.7	0.80	406	1.35	246	61	110	108	83	7.5
-4	205	6:10.5	284.9	0.75	406	1.30	243	61	110	108	84	7
-4	210	6:15.5	288.2	0.74	406	1.30	239	62	110	108	85	7
-3	215	6:20.5	291.5	0.75	408	1.35	250	63	110	108	86	7
-3	220	6:25.5	—	0.74	403	1.35	238	61	110	108	84	7.5
-2	225	6:30.5	297.8	0.45	403	0.77	237	62	110	108	84	5.5
-2	230	6:35.5	300.4	0.47	405	0.80	231	63	109	107	86	5.5
-1	235	6:40.5	302.8	0.47	408	0.80	229	63	109	107	87	5
-1	240	6:45.5	305.768	0.49	408	0.84	225	63	109	108	89	5.5
	Stop @											

Post-Test Leak Rate = 0.007 CFM @ 12 "Hg

COMMENTS * Impinger bucket filled w/ ices, ambient temp = 105°F

Revision 11/90

RADIAN CORPORATION

Plant: MORRISTOWN

Date: 11/22/91

Sampling location: INLET

Sample type: CDD/CDF

Run number: 5

Sample box number: INLET CDD/CDF

Clean-up person: BW

Solvent rinses: _____

Sample identification code: _____

Checked by: _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	831.6	446.6	385.0
2	HPLC H_2O	≈ 100	MGS	663.3	571.0	92.3
3	HPLC H_2O	≈ 100	MGS	602.4	602.9	-0.5
4	SILICA GEL	≈ 200	MGS	855.4	801.3	54.1
5						
6						
7						

Total Weight Gain (grams): 530.9

1181671R

Moisture Recovery Form

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #6
PAGE 1 OF 3

PLANT	Morristown Hospital	PROBE LENGTH AND TYPE	2' Quartz	DUCT DIMENSIONS	17" ϕ
DATE	11/23/91	NOZZLE I.D. (in)	0.235	FILTER TYPE	—
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	N-34	FILTER NUMBER	—
SAMPLE TYPE	Dioxin	METER ▲ H@	1.94	ASSUMED MOISTURE (%)	16
RUN NUMBER	#6	Yd	1.00	MOISTURE METHOD	—
OPERATOR	MK	K FACTOR	1.71	MOISTURE DATA	—
AMBIENT TEMPERATURE	105	PROBE HEATER SETTING	—	O2/CO2 METHOD	CFM
BAROMETRIC PRESSURE	29.92	HEATER BOX SETTING	—	O2	↓
STATIC PRESSURE (Ps)	-5.8	XAD TRAP	—	CO2	↓
INITIAL LEAKCHECK	0.008 CFM @ 21" Hg	HEIGHT OF LOCATION (ft)	0	FINAL LEAKCHECK	0.016 @ 15" Hg

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	930	306.111									
3A-1	5	935	—	0.58	405	1.00	225	56	101	102	80	5
-2	10	940	311.9	0.70	402	1.20	230	56	102	102	78	5
-3	15	945	315.1	0.80	400	1.35	247	56	104	103	77	5.5
-4	20	950	318.6	0.76	398	1.30	266	57	106	103	75	5
-5	25	955	321.7	0.79	411	1.35	268	57	106	103	73	6
-6	30	1000	325.0	0.76	410	1.30	270	62	110	107	74	5.5
-7	35	1005	328.8	0.76	408	1.30	270	61	117	111	77	5.5
-8	40	1010	331.8	0.85	408	1.45	270	55	108	105	69	5.5
-9	45	1015	335.4	0.95	406	1.65	273	54	108	105	68	7
-10	50	1020	339.1	1.10	404	1.90	272	52	108	105	66	7.5
-11	55	1025	343.2	1.30	404	2.25	272	54	108	105	68	8.5
-12	60	1030	347.57	1.30	402	2.25	273	54	107	105	69	8
~~-12~~	~~65~~	Stope Restarte 1035		~~1.30~~		~~2.25~~						
-12	65	1040	351.6	1.30	404	2.25	260	56	107	106	72	8.5
-11	70	1045	355.8	1.30	408	2.25	263	55	105	104	68	9.5
-10	75	1050	359.7	1.00	405	1.70	264	57	107	106	75	8
-9	80	1055	363.3	0.85	402	1.45	260	56	107	106	74	6
-8	85	1100	366.1	0.85	408	1.45	251	54	106	104	71	6
-7	90	1105	370.0	0.68	410	1.15	248		107	105	73	6.5

Pstat -5.8

COMMENTS

*Interrupt Test for 5-minutes to allow Mercury Train to "catch-up" (started 5 min late)

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #6
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/23/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#6
OPERATOR	[illegible]

~~Initial Leak 0.008 cfm @ 21" Hg~~

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
3A-6	95	1110	373.2	0.82	409	1.40	245	57	109	106	78	6
-5	100	1115	376.5	0.78	413	1.35	243	58	109	106	80	6
-4	105	1120	379.7	0.80	403	1.35	232	55	108	105	71	6
-3	110	1125	383.1	0.73	407	1.25	233	57	110	108	75	6.5
-2	115	1130	386.2	0.65	408	1.10	235	55	108	106	72	5.5
-1	120	1135	389.342	0.72	407	1.25	230	56	110	107	75	5.5
			Mid-test Leak Rate = 0.013 cfm @ 10" Hg ; Pre-BT Traverse Leak Rate = 0.008 cfm @ 10" Hg									
	120	1150h	=389.61									
3B-1	125	1155	392.8	0.74	409	1.25	215	55	106	107	75	6
-2	130	1200	395.8	0.68	405	1.15	255	56	107	106	80	6
-3	135	1205	399.0	0.66	409	1.15	262	59	110	108	78	6
-4	140	1210	402.0	0.70	412	1.20	250	56	109	107	79	6
-5	145	1215	405.2	0.65	412	1.10	255	57	112	108	82	6
-6	150	1220	408.8	1.10	408	1.90	255	54	110	107	76	8.5
-7	155	1225	412.6	1.05	410	1.80	268	56	111	108	78	8.5
-8	160	1230	416.6	1.10	412	1.90	268	58	111	108	78	8.5
-9	165	1235	420.8	1.30	402	2.20	269	53	111	108	74	10
-10	170	1240	—	1.30	401	2.20	266	49	110	108	74	9.5
-11	175	1245	430.0	1.70	413	2.90	267	56	110	108	67	12.5

Pst -5

COMMENTS

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN #6
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/22/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Dioxin
RUN NUMBER	#6
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
3B-12	180	1250	434.6	1.60	405	2.75	268	53	110	108	79	12
-12	185	1255	439.0	1.50	405	2.55	270	55	111	108	75	11.5
-11	190	1300	443.4	1.45	409	2.45	265	55	110	108	72	11.5
-10	195	105	447.8	1.35	408	2.30	265	58	112	109	80	11
-9	200	110	452.0	1.25	408	2.15	261	55	111	108	80	10
-8	205	115	456.2	1.10	409	1.90	258	53	111	108	84	10
-7	210	120	460.0	1.00	407	1.70	254	51	112	108	75	9
-6	215	125	463.0	0.59	409	1.00	248	49	111	108	79	7.5
-5	220	130	466.1	0.70	404	1.20	241	50	111	109	77	7
-4	225	135	469.2	0.70	408	1.20	234	51	111	109	76	6.5
-3	230	140	472.7	0.70	415	1.20	231	51	110	108	76	6.5
-2	235	145	476.0	0.82	408	1.40	225	52	111	108	77	8
-1	240	150	479.47	0.81	411	1.40	220	55	114	111	80	7.5
	Stop @											

Post-Test Leak Rate = 0.016 CFM @ 15" Hg.

COMMENTS

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RADIAN
CORPORATION

Plant: Morristown HSD
Date: 11/22/91
Sampling location: Inlet
Sample type: CDD/CDF
Run number: 6
Sample box number: Inlet CDD/CDF
Clean-up person: Bun.
Solvent rinses: 3x H_2O

Sample identification code: _____
Checked by: _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGJ	815.1	445.7	369.4
2	HPLC H_2O	≈100	MGJ	673.2	565.4	107.8
3	HPLC H_2O	~100	MGJ	593.7	594.8	-1.1
4	Silica Gel	≈200	MGJ	856.1	805.3	50.8
5						
6						
7						

Total Weight Gain (grams): 526.6

1181671R

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE 1 OF _____

93.4% ISO

PLANT Morristown	MWI	PROBE LENGTH AND TYPE		HEIGHT OF LOCATION (ft)	25'
DATE	11/8/91	NOZZLE I.D. (in)	.265	DUCT DIMENSIONS	
SAMPLING LOCATION	Stack	METER BOX NUMBER	1.32	FILTER NUMBER	
SAMPLE TYPE	MM5	METER ▲ H@	1.98	ASSUMED MOISTURE (%)	15.5
RUN NUMBER	1	Yd	1.0154	MOISTURE METHOD	
OPERATOR	TB flg	K FACTOR	1.15	MOISTURE DATA	
AMBIENT TEMPERATURE	97	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	29.97	HEATER BOX SETTING	250	O2	
STATIC PRESSURE (Ps)	-.1			CO2	
INITIAL LEAKCHECK	.010@10"			FINAL LEAKCHECK	

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)	XAD
		1402	522.004									
B12	5	1407	24.5	.8	284	.92	260	95	95	66	5	62
12	10	1412	27.2	.86	287	.97	262	96	95	64	6	60
B11	15	1417	29.74	.83	295	.97	262	96	95	67	7	55
11	20.5	1422.5	32.6	.81	291	.97	232	98	96	69	7	54
B10	25	1427	34.95	.80	290	.84	231	100	96	67	7	56
B10	30	1432	37.5	.82	292	.73	225	101	97	67	7	57
B7	35	1437	40.11	.86	287	.91	224	102	97	67	7	58
9	40	1442	42.65	.90	288	.90	223	103	97	69	7	57
B8	45	1447	45.23	.91	291	.93	218	103	98	69	7	58
8	50	1452	47.75 ~~5.23~~	.98	292	.92	214	104	99	69	7	54
B7	55	1457	50.34	.92	291	.88	214	105	99	68	7	56
7	60	1502	52.87	.97	292	.89	215	105	99	69	7	57
B6	65	1507	55.41	1.0	296	.89	213	106	101	70	7	57
6	70	1512	57.97	1.05		.88	214	106	101	70	7	60
B5	75	1517	60.47	1.20		.86	215	108	103	72	7	64
5	80	1522	62.98	1.20	290	.85	211	107	101	71	7	60
B4	85	1527	65.49	1.20	292	.87	208	107	102	70	7	62
4	90	1532	67.99	1.20	291	.85	204	107	103	70	7	58
B3	95	1537	510.49	1.10	295	.88	201	108	103	70	7	55

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE ___ OF ___

PLANT	MORRISTOWN MWI
DATE	11/18/91
SAMPLING LOCATION	OUTLET / STACK
SAMPLE TYPE	17115
RUN NUMBER	1
OPERATOR	TS FCG

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	95	1537	570.49									
B3	100	1542	72.98	1.05	290	.85	206	108	103	70	7	56
B2	105	1547	74.90	.96	283	.85	218	107	103	70	7	57
2	110	1552	78.00	.97	292	.86	224	108	104	70	7	57
B1	115	1557	80.49	.89	298	.84	214	108	104	71	7	59
1	120	1602	582.996	.93	291	.86	213	108	104	71	7	59
				.93	293	.95	214	107	104	71	7	58
					leak	✓	.002	@10'				
							.003	@16'				
		1641	583.362									XAD
A12	125	1646	85.87	.65	292	.89	216	99	100	72	7	
12	130	1651	88.37	.67	294	.88	214	99	100	72	7	
A11	135	1656	90.90	.68	293	.85	215	102	100	73	7	66
11	140	1701	93.42	.69	292	.93	249	102	100	72	7	65
A10	145	1706	96.10	.67	290	.95	285	103	100	71	7	60
10	150	1711	98.74	.72	293	.94	283	104	100	71	7	66
A9	155	1716	601.53	.92	295	1.00	280	105	100	71	7	68
9	160	1721		.98	291	1.15	282	106	100	71	7	59

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 2 OF

PLANT	[illegible]
DATE	11/18/91
SAMPLING LOCATION	STACK
SAMPLE TYPE	MM5
RUN NUMBER	1
OPERATOR	TE

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	~~17~~ 155	1716	601.53									
A8	160	1720	604.48	~~1.00~~ .98	~~292~~ 291	~~1.35~~ 1.15	~~283~~ 282	~~106~~ 106	~~107~~ 101	~~71~~ 71	~~8~~ 7	66
8	165	1726	607.46	1.00	292	1.35	283	106	101	71	8	—
A7	170	1731	610.54	.99	294	1.30	283	107	101	72	8	68
7	175	1736	613.43	.93	284	1.40	278	107	101	72	9	68
A6	180	1741	616.20	.98	293	1.15	275	107	102	74	8	69
6	185	1746	618.90	1.00	293	1.10	276	107	102	75	8	71
A5	190	1751	621.69	.99	294	1.00	273	107	102	73	8	66
A5	195	1756	624.64	1.20	297	1.10	270	107	103	71	8	64
A4	200	1801	627.87	1.20	288	1.40	267	107	103	70	9	64
4	205	1806	630.38	1.10	289	1.45	268	108	103	~~69~~	9	64
A3	210	1811	633.86	1.00	291	1.35	267	108	103	70	9	65
3	215	1816	636.80	1.10	298	1.30	268	109	105	7	8.5	66
A2	220	1821	639.77	1.20	292	1.25	266	108	103	71	8.5	68
2	225	1826	642.75	.98	284	1.30	268	108	103	72	9.0	67
A1	230	1831	645.54	.97	290	1.30	268	108	103	72	8.0	68
1	235	1836	48.33	1.0	295	1.10	265	108	103	72	8.0	67
1	240	1841	651.064	1.05	295	1.10	264	108	101	72	8.0	65
					1034		[illegible]					

COMMENTS:

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RADIAN
CORPORATION

Plant Morrisville H_2S

Date 11/10/91

Sampling location Outlet

Sample type CDD/CDF

Run number 1

Sample box number Outlet CDD/CDF

Clean-up person Bob

Solvent rinses 3 - MeCl2

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	926.4	497.2	429.2
2	HPLC H_2O	≈ 100	MGS	676	579.2	32.4
3	HPLC H_2O	≈ 100	MGS	535.9	586.9	-50.1
4	Silica Gel	≈ 200	MGS	772.7	739.5	33.2
5						
6						
7						

Total Weight Gain (grams) 449.9

1181671R

Moisture Recovery Form

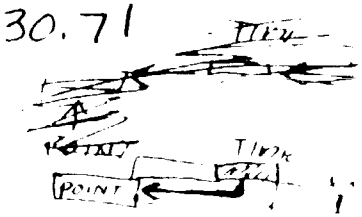
RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 1 OF

PLANT	MORRISTOWN	PROBE LENGTH AND TYPE		HEIGHT OF LOCATION (ft)	
DATE	11/19/91	NOZZLE I.D. (in)	.205	DUCT DIMENSIONS	
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	N-32	FILTER NUMBER	
SAMPLE TYPE	MM5	METER ▲ H@	1.98	ASSUMED MOISTURE (%)	16%
RUN NUMBER	2 (OVERALL)	Yd	1.0159	MOISTURE METHOD	
OPERATOR	TTS	K FACTOR	1.15	MOISTURE DATA	
AMBIENT TEMPERATURE	98	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE		HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)				CO2	
INITIAL LEAKCHECK	.008 @ 11"			FINAL LEAKCHECK	.005 @ 10"

AVE ΔP = 1.0583
AVE T_s = 292.125
AVE T_m = 105.357
% ISO = 95
DSCF = 130.71



READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	0	1552	655.731									
A12	5	1557	59.09	1.10	289	1.20	270	97	96	78	3.5	59
12	10	1602	61.79	1.10	294	1.20	274	97	96	73	3.5	59
A11	15	1607		1.10	293	1.20	280	99	96	70	3.5	60
11	20	1612	67.52	1.10	291	1.20	282	100	97	70	3.5	61
A10	25	1617	70.44	1.10	296	1.30	282	103	98	69	3.5	62
10	30	1622	73.37	1.10	294	1.25	282	104	98	69	3.5	61
A9	35	1627	76.30	1.20	294	1.25	281	105	99	69	3.5	63
9	40	1632	79.27	1.15	292	1.30	282	106	100	69	3.5	64
A8	45	1637	82.08	1.00	294	1.30	282	106	101	69	3.5	64
8	50	1642	84.82	.99	293	1.10	280	107	101	71	3.5	67
A7	55	1647	87.66	1.10	296	.99	281	108	102	72	3.5	65
7	60	1652	90.50	1.10	293	1.25	281	108	102	68	3.5	57
A6	65	1657	93.75	1.40	293	1.30	279	107	103	67	4.0	56
6	70	1702	96.98	1.30	294	1.60	278	110	104	66	4.0	55
A5	75	1707	699.97	1.10	290	1.50	279	110	104	65	4.0	67
5	80	1712	702.84	1.10	298	1.25	280	111	105	65	4.0	57
A4	85	1717	05.74	1.10	296	1.20	279	111	105	65	4.0	56
4	90	1722	08.78	1.20	291	1.25	278	111	106	65	4.0	53
A3	95			1.30	295	1.40	277	112	106	65	4.0	54

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 2 OF 3

PLANT	MORRISTOWN MWI
DATE	11/19/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5
RUN NUMBER	2
OPERATOR	TS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	95	1727	711.95									
A3	100	1732	15.07	1.30	288	1.45	279	112	106	64	4	56
A2	105	1737	18.11	1.15	293	1.40	277	112	107	64	4	55
2	110	1742	21.12	1.15	289	1.40	278	112	107	64	4	54
A1	115	1747	24.02	1.05	292	1.30	276	112	107	64	4	54
1	120	1752	726.884	1.05	293	1.20	279	112	107	66	4	54
		LEAK CHECK		.004 @	6.5"							
		LEAK CHECK		.008 @	11"							
		727.032 ↔ 1855										
B1	125	~~2918~~ 1900	729.8	—	293	~~[illegible]~~ 1.30	256	100	101	73	4	—
1	130	1905	732.62	1.10	294	1.20	260	100	101	71	4	65
B2	135	1910	35.49	1.10	288	1.25	267	102	101	68	4	54
2	140	1915	38.35	1.05	289	1.25	271	104	102	67	4	53
B3	145	1920	41.19	1.10	295	1.20	277	105	102	67	4	54
3	150	1925	44.11	1.10	289	1.30	278	106	103	65	4	54
B4	155	1930	47.05	1.20	294	1.30	280	107	103	66	4	54
4	160	1935	49.99	1.10	290	1.30	273	108	103	65	4	55
B5	165			1.20	293	1.30	270	108	103	65	4	56

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 3 OF 3

71.153
66.251

PLANT	MORRISTOWN MWI
DATE	11/19/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5
RUN NUMBER	2
OPERATOR	TJS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	165	1940	53.03									
B5	170	1945	55.93	1.10	290	1.30	266	109	103	64	4	56
B6	175	1950	59.1	1.20	291	1.38	266	109	104	65	4	56
6	180	1955	62.1	1.2	296	1.38	266	110	104	65	4	56
B7	185	2000	64.8	.98	292	1.12	258	110	105	64	4	57
7	190	2005	67.99	.94	285	1.10	252	110	105	65	4	57
B8	195	2010	70.15	.85	293	.98	256	110	105	65	4	57
8	200	2015	72.88	.90	299	1.02	260	110	105	66	4	58
B9	205	2020	75.56	.88	292	.99	262	110	105	66	4	59
9	210	2025	78.23	.86	288	1.00	262	110	105	66	4	58
B10	2~~20~~15	2030	80.75	.78	290	.93	264	110	106	67	4	58
10	2~~25~~20	2035	83.32	.78	290	.87	264	110	106	68	4	58
B11	2~~30~~25	2040	85.80	.76	287	.92	263	110	106	69	4	58
11	2~~35~~30	2045	88.24	.72	290	.82	265	110	106	69	4	58
B12	2~~40~~35	2050	90.73	.75	291	.85	267	110	106	70	4	59
12	240	2055	793.233	.75	292	.85	265	110	106	70	4	58

COMMENTS: LOW VELOCITY FLOW AT POINTS B7 & B8, WIERD?

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RADIAN
CORPORATION

Plant Morristown

Date 11/19/91

Sampling location Outlet

Sample type CDD, CDF

Run number 2

Sample box number Outlet CDD/CDF

Clean-up person [illegible]

Solvent rinses 3x HPLC H_2O

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	914.9	495.6	[illegible]
2	HPLC H_2O	≈ 100	MGS	609.8	577.6	[illegible]
3	HPLC H_2O	≈ 100	MGS	591.8	591.3	[illegible]
4	Silica Gel	≈ 200	MGS	779.0 g	749.6	[illegible]
5						
6						
7						

Total Weight Gain (grams) [illegible]

1181671R

Moisture Recovery Form

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF

PLANT	Milestone	PROBE LENGTH AND TYPE		DUCT DIMENSIONS	19"
DATE	11/20/91	NOZZLE I.D. (in)	.205	FILTER TYPE	
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	N-32	FILTER NUMBER	
SAMPLE TYPE	M5 Box	METER ▲ H@	1.98	ASSUMED MOISTURE (%)	
RUN NUMBER	3	Yd	1.0159	MOISTURE METHOD	
OPERATOR	TTB	K FACTOR	1.15	MOISTURE DATA	
AMBIENT TEMPERATURE	100	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.13	HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)	-1	XAD TRAP		CO2	
INITIAL LEAKCHECK	.005 @ 10" Hg	HEIGHT OF LOCATION (ft)		FINAL LEAKCHECK	

AVE ΔP = 1.0585
AVE T_s = 292.29
AVE T_m = 106.18
DSCF = 132.3096
[illegible] = 95.3

69.23
69.4

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps)	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	1230	793.760									
B12	5	1235	96.42	.92	291	1.02		69	102	100	83	7
12	10	1240	99.70	.85	292	.98	272	61	103	101	76	7
*B11	15	1245	801.70	.82	294	.94	252	60	106	101	73	7
11	20	1250	04.28	.82	290	.94	252	60	107	102	73	7
B10	25	1255	06.91	.84	292	.96	243	61	108	103	73	7
10	30	1300	09.60	.87	293	1.00	262	61	109	103	73	7
B9	35	1305	12.33	.94	288	1.08	270	62	109	104	73	7
9	40	1310	14.99	.86	289	.99	273	63	110	104	73	7
B8	45	1315	17.73	.90	298	.97	274	62	110	105	72	7
8	50	1320	20.48	.90	291	1.05	277	62	111	105	68	7
B7	55	1325	23.22	.98	299	1.10	278	63	111	106	66	7
7	60	1330	25.96	.93	294	1.10	276	63	111	106	66	7
B6	65	1335	29.24	1.40	294	1.60	275	63	112	107	66	9
6	70	1340	32.76	1.60	286	1.82	279	62	113	107	65	10
B5	75	1345	36.08	1.35	291	1.60	255	63	113	107	64	10
5	80	1350	39.35	1.38	297	1.55	256	63	113	108	65	9
B4	85	1355	42.62	1.35	292	1.55	255	63	113	108	66	9
4	90	1400	45.83	1.28	296	1.52	252	64	114	108	67	9
B3	95			1.18	287	1.45	253	64	114	108	68	9

COMMENTS:

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF

PLANT	MORRISTOWN MWI
DATE	11/20/91
SAMPLING LOCATION	INLET
SAMPLE TYPE	M5
RUN NUMBER	3
OPERATOR	MS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	95	1405	848.87									
B3	100	1410	51.74	1.0	292	1.18	248	64	114	109	67	8.5
B2	105	1415	54.54	.97	294	1.10	256	64	114	109	70	8.0
2	110	1420	57.40	1.07	295	1.20	256	65	114	109	72	8.0
B1	115	1425	60.24	1.01	285	1.20	260	67	114	109	72	8
1	120	1430	862.995	.96	291	1.12	255	66	114	110	72	8
		LEAK CHECK = .002 @ 11"										
		LEAK CHECK = .008 @ 12"										
	125	1645	863.244									
A1	125	1650	66.12	1.10	289	1.30	261		102	102		9
1	130	1655	869.111	1.10	293	1.30	254		102	102		8.5
~~A2~~	~~140~~	~~1700~~		~~1.05~~	~~291~~	~~1.20~~		~~67~~				
2					~~296~~							
A3												
3												

COMMENTS: 1655 FAN CAME DOWN ON SPRAY DRIER, ALSO ABSORBENT TRAP THERMOCOUPLE REATTACHED.

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 3
PAGE 3 OF

PLANT	MORRISTOWN MWI
DATE	11/20/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	M5 / PCDD/F
RUN NUMBER	3
OPERATOR	TB

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	1380	2100	869.111									
A2	1435	2105	72.34	1.20	293	1.40	233	65	97	96	82	8.5
A2	140	2110	75.25	1.12	283	1.30	246	61	98	97	74	8.5
A3	1545	2115	78.25	1.18	282	1.32	252	59	99	97	72	9.0
A3	150	2120	81.24	1.20	294	1.32	260	59	100	98	69	9.0
A4	155	2125	84.24	1.22	302	1.37	260	59	102	98	68	9.0
A4	160	2130	87.34	1.28	296	1.42	261	60	103	99	67	9.0
A5	1765	2135	90.6	1.32	288	1.50	259	60	105	99	68	9.0
A5	170	2140	93.65	1.3	289	1.5	260	61	107	101	66	9
A6	1855	2145	96.60	1.05	292	1.2	261	62	107	101	69	9
A6	185	2150	899.38	.98	286	~~.98~~ 1.10	262	61	108	102	71	8.5
A7	190	2155	902.16	.99	291	1.10	262	61	108	102	71	8.5
A7	195	2200	04.93	.97	298	1.10	265	61	108	103	72	8.0
A8	200	2205	07.72	1.05	291	1.15	267	60	109	103	71	8.0
A8	205	2210	10.46	.92	283	1.02	268	61	110	104	71	8.0
A9	210	2215	13.16	.89	294	1.00	267	59	109	104	70	8.0
A9	215	2220	16.05	1.08	298	1.15	266	59	110	105	71	8.0
A10	220	2225	18.81	1.00	299	1.20	266	60	110	105	71	8.0
A10	225	2230	21.77	.95	294	1.12	265	60	110	106	71	8.0
A11	230			.91	294	1.08	268	59	110	105	71	8.0

COMMENTS START AT POINT A-2 AFTER SYSTEM PROBLEMS (BOILER FEEDWATER, OIL ATOMIZER ETC)

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 3
PAGE 4 OF 4

PLANT	MORRISTOWN MWI
DATE	11/20/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5 / MOXIN
RUN NUMBER	3
OPERATOR	WS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	225	2235	924.49									
A11	230	2240	27.21	.94	293	1.03	267	59	111	106	71	8
A12	235	2245	29.95	.93	290	1.02	269	60	111	107	71	8
A12	240	2250	932.692	.95	297	1.08	268	60	111	106	71	8
		LEAK	CHECK =		.002	@ 12" Hg	VAC					

COMMENTS

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	[illegible]
Date	[illegible]
Sampling Location	Outlet
Sample Type	CWO/CDF
Run Number	3
Sample Box Number	Outlet CWO/CDF
Clean-up Person	JDL
Solvent Rinses	3 x [illegible]
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	925.5 g	499.7 g	425.8
2	HPLC H_2O	~100	MGS	603.2 g	592.0 g	11.2
3	HPLC H_2O	~100	MGS	598.7 g	597.3 g	1.4
4	Silica Gel	~200	MGS	834.7 g	797.9 g	36.8
5						
6						
7						

TOTAL WEIGHT GAIN (g) 475.2

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 4
PAGE 1 OF 3

PLANT	MORRISTOWN	PROBE LENGTH AND TYPE		DUCT DIMENSIONS	19"
DATE	11/21/91	NOZZLE I.D. (in)	.205	FILTER TYPE	
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	N-32	FILTER NUMBER	
SAMPLE TYPE	MM5 - DIOXIN	METER ▲ H@	1.98	ASSUMED MOISTURE (%)	
RUN NUMBER	4	Yd	1.0159	MOISTURE METHOD	
OPERATOR	TS	K FACTOR	1.19	MOISTURE DATA	
AMBIENT TEMPERATURE	102	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	29.95	HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)	+.11	XAD TRAP		CO2	
INITIAL LEAKCHECK	.008 @ 10"	HEIGHT OF LOCATION (ft)	~35'	FINAL LEAKCHECK	.010 @ 10"

AVE ΔP = 1.014
AVE T_s = 292.88
AVE T_m = 109.79
DSCF = 125.63
% ISO = 91.6

67.4
65.8

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	1245	935.233									
A12	5	1250	38.05	.95	296	1.20	274	76	99	99	84	4.5
12	10	1255	40.82	.94	290	1.10	270	68	99	99	77	5
A11	15	1300	43.54	.90	292	1.08	263	64	102	100	72	5
11	20	1305	46.25	.90	291	1.05	265	66	103	101	70	5
A10	25	1310	49.03	.97	295	1.12	267	64	105	101	70	5
10	~~30~~			.90	295	1.05	267	64	105	102	70	5
~~A9~~	~~35~~	1345										
A	~~40~~	[illegible]	949.616									
A 9	~~45~~	1350	52.58	.98	288	1.18	273	80	106	105	85	5
9	~~50~~	1355	55.45	1.05	297	1.22	273	73	108	105	76	4.5
A 8	~~55~~	1400	58.30	.99	290	1.20	275	72	109	105	72	5
8	~~60~~	1405	61.11	.95	294	1.15	275	72	111	106	70	5
A 7	55	1410	63.88	.98	298	1.20	277	70	111	106	70	4
7	60	1415	66.69	.94	291	1.12	273	70	113	107	70	5
A6	65	1420	69.42	.91	293	1.05	273	68	112	107	68	5
A6	70	1425	72.15	.92	298	1.08	275	65	113	108	70	5
A5	75	1430	75.20	1.15	291	1.33	277	66	113	108	70	5
5	80	1435	78.2	1.20	288	1.35	276	66	113	108	70	5
A 4	85			1.15	300	1.38	275	68	114	109	70	5

COMMENTS 1311 → 949.616 cf → SYSTEM DOWN, LOST SPRAY DRIER

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RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 4
PAGE 2 OF 3

PLANT	MORRISTOWN MWI
DATE	11/21/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5 - DIOXIN
RUN NUMBER	4
OPERATOR	RS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	85	1440	981.31									
A4	90	1445	84.47	1.25	292	1.45	274	69	114	109	71	6
A3	95	1450	87.54	1.15	297	1.38	272	69	114	109	71	5.5
3	100	1455	90.58	1.08	300	1.30	271	68	114	109	72	5.5
A2	105	1500	93.45	.99	286	1.20	273	66	114	109	72	5.5
2	110	1505	96.37	1.05	292	1.25	272	65	115	110	76	5.5
A1	115	1510	99.49	1.20	301	1.40	273	67	115	110	78	6.0
1	120	1515	1002.71	1.22	293	1.48	273	68	115	110	78	6.0
		LEAK	CHECK = .006 @			10"						
		LEAK	CHECK = .012 @			10"						
		1550	(1)003.705									
B1	125	1555	06.70	1.12	285	1.32	276	70	109	109	70	5.5
B1	130	1600	09.64	1.05	291	1.25	274	62	111	109	70	5.5
B2	135	1605	12.60	1.05	291	1.25	271	62	112	109	69	5.0
B2	140	1610	15.52	1.02	290	1.20	272	61	113	109	69	5.
B3	145	1615	18.36	1.00	295	1.18	269	62	113	109	69	5
3	150			1.05	287	1.22	269	60	114	109	70	5

COMMENTS

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 3 OF 3

PLANT	MORRISTOWN MWI
DATE	11/21/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	M5 - DIOXIN
RUN NUMBER	4
OPERATOR	TS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	XAD
	150	1620	021.25									
B4	155	1625	24.24	1.1	291	1.28	271	114	109	69	5.5	59
4	160	1630	27.27	1.15	298	1.38	270	114	110	70	5.5	60
B5	165	1635	30.52	1.30	293	1.55	273	114	110	69	6	60
5	170	1640	33.81	1.30	291	1.52	271	115	110	69	6	61
B6	175	1645	37.13	1.40	294	1.62	274	114	110	69	6	62
6	180	1650	40.45	1.38	292	1.65	274	115	110	70	6	62
B7	185	1655	43.27	.94	292	1.15	274	115	110	71	6	63
7	190	1700	46.04	.90	295	1.10	272	115	110	72	5.5	61
B8	195	1705	48.75	.86	292	1.02	274	114	110	70	5	58
8	200	1710	51.51	.92	291	1.08	273	114	110	69	5	61
B9	205	1715	54.21	.84	293	1.00	273	114	110	68	5	61
9	210	1720	56.92	.83	297	.99	275	114	110	69	5	61
B10	215	1725	59.89	.80	292	.95	276	114	110	69	5	62
10	220	1730	62.61	.82	293	.97	275	114	110	70	5	61
B11	225	1735	64.79	.77	293	.91	276	114	110	70	5	61
11	230	1740	67.36	.74	293	.88	274	114	110	71	5	61
B12	235	1745	69.92	.77	293	.91	274	114	111	71	5	61
12	240	1750	072.538	.79	288	.95	279	114	110	72	5	63

COMMENTS:

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown
Date	1/21/91
Sampling Location	~~Inlet~~ Outlet
Sample Type	CDD/CDF
Run Number	Outlet CDD/CDF
Sample Box Number	4
Clean-up Person	JDL
Solvent Rinses	3 x HPLC H_2O
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	910.8	500.9g	409.9
2	HPLC H_2O	~100	MGS	615.8	576.1g	39.7
3	HPLC H_2O	~100	MGS	592.2	592.7g	-0.5
4	Silica Gel	~200	MGS	795.6	764.0g	31.6
5						
6						
7						

TOTAL WEIGHT GAIN (g) 480.7

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 5
PAGE 1 OF ____

PLANT	MORRISTOWN	PROBE LENGTH AND TYPE		DUCT DIMENSIONS	19" id
DATE	11/22/91	NOZZLE I.D. (in)	.205	FILTER TYPE	
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	N-32	FILTER NUMBER	
SAMPLE TYPE	M5 / VOST	METER ΔH@	1.98	ASSUMED MOISTURE (%)	
RUN NUMBER	5	Yd	1.0159	MOISTURE METHOD	
OPERATOR	TS	K FACTOR	1.19	MOISTURE DATA	
AMBIENT TEMPERATURE	100	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	30	HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)	(+)	XAD TRAP		CO2	
INITIAL LEAKCHECK	.010 @ 10"	HEIGHT OF LOCATION (ft)	~35 ft	FINAL LEAKCHECK	.010 @ 10"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pe),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Temperature (°F) Dry Gas Meter Outlet	Temperature (°F) Impinger	Pump Vacuum
	0	1215	85.065 ~~84.982~~									
B12	5	1220	87.63	.85	291	1.05	220	87	100	99	65	4"
B12	10	1225	90.18	.81	291	.97	231	78	103	99	64	4
B11	15	1230	92.78	.82	290	1.00	271	69	101	99	68	4
B11	20	1235	95.37	.80	288	.96	272	69	102	100	71	4
B10	25	1240	97.95	.78	288	.93	275	67	102	99	72	4
10	30	1245	100.63	.86	294	1.05	278	67	104	100	73	3.5
B 9	35	1250	103.44	.95	294	1.15	271	67	104	100	73	4
9	40	1255	106.17	.92	289	1.10	268	67	104	100	73	4
B 8	45	1300	108.78	.90	287	1.10	26[illegible]	69	104	101	73	4
8	50	1305	111.64	.95	293	1.12	266	68	105	101	74	4
B7	55	1310	114.49	.99	295	1.20	265	67	105	101	73	4
7	60	1315	117.44	1.08	293	1.30	264	67	106	101	73	4
B6	65	1320	120.81	1.48	290	1.75	264	66	106	102	72	5
6	70	1325	124.12	1.32	290	1.60	260	71	107	102	74	4.5
B5	75	1330	127.47	1.30	293	1.55	258	69	107	102	74	4.5
5	80	1335	130.51	1.20	295	1.45	259	67	107	103	74	4
B4	85	1340	133.56	1.18	289	1.38	257	67	107	103	75	4
4	90	1345	136.88	1.40	295	1.62	256	69	107	103	75	4
B3	95			1.28	284	1.52	255	68	107	103	75	4

COMMENTS

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RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 5
PAGE 3 OF

PLANT	MORRISTOWN MWI
DATE	11/22/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5 / DIOXIN
RUN NUMBER	5
OPERATOR	TTS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	95	1350	140.12									
B3	100	1355	143.34	1.25	290	1.52	254	67	108	103	76	4.5
B2	105	1400	146.41	1.12	291	1.35	254	68	107	103	76	4.5
2	110	1405	149.65	1.10	292	1.28	253	68	108	103	77	4
B1	115	1410	152.24	1.00	288	1.18	252	67	107	103	77	4
1	120	1415	155.344	1.20	287	1.43	252	69	107	103	78	4
		LEAK	CHECK	=.015 @ 9"								
		LEAK	CHECK	= .015 @ 9"								
		1505	155.702									
A 12	125	1520	58.48	.97	294	1.15	255	84	103	103	85	4
12	~~130~~ 126	1571	158.920	1.04	289	1.20	248	75	103	103	78	4
~~A12~~	126	1650	158.920									
A11	130	1654	61.08	.84	290	1.00	267	82	105	105	87	4
A11	135	1659	63.77	.84	292	1.00	260	67	105	104	84	4
A11	140	1704	66.50	.88	293	1.05	263	66	106	105	77	4
A 10	145	1709	69.26	.90	292	1.08	266	63	107	104	73	4
A10				.95	293	1.15	266	64	108	105	73	4

COMMENTS: SHUT DOWN 1511, CAME BACK 1650

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RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 5
PAGE 3 OF 3

PLANT	MORRISTOWN MWT
DATE	11/22/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	M5 / DIOXIN
RUN NUMBER	5
OPERATOR	TTS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	150	1714	172.04									
A9	155	1719	74.86	.98	300	1.17	269	65	109	105	72	4
A9	160	1724	77.82	1.10	280	1.30	269	64	109	105	71	4.5
A8	165	1729	80.62	.99	283	1.15	270	65	109	105	71	4
A8	170	1734	83.46	1.00	294	1.20	269	67	109	105	72	4.5
A7	175	1739	86.46	1.15	297	1.32	268	65	109	105	72	4.5
A7	180	1744	89.60	1.20	293	1.40	270	65	109	105	71	4.5
A6	185	1749	92.69	1.17	289	1.45	267	65	110	106	70	4.5
A6	190	1754	95.91	1.20	295	1.50	268	65	110	106	71	4.5
A5	195	1759	99.10	1.23	296	1.42	264	65	110	105	73	4.5
A5	200	1804	202.12	1.15	292	1.32	264	65	110	105	73	4.5
A4	205	1809	05.15	1.15	293	1.32	263	65	110	106	73	4.5
A4	210	1814	08.13	1.10	293	1.30	261	67	109	105	74	4.5
A3	215	1819	11.10	1.10	293	1.30	261	67	109	105	73	4.5
A3	220	1824	14.10	1.12	293	1.32	259	64	109	105	71	4.5
A2	225	1829	17.10	1.10	290	1.30	258	65	110	106	71	4.5
A2	230	1834	20.05	1.08	290	1.25	259	66	110	106	70	4
A1	235	1839	22.95	1.10	296	1.25	257	66	109	106	71	4
A1	240	1844	225.904	1.12	292	1.32	259	67	109	106	71	4

COMMENTS:

Revision 11/90

RADIAN
CORPORATION

Plant: Morristown Hosp

Date: 11/21/91

Sampling location: Outlet

Sample type: CDD/CDF

Run number: 5

Sample box number: Outlet CDD/CDF

Clean-up person: Bun

Solvent rinses: 3x H_2O

Sample identification code: _____

Checked by: _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	893.5	501.1	392.4
2	HPLC H_2O	≈ 100	MGS	612.1	601.2	10.9
3	HPLC H_2O	≈ 100	MGS	591.6	590.0	1.6
4	Silica Gel	≈ 200	MGS	805.1	774.2g ~~764.1~~ JDL	30.9
5						
6						
7						

Total Weight Gain (grams): 435.8

1181671A

Moisture Recovery Form

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 6
PAGE 1 OF _____

PLANT	MONTICELLO	PROBE LENGTH AND TYPE		DUCT DIMENSIONS	17"
DATE	11/22/93	NOZZLE I.D. (in)	.205	FILTER TYPE	
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	N-32	FILTER NUMBER	
SAMPLE TYPE	M5/DXN	METER ▲ H@	1.98	ASSUMED MOISTURE (%)	
RUN NUMBER	6	Yd	1.0159	MOISTURE METHOD	
OPERATOR	MS	K FACTOR	1.2	MOISTURE DATA	
AMBIENT TEMPERATURE	96	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	29.87	HEATER BOX SETTING		O2	
STATIC PRESSURE (Pa)	+.17	XAD TRAP		CO2	
INITIAL LEAKCHECK	.009@9"	HEIGHT OF LOCATION (ft)	~35	FINAL LEAKCHECK	.010 @ 10"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa),	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	Absorbent Trap	Temperature (°F) Dry Gas Meter Inlet	Dry Gas Meter Outlet	Impinger	Pump Vacuum
	0	0930	226.500									
A 1	5	0935	229.23	1.15	293	1.32	244	31	95	95	84	3"
A 2	10	0940	232.20	1.10	283	1.30	241	63	95	95	75	3"
A 3	15	0945	235.24	1.15	288	1.40	241	63	96	95	73	4"
A 4	20	0950	238.35	1.17	300	1.40	245	61	93	96	71	4
A 5	25	0955	241.46	1.20	293	1.45	249	63	100	96	71	4
A 6	30	1000	244.80	1.38	293	1.65	253	63	102	98	72	4
A 7	35	1005	247.63	1.00	294	1.20	256	63	103	98	70	4
A 8	40	1010	250.56	1.06	288	1.28	259	65	104	99	82	4
A 9	45	1015	253.30	.97	294	1.15	262	61	106	100	76	4
A 10	50	1020	256.12	.95	291	1.15	265	63	105	100	74	4
A 11	55	1025	258.83	.95	296	1.12	268	61	106	100	73	3.5
A 12	60	1030	261.705	.94	293	1.12	268	61	106	99	71	3.5
STOP	60	1035	261.705									
A-12	65	1040	264.53	.93	286	1.18	272	66	104	102	75	4
A-11	70	1045	267.34	.90	291	1.15	269	61	105	102	73	4
A-10	75	1050	270.20	.98	300	1.20	270	61	106	102	70	4
A-9	80	1055	273.12	1.00	290	1.22	272	60	107	103	70	4
A-8	85	1100	275.96	.95	290	1.18	270	60	107	103	69	4
A-7				.96	298	1.18	271	60	107	104	70	4

COMMENTS

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 6
PAGE 2 OF

PLANT	MORRISTOWN MWI
DATE	11/23/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	MM5/DIOXIN
RUN NUMBER	6
OPERATOR	TMS

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	90	1105	278.70									
A-6	95	1110	281.91	1.20	287	~~270~~ 1.48	270	63	107	103	71	4
A-5	100	1115	285.20	1.28	286	1.55	267	62	107	103	69	4
A-4	105	1120	288.35	1.20	296	1.45	266	60	108	104	69	4
A-3	110	1125	291.41	1.15	300	1.40	265	59	108	104	70	4
A-2	115	1130	294.46	1.15	283	1.38	264	59	108	104	74	4
A-1	120	1135	297.420	1.0	288	1.30	262	60	108	104	74	4
		LEAK	CHECK = .002		@ 8.5"							
		LEAK	CHECK = .000		@ 10"							
—		1150	297.729									
B12	125	1155	00.52	.81	285	.98	268	68	103	103	81	3.5
12	130	1200	02.88	.67	290	.82	264	64	104	103	79	3
B11	135	1205	05.36	.66	290	.81	266	65	104	103	78	3
11	140	1210	07.89	.70	292	.86	268	65	106	103	78	3
B10	145	1215	10.54	.77	292	.94	269	65	[illegible]	103	79	4
10	150	1220	13.13	.74	290	.89	268	66	107	103	77	4
B 9				.80	291	.96	267	66	107	103	76	4

COMMENTS:

Revision 11/90

RADIAN CORPORATION

MODIFIED METHOD 5
FIELD DATA

RUN 6
PAGE 3 OF

PLANT	MORRISTOWN MLRE
DATE	11/23/91
SAMPLING LOCATION	OUTLET
SAMPLE TYPE	IN75 / DIOXIN
RUN NUMBER	6
OPERATOR	TK

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Absorbent Trap Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	155	1225	315.77									
B9	160	1230	18.43	.79	293	.95	269	65	107	104	74	4
B8	165	1235	21.22	.86	289	1.07	268	65	107	104	72	4
8	170	1240	23.90	.81	291	.99	269	64	108	104	71	4
B7	175	1245	26.74	.98	294	1.20	268	65	108	104	71	4
7	180	1250	29.71	1.08	294	1.30	269	69	108	105	73	4
B6	185	1255	32.75	1.08	291	1.42	267	65	108	105	75	4
6	190	1300	35.90	1.16	295	1.42	265	64	109	105	72	4
B5	195	1305	39.25	1.30	297	1.60	263	65	110	105	71	4.5
5	200	1310	42.66	1.40	293	1.70	263	65	110	105	71	4.5
B4	205	1315	46.94	1.30	293	1.60	261	66	110	105	71	4.5
4	210	1320	49.11	1.20	293	1.45	262	66	110	105	71	4.5
B3	215	1325	52.26	1.20	292	1.45	261	65	110	106	72	4.5
3	220	1330	55.32	1.12	292	1.35	264	65	110	106	72	4.5
B2	225	1335	58.41	1.10	285	1.32	262	66	109	106	73	4.5
2	230	1340	61.37	1.10	297	1.32	261	66	109	106	74	4.5
B1	235	1345	64.49	1.15	294	1.40	265	67	110	106	74	4.5
1	240	1350	367.611	1.18	285	1.42	262	65	116	106	76	4.5

COMMENTS

RADIAN
CORPORATION

Plant: Morristown MSP

Date: 11/22/91

Sampling location: Outlet

Sample type: CDD/CDF

Run number: 6

Sample box number: Outlet CDD/CDF

Clean-up person: Bax

Solvent rinses: 3 × H_2O

Sample identification code: _____

Checked by: _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	908.1g	501.4	406.7
2	HPLC H_2O	≈ 100	MGS	629.1g	579.1	50.0
3	HPLC H_2O	≈ 100	MGS	538.8g	584.8	-46.0
4	Silica Gel	≈ 200	MGS	799.0g	774.8	24.2
5						
6						
7						

Total Weight Gain (grams): 434.9

1181671R

Moisture Recovery Form

RADIAN CORPORATION

FIELD DATA

1/3

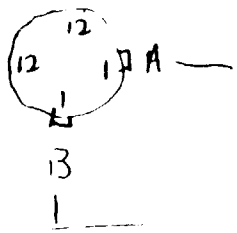
PLANT: Morristown
DATE: 11-18-96
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Multi-metals
RUN NUMBER: Run #1
OPERATOR: [illegible]
AMBIENT TEMPERATURE: 105
BAROMETRIC PRESSURE: 30.05
STATIC PRESSURE, (P_s):
FILTER NUMBER (s): 0.014 cfm @ 15" Hg

PROBE LENGTH AND TYPE: 2 glass/N
NOZZLE I.D.: 0.191
ASSUMED MOISTURE %: 18%
SAMPLE BOX NUMBER:
METER BOX NUMBER: A-35
METER $\Delta H_@$: 2.06
K FACTOR:
PROBE HEATER SETTING:
HEATER BOX SETTING:
REFERENCE Δp:
METER γ: 1.0010

K = 0.786

C = 2.45

SCHEMATIC OF TRAVERSE POINT LAYOUT



READ AND RECORD ALL DATA EVERY 5 MINUTES

Start @ 2:09

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O Actual REQUIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	~~926.680~~ V_1 = 927.337									
2A 1	5	2:14	—	0.74	0.56		406	111	109	-2.5	261	69
2	10	2:19	931.5	0.85	0.65		406	121	111	-2.5	262	61
3	15	2:24	933.4	0.82	0.63		416	127	112	-2.5	252	59
4	20	2:29	—	0.83	0.63		408	132	114	-1	246	60
5	25	2:34	938.7	0.95	0.72		404	137	117	-1.5	240	59
6	30	2:39	940.7	1.25	0.94		411	144	121	-2	252	59
7	35	2:44	943.5	1.20	0.86	0.86	408	148	125	-2	258	58
8	40	2:49	—	1.25	0.94	0.94	410	157	130	-2	255	58
9	45	2:54	949.3	1.40	1.05	1.05	409	162	134	-2	253	56
10	50	2:59	952.0	1.35	1.00	1.00	408	167	138	-2	253	57
11	55	3:04	954.8	1.40	1.05	1.05	412	171	143	-2	253	59
12	60	3:09	957.5	1.40	1.10	1.10	410	172	145	-3	251	53
12	65	3:14	960.5	1.35	1.05	1.05	406	174	148	-3	252	53
11	70	3:19	962.8	1.35	1.05	1.05	406	176	151	-3	249	56
10	75	3:24	965.5	1.35	1.05	1.05	408	175	153	-3.5	258	60
9	80	3:29	968.8	1.30	1.00	1.00	409	179	155	-3.5	262	58
8	85	3:34	971.2	1.20	0.94	0.94	408	178	157	-3.5	264	55
7	90	3:39	974.0	1.00	0.79	0.79	404	179	159	-3	265	57
6	95	3:44	976.5	1.00	0.79	0.79	404	179	160	-2.5	253	58
5	100	3:49	979.5	0.82	0.64	0.64	~~375~~*	178	160	-2.5	245	59
4	105	3:54	981.3	0.80	0.63	0.63	411	179	162	-2	235	61
3	110	3:59	984.0	0.80	0.63	0.63	398	179	161	-2	234	62
2	115	4:04	986.2	0.85	0.67	0.67	405	180	162	-2	236	63

Adjust K → 12

P_{stat}

-5.3

COMMENTS

* Dilution Air - Void data point

4-55

13954 (23)

9112

RADIAN CORPORATION

FIELD DATA

7/3

PLANT Morristown
DATE 11-18-91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE Multi Metals
RUN NUMBER Run #1
OPERATOR [illegible]
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

K=0.786

PROBE LENGTH AND TYPE
NOZZLE I.D.
ASSUMED MOISTURE %
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
K FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp
METER γ

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_v), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Stop @ 2A1	120	4:09	988.760	0.85	0.67	0.67	400	180	163	2	236	63
			Mid-Test Leak Rate = 0.008 CFM @ 10" Hg									
		Vi =	989.172				412				Pre-Bt traverse	
A1	125	440	—	1.45	1.15	1.15	412	155	146			
A2	130	445	—	1.40	1.10	1.10	412	162	148	3.5	290	60
A3	135	450	997.7	1.10	0.86	0.86	411	167	149	3	268	61
A4	140	455	1000.0	0.88	0.69	0.69	407	169	150	2	240	54
5	145	500	1002.3	0.88	0.69	0.69	406	170	151	2	233	49
6	150	505	1005.1	1.20	0.96	0.96	406	174	153	3	252	47
7	155	510	—	1.20	0.94	0.94	407	175	154	3	256	46
8	160	515	1010.4	1.00	0.79	0.79	408	178	154	3	260	48
9	165	520	—	0.92	0.72	0.72	406	178	157	3	258	51
10	170	525	1015.0	0.67	0.53	0.53	407	176	158	3	260	55
11	175	530	1017.8	0.90	0.71	0.71	411	178	160	3	260	56
12	180	535	1020.3	0.96	0.75	0.75	415	180	160	3	258	58
12	185	540	1023.5	0.91	0.71	0.71	412	179	161	2	258	60
11	190	545	1025.0	0.81	0.64	0.64	409	180	162	2.5	258	61
10	195	550	1027.7	0.91	0.71	0.71	408	180	162	3	260	56
9	200	555	1030.1	1.10	0.86	0.86	408	181	163	3	262	51
8	205	600	1033.0	1.15	0.90	0.90	407	181	164	3	280	52
7	210	605	—	0.90	0.71	0.71	406	181	164	3	290	53
6		610	—	0.98	0.66	0.66	404	182	165	3	295	54
5		615	—	0.98	0.66	0.66	404	182	165	3	300	55

Pstat = 5.3

COMMENTS

44943 (21

13939

RADIAN CORPORATION

3/3

FIELD DATA

PLANT Morristown
DATE 11-18-91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE Multi-Metals
RUN NUMBER #1
OPERATOR [illegible]
AMBIENT TEMPERATURE 105
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE, (P_s) _____
FILTER NUMBER (s) _____

PROBE LENGTH AND TYPE _____
NOZZLE I.D. _____
ASSUMED MOISTURE % _____
SAMPLE BOX NUMBER _____
METER BOX NUMBER _____
METER $\Delta H_@$ _____
K FACTOR _____
PROBE HEATER SETTING _____
HEATER BOX SETTING _____
REFERENCE Δp _____
METER γ _____

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
5	620	1040.0	0.98	0.66	0.66	406	180	165	3	256	55
~~3~~	~~1825~~		~~0.71~~	~~0.50~~	~~0.50~~	~~405~~		VOID - Wrong Box			
4	1825	1042.3	1.1	0.75	0.75	405	181	165	3	256	54
3	1830	1045.0	1.15	0.94	0.94	406	182	165	3.5	287	56
2	1835	1048.0	1.25	0.98	0.98	405	183	166	4	290	58
1	1840	1050.633	1.25	0.98	0.98	405	183	166	3.5	245	60
		Post-Test Leak Rate =				0.005 CFM @ 10" Hg					
	Avg	Avg = 122.884	1.026		0.818	407.6	159.9				

Stop @

COMMENTS

15675

RADIAN
CORPORATION

Plant Morristown

Date [illegible]

Sampling location Inlet

Sample type TM

Run number 1

Sample box number Inlet TM

Clean-up person JDL

Solvent rinses 3 x 5% HNO3

Sample identification code _____

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—		855.3	478.1g	377.2
2	ABS	~100		611.3	580.3g	31.0
3	ABS	~100		575.5	573.3g	2.2
4	MT	—		483.0	432.6g	0.4
5	Acidic KMnO4	~100		591.9	592.7g	-0.8
6	Acidic KMnO4	~100		577.1	577.5g	-0.4
7	Silica Gel	~200		752.2	728.8g	23.4

1181671R

Total Weight Gain (grams) 433.0

Moisture Recovery Form

RADIAN CORPORATION

FIELD DATA

PLANT Morristown Men. Hosp. tal
DATE 11/19/91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE Multi-Metals
RUN NUMBER #2
OPERATOR [illegible]
AMBIENT TEMPERATURE 100
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 2'
NOZZLE I.D. ~~0.190~~ 0.191
ASSUMED MOISTURE %
SAMPLE BOX NUMBER #
METER BOX NUMBER A-35
METER $\Delta H_@$ 2.06
K FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp
METER γ 1.001

K=0.794

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	350.5	51.413 ~~51.233~~									
2A-1	5	355.5	53.5	0.82	0.65	0.65	414	118	114	2.5	233	77
-2	10	400.5	55.8	0.85	0.67	0.67	415	123	114	2.5	225	73
-3	15	4:05.5	58.2	0.85	0.67	0.67	413	133	115	2.5	220	67
-4	20	4:10.5	60.4	0.85	0.67	0.67	414	137	117	3	220	67
-5	25	4:15.5	62.8	1.10	0.87	0.87	418	146	122	3	225	67
-6	30	4:20.5	65.7	1.10	0.87	0.87	418	149	124	3	253	65
-7	35		—	1.20	0.95	0.95	403	156	129	3.5	275	62
-8	40	4:30.5	71.2	1.20	0.95	0.95	408	160	134	3.5	300	60
-9	45	4:35	74.1	1.20	0.95	0.95	402	162	135	3.5	275	60
-10	50	4:40	76.7	1.20	0.95	0.95	402	166	140	3.5	268	56
-11	55	4:45	—	1.25	1.00	1.00	407	167	143	3.5	280	57
-12	60	4:50	82.5	1.20	0.95	0.95	406	169	145	3.5	290	57
12	65	4:55	85.0	1.20	0.95	0.95	403	172	148	3.5	295	59
11	70	5:00	88.0	1.25	1.00	1.00	404	173	151	3.5	295	60
10	75	5:05	90.8	1.15	0.91	0.91	403	174	153	3.5	263	59
9	80	5:10	93.4	1.15	0.91	0.91	403	175	153	3.5	273	59
8	85	5:15	96.2	1.20	0.95	0.95	405	175	155	3.5	300	58
7	90	5:20	99.1	1.15	0.91	0.91	408	176	157	3.5	300	58
6	95	5:25	101.7	1.05 ~~1.10~~	~~0.87~~	0.83	409	177	157	3	301	60
5	100	5:30	104.3	0.94	0.74	0.74	410	176	159	3	303	63
4	105	5:35	106.7	0.85	0.69	0.69	411	176	160	3	295	64
3	110	5:40	109.2	0.79	0.62	0.62	408	176	160	2	290	66
2	115	5:45	—	0.39	0.31	0.31	409	174	160	2	285	66

P_{stat} -5.4

COMMENTS

RADIAN CORPORATION

2

FIELD DATA

PLANT: Morgantown M Hospital
DATE: 1/17/91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Multi-Metals
RUN NUMBER: #2
OPERATOR: MJ
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

K=0.794

PROBE LENGTH AND TYPE
NOZZLE ID
ASSUMED MOISTURE %
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
K FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp
METER Y

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET (T_m in), °F	OUTLET (T_m out), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
2A-1	120	5:50	112.586	0.35	0.28	0.28	409	172	161	<1	271	71
			Post Test Leak Rate = 0.012 cfm @ 20 in Hg									
			Pre-B Traverse Leak Rate = 0.25 @ 11 in Hg									
			V_f = 113.797									
2B-1	125	655	116.3	0.89	0.71	0.71	412	144	141	3.5	265	65
2	130	700	118.8	1.00	0.79	0.79	413	151	140	3.5	248	61
3	135	705	121.0	0.95	0.75	0.75	406	157	142	3.5	259	61
4	140	710	123.7	0.90	0.71	0.71	404	161	143	3	263	62
5	145	715	—	1.00	0.79	0.79	408	164	145	3	257	63
6	150	720	128.8	1.10	0.87	0.87	408	167	147	3.5	258	63
7	155	725	131.5	1.10	0.87	0.87	411	170	148	3.5	262	61
8	160	730	134.3	1.20	0.95	0.95	413	173	152	4	264	58
9	165	735	137.0	1.10	0.87	0.87	408	174	152	3.5	264	59
10	170	740	139.6	1.10	0.87	0.87	408	175	154	3.5	269	61
11	175	745	142.6	1.30	1.05	1.05	405	177	156	4	270	61
12	180	750	145.4	1.20	0.91	0.91	408	178	156	4	271	60
12	185	755	148.2	1.30	1.05	1.05	406	179	158	4	273	59
11	190	800	151.3	1.30	1.05	1.05	407	180	160	4	273	58
10	195	805	154.0	1.15	0.91	0.91	408	180	161	4	277	59
9	200	810	156.5	1.05	0.83	0.83	409	180	161	3.5	277	58
8	205	815	159.2	1.00	0.79	0.79	410	180	161	3.5	273	59
7	210	820	161.5	0.95	0.75	0.75	406	179	163	3.5	265	61
6	215	825	164.3	1.25	0.98	0.98	406	181	163	4	268	60

Stop @

5.4

COMMENTS

RADIAN CORPORATION

FIELD DATA

3/3

PLANT Morristown Hospital
DATE 11/19/91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE Multi Metals
RUN NUMBER
OPERATOR
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE (P_s)
FILTER NUMBER (s)

K=0.794

PROBE LENGTH AND TYPE
NOZZLE ID
ASSUMED MOISTURE %
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
K FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp
METER Y

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
2B-5	220	830	167.0	1.10	0.87	0.87	410	180	164	4	271	60
-4	225	835	169.5	0.72	0.73	0.73	404	179	163	3.5	268	58
-3	230	840	171.5	0.45	0.36	0.36	346	175	163	3	256	60
-2	235	845	173.6	0.73	0.58	0.59	406	176	163	3	245	64
-1	240	850	174.993	0.90	0.70	0.72	405	174	164	3	230	63
Stop @		1858										

Post-Test Leak Rate = 0.012 CFM @ 11" Hg

122.369 — 1.5107 — 157.7292
Rins
122.4414
1.6150 — 45.49
vol. Hg — 13.56
ACFM — 1.991
DCFM — 1.990

COMMENTS

RADIAN
CORPORATION

Plant [illegible]

Date [illegible]

Sampling location [illegible]

Sample type [illegible]

Run number [illegible]

Sample box number [illegible]

Clean-up person [illegible]

Solvent rinses [illegible]

Sample identification code _____

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	[illegible]	—	[illegible]	846.2	[illegible]	371.2
2	[illegible]	~100	[illegible]	612.2	[illegible] g	29.3
3	[illegible]	~100	[illegible]	567.0	[illegible] g	4.6
4	[illegible]	—	[illegible]	485.0	[illegible] g	-1.1
5	[illegible]	~100	[illegible]	585.2	585.9 g	-0.7
6	[illegible]	~100	[illegible]	587.3	587.5 g	-0.2
7	Silica Gel	~200	[illegible]	762.0	743.1 g	18.9

Total Weight Gain (grams) 422.0

11816/1R

Moisture Recovery Form

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11/20/91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Multiметals
RUN NUMBER: #3
OPERATOR: [illegible]
AMBIENT TEMPERATURE: 105
BAROMETRIC PRESSURE: 29.85
STATIC PRESSURE, (P_s): —
FILTER NUMBER (s): —

K=0.794

PROBE LENGTH AND TYPE: 2' Quartz
NOZZLE ID: 0.191
ASSUMED MOISTURE %: 16
SAMPLE BOX NUMBER: —
METER BOX NUMBER: A-35
METER ΔH@: 2.06
K FACTOR: 0.794
PROBE HEATER SETTING: —
HEATER BOX SETTING: —
REFERENCE Δp: —
METER Y: 1.0010

SCHEMATIC OF TRAVERSE POINT LAYOUT

Pre-Test Leak Rate = 0.010 CFM @ 14" Hg

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (Δh), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1030	176.336									
2A-12	5	1035	179.4	1.85	1.45	1.45	420	129	119	4.5	284	68
2A-12	10	1040	—	1.70	1.30	1.30	415	137	121	4	290	64
2A-12	15	1045	—	1.70	1.30	1.30	415	145	122	4.5	292	64
-11	20	1050	188.9	1.75	1.35	1.35	415	150	123	4.5	295	65
-10	25	1055	192.0	1.75	1.35	1.35	408	154	128	4	290	60
-10	30	1100	195.5	1.70	1.35	1.35	411	159	133	4	285	62
-9	35	105	198.0	1.50	1.20	1.20	405	161	136	3.5	280	59
-9	40	110	201.4	1.50	1.20	1.20	404	163	138	3.5	285	59
-8	45	115	204.2	1.20	0.95	0.95	405	166	142	3	275	59
-8	50	120	207.0	1.25	1.00	1.00	408	167	144	3	270	59
-7	55	125	209.9	1.25	1.00	1.00	407	170	148	3	277	59
-7	60	130	212.7	1.20	0.95	0.95	405	172	150	3	284	60
-6	65	135	215.4	1.15	0.91	0.91	411	173	152	3.5	263	58
-6	70	140	218.0	1.20	0.95	0.95	413	174	154	3.5	244	58
-5	75	145	—	1.25	1.00	1.00	415	176	155	3.5	252	56
-5	80	150	—	1.25	1.00	1.00	417	178	156	3.5	274	57
-4	85	155	226.8	1.20	0.95	0.95	413	178	158	3.5	255	58
-4	90	200	229.5	1.10	0.87	0.87	405	178	159	3	235	61
-3	95	205	232.1	0.89	0.71	0.71	402	178	161	2	249	62
-3	100	210	234.6	0.81	0.64	0.64	398	178	162	2	255	62
-2	105	215	236.8	0.77	0.62	0.62	400	178	162	2	264	62
-2	110	220	239.0	0.75	0.60	0.60	401	178	162	2	234	64
-1	115	225	241.3	0.77	0.62	0.62	398	178	163	2	220	65

COMMENTS

P_{sta} = -5.0

RADIAN CORPORATION

2/3

FIELD DATA

PLANT: Morristown
DATE: 11/20/91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Multi-Metals
RUN NUMBER: #3
OPERATOR: MK
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

K = 0.794

PROBE LENGTH AND TYPE
NOZZLE I.D.
ASSUMED MOISTURE %
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$
K FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp
METER Y

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (Δh), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Stop @ 2A-1	120	230	243.622	0.80	0.64	0.64	407	179	163	2	215	65
			Mid-Test Leak Rate = 0.005 CFM @ 10 "Hg									
			Pre-B-Traverse Leak Rate = 0.006 CFM @ 10 "Hg									
	Start @	4:45	V_i = 243.838									
stop @ 2B-12	125	4:50	246.4	1.20	1.05	1.05	401	127	124	3.5	290	73
-12	130	4:55	249.188	1.30	1.05	1.05	398	137	124	3.5	240	64
		~~5:00~~										
		~~5:05~~	V_i = 249.321									
		9:00										
-11	135	9:05	252.2	1.30	1.05	1.05	402	139	122	4	258	64
-11	140	9:10	254.8	1.20	0.95	0.95	400	148	124	4	275	63
-10	145	9:15	257.5	1.10	0.87	0.87	405	154	129	3.5	280	63
-10	150	9:20	260.0	1.10	0.87	0.87	404	156	132	3.5	280	63
-9	155	9:25	262.6	1.00	0.79	0.79	411	158	135	3.5	279	63
-9	160	9:30	265.3	1.05	0.83	0.83	410	161	139	3.5	273	64
-8	165	9:35	267.8	0.95	0.75	0.75	411	164	141	3.5	266	63
-8	170	9:40	270.4	0.96	0.76	0.76	412	165	144	3.5	266	64
-7	175	9:45	272.9	1.00	0.79	0.79	412	167	146	3.5	258	63
-7	180	9:50	275.4	0.96	0.76	0.76	408	169	149	3.5	260	62
-6	185	9:55	278.1	1.25	1.00	1.00	410	173	152	4	258	62
-6	190	10:00	281.0	1.35	1.10	1.10	413	174	152	3.5	255	62
-5	195	10:05	283.3	0.85	0.67	0.67	399	174	154	3.5	250	63

P_{stat} = -5.9

4-55

COMMENTS

Incinerator down @ 4:55 (Boiler water outage) - interrupt Test

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #3
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/20/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#3
OPERATOR	BMJ

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
2B-5	200	1010	286.0	0.92	392	0.73	244	174	155	63	3
2B-4	205	1015	288.4	0.90	402	0.72	243	174	157	63	3
-4	210	1020	291.3	1.15	398	0.91	240	176	157	63	3.5
-3	215	1025	294.0	1.20	398	0.95	239	178	158	62	4
-3	220	1030	296.8	1.10	398	0.87	234	179	159	62	3.5
-2	225	1035	299.1	0.90	414	0.72	252	179	160	64	3
-2	230	1040	301.5	0.95	406	0.75	259	178	160	64	3.5
-1	235	1045	304.0	0.89	420	0.69	263	178	161	65	3.5
-1	240	1050	306.338	0.86	410	0.68	225	178	162	65	3
	Stop @										
			Post-Test Leak Rate = 0.000 CFM @ 10 "Hg								

COMMENTS

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	[illegible]
Date	[illegible]
Sampling Location	Inlet
Sample Type	TM
Run Number	3
Sample Box Number	Inlet TM
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO_3
Sample Identification Code	
XAD Trap Number	

Filter

~~TM027~~

TM021

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	849.8	473.5 g	376.0
2	ABS	~100	MGS	611.5	573.3 g	38.2
3	ABS	~100	GS	582.5	576.6 g	5.9
4	MT	—	MGS	485.9	484.3 g	1.6
5	Acidic KMnO4	~100	MGS	584.9	586.5 g	-1.6
6	Acidic KMnO4	~100	MGS	587.6	584.6 g	3.0
7	Silica Gel	~200	MGS	750.9	730.0	20.9

TOTAL WEIGHT GAIN (g) 444.0

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #4
PAGE 1 OF ____

PLANT	Morristown	PROBE LENGTH AND TYPE	2' Quartz	HEIGHT OF LOCATION (ft)	0
DATE	11/21/91	NOZZLE I.D. (in)	.216	DUCT DIMENSIONS	17"
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	A-35	FILTER NUMBER	—
SAMPLE TYPE	Mall-Metals	METER ▲ H@	2.06	ASSUMED MOISTURE (%)	16
RUN NUMBER	#4	Yd	1.0010	MOISTURE METHOD	—
OPERATOR	MJ	K FACTOR	1.3	MOISTURE DATA	—
AMBIENT TEMPERATURE	105	PROBE HEATER SETTING	—	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.80	HEATER BOX SETTING	—	O2	8
STATIC PRESSURE (Pa)				CO2	10
INITIAL LEAKCHECK	0.010 CFM @ 12" Hg	K=1.3		FINAL LEAKCHECK	.00 @ 12"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	12:45	307.680								
2A-12	5	12:50	—	1.40	421	1.80	285	121	115	67	5.5
-12	10	12:55	315.2	1.40	414	1.80	290	135	117	63	5
-11	15	1:00	318.8	1.45	412	1.90	285	140	118	63	5.5
-11	20	1:05	322.5	1.45	415	1.90	283	145	120	64	6
-10*	25	Stop 1:10:30	326.545	1.40	413	1.80	275	153	125	64	5.5
-10	30	1:45	330.0	1.50	415	1.75	264	132	126	66	6
-9	35	1:55	333.5	1.35	415	1.75	275	144	127	61	5.5
-9	40	2:00	337.1	1.30	412	1.70	277	152	129	63	5
-8	45	2:05	340.7	1.20	410	1.55	274	156	132	65	5
-8	50	2:10	344.0	1.20	409	1.55	271	161	135	64	5
-7	55	2:15	347.4	1.05	408	1.35	268	162	137	62	5
-7	60	2:20	350.6	0.97	405	1.25	263	165	141	63	4.5
-6	65	2:25	353.7	0.87	400	1.15	256	166	143	65	4.5
-6	70	2:30	356.6	0.92	405	1.20	253	167	145	65	4
-5	75	2:35	359.8	1.00	408	1.30	249	170	147	67	4.5
-5	80	2:40	363.4	1.15	415	1.50	248	173	150	64	5
-4	85	2:45	366.4	0.85	405	1.10	237	175	153	64	4
-4	90	2:50	369.4	0.77	400	1.00	240	173	154	65	4
-3	95	2:55	372.0	0.67	404	0.87	241	175	156	64	3.5

P_{start} = -5.3

COMMENTS: * Spray Dryer down @ 1:10 (power outage?) interrupt test — Re-start test @ ~ 13:45

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #4
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/21/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#4
OPERATOR	MJ

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
-3	100	3:00	374.6	0.63	405	0.82	242	176	157	65	3
-2	105	3:05	377.0	0.55	401	0.72	240	176	158	67	2.5
-2	110	3:10	379.6	0.59	406	0.77	241	176	159	68	3
-1	115	3:15	382.2	0.60	404	0.78	243	177	160	70	3
-1	120	3:20	384.618	0.56	404	0.73	245	178	161	68	3
	Stop @	Mid-Test Leak Rate = 0.005 CFM @ 12" Hg									
		Pre-Test Leak Rate = 0.005 CFM @ 11" Hg									
	120	3:50	Vi = 384.90								
2B-12	125	3:55	389.0	1.75	407	2.30	290	163	151	65	8
-12	130	4:00	393.0	1.60	409	2.05	295	172	151	63	7.5
-4	135	4:05	397.2	1.55	407	2.00	294	175	152	64	7.5
-11	140	4:10	400.9	1.50	405	1.95	285	177	153	63	7
-10	145	4:15	405.0	1.45	405	1.90	270	178	155	63	7
-10	150	4:20	408.6	1.45	408	1.80	263	180	156	61	7
-9	155	4:25	412.1	1.35	403	1.75	262	180	156	58	6.5
-9	160	4:30	415.9	1.30	408	1.70	254	180	158	63	6.5
-8	165	4:35	419.3	1.20	414	1.55	253	180	159	64	6
-8	170	4:40	423.2	1.30	412	1.70	250	180	160	65	6.5
-7	175	4:45	426.2	1.20	412	1.55	249	181	162	65	6.5

Pstat ≅ -6.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #4
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/21/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#4
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
-7	180	4:50	430.0	1.20	~~[illegible]~~ 415	1.55	247	181	161	64	6.5
-6	185	4:55	433.3	1.05	402	1.35	245	181	162	65	5.5
-6	190	5:00	436.7	0.95	408	1.25	240	181	162	63	5.5
-5	195	5:05	439.8	1.10	409	1.45	234	180	163	64	5.5
-5	200	5:10	443.0	1.15	411	1.50	231	182	163	64	6
-4	205	5:15	446.4	1.05	407	1.35	225	183	164	65	5.5
-4	210	5:20	449.8	1.05	406	1.35	236	182	164	64	5
-3	215	5:25	452.8	0.90	408	1.15	259	181	164	67	5
-3	220	5:30	455.8	0.97	412	1.25	260	182	165	68	5
-2	225	5:35	458.7	0.81	408	1.05	258	182	164	71	5
-2	230	5:40	461.5	0.77	399	1.00	253	181	164	74	4.5
-1	235	5:45	464.5	0.80	401	1.05	249	181	164	76	5
-1	240	5:50	467.375	0.85	400	1.10	248	181	164	75	5
	Stop @										
		Post-Test Leak Rate =			0.005 CFM @		12 "Hg				
			159.413								
		DG Clear	159.572	1.084	4079585			[illegible]			
		Vol STA	135.8746								

COMMENTS: velocity ft/sec 76.58 % [illegible] 46.33
ACFM 7271

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Moncastown
Date	11/21/91
Sampling Location	Inlet
Sample Type	TM
Run Number	4
Sample Box Number	Inlet MMTL
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO3
Sample Identification Code	
XAD Trap Number	

FILTER

TM 023

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	895.8	471.9g	423.9
2	ABS	~100	MGS	671.6	580.8g	90.8
3	ABS	~100	GS	586.7	576.5g	10.2
4	MT	—	MGS	484.8	484.3g	0.5
5	Acidic KMnO4	~100	MGS	583.0	586.8g	-3.8
6	Acidic KMnO4	~100	MGS	584.8	588.7g	-3.9
7	Silica Gel	~200	MGS	767.4	729.8g	37.6

TOTAL WEIGHT GAIN (g) 555.3

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #5
PAGE 1 OF 3

PLANT	Morrison	PROBE LENGTH AND TYPE	2'-Quartz	HEIGHT OF LOCATION (ft)	0
DATE	11/22/91	NOZZLE I.D. (in)	0.216	DUCT DIMENSIONS	17"Φ
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	A-35	FILTER NUMBER	—
SAMPLE TYPE	Multi-Metals	METER ▲ H@	2.06	ASSUMED MOISTURE (%)	16
RUN NUMBER	#5	Yd	1.0010	MOISTURE METHOD	—
OPERATOR	PAR	K FACTOR	1.30	MOISTURE DATA	—
AMBIENT TEMPERATURE	105	PROBE HEATER SETTING	—	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.85	HEATER BOX SETTING	—	O2	↓
STATIC PRESSURE (Pa)	-6.6			CO2	↓
INITIAL LEAKCHECK	0.014 CFM @ 12"Hg			FINAL LEAKCHECK	.014 @ 14"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	12:00	467.861								
2A-1	5 *	12:05	~~[illegible]~~ 470.0	0.90	~~[illegible]~~ 406	1.15	256	111	109	80	2
	Re-start	12:16	~~40~~	~~0.92~~	~~407~~	~~1.20~~		~~12~~	VOID		
A-1	10	12:20	473.3	0.92	407	1.20	244	121	110	72	3.5
-2	15	12:25	476.4	0.92	404	1.20	246	128	112	72	3.5
-2	20	12:30	479.3	0.83	404	1.10	235	136	114	71	3.5
-3	25	12:35	482.1	0.80	402	1.05	230	139	117	71	3.5
-3	30	12:40	484.9	0.89	405	1.15	231	144	121	68	3.5
-4	35	12:45	—	0.95	402	1.25	234	148	123	68	3.5
-4	40	12:50	491.2	~~[illegible]~~ 98	405	1.15	232	151	127	70	3.5
-5	45	12:55	—	0.85	405	1.10	232	153	132	68	3.5
-5	50	1:00	499.8	0.90	407	1.20	232	156	133	66	3.5
-6	55	1:05	500.1	1.20	414	1.55	238	158	137	64	4
-6	60	1:10	503.8	1.25	413	1.60	242	160	138	65	5
-7	65	1:15	506.8	1.25	415	1.60	245	162	141	65	4.5
-7	70	1:20	510.5	1.20	414	1.55	250	162	143	62	4.5
-8	75	1:25	513.9	1.20	413	1.55	253	162	145	62	4.5
-8	80	1:30	517.4	1.15	404	1.50	251	164	146	64	4.5
-9	85	1:35	520.9	1.35	414	1.75	254	165	148	65	5
-9	90	1:40	524.5	1.50	417	1.95	258	166	148	65	5.5

Pstat = -5.2

COMMENTS: *Interrupt Test 5 after 1.5 minutes (12:01.5) to await outlet sampling team (glassware problem)
Re-start Test #5 @ 12:16.5

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #5
PAGE 2 OF 3

PLANT	Morristown Hospital
DATE	11/22/91
SAMPLING LOCATION	Spray Dryer
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#5
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
2A-10	95	1:45	528.4	1.50	417	1.95	260	168	150	65	5.5
-10	100	1:50	532.2	1.40	414	1.80	262	170	151	61	5
-11	105	1:55	535.7	1.20	407	1.55	253	169	152	62	4.5
-11	110	2:00	—	1.20	403	1.55	247	168	152	62	4.5
-12	115	2:05	542.7	1.20	403	1.55	245	168	152	62	5
-12	120	2:10	546.211	1.40	413	1.80	240	168	153	62	5.5
	Stop @	2:15	Mid-test	Leak Rate = 0.005		CFM @	10 "Hg				
			Pre-B-Traverse	Leak Rate = 0.010		CFM @	10 "Hg				
	Start 120	Stop 3:05	546.700								
2B-1	125	@ 3:10		0.93	408	1.20	225	127	130	76	4
	Start @	4:50.5		~~0.80~~	~~399~~	~~1.05~~	~~260~~	~~117~~	~~115~~	~~69~~	~~3.5~~ VOID
2B-1	130	455.5		0.80	399	1.05	260	117	115	69	3.5
2B-2	135	505.5	555.2	0.90	402	~~1.15~~ 1.15	255	125	116	69	3.5
2B-2	140	505.5	558.6	0.93	404	1.20	249	135	116	69	4
2B-3	145	510.5	561.2	0.92	414	1.20	251	141	119	64	4
-3	150	515.5	—	0.98	418	1.25	253	145	121	66	4.5
-4	155	520.5	567.6	1.00	414	1.30	255	152	125	65	4.5
-4	160	525.5	570.9	1.20	411	~~1.30~~ 1.55	258	155	125	64	5
-5	165	530.5	574.4	1.00	408	1.30	262	158	132	59	4.5

COMMENTS: Start B-Traverse @ 3:05, Stop @ 3:10 Re-Start @ 4:50
(Traverse [illegible])

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #5
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/22/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#5
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
2B-5	170	5:35.5	—	1.20	415	1.55	264	160	136	58	5.5
2B-6	175	5:40.5	581.4	1.15	413	1.50	268	163	140	60	5.0
-6	180	5:45.5	—	1.00	408	1.30	258	164	142	61	4.5
-7	185	5:50.5	587.9	1.20	415	1.55	246	166	144	62	5
-7	190	5:55.5	590.8	1.15	412	1.50	244	168	147	62	5.5
-8	195	6:00.5	594.6	1.20	411	1.55	242	168	148	63	5.5
-8	200	6:05.5	598.6	1.20	405	1.55	240	169	150	66	5.5
-9	205	6:10.5	601.8	1.20	406	1.55	254	171	152	64	5
-9	210	6:15.5	605.1	1.20	405	1.55	254	172	153	64	5.5
-10	215	6:20.5	608.8	1.45	406	1.90	254	173	154	63	7
-10	220	6:25.5	—	1.40	405	1.80	255	174	155	61	7
-11	225	6:30.5	616.5	1.45	404	1.90	255	175	156	62	7
-11	230	6:35.5	620.4	1.60	405	2.10	257	175	157	62	8
-12	235	6:40.5	—	1.60	408	2.10	258	175	157	63	8
-12	240	6:45.5	628.752	1.75	406	2.30	243	177	158	63	9
	Stop @	[illegible]									

Pstat = -5.6

Post Test Leak Rate = 0.014 CFM @ 14 "Hg

COMMENTS:

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/22/91
Sampling Location	INLET
Sample Type	TM
Run Number	5
Sample Box Number	INLET
Clean-up Person	BWW
Solvent Rinses	3 x HNO_3
Sample Identification Code	
XAD Trap Number	

TM Ø27

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	–	MGS	861.4g	~~441.2~~ ~~473.5~~ 474.0	387.4
2	5% HNO_3 10% H_2O_2	≈100	MGS	640.4g	~~596.7~~ ~~585.7~~ 573.1	67.3
3	5% HNO_3 10% H_2O_2	≈100	GS	580.6g	~~559.1~~ ~~564.6~~ 570.4	10.2
4	MT	–	MGS	490.0g	~~480.4~~ ~~485.7~~ 487.5	2.5
5	Acidic $KMnO_4$	≈100	GS	591.6g	~~595.6~~ ~~590.2~~ 590.1	1.5
6	Acidic $KMnO_4$	≈100	MGS	603.5g	~~609.7~~ ~~586.6~~ 604.0	-0.5
7	Silica Gel	≈200	MGS	756.3g	726.6	29.7

TOTAL WEIGHT GAIN (g) 498.1

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #6
PAGE 1 OF 3

PLANT	Morgantown Metal	PROBE LENGTH AND TYPE	2' Quartz	HEIGHT OF LOCATION (ft)	10'
DATE	11/23/91	NOZZLE I.D. (in)	0.216	DUCT DIMENSIONS	17" ϕ
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	A-35	FILTER NUMBER	—
SAMPLE TYPE	Multi-Metals	METER ▲ H@	2.00	ASSUMED MOISTURE (%)	16
RUN NUMBER	#6	Yd	1.0010	MOISTURE METHOD	—
OPERATOR	[illegible]	K FACTOR	1.30	MOISTURE DATA	—
AMBIENT TEMPERATURE	65	PROBE HEATER SETTING	—	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.92	HEATER BOX SETTING	—	O2	↓
STATIC PRESSURE (Ps)	-5.8			CO2	↓
INITIAL LEAKCHECK	0.005 CFM @15" Hg			FINAL LEAKCHECK	0.005 @12" Hg

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	930	629.023								
2A-1	5	935	—	0.80	~~1045~~	1.10	280	114	107	75	3.5
-2	10	940	634.8	0.84	402	1.10	268	120	108	80	3.5
-3	15	945	637.7	0.85	400	1.10	247	130	111	83	4
-4	20	950	640.8	0.78	398	1.00	243	134	113	80	3.5
-5	25	955	643.6	0.88	398	1.15	245	139	116	68	4
-6	30	1000	647.3	1.35	410	1.75	253	146	120	62	6
-7	35	1005	651.0	1.20	411	1.55	258	151	123	62	5.5
-8	40	1010	654.0	1.25	408	1.60	264	155	127	62	5.5
-9	45	1015	657.5	1.30	412	1.70	269	158	132	58	6
-10	50	1020	661.2	1.30	407	1.70	251	161	135	58	6
-11	55	1025	664.7	1.30	404	1.70	238	165	139	58	6
-12	60	1030	668.236	1.30	403	1.70	235	167	141	57	5.5
	Resume	*1030 1035		1.30	403	1.70	—	160	— VOID		
-12	65	1040	671.8	1.30	403	1.70	227	160	145	56	5.5
-11	70	1045	675.3	1.35	406	1.75	235	171	147	55	6
-10	75	1050	678.8	1.25	405	1.65	250	173	150	55	5.5
-9	80	1055	682.4	1.20	402	1.55	258	172	151	53	5.5
-8	85	1100	685.3	1.20	404	1.55	256	172	153	55	5.5
-7	90	1105	689.2	1.00	408	1.30	255	170	154	57	5

COMMENTS: *Interrupt Test for 5 minutes to allow Mercury train to "catch up" (Started 5 min. late)

Pstat = -5.8

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #6
PAGE 2 OF 3

PLANT	Morristown Hosp. #1
DATE	11/23/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#6
OPERATOR	MJ

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
2A-6	95	1110	692.3	1.00	410	1.30	250	168	154	56 250	5
-5	100	1115	696.3	0.89	409	1.15	254	166	154	57	4.5
-4	105	1120	698.1	0.79	404	1.05	237	166	154	54	4.5
-3	110	1125	700.7	0.64	407	0.83	236	165	154	55	3.5
-2	115	1130	703.0	0.42	408	0.55	238	163	154	57	2.5
-1	120	1135	705.178	0.45	407	0.59	240	162	153	59	3
			Pre-Test Leak Rate = 0.004 CFM @ 11" Hg								
	120	1150	705.46								
2B-1	125	1155	708.5	0.95	404	1.25	245	144	147	62	5
-2	130	1200	711.8	1.10	405	1.45	251	155	145	45	5
-3	135	1205	715.0	1.00	405	1.30	249	159	145	55	5
-4	140	1210	718.2	1.15	412	1.50	242	161	146	56	6
-5	145	1215	721.7	1.15	412	1.50	255	163	147	56	6
-6	150	1220	724.8	0.95	408	1.25	263	162	148	55	5.5
-7	155	1225	728.0	0.95	407	1.25	265	162	148	56	5
-8	160	1230	731.2	1.10	405	1.45	264	163	149	58	6
-9	165	1235	735.0	1.30	403	1.70	264	165	150	59	7.5
-10	170	1240	—	1.30	401	1.70	257	166	151	56	7
-11	175	1245	742.5	1.60	414	2.10	254	168	151	57	9

P_{static} = -5.1

COMMENTS

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN #6
PAGE 3 OF 3

PLANT	Morristown Hospital
DATE	11/23/91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	Multi-Metals
RUN NUMBER	#6
OPERATOR	[illegible]

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
28-12	180	1250	746.3	1.60	407	2.10	252	169	152	58	9
-12	185	1255	750.3	1.50	405	1.95	256	171	152	60	8.5
-11	190	100	754.1	1.40	409	1.80	247	170	152	58	8.5
-10	195	105	758.0	1.35	409	1.75	245	171	154	58	8
-9	200	100	761.2	1.20	405	1.55	243	170	154	59	7
-8	205	115	764.5	1.00	409	1.30	241	168	155	62	6.5
-7	210	120	767.8	1.00	411	1.30	239	168	155	61	6.5
-6	215	125	771.0	1.05	412	1.35	234	168	155	59	6.5
-5	220	130	774.0	0.97	406	1.25	234	167	155	59	6
-4	225	135	777.2	0.94	412	1.20	235	167	155	59	6
-3	230	140	780.4	1.10	414	1.45	232	167	155	57	7
-2	235	145	784.0	1.10	411	1.45	232	167	155	58	7
-1	240	150	787.183	1.00	410	1.30	225	168	155	55	
	stop @										
			Post-Test Leak Rate = 0.005 CFM @ 12" Hg								

COMMENTS:

Revis

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Momstown
Date	11/23/91
Sampling Location	Inlet
Sample Type	TM
Run Number	6
Sample Box Number	Inlet MMTL
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO_3
Sample Identification Code	
XAD Trap Number	

Filter# ~~991-24~~ TM 026 11/23/91

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	857.0	471.9g	385.1
2	ABS	~100	MGS	639.0	574.0g	65.0
3	ABS	~100	GS	583.4	577.6g	5.8
4	MT	—	MGS	484.0	484.4g	-0.4
5	Acidic $KMnO_4$	~100	MGS	587.1	587.7g	-0.6
6	Acidic $KMnO_4$	~100	MGS	581.8	582.1g	-0.3
7	Silica Gel	~200	MGS	791.7	759.6g	32.1

TOTAL WEIGHT GAIN (g) 486.7

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown Hosp
Date	11/22/91
Sampling Location	Inlet
Sample Type	TM
Run Number	~~5~~ F3
Sample Box Number	Inlet TM
Clean-up Person	Bun
Solvent Rinses	3x HNO_3, 3x $KMnO_4$
Sample Identification Code	
XAD Trap Number	

Filter

TM-491-14

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MOS		472.2	
2	5% HNO_3 10% H_2O_2	≈100	MOS		588.4	
3	5% HNO_3 10% H_2O_2	≈100	GS		562.1	
4	MT	—	MOS		484.4	
5	Acidic $KMnO_4$	≈100	GS		587.9	
6	Acidic $KMnO_4$	≈100	MOS		587.2	
7	Silica Gel	≈200	MOS		726.5	

TOTAL WEIGHT GAIN (g) _____

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown
Date	11/22/91
Sampling Location	Outlet
Sample Type	TM
Run Number	~~5~~ FB
Sample Box Number	Outlet TM
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO_3
Sample Identification Code	
XAD Trap Number	

Filter
99129

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS		441.2g	
2	ABS	~100	GS		596.7g	
3	ABS	~ 100	MGS		559.1g	
4	MT	—	MGS		490.1g	
5	Acidic $KMnO_4$	~ 100	MGS		594.0g	
6	Acidic $KMnO_4$	~ 100	JDL MGS		607.4g	
7	Silica Gel	~ 200	MGS		698.4g	

TOTAL WEIGHT GAIN (g) _____

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown Hosp
Date	11/23/91
Sampling Location	Outlet
Sample Type	TM
Run Number	6
Sample Box Number	Outlet TM
Clean-up Person	Bow
Solvent Rinses	
Sample Identification Code	
XAD Trap Number	

Filter

TM 03-

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	655.1g	494.9 ~~437.4~~	160.2
2	5% HNO_3 10% H_2O_2	≈ 100	MGS	767.9g	601.4	166.5
3	5% HNO_3 10% H_2O_2	≈ 100	GS	590.6g	559.0	31.6
4	MT	—	MGS	498.4g	489.8	8.6
5	Acidic $KMnO_4$	≈ 100	GS	598.3g	595.4	2.9
6	Acidic $KMnO_4$	≈ 100	MGS	607.8g	609.4	-1.6
7	Silica Gel	≈ 200	MGS	747.2g	719.7	27.5

TOTAL WEIGHT GAIN (g) 395.7

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6
PAGE 3 OF 3

PLANT	Morristown
DATE	11/23
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	6
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-6	02:50	12:40	255.90	1.1	293	1.32	254	98	95	56	3.0
-6	02:55	12:45	258.96	1.2	286	1.44	254	98	95	52	3.5
-7	03:00	12:50	262.20	1.1	287	1.32	254	99	96	53	3.5
-7	03:05	12:55	265.30	1.1	290	1.32	255	99	95	54	3.5
-8	03:10	13:00	268.32	1.0	291	1.2	255	98	95	55	3.5
-8	03:15	13:05	271.40	1.0	291	1.2	256	98	95	57	3.5
-9	03:20	13:10	274.43	.97	293	1.16	255	98	95	55	3.0
-9	03:25	13:15	277.82	.97	290	1.16	255	99	95	54	3.0
-10	03:30	13:20	280.41	1.0	291	1.2	254	99	96	50	3.0
-10	03:35	13:25	283.54	1.0	288	1.2	254	99	96	51	3.0
-11	03:40	13:30	286.77	.98	286	1.18	254	99	97	52	3.0
-11	03:45	13:35	289.35	.97	288	1.16	254	99	97	53	3.0
-12	03:50	13:40	292.37	.97	284	1.16	255	99	96	54	3.0
-12	03:55	13:45	295.35	.97	280	1.16	255	99	96	58	3.0
STOP	04:00	13:50	298.40								

COMMENTS:

Revision 11/90

RADIAN CORPORATION

~~MODIFIED~~ METHOD 5
FIELD DATA

RUN 6
PAGE 2 OF 3

PLANT	Morristown
DATE	11/23
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	6
OPERATOR	VLL

leak check out = 0.003 @ 11"
leak check in = 0.006 @ 15"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	~~Absorbent Trap~~ Inlet	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
B-6	01:30	11:05	209.11	.99	278	1.19	254		97	94	53	2.75
-5	01:35	11:10	212.12	1.0	284	1.2	254		97	94	54	2.75
-4	01:40	11:15	215.62	1.0	294	1.2	255		96	94	56	2.75
-3	01:45	11:20	218.05	1.0	290	1.2	255		96	94	56	2.75
-2	01:50	11:25	220.02	.99	281	1.19	254		97	94	51	2.75
-1	01:55	11:30	223.94	.99	283	1.19	255		97	94	53	2.75
STOP	02:00	11:35	226.92									
A-1	02:00	11:50	227.10	.99	279	1.19	254		94	93	50	2.75
-1	02:05	11:55	230.09	.99	280	1.19	254		94	93	52	2.75
-2	02:10	12:00	232.93	.90	287	1.08	254		95	93	54	2.75
-2	02:15	12:05	235.81	.90	287	1.08	254		95	93	55	2.75
-3	02:20	12:10	238.65	.96	289	1.15	255		96	93	57	2.75
-3	02:25	12:15	241.45	.97	287	1.16	255		96	94	58	2.75
-4	02:30	12:20	244.83	.93	289	1.12	252		97	94	54	2.75
-4	02:35	12:25	247.27	.94	290	1.13	254		97	94	54	3.0
-5	02:40	12:30	250.1	.97	289	1.16	254		97	94	56	3.0
-5	02:45	12:35	252.92	.97	286	1.16	255		97	94	58	3.0

COMMENTS

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RADIAN CORPORATION

~~MODIFIED~~ METHOD 5
FIELD DATA

RUN 6
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	DUCT DIMENSIONS	
DATE	11/23/91	NOZZLE I.D. (in)	0.2	FILTER TYPE	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	N-33	FILTER NUMBER	TM030
SAMPLE TYPE	TM	METER Δ H@	1.97	ASSUMED MOISTURE (%)	14
RUN NUMBER	6	Yd	.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.2	MOISTURE DATA	
AMBIENT TEMPERATURE	98	PROBE HEATER SETTING	250	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.89	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Ps)	+0.17	XAD TRAP		CO2	5
INITIAL LEAKCHECK	0.006@14"	HEIGHT OF LOCATION (ft)	25	FINAL LEAKCHECK	0.005@12"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Problem operator → did not start on the correct line

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps)	Flue Gas Temperature	Orifice Pressure Differential	Filter Temperature	~~Absorbent Trap~~	Temperature (°F) Dry Gas Meter Inlet	Dry Gas Meter Outlet	Impinger	Pump Vacuum
B-1	00:00	09:30	155.05	1.1	288	1.32	255		87	87	49	2.75
-2	00:05	09:35	157.86	1.1	280	1.32	255		88	87	50	2.75
-3	00:10	09:40	160.88	.98	289	1.18	254		88	87	53	2.5
-4	00:15	09:45	163.76	1.0	292	1.2	254		91	88	56	2.5
-5	00:20	09:50	166.65	.92	289	1.1	255		92	89	57	2.5
-6	00:25	09:55	169.47	.96	289	1.15	254		93	89	57	2.5
-7	00:30	10:00	172.30	1.2	286	1.44	253		94	89	51	3.0
-8	00:35	10:05	175.46	1.1	284	1.32	253		95	90	53	2.75
-9	00:40	10:10	178.51	1.1	289	1.32	253		96	90	55	2.75
-10	00:45	10:15	181.54	1.0	285	1.2	254		96	92	57	2.75
-11	00:50	10:20	184.55	1.2	285	1.44	253		97	92	58	3.0
-12	00:55	10:25	187.71	1.0	287	1.2	254		97	92	56	3.0
STOP	01:00	10:30	191.02									
B-12	01:00	10:35	191.02	1.0	288	1.2	254		95	92	50	3.0
-11	01:05	10:40	194.05	1.1	283	1.32	254		95	92	53	3.0
-10	01:10	10:45	197.01	.98	287	1.18	254		96	93	55	3.0
-9	01:15	10:50	199.95	1.0	282	1.2	255		96	93	56	3.0
-8	01:20	10:55	202.92	1.0	284	1.2	255		96	93	57	3.0
-7	01:25	11:00	205.87	1.2	293	1.44	256		96	93	56	3.0

COMMENTS

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/22/91
Sampling Location	OUTLET
Sample Type	TM
Run Number	5
Sample Box Number	OUTLET TM
Clean-up Person	BWW
Solvent Rinses	3 x HNO_3
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	–	MGS	671.3g	474.4	196.9
2	5% HNO_3 10% H_2O_2	≈100	MGS	760.6g	585.4	175.2
3	5% HNO_3 10% H_2O_2	≈100	GS	578.7g	565.5	13.2
4	MT	–	MGS	496.7 ~~502.4~~ JDL g	486.7	10.0
5	Acidic $KMnO_4$	≈100	GS	599.7g	590.2	9.5
6	Acidic $KMnO_4$	≈100	MGS	611.1g	586.6	24.5
7	Silica Gel	≈200	MGS	723.0g	698.4	24.6

TOTAL WEIGHT GAIN (g) 453.9

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 3 OF 3

PLANT	Morristown
DATE	11/22
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	5
OPERATOR	VLc

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-4	02:30	17:14	099.70	.97	290	1.14	253	95	91	54	2.0
-4	02:35	17:19	102.53	1.1	279	1.3	254	95	91	55	2.0
B-5	02:40	17:24	105.65	1.1	278	1.3	254	95	91	56	2.0
-5	02:45	17:29	108.69	1.1	292	1.3	254	96	92	56	2.0
B-6	02:50	17:34	111.81	1.25	291	1.475	255	97	92	58	2.25
-6	02:55	17:39	115.11	1.15	286	1.36	256	98	93	61	2.25
B-7	03:00	17:44	118.22	1.1	286	1.3	256	98	93	51	2.25
-7	03:05	17:49	121.41	1.1	293	1.3	254	98	94	53	2.25
B-8	03:10	17:54	124.40	.95	292	1.12	255	98	94	54	2.25
-8	03:15	17:59	127.79	.95	290	1.12	255	99	95	54	2.25
B-9	03:20	18:04	131.0	1.05	289	1.24	255	99	95	56	2.25
-9	03:25	18:09	133.84	1.05	287	1.24	255	99	95	57	2.25
B-10	03:30	18:14	136.55	1.05	289	1.24	255	100	96	56	2.25
-10	03:35	18:19	139.84	1.0	287	1.18	255	99	96	55	2.25
B-11	03:40	18:24	142.65	1.0	283	1.18	254	99	96	50	2.25
-11	03:45	18:29	145.67	.99	286	1.17	255	100	96	53	2.25
B-12	03:50	18:34	148.71	.99	291	1.17	255	100	97	55	2.25
-12	03:55	18:39	151.65	.99	289	1.17	256	100	97	57	2.25
STOP	04:00	18:44	154.70								

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 2 OF 3

PLANT	Morristown
DATE	11/22/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	5
OPERATOR	VLL

Leak checks ⇒ port out = 0.006 @ 12"
port in = 0.006 @ 12"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-9	01:20	13:33	057.69	1.0	285	1.18	255	97	94	65	2.0
-9	01:25	13:38	060.58	1.2	288	1.42	255	97	94	53	2.0
A-10	01:30	13:43	063.81	1.3	288	1.53	254	97	94	55	2.25
-10	01:35	13:48	067.17	1.4	285	1.65	255	97	94	56	2.5
A-11	01:40	13:53	070.60	1.2	289	1.42	255	98	95	59	2.25
-11	01:45	13:58	074.00	1.2	289	1.42	255	98	95	60	2.25
A-12	01:50	14:03	077.27	.99	286	1.17	255	98	95	52	2.0
-12	01:55	14:08	080.37	.99	284	1.17	256	98	95	54	2.0
STOP	02:00	14:13	083.16								
B-1	02:00	15:05	083.40	.98	282	1.16	258	91	89	49	2.0
-1	~~STOP~~ 02:05	15:10	086.44	.98	283	1.16	256	93	90	52	2.0
STOP	~~STOP~~ 02:10	15:15	086.90								
B-1	02:15	16:50	086.90	.81	272	.96	256	90	89	50	2.0
B-2	02:10	16:54	088.63	.81	277	.96	256	90	89	50	2.0
-2	02:15	16:59	091.35	.89	282	1.05	255	90	89	53	2.0
B-3	02:20	17:04	094.10	.93	282	1.1	254	92	90	54	2.0
-3	02:25	17:09	096.91	.93	285	1.1	254	92	91	54	2.0

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25
DATE	11/22	NOZZLE I.D. (in)	.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	N-33	FILTER NUMBER	TM-027
SAMPLE TYPE	TM1	METER Δ H@	1.97	ASSUMED MOISTURE (%)	14
RUN NUMBER	5	Yd	.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.18	MOISTURE DATA	
AMBIENT TEMPERATURE	96	PROBE HEATER SETTING	250	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	30.00	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Ps)	+0.14			CO2	5
INITIAL LEAKCHECK	0.009 @ 14"			FINAL LEAKCHECK	0.01 @ 15"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-1	00:00	12:00	012.92	.94	298	1.1	251	90	90	49	1.0
STOP	00:02	12:02	013.82								
-1	00:02	12:15	013.82	.90	287	1.06	256	90	90	51	1.0
-1	00:05	12:18	014.70	.90	287	1.06	255	91	90	54	1.0
A-2	00:10	12:23		.90	288	1.06	253	93	91	56	1.0
-2	00:15	12:28	019.03	.90	288	1.06	254	94	92	57	1.0
A-3	00:20	12:33	021.04	.94	293	1.1	255	95	92	58	1.0
-3	00:25	12:38	024.58	.94	294	1.1	256	96	93	59	1.0
A-4	00:30	12:43	027.76	1.1	292	1.3	255	97	94	62	1.0
-4	00:35	12:48	030.43	1.1	290	1.3	255	97	94	60	1.0
A-5	00:40	12:53	033.45	.92	286	1.08	256	99	95	53	2.0
-5	00:45	12:58	036.39	.94	288	1.1	255	100	96	54	2.0
A-6	00:50	13:03	039.21	.99	285	1.17	255	100	97	55	2.0
-6	00:55	13:08		1.1	285	1.3	254	97	93	50	2.0
A-7	01:00	13:13	045.14	1.1	287	1.3	255	98	94	53	2.0
-7	01:05	13:18	048.28	1.1	283	1.3	255	97	93	55	2.0
A-8	01:10	13:23	051.40	1.05	288	1.24	256	98	94	57	2.0
-8	01:15	13:28	054.42	1.1	291	1.3	254	98	94	56	2.0

COMMENTS STOPPED after 2 min. due to imp. breaking in CDD train.

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/21/91
Sampling Location	OUTLET
Sample Type	TM
Run Number	4
Sample Box Number	OUTLET TM
Clean-up Person	BWN
Solvent Rinses	3x KMnO4
Sample Identification Code	
XAD Trap Number	

FILTER

TM 028

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	714.2	440.5	273.7
2	5% HNO_3 10% H_2O_2	≈100	MGS	766.2	600.1	166.1
3	5% HNO_3 10% H_2O_2	≈100	GS	578.0	559.2	18.8
4	MT	—	MGS	494.9	489.9	5.0
5	Acidic $KMnO_4$	≈100	MGS	595.3	596.2	-0.9
6	Acidic $KMnO_4$	≈100	MGS	611.2	611.5	-0.3
7	Silica Gel	≈200	MGS	755.9	730.4	25.5

TOTAL WEIGHT GAIN (g) 487.9

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 3 OF 3

PLANT	Morristown
DATE	11/21/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	4
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-5	02:40	16:30	965.05	1.1	291	1.3	254	101	98	61	3.5
-5	02:45	16:35	968.15	1.1	288	1.3	255	101	98	57	3.5
A-6	02:50	16:40	971.25	.98	292	1.16	256	101	98	58	3.0
-6	02:55	16:45	974.25	.98	290	1.16	256	101	98	59	3.0
A-7	03:00	16:50	977.22	.98	288	1.16	257	101	98	62	3.0
-7	03:05	16:55	980.24	.94	294	1.11	253	102	99	62	3.0
A-8	03:10	17:00	983.22	.92	292	1.1	252	102	99	53	3.0
-8	03:15	17:05	986.05	.92	289	1.1	253	102	99	55	3.0
A-9	03:20	17:10	989.30	.85	293	.98	255	102	99	56	3.0
-9	03:25	17:15	992.03	.87	295	1.03	254	102	99	59	3.0
A-10	03:30	17:20	994.74	.92	285	1.1	255	102	99	62	3.0
-10	03:35	17:25	997.70	.92	291	1.1	255	102	99	55	3.0
A-11	03:40	17:30	1000.66	.96	287	1.13	255	102	99	57	3.0
-11	03:45	17:35	1003.32	.91	290	1.1	256	102	99	58	3.0
A-12	03:50	17:40	1006.89	.91	286	1.1	256	102	99	59	3.0
-12	03:55	17:45	1009.52	.92	284	1.1	253	102	99	62	3.0
STOP	04:00	17:50	1012.12								

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 2 OF 3

PLANT	Morristown
DATE	11/21/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	4
OPERATOR	VLL

port change initial = 0.009 @ 11"
port change final = 0.009 @ 11"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-9	01:20	14:39	916.80	1.0	288	1.18	256	100	97	64	4.0
-9	01:25	14:44	919.80	1.0	289	1.18	257	102	98	60	4.0
B-10	01:30	14:49	922.76	.91	294	1.07	255	102	99	65	4.0
-10	01:35	14:54	925.67	.80	285	.94	255	101	98	52	3.0
B-11	01:40	14:59	928.78	.84	289	.99	254	101	98	54	3.25
-11	01:45	15:04	931.52	.97	301	1.15	254	102	99	57	4.0
B-12	01:50	15:09	934.25	1.1	292	1.3	252	102	99	61	4.0
-12	01:55	15:14	937.57	1.1	290	1.3	254	102	99	62	4.0
STOP	02:00	15:19	940.50								
A-1	02:00	15:50	940.80	1.15	285	1.36	252	97	97	50	3.5
-1	02:05	15:55	943.96	1.1	288	1.3	253	96	95	53	3.5
A-2	02:10	16:00	947.03	1.1	289	1.3	254	97	96	54	3.5
-2	02:15	16:05	950.11	1.1	291	1.3	254	98	97	56	3.5
A-3	02:20	16:10	953.18	.93	293	1.1	256	99	97	59	3.0
-3	02:25	16:15	956.13	1.0	285	1.18	255	100	97	62	3.0
A-4	02:30	16:20	959.51	1.0	290	1.18	255	101	98	64	3.0
-4	02:35	16:25	962.15	1.0	295	1.18	255	100	97	51	3.0

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25'
DATE	11/21/91	NOZZLE I.D. (in)	0.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	N-33	FILTER NUMBER	TM-028
SAMPLE TYPE	TM	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	15.29
RUN NUMBER	4	Yd	0.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.18	MOISTURE DATA	
AMBIENT TEMPERATURE	95	PROBE HEATER SETTING	250	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.95	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Ps)	+0.11			CO2	5
INITIAL LEAKCHECK	0.009@11"			FINAL LEAKCHECK	0.011@9"

AVE ΔP = .9655
AVE Ts = 288.92
AVE Tm = 97.86
DSC F = 133.10
% ISO = 99.2

69.47
71.20

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
B-1	00:00	12:45	871.03	.95	283	1.12	251	92	92	49	3.0
-1	00:05	12:50	873.75	.95	280	1.12	254	92	92	51	3.0
B-2	00:10	12:55	876.66	.92	280	1.09	255	92	92	52	3.0
-2	00:15	13:00	879.34	.92	281	1.09	254	93	92	54	3.0
B-3	00:20	13:05	882.19	.92	286	1.09	253	95	92	55	3.0
-3	00:25	13:10	885.14	.92	285	1.09	252	96	93	56	3.0
STOP B-4	00:26	13:11	885.75								
-4	00:26	~~13:20~~ 13:45	885.75	1.0	286	1.18	253	94	93	53	3.0
-4	00:30	13:49	888.00	.94	292	1.11	252	94	93	54	3.5
-4	00:35	13:54	890.78	.94	288	1.11	254	93	92	52	3.5
B-5	00:40	13:59	893.62	.94	289	1.11	256	95	93	56	3.5
-5	00:45	14:04	896.83	.99	293	1.17	255	97	94	58	3.75
B-6	00:50	14:09	899.36	.99	286	1.17	256	98	95	60	3.75
-6	00:55	14:14	902.33	.94	285	1.11	254	98	95	62	3.75
B-7	01:00	14:19	905.25	.94	291	1.11	253	99	95	64	3.75
-7	01:05	14:24	908.13	.97	293	1.15	255	100	96	55	3.75
B-8	01:10	14:29	911.21	.90	286	1.06	255	101	97	59	3.50
-8	01:15	14:34	913.91	.90	294	1.06	256	101	97	60	3.75

COMMENTS Spray Dryer down @ 13:11

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown
Date	11/20/91
Sampling Location	Outlet
Sample Type	TM
Run Number	3
Sample Box Number	Outlet TM
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO3
Sample Identification Code	
XAD Trap Number	

Filter

TM031

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	–	MGS	715.7g	431.1g	275.8
2	ABS	~100	MGS	762.2g	601.9g	160.3
3	ABS	~100	MGS JDL	576.7g	564.7g	12.0
4	MT	–	MGS	495.6g	490.4g	5.2
5	Acidic KMnO4	~100	MGS	609.1g	593.5g	15.6
6	Acidic KMnO4	~100	MGS	602.5g	603.1g	-0.6
7	Silica Gel	~200	MGS	741.5g	714.1g	27.4

TOTAL WEIGHT GAIN (g) 495.7

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 3 OF 3

69.04
69.89

PLANT	Morristown
DATE	11/20
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	3
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-6	02:50	21:40	829.23	1.1	285	1.28	253	96	92	59	4.0
-6	02:55	21:45	832.32	1.1	276	1.28	256	96	92	61	4.0
B-7	03:00	21:50	835.23	1.0	281	1.16	259	96	92	62	4.0
-7	03:05	21:55	838.30	1.0	290	1.16	260	98	94	66	4.0
B-8	03:10	22:00	841.28	1.0	284	1.16	260	99	95	54	4.0
-8	03:15	22:05	844.25	1.0	278	1.16	259	99	95	56	4.0
B-9	03:20	22:10	847.55	.89	284	1.0	258	99	95	57	4.0
-9	03:25	22:15	850.40	1.1	288	1.28	258	99	95	59	4.0
B-10	03:30	22:20	853.13	1.1	289	1.28	260	99	95	62	4.0
-10	03:35	22:25	856.21	.96	285	1.1	257	99	95	63	4.0
B-11	03:40	22:30	859.04	.92	284	1.07	258	99	95	50	4.0
-11	03:45	22:35	862.00	.93	278	1.08	260	99	96	51	4.0
B-12	03:50	22:40	864.82	.95	280	1.1	260	100	97	53	4.0
-12	03:55	22:45	868.01	.94	289	1.1	259	100	96	54	4.0
STOP	04:00	22:50	870.65								

COMMENTS:

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RADIAN CORPORATION

METHOD 5 FIELD DATA

RUN 3
PAGE 2 OF 3

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

AVE ΔP = .9733
AVE T_s = 285.21
AVE T_m = 94.68
DSCF =
% ISO =

leak check out = 0.007 @ 15"
leak check in = 0.004 @ 16"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ hs), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	01:30	14:00	782.67	1.0	284	1.16	255	100	97	63	2.0
-10	01:35	14:05	785.70	.92	290	1.07	256	100	97	57	2.0
A-11	01:40	14:10	788.30	.96	289	1.1	258	100	97	58	2.0
-11	01:45	14:15	791.39	1.0	287	1.16	257	100	97	60	2.0
A-12	01:50	14:20	794.15	1.0	288	1.16	258	100	97	61	2.0
-12	01:55	14:25	797.25	.96	287	1.1	260	102	99	64	2.0
STOP	02:00	14:30	800.29								
B-1	02:00	16:45	800.76	.79	281	.92	251	94	93	52	2.0
-1	02:05	16:50	803.33	.79	283	.92	254	94	93	51	2.0
STOP/START B-2	02:10	16:55	805.95	1.1	289	1.3	264	89	88	50	2.0
-2	02:15	17:00	809.60	.94	278	1.1	259	90	89	53	2.0
B-3	02:20	17:10	812.175	.92	275	1.1	256	90	89	56	2.0
-3	02:25	17:15	815.08	.97	290	1.1	260	91	89	58	2.0
B-4	02:30	17:20	817.77	.97	294	1.1	259	92	89	59	2.0
-4	02:35	17:25	820.65	1.0	285	1.16	263	94	91	61	2.0
B-5	02:40	17:30	823.41	1.0	283	1.16	260	95	92	62	2.0
-5	02:45	17:35	826.34	.95	291	1.0	260	95	92	64	2.0

COMMENTS Unit was down for ~2.5 hrs during port change
Unit [illegible] 10 min [illegible]

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF 3

AVE ΔP = .9733
AVE Ts = 285.21
AVE Tm = 94.68
DSCF = 133.00
% ISO = 99.4

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25'
DATE	11/20/91	NOZZLE I.D. (in)	0.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	N-33	FILTER NUMBER	TM-031
SAMPLE TYPE	TM	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	
RUN NUMBER	3	Yd	0.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.16	MOISTURE DATA	
AMBIENT TEMPERATURE	92	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.13	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Ps)	-0.1			CO2	5
INITIAL LEAKCHECK	0.006@15"			FINAL LEAKCHECK	

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-1	00:00	12:30	731.25	.96	284	1.1	251	87	87	51	2.0
-1	00:05	12:35	734.18	1.1	283	1.3	253	88	87	53	2.0
A-2	00:10	12:40	736.84	1.0	285	1.16	255	89	87	54	2.0
-2	00:15	12:45	740.10	1.0	282	1.16	260	91	88	55	2.0
A-3	00:20	12:50	742.93	.96	286	1.1	258	94	90	56	2.0
-3	00:25	12:55	745.80	.96	286	1.1	260	94	90	57	2.0
A-4	00:30	13:00	748.65	.92	282	1.07	258	96	91	58	2.0
-4	00:35	13:05	751.45	.92	283	1.07	258	97	91	59	2.0
A-5	00:40	13:10	754.27	.88	292	1.0	258	97	92	61	2.0
-5	00:45	13:15	757.26	.88	287	1.0	259	97	92	60	2.0
A-6	00:50	13:20	759.92	.96	288	1.1	258	97	94	56	2.0
-6	00:55	13:25	762.75	.96	289	1.1	253	98	95	58	2.0
A-7	01:00	13:30	765.57	.96	287	1.1	255	98	95	59	2.0
-7	01:05	13:35	768.49	1.0	285	1.16	258	98	94	61	2.0
A-8	01:10	13:40	771.34	1.0	284	1.16	260	98	94	53	2.0
-8	01:15	13:45	774.84	1.0	285	1.16	259	99	95	55	2.0
A-9	01:20	13:50	776.11	1.0	287	1.16	258	99	96	57	2.0
-9	01:25	13:55	779.85	1.0	290	1.16	259	100	97	59	2.0

COMMENTS:

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RADIAN
CORPORATION

Plant [illegible]

Date [illegible]

Sampling location [illegible]

Sample type [illegible]

Run number 2

Sample box number [illegible]

Clean-up person [illegible]

Solvent rinses 3 x [illegible]

Sample identification code _____

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	675.0 g	[illegible]	[illegible]
2	ABS	~100	MGS	713.4 g	[illegible]	-
3	ABS	~100	GS	611.6	[illegible]	[illegible]
4	MT	-	MGS	493.5 g	[illegible]	[illegible]
5	Acidic KMnO4	~100	MGS	600.1 g	[illegible]	[illegible]
6	Acidic KMnO4	~100	GS	640.1 g	611.2 g	[illegible]
7	Silica Gel	~200	MGS	732.9 g	712.0 g	[illegible]

Total Weight Gain (grams) [illegible]

118167IR

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____

PAGE ___ OF _____

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	03:30	20:25	713.62	.90	286	1.05	260	99	96	57	2
-10	03:35	20:30	716.38	.91	284	1.06	260	99	96	57	2
A-11	03:40	20:35	719.11	.83	283	.97	259	98	96	58	2
-11	03:45	20:40	721.48	.90	284	1.05	260	98	96	55	2
A-12	03:50	20:45	724.48	.90	279	1.05	260	98	96	57	2
-12	03:55	20:50	726.31	.90	281	1.05	260	98	96	58	2
STOP	04:00	20:55	730.00								

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 3 OF 4

PLANT		PROBE LENGTH AND TYPE		HEIGHT OF LOCATION (ft)	
DATE	11/19/91	NOZZLE I.D. (in)		DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER		FILTER NUMBER	
SAMPLE TYPE	TM	METER ▲ H@		ASSUMED MOISTURE (%)	
RUN NUMBER	2	Yd		MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.17	MOISTURE DATA	
AMBIENT TEMPERATURE		PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE		HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)				CO2	
INITIAL LEAKCHECK	0.004@12"			FINAL LEAKCHECK	0.005@14"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-1	02:00	18:55	662.65	~~.82~~	284	~~1.15~~ 1.15	256	93	92	61	2
-1	02:05	19:00	665.62	.99	288	1.15	258	90	90	58	2
A-2	02:10	19:05	668.68	.99	283	1.15	260	91	91	56	2
-2	02:15	19:10	671.51	.99	285	1.15	260	92	91	56	2
A-3	02:20	19:15	674.52	.93	288	1.1	259	94	91	52	2
-3	02:25	19:20	677.26	.94	286	1.1	260	94	92	55	2
A-4	02:30	19:25	680.54	.95	286	1.1	260	95	92	58	2
-4	02:35	19:30	683.11	.94	284	1.1	261	95	92	61	2
A-5	02:40	19:35	686.08	.92	289	1.1	260	95	92	60	2
-5	02:45	19:40	688.75	.93	285	1.1	258	97	93	64	2
A-6	02:50	19:45	691.34	.84	287	.98	259	97	94	56	2
-6	02:55	19:50	694.08	.85	289	.99	260	97	94	57	2
A-7	03:00	19:55	696.25	1.0	251	1.17	262	97	94	60	2
-7	03:05	20:00	699.60	1.0	279	1.17	260	97	94	60	2
A-8	03:10	20:05	702.52	.92	287	1.1	260	97	94	61	2
-8	03:15	20:10	705.36	.92	292	1.1	260	97	94	56	2
A-9	03:20	20:15	708.11	.90	285	1.05	259	97	95	56	2
-9	03:25	20:20	710.91	.90	282	1.05	26[illegible]	97	95	57	2

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE 2 OF 4

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-10	01:35	17:26	648.66	.90	284	1.0	260	97	94	61	2
-10	01:40	17:31	651.60	.86	283	1.0	260	97	94	62	2
B-11	01:45	17:36	654.12	.86	287	1.0	260	97	94	59	2
-11	01:50	17:41	657.09	.82	285	.96	258	97	94	61	2
B-12	01:55	17:46	659.53	.82	288	.96	258	97	94	62	2
-12	02:00	17:51	662.35	.82	287	.96	259	97	94	60	2

STOP

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 1 OF 4

PLANT Mo-town	MINI	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25'
DATE	11/19/91	NOZZLE I.D. (in)	0.203 VLL	DUCT DIMENSIONS	
SAMPLING LOCATION	stack	METER BOX NUMBER	N-33	FILTER NUMBER	
SAMPLE TYPE	TM	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	15.29
RUN NUMBER	2	Yd	.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.13	MOISTURE DATA	
AMBIENT TEMPERATURE	90°	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.01	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Ps)	-0.1			CO2	5
INITIAL LEAKCHECK	.01 @ 11"			FINAL LEAKCHECK	0.006 @ 10"

AVE ΔP = ~~.9054~~ .9158 VLL
AVE T_s = 285.35
AVE T_m = 94.1458
DSCF = = 127.11
% ISO = 100.0

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	00:00	1551	596.525								
B-1	00:05	1556	599.5	.98	278	1.15	251	88	88	67	2
-1	00:10	1601	603.11	.98	283	1.15	248	88	87	63	2
B-2	00:15	16:06	605.60	.98	282	1.15	250	90	88	63	2
-2	00:20	16:11	607.61	.98	283	1.15	253	92	89	63	2
B-3	00:25	16:16	610.31	.97	288	1.15	256	94	91	62	2
-3	00:30	16:21	612.95	.96	287	1.15	258	95	92	62	2
B-4	00:35	16:26	615.72	.95	286	1.1	260	95	91	62	2
-4	00:40	16:31	618.52	.95	284	1.1	258	94	91	61	2
B-5	00:45	16:36	621.29	.87	286	1.0	260	94	91	61	2
-5	00:50	16:41	624.09	.88	285	1.0	260	94	90	60	2
B-6	00:55	16:46	626.80	.86	286	1.0	258	96	93	60	2
-6	01:00	16:51	629.50	.91	289	1.1	258	96	93	59	2
B-7	01:05	16:56	632.29	.92	289	1.1	259	96	93	59	2
-7	01:10	17:01	635.00	.86	284	1.0	260	96	94	58	2
B-8	01:15	17:06	637.73	.86	291	1.0	260	96	94	58	2
-8	01:20	17:11	640.41	.91	291	1.1	258	97	94	59	2
B-9	01:25	17:16	643.15	.93	285	1.1	257	97	94	60	2
-9	01:30	17:21	646.02	.90	288	1.0	260	97	94	60	2

COMMENTS:

Revision 11/90

RADIAN
CORPORATION

Plant [illegible]

Date 11/19/91

Sampling location [illegible]

Sample type TM

Run number 1

Sample box number [illegible] TM

Clean-up person [illegible]

Solvent rinses

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	705.8 g ~~706.5~~ g	437.9 g	267.9
2	ABS	≈ 100	MGS	743.3 g	596.0 g	147.3
3	ABS	≈ 100	GS	573.3 g	558.8 g	14.5
4	MT	—	MGS	492.0 g	488.2 g	3.8
5	Acidic KMnO4	≈ 100	MGS	596.9 g	594.9 g	2.0
6	Acidic KMnO4	≈ 100	GS	600.0 g	601.1 g	-1.1
7	Silica Gel	≈ 200	MGS	715.1 g	691.4 g	23.7

Total Weight Gain (grams) 458.1

1181671R

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN
PAGE 4 OF 4

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-10	03:35	18:10	579.89	.88	283	1.0	265	95	93	60	2.0
-10	03:40	18:15	582.71	.88	281	1.0	260	95	93	59	2.0
B-11	03:45	18:20	585.13	.84	278	.97	257	95	93	58°	2.0
-11	03:50	18:25	587.78	.84	278	.97	256	95	93	59°	2.0
B-12	03:55	18:30	590.45	.82	284	.94	259	95	93	60	2.0
-12	04:00	18:35	593.18	.83	286	.95	261	94	92	64	2.0
STOP		18:40	595.66								

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 3 OF 4

AVE ΔP = .9215
AVE STACK T = 284.6
AVE Meter T = 92.35
DSCF = 125.19
ISO % 101.3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	
DATE	11/18/91	NOZZLE I.D. (in)		DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER		FILTER NUMBER	
SAMPLE TYPE	TM	METER ▲ H@		ASSUMED MOISTURE (%)	
RUN NUMBER	1	Yd		MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.15	MOISTURE DATA	
AMBIENT TEMPERATURE	90°F	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.05	HEATER BOX SETTING		O2	
STATIC PRESSURE (Pa)	-0.1			CO2	
INITIAL LEAKCHECK	0.003@20"			FINAL LEAKCHECK	

This no. should have been 02:00

Adjust accordingly

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
B-1	02:05	16:40	531.92	.94	278	1.08	260	91	90	56	2.0
-1	02:10	16:45	534.76	.94	279	1.08	261	90	89	61	2.0
B-2	02:15	16:50	537.48	.91	278	1.05	260	91	90	62	2.0
-2	02:20	16:55	540.18	.88	279	1.0	260	92	91	61	2.0
B-3	02:25	17:00	542.89	.80	277	.92	259	94	92	63	2.0
-3	02:30	17:05	545.50	.79	278	.91	260	94	92	60	2.0
B-4	02:35	17:10	548.11	.85	285	.98	259	94	92	59	2.0
-4	02:40	17:15	550.6	.86	283	.99	259	94	92	60	2.0
B-5	02:45	17:20	553.20	.90	286	1.03	260	96	94	63	2.0
-5	02:50	17:25	555.91	.88	285	1.0	261	96	95	61	2.0
B-6	02:55	17:30	558.58	.86	287	.99	260	97	95	60	2.0
-6	03:00	17:35	561.35	.86	288	.99	258	95	93	58	2.0
B-7	03:05	17:40	563.92	.91	285	1.05	259	95	93	60	2.0
-7	03:10	17:45	566.66	.91	284	1.05	260	95	93	60	2.0
B-8	03:15	17:50	569.39	.89	286	1.02	257	97	95	63	2.0
-8	03:20	17:55	572.11	.87	284	1.0	260	96	93	60	2.0
B-9	03:25	18:00	574.71	.81	280	.93	260	95	93	60	2.0
-9	03:30	18:05	577.6	.78	283	.90	254	96	94	63	2.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 2 OF 4

PLANT	Morristown
DATE	11/18
SAMPLING LOCATION	Outlet
SAMPLE TYPE	TM
RUN NUMBER	1
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	01:30	15:31	514.88	1.0	288	1.15	260	95	92	61	2.0
-10	01:35	15:36	517.49	1.0	289	1.15	261	95	92	62	2.0
A-11	01:40	15:41	520.30	.95	282	1.1	259	95	92	61	2.0
-11	01:45	15:46	523.20	.93	283	1.07	261	95	92	60	2.0
A-12	01:50	15:51	525.94	.98	293	1.13	260	95	93	62	2.0
-12	01:55	15:56	528.63	1.1	290	1.26	260	95	93	62	2.0
STOP	02:00	16:01	531.56								

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 1 OF 4

101% ISO

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	26
DATE	11/18/91	NOZZLE I.D. (in)	.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	N-33	FILTER NUMBER	
SAMPLE TYPE	Trace metals	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	15.5
RUN NUMBER	1	Yd	0.9987	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.15	MOISTURE DATA	
AMBIENT TEMPERATURE	90°	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	~~29.97~~ 30.05	HEATER BOX SETTING	250	O2	13
STATIC PRESSURE (Pa)	-0.1			CO2	5
INITIAL LEAKCHECK	0.003@17"			FINAL LEAKCHECK	0.003@18"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
			~~464.73~~								
A-1	00:00	14:01	464.73	.95	~~285~~ 284	1.1	256	~~100~~ 87	~~98~~ 87	61	2.0
-21	00:05	14:06	467.71	.95	280	1.1	264	86	86	63	2.0
A-2	00:10	14:11	470.45	.93	289	1.07	273	86	85	60	2.0
-2	00:15	14:16	473.26	.93	289	1.07	264	86	86	61	2.0
A-3	00:20	14:21	475.91	.93	285	1.07	262	88	86	59	2.0
-3	00:25	14:26	478.64	.90	287	~~2.93~~ 1.04	263	90	87	62	2.0
A-4	00:30	14:31	481.54	.94	284	1.09	267	92	90	63	2.0
-4	00:35	14:36	483.95	.95	286	1.1	269	92	88	61	2.0
A-5	00:40	14:41	486.70	.96	287	1.1	265	92	89	60	2.0
-5	00:45	14:46	489.61	.96	289	1.1	261	93	90	62	2.0
A-6	00:50	14:51	492.09	.98	289	1.14	266	93	89	61	2.0
-6	00:55	14:56	494.85	1.0	288	1.16	263	94	90	63	2.0
A-7	01:00	15:01	497.60	.99	283	1.14	260	94	90	60	2.0
-7	01:05	15:06	500.38	.97	291	1.12	260	94	91	63	2.0
A-8	01:10	15:11	503.33	1.1	290	1.26	260	95	91	59	2.0
-8	01:15	15:16	506.52	1.1	289	1.26	260	95	91	60	2.0
A-9	01:20	15:21	508.37	1.0	286	1.15	261	95	92	58	2.0
-9	01:25	15:26	511.82	1.0	288	1.15	260	95	92	60	2.0

COMMENTS

Revision 11/90

RADIAN CORPORATION

FIELD DATA

PLANT Morristown
DATE 11-18-91
SAMPLING LOCATION Spray Dryer Inlet
SAMPLE TYPE Hg
RUN NUMBER 1
OPERATOR RKW
AMBIENT TEMPERATURE 106°F
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE, (P_s) -6.6
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3FT Glass
NOZZLE ID 0.170"
ASSUMED MOISTURE % 18% (15 sh)
SAMPLE BOX NUMBER 8
METER BOX NUMBER 8 1.0075
METER $\Delta H_@$ 1.97 1.97
K FACTOR .7282
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp
METER Y 1.0075

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1409	750.265									
2B 10	5	1414	752.75	1.1		.79	405	98	99	3.0	272	67
10	10	1419	755.17	1.1		.79	412	106	99	3.0	272	67
10	15	1424	757.64	1.1		.79	408	112	97	3.0	270	67
9	20	1429	760.19	0.90		.65	410	118	97	3.0	271	67
8	25	1434	762.01	0.88		.64	412	122	94	3.0	258	66
7	30	1439	764.58	1.1		.79	410	126	104	3.0	258	66
6	35	1444	767.14	1.0		.72	410	126	105	3.0	256	65
5	40	1449	769.44	1.0		.72	414	132	97	3.0	268	64
4	45	1454	771.74	0.95		.68	414	135	97	3.0	270	67
3	50	1459	774.07	0.78		.56	414	137	91	3.0	268	66
2	55	1504	776.23	0.37		.52	414	137	91	3.0	264	64
1	60	1509	778.05	0.60		.44	410	137	91	3.0	262	64
1	65	1514	779.95	0.78		.56	408	138	82	3.0	246	66
2	70	1519	782.04	0.92		.67	406	138	82	3.0	244	66
3	75	1524	784.35	0.82		.58	406	138	82	3.0	238	67
4	80	1529	786.97	1.1		.78	410	138	82	3.0	240	66
5	85	1534	789.12	1.1		.78	412	144	82	3.0	254	65
6	90	1539	791.67	0.82		0.58	410	147	82	3.0	252	65
7	95	1544	793.76	0.82		0.58	408	147	82	3.0	259	64
8	100	1549	795.89	0.78		0.56	408	147	82	3.0	256	65
9	105	1554	798.12	0.82		0.58	408	149	86	3.0	254	64
10	110	1559	800.02	[illegible]		0.78	406	150	83	3.0	260	65
10	115	1604	802.77	1.1		0.78	408	150	83	3.0	264	66

COMMENTS

805 195 1.1

[illegible] 1.1f (5116) 409625 116.5

[illegible] — — RKS [illegible]

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11-12-91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Hg
RUN NUMBER: 1
OPERATOR: RVW
AMBIENT TEMPERATURE: 106 °F
BAROMETRIC PRESSURE: 30.15
STATIC PRESSURE, (P_g): -6.6
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3/7 Glass
NOZZLE ID: .19
ASSUMED MOISTURE, %: 1.8%
SAMPLE BOX NUMBER: 8
METER BOX NUMBER: 8
METER $\Delta H_@$: 1.97
K FACTOR: .7287
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250
REFERENCE Δp:
METER Y: 1.0075

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Leak Check												
Stop 10	1609	120	805.195	1.1		0.75	410	150	83	3.0	268	67
	1640		805.735									
2A1	1645	125	807.80	0.62		0.44	414	132	81	3.0	272	66
2	1650	130	810.09	0.80		0.58	412	143	86	3.0	274	66
3	1655	135	812.30	0.88		0.64	412	145	87	3.0	269	66
4	1700	140	814.76	0.85		0.61	407	146	88	3.0	263	67
5	1705	145	816.79	1.1		0.80	406	147	94	3.0	270	66
6	1710	150	819.12	0.96		0.70	408	147	93	3.0	268	65
7	1715	155	821.21	1.1		0.80	410	149	93	3.0	272	64
8	1720	160	823.77	1.1		0.80	412	149	93	3.0	247	58
9	1725	165	826.81	1.1		0.80	410	150	92	3.0	239	58
10	1730	170	829.20	1.1		0.80	412	150	89	3.0	243	60
11	1735	175	831.77	1.1		0.80	405	150	87	3.0	246	62
12	1740	180	834.05	1.1		0.80	410	151	91	3.0	248	65
12	1745	185	836.72	1.1		0.80	412	151	91	3.0	250	67
11	1750	190	839.31	1.1		0.80	411	151	91	3.0	251	68
10	1755	195	841.85	1.1		0.80	409	152	91	3.0	249	67
9	1860	200	844.38	1.0		0.72	408	150	90	3.0	246	68
8	1865	205	846.78	0.95		0.69	404	149	89	3.0	238	62
7	1870	210	848.88	0.86		0.60	405	149	89	3.0	242	61
6	1875	215	851.91	0.78		0.56	404	147	93	3.0	266	64
5	1880	220	853.16	0.78		0.56	406	147	92	3.0	262	64
4	1885	225	855.25	0.85		0.61	406	147	92	3.0	258	65

COMMENTS

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11-18-91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Hg
RUN NUMBER: 1
OPERATOR: RVW
AMBIENT TEMPERATURE: 106 °F
BAROMETRIC PRESSURE: 30.05
STATIC PRESSURE, (P_s): -6.6
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3FT Glass
NOZZLE I.D.: 0.
ASSUMED MOISTURE %: 18
SAMPLE BOX NUMBER: 8
METER BOX NUMBER: 8
METER $\Delta H_@$: 1.97
K FACTOR: .7287
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250
REFERENCE Δp:
METER γ: 1.0075

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
3	1830	230	857.75	0.85		0.61	408	146	88	3.0	250	66
2	1838	235	859.81	0.7		0.51	406	144	94	3.0	248	66
STOP 1	1840	240	861.604	0.52		0.38	406	143	88	3.0	242	67
							LEAK ✓	@	.018@11"			
			110.799	.9173			409.0833	115.3125				
				RMS								
			% Iso	104.4								
			Velocity, ft/sec	70.76								
			ACFM	6692								
			DSCFM	3294								

COMMENTS

RADIAN
CORPORATION

Plant Morristown Hosp

Date 11/13/91

Sampling location Inlet

Sample type MICIA

Run number 1

Sample box number Inlet MICIA

Clean-up person Buck / JDL

Solvent rinses 3 x 5% HNO_3

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	Empty	—		796.8g	469.0g	327.8
2	Acidic $KMnO_4$	~100		644.2g	591.3g ~~487.0g~~	52.9
3	Acidic $KMnO_4$	~100		611.8g	608.1g	3.7
4	Acidic $KMnO_4$	~100		594.1g	594.1g	0
5	Silica Gel	~200		746.7g	727.7g	19.0
6						
7						

Total Weight Gain (grams) 403.4

1181671R

Moisture Recovery Form

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11-19-91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Hg
RUN NUMBER: 2
OPERATOR: RW
AMBIENT TEMPERATURE: 106 °F
BAROMETRIC PRESSURE: 30.01
STATIC PRESSURE, (P_s): -6.6
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3 FT Glass
NOZZLE ID: 0.190
ASSUMED MOISTURE %: 12%
SAMPLE BOX NUMBER: 8
METER BOX NUMBER: 8
METER $\Delta H_@$: 1.97
K FACTOR: ~~0.7144~~ ~~0.7441~~ .7569
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250
REFERENCE Δp:
METER Y: 1.0075

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1550	862.133									
LEAK/0.008 2B 10	5	1555	864.88	1.2		0.91	416	106	102	2.0	245	68
10	10	1600	867.38	1.2		0.91	411	114	104	2.0	238	69
10	15	1605	870.05	1.2		0.91	410	121	102	2.0	238	62
9	20	1610	872.48	1.1		0.83	414	128	101	2.0	240	63
8	25	1615	874.95	1.0		0.76	422	134	107	2.0	241	65
7	30	1620	877.31	1.0		0.76	418	139	106	2.0	242	66
6	35	1625	879.90	1.1		0.83	416	138	106	2.0	240	66
5	40	1630	882.36	1.1		0.83	416	138	106	2.0	238	66
4	45	1635	884.81	0.88		0.64	403	142	96	2.0	268	63
3	50	1640	886.89	0.78		0.59	404	134	91	2.0	236	59
2	55	1645	889.92	0.75		0.57	404	141	93	2.0	236	61
1	60	1650	891.29	0.80		0.60	404	142	88	2.0	234	62
1	65	1655	893.65	0.80		0.60	406	142	95	2.0	248	66
2	70	1700	895.84	0.88		0.66	408	143	96	2.0	254	67
3	75	1705	898.15	0.90		0.68	408	144	95	2.0	249	67
4	80	1710	900.33	0.77		0.58	406	143	95	2.0	247	64
5	85	1715	902.70	0.95		0.71	411	145	116	2.0	249	64
6	90	1720	905.29	1.1		0.85	414	147	87	2.0	250	63
7	95	1725	907.85	1.1		0.85	414	147	88	2.0	251	65
8	100	1730	910.33	0.97		0.74	412	148	90	2.0	254	67
9	105	1735	912.77	0.98		0.76	409	148	91	2.0	257	66
10	110	1740	915.26	0.98		0.76	409	148	91	2.0	258	66
10	115	1745	917.92	1.0		0.77	407	151	98	2.0	261	65

COMMENTS

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11-19-91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Hg
RUN NUMBER: 2
OPERATOR: RVW
AMBIENT TEMPERATURE: 106°F
BAROMETRIC PRESSURE: 30.01
STATIC PRESSURE, (P_s): -6.6
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3FT Glass
NOZZLE I.D.: 0.190
ASSUMED MOISTURE %: 16%
SAMPLE BOX NUMBER: 8
METER BOX NUMBER: 8
METER $\Delta H_@$: 1.97
KFACTOR: .7706
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250
REFERENCE Δp:
METER γ: 1.0075

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
10	120	1750	920.452	1.1		0.85	4.88	152	96	2.0	238	66
START	0	1855	921.100									
21	125	1900	923.74	1.1		0.85	414	121	91	2.0	265	68
21	130	1905	926.26	1.1		0.85	412	127	92	2.0	258	65
10	135	1910	928.77	1.1		0.85	412	130	94	2.0	255	65
9	140	1915	931.28	1.1		0.85	406	134	93	2.0	256	67
8	145	1920	933.75	1.0		0.75	405	139	92	2.0	256	67
7	150	1925	936.37	1.1		0.85	405	139	91	2.0	254	67
6	155	1930	938.56	0.92		0.69	406	140	92	2.0	253	61
5	160	1935	941.08	1.1		0.85	412	142	89	2.0	253	63
4	165	1940	943.29	0.80		0.60	410	142	86	2.0	250	66
3	170	1945	945.40	0.75		0.56	410	142	84	2.0	248	68
2	175	1950	947.81	0.85		0.64	406	143	84	2.0	246	67
1	180	1955	949.55	0.52		0.39	408	142	89	2.0	244	66
1	185	2000	951.27	0.52		0.39	406	140	88	2.0	242	65
2	190	2005	953.28	0.70		0.53	406	141	87	2.0	240	63
3	195	2010	955.35	0.74		0.56	406	142	83	2.0	248	66
4	200	2015	957.50	0.75		0.57	408	141	82	2.0	253	64
5	205	2020	959.75	0.87		0.65	410	140	85	2.0	261	65
6	210	2025	962.32	1.1		0.85	410	143	84	2.0	260	65
7	215	2030	964.70	0.95		0.90	411	143	86	2.0	255	66
8	220	2035	967.11	1.0		0.75	412	144	84	2.0	252	67
9	225	2040	969.54	1.0		0.75	410	144	84	2.0	252	62

STOP LEAK ✓ 0.012

103% 150

COMMENTS

RADIAN CORPORATION

FIELD DATA

PLANT: Morristown
DATE: 11-15-91
SAMPLING LOCATION: Spray Dryer Inlet
SAMPLE TYPE: Hg
RUN NUMBER: 2
OPERATOR: RVN
AMBIENT TEMPERATURE: 106 °F
BAROMETRIC PRESSURE: 36.91
STATIC PRESSURE, (P_g): -6.6
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3 FT Glass
NOZZLE ID: 0.190
ASSUMED MOISTURE %: 16%
SAMPLE BOX NUMBER: 5
METER BOX NUMBER: 8
METER $\Delta H_@$: 1.97
K FACTOR: .7540
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250
REFERENCE Δp:
METER Y: 1.0015

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
10	230	2045	971.97	1.0		0.85	410	144	83	2.0	252	62
11	235	2050	974.62	1.2		0.90	410	144	84	2.0	247	63
12	240	2055	977.168	1.1		0.85	406	147	78	2.0	241	65
				RMS								
			114.387	.9506			406.6667	115.7083				
	DGV over		115.2449									
			% ISO	103.7								
			Velocity ft/sec	71.79								
			ACFM	6790								
			DSCFM	3417								

Final Link/Occs

COMMENTS

RADIAN
CORPORATION

Plant: MORRISTOWN HOSP

Date: 11/19/91

Sampling location: INLET

Sample type: MICIA

Run number: 2

Sample box number: INLET MICIA

Clean-up person: BOW

Solvent rinses: 3 x KMnO4

Sample identification code: _____

Checked by: _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	774.0	471.7	302.3
2	Acidic KMnO4	~~50~~ 100	MGS	667.6	596.2	71.4
3	Acidic KMnO4	≈ 100	GS	623.6	610.6	13.0
4	Acidic KMnO4	≈ 100	MGS	606.8	605.5	1.3
5	Silica Gel	≈ 200	MGS	799.4	780.5	17.9
6						
7						

Total Weight Gain (grams): 405.9

1181671R

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF

PLANT	Morristown	PROBE LENGTH AND TYPE	3FT Glass	HEIGHT OF LOCATION (ft)	0 FT
DATE	11-20-91	NOZZLE I.D. (in)	0.190	DUCT DIMENSIONS	17"
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	8	FILTER NUMBER	21
SAMPLE TYPE	Hg	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	16%
RUN NUMBER	3	Yd	1.0075	MOISTURE METHOD	
OPERATOR	RJW	K FACTOR	K= 0.7538	MOISTURE DATA	
AMBIENT TEMPERATURE	106 °F	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	29.85	HEATER BOX SETTING	250	O2	8%
STATIC PRESSURE (Pa)	-6.6			CO2	10%
INITIAL LEAKCHECK	0.012 @ 15"			FINAL LEAKCHECK	

READ AND RECORD ALL DATA EVERY 5 MINUTES

K= .7538

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	1230	977.450								
2B 1	5	1235	979.70	0.82	406	0.62	257	103	97	67	2.0
1	10	1240	982.38	0.95	414	0.71	242	112	105	55	2.0
2	15	1245	984.0	0.45	412	0.33	244	119	110	63	2.0
2	20	1250	985.55	0.45	415	0.33	251	121	111	66	2.0
3	25	1255	987.88	0.92	409	0.67	256	129	107	61	2.0
3	30	1300	990.22	0.93	409	0.69	261	134	111	62	2.0
4	35	1305	992.65	1.0	408	0.73	254	136	108	64	2.0
4	40	1310	995.00	0.93	408	0.69	252	138	106	64	2.0
5	45	1315	997.18	0.83	406	0.62	261	139	106	63	2.0
5	50	1320	999.53	0.95	406	0.71	262	140	98	63	2.0
6	55	1325	1001.93	0.97	408	0.72	263	141	96	63	2.0
6	60	1330	1004.54	1.2	408	0.90	260	143	94	63	2.0
7	65	1335	1006.83	0.90	413	0.68	256	143	95	66	2.0
7	~~80~~ 70	1340	1009.16	0.98	414	0.74	260	145	100	62	2.0
8	~~85~~ 75	1345	1011.63	0.98	410	0.74	262	145	100	65	2.0
8	~~90~~ 80	1350	1014.09	1.0	408	0.75	268	146	95	63	2.0
9	~~95~~ 85	1355	1016.50	0.9	413	0.68	258	147	96	64	2.0
9	~~100~~ 90	1400	1019.16	1.1	410	0.82	258	147	95	65	2.0
10	~~105~~ 95	1405	1021.56	1.0	408	0.75	255	119	90	66	2.0

COMMENTS

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF 2

PLANT	MORRISTOWN
DATE	11-20-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	3
OPERATOR	RVW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)	
10	100	1410	1024.10	1.0	408	0.75	255	147	84	63	2.0	1ST PORT 103% ISO
10	105	1415	1026.62	1.0	406	0.75	252	147	81	63	2.1	
10	110	1420	1029.20	1.0	408	0.75	250	148	89	63	2.0	
10	115	1425	1031.42	1.0	408	0.75	255	149	97	65	2.0	
* 10	120	1430	1033.780	1.0	408	0.75	251	148	88	66	2.0	
			Mid-Test Leak Check = 0.006 CFM @ 10" Hg									
LEAK ✓ 0.010	0	1645	1034.100									
1	125	1650	1036.10	0.68	406	0.51	238	110	100	68	2.0	
* STOP 1	130	1655	1038.00	0.68	404	0.51	238	114	103	68	2.2	
~~2~~	~~135~~	~~1700~~			LEAK ✓	0.010						
START	0	2100	1038.200	~~0.82~~								
2	135	2105	1040.34	0.82	406	0.61	266	108	98	66	2.0	
2	140	2110	1042.43	0.74	402	0.56	268	110	96	63	2.0	
3	145	2115	1044.40	0.70	404	0.52	242	117	97	66	2.0	
3	150	2120	1046.66	0.87	400	0.66	239	122	95	64	2.0	
4	155	2125	1048.88	0.84	410	0.63	238	128	94	64	2.0	
4	160	2130	1051.02	0.84	408	0.63	246	131	93	66	2.0	
5	165	2135	1053.33	0.97	413	0.72	257	141	116	64	2.0	
5	170	2140	55.63	0.97	412	0.72	263	142	114	63	2.0	

COMMENTS: * NOZZLE BROKE WHILE CHANGING PORTS
NEW NOZZLE SAME SIZE 0190

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 2 OF 2

PLANT	MORRISTOWN
DATE	11-20-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	3
OPERATOR	RVW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
6	175	2145	1058.21	1.1	414	0.84	262	143	115	60	2.0
6	180	2150	1060.72	1.1	414	0.84	260	143	117	60	2.0
7	185	2155	1063.21	1.1	410	0.84	254	144	117	61	2.0
7	190	2200	1065.65	0.95	415	0.73	256	143	118	62	2.0
8	195	2205	1067.87	0.9	406	0.68	252	143	119	63	2.0
8	200	2210	1070.41	1.0	406	0.75	250	142	121	64	2.0
9	205	2215	1072.78	1.1	404	0.84	250	143	121	65	2.0
9	210	2220	1075.32	1.2	412	0.90	252	144	123	65	2.0
10	215	2225	1077.85	1.2	414	0.90	256	144	123	64	2.0
10	220	2230	1080.36	1.2	414	0.90	257	143	123	65	2.0
11	225	2235	1082.90	1.1	414	0.85	257	145	124	65	2.0
11	230	2240	1085.40	1.1	414	0.85	259	144	124	66	2.0
12	235	2245	1088.01	1.1	423	0.85	252	145	124	66	2.0
STOP 12	240	2250	1090.460	1.1	421	0.85	250	145	125	67	2.0
					FINAL LEAK ✓		0.004 @ 5" Hg				

COMMENTS

Revision 11/90

RADIAN
CORPORATION

Plant Morrisville Hosp

Date 11/20/91

Sampling location Inlet

Sample type M101A

Run number 3

Sample box number Inlet M101A

Clean-up person Ben

Solvent rinses

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	731.1	470.8	260.3
2	Acidic KMnO4	≈ 100	MGS	662.7	593.1	69.6
3	Acidic KMnO4	≈ 100	GS	622.7	~~598~~ 613.1	9.6
4	Acidic KMnO4	≈ 100	MGS	600.0	598.6	1.4
5	Silica Gel	≈ 200	MGS	759.8	741.8	18.0
6						
7						

Total Weight Gain (grams) 359.2

1181671R

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____

PAGE 1 OF 2

PLANT	MORRISTOWN	PROBE LENGTH AND TYPE	3 FT GLASS	HEIGHT OF LOCATION (ft)	0
DATE	11-21-91	NOZZLE I.D. (in)	0.190	DUCT DIMENSIONS	17"
SAMPLING LOCATION	SCRAP DRYER IN	METER BOX NUMBER	8	FILTER NUMBER	
SAMPLE TYPE	MERCURY	METER ▲ H@	1.97	ASSUMED MOISTURE (%)	16%
RUN NUMBER	4	Yd	1.0015	MOISTURE METHOD	
OPERATOR	RVN	K-FACTOR	0.74	MOISTURE DATA	
AMBIENT TEMPERATURE	106 °F	PROBE HEATER SETTING	256	O2/CO2 METHOD	CEMS
BAROMETRIC PRESSURE	29.80	HEATER BOX SETTING	250	O2	8%
STATIC PRESSURE (Pa)	-6.6			CO2	10%
INITIAL LEAKCHECK	0.00820 15"			FINAL LEAKCHECK	0.01526"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	1245	91.900								
2B 1	5	1250	94.30	0.95	415	0.71	239	115	114	68	2.0
1	10	1255	96.65	0.97	417	0.72	242	121	114	67	2.0
2	15	1300	99.00	0.92	414	0.68	262	127	115	66	2.0
2	20	1305	101.33	0.92	414	0.68	248	129	116	64	2.0
STOP 3	25	1310	103.50	0.90	412	0.66	254	132	116	63	2.0
START ~~3~~	~~30~~	~~1315~~ 1345	103.50								
3	30	1350	105.95	0.88	410	0.65	241	117	115	64	2.0
4	35	1355	108.34	1.0	414	0.75	238	122	114	66	2.0
4	40	1400	110.70	0.95	416	0.71	238	126	114	66	2.0
5	45	1405	112.92	0.90	410	0.67	240	128	114	66	2.0
5	50	1410	115.52	1.1	408	0.82	238	131	115	67	2.0
6	55	1415	117.96	1.1	408	0.82	242	138	116	63	2.0
6	60	1420	120.51	1.1	409	0.82	245	135	116	61	2.0
7	65	1425	122.74	0.84	408	0.63	244	135	118	65	2.0
7	70	1430	124.97	0.84	410	0.63	247	136	119	67	2.0
8	75	1435	127.13	0.84	412	0.63	248	137	120	67	2.0
8	80	1440	129.41	0.90	415	0.68	244	138	122	65	2.0
9	85	1445	131.93	1.1	414	0.82	246	139	121	63	2.0
9	90	1450	134.46	1.1	412	0.82	251	141	122	64	2.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 1 OF 2

PLANT	MORRISTOWN
DATE	11-21-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	4
OPERATOR	RVW

	Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	10	95	1455	137.00	1.1	412	0.82	254	141	123	65	2.0
	10	100	1500	139.56	1.1	412	0.82	255	142	123	65	2.0
	11	105	1505	142.27	1.2	414	0.92	255	143	124	65	2.0
Leak ✓ 0.012	11	110	1510	145.0	1.3	414	0.99	256	144	124	66	2.0
	12	115	1515	147.81	1.3	413	0.99	259	144	125	66	2.0
STOP	12	120	1520	150.588	1.3	414	0.99	261	145	125	67	2.0
		0	1550	150.134								
	1	125	1555	153.27	0.80	408	0.61	238	122	118	65	2.0
	1	130	1600	155.26	0.80	406	0.61	241	125	118	64	2.0
	2	135	1605	157.55	0.85	406	0.64	261	131	117	62	2.0
	2	140	1610	159.88	0.85	408	0.64	241	133	118	59	2.0
	3	145	1615	162.16	0.85	410	0.64	237	136	119	60	2.0
	3	150	1620	164.30	0.85	410	0.64	242	136	119	60	2.0
	4	155	1625	166.63	0.98	412	0.75	259	137	120	62	2.0
	4	160	1630	169.11	0.95	412	0.73	264	139	121	60	2.0
	5	165	1635	171.45	1.0	412	0.76	263	140	121	59	2.0
	5	170	1640	173.90	1.0	414	0.76	249	141	122	61	2.0
	6	175	1645	176.21	0.92	412	0.70	240	141	122	65	2.0
	6	180	1650	178.49	0.92	413	0.70	238	141	122	66	2.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 2 OF 2

PLANT	MORRISTOWN
DATE	11-21-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	4
OPERATOR	RVW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
7	185	1655	181.00	1.0	414	0.76	239	141	123	66	2.0
7	190	1700	183.38	1.0	414	0.76	264	142	123	66	2.0
8	195	1705	185.95	1.1	413	0.84	238	143	123	66	2.0
8	200	1710	188.51	1.1	414	0.84	243	143	123	65	2.0
9	205	1715	191.01	1.1	415	0.84	237	143	124	67	2.0
9	210	1720	193.45	1.2	414	0.91	238	144	124	66	2.0
10	215	1725	195.84	1.2	414	0.91	240	143	124	67	2.0
10	220	1730	198.25	1.2	413	0.91	247	143	124	67	2.0
11	225	1735	200.83	1.2	415	0.91	239	144	124	67	2.0
11	230	1740	203.38	1.2	414	0.91	241	144	124	67	2.0
12	235	1745	206.15	1.3	414	0.99	254	145	124	67	2.0
12	240	1750	208.897	1.3	414	0.99	256	146	125	66	2.0
		Meter Vol	116.451	RMS							
DGU Std	105.0469	DGU Corr	117.3244	1.0213	412.25			128.4792			
		% Iso	99.43								
		Velocity	2479 fpm								
		ACFM	7074								
		DSCFM	3524								

COMMENTS:

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown
Date	11/21/91
Sampling Location	Inlet
Sample Type	M101A
Run Number	4
Sample Box Number	Inlet M101A
Clean-up Person	JDL
Solvent Rinses	~~5x~~ 3x ~~5% HNO3~~ $KMnO_4$
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	729.9g	470.9g	259.0
2	Acidic $KMnO_4$	~50	MGS	603.7g	543.0g	60.7
3	Acidic $KMnO_4$	~100	MGS	621.8g	612.9g	8.9
4	Acidic $KMnO_4$	~100	MGS	595.4g	593.2g	2.2
5	Silica Gel	~200	MGS	792.5g	772.4g	20.1
6						
7						

TOTAL WEIGHT GAIN (g) 350.9

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____

PLANT	Morristown	PROBE LENGTH AND TYPE	3FT Glass	HEIGHT OF LOCATION (ft)	0 FT
DATE	11-22-91	NOZZLE I.D. (in)	0.190	DUCT DIMENSIONS	17"
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	A-36	FILTER NUMBER	
SAMPLE TYPE	Mercury	METER ▲ H@	1.86	ASSUMED MOISTURE (%)	16%
RUN NUMBER	5	Yd	0.9968	MOISTURE METHOD	
OPERATOR	BW	K FACTOR	0.7119	MOISTURE DATA	
AMBIENT TEMPERATURE	106°F	PROBE HEATER SETTING	250°F	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.85	HEATER BOX SETTING	250°F	O2	8%
STATIC PRESSURE (Pg)	-66			CO2	10%
INITIAL LEAKCHECK	0.016@15"			FINAL LEAKCHECK	0.00E@5"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	1200 ~~965.000~~	963.000								
* 2B12	STOP 1	1201	963.505	1.3	410	0.95	264	97	97	66	2.0
	START	1216	963.505								
2B12	5	1220	965.76	1.3	410	0.95	264	97	97	66	2.0
12	10	1225	968.15	1.1	409	0.80	267	107	97	66	2.0
11	15	1230	970.74	1.2	404	0.88	243	112	99	66	2.0
11	20	1235	973.46	1.1	406	0.80	242	114	102	66	2.0
10	25	1240	975.70	1.1	406	0.80	242	116	105	66	2.0
10	30	1245	978.15	1.1	408	0.80	245	119	106	66	2.0
9	35	1250	980.60	1.1	405	0.82	244	116	108	66	2.0
9	40	1255	982.96	0.98	412	0.68	243	120	112	66	2.0
8	45	1300	985.22	0.86	404	0.61	242	120	113	65	2.0
8	50	1305	987.60	0.95	405	0.68	242	116	114	66	2.0
7	55	1310	990.00	0.98	406	0.70	241	121	116	66	2.0
7	60	1315	992.48	1.0	412	0.72	244	121	118	66	2.0
6	65	1320	995.20	1.3	415	0.93	262	124	118	66	2.0
6	70	1325	997.76	1.2	414	0.85	259	124	119	63	2.0
5	75	1330	1000.40	1.2	414	0.85	255	124	120	63	2.0
5	80	1335	1002.95	1.1	410	0.79	255	124	120	63	2.0

COMMENTS: * Problems @ Outlet Location
Stopped Running @ 1201
Start Running @ 1216

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 1 OF 2

PLANT	MORRISTOWN
DATE	11-22-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	5
OPERATOR	RJW

K = 0.712

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
4	85	1340	1005.31	0.95	410	0.68	250	122	124	66	2.0
4	90	1345	1007.75	1.0	412	0.71	247	122	121	67	2.0
3	95	1350	1010.21	1.0	417	0.71	245	122	121	67	2.0
3	100	1355	1012.65	0.99	417	0.71	245	122	121	64	2.0
2	105	1400	1014.76	0.70	410	0.50	245	120	121	64	2.0
2	110	1405	1016.84	0.72	408	0.51	251	120	120	65	2.0
1	115	1410	1018.98	0.72	411	0.51	259	119	121	66	2.0
1	120	1415	1020.931	0.72	412	0.51	252	119	119	67	2.0
	1200	1305	1021.200								
12	125	1310	1023.723	1.2	414	0.85	236	105	105	68	2.0
~~12~~ Short	~~[illegible]~~ 125	~~1315~~ 1650	1023.723	~~.55~~	~~411~~						
12	130	1655	1025.92	0.55	414	0.39	273	101	99	68	1.0
11	135	1700	1027.77	0.62	412	0.43	266	104	101	65	2.0
11	140	1705	1029.62	0.64	412	0.45	263	107	101	66	2.0
10	145	1710	1031.57	0.68	413	0.48	256	110	103	67	2.0
10	150	1715	1033.62	0.74	412	0.53	256	112	104	67	2.0
9	155	1720	1035.76	0.78	412	0.55	255	115	107	67	2.0
9	160	1725	1037.94	0.80	412	0.58	253	117	111	67	2.0

Stop

LEAK ✓ 0.010

STOP

LEAK ✓ 0.010

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 2 OF 2

PLANT	MORRISTOWN
DATE	11-22-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	5
OPERATOR	RVW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
8	165	1730	1040.20	0.80	414	0.58	254	118	112	64	2.0
8	170	1735	1042.35	0.80	413	0.58	252	119	114	62	2.0
7	175	1740	1044.65	0.84	412	0.59	252	120	115	63	2.0
7	180	1745	1046.93	0.84	412	0.59	246	120	117	64	2.0
6	185	1750	1049.15	0.84	412	0.59	239	120	118	65	2.0
6	190	1755	1051.41	0.85	410	0.60	242	121	119	67	2.0
5	195	1800	1053.70	0.85	410	0.60	244	122	120	67	2.0
5	200	1805	1056.00	0.85	409	0.60	260	123	121	64	2.0
4	205	1810	1058.25	0.85	408	0.60	256	123	122	64	2.0
4	210	1815	1060.53	0.85	408	0.60	255	122	122	64	2.0
3	215	1820	1062.80	0.85	407	0.60	253	122	122	65	2.0
3	220	1825	1065.06	0.85	410	0.60	252	122	122	65	2.0
2	225	1830	1067.32	0.85	411	0.60	251	122	123	65	2.0
2	230	1835	1069.52	0.85	406	0.60	247	123	123	63	2.0
1	235	1840	1071.92	0.85	404	0.60	242	123	123	64	2.0
1	240	1845	1073.985	0.85	404	0.60	243	123	123	65	2.0

COMMENTS:

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/22/91
Sampling Location	INLET
Sample Type	~~TM~~ M101A
Run Number	5
Sample Box Number	INLET TM
Clean-up Person	BUN
Solvent Rinses	3x HNO_3
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	737.0	471.4g	265.6
2	ACIDIC KMNO4	≈50	MGS	647.8	593.3g ~~604.6g~~ 11/4/91 SDL	54.5
3	ACIDIC KMNO4	≈100	GS	596.4	591.1g	5.3
4	ACIDIC KMNO4	≈100	MGS	607.2	604.6g	2.6
5	SILICA GEL	≈200	MGS	767.2	748.5g	18.7
6						
7						

TOTAL WEIGHT GAIN (g) 346.7

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6

PAGE 1 OF 2

PLANT	Morristown	PROBE LENGTH AND TYPE	3FT Glass	HEIGHT OF LOCATION (ft)	0 FT
DATE	11-23-91	NOZZLE I.D. (in)	0.190	DUCT DIMENSIONS	17"
SAMPLING LOCATION	Spray Dryer IN	METER BOX NUMBER	A 36	FILTER NUMBER	
SAMPLE TYPE	Mercury	METER Δ H@	1.86	ASSUMED MOISTURE (%)	16%
RUN NUMBER	6	Yd	.9968	MOISTURE METHOD	
OPERATOR	RJW	K FACTOR	0.7056	MOISTURE DATA	
AMBIENT TEMPERATURE	106 °F	PROBE HEATER SETTING	250	O2/CO2 METHOD	
BAROMETRIC PRESSURE	29.92	HEATER BOX SETTING	250	O2	8%
STATIC PRESSURE (Pa)	-~~0.0~~5.8			CO2	10%
INITIAL LEAKCHECK	0.012			FINAL LEAKCHECK	0.014

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	0935	74.872								
28 12	5	0940	77.60	1.3	410	0.91	252	99	97	68	2.0
11	10	0945	80.18	1.2	407	0.84	251	107	98	67	2.0
10	15	0950	82.63	1.1	406	0.77	254	113	101	66	2.0
9	20	0955	85.11	1.1	407	0.77	264	114	102	64	2.0
8	25	1000	87.55	1.1	409	0.77	262	117	105	64	2.0
7	30	1005	89.92	1.0	410	0.70	249	118	108	65	2.0
6	35	1010	92.30	0.80	408	0.56	248	117	111	66	2.0
5	40	1015	94.00	0.60	412	0.42	247	115	112	66	2.0
4	45	1020	96.59	1.1	407	1.1	244	119	115	65	2.0
3	50	1025	98.89	0.97	410	0.68	237	120	116	65	2.0
2	55	1030	101.22	0.90	406	0.63	238	120	117	64	2.0
1	60	1035	103.15	0.67	404	0.47	236	118	118	63	2.0
1	65	1040	105.30	0.80	402	0.56	241	119	118	64	2.0
2	70	1045	107.46	0.78	403	0.55	248	119	119	65	2.0
3	75	1050	109.95	0.85	404	0.60	255	120	119	65	2.0
4	80	1055	112.07	0.92	404	0.64	253	120	120	60	2.0
5	85	1100	114.78	1.2	405	0.84	261	123	121	61	2.0
6	90	1105	116.87	0.78	410	0.55	265	122	121	64	2.0
7	95	1110	119.20	0.95	413	0.67	265	122	121	65	2.0

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6
PAGE 1 OF 2

PLANT	Morristown
DATE	11-23-91
SAMPLING LOCATION	Spray Dryer IN
SAMPLE TYPE	Mercury
RUN NUMBER	6
OPERATOR	RNW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
8	100	1115	121.58	0.95	412	0.67	265	123	122	65	2.0
9	105	1120	123.96	0.97	408	0.68	268	122	121	62	2.0
10	110	1125	126.41	1.0	406	0.70	261	122	121	61	2.0
11	115	1130	129.01	1.2	407	0.84	258	123	122	63	2.0
12	120	1135	131.665	1.2	406	0.84	254	125	124	64	2.0
	0	1150	131.850								
12	125	1155	134.48	1.2	411	0.85	235	115	117	67	2.0
11	130	1200	137.15	1.2	412	0.85	241	120	117	66	2.0
10	135	1205	139.59	1.1	411	0.78	258	121	117	61	2.0
9	140	1210	142.01	1.1	412	0.78	236	122	118	61	2.0
8	145	1215	144.57	1.1	410	0.78	237	122	119	63	2.0
7	160	1220	146.36	0.50	411	0.35	238	119	119	66	2.0
6	155	1225	148.52	0.78	408	0.55	240	118	120	67	2.0
5	160	1230	150.69	0.78	407	0.55	242	121	119	67	2.0
4	165	1235	152.90	0.80	402	0.57	243	122	121	68	2.0
3	170	1240	154.65	0.53	403	0.37	243	119	121	65	2.0
2	175	1245	156.63	0.68	407	0.48	242	120	121	67	2.0
1	180	1250	159.00	0.95	407	0.68	242	122	122	66	2.0

LEAK ✓ 0.01 cfm

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE 2 OF 2

PLANT	MORRISTOWN
DATE	11-23-91
SAMPLING LOCATION	SPRAY DRYER INLET
SAMPLE TYPE	MERCURY
RUN NUMBER	6
OPERATOR	RJW

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
1	185	1255	169.27	0.88	401	0.63	240	123	122	66	2.0
2	190	1300	163.48	0.85	400	0.61	244	123	123	67	2.0
3	195	1305	165.70	0.85	400	0.61	244	123	123	67	2.0
4	200	1310	168.00	0.88	402	0.63	243	124	123	67	2.0
5	205	1315	170.15	0.80	402	0.56	256	124	124	68	2.0
6	210	1320	171.75	0.38	407	0.27	244	121	123	65	2.0
7	215	1325	174.37	1.0	406	0.71	246	121	124	63	2.0
8	220	1330	176.49	0.95	405	0.67	247	124	124	61	2.0
9	225	1335	179.02	1.1	408	0.78	247	126	124	62	2.0
10	230	1340	181.54	1.1	409	0.78	243	126	125	63	2.0
11	235	1345	184.05	1.1	412	0.78	238	126	125	64	2.0
12	240	1350	186.581	1.1	413	0.78	237	126	125	66	2.0

COMMENTS:

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RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morristown Hosp
Date	11/23/91
Sampling Location	Inlet
Sample Type	Mid A
Run Number	6
Sample Box Number	Inlet Mid A
Clean-up Person	Bun
Solvent Rinses	3 x KMnO4
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	–	MGS	742.8g	471.0	271.8
2	Acidic KMnO4	≈50	MGS	620.8g	561.1 ~~594.1~~	59.7
3	Acidic KMnO4	≈100	GS	599.9g	590.8	9.1
4	Acidic KMnO4	≈100	MGS	591.5g	594.1	-2.6
5	Silica Gel	≈200	MGS	787.7g	769.0	18.7
6						
7						

TOTAL WEIGHT GAIN (g) 356.7

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/22/91
Sampling Location	INLET
Sample Type	MIC1A
Run Number	~~5~~ FB
Sample Box Number	INLET MIC1A
Clean-up Person	BWU
Solvent Rinses	3 - KMnO4
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	471.4g	471.3	
2	Acidic KMnO4	250	MGS	552.5g	552.7 ~~553.1~~	
3	Acidic KMnO4	≈100	GS	593.1g	613.1	
4	Acidic KMnO4	≈100	MGS	613.0	593.1	
5	Silica Gel	≈200	MGS		748.5	
6						
7						

TOTAL WEIGHT GAIN (g) _____

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 1 OF 4

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25
DATE	11/18/91	NOZZLE I.D. (in)	0.206	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	15.5
RUN NUMBER	1	Yd	.9817	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.04	MOISTURE DATA	
AMBIENT TEMPERATURE	90°	PROBE HEATER SETTING	6	O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.05	HEATER BOX SETTING	6	O2	13
STATIC PRESSURE (Ps)	-0.1			CO2	5
INITIAL LEAKCHECK	0.004@19"			FINAL LEAKCHECK	0.003@18"

AVE ΔP = .9215
AVE STACK Temp. = 284.6
AVE Meter Temp. = 92.35
DSCF = ~~134.27~~ 128.91
ISO % = 99.3

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
		VLL	~~148.85~~								
A-1	00:00	14:01	148.85	.95	~~285~~ 279	1.0	262	87	87	61	2.5
-1	00:05	14:06	151.92	.95	280	1.0	263	86	86	63	2.5
A-2	00:10	14:11	154.83	.93	289	.96	271	86	85	60	3.0
-2	00:15	14:16	157.72	.93	289	.96	267	86	86	62	3.0
A-3	00:20	14:21	160.41	.93	285	.96	261	88	86	58	3.0
-3	00:25	14:26	163.40	.90	287	.93	264	90	87	62	3.0
A-4	00:30	14:31	166.42	.94	284	.98	266	93	91	63	3.0
-4	00:35	14:36	168.92	.95	286	.99	263	92	88	61	3.0
A-5	00:40	14:41	171.85	.96	287	1.0	265	92	89	60	3.0
-5	00:45	14:46	174.03	.96	289	1.0	259	93	90	62	3.0
A-6	00:50	14:51	177.52	.98	289	1.0	262	93	89	61	3.0
-6	00:55	14:56	180.43	1.0	288	1.04	261	94	90	64	3.0
A-7	01:00	15:01	183.41	.99	283	1.03	263	94	90	61	3.0
-7	01:05	15:06	186.29	.97	291	1.0	262	94	91	65	3.0
A-8	01:10	15:11	189.46	1.1	290	1.14	261	95	91	60	3.0
-8	01:15	15:16	192.89	1.1	289	1.14	259	95	91	61	3.0
A-9	01:20	15:21	194.86	1.0	286	1.04	260	95	92	57	3.0
-9	01:25	15:26	198.40	1.0	288	1.04	260	95	92	59	3.0

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

PLANT	Morristown
DATE	11/18
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	1
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	01:30	15:31	201.61	1.0	288	1.04	261	95	92	60	3.0
-10	01:35	15:36	204.26	1.0	289	1.04	262	95	92	59	3.0
A-11	01:40	15:41	207.23	.95	282	.99	260	95	92	61	3.0
-11	01:45	15:46	210.25	.93	283	.97	260	95	92	60	3.0
A-12	01:50	15:51	213.21	.98	293	1.02	261	95	93	62	3.0
-12	01:55	15:56	216.19	1.1	280	1.14	260	95	93	62	3.0
STOP	02:00	16:01	219.05								
				.969	1.069						

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 3 OF 4

99.3% ISO

PLANT	Morgistan	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	
DATE	11/18	NOZZLE I.D. (in)		DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER		FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@		ASSUMED MOISTURE (%)	
RUN NUMBER	1	Yd		MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.04	MOISTURE DATA	
AMBIENT TEMPERATURE	90°F	PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.05	HEATER BOX SETTING		O2	
STATIC PRESSURE (Pe)	-0.1			CO2	
INITIAL LEAKCHECK	0.001@17"			FINAL LEAKCHECK	

This no. should have been 02:00 Adjust accordingly

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-1	02:05	16:40	219.47	.94	278	.98	261	91	90	56	3.0
-1	02:10	16:45	222.36	.94	279	.98	264	90	89	62	3.0
B-2	02:15	16:50	225.13	.91	278	.95	262	91	90	62	3.0
-2	02:20	16:55	228.02	.88	279	.91	260	92	91	60	3.0
B-3	02:25	17:00	230.85	.80	277	.83	258	94	92	62	3.0
-3	02:30	17:05	233.46	.79	278	.82	260	94	92	60	3.0
B-4	02:35	17:10	236.21	.85	285	.88	260	94	92	63	3.0
-4	02:40	17:15	238.83	.86	283	.89	259	94	92	61	3.0
B-5	02:45	17:20	241.54	.90	286	.94	260	94	94	60	3.0
-5	02:50	17:25	244.42	.88	285	.91	261	96	95	62	3.0
B-6	02:55	17:30	247.18	.86	287	.89	262	97	95	61	3.0
-6	03:00	17:35	250.16	.86	288	.89	260	95	93	60	3.0
B-7	03:05	17:40	252.80	.91	285	.95	260	95	93	60	3.0
-7	03:10	17:45	255.74	.91	284	.95	260	95	93	59	3.0
B-8	03:15	17:50	258.51	.89	286	.93	262	97	95	62	3.0
-8	03:20	17:55	261.04	.87	284	.90	260	96	94	60	3.0
B-9	03:25	18:00	264.34	.81	280	.84	260	95	93	60	3.0
-9	03:30	18:05	267.29	.78	283	.81	255	96	94	64	3.0

COMMENTS

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN ____
PAGE 4 OF 4

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

4460 cf

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-10	03:35	18:10	269.62	.88	283	.91	264	95	93	60	3.0
-10	03:40	18:15	272.55	.88	281	.91	259	95	93	61	3.0
B-11	03:45	18:20	275.11	.84	278	.87	255	95	93	59	3.0
-11	03:50	18:25	277.87	.84	278	.87	253	95	93	58	3.0
B-12	03:55	18:30	280.75	.82	284	.85	256	95	93	60	3.0
-12	04:00	18:35	283.51	.83	286	.86	257	94	92	63	3.0
STOP		18:40	286.04								

COMMENTS:

RADIAN
CORPORATION

Plant Morristown Hosp

Date 11/13/19

Sampling location Outlet

Sample type Midia

Run number 1

Sample box number Outlet Midia

Clean-up person Bill & JDL

Solvent rinses 3 x 5 % HNO3

Sample identification code _____

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	795.5	471.6	323.9
2	Acidic KMnO4	≈ 50	MGS	695.2	603.5	91.7
3	Acidic KMnO4	≈ 100	GS	581.3	561.4	1[illegible].7
4	Acidic KMnO4	≈ 100	MGS	601.7	599.1	2.6
5	Silica Gel	≈ 200	MGS	728.9	708.7	20.2
6						
7						

Total Weight Gain (grams) 458.3

11816718

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 1 OF 4

PLANT	Morris Cow	PROBE LENGTH AND TYPE	8'	HEIGHT OF LOCATION (ft)	25'
DATE	11/19/91	NOZZLE I.D. (in)	0.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	Box 18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	15.29
RUN NUMBER	2	Yd	0.9817	MOISTURE METHOD	
OPERATOR	Hg/VLL	K FACTOR	1.06	MOISTURE DATA	
AMBIENT TEMPERATURE	90°	PROBE HEATER SETTING	5.5	O2/CO2 METHOD	
BAROMETRIC PRESSURE	30.01	HEATER BOX SETTING	5.5	O2	13
STATIC PRESSURE (Pa)	-0.1			CO2	5.0
INITIAL LEAKCHECK	.012 @ 12"			FINAL LEAKCHECK	0.004 @ 10"

AVE ΔP = ~~1.0583~~ .9158
AVE Ts = ~~297.125~~ 285.35
AVE Tm = ~~105.357~~ 94.1458
DSCF = 12866
% ISO = 99.4

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
		1551	287.171 / 96.525								
B-1	00:05	1556	290.1	.98	278	1.0	248	88	88	68	3
-1	00:10	16:01	292.91	.98	283	1.0	251	87	88	67	3
B-2	00:15	16:06	296.21	.98	282	1.0	253	90	88	66	3
-2	00:20	16:11	298.49	.98	283	1.0	254	92	89	66	3
B-3	00:25	16:16	301.01	.97	288	1.0	260	94	91	65	3
-3	00:30	16:21	303.68	.96	287	1.0	259	95	92	64	3
B-4	00:35	16:26	306.75	.95	286	1.0	260	95	91	63	3
-4	00:40	16:31	308.91	.95	284	1.0	262	94	91	62	3
B-5	00:45	16:36	311.32	.87	286	.91	260	94	91	62	3
B-5	00:50	16:41	314.20	.88	285	.91	260	94	90	60	3
B-6	00:55	16:46	317.02	.86	286	.90	258	96	93	60	3
-6	01:00	16:51	319.80	.91	284	.96	258	96	93	59	3.25
B-7	01:05	16:56	322.74	.92	284	.97	260	96	93	58	3.25
-7	01:10	17:01	325.62	.86	284	.90	259	96	94	58	3.25
B-8	01:15	17:06	328.49	.86	291	.90	257	96	94	58	3.25
-8	01:20	17:11	331.24	.91	291	.96	260	97	94	60	3.25
B-9	01:25	17:16	334.15	.93	285	.98	259	97	94	61	3.25
-9	01:30	17:21	337.22	.90	288	.94	260	97	94	60	3.25

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE 2 OF 4

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-10	01:35	17:26	340.02	.90	284	.94	260	97	94	62	3.25
-10	01:40	17:31	343.11	.86	283	.90	260	97	94	62	3.25
B-11	01:45	17:36	345.84	.86	287	.90	260	97	94	60	3.25
-11	01:50	17:41	349.01	.82	285	.86	262	97	94	62	3.25
B-12	01:55	17:46	351.46	.82	288	.86	260	97	94	63	3.25
STOP -12	02:00	17:51	354.35	.82	288	.86	260	97	94	60	3.25

COMMENTS

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 2
PAGE 3 OF 4

PLANT		PROBE LENGTH AND TYPE		HEIGHT OF LOCATION (ft)	
DATE	11/19/91	NOZZLE I.D. (in)		DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER		FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@		ASSUMED MOISTURE (%)	
RUN NUMBER	2	Yd		MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.05	MOISTURE DATA	
AMBIENT TEMPERATURE		PROBE HEATER SETTING		O2/CO2 METHOD	
BAROMETRIC PRESSURE		HEATER BOX SETTING		O2	
STATIC PRESSURE (Ps)				CO2	
INITIAL LEAKCHECK	0.006@13"			FINAL LEAKCHECK	0.006@14"

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
A-1	02:00	18:55	354.79	.82	284	1.0	256	93	92	61	3.75
-1	02:05	19:00	357.73	.99	288	1.0	259	90	90	58	3.75
A-2	02:10	19:05	360.62	.99	283	1.0	260	91	91	57	3.75
-2	02:15	19:10	363.45	.99	285	1.0	260	92	91	56	3.75
A-3	02:20	19:15	366.44	.93	288	.98	260	94	91	53	3.75
-3	02:25	19:20	369.32	.94	286	.99	260	94	92	55	3.75
A-4	02:30	19:25	372.77	.95	286	1.0	260	95	92	59	3.75
-4	02:35	19:30	375.41	.94	284	.99	260	95	92	61	3.75
A-5	02:40	19:35	378.59	.92	289	.97	258	95	92	59	3.75
-5	02:45	19:40	381.42	.93	285	.98	266	97	93	65	3.75
A-6	02:50	19:45	383.93	.84	287	.88	260	97	94	55	3.75
-6	02:55	19:50	386.85	.85	289	.89	260	97	94	57	3.75
A-7	03:00	19:55	389.63	1.0	281	1.05	259	97	94	61	3.75
-7	03:05	20:00	392.58	1.0	279	1.05	260	97	94	60	3.75
A-8	03:10	20:05	395.59	.92	287	.97	258	97	94	61	3.75
-8	03:15	20:10	398.60	.92	292	.97	260	97	94	55	3.75
A-9	03:20	20:15	401.52	.90	285	.94	259	97	95	56	3.75
-9	03:25	20:20	404.47	.90	282	.94	259	97	95	57	3.75

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE ___ OF _____

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2C	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	20:25	03:30	407.32	.90	286	.94	258	99	96	57	3.75
-10	20:30	03:35	410.20	.91	284	.96	259	99	96	58	3.75
A-11	20:35	03:40	413.19	.83	283	.87	260	98	96	57	3.75
-11	20:40	03:45	418.81	.90	281	.94	260	98	96	58	3.75
A-12	20:45	03:50	421.62	.90	279	.94	260	98	96	57	3.75
-12	20:50	03:55	423.28	.90	281	.94	260	98	96	56	3.75
STOP	20:55	04:00	424.75								

COMMENTS:

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RADIAN
CORPORATION

Plant Morristown Hosp

Date 11/19/91

Sampling location Outlet

Sample type M101A

Run number 2

Sample box number Outlet M101A

Clean-up person Bun

Solvent rinses 3x KMnO4

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	—	MGS	813.4	473.6	[illegible]
2	Acidic KMnO4	≈100	MGS	691.2	607.5	[illegible]
3	Acidic KMnO4	≈100	GS	578.1	562.5	15.6
4	Acidic KMnO4	≈100	MGS	603.7	602.4	2
5	Silica Gel	≈200	MGS	716.2	695.0	[illegible]
6						
7						

Total Weight Gain (grams) [illegible]

11816718

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25'
DATE	11/20/91	NOZZLE I.D. (in)	0.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	Box 18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	15.29
RUN NUMBER	3	Yd	0.9817	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.05	MOISTURE DATA	
AMBIENT TEMPERATURE	92	PROBE HEATER SETTING	6	O2/CO2 METHOD	
BAROMETRIC PRESSURE		HEATER BOX SETTING	6	O2	13
STATIC PRESSURE (Ps)	-0.1			CO2	5
INITIAL LEAKCHECK	0.003@14"			FINAL LEAKCHECK	

AVE ΔP = .9733
AVE Ts = 285.21
AVE Tm = 94.63
DSCF = 134.34
% ISO = 100.4

71.02
71.74

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-1	00:00	12:30	425.76	.96	284	1.0	253	87	87	50	3.0
-1	00:05	12:35	428.74	1.1	283	1.15	254	88	87	54	3.0
A-2	00:10	12:40	431.54	1.0	285	1.05	255	89	87	55	3.0
-2	00:15	12:45	434.74	1.0	282	1.05	256	91	88	56	3.0
A-3	00:20	12:50	437.62	.96	286	1.0	258	94	90	57	3.0
-3	00:25	12:55	440.49	.96	286	1.0	259	94	90	57	3.0
A-4	00:30	13:00	443.47	.92	282	.97	258	96	91	59	3.0
-4	00:35	13:05	446.26	.92	283	.97	259	97	91	60	3.0
A-5	00:40	13:10	449.18	.88	292	.92	260	97	92	61	3.0
-5	00:45	13:15	452.26	.88	287	.92	260	97	92	60	3.0
A-6	00:50	13:20	455.01	.96	288	1.0	259	97	94	55	3.0
-6	00:55	13:25	457.99	.96	289	1.0	258	98	95	58	3.0
A-7	01:00	13:30	460.88	.96	287	1.0	259	98	95	58	3.0
-7	01:05	13:35	463.89	1.0	285	1.05	259	98	94	62	3.0
A-8	01:10	13:40	466.92	1.0	284	1.05	260	98	94	52	3.0
-8	01:15	13:45	469.21	1.0	285	1.05	261	98	95	56	3.0
A-9	01:20	13:50	472.11	1.0	287	1.05	259	99	96	59	3.0
-9	01:25	13:55	475.77	1.0	290	1.05	260	100	97	61	3.0
	VLL										

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 2 OF 3

PLANT	
DATE	
SAMPLING LOCATION	
SAMPLE TYPE	
RUN NUMBER	
OPERATOR	

leak check out = 0.007 @ 16"
leak check in = 0.003 @ 16"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-10	01:30	14:00	478.65	1.0	284	1.05	253	100	97	62	3.0
-10	01:35	14:05	481.83	.92	290	.97	255	100	97	57	3.0
A-11	01:40	14:10	484.63	.96	289	1.0	257	100	97	59	3.0
-11	01:45	14:15	488.00	1.0	287	1.05	258	100	97	61	3.0
A-12	01:50	14:20	490.71	1.0	288	1.05	260	100	97	62	3.0
-12	01:55	14:25	493.66	.96	287	1.0	260	102	99	65	3.0
STOP	02:00	14:30	496.78								
B-1	02:00	16:45	497.11	.79	281	.83	252	94	93	51	3.0
-1	02:05	16:50	500.11	.79	283	.83	256	94	93	53	3.0
STOP/START B-2	02:10	16:55	502.71	1.1	289	1.16	263	89	88	49	3.0
-2	02:15	21:05	506.54	.94	278	.99	256	90	89	54	3.0
B-3	02:20	21:10	509.13	.92	275	.97	258	90	89	57	3.0
-3	02:25	21:15	512.15	.97	290	1.02	262	91	89	59	3.0
B-4	02:30	21:20	514.99	.97	294	1.02	260	92	89	60	3.0
-4	02:35	21:25	517.92	1.0	285	1.05	261	94	91	61	3.0
B-5	02:40	21:30	520.70	1.0	283	1.05	260	95	92	62	3.0
-5	02:45	21:35	523.62	.95	291	1.0	259	95	92	64	3.0

COMMENTS

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 3
PAGE 3 OF 3

PLANT	Morristown
DATE	11/20/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	3
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-6	02:50	21:40	526.55	1.1	285	1.16	258	96	92	57	4.0
-6	02:55	21:45	529.71	1.1	276	1.16	260	96	92	60	4.0
B-7	03:00	21:50	532.65	1.0	281	1.05	257	96	92	60	4.0
-7	03:05	21:55	535.86	1.0	290	1.05	261	98	94	64	4.0
B-8	03:10	22:00	538.66	1.0	284	1.05	260	99	95	52	4.0
-8	03:15	22:05	541.81	1.0	278	1.05	257	99	95	55	4.0
B-9	03:20	22:10	544.99	.89	284	.93	258	99	95	58	4.0
-9	03:25	22:15	548.00	1.1	288	1.16	260	99	95	60	4.0
B-10	03:30	22:20	550.84	1.1	289	1.16	260	99	95	61	4.0
-10	03:35	22:25	554.06	.96	285	1.0	261	99	95	62	4.0
B-11	03:40	22:30	556.99	.92	284	.97	259	99	95	51	4.0
-11	03:45	22:35	560.03	.93	278	.98	260	99	96	52	4.0
B-12	03:50	22:40	562.91	.95	280	1.0	260	100	97	53	4.0
-12	03:55	22:45	566.22	.94	289	1.0	260	100	96	55	4.0
STOP	04:00	22:50	568.85								

COMMENTS:

Revision 11/90

RADIAN
CORPORATION

Plant Morristown Hosp

Date 11/20/91

Sampling location Outlet

Sample type Micro

Run number 3

Sample box number Outlet Micro

Clean-up person Ron

Solvent rinses

Sample identification code

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	MT	–	MGS	826.4	473.9	352.5
2	Acidic KMnO4	≈ 100	MGS	688.8	605.1g	83.7
3	Acidic KMnO4	≈ 100	GS	572.0	556.0g	16.0
4	Acidic KMnO4	≈ 100	MGS	601.6	599.3g	2.3
5	Silica Gel	≈ 200	MGS	767.5	745.0	22.5
6						
7						

Total Weight Gain (grams) 477.0

118167IR

Moisture Recovery Form

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 1 OF 3

AVE ΔP = .9655
AVE Ts = 288.92
AVE Tm = 97.86
DSCF = 133.98
% ISO = 99.83

71.04
73.01

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25
DATE	11/21/91	NOZZLE I.D. (in)	.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	15.29
RUN NUMBER	4	Yd	.9817	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.06	MOISTURE DATA	
AMBIENT TEMPERATURE	95	PROBE HEATER SETTING	6	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE		HEATER BOX SETTING	6	O2	13
STATIC PRESSURE (Ps)	+0.11			CO2	5
INITIAL LEAKCHECK	0.01@14"			FINAL LEAKCHECK	0.005@10"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
B-1	00:00	12:45	569.53	.95	283	1.01	254	92	92	50	3.0
-1	00:05	12:50	572.23	.95	280	1.01	255	92	92	51	3.0
B-2	00:10	12:55	575.22	.92	280	.98	253	92	92	53	3.0
-2	00:15	13:00	578.15	.92	281	.98	255	93	92	55	3.0
B-3	00:20	13:05	580.92	.92	286	.98	256	95	92	57	3.0
-3	00:25	13:10	583.99	.92	285	.98	255	96	93	57	3.0
STOP B-4	00:26	13:18	584.69								
-4	00:26	~~13:20~~ 13:45	584.69	1.0	286	1.06	252	94	93	52	3.0
-4	00:30	13:49	587.00	.94	292	1.0	254	94	93	53	3.0
-4	00:35	13:54	589.83	.94	288	1.0	254	93	92	53	3.0
B-5	00:40	13:59	592.74	.94	289	1.0	255	95	93	57	3.0
-5	00:45	14:04	596.09	.99	293	1.05	257	97	94	59	3.25
B-6	00:50	14:09	598.67	.99	286	1.05	259	98	95	61	3.25
-6	00:55	14:14	601.71	.94	285	1.0	257	98	95	62	3.25
B-7	01:00	14:19	604.70	.94	291	1.0	255	99	95	63	3.25
-7	01:05	14:24	607.63	.97	293	1.03	256	100	96	54	3.25
B-8	01:10	14:29	610.81	.90	286	.95	254	101	97	58	3.25
-8	01:15	14:34	613.52	.90	291	.95	255	101	97	60	3.25

COMMENTS: Spray dryer down @ 13:11

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 4
PAGE 2 OF 3

PLANT	Morristown
DATE	11/21/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	4
OPERATOR	VLL

port change initial = 0.007 @ 10"
port change final = 0.007 @ 10"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-9	01:20	14:39	616.42	1.0	288	1.06	257	100	97	64	3.25
-9	01:25	14:44	619.48	1.0	289	1.06	253	102	98	59	3.25
B-10	01:30	14:49	622.44	.91	294	.96	254	102	99	66	3.25
-10	01:35	14:54	625.40	.80	285	.85	255	101	98	51	3.0
B-11	01:40	14:59	628.52	.84	289	.89	254	101	98	53	3.0
-11	01:45	15:04	631.41	.97	301	1.03	255	102	99	56	3.5
B-12	01:50	15:09	634.04	1.1	292	1.17	253	102	99	62	3.5
-12	01:55	15:14	637.50	1.1	290	1.17	254	102	99	63	3.5
STOP	02:00	15:19	640.57								
A-1	02:00	15:50	640.80	1.15	285	1.22	260	97	97	49	3.5
-1	02:05	15:55	644.23	1.1	288	1.17	254	96	95	52	3.5
A-2	02:10	16:00	647.47	1.1	289	1.17	255	97	96	55	3.5
-2	02:15	16:05	650.71	1.1	291	1.17	254	98	97	57	3.5
A-3	02:20	16:10	653.90	.93	293	.99	255	99	97	58	3.0
-3	02:25	16:15	656.89	1.0	285	1.06	254	100	97	63	3.0
A-4	02:30	16:20	660.29	1.0	290	1.06	255	101	98	65	3.0
-4	02:35	16:25	663.00	1.0	295	1.06	256	100	97	50	3.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN _____
PAGE 3 OF 3

PLANT	Morristown
DATE	11/21/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	1
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (In. Hg)
A-5	02:40	16:30	665.97	1.1	291	1.17	255	101	98	62	3.75
-5	02:45	16:35	669.09	1.1	288	1.17	256	101	98	60	3.75
A-6	02:50	16:40	672.28	.98	292	1.04	256	101	98	57	3.5
-6	02:55	16:45	675.36	.98	290	1.04	256	101	98	59	3.5
A-7	03:00	16:50	678.40	.98	288	1.04	257	101	98	62	3.5
-7	03:05	16:55	681.41	.94	294	1.0	255	102	99	63	3.5
A-8	03:10	17:00	684.39	.92	292	.98	252	102	99	54	3.5
-8	03:15	17:05	687.32	.92	289	.98	254	102	99	56	3.5
A-9	03:20	17:10	690.67	.85	293	.90	256	102	99	56	3.5
-9	03:25	17:15	693.49	.87	295	.92	255	102	99	59	3.5
A-10	03:30	17:20	696.11	.92	285	.98	255	102	99	61	3.5
-10	03:35	17:25	699.13	.92	291	.98	253	102	99	53	3.5
A-11	03:40	17:30	702.30	.96	287	1.02	254	102	99	55	3.5
-11	03:45	17:35	705.00	.91	290	.96	255	102	99	57	3.5
A-12	03:50	17:40	708.39	.91	286	.96	256	102	99	58	3.5
-12	03:55	17:45	711.09	.92	284	.98	256	102	99	62	3.5
STOP	04:00	17:50	713.81								

COMMENTS:

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/21/91
Sampling Location	OUTLET
Sample Type	M101A
Run Number	4
Sample Box Number	OUTLET M101A
Clean-up Person	BWN
Solvent Rinses	3x $KMnO_4$
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	821.0	473.4	347.6
2	Acidic $KMnO_4$	≈ 50	MGS ~~≈ 50~~	644.9	556.3	88.6
3	Acidic $KMnO_4$	≈ 100	GS ~~≈ 100~~	587.1	565.0	22.1
4	Acidic $KMnO_4$	≈ 102	MGS ~~≈ 100~~	603.8g	601.2	2.6
5	Silica Gel	≈ 200	MGS ~~≈ 200~~	768.0	744.8	23.2
6						
7						

TOTAL WEIGHT GAIN (g) 484.1

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25
DATE	11/22	NOZZLE I.D. (in)	.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	14
RUN NUMBER	5	Yd	.9817	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.06	MOISTURE DATA	
AMBIENT TEMPERATURE	96	PROBE HEATER SETTING	5.5	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	30.00	HEATER BOX SETTING	5.5	O2	13
STATIC PRESSURE (Pa)	+0.14			CO2	5
INITIAL LEAKCHECK	0.01@15"			FINAL LEAKCHECK	0.01@16"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pa), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
A-1	00:00	12:00	714.46	.94	298	1.0	252	90	90	50	3.0
STOP	00:02	12:02	715.33	.90							
-1	00:02	12:15	717.12	.90	287	.95	253	90	90	52	3.0
-1	00:05	12:18	718.64	.90	287	.95	253	91	90	53	3.0
A-2	00:10	12:23		.90	288	.95	255	93	91	55	3.0
-2	00:15	12:28	722.76	.90	288	.95	255	94	92	56	3.0
A-3	00:20	12:33	725.51	.94	293	1.0	255	95	92	58	3.0
-3	00:25	12:38	728.11	.94	294	1.0	254	96	93	60	3.0
A-4	00:30	12:43	731.32	1.1	292	1.17	255	97	94	63	3.0
-4	00:35	12:48	734.08	1.1	290	1.17	256	97	94	62	3.0
A-5	00:40	12:53	737.25	.92	286	.98	255	99	95	52	3.5
-5	00:45	12:58	740.29	.94	288	1.0	256	100	96	54	3.5
A-6	00:50	13:03	743.22	.99	285	1.05	256	100	97	56	3.5
-6	00:55	13:08		1.1	285	1.17	255	97	93	57	3.75
A-7	01:00	13:13	749.35	1.1	287	1.17	256	98	94	58	3.75
-7	01:05	13:18	752.59	1.1	283	1.17	255	97	93	52	3.75
A-8	01:10	13:23	755.81	1.05	288	1.11	255	98	94	56	3.75
-8	01:15	13:28	758.91	1.1	291	1.3	255	98	94	59	3.75

COMMENTS: STOPPED @ 12:02 due to 6G imp. breaking in CDD train

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 2 OF 3

PLANT	Morristown
DATE	11/22
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	5
OPERATOR	VLL

leak checks ⇒ port out = 0.008 @ 14"
port in = 0.007 @ 13"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-9	01:20	13:33	762.27	1.0	285	1.06	254	97	94	63	3.5
-9	01:25	13:38	765.29	1.2	288	1.27	255	97	94	51	3.5
A-10	01:30	13:43	768.58	1.3	288	1.38	256	97	94	54	4.0
-10	01:35	13:48	772.02	1.4	285	1.48	256	97	94	56	4.0
A-11	01:40	13:53	775.52	1.2	289	1.27	255	98	95	61	4.0
-11	01:45	13:58	778.97	1.2	289	1.27	255	98	95	63	4.0
A-12	01:50	14:03	782.43	.99	286	1.05	255	98	95	50	3.5
-12	01:55	14:08	785.54	.99	284	1.05	256	98	95	53	3.5
STOP	02:00	14:13	788.50								
B-1	02:00	15:05	788.75	.98	282	1.04	254	91	89	50	3.5
-1	02:05	15:10	791.91	.98	283	1.04	255	93	90	52	3.5
STOP ~~B-2~~	~~02:00~~	~~15:15~~	792.45								
B-1	02:05	16:50	792.45	.81	272	.86	256	90	89	50	3.5
B-2	02:10	16:54	794.10	.81	277	.86	255	90	89	50	3.5
-2	02:15	16:59	796.80	.89	282	.94	253	90	89	52	3.5
B-3	02:20	17:04	799.57	.93	282	.99	252	92	90	53	3.5
-3	02:25	17:09	802.42	.93	285	1.1	253	92	91	54	3.5

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 5
PAGE 3 OF 3

PLANT	Morristown
DATE	11/22
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	5
OPERATOR	VL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-4	02:30	17:14	805.31	.97	290	1.03	254	95	91	54	3.5
-4	02:35	17:19	808.19	1.1	279	1.17	254	95	91	55	3.5
B-5	02:40	17:24	811.45	1.1	278	1.17	254	95	91	55	3.5
-5	02:45	17:29	814.47	1.1	292	1.317	254	96	92	57	3.5
B-6	02:50	17:34	817.67	1.25	291	1.325	255	97	92	58	4.0
-6	02:55	17:39	821.04	1.15	286	1.22	255	98	93	60	4.0
B-7	03:00	17:44	824.29	1.1	286	1.17	256	98	93	50	4.0
-7	03:05	17:49	827.58	1.1	293	1.17	256	98	94	54	4.0
B-8	03:10	17:54	830.81	.95	292	1.0	256	98	94	55	4.0
-8	03:15	17:59	834.01	.95	290	1.0	254	99	95	56	4.0
B-9	03:20	18:04	837.47	1.05	289	1.11	255	99	95	56	4.0
-9	03:25	18:09	840.36	1.05	287	1.11	255	99	95	56	4.0
B-10	03:30	18:14	843.04	1.05	289	1.11	255	100	96	57	4.0
-10	03:35	18:19	846.49	1.0	287	1.06	253	99	96	53	4.0
B-11	03:40	18:24	849.22	1.0	283	1.06	254	99	96	49	4.0
-11	03:45	18:29	852.27	.99	286	1.05	254	100	96	52	4.0
B-12	03:50	18:34	855.32	.99	291	1.05	254	100	97	53	4.0
-12	03:55	18:39	857.91	.99	289	1.05	256	100	97	56	4.0
STOP	04:00	18:44	861.25								

COMMENTS

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN MOSP
Date	11/22/91
Sampling Location	OUTLET
Sample Type	MIDIA
Run Number	5
Sample Box Number	OUTLET MIDIA
Clean-up Person	BWW
Solvent Rinses	3 x KMnO4
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	NT	—	MGS	776.6g	472.7g	303.9
2	ACIDIC KMnO4	≈50	MGS	596.1g	507.6g	88.5
3	ACIDIC KMnO4	≈100	GS	631.0g	601.1g	29.9
4	ACIDIC KMnO4	≈100	MGS	599.6g	594.2g	5.4
5	SILICA GEL	≈200	MGS	746.5g	724.7g	21.8
6						
7						

TOTAL WEIGHT GAIN (g) 449.5

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6
PAGE 1 OF 3

PLANT	Morristown	PROBE LENGTH AND TYPE	3'	HEIGHT OF LOCATION (ft)	25
DATE	11/23/91	NOZZLE I.D. (in)	0.205	DUCT DIMENSIONS	
SAMPLING LOCATION	Outlet	METER BOX NUMBER	18	FILTER NUMBER	
SAMPLE TYPE	Hg	METER ▲ H@	1.77	ASSUMED MOISTURE (%)	14
RUN NUMBER	6	Yd	.9817	MOISTURE METHOD	
OPERATOR	VLL	K FACTOR	1.08	MOISTURE DATA	
AMBIENT TEMPERATURE	98	PROBE HEATER SETTING	5.5	O2/CO2 METHOD	CEM
BAROMETRIC PRESSURE	29.84	HEATER BOX SETTING	5.5	O2	13
STATIC PRESSURE (Ps)	+0.17			CO2	5
INITIAL LEAKCHECK	0.009@11"			FINAL LEAKCHECK	0.007@11"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-1	00:00	09:30	861.50	1.1	288	1.19	253	87	87	50	3.75
-2	00:05	09:35	864.51	1.1	280	1.19	254	88	87	50	3.75
-3	00:10	09:40	867.75	.98	289	1.06	254	88	87	54	3.5
-4	00:15	09:45	870.78	1.0	292	1.08	255	91	88	55	3.5
-5	00:20	09:50	873.74	.92	289	1.0	254	92	89	57	3.5
-6	00:25	09:55	876.78	.96	289	1.04	254	93	89	57	3.5
-7	00:30	10:00	879.63	1.2	286	1.3	254	94	89	50	3.75
-8	00:35	10:05	882.84	1.1	284	1.19	253	95	90	52	3.75
-9	00:40	10:10	885.99	1.1	289	1.19	254	96	90	53	3.5
-10	00:45	10:15	889.28	1.0	285	1.08	254	96	92	56	3.5
-11	00:50	10:20	892.33	1.2	285	1.3	254	97	92	58	3.75
-12	00:55	10:25	895.59	1.0	287	1.08	254	97	92	57	3.75
STOP	01:00	10:30	898.92								
B-12	01:00	10:35	898.92	1.0	288	1.08	255	95	92	50	3.75
-11	01:05	10:40	902.14	1.1	283	1.19	255	95	92	52	3.75
-10	01:10	10:45	905.15	.98	287	1.06	254	96	93	53	3.75
-9	01:15	10:50	908.19	1.0	282	1.08	254	96	93	55	3.75
-8	01:20	10:55	911.22	1.0	284	1.08	255	96	93	56	3.75
-7	01:25	11:00	914.21	1.2	293	1.3	255	96	93	56	3.75

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6
PAGE 2 OF 3

PLANT	Morristown
DATE	11/23/91
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	6
OPERATOR	VLL

leak check out = 0.005 @ 13"
leak check in = 0.006 @ 15"

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
B-6	01:30	11:05	917.58	.99	278	1.07	254	97	94	54	3.5
-5	01:35	11:10	920.69	1.0	284	1.08	254	97	94	54	3.5
-4	01:40	11:15	924.41	1.0	294	1.08	254	96	94	56	3.5
-3	01:45	11:20	926.83	1.0	290	1.08	254	96	94	57	3.5
-2	01:50	11:25	929.89	.99	281	1.07	254	97	94	50	3.5
-1	01:55	11:30	932.92	.99	283	1.07	254	97	94	52	3.5
STOP	02:00	11:35	936.00								
A-1	02:00	11:50	936.15	.99	279	1.07	254	94	93	50	3.5
-1	02:05	11:55	939.49	.99	280	1.07	254	94	93	51	3.5
-2	02:10	12:00	942.30	.90	287	.97	255	95	93	54	3.5
-2	02:15	12:05	945.25	.90	287	.97	255	95	93	54	3.5
-3	02:20	12:10	948.19	.96	289	1.04	255	96	93	56	3.5
-3	02:25	12:15	951.13	.97	287	1.05	253	96	94	57	3.5
-4	02:30	12:20	954.71	.93	289	1.00	254	97	94	52	3.75
-4	02:35	12:25	957.23	.94	290	1.02	255	97	94	53	4.0
-5	02:40	12:30	960.19	.97	289	1.05	256	97	94	55	4.0
-5	02:45	12:35	963.12	.97	286	1.05	255	97	94	56	4.0

COMMENTS:

Revision 11/90

RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 6
PAGE 3 OF 3

PLANT	Morristown
DATE	11/23
SAMPLING LOCATION	Outlet
SAMPLE TYPE	Hg
RUN NUMBER	6
OPERATOR	VLL

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲ Pe), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (▲ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
A-6	02:50	12:40	966.24	1.1	293	1.19	254	98	95	57	4.0
-6	02:55	12:45	969.43	1.2	286	1.3	254	98	95	51	4.25
-7	03:00	12:50	972.81	1.1	287	1.19	255	99	96	53	4.25
-7	03:05	12:55	976.03	1.1	290	1.19	255	99	95	55	4.25
-8	03:10	13:00	979.19	1.0	291	1.08	256	98	95	56	4.25
-8	03:15	13:05	982.38	1.0	291	1.08	255	98	95	58	4.25
-9	03:20	13:10	985.47	.97	293	1.05	255	98	95	54	4.0
-9	03:25	13:15	988.01	.97	290	1.05	255	99	95	54	4.0
-10	03:30	13:20	991.62	1.0	291	1.08	256	99	96	51	4.0
-10	03:35	13:25	994.89	1.0	288	1.08	255	99	96	53	4.0
-11	03:40	13:30	998.11	.98	286	1.06	255	99	97	53	4.0
-11	03:45	13:35	1000.09	.97	288	1.05	255	99	97	54	4.0
-12	03:50	13:40	1004.07	.97	284	1.05	253	99	96	54	4.0
-12	03:55	13:45	1007.20	.97	280	1.05	254	99	96	57	4.0
STOP	04:00	13:50	1010.25								

COMMENTS:

Revision 11/90

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	Morgantown
Date	11/23/91
Sampling Location	Outlet
Sample Type	M101A
Run Number	6
Sample Box Number	Outlet M101A
Clean-up Person	JDL
Solvent Rinses	3 x 5% HNO_3
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS	795.0	472.8g	322.2
2	Acidic $KMnO_4$	~100	MGS	593.6	503.8g	89.8
3	Acidic $KMnO_4$	~100	MGS	629.3	602.9g	26.4
4	Acidic $KMnO_4$	~100	MGS	601.6	595.8g	5.8
5	Silica Gel	~200	MGS	765.8	740.2g	25.6
6						
7						

TOTAL WEIGHT GAIN (g) 469.8

RADIAN CORPORATION

MOISTURE RECOVERY FORM FOR METHODS 4, 5, 6

Plant	MORRISTOWN HOSP
Date	11/22/91
Sampling Location	OUTLET
Sample Type	MI01A
Run Number	~~5~~ FB
Sample Box Number	OUTLET MI01A
Clean-up Person	BW
Solvent Rinses	3 x KMnO4
Sample Identification Code	
XAD Trap Number	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (g)		
				Final	Initial	Weight Gain
1	MT	—	MGS		472.7	
2	ACIDIC KMnO4	~50	MGS		554.4	
3	ACIDIC KMnO4	≈100	GS		563.9	
4	ACIDIC KMnO4	≈100	MGS		603.4	
5	SILICA GEL	~200	MGS		724.7	
6						
7						

TOTAL WEIGHT GAIN (g) _____

RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown Mill	ASSUMED MOISTURE (%)	18
DATE	11-18-91	SAMPLE BOX NUMBER	~~[illegible]~~
SAMPLING LOCATION	Spray dryer inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl / Cl2	METER FACTOR	.9894
RUN NUMBERS	1	PROBE HEATER SETTING	~~to~~ 2 @ 45%
OPERATOR	CSG	SAMPLE RATE	1.0 lpm
AMBIENT TEMPERATURE	110° F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	-6.6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Initial C		0	1408	223.91					
		5	1413	228.3	2.3	116	278		3.0
		10	1418	232.6	2.3	116	274		7.0
Final 0		15	1423	237.6	2.3	115	270		8.0
		20	1428	242.3	2.3	116	265		8.5
Run Number 1		25	1433	247.3	2.3	116	265		8.5
		30	1438	252.2	2.3	115	261		8.5
		35	1443	258.0	2.3	115	261		9.0
		40	1448	262.1	2.3	115	260		9.0
Leakchecks		45	1453	267.1	2.3	115	264		9.0
		50	1458	272.1	2.3	113	254		9.5
Initial		55	1503	277.2	2.3	113	256		9.5
	Stop	60	1508	282.68	2.3	112	259		9.5
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

Revision 1/91

RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown MW	ASSUMED MOISTURE (%)	18
DATE	11-18-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Spray dryer inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl / Cl_2	METER FACTOR	.9894
RUN NUMBERS	2	PROBE HEATER SETTING	2 @ 45% line
OPERATOR	CSG	SAMPLE RATE	1.0 LPM
AMBIENT TEMPERATURE	110 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	-6.6		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1535	287.69					
	5	1440	292.5	2.3	109	266		9.0
	10	1445	297.5	2.3	109	265		9.0
	15	1530	302.5	2.3	109	258		9.0
	20	1555	307.4	2.3	108	262		9.0
	25	1600	312.2	2.3	108	261		9.0
Stop	30	1605	317.55	2.3	108	258		9.0
	30	1640	317.55					
	35	1645	322.3	2.3	106	262		9.0
	40	1650	327.3	2.3	106	262		9.5
	45	1655	332.3	2.3	105	254		9.5
	50	1700	337.2	2.3	106	254		9.5
	55	1705	342.1	2.3	106	254		9.5
	60	1710	347.03	2.3	106	255		9.5

Leakchecks

Initial 0

Final 0

Run Number 2

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown MWI	ASSUMED MOISTURE (%)	18
DATE	11-18-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	V7
SAMPLE TYPE	HCl / Cl2	METER FACTOR	.9894
RUN NUMBERS	3	PROBE HEATER SETTING	2 @ 45% line
OPERATOR	CSG	SAMPLE RATE	1.0
AMBIENT TEMPERATURE	110 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	-6.6		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
		0	1740	355.42					
Initial 0		5	1745	360.0	2.3	105	257		9.0
		10	1750	364.6	2.3	106	254		9.0
Final		15	1755	369.5	2.3	105	254		9.5
		20	1800	374.3	2.3	105	252		9.5
Run Number 3		25	1805	379.3	2.3	105	252		9.5
		30	1810	384.3	2.3	105	253		9.5
		35	1815	389.2	2.3	105	253		9.5
		40	1820	394.1	2.3	105	247		9.5
Leakchecks		45	1825	399.1	2.3	105	248		9.5
		50	1830	404.1	2.3	105	245		9.5
Initial		55	1835	409.1	2.3	105	243		9.5
		60	1840	414.17	2.3	105	252		9.5
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

Revision 1-91

RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	Morristown MWI	ASSUMED MOISTURE (%)	16
DATE	11-19-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Spray Dryer Outlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl/Cl2	METER FACTOR	.9894
RUN NUMBERS	1	PROBE HEATER SETTING	2 @ 50 %
OPERATOR	CS6	SAMPLE RATE	1.02 ~~-0~~ LPM
AMBIENT TEMPERATURE	105	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.01		
STATIC PRESSURE (Ps)	-6.6		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Initial 0		0	1553	421.14					
		5	1558	423.0	2.3	105	280		25
		10	1603	424.1	1.0	109	274		25
Final	Stop	15	1608	425.27	1.0	109	270		25
		15	1631	426.63					
Run Number 1		20	1636	438.6	5	109	243		5.0
		25	1641	445.6	2.3	109	281		5.5
		30	1646	450.1	2.0	109	275		6.5
		35	1651	454.8	2.0	109	268		6.5
Leakchecks		40	1656	459.1	2.0	109	271		7.0
		45	1701	463.4	2.0	108	265		7.0
Initial		50	1706	468.0	2.0	107	254		7.0
		55	1711	472.0	2.0	108	253		7.0
Final		60	1716	476.26	2.0	108	247		8.0
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

Stopped 1608 to change filter

Revision: 1/91

RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	Morristown MWI	ASSUMED MOISTURE (%)	16
DATE	11-19-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl / Cl_2	METER FACTOR	.9894
RUN NUMBERS	2	PROBE HEATER SETTING	2 @ 45%
OPERATOR	CSG	SAMPLE RATE	1.0
AMBIENT TEMPERATURE	110° F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.01		
STATIC PRESSURE (Ps)	-6.6		

READ AND RECORD ALL DATA EVERY ____ MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1723	479.56					
Initial 0		5	1728	483.4	1.9	108	283		8.0
		10	1733	487.5	1.8	108	279		8.0
Final 0		15	1738	491.4	1.8	108	282		8.0
		20	1743	495.6	1.75	109	281		8.0
Run Number 2		25	1748	499.9	1.75	110	273		8.5
	Stop	30	1753	504.05	1.8	110	280		9.0
		30	1855	504.05					
		35	1900	506.5	2.0	110	273		9.0
Leakchecks		40	1905	512.7	1.9	110	267		9.0
		45	1910	517.0	1.9	110	253		9.0
Initial		50	1915	521.3	1.9	110	250		9.0
		55	1920	525.7	1.9	110	240		9.0
Final	Stop	60	1925	529.93	1.9	110	249		9.0
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown MWI	ASSUMED MOISTURE (%)	16
DATE	11-19-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Spray Dryer Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl/Cl2	METER FACTOR	.9894
RUN NUMBERS	3	PROBE HEATER SETTING	2 @ 45 %
OPERATOR	CSG	SAMPLE RATE	~1.0 LPM
AMBIENT TEMPERATURE	110 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.01 " Hg		
STATIC PRESSURE (Ps)	-6.6 " H_2O		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks

Initial 0

Final 0

Run Number 3

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1955	536.43					
	5	2000	540.3	2.0	110	260		9.0
	10	2005	544.9	2.0	109	270		9.0
	15	2010	549.5	2.0	109	263		9.5
	20	2015	554.1	2.0	108	274		9.5
	25	2020	558.5	2.0	109	273		9.5
	30	2025	563.0	2.0	109	268		9.5
	35	2030	567.4	2.0	109	258		9.5
	40	2035	571.8	2.0	108	257		9.5
	45	2040	576.5	2.0	109	255		9.5
	50	2045	581.1	2.0	109	256		9.5
	55	2050	585.5	2.0	108	253		9.5
Stop	60	2055	590.10	2.0	108	250		9.5

Leakchecks

Initial

Final

Run Number

Leakchecks

Initial

Final

Run Number

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	18 %
DATE	11-20-91	SAMPLE BOX NUMBER	~~V-7~~
SAMPLING LOCATION	Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl	METER FACTOR	9894
RUN NUMBERS	1	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1 L/ M.A.
AMBIENT TEMPERATURE	90°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.85		
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
		0	1230	601.18					
Initial 0		5	1235	606.2	2.2	113	284		2
		10	1240	611.2	2.2	111	288		2
Final 0		15	1245	616.1	2.2	112	282		2
		20	1250	621.1	2.2	112	282		2
Run Number 1		25	1255	626.0	2.2	113	283		2
		30	1300	631.1	2.2	113	281		2
		35	1305	636.1	2.3	114	281		2
		40	1310	641.1	2.2	114	280		2
Leakchecks		45	1315	646.1	2.3	113	280		2
		50	1320	651.2	2.3	113	276		2
Initial		55	1325	656.3	2.3	113	276		2
		60	1330	661.97	2.3	112	274		2
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	18%
DATE	11-20-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl	METER FACTOR	.9844
RUN NUMBERS	2	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/Min.
AMBIENT TEMPERATURE	95	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.85		
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks								
Initial 0	0	1350	672.3					
	5	1355	677.4	2.3	114	260	~~2~~	2
	10	1400	682.6	2.3	114	277		2
Final	15	1405	687.6	2.3	114	278		2
	20	1410	692.5	2.3	114	277		2
Run Number 2	25	1415	697.6	2.3	114	279		2
	30	1420	702.65	2.3	115	278		2
	Stop							
Leakchecks	30	1645	702.65					
	35	1650	707.7	2.3	112	275		2
Initial Probes 50	40	1655	712.7	2.3	112	277		2
	~~45~~ 40	~~1700~~ 2102	718.14					
Final	~~50~~ 45	~~1705~~ 2107	723.2	2.3	109	225		2
	~~55~~ 50	~~1710~~ 2112	728.2	2.3	109	231		2
Run Number	~~60~~ 55	~~1715~~ 2117	733.1	2.3	109	254		2
	60	2122	738.24	2.4	110	266		2
Leakchecks								
Initial								
Final								
Run Number								

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-20-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	U-7
SAMPLE TYPE	HCl	METER FACTOR	.9894
RUN NUMBERS	3	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/Min
AMBIENT TEMPERATURE	95	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.85		
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
		0	2132	742.50					
Initial 0		5	2137	747.5	2.4	109	229		1
		10	2142	752.5	2.4	109	243		1
Final 0		15	2147	757.8	2.4	109	261		1
		20	2152	762.8	2.3	109	253		1
Run Number 3		25	2157	767.8	2.2	109	256		1
		30	2202	772.8	2.2	109	262		1
		35	2207	777.7	2.2	110	272		1
		40	2212	782.7	2.2	110	239		1
Leakchecks		45	2217	787.7	2.3	110	241		1
		50	2222	792.8	2.3	109	242		1
Initial		55	2227	797.8	2.3	109	241		1
		60	2232	802.81	2.3	110	262		1
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN
CORPORATION

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HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-21-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl	METER FACTOR	.9594
RUN NUMBERS	1	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/min
AMBIENT TEMPERATURE	95	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.80		
STATIC PRESSURE (Pa)	-0		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1245	809.08					
	5	1250	813 -	23	112	253	1	4
	10	1255	818.8	23	112	260		6
	15	1300	823.9	24	112	258		8
	20	1305	829.0	24	112	260		8
	25	1310	834.27	23	112	257		9
[illegible]	~~30~~	~~1315~~			1			
	~~30~~	~~1320~~ 1345	834.27		~~115~~	~~255~~		
	~~35~~ 20	~~1325~~ 1350	839.3	23	113	255		5
	~~40~~ 25	~~1340~~ 1355	844.5	21	112	251		7
	~~45~~ 40	~~1345~~ 1400	849.5	23	112	251		8
	~~50~~ 45	~~1350~~ 1405	854.5	23	112	252		8
	~~55~~ 50	~~1350~~ 1410	859.7	24	112	256		1
	~~60~~ 55	~~1400~~ 1415	864.6	23	112	294		8
	60	1420	861.55	22	112	280		8

Leakchecks

Initial 0

Final 0

Run Number 1

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	[illegible]
DATE	11-20-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	[illegible]
SAMPLE TYPE	HCl	METER FACTOR	9894
RUN NUMBERS	2	PROBE HEATER SETTING	250
OPERATOR	JDP	SAMPLE RATE	[illegible]
AMBIENT TEMPERATURE	45	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.30		
STATIC PRESSURE (Ps)	[illegible]		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1445	880.82					
Initial 0		5	1450	885.9	24	113	230		9
		10	1455	891.0	24	112	234		5
Final C		15	1500	896.1	24	113	236		6
		20	1505	901.3	23	112	234		8
Run Number 2		25	1510	906.4	23	112	236		8
		30	1515	911.5	23	112	233		8
		35	1520	916.3	23	112	239		8
	STOP PORT CHANGE	~~40~~	~~1525~~		~~23~~	~~112~~	~~247~~		
Leakchecks		~~45~~	~~1530~~						
		~~50~~	~~1535~~						
Initial		~~55~~	~~1540~~						
		~~60~~	~~1545~~						
Final			1550	916.3					
		40	1555	921.4	23	112	253		8
Run Number		45	1600	926.5	23	112	253		8
		50	1605	931.6	23	112	250		9
		55	1610	936.5	23	112	251		8
Leakchecks		60	1615	941.83	23	112	259		8
Initial									
Final									
Run Number									

COMMENTS:

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HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-21-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	67
SAMPLE TYPE	HCl	METER FACTOR	9594
RUN NUMBERS	3	PROBE HEATER SETTING	250
OPERATOR	JRP	SAMPLE RATE	1L/min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.3		
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1637	949.69					
	5	1642	954.8	2.4	112	253		5
	10	1647	959.9	22	112	315		5
	15	1652	964.9	23	112	310		8
	20	1657	969.7	23	113	292		9
	25	1702	974.8	23	113	282		10
	30	1707	979.9	23	112	273		
	35	1712	985.1	23	112	259		7
	40	1717	990.1	24	112	247		5
	45	1722	995.9	23	112	237		5
	50	1727	1000.2	23	112	242		8
	55	1732	1005.3	22	113	241		9
	60	1737	1010.32	23	112	239		8

Leakchecks

Initial 0

Final 0

Run Number 3

Leakchecks

Initial

Final

Run Number

Leakchecks

Initial

Final

Run Number

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-22-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl	METER FACTOR	.9894
RUN NUMBERS	1	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/Min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE			
STATIC PRESSURE (Pa)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (In. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1200	15.88					
	~~5~~ 1	1201	17.08	22	108	225		8
	~~10~~	1215	"	~~22~~	~~108~~	~~307~~		~~11~~
	~~15~~ 6	1220	22.2	22	108	302		"
	~~20~~ 7 FF	1221	23.05	22	108	305		21
STOP	~~16~~	~~1230~~						
Filter	~~21~~	~~1235~~						
Clogged	~~26~~	~~1240~~						
	~~31~~	~~1245~~						
	~~8~~							
	7	1232	23.62					
	10	1235	26.8	24	108	184		3
	15	1240	31.8	23	108	198		12
	20	1245	36.8	25	108	240		14
	25	1250	41.8	25	109	226		14
	30	1255	46.9	23	110	253		13
	35	1300	52.2	23	109	250		11
	40	1305	57.0	23	109	255		6
	45	1310	61.9	22	105	259		6
	50	1315	67.0	23	108	253		8
	55	1320	71.6	23	108	256		10
	60	1325	76.56	23	109	252		10

Leakchecks

Initial 0

Final 0

Run Number 1

Leakchecks

Initial

Final

Run Number

Leakchecks

Initial

Final

Run Number

COMMENTS:

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RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16%
DATE	11-22-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	U-7
SAMPLE TYPE	HCl	METER FACTOR	.9944
RUN NUMBERS	2	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE			
STATIC PRESSURE (Pst)	-4		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1336	82.12					
Initial 0		5	1341	87.2	2.4	109	311		2
		10	1346	92.2	23	109	300		2
Final 0		15	1351	97.2	23	109	299		2
		20	1356	102.1	23	109	281		2
Run Number 2		25	1401	107.3	23	109	265		2
		30	1406	112.3	23	109	251		2
		35	1411	117.0	23	109	243		2
		40	1416	122.2	23	109	237		2
Leakchecks	PORT →	~~45~~	~~1421~~ 1505						
	CHANGE	45	1510	127.2	23	108	233		2
Initial		~~50~~	~~1515~~		~~23~~	~~108~~	~~245~~		~~2~~
		~~55~~	~~1520~~						
Final		~~60~~	~~1525~~	127.2					
		45	1655	132.0	23	[illegible]	241		2
Run Number		50	1700	137.0	23	109	248		2
		55	1705	142.0	23	110	248		2
		60	1710	146.76	23	110	244		2
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16%
DATE	11-22-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	U-7
SAMPLE TYPE	HCl	METER FACTOR	9894
RUN NUMBERS	3	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.85		
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Initial .02 L/min		0	1745	55.03					
		5	1750	60.0	2.3	112	235		2
Final 0		10	1755	65.0	2.3	111	256		2
		15	1800	70.0	2.3	112	267		2
		20	1805	74.9	2.2	112	262		2
Run Number 3		25	1810	79.6	2.3	112	270		2
		30	1815	85.1	2.3	112	269		2
		35	1820	90.0	2.3	112	261		2
		40	1825	95.0	2.3	112	289		2
Leakchecks		45	1830	100.0	2.3	111	264		2
		50	1835	105.0	2.3	111	266		2
Initial		55	1840	109.8	2.3	111	272		2
		60	1845	114.86	2.3	111	271		2
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-23-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	V-7
SAMPLE TYPE	HCl	METER FACTOR	.9894
RUN NUMBERS	1	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/Min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE			
STATIC PRESSURE (Pa)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	0930	229.61					
	5	935	224.5	2.4	108	259	-	1
	10	940	229.3	2.3	108	244		1
	15	945	234.2	2.3	107	251		2
	20	950	239.1	2.3	108	240		2
	25	955	244.0	2.3	107	237		2
	30	1000	248.9	2.3	108	250		2
	35	1005	254.0	2.3	108	259		2
	40	1010	259.1	2.3	108	253		2
	45	1015	264.1	2.4	108	255		2
	50	1020	269.0	2.3	108	267		2
	55	1025	274.1	2.3	108	275		2
	60	1030	279.27	2.3	108	270		2

Leakchecks

Initial 0

Final 0.2 L/Min

Run Number 1

Leakchecks

Initial

Final

Run Number

Leakchecks

Initial

Final

Run Number

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-23-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	U-7
SAMPLE TYPE	HCl	METER FACTOR	9894
RUN NUMBERS	2	PROBE HEATER SETTING	250
OPERATOR	JBP	SAMPLE RATE	1L/min.
AMBIENT TEMPERATURE	108	OTHER DATA/NOTES	
BAROMETRIC PRESSURE			
STATIC PRESSURE (Ps)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
	0	1110	286.00					
	5	1115	290.9	2.3	105	251		1
	10	1120	295.9	2.3	104	251		1
	15	1125	300.7	2.3	104	276		1
	20	1130	305.6	2.3	104	280		1
	25	1135	310.32	2.3	105	267		1
	PORT CHANGE							
	25	1150	310.32					
	30	1155	315.3	2.4	107	282		1
	35	1200	320.3	2.4	107	277		2
	40	1205	325.2	2.4	107	286		2
	45	1210	330.3	2.4	108	273		2
	50	1215	335.3	2.4	108	267		2
	55	1220	340.2	2.3	108	266		2
	60	1225	345.07	2.3	108	260		2

Leakchecks
Initial 0
Final 0
Run Number 2

Leakchecks
Initial
Final
Run Number

Leakchecks
Initial
Final
Run Number

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	Morristown	ASSUMED MOISTURE (%)	16 %
DATE	11-23-91	SAMPLE BOX NUMBER	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	U-7
SAMPLE TYPE	HCl	METER FACTOR	9894
RUN NUMBERS	3	PROBE HEATER SETTING	250
OPERATOR	JBF	SAMPLE RATE	1L/Min
AMBIENT TEMPERATURE	100	OTHER DATA/NOTES	
BAROMETRIC PRESSURE			
STATIC PRESSURE (Pa)	-6		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1245	349.78					
Initial 0		5	1250	3550	24	~~74~~ 108	245		2
		10	1255	359.8	23	108	247		2
Final 0		15	1300	364.7	23	108	242		2
		20	1305	369.6	23	108	254		2
Run Number 3		25	1310	374.8	24	108	263		2
		30	1315	379.7	2.3	108	255		2
		35	1320	384.7	2.3	108	268		2
		40	1325	389.7	2.3	108	264		2
Leakchecks		45	1330	394.7	2.3	108	251		2
		50	1335	399.6	2.3	108	248		2
Initial		55	1340	404.8	2.3	108	262		2
		60	1345	409.99	2.3	108	258		2
Final									
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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HCl
FIELD DATA

PLANT	MORRISTOW HWI	ASSUMED MOISTURE (%)	16%
DATE	11-18-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	~~HCL~~	METER FACTOR	1.0134
RUN NUMBERS	1, ~~[illegible]~~	PROBE HEATER SETTING	
OPERATOR	KAGOLANU	SAMPLE RATE	1 L/MIN
AMBIENT TEMPERATURE	90°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05"		
STATIC PRESSURE (Ps)	-0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm) 0.91 L17 GRS ~~(Vm) Cu ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)	FILT TEM °F
	0	1400	~~[illegible]~~ 0.91	2.4	5	3			
	10	1410	16.30	~~0.24~~	95	308		0	133
	20	1420	26.5	2.2	96	311		0	136
	30	1430	36.3	2.2	98	313		0	135
	35	1435	41.1	2.2	99	312		0	13
	40	1440	46.0	2.2	100	314		0	13
	45	1445	51.3	2.1	101	318		0	14.
	50	1450	56.5	2.1	102	311		0	
	55	1455	61.1	2.2	102	319		0	
	60	1500	65.77	2.2	102	320		0	

Leakchecks

Initial 0 at 15" Hg

Final 0 @ 15"

Run Number 1

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS: Did not purge the train with air after sampling.

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HW1	ASSUMED MOISTURE (%)	16%
DATE	11-18-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	2	PROBE HEATER SETTING	
OPERATOR	KAGOLANU	SAMPLE RATE	1 L/min
AMBIENT TEMPERATURE	90°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05"		
STATIC PRESSURE (Ps)	-0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITERS ~~(cu. ft)~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1535	72.85					
Initial 0 @ 15"		5	1540	77.6	2.2	100	303		0
		10	1545	82.8	2.2	99	306		0
Final 0 @ 24"		15	1550	88.0	2.2	100	308		0
		20	1555	93.1	2.2	101	313		0
Run Number 2		25	1600	98.3	2.2	101	312		0
		30	1605	103.45	2.2	101	312		0
Leakchecks									
Initial		30	1640	103.45	2.2	99	303		0
		35	1645	108.6	2.2	99	306		0
		40	1650	114.3	2.2	98	306		0
Final		45	1655	119.0	2.2	99	302		0
		50	1700	124.1	2.2	99	301		0
Run Number		55	1705	129.2	2.2	100	307		0
		60	1710	134.55	2.2	100	305		0
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS: Stopped Gas meter at 1605 to wait for part change at other locations. Restarted at 1640. Purged with air for 5 min @ 1 L/min after Run.

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HCl
FIELD DATA

PLANT	MORRISTOWN HW1	ASSUMED MOISTURE (%)	16 %
DATE	11-18-91	SAMPLE BOX NUMBER	–
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	3	PROBE HEATER SETTING	–
OPERATOR	Kagolanu	SAMPLE RATE	1 L/min
AMBIENT TEMPERATURE	85 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05"		
STATIC PRESSURE (Ps)	−0.1"		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(dm³), cu ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger Outlet Temperature (°F)	Pump Vacuum (in. Hg)
Initial 0 @ 19"		0	1740	144.12					
		5	1745	148.8	2.2	98	283	–	0
		10	1750	153.9	2.2	98	284		0
Final 0 @ 28"		15	1755	159.0	2.2	97	290	–	0
		20	1800	164.2	2.2	97	289	–	0
Run Number 3		25	1805	169.4	2.2	98	281	–	0
		30	1810	174.6	2.2	98	290	–	0
		35	1815	180.0	2.2	98	298	–	0
Leakchecks									
Initial ____		40	1820	185.1	2.2	99	289		0
		45	1825	190.3	2.2	99	287		0
		50	1830	195.7	2.2	99	292		0
Final ____		55	1835	200.5	2.2	99	298		0
		60	1840	205.85	2.2	99	289		0
Run Number ____									
Leakchecks									
Initial ____									
Final ____									
Run Number ____									

COMMENTS:

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HCl
FIELD DATA

PLANT	MORRISTOWN HW1	ASSUMED MOISTURE (%)	15.3%
DATE	11-19-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	4	PROBE HEATER SETTING	
OPERATOR	KAGOLANU	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	-0.1"		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(Vm) cu ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger/FILTER ~~Outlet~~ Temperature (°F)	Pump Vacuum (in. Hg)
		0	1550	212.91					
Initial 0 @ 23"		5	1555	221.0	6	97	257	324	-4
		10	1600	231.2	6	98	265	268	4
Final 0 @ 21"		15	1605	242.5	6	99	267	300	2.5
		20	1610	253.2	6	98	267	302	2.0
Run Number 4		25	1615	264.8	6	101	267	307	2.0
		30	1620	275.2	6	102	268	293	1.5
		35	1625	285.7	6	103	268	367	1.5
Leakchecks									
		40	1630	296.4	6	103	~~264~~ 270	378	1.5
Initial		45	1635	307.1	6	104	~~265~~ 268	343	1.5
		50	1640	317.8	6	105	270	296	1.0
Final		55	1645	328.4	6	107	266	355	1.0
		60	1650	338.92	6	106	266	363	1.0
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.3
DATE	11-19-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	5	PROBE HEATER SETTING	—
OPERATOR	Kagolamm	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	−0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading ~~(cu ft)~~ LITER	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	Impinger ~~Outlet Temperature~~ FILTER (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1720	348.3					
Initial 0 @ 26"		5	1725	357.2	4.6	108	262	303	2.5
		10	1730	366.5	4.8	108	265	323	2.5
Final 0 @ 27"		15	1735	376.5	5	109	263	354	2.0
		20	1740	386.0	5	109	264	292	2.0
Run Number 5		25	1745	395.9	5	109	265	366	2.0
		30	1750	406.03	5	108	265	354	2.0
Leakchecks		30	1855	406.03	5	101	256	291	3.0
Initial		35	1900	415.6	4.6	100	260	305	3.0
		40	1905	425.2	4.8	100	260	359	3.0
Final		45	1910	435.0	4.8	101	258	340	3.0
		50	1915	444.4	4.8	102	262	329	2.5
Run Number		55	1920	454.6	4.8	103	258	364	2.5
		60	1925	464.9	4.8	103	259	326	2.5
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS: Stopped DGM at 1750 to wait for port change at other locations. Restarted at 1855.

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.3 %
DATE	11-19-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	6	PROBE HEATER SETTING	—
OPERATOR	KAGOLANU	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.05		
STATIC PRESSURE (Ps)	-0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter ~~Reading~~ LITERS ~~(Am)~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1955	482.19					
Initial 0 @ 24"		5	2000	492.0	4.9	103	258	340	~~4.9~~ 3
		10	2005	502.1	5	103	258	363	3
Final 0 @ 16"		15	2010	511.8	5	104	259	343	3
		20	2015	523.1	5	104	260	395	3
Run Number 6		25	2020	531.6	5	104	254	348	3
		30	2025	541.5	5	104	252	340	3
Leakchecks									
Initial		35	2030	551.5	5	104	257	348	3
		40	2035	561.4	5	104	258	318	3
Final		45	2040	571.4	5	105	257	335	3
		50	2045	581.4	5	105	259	323	3
		55	2050	591.4	5	104	261	341	3
Run Number		60	2055	601.42	5	106	257	395	3
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.5
DATE	11-20-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	7	PROBE HEATER SETTING	-
OPERATOR	Kagolam	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	90 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.13		
STATIC PRESSURE (Ps)	-0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER (Vm) out	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1230	614.46					
Initial 0 @ 27"		5	1235	623.55	6	97	244	389	6
		10	1240	634.9	6	98	250	435	5
Final 0 @ 18"		15	1245	647.1	6	100	252	388	4
		20	1250	659.2	6	101	256	412	3
Run Number 7		25	1255	671.4	6	102	258	430	3
		30	1300	682.5	6	103	258	440	2.5
Leakchecks									
		35	1305	693.6	6	104	258	419	2
Initial		40	1310	704.3	6	105	259	390	2
		45	1315	714.7	6	106	261	450	2
Final		50	1320	725.2	6	106	259	451	2
		55	1325	735.6	6	108	256	395	2
Run Number		60	1330	746.07	6	108	259	415	2
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWY	ASSUMED MOISTURE (%)	15.5
DATE	11.20.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	8	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	90 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.13		
STATIC PRESSURE (Ps)	−0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LTGR ~~(Nm³, cu.ft)~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1400	756.77					
Initial 0 @ 21"		5	1405	765.3	4.6	107	243	453	2
		10	1410	774.9	4.8	107	244	452	2
Final 0 @ 28"		15	1415	784.8	4.8	107	247	420	2
		20	1420	794.4	4.9	108	248	453	2
Run Number 8		25	1425	804.7	4.8	108	243	423	3
		30	1430	813.73	4.6	108	245	368	3
Leakchecks									
		30	1645	813.73					
Initial		35	1650	822.3	4.6	103	240	328	6.5
		40	1655	831.48	4.6	103	243	357	6.0
Final									
		40	2100	831.48					
Run Number		45	2105	838.2	3.4	97	239	457	15
		50	2110	-	-	-	-	-	-
Leakchecks									
		55	2115	855.4	6	99	240	380	15
Initial		60	2120	866.69	6	99	243	483	13.5
Final									
Run Number									

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.5
DATE	11.20.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	9	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	90 F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.13		
STATIC PRESSURE (Ps)	-0.1		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading ~~(Am³, cu.ft~~ LITER	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
	0	2135	878.7					
	5	2140	888.0	4.8	101	276	473	3
	10	2145	897.8	4.9	101	274	467	3
	15	2150	907.4	4.9	101	268	503	3
	20	2155	916.8	4.8	101	276	502	3.5
	25	2200	926.5	4.6	102	275	457	4
	30	2205	935.9	4.8	102	277	443	3.5
	35	2210	945.6	5	102	270	566	3.5
	40	2215	955.5	4.9	103	278	453	3.5
	45	2220	965.7	4.9	103	278	414	4
	50	2225	975.1	5	103	281	475	4
	55	2230	985.1	6	104	271	492	4
	60	2235	995.35	6	104	273	440	4

Leakchecks

Initial 0 @ 24"

Final 0 @ 23"

Run Number 9

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWNHW1	ASSUMED MOISTURE (%)	15.29
DATE	11.21.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	Hcl	METER FACTOR	1.0134
RUN NUMBERS	10	PROBE HEATER SETTING	—
OPERATOR	Kapolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	90 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.95		
STATIC PRESSURE (Ps)	0.11		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading ~~(Am³, cu.ft)~~ LITER	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1245	1006.75					
Initial 0 @ 21"		5	1250	1016.4	4.8	102	265	357	1.5
		10	1255	1026.3	4.9	103	266	392	1.5
Final 0 @ 16"		15	1300	1036.2	4.9	103	263	420	1.5
		20	1305	1046.2	4.9	104	263	336	1.5
Run Number 10		25	1310	1055.7	4.9	105	266	415	1.5
Leakchecks									
		25	1345	1055.7					
Initial		30	1350	1066.0	4.9	103	264	389	1.5
		35	1355	1075.8	4.9	104	263	340	1.5
Final		40	1400	1085.7	5	104	266	386	1.5
		45	1405	1095.6	5	105	264	350	1.5
Run Number		50	1410	1105.4	5	105	266	383	1.5
		55	1415	1115.6	5	106	265	420	1.5
		60	1420	1125.22	5	106	263	382	1.5
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS: Stopped run at 1310. Spray dryer break down. Restart at 1345.

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.29
DATE	11.21.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	11	PROBE HEATER SETTING	—
OPERATOR	KAGOLANU	SAMPLE RATE	2 L/MIN
AMBIENT TEMPERATURE	90 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.95		
STATIC PRESSURE (Ps)	0.11		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks

Initial 0 @ 24"

Final 0 @ 19"

Run Number 11

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(Vm), cu.ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger~~ FILTER ~~Outlet~~ Temperature (°F)	Pump Vacuum (in. Hg)
	0	1445	1132.08					
	5	1450	1141.3	4.5	108	255	403	1.5
	10	1455	1151.0	4.6	108	253	387	1.5
	15	1500	1160.5	4.6	109	259	395	1.5
	20	1505	1169.7	4.6	109	260	412	1.5
	25	1510	1179.4	4.6	109	260	415	1.5
	30	1515	1188.8	4.6	109	257	369	1.5
	35	1520	1198.4	4.6	108	258	403	1.5
	35	1550	1198.4					
	40	1555	1207.9	4.6	106	255	363	1.5
	45	1600	1217.3	4.7	106	259	366	1.0
	50	1605	1226.8	4.6	106	258	390	1.0
	55	1610	1236.4	4.7	107	255	373	1.0
	60	1615	1245.95	4.7	106	257	369	1.0

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.29%
DATE	11.21.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	12	PROBE HEATER SETTING	—
OPERATOR	KAGOLANU	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	90°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.95		
STATIC PRESSURE (Ps)	0.11		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(Vm), cuft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1640	1255.61					
Initial 0 @ 19"		5	1645	1265.1	4.7	109	239	405	1.5
		10	1650	1274.7	4.8	109	239	357	1.5
Final 0 @ 26"		15	1655	1284.5	4.8	109	231	390	1.5
		20	1700	1294.2	4.8	109	231	368	1.5
Run Number 12		25	1705	1304.0	4.9	109	237	364	1.5
		30	1710	1314.2	5	110	236	372	1.5
		35	1715	1324.2	6	110	242	353	1.5
Leakchecks									
		40	1720	1334.4	5.5	110	243	351	1.5
Initial		45	1725	1344.5	5.5	110	247	354	1.5
		50	1730	1354.6	5.5	110	251	388	2
Final		55	1735	1364.7	5.5	109	245	393	1.5
		60	1740	1374.86	5.5	110	248	377	1.5
Run Number									
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.29
DATE	11-22-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	Y-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	13	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85°F	OTHER DATA/NOTES	—
BAROMETRIC PRESSURE	30.00		
STATIC PRESSURE (Ps)	0.14		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(Vm), cu ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger~~ FILTER Outlet Temperature (°F)	Pump Vacuum (in. Hg)
		~~0~~	~~1200~~	~~1389.43~~					
Initial 0 @ 18"		~~5~~	~~1205~~						
		~~10~~	~~1210~~						
Final 0 @ 24"									
		0	1215	1389.43					
Run Number 13		5	1220	1401.6	6	97	305	265	5
		10	1225	1412.6	6	98	306	270	3.5
		15	1230	1423.3	6	98	299	280	2.5
Leakchecks		20	1235	1433.6	6	99	307	330	2
		25	1240	1443.9	6	100	304	297	2
Initial		30	1245	1454.3	6	101	305	296	2
		35	1250	1464.6	6	101	299	290	2
Final		40	1255	1474.9	6	103	299	335	2
		45	1300	1485.5	6	103	303	293	2
Run Number		50	1305	1495.6	6	103	296	289	1.5
		55	1310	1505.8	6	104	299	292	1.5
		60	1315	1516.01	6	104	300	295	1.5
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HW1	ASSUMED MOISTURE (%)	15.29
DATE	11-22-91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	14	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85°F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.00		
STATIC PRESSURE (Ps)	0.14		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITERS ~~(cu.ft)~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	1345	1539.07					
Initial 0 @ 29"		5	1350	1546.1	6	104	300	295	5
		10	1355	1556.0	5	104	305	356	6
Final 0 @ 23"		15	1400	1566.0	4.8	105	308	343	6
		20	1405	1575.6	4.8	105	302	311	6
Run Number 14		25	1410	1584.8	4.8	105	304	271	6.5
		30	1415	1594.5	4.8	104	302	315	6.5
Leakchecks		30	1505	1594.5					
		35	1510	1605.5	4.8	104	301	356	6.5
Initial _____		~~40~~	~~1515~~						
Final _____		35	1655	1605.5	6	97	266	292	4
		40	1700	1616.5	6	97	291	284	4
Run Number _____		45	1705	1627.6	6	98	302	287	4.5
		50	1710	1637.8	6	98	292	295	5
Leakchecks		55	1715	1648.1	6	100	295	246	4
		60	1720	1658.55	6	100	288	261	4
Initial _____									
Final _____									
Run Number _____									

COMMENTS:

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RADIAN CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.29
DATE	11·22·91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	15	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85 F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	30.0		
STATIC PRESSURE (Ps)	0.14		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Leakchecks

Initial 0 @ 26"

Final 0 @ 24"

Run Number 15

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(Vm), cu.ft~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
	0	1745	1669.7					
	5	1750	1679.3	5	101	295	267	5
	10	1755	1689.3	5.5	101	298	261	5
	15	1800	1699.3	5.5	102	295	254	5
	20	1805	1709.4	5.5	103	289	237	5
	25	1810	1719.5	5.5	103	289	220	5
	30	1815	1729.5	5	103	287	245	6
	35	1820	1739.5	5.5	104	285	240	5
	40	1825	1749.7	6	104	284	259	5
	45	1830	1759.9	6	104	289	264	5
	50	1835	1770.5	6	105	286	227	5
	55	1840	1780.5	6	105	284	259	5
	60	1845	1790.65	6	105	286	264	5

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS:

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CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN HWI	ASSUMED MOISTURE (%)	15.29 %
DATE	11·23·91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	16	PROBE HEATER SETTING	—
OPERATOR	Kagolanu	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.89		
STATIC PRESSURE (Ps)	0.17		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading LITER ~~(cu ft)~~	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
Leakchecks		0	0930	1802.47					
Initial 0 @ 20"		5	0935	1810.2	5.5	103	346	235	6
		10	0940	1820.1	5	103	308	247	6
Final 0 @ 19"		15	0945	1830.0	5	104	299	265	6
		20	0950	1840.1	6	104	293	258	6
Run Number 16		25	0955	1850.2	6	104	294	235	6
		30	1000	1860.8	6	105	293	253	6
		35	1005	1871.2	6	105	288	279	6
Leakchecks		40	1010	1881.6	6	105	292	235	6
		45	1015	1892.0	6	105	283	234	6
Initial _____		50	1020	1902.4	6	105	291	237	6
		55	1025	1912.8	6	105	289	253	6
Final _____		60	1030	1923.29	6	105	291	263	6
Run Number _____									
Leakchecks									
Initial _____									
Final _____									
Run Number _____									

COMMENTS:

Revision 1/91

RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN MWI	ASSUMED MOISTURE (%)	15.29
DATE	11.23.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	17	PROBE HEATER SETTING	—
OPERATOR	Kagolan	SAMPLE RATE	2L/min
AMBIENT TEMPERATURE	85 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.89		
STATIC PRESSURE (Ps)	0.17		

READ AND RECORD ALL DATA EVERY 5 MINUTES

	Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in Hg)
Leakchecks		0	1110	1929.85					
Initial 0 @ 16"		5	1115	1939.2	5	103	189	257	6
		10	1120	1949.4	4.8	104	205	313	6
Final 0 @ 21		15	1125	1958.5	5	104	283	147	6
		20	1130	1968.8	6	104	276	271	6
Run Number 17		25	1135	1979.13	6	104	281	268	6
Leakchecks									
		25	1150	1979.13					
Initial		30	1155	1988.3	6	102	270	328	6
		35	1200	1998.6	6	102	266	247	6
Final		40	1205	2008.6	5.5	102	271	283	6
		45	1210	2018.3	5	102	270	283	7
Run Number		50	1215	2028.9	5	103	271	287	7
		55	1220	2037.8	5	103	267	283	7
		60	1225	2047.56	5	103	268	281	7
Leakchecks									
Initial									
Final									
Run Number									

COMMENTS:

Revision 1/91

RADIAN
CORPORATION

HCl
FIELD DATA

PLANT	MORRISTOWN	ASSUMED MOISTURE (%)	15.29
DATE	11.23.91	SAMPLE BOX NUMBER	—
SAMPLING LOCATION	OUTLET	METER BOX NUMBER	V-8
SAMPLE TYPE	HCl	METER FACTOR	1.0134
RUN NUMBERS	18	PROBE HEATER SETTING	—
OPERATOR	Kapolan	SAMPLE RATE	2 L/min
AMBIENT TEMPERATURE	85 °F	OTHER DATA/NOTES	
BAROMETRIC PRESSURE	29.89		
STATIC PRESSURE (Ps)	0.17		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Test Section (#)	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading ~~(Min), cu. ft~~ LITER	Meter Pressure (in. H2O)	Dry Gas Meter Temperature (°F)	Probe Outlet Temperature (°F)	~~Impinger Outlet~~ FILTER Temperature (°F)	Pump Vacuum (in. Hg)
	0	1245	2054.3					
	5	1250	2063.2	4.4	103 ~~225~~	225	350	10
	10	1255	2072.6	4.8	103	243	430	12
	15	1300	2082.1	5.5	103	260	418	12
	20	1305	2093.0	6	104	267	421	11
	25	1310	2103.3	6	104	263	371	11
	30	1315	2113.7	6	104	267	323	10.5
	35	1320	2123.9	6	105	262	389	11
	40	1325	2134.0	6	105	265	367	10
	45	1330	2144.8	6	106	267	355	10
	50	1335	2155.1	6	106	265	376	10
	55	1340	2165.4	6	107	270	347	10.5
	60	1345	2175.7	6	106	271	342	10.5

Leakchecks

Initial 0 @ 26"

Final 0 @ 25"

Run Number 18

Leakchecks

Initial _____

Final _____

Run Number _____

Leakchecks

Initial _____

Final _____

Run Number _____

COMMENTS:

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MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN 1
PAGE 1 OF 3

PLANT	[illegible]	PROBE LENGTH AND TYPE	45" [illegible]	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	
DATE	11/18/91	NOZZLE I.D. (in)	.327	ASSUMED MOISTURE (%)	[illegible]		
SAMPLING LOCATION	SC Inlet	METER BOX NUMBER	456	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	
RUN NUMBER	1	METER ▲ H@	1.86	MOISTURE DATA			
OPERATOR	MB	Yd	.9968	O2/CO2 METHOD			
AMBIENT TEMPERATURE	1.03	K FACTOR	1.39	O2	8%		
BAROMETRIC PRESSURE		PROBE HEATER SETTING	—	CO2	10%		
STATIC PRESSURE (Ps)	-6	HEATER BOX SETTING	-	FINAL LEAKCHECK			
INITIAL LEAKCHECK	.005 at	HEIGHT OF LOCATION (ft)	30'	BUFFER SOLN RATE (ml/min)	[illegible]		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Dry Gas Meter Outlet (Tm out)	1st Buffer Impinger Exit	Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	0	[illegible]	46.939								
A 1	5	1414	46.13	[illegible]	361	1.5	102	97	79	[illegible]	3.0
A 2	10	1419	49.81	1.67	410	1.2	115	99	81	94	[illegible]
A 3	15	1424	53.21	1.39	414	1.0	116	101	83	5[illegible]	[illegible]
A 4	20	1429	56.50	1.33	418	.99	118	102	87	9[illegible]	[illegible]
A 5	25	1434	59.5	1.17	420	.86	119	104	87	[illegible]	[illegible]
A 6	30	1439	62.46	1.08	420	.78	121	101	[illegible]	58	[illegible]
A 7	35	1444	65.51	1.78	418	.9[illegible]	123	105	87	6[illegible]	[illegible]
A 8	40	1449	68.22	1.30	420	.99	125	1[illegible]	77	65	3.1
9	45	1454	72.14	1.39	420	1.0	122	110	78	[illegible]	3.0
10	50	1459	75.68	1.67	419	1.2	124	118	78	62	[illegible]
11	55	1504	79.14	1.53	412	1.1	[illegible]	118	79	[illegible]	[illegible]
12	60	1509	82.65	1.53	41[illegible]	1.1	[illegible]	119	75	65	[illegible]
13	65	1514	86.22	1.53	[illegible]	1.1	130	121	[illegible]	[illegible]	[illegible]
11	70	1519	89.5[illegible]	1.39	41[illegible]	1.0	130	121	74	[illegible]	[illegible]
10	75	1524	92.82	1.39	418	1.0	124	[illegible]	[illegible]	[illegible]	3.0
9	80	1529	96.1[illegible]	1.39	[illegible]	1.0	122	122	[illegible]	[illegible]	[illegible]
8	85	1534	99.50	1.39	4[illegible]	[illegible]	130	123	[illegible]	66	3.4
7	90	1539	102.82	1.38	41[illegible]	.99	130	123	[illegible]	65	3.5
6	95	1544	106.69	1.24	41[illegible]	.89	130	124	77	67	3.5

COMMENTS

Revision 5/90

MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN 1

PAGE 3 OF ____

PLANT	[illegible]	PROBE LENGTH AND TYPE	[illegible]	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	
DATE	11/13/9[illegible]	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)	[illegible]		
SAMPLING LOCATION	Inlet	METER BOX NUMBER	[illegible]	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	
RUN NUMBER	1	METER ▲ H@	[illegible]	MOISTURE DATA			
OPERATOR	[illegible]	Yd	[illegible]	O2/CO2 METHOD			
AMBIENT TEMPERATURE	160	K FACTOR	[illegible]	O2			
BAROMETRIC PRESSURE	30	PROBE HEATER SETTING	-	CO2			
STATIC PRESSURE (Ps)		HEATER BOX SETTING	-	FINAL LEAKCHECK			
INITIAL LEAKCHECK		HEIGHT OF LOCATION (ft)	-	BUFFER SOLN RATE (ml/min)	[illegible]		

READ AND RECORD ALL DATA EVERY ____ MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Dry Gas Meter Outlet (Tm out)	1st Buffer Impinger Exit	Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	95	1544	100.09								
A5	100	1549	104.2	1.10	412	[illegible]	129	124	[illegible]	[illegible]	[illegible]
4	105	1554	112.45	1.38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	110	1559	118.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	115	1604	119.29	1.53	[illegible]	1.7	130	124	[illegible]	[illegible]	[illegible]
1	120	1609	123.23	1.95	[illegible]	[illegible]	135	124	[illegible]	[illegible]	[illegible]
1	125	1614	[illegible]	1.81	397	[illegible]	134	125	[illegible]	[illegible]	[illegible]
2	130	1619	130.61	[illegible]	[illegible]	[illegible]	133	125	75	65	[illegible]
3	135	1624	134.9	1.07	418	[illegible]	130	125	78	[illegible]	[illegible]
4	140	1629	137.16	1.01	[illegible]	[illegible]	[illegible]	124	[illegible]	[illegible]	[illegible]
5	145	1634	[illegible]	1.34	418	[illegible]	[illegible]	124	81	68	[illegible]
6	150	1639	143.64	1.48	417	[illegible]	130	124	82	[illegible]	[illegible]
7	155	1644	[illegible]	1.39	[illegible]	[illegible]	130	124	76	[illegible]	[illegible]
8	160	1649	[illegible]	[illegible]	423	[illegible]	[illegible]	[illegible]	[illegible]	64	[illegible]
9	165	1654	[illegible]	[illegible]	423	[illegible]	132	125	[illegible]	[illegible]	[illegible]
10	170	1659	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	125	[illegible]	[illegible]	[illegible]
12	180	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	80	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	69	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0

COMMENTS

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MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN 1
PAGE 1 OF 1

PLANT	[illegible]	PROBE LENGTH AND TYPE	[illegible]	DUCT DIMENSIONS		FIRST IMPINGER	
DATE	11/5/91	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)	15	INITIAL BUFFER pH	
SAMPLING LOCATION	Inlet	METER BOX NUMBER	[illegible]	MOISTURE METHOD		FIRST IMPINGER	
RUN NUMBER	1	METER ▲ H@	1.56	MOISTURE DATA		FINAL BUFFER pH	
OPERATOR	[illegible]	Yd	.9968	O2/CO2 METHOD			
AMBIENT TEMPERATURE	110	K FACTOR	1.39	O2			
BAROMETRIC PRESSURE		PROBE HEATER SETTING		CO2			
STATIC PRESSURE (Pa)		HEATER BOX SETTING		FINAL LEAKCHECK	.004 [illegible]		
INITIAL LEAKCHECK		HEIGHT OF LOCATION (ft)		BUFFER SOLN RATE (ml/min)			

4/5

READ AND RECORD ALL DATA EVERY ____ MINUTES

	Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Dry Gas Meter Outlet (Tm out)	1st Buffer Impinger Exit	Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
		190	1719	169.8								
	A10	195	1724	173.31	1.39	418	1.0	131	125	79	[illegible]	13
	9	200	1729	176.65	1.36	412	.95	135	125	79	69	10.5
	8	205	1734	179.31	1.25	415	.92	133	125	82	69	11.8
	7	210	1739	182.5	1.25	421	.92	131	126	84	69	[illegible]
Stop	6	[illegible]	[illegible] 1741	184.048								
	[illegible]	[illegible]	[illegible]	184.048								
Restart	6	212	1750	[illegible]	1.04	416	.75	118	121	85	69	15
	6	215	1753	185.7	1.04	416	.75	122	121	83	69	16
	5	220	1758	188.0	1.11	416	.8	124	123	82	69	19
	4	225	1803	191.13	1.04	414	.75	123	120	82	69	21
	3	230	1808	193.82	1.04	404	.75	126	121	83	[illegible]	[illegible]
Stop*	2	231 [illegible]	[illegible] 1804	194.19	1.11	382	.8	124	[illegible]	80	65	[illegible]
		[illegible]	[illegible]									
				leak check =		.004	at 7[illegible]					

COMMENTS:

* [illegible] not maintain [illegible] sampling.

Revision 5/90

RADIAN
CORPORATION

Plant Huntsville House

Date [illegible]

Sampling location Inlet

Sample type [illegible]

Run number [illegible]

Sample box number [illegible]

Clean-up person [illegible]

Solvent rinses [illegible]

Sample identification code [illegible]

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	2 M Phosphate Buffer	[illegible]	MGS	1322.4	[illegible]	[illegible]
2	2 M Phosphate Buffer	[illegible]	MGS	[illegible]	577.5	[illegible]
3	MT	—	MGS	[illegible]	463.7	3.7
4	Silica Gel	~200	MGS	774.6	735.6	[illegible]
5						
6						
7						

Total Weight Gain (grams) [illegible]

1181671R

Moisture Recovery Form

Magic Box
Short [illegible]

MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN [illegible]
PAGE 1 OF [illegible]

PLANT	[illegible]	PROBE LENGTH AND TYPE	48"	DUCT DIMENSIONS	21 [illegible]	FIRST IMPINGER INITIAL BUFFER pH	7.0
DATE	1/19/91	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)	15		
SAMPLING LOCATION	Inlet	METER BOX NUMBER	[illegible]	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	6.8
RUN NUMBER	2	METER ▲ H@	1.56	MOISTURE DATA			
OPERATOR	MB	Yd	.9968	O2/CO2 METHOD			
AMBIENT TEMPERATURE	98	K FACTOR (1.43)	1.38	O2	.05		
BAROMETRIC PRESSURE	30.0[illegible]	PROBE HEATER SETTING		CO2	.10		
STATIC PRESSURE (Ps)	-6	HEATER BOX SETTING		FINAL LEAKCHECK			
INITIAL LEAKCHECK	.01 at 7[illegible]	HEIGHT OF LOCATION (ft)	5.0'	BUFFER SOLN RATE (ml/min)	10		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Temperature (deg. F) Dry Gas Meter Outlet (Tm out)	Temperature (deg. F) 1st Buffer Impinger Exit	Temperature (deg. F) Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	0	1550	94.362								
A1	5	1555	96.9	1.2	413	1.1	101	101	53	67	2.5
2	10	1600	101.98	1.4	389	1.9	101	110	79	66	2
3	15	1605	105.45	1.7	420	1.66	117	102	74	66	2.2
4	20	1610	108.95	1.1	427	1.52	119	104	74	66	2.1
5	25	1615	112.06	.92	420	1.27	121	105	65	65	1.5
6	30	1620	115.10	.8	470	1.1	122	109	60	65	1.9
7	35	1625	118.2[illegible]	.88	477	1.21	123	111	54	63	2.0
8	40	1630	121.45	.86	419	1.19	125	112	57	65	2.0
9	45	1635	124.65	.90	415	1.24	125	114	58	65	2.0
10	50	1640	127.4	.84	410	1.18	126	118	60	64	2.0
11	55	1645	130.8	1.1	411	1.5	127	119	59	64	2
12	60	1650	134.6	1.2	416	1.7	129	121	61	65	2
13	65	1655	138.6	1.2	417	1.7	131	122	63	65	2
14	70	1700	141.7	1.3	416	1.4	131	122	60	66	2
15	75	1705	144.9	.95	412	1.3	129	122	59	66	2
16	80	1710	147.9	.55	413	1.1	129	122	[illegible]	66	2
17	85	1715	151.0	.54	416	1.1	128	122	58	66	2
18	90	1720	153.3	.83	417	1.1	128	121	[illegible]	67	2
19	95	1725	159.0	.72	420	1.0	128	121	60	67	2

COMMENTS

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MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN 2
PAGE 1 OF 3

PLANT	Yorkstown	PROBE LENGTH AND TYPE	48 glass	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	7.0
DATE	11-19-91	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)			
SAMPLING LOCATION	Inlet	METER BOX NUMBER	[illegible]	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	6.8
RUN NUMBER	2	METER ▲ H@	[illegible]	MOISTURE DATA			
OPERATOR	MB	Yd	[illegible]	O2/CO2 METHOD			
AMBIENT TEMPERATURE	48	K FACTOR	[illegible]	O2			
BAROMETRIC PRESSURE	30.02	PROBE HEATER SETTING		CO2			
STATIC PRESSURE (Ps)	-6	HEATER BOX SETTING		FINAL LEAKCHECK			
INITIAL LEAKCHECK		HEIGHT OF LOCATION (ft)		BUFFER SOLN RATE (ml/min)			

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Temperature (deg. F) Dry Gas Meter Outlet (Tm out)	Temperature (deg. F) 1st Buffer Impinger Exit	Temperature (deg. F) Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	95	1725	57.0								
5	100	1130	60.1	.72	415	1.0	128	125	60	67	2
4	105	1735	62.8	.77	415	1.1	129	125	59	67	2
3	110	1740	65.7	.75	415	1.1	131	125	58	66	2
2	115	1745	69.6	1.2	304	1.7	133	126	58	66	3
1	120	~~1800~~ 1750	73.2	1.1	374	1.5	135	127	61	66	2.5
1	125	~~1805~~ 1755	76.6	1.1	376	1.5	135	128	60	66	2.5
2	130	~~1810~~ 1800	79.8	1.1	382	1.5	135	129	58	65	2
3	135	~~1815~~ 1805	83.5	1.1	411	1.5	135	128	57	67	2
4	140	~~1820~~ 1810	86.74	.97	414	1.3	133	129	57	67	2
5	145	~~1825~~ 1815	89.88	.88	416	1.31	133	129	59	67	2
6	150	1820	92.73	.77	414	.97	131	129	58	65	2
7	155	1825	95.6	.77	414	1.06	129	128	60	64	2.2
8	160	1830	98.5	.76	415	1.05	128	128	61	64	2.2
9	165	1835	101.45	.86	409	1.2	130	128	61	65	2
10	170	1840	104.81	.59	409	1.23	129	128	58	64	2
11	175	1845	108.0	1.0	406	1.35	129	128	52	67	2.5
12	180	1850	111.52	1.1	410	1.52	130	127	61	69	3
12	185	1855	115.09	1.2	414	1.66	132	128	58	66	3
11	190	1900	118.6	1.1	415	1.62	132	128	57	65	3.5

COMMENTS:

Revision 5/90

MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN [illegible]
PAGE 3 OF 5

PLANT	[illegible]	PROBE LENGTH AND TYPE	[illegible]	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	7.0
DATE	[illegible]	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)			
SAMPLING LOCATION	[illegible]	METER BOX NUMBER	4.36	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	6.8
RUN NUMBER	[illegible]	METER ▲ H@	[illegible]	MOISTURE DATA			
OPERATOR	[illegible]	Yd	[illegible]	O2/CO2 METHOD			
AMBIENT TEMPERATURE	98	K FACTOR	[illegible]	O2			
BAROMETRIC PRESSURE	30.02	PROBE HEATER SETTING		CO2			
STATIC PRESSURE (Ps)	[illegible]	HEATER BOX SETTING		FINAL LEAKCHECK	[illegible]		
INITIAL LEAKCHECK		HEIGHT OF LOCATION (ft)	[illegible]	BUFFER SOLN RATE (ml/min)	[illegible]		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Temperature (deg. F) Dry Gas Meter Outlet (Tm out)	Temperature (deg. F) 1st Buffer Impinger Exit	Temperature (deg. F) Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	190	1900	118.6								
10	195	1905	122.1	1.0	[illegible]	1.4	[illegible]	128	[illegible]	65	3
9	200	1910	125.2	.93	[illegible]	1.2	133	127	[illegible]	[illegible]	2
8	205	1915	128.2	.91	416	1.2	131	128	58	[illegible]	2
7	210	1920	131.3	.81	414	.98	130	127	59	[illegible]	2
6	215	1925	134.0	.70	413	.95	128	128	60	66	2
5	220	1930	136.6	.70	413	.95	129	127	[illegible]	[illegible]	2
4	225	1935	139.5	.76	[illegible]	1.0	130	127	59	[illegible]	2
3	230	1940	142.5	.7[illegible]	412	[illegible]	131	128	[illegible]	65	2
2	235	1945	145.7	.88	411	1.1	126	127	[illegible]	65	3
	240	1950	149.008	1.0	[illegible]	1.4	[illegible]	128	58	65	3

COMMENTS:

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RADIAN
CORPORATION

Plant [illegible]

Date [illegible]

Sampling location [illegible]

Sample type [illegible]

Run number [illegible]

Sample box number [illegible]

Clean-up person [illegible]

Solvent rinses _____

Sample identification code [illegible]

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
5						
6						
7						

Total Weight Gain (grams) [illegible]

1181671R

Moisture Recovery Form

MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN [illegible]

PAGE 1 OF 2

PLANT	[illegible]	PROBE LENGTH AND TYPE	[illegible]	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	[illegible]
DATE	11/2/91	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)	[illegible]		
SAMPLING LOCATION	[illegible]	METER BOX NUMBER	[illegible]	MOISTURE METHOD	[illegible]	FIRST IMPINGER FINAL BUFFER pH	6.7
RUN NUMBER	[illegible]	METER ▲ H@		MOISTURE DATA			
OPERATOR	[illegible]	Yd	.9968	O2/CO2 METHOD	[illegible]		
AMBIENT TEMPERATURE	100	K FACTOR	1.35	O2			
BAROMETRIC PRESSURE	[illegible]	PROBE HEATER SETTING	–	CO2			
STATIC PRESSURE (Ps)	[illegible]	HEATER BOX SETTING		FINAL LEAKCHECK			
INITIAL LEAKCHECK	[illegible]	HEIGHT OF LOCATION (ft)	[illegible]	BUFFER SOLN RATE (ml/min)	[illegible]		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Dry Gas Meter Outlet (Tm out)	1st Buffer Impinger Exit	Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	0	1235	49.310								
1	5	1335	53.3	[illegible]	[illegible]	2.07	[illegible]	[illegible]	[illegible]	[illegible]	2
2	10	1340	56.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
3	15	1345	60.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
4	20	1350	63.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
5	25	1355	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
6	30	1400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5
7	35	1405	73.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5
8	40	1410	75.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5
9	45	1415	78.92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
10	50	[illegible]	82.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
11	55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
12	60	1430	89.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
13	65	1435	92.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
14	70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
15	75	1445	100.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.5
16	80	1450	103.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0
17	85	[illegible]	106.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
18	90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
19	95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5

COMMENTS:

Revision 5/90

MICROORGANISM EMISSIONS TESTING
FIELD DATA

RUN [illegible]
PAGE 2 OF [illegible] 2

PLANT	[illegible]	PROBE LENGTH AND TYPE	45'	DUCT DIMENSIONS		FIRST IMPINGER INITIAL BUFFER pH	[illegible]
DATE	[illegible]	NOZZLE I.D. (in)	[illegible]	ASSUMED MOISTURE (%)	15		
SAMPLING LOCATION	[illegible]	METER BOX NUMBER	[illegible]	MOISTURE METHOD		FIRST IMPINGER FINAL BUFFER pH	6.7
RUN NUMBER	[illegible]	METER ▲ H@	[illegible]	MOISTURE DATA			
OPERATOR	[illegible]	Yd	[illegible]	O2/CO2 METHOD			
AMBIENT TEMPERATURE	100	K FACTOR	[illegible]	O2			
BAROMETRIC PRESSURE	[illegible]	PROBE HEATER SETTING		CO2			
STATIC PRESSURE (Ps)	[illegible]	HEATER BOX SETTING		FINAL LEAKCHECK			
INITIAL LEAKCHECK		HEIGHT OF LOCATION (ft)		BUFFER SOLN RATE (ml/min)	[illegible]		

READ AND RECORD ALL DATA EVERY 5 MINUTES

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (▲Ps), in. H2O	Flue Gas Temperature (deg. F)	Orifice Pressure Differential (▲H, in. H2O)	Temperature (deg. F) Dry Gas Meter Inlet (Tm out)	Dry Gas Meter Outlet (Tm out)	1st Buffer Impinger Exit	Silica Gel Impinger Exit	Pump Vacuum (in. Hg)
	25	1405	113.5								
4	100	1410	115.84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	105	1415	118.83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	110	1420	122.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	115	1425	126.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	120	1430	129.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	125	1435	133.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	130	1440	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	135	1445	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	140	1450	143.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	1451	144.275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]										
	[illegible] 141	[illegible]	144.275								
5	145	1649	147.00	1.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	150	1654	150.39	1.1	[illegible]	1.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	~~155~~	~~1659~~ 1655	153.792	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	~~160~~	~~1704~~									
	~~165~~	~~1709~~									
	~~170~~	~~1714~~									
	~~175~~	~~1719~~									

* stop → kill start down

stop kill start down

COMMENTS * Spike placed in [illegible] at start check = [illegible] ~~[illegible]~~ [illegible]

Revision 5/90

RADIAN
CORPORATION

Plant [illegible]

Date [illegible]

Sampling location [illegible]

Sample type [illegible]

Run number [illegible]

Sample box number [illegible]

Clean-up person [illegible]

Solvent rinses _____

Sample identification code [illegible]

Checked by _____

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
5						
6						
7						

Total Weight Gain (grams) [illegible]

1181671R

Moisture Recovery Form

RADIAN
CORPORATION

Plant Morristown

Date [illegible]

Sampling location Inlet

Sample type Spores

Run number Field Blank

Sample box number [illegible]

Clean-up person Mike Brooks

Solvent rinses

Sample identification code [illegible]

Checked by

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight (grams)		
				Final	Initial	Weight Gain
1	[illegible]			548.4	845.8	702.6
2	[illegible]			571.8	571.6	0.2
3	[illegible]			[illegible]	471.2	0.2
4	[illegible]			618.3	615.8	2.5
5						
6						
7						

1181671R

Total Weight Gain (grams) 705.5

Moisture Recovery Form

Leak checked at start and end

RADIAN CORPORATION

~~METHOD 5~~ IMPACTOR FIELD DATA

RUN 1
PAGE 1 OF 1

Set JO
D nozzle 0.123"
K = .1233
Yd = .9968
ΔH@ 1.86

Tambient 105°F
Diam. Duct 17"
Sample height 0'
Pbar 29.85" Hg
Pstatic -6.6" H_2O

PLANT	Morristown
DATE	11-20-91
SAMPLING LOCATION	Spray Dryer Outlet
SAMPLE TYPE	Andersen
RUN NUMBER	1
OPERATOR	CSG

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
	0	2130	951.185								
9	5	2136	952.12	.95	410	.12		102	101		1.0
	10	2141	953.2	.95	410	.12		103	102		1.0
	15	2146	954.2	.95	410	.12		105	102		1.0
stop	20	2151	955.18	.95	410	.12		107	104		3.0
	~~25~~	~~2156~~									
~~stop~~	~~30~~	~~2201~~									
								103.25			

COMMENTS:
Vacuum rose to 5" at 2149, 6" at 2150 104.5% iso

Revision 11/90

RADIAN CORPORATION

~~METHOD~~ 5 IMPACTOR
FIELD DATA

RUN 1
PAGE 1 OF 1

Tambient 105 °F
Diam Duct 17"
Sample height 0'
Pbar 29.80" Hg
Pstat -.66" H2O

PLANT	Morristown MWI
DATE	11-21-91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	PSD Anderson
RUN NUMBER	1
OPERATOR	CSG

Set JC
D nozzle .123
K = .1233
Yd = .9968
ΔH@ 1.86

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Impinger Exit	Pump Vacuum (in. Hg)
	0	1430	956.187								
	5	1435	957.25	.95	~~412~~ 410	.12		103	102		1.0
~~Stop~~	10	1440	958.2	.95	410	.12		104	103		1.0
Stop	15	1445	959.15	.95	410	.12		107	105		1.0
								104.5			

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 1 OF 1

Tambient 105°
Sample height 0'
Duct Diam. 17"
Pbar 29.85 "Hg
P static -6.6 "H2O

PLANT	Morristown MWI
DATE	11 22 91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	PSD Anderson
RUN NUMBER	1
OPERATOR	CSG

Set PO
D nozzle 0.123"
k = .1797
Yd = 1.0075
ΔH@ = 1.97

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	1245	209.864								
	5	1250	210.87	.95	410	.12		101	101		1.0
	10	1255	211.82	.95	410	.12		103	102		1.0
stop	15	1300	212.75	.95	410	.12		105	103		2.0
								102.5			

COMMENTS: Vacuum at 7" at end

1018

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN 1
PAGE 1 OF 1

T ambient 100°
Sample height 0'
Duct Diam 17"
P bar 29.92" Hg
P static -6.6" H2O

PLANT	Morrisstown MGU
DATE	11-23-91
SAMPLING LOCATION	Spray Dryer Outlet
SAMPLE TYPE	PSD Anderson
RUN NUMBER	1
OPERATOR	CSG

Set A O
D nozzle 0.123
K = .1290
Yd 1.0075
ΔHe 1.97

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)
	0	1040	214.656								
	5	1045	215.65	.95	410	.12		102	102		1.0
	10	1050	216.63	.95	410	.12		103	103		1.0
	15	1055	217.57	.95	410	.12		105	103		1.0

COMMENTS:

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RADIAN CORPORATION

METHOD 5
FIELD DATA

RUN Blank
PAGE 1 OF 1

Set 1A

PLANT	Morristown MWI
DATE	11-23-91
SAMPLING LOCATION	Spray Dryer Inlet
SAMPLE TYPE	PSD Anderson
RUN NUMBER	Blank
OPERATOR	CSG

Traverse Point Number	Sampling Time (min)	Clock Time (24-hr)	Gas Meter Reading (Vm), cu.ft	Velocity Head (Δ Ps), in. H2O	Flue Gas Temperature (°F)	Orifice Pressure Differential (Δ H, in. H2O)	Filter Temperature (°F)	Temperature (°F) Dry Gas Meter Inlet (Tm in)	Temperature (°F) Dry Gas Meter Outlet (Tm out)	Temperature (°F) Impinger Exit	Pump Vacuum (in. Hg)

COMMENTS:

Revision 11/90

No.

COMPANY NAME	Morristown Hospital
STREET ADDRESS	
CITY	Morristown
STATE	NJ
ZIP	
PHONE (KEY CONTACT)	
SOURCE ID NUMBER	

PROCESS EQUIPMENT	Rotary kiln Hospital waste Incinerator
OPERATING MODE	Full Capacity
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	

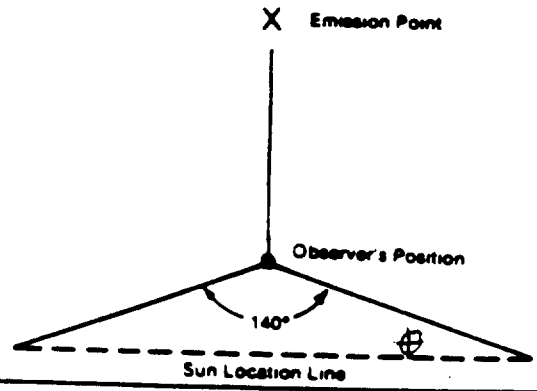
DESCRIBE EMISSION POINT	100 foot round stack - dual
HEIGHT ABOVE GROUND LEVEL	100 feet
HEIGHT RELATIVE TO OBSERVER	Start 100 ft End 100 ft
DISTANCE FROM OBSERVER	Start 300 ft End 300 ft
DIRECTION FROM OBSERVER	Start NE End NE

DESCRIBE EMISSIONS	Start None visible End
EMISSION COLOR	Start None End
IF WATER DROPLET PLUME	Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	Start End
DESCRIBE PLUME BACKGROUND	Start Grey Sky End Grey Sky
BACKGROUND COLOR	Start Grey End Grey
SKY CONDITIONS	Start Overcast End Overcast
WIND SPEED	Start 1-3 mph End 1-3 mph
WIND DIRECTION	Start NW End NW
AMBIENT TEMP	Start 50°F End 50°F
WET BULB TEMP	
RH, percent	

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

Two stacks emitting from one stack
Neither one has visible emissions

OBSERVATION DATE	START TIME	END TIME
11-18-91	1400	1600

MIN \ SEC	0	15	30	45	COMMENTS
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	
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	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	Jon B. Prouk
OBSERVER'S SIGNATURE	Jon B Prouk
DATE	11-18-91
ORGANIZATION	Radian Corporation
CERTIFIED BY	ETI
DATE	9-91
CONTINUED ON VEO FORM NUMBER	

Page No. 2

COMPANY NAME		
Morristown Hospital		
STREET ADDRESS		
CITY	STATE	ZIP
Morristown	NJ	
PHONE (KEY CONTACT)	SOURCE ID NUMBER	

PROCESS EQUIPMENT	OPERATING MODE
Rotary Kiln Hwl	Full
CONTROL EQUIPMENT	OPERATING MODE

DESCRIBE EMISSION POINT	
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
100 ft	Start 100 ft End 100 ft
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER
Start 300 ft End 300 ft	Start NE End NE

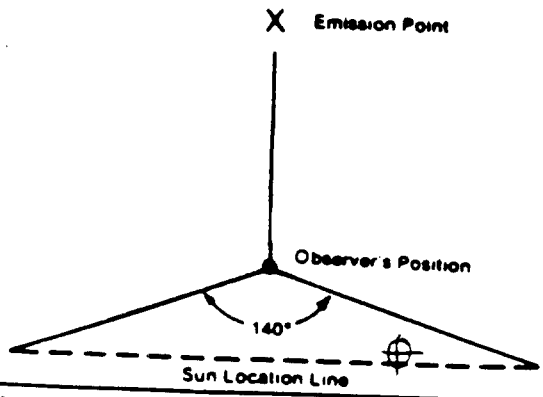
DESCRIBE EMISSIONS	
Start None	End None
EMISSION COLOR	IF WATER DROPLET PLUME
Start None End None	Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	
Start 1 diameter above Stack	End Same

DESCRIBE PLUME BACKGROUND	
Start Sky	End Sky
BACKGROUND COLOR	SKY CONDITIONS
Start Grey End Grey	Start P. Cloudy End P Cloudy
WIND SPEED	WIND DIRECTION
Start 1-3 mph End 1-3 mph	Start NW End NW
AMBIENT TEMP	WET BULB TEMP / RH, percent
Start 50 End 50	

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



OBSERVATION DATE	START TIME	END TIME
11-18 91	1400	1600

MIN \ SEC	0	15	30	45	COMMENTS
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	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
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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	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	
Jon B. Poulx	
OBSERVER'S SIGNATURE	DATE
Jon B. Poulx	11 18 91
ORGANIZATION	
Radian Corp	
CERTIFIED BY	DATE
ETI	1-91

ADDITIONAL INFORMATION

CONTINUED ON VEO FORM NUMBER

COMPANY NAME		
Morristown Hospital		
STREET ADDRESS		
CITY	STATE	ZIP
PHONE (KEY CONTACT)	SOURCE ID NUMBER	

PROCESS EQUIPMENT	OPERATING MODE
Rotary Kiln Hwt	FULL
CONTROL EQUIPMENT	OPERATING MODE

DESCRIBE EMISSION POINT
~~Rotary Kiln HWT~~

HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
100 ft	Start 100 ft End 100 ft
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER
Start 300 ft End 300 ft	Start NE End NE

DESCRIBE EMISSIONS
Start None End None

EMISSION COLOR	IF WATER DROPLET PLUME
Start None End None	Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
Start 1 diameter above stack End Same

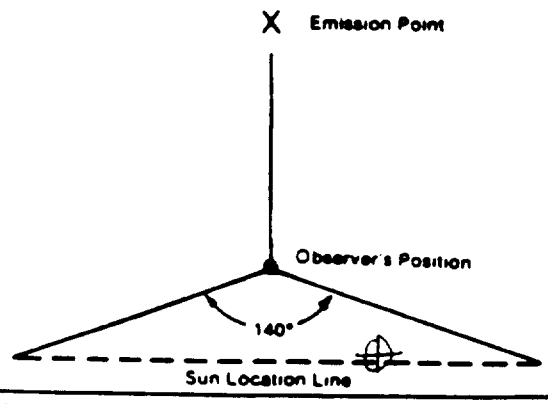
DESCRIBE PLUME BACKGROUND
Start Sky End Sky

BACKGROUND COLOR	SKY CONDITIONS
Start Grey End Grey	Start P Cloudy End P. Cloudy
WIND SPEED	WIND DIRECTION
Start 1-3 mph End 1-3	Start NW End
AMBIENT TEMP	WET BULB TEMP / RH, percent
Start 50 End 50	

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
11-15-91	1400	1600

SEC / MIN	0	15	30	45	COMMENTS
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	
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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	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	
Jon B Proulx	
OBSERVER'S SIGNATURE	DATE
Jon B Proulx	11-18-91
ORGANIZATION	
Radian Corp.	
CERTIFIED BY	DATE
ET	9-11

CONTINUED ON VEO FORM NUMBER

COMPANY NAME		
Morristown Hospital		
STREET ADDRESS		
CITY: Morristown	STATE: NJ	ZIP:
PHONE (KEY CONTACT)	SOURCE ID NUMBER	

PROCESS EQUIPMENT	OPERATING MODE
Rotary Kiln Hwi	Full
CONTROL EQUIPMENT	OPERATING MODE

DESCRIBE EMISSION POINT	
Round dual stack	
HEIGHT ABOVE GROUND LEVEL: 100 ft	HEIGHT RELATIVE TO OBSERVER: Start 100 ft End 100 ft
DISTANCE FROM OBSERVER: Start 300 ft End 300 ft	DIRECTION FROM OBSERVER: Start W ~~300 ft~~ End 3 NW

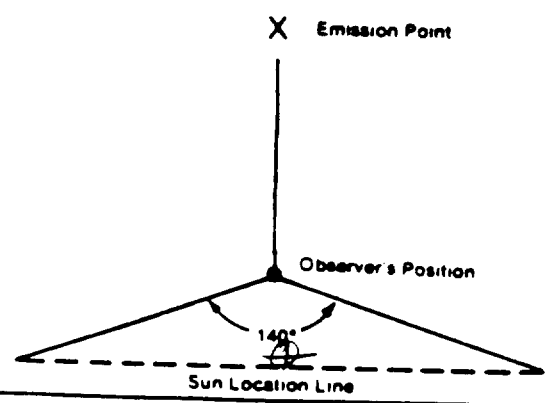
DESCRIBE EMISSIONS	
Start None	End None
EMISSION COLOR: Start [illegible] End	IF WATER DROPLET PLUME: Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1 dia. above stack	End Same

DESCRIBE PLUME BACKGROUND	
Start Grey clouds	End
BACKGROUND COLOR: Start Grey End	SKY CONDITIONS: Start Overcast End
WIND SPEED: Start 1-3 mph End 1-3 mph	WIND DIRECTION: Start NW End
AMBIENT TEMP: Start 40 End 40	WET BULB TEMP / RH, percent

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
11-18-91	1630	1700

MIN \ SEC	0	15	30	45	COMMENTS
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2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
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6	0	0	0	0	
7	0	0	0	0	
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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	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	
Jon B. Poulx	
OBSERVER'S SIGNATURE: Jon B. Poulx	DATE: 11-18-91
ORGANIZATION: Radian Corp	
CERTIFIED BY: ETI	DATE: 9-11

CONTINUED ON VEO FORM NUMBER

COMPANY NAME		
Morristown Hospital		
STREET ADDRESS		
CITY: Morristown	STATE: NJ	ZIP:
PHONE (KEY CONTACT)	SOURCE ID NUMBER	

PROCESS EQUIPMENT	OPERATING MODE
Rotary Kiln HWF	
CONTROL EQUIPMENT	OPERATING MODE

DESCRIBE EMISSION POINT	
[redacted] Round dualstack	
HEIGHT ABOVE GROUND LEVEL: 100 ft	HEIGHT RELATIVE TO OBSERVER: Start 100 ft End 100 ft
DISTANCE FROM OBSERVER: Start 300 ft End 300 ft	DIRECTION FROM OBSERVER: Start NE End NW

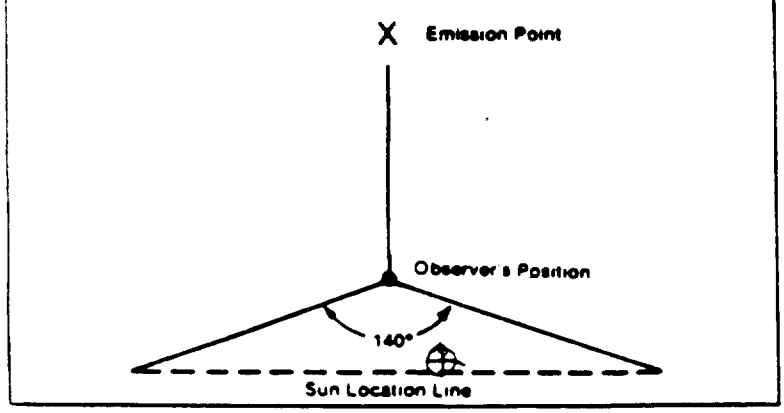
DESCRIBE EMISSIONS	
Start None	End None
EMISSION COLOR: Start None End	IF WATER DROPLET PLUME: Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 1 diameter out stack	End same

DESCRIBE PLUME BACKGROUND		
Start Sky	End	
BACKGROUND COLOR: Start Grey End Grey	SKY CONDITIONS: Start Overcast End Overcast	
WIND SPEED: Start 1-3 mph End	WIND DIRECTION: Start NW End NW	
AMBIENT TEMP: Start 45 End 40	WET BULB TEMP	RH, percent

SOURCE LAYOUT SKETCH

Stack with Plume
Sun
Wind

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
11-18-91	1400	1600

SEC / MIN	0	15	30	45	COMMENTS
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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	
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26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	
Jon B Proulx	
OBSERVER'S SIGNATURE: Jon B Proulx	DATE: 11-18-91
ORGANIZATION: Radian Corp	
CERTIFIED BY: ETI	DATE: 9-91

CONTINUED ON VEO FORM NUMBER

PRETEST CHECKLIST

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-18-91
Run No.: ONE

Kiln clear ?	yes; small slag donut ≈ 4" 3/4 way towards back of kiln
Charging begun at?	≈ 0900 hrs
Lime slurry mixed ?	yes - Tank 2
Baghouse hopper checked?	No; Rotary Valve operating
Ash hopper clear?	yes @ 1440
Data logger operating?	No
Time synchronized?	Neulicht with control room; with Mike Bilonski (Radian)

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-18-91
Run No.: ONE

Time	0900	1350			
Primary chamber temp., F	1425				
SD Temp.	280				
Secondary chamber temp., F	1800				
Primary chamber draft, in. w.c.	-.20				
Primary chamber min O2, %	8				
Primary Chamber idle temp, F	1000				
Secondary chamber idle temp., F	1200				
Atomizer Speed %	80%				
Water quench on, F	1470				
Water quench off, F	1460				
Maximum charge rate, lb/hr	780				
Baghouse cleaning on, in. w.c.	4				
Baghouse cleaning off, in. w.c.	3				
Lime slurry conc.	45%	6.%			
Target SR	2				
Kiln Speed 1.10 /Rev; 1:07 rpm	0.86				

SETPOINT

DATA LOG

Facility: Morristown memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-18-91
Run No.: one
Test condition: —

Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed RPM	Kiln O2 %	Prim. air damper[1a] %	Sec. air damper[1a] %	Natural gas reading cf x10
0918	1502	1808	.12	—	8.7	0	75	@0923 532660
0948	1504	1817	.16		8.9	0	59	@0955 532764
—	—	—	—	—	—	—	—	—
Begin Run								
1400	1452	1782	.16	.86	11.5	0	56	@1406 533600
1430	1499	1783	.18	—	9.3	0	63	@1439 533707
1500	1517	1821	.22	—	10.1	0	58	@1505 533801
1530	1485	1817	.14	—	7.1	0	58	—
1600	1453	1793	.14	—	7.5	0	69	@1606 534003
1600 Port change 1630	1487	1804	.10	—	10.2	0	66	—
1640 Second traverse 1640	1442	1804	.22	—	9.0	0	66	—
1700	1500	1791	.22	—	9.5	0	50	
1730	1452	1779	.22	—	12.1	0	57	
1800	1491	1806	.20	—	10.3	0	32	@1805 534585
1830	1467	1799	.20	—	6.9	0	52	@1900 534563
End Run 1843	1489	1791	.18	0.86	9.8	0	58	
DATALOG 1949	1438	1807						

[1a] Burner damper Setting indicate percent of output from Controller; i.e. 4-20 mA output indicating relative closed to open position. ∴ 0% = full turn down position which is still About 10% open.

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neuhart
Date: 11-18-91
Run No.: ONE
Test condition: —

Time	Quench flow, ~~gallons~~ gpm	SD outlet temp. F	SD atomiz Rotation[1a] RPM %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
0918	0	298	81%	41	63	1.7	13.1	3.3	
0948		274	81	41	64	1.1	13.2	2.6	
1328	—	—	—	—	50	—	—	—	
Begin Run									
1400	—	271	81	41	48	1.2	13.1	3.5	
1430	—	281	81	41	46	2.0	13.0	3.8	
1500	3.5	270	81	41	44	1.1	13.0	3.4	
1530	0	285	81	41	43	1.5 Rmp ~~13.1~~	13.1	3.8	
1600	0	281	81	41	43	1.4	13.1	2.8	
Port change @ 1600 1630	0	270	81	41	41	1.4	13.0	3.8	
1640 — Beg. in Second Port 1640	—	283	81	41	41	1.7	13.1	3.0	
1700	—	276	81	41	40	1.2	13.1	3.1	
1730	3.5	274	81	41	40	1.2	13.1	3.9	
1800	—	282	81	41	36	0.8	13.1	2.8	
1830	—	289	81	41	35	1.1	13.0	3.5	
1840	—	271	81	41	34	1.2	13.0	3.7	

DATALOGC

[1a] Atomizer speed = percent of full speed.

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Neulicht
Location:	Morristown, N.J.	**Date:**	11-18-91
		Run No.:	ONE

Temp on kiln Brought up @ 5 AM
@ 7:00 AM @ Temp ≈ 1800
@ 9:03 Switched to Lime Slurry Tank # 2
@ ≈ 9:08 AM First charge Began; charging
@ 0918 - First Readings
@ 1030 - Plant ready; Radian indicated should be ready @ 11:00
@ ≈ 1:00 had HCL Break Through
@ 13 50 Add 2 Bags (100 lb) of Lime
@ 1400 Begin TEST Run #1
@ 1440 - Placed new ash cart
@ 1600 Port change; Pathogen Train -- no Port change
@ 1640 Begin Second Port
@ 1755 Looked @ kiln -- noted what appeared to be Large pieces (4-6" Diam x 12 to 24" long) of Smoldering Plastic, Burning near end
@ 1838 - Flames in Ash Hopper noted; Water Quench sprays used
@ 1842 - Complete All Runs
@ 1845 - Measure Tank level
@ 1850 - Stopped Charging

DNOTES

@ 1919 - Pulled Bottom Ash Cart; kiln clean
Done for Day

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON: NeuLicht
DATE: 11-18-91
RUN NO.: ONL

SYSTEM CHECK:

SLURRY TANK NUMBER: # 2

ADDITIONS

Time	Water	Lime	Tank level
9:03	60"	350 lb	63
1330			50
1350	48"	Add 100 lb	50 — Ag. tank off
Final Reading 1845	~~36"~~		36 — Ag. tank off

COMMENTS:
@ 1350 for test; calculated lime conc is 93#/ft water

LIMEINJ

Page ___ of ___

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht / Wood
Date: 11-18-91
Run No.: one

art 1st → verse

Time	PCCT	SCCT	Time	PCCT	SCCT	Time	PCCT	SCCT
1400	1452	1782	1530	1485	1817	1700	1500	1791
1405	1468	1785	1535	1470	1804	1705	1443	1762
1410	1501	1820	1540	1446	1786	1710	1440	1785
1415	1488	1827	1545	1491	1789	1715	1507	1839
1420	1529	1806	1550	1440	1770	1720	1461	1807
1425	1448	1769	1555	1489	1797	1725	1478	1801
1430	1499	1783	end 1st traverse 1600	1453	1793	1730	1452	1779
1435	1472	1798	1605	1466	1810	1735	1451	1799
1440	1451	1788	1610	1509	1821	1740	1443	1788
1445	1497	1812	1615	1454	1785	*1751	1505	1818
1450	1496	1806	1620	1523	1808	1755	1510	1828
1455	1458	1806	1625	1461	1784	1800	1491	1806
1500	1517	1821	1630	1487	1804	*1806	1446	1756
1505	1466	1802	1635	1402	1759	1810	1450	1766
1510	1454	1789	start 2nd traverse 1640	1442	1804	1815	1480	1804
1515	1521	1809	1645	1533	1849	1820	1497	1816
1520	1440	1773	1650	1548	1837	1825	1461	1802
1525	1441	1787	1655	1467	1784	1830	1467	1799

1835 1506 1815
1840 1449 1770
1843 end 2nd traverse

DNOTES

INCINERATOR DAILY CHARGING REPORT

DATE: 11-18-91 07:00 - 15:00 hrs.

OPERATOR'S NAME: HENRY RAMIREZ

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	13:49	64.5	RB						
2	13.59	51.0	BB						
3	14.03	82.5	B	* not in printout	dataLogger				
4	14.07	82.5	B						
5	14.11	77.5	B						
6	14.15	114.0	B						
7	14:29	112.0	B						
8	14:33	51.0	B						
9	14.37	65.5	B						
10	14.43	52.0	RB						
11	14.47	61.0	B						
12	14.51	126.0	B						
13	14.59	70.0	RB						
14	15.04	74.0	RB						
15	15.10	47.5	RB						
16	15.15	56.0	RB						
17	15.19	60.0	RB						
18	15.23	64.0	B						
19	15.28	93.0	RB						
20	15:32	57.0	RB						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: Nov, 18, 1991 1500 - 2300

OPERATOR'S NAME: R. Munoz

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	15:36	58	RB.						
2	15.53	92.5	RB						
3	15.58	51.5	RB						
4	16.01	52.5	B						
5	16.05	97.5	B						
6	16.10	102.5	RB						
7	16:17	63.5	RB						
8	16.21	52.5	RB						
9	16.25	51.	RB						
10	16.30	46.5	RB						
11	16.34	50.5	RB						
12	16.38	79.5	B						
13	16.42	71	RB						
14	16.46	41.5	RB						
15	16.57	72	RB						
16	17:03	65 5	RB						
17	17.07	38.5	B						
18	17:013	30 -	RB						
19	17:16	86	B.						
20	17.22	52.5	RB						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 1-18-91 15.00 TO 23.00

OPERATOR'S NAME: R. MUÑOZ

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	17.26	91.0	RB						
2	17.30	32.5	RB						
3	17.34	71.0	RB						
4	17.37	47.0	B						
5	17.40	45.0	RB						
6	17.44	37.0	B						
7	17.48	69.5	RB						
8	17.52	92.0	B						
9	18:02	59.5	RB						
10	18.06	63.0	RB						
11	18.10	103.0	B						
12	18.19	51.0	RB						
13	18.23	47.0	B						
14	18:30	57:5	B						
15	18:39	42.5	RB						
16	18 43	82.5	B						
17	18:46	39.	RB						
18									
19									
20									

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

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1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

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41306	= 0000	Decimal		41326	= 0000	Decimal 1403 82.5	41346	= 0000 Decimal
41307	= 0000	Decimal		41327	= 0000	Decimal	41347	= 0000 Decimal
41308	= 0000	Decimal		41328	= 0000	Decimal	41348	= 0000 Decimal
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41313	= 0114	Decimal 18		41333	= 0052	Decimal	41353	= 0000 Decimal
41314	= 0000	Decimal		41334	= 0000	Decimal	41354	= 0000 Decimal
41315	= 0000	Decimal		41335	= 0000	Decimal	41355	= 0074 Decimal
41316	= 0000	Decimal		41336	= 0065	Decimal	41356	= 0000 Decimal
41317	= 0000	Decimal		41337	= 0000	Decimal	41357	= 0000 Decimal
41318	= 0000	Decimal		41338	= 0000	Decimal	41358	= 0000 Decimal
41319	= 0078	Decimal 12		41339	= 0000	Decimal	41359	= 0000 Decimal
41320	= 0000	Decimal		41340	= 0000	Decimal	41360	= 0059 Decimal 1331

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

~~Full Page Data: State:RUNNING Mode:MONITOR AR: 41341~~

41301	= 0048	Decimal	1513	41321	= 0000	Decimal	41341	= 0052 Decimal
41302	= 0000	Decimal		41322	= 0000	Decimal	41342	= 0000 Decimal
41303	= 0000	Decimal		41323	= 0000	Decimal	41343	= 0000 Decimal
41304	= 0000	Decimal		41324	= 0000	Decimal	41344	= 0000 Decimal
[illegible]				[illegible]			[illegible]	

41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0056 Decimal
41313 = 0114 Decimal	41333 = 0052 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0074 Decimal
41316 = 0000 Decimal	41336 = 0065 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0078 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0059 Decimal 1331

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

1513

41301 = 0048 Decimal	41321 = 0000 Decimal	41341 = 0052 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0075 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0061 Decimal	41348 = 0112 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0052 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0070 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0114 Decimal
41317 = 0000 Decimal	41337 = 0066 Decimal	41357 = 0000 Decimal
41318 = 0122 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1414

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

1530

41301 = 0000 Decimal	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0092 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	✓41323 = 0075 Decimal	41343 = 0000 Decimal
41304 = 0064 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	✓41345 = 0061 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	✓41348 = 0052 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal 1500	41351 = 0000 Decimal
41312 = 0061 Decimal	✓41332 = 0070 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	✓41354 = 0066 Decimal
41315 = 0000 Decimal	✓41335 = 0122 Decimal	41355 = 0000 Decimal
41316 = 0056 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0048 Decimal	41338 = 0000 Decimal	✓41358 = 0052 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1431

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

41301 = 0000 Decimal 1600	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0053 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal 1630	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0061 Decimal
41305 = 0000 Decimal 2nd	41325 = 0059 Decimal	41345 = 0000 Decimal
41306 = 0052 Decimal 1st	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal trav.	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0056 Decimal
41309 = 0000 Decimal	41329 = 0058 Decimal	41349 = 0000 Decimal
41310 = 0093 Decimal	41330 = 0000 Decimal	41350 = 0048 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0092 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0075 Decimal
41316 = 0000 Decimal	41336 = 0064 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1503

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

41301 = 0047 Decimal 1630	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0051 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0098 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0053 Decimal	41330 = 0053 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal 1600	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal end 1st	41353 = 0059 Decimal
41314 = 0064 Decimal	41334 = 0052 Decimal trav.	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0103 Decimal	41337 = 0000 Decimal	41357 = 0058 Decimal
41318 = 0000 Decimal	41338 = 0093 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1531

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

41301 = 0000 Decimal 1701	41321 = 0000 Decimal start 2nd trav.	41341 = 0053 Decimal
41302 = 0000 Decimal 1700	41322 = 0000 Decimal 1640	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
1304 = 0073 Decimal	41324 = 0080 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0064 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0042 Decimal	41328 = 0051 Decimal	41348 = 0103 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
[illegible]	[illegible]	[illegible]

1315 = 0000 Decimal
1316 = 0000 Decimal
1317 = 0000 Decimal
1318 = 0000 Decimal
1319 = 0000 Decimal
1320 = 0071 Decimal

41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41356 = 0000 Decimal
41357 = 0098 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1602

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

State:RUNNING Mode:MONITOR AR:41341

Full Page Data:

41301 = 0000 Decimal 1731
41302 = 0033 Decimal 30
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0091 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0053 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0086 Decimal
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0031 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0039 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0065 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal 1700
41333 = 0000 Decimal
41334 = 0073 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0042 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0071 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal 1640
41353 = 0000 Decimal
41354 = 0080 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0051 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1632

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

State:RUNNING Mode:MONITOR AR:41341

Full Page Data: 1800

41301 = 0000 Decimal
41302 = 0092 Decimal
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0070 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0038 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0046 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0048 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0071 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0033 Decimal
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0091 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0053 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0086 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0031 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0039 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0065 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1721

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

41301 = 0000 Decimal 1830
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0048 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0052 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0103 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0063 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0060 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal 1800
41332 = 0092 Decimal
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0070 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0038 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0046 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0048 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0071 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 73

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: 1850 State:RUNNING Mode:MONITOR AR: 41341

41301 = 0000 Decimal
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0040 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0083 Decimal 1843
41309 = 0000 Decimal end
41310 = 0000 Decimal 2nd
41311 = 0000 Decimal trow
41312 = 0043 Decimal
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0058 Decimal 1831

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0048 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0052 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0103 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0063 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0060 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal 1839
41352 = 0092 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1751

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

PRETEST CHECKLIST

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-19-91
Run No.: Two

Kiln clear ?	yes @ 0910
Charging begun at?	1434
Lime slurry mixed ?	yes 750 lb / 60" water
Baghouse hopper checked?	NO ; Box changed on BH A. 2SD @1550
Ash hopper clear?	New cart @ 1626 - ~~FIS~~
Data logger operating?	NO ; ON-LINE @ 1830 for 2nd Traverse
Time synchronized?	Neulicht with Control Room

Shift FS

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neilt
Date: 11-19-91
Run No.: Two

Time	1554	1800			
Primary chamber temp., F	1425				
Secondary chamber temp., F	1800				
Primary chamber draft, in. w.c.	-.20	.18			
Primary chamber min O2, %	8				
Primary Chamber idle temp, F	1000				
Secondary chamber idle temp., F	1200				
Atomizer Speed	80 %				
Water quench on, F	1495				
Water quench off, F	1485				
Maximum charge rate, lb/hr	780				
Baghouse cleaning on, in. w.c.	4				
Baghouse cleaning off, in. w.c.	3				
Lime slurry conc.	750 lb 60% H2O 9%				
Target SR	2:1				
SD Temp	280				

SETPOINT

F1

DATA LOG

Facility: Morristown memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-19-91
Run No.: Two
Test condition:

Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed RPM	Kiln O2 %	Prim. air damper %	Sec. air damper %	Natural gas reading cf X10
1550	1505	1815	0.18	—	10.9	0	71	@1607 543117
1620	1465	1806	0.20	1.0	7.9	0	60	—
1650	1505	1817	.08	—	10.4	0	67	—
1720	1454	1804	.16	—	9.6	0	64	@1724 543462
1750	1522	1829	.16	—	10.7	0	71	
END 1st TRAVERSE								
1820	1488	1791	.16	—	10.4	0	56%	
Begin Second Traverse @ 1855 1855	1504	1822	.08	—	9.3	0	66%	
1928	1484	1811	.26	—	8.4	0	59%	@1936 543923
1958	1442	1792	.20	—	12.4	0	62%	
2028	1502	1797	.18	—	9.3	0	71%	
2058	1432	1795	.18	—	13.3	0	70%	@2109 544260
2128	1495	1820	.20	—	9.1	0	62	
2058	1414	1791	.04		8.3	*49	81	

DATALOG

* RAM FEEDER NOT FEEDING WASTE AT THIS TIME

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neuhart
Date: 11-19-91
Run No.: Two
Test condition:

Time	Quench flow, gal/h	SD outlet temp. F	SD atomiz Rotation ~~RPM~~ %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
1550	~~1.2~~	273	81	61	14	1.1	13.1	2.8	
1620	—	278	81	59	14	1.4	13.1	3.4	
1650	—	282	81	57	14	1.5	13.1	3.8	
1720	—	283	81	56	14	1.3	13.0	3.2	
1750	—	272	81	54	14	1.2	13.0	3.3	
	— END FIRST	TRAVERSE							
1820	—	283	81	53	14	1.4	13.0	3.7	
1855	—	286	81	51	14	1.3	13.0	3.4	
1928		272	81	51	14	1.4	13.0	4.0	
1958		267	81	48	14	1.1	13.0	3.2	
2028		276	81	47	14	1.7	13.0	3.9	
2058		275	81	45	13	1.1	13.0	3.2	
2128		286	81	44	14	1.5	13.0	3.0	
2158		280	81	43	14	1.7	13.0	4.1	

DATALOGC

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Neulist
Location:	Morristown, N.J.	**Date:**	11-19-91
		Run No.:	TWO

7:15 UNIT up to Temp when arrived on Site

9:15 Begin charging using slurry TANK 2 residual

-Problem with Belt feeder; charging Discontinued after

~~14:30~~ 2 charges.

14:30 Conveyor fixed;

Initiated charging

~~14:34~~ Begin Charging Again

1550 Begin RUN 2

1620 - Kiln Rotation slightly faster today

1750 - END FIRST TRAVERSE

@ 1800 Adjusted Draft Setpoint

@ 1855 Begin Second Traverse.

~ @ 2015 END SPORE RUN TRAIN

2055 STOP TEST RUN 2

2122 BEGIN O_2 TRAVERSE

O_2 CALIBRATION (BEFORE O_2 TRAVERSE)

2140 CHECK ASH BUCKET - TAKE SAMPLE

2205 EXPLOSION IN KILN

DNOTES

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON: Neolith
DATE: 11-19-91
RUN NO.: Two

SYSTEM CHECK:

SLURRY TANK NUMBER: #1

ADDITIONS

Time	Water	Lime	TANK READING
1545	60" H_2O	750 #Lime *	61 ** ← @ START of TEST
1805	—	—	54 **
2140	—	—	45 *,**

COMMENTS: * mix made @ 1430

** Agitator off

*** AGITATOR OFF
LEVEL READING
TAKEN FROM COMPUTER

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-19-91
Run No.: Two

Time	PCCT	SCCT	TIME	PCCT	SCCT				
1550	1505	1815	1720	1454	1804				
1555	1460	1792	1725	1475	1794				
1600	1453	1784	1730	1515	1817				
1605	1471	1789	1735	1450	1780				
1610	1458	1794	1740	1437	1778				
1615	1499	1810	1745	1471	1793				
1620	1465	1806	1750	1522	1829	End	1st traverse		
1625	1473	1796	1755	1462	1809				
1630	1442	1788	1800	1457	1791				
1635	1396	1753	1805	1458	1797				
1640	1490	1813	1810	1511	1824				
1645	1457	1804	1815	—	—				
1650	1504	1817	1820	1488	1791				
1655	1506	1804	1825	1502	1814				
1700	1440	1776	1830	1452	1760				
1705	1449	1794	Data Being Logged						
1710	1482	1811	on MRI Data Logger						
1715	1460	1800							

DNOTES

Filename:mor2
Name:Run 2
Date:11-19-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:Neulicht

	0	1
	PCCT	SCCT

Filename:mor2a
Name:Run Two
Date:11-19-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:Neulicht

	0	1	2	3
	O2	CO2	CO	THC
18:11:5	25.60	1.80		
18:11:5	259	21		

Filename:mor2b
Name:Run Two
Date:11-19-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:Neulicht

	PCCT ~~O2~~	SCCT ~~CO2~~	~~2 CO~~	~~3 THC~~
18:17	152.90	178.40		
18:17	1550	2045		
18:18	145.99	179.22		
18:18	1480	2055		
18:19	148.98	180.88		
18:19	1510	2074		
18:20	144.40	177.97		
18:20	1463	2040		

Changed SecCCT
To Channel 1
New Cal. Val
Returned to
1 mV / °F

Begin Logging

18:25	143.38	178.22
18:25	1453	1782
18:26	148.32	179.72
18:26	1503	1797
18:27	148.66	180.26
18:27	1507	1803
18:28	144.14	177.73
18:28	1461	1777
18:29	144.22	176.78
18:29	1462	1768
18:30	147.75	177.85
18:30	1497	1778
18:31	145.73	176.69
18:31	1477	1767
18:32	144.05	174.80
18:32	1460	1748

```
8:33   144.16 175.13
8:33     1461   1751

8:34   146.08 175.87
8:34     1481   1759

8:35   147.25 176.20
8:35     1492   1762

8:36   145.00 175.66
8:36     1470   1757

8:37   141.05 174.79
8:37     1430   1748

8:38   137.97 174.18
8:38     1398   1742

8:39   135.73 174.19
8:39     1376   1742

8:40   136.04 175.10
8:40     1379   1751
ogging data beginning at 1825 [11-19-1991 -- 18:40:43]

8:41   138.27 176.61
8:41     1401   1766

8:42   141.29 177.78
8:42     1432   1778

8:43   143.74 178.85
8:43     1457   1789

8:44   147.72 180.41
8:44     1497   1804

8:45   149.15 181.19
8:45     1512   1812

8:46   142.27 179.78
8:46     1442   1798

8:47   144.72 179.84
8:47     1467   1798

8:48   145.96 180.67
8:48     1479   1807

8:49   145.51 180.23
8:49     1475   1802

8:50   142.76 178.70
8:50     1447   1787

8:51   144.81 179.26
8:51     1468   1793

8:52   148.25 181.02
8:52     1502   1810

8:53   144.99 179.73
8:53     1470   1797

8:54   143.92 178.82
8:54     1459   1788

8:55   145.92 180.06   ←—— begin 2nd traverse
8:55     1479   1801

8:56   148.91 181.14
8:56     1509   1811

:57   143.60 179.32
```

18:58	[illegible]	[illegible]
18:59	148.69	181.60
18:59	1507	1816
19:00	144.68	179.75
19:00	1466	1797
19:01	150.80	182.29
19:01	1528	1823
19:02	149.94	182.39
19:02	1520	1824
19:03	145.70	179.71
19:03	1477	1797
19:04	145.64	179.20
19:04	1476	1792
19:05	149.29	180.86
19:05	1513	1809
19:06	147.00	179.02
19:06	1490	1790
19:07	144.66	177.46
19:07	1466	1775
19:08	148.48	179.26
19:08	1505	1793
19:09	145.35	177.66
19:09	1473	1777
19:10	144.51	176.98
19:10	1465	1770
19:11	148.62	178.56
19:11	1506	1786
19:12	144.44	177.18
19:12	1464	1772
19:13	143.98	176.45
19:13	1459	1765
19:14	149.60	178.34
19:14	1516	1783
19:15	145.27	177.15
19:15	1472	1772
19:16	143.11	176.14
19:16	1450	1761
19:17	148.03	177.64
19:17	1500	1776
19:18	144.72	177.33
19:18	1467	1773
19:19	142.30	176.42
19:19	1442	1764
19:20	147.79	178.17
19:20	1498	1782
19:21	148.14	179.24
19:21	1501	1792
19:22	143.77	177.73
19:22	1457	1777
19:23	148.04	178.98
19:23	1500	1790
19:24	148.36	179.86
19:24	1504	1799
[illegible]	[illegible]	[illegible]

9:25	145.54	176.68
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9:26	149.00	180.64
9:26	1510	1806
9:27	147.60	181.30
9:27	1496	1813
9:28	143.00	179.08
9:28	1449	1791
9:29	146.80	180.22
9:29	1488	1802
9:30	149.43	181.57
9:30	1515	1816
9:31	143.11	178.81
9:31	1450	1788
9:32	145.19	179.42
9:32	1472	1794
9:33	149.64	181.93
9:33	1517	1819
9:34	144.53	179.20
9:34	1465	1792
9:35	146.73	179.26
9:35	1487	1793
9:36	148.40	179.77
9:36	1504	1798
9:37	142.53	177.33
9:37	1445	1773
9:38	146.53	178.44
9:38	1485	1784
9:39	148.44	179.53
9:39	1504	1795
9:40	143.09	177.08
9:40	1450	1771
9:41	144.27	177.20
9:41	1462	1772
9:42	147.71	178.66
9:42	1497	1787
9:43	143.44	176.97
9:43	1454	1770
9:44	140.77	175.36
9:44	1427	1754
9:45	144.45	176.15
9:45	1464	1761
9:46	147.48	177.32
9:46	1495	1773
9:47	143.98	176.75
9:47	1459	1767
9:48	143.68	176.44
9:48	1456	1764
9:49	147.94	178.23
9:49	1499	1782
9:50	145.16	178.26
9:50	1471	1783
9:51	142.26	177.39
9:51	1442	1774

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19:53	1496	1814
19:54	142.23	179.19
19:54	1442	1792
19:55	143.43	179.62
19:55	1454	1796
19:56	147.67	181.17
19:56	1497	1812
19:57	145.17	180.50
19:57	1471	1805
19:58	142.68	178.33
19:58	1446	1783
19:59	142.09	177.86
19:59	1440	1779
20:00	144.46	178.30
20:00	1464	1783
20:01	147.83	178.93
20:01	1498	1789
20:02	141.90	177.04
20:02	1438	1770
20:03	141.68	176.13
20:03	1436	1761
20:04	143.29	176.48
20:04	1452	1765
20:05	146.94	177.79
20:05	1489	1778
20:06	145.15	178.12
20:06	1471	1781
20:07	143.73	177.14
20:07	1457	1771
20:08	146.91	178.80
20:08	1489	1788
20:09	146.18	179.16
20:09	1482	1792
20:10	143.46	177.95
20:10	1454	1780
20:11	146.83	179.30
20:11	1488	1793
20:12	145.18	179.25
20:12	1471	1793
20:13	141.18	177.30
20:13	1431	1773
20:14	142.55	177.55
20:14	1445	1776
20:15	147.86	179.77
20:15	1499	1798
20:16	147.38	180.53
20:16	1494	1805
20:17	142.95	178.81
20:17	1449	1788
20:18	146.84	179.66
20:18	1488	1797
20:19	146.69	179.86
20:19	1487	1799

[illegible]	[illegible]	[illegible]
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[illegible]0:21	1477	1786
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[illegible]0:22	1493	1794
[illegible]0:23	143.49	178.05
[illegible]0:23	1454	1780
[illegible]0:24	146.00	178.21
[illegible]0:24	1480	1782
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[illegible]0:27	1446	1773
[illegible]0:28	146.41	178.15
[illegible]0:28	1484	1781
[illegible]0:29	146.18	178.34
[illegible]0:29	1482	1783
[illegible]0:30	144.21	177.75
[illegible]0:30	1462	1777
[illegible]0:31	147.41	179.08
[illegible]0:31	1494	1791
[illegible]0:32	145.64	178.75
[illegible]0:32	1476	1787
[illegible]0:33	141.72	177.89
[illegible]0:33	1436	1779
[illegible]0:34	143.46	178.33
[illegible]0:34	1454	1783
[illegible]0:35	145.68	178.95
[illegible]0:35	1477	1790
[illegible]0:36	145.33	179.27
[illegible]0:36	1473	1793
[illegible]0:37	146.88	179.34
[illegible]0:37	1489	1793
[illegible]0:38	145.43	179.07
[illegible]0:38	1474	1791
[illegible]0:39	143.97	178.81
[illegible]0:39	1459	1788
[illegible]0:40	144.93	178.57
[illegible]0:40	1469	1786
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[illegible]0:41	1463	1787
[illegible]0:42	145.14	179.05
[illegible]0:42	1471	1791
[illegible]0:43	146.26	179.30
[illegible]0:43	1482	1793
[illegible]0:44	145.47	179.24
[illegible]0:44	1474	1792
[illegible]0:45	143.20	178.28
[illegible]0:45	1451	1783
[illegible]0:46	143.75	178.06
[illegible]0:46	1457	1781

[illegible]	[illegible]	[illegible]	
20:47	1480	1790	
[illegible]:48	147.30	179.91	
20:48	1493	1799	
20:49	142.92	178.73	
20:49	1449	1787	
20:50	142.52	178.32	
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20:52	146.69	179.51	
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:53	145.23	179.22	
20:53	1472	1792	
20:54	143.44	178.48	
20:54	1454	1785	
20:55	145.58	178.93	← End 2nd traverse
[illegible]:55	1475	1789	
20:56	147.67	179.31	
20:56	1497	1793	
20:57	144.19	178.95	
20:57	1461	1790	
[illegible]:58	141.43	178.37	
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20:59	139.92	178.19	
20:59	1418	1782	
21:00	139.12	177.45	
:00	1410	1775	
21:01	138.05	176.90	
21:01	1399	1769	
21:02	139.29	176.93	
21:02	1412	1769	
[illegible]:03	139.99	177.40	
21:03	1419	1774	
21:04	142.26	178.41	
21:04	1442	1784	
21:05	145.00	179.53	
:05	1470	1795	
21:06	147.58	180.50	
21:06	1496	1805	
21:07	143.99	179.89	
21:07	1459	1799	
[illegible]:08	141.96	179.15	
21:08	1439	1792	
21:09	144.75	179.98	
21:09	1467	1800	
21:10	148.75	181.41	
[illegible]:10	1508	1814	
21:11	144.86	180.35	
21:11	1468	1803	
21:12	144.12	179.72	
21:12	1461	1797	
[illegible]	[illegible]	[illegible]	

INCINERATOR DAILY CHARGING REPORT

DATE: NOV - 19 - 91 - 07:00 TO 15:00

OPERATOR'S NAME: HENRY RAMIREZ

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	09:30	75.5	RB						
2	09:34	81.5	B						
3	09:40	79.5	RB						
4	14:34	81.5	B						
5	14:40	77.0	B						
6	14:45	99.0	RB						
7	14:50	80.5	RB						
8	14:55	89.5	RB						
9	15:03	63.5	RB						
10	15:12	81.5	RB						
11	15:32	76.5	RB						Mario Vizoso 15:00-23:00 11-19-91
12	15:37	82.0	RB						
13	15:42	82.0	RB						
14	15:47	81.0	RB						
15	15:54	81.5	RB	start 1st trav. 1550					
16	15:59	82.5	B						
17	16:04	80.0	RB						
18	16:09	81.5	RB						
19	16:14	80.0	B						
20	16:39	80.0	B						

waste type:
B = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

ILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-19-91 15:00 - 23:00

OPERATOR'S NAME: Mario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	16:38	80.5	RB						
2	16:43	84.0	RB						
	16:49	73.0	B						
4	16:54	79.0	B						
5	16:59	86.5	B						
6	17:04	78.0	B						
7	17:11	78.0	B						
8	17:16	68.0	B						
9	17:21	57.0	RB						
10	17:34	81.0	RB						
11	17:39	80.0	RB						
12	17:44	78.5	RB	end 1st traverse 1750 ↑					
13	17:50	79.0	RB						
14	17:55	84	R.B						
15	18:00	80.0	R.B						
16	18:05	78.5	RB						
17	18:12	79.5	B						
18	18:17	78.0	RB						
19	18:35	79.5	RB						
20	18:40	80.0	RB						

* waste type:
RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

ILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-19-91 15:00 - 23:00

OPERATOR'S NAME: Mario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	18:45	79.5	RB						
2	18:50	79.0	RB						
3	18:55	78.0	RB						
4	19:01	82.5	R.B	Start 2nd transfer 855					
5	19:07	78.5	R.B						
6	19:13	76.5	R.B						
7	19:17	70.5	R.B						
8	19:22	66.5	B						
9	19:36	79.0	RB						
10	19:40	77.0	RB						
11	19:46	84.0	R.B						
12	19:57	89.0	R.B						
13	20:01	69.0	R.B						
14	20:05	83.0	R.B						
15	20:09	76.5	B						
16	20:14	69.5	B						
17	20:23	85.5	B						
18	20.27	52.0	B						
19	20:37	73.0	RB						
20	20:42	57.5	RB						

* waste type:
RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-19-91 15:00-23:00

OPERATOR'S NAME: Elario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	20:47	83.5	B	End 2nd Tray ↑ 2055					
2	20:58	72.0	RB						
3	21:03	75.5	RB						
4	21:07	70.5	RB						
5	21:11	84.0	RB						
6	21:15	92.0	RB						
7	21:24	62.5	RB						
8	21:28	77.5	RB						
9	21:39	74.5	RB						
10	21:43	70.0	RB						
	21:48	76.0	RB						
12	21:59	70.5	RB						
13	22:03	83.5	B						
14	22:07	78.5	RB						
15	22:11	73.5	RB						
16	22:16	69.5	RB						
17	22:25	64.0	B						
18	22:30	80.5	B						
19	22:40	75.0	B						
20	22:44	79.0	RB						

waste type:
B = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

rRPT

99

41311 = 0000 Decimal
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41339 = 0000 Decimal
41340 = 0000 Decimal

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41356 = 0000 Decimal
41357 = 0078 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-19 - Run 2

Full Page Data: State:RUNNING Mode:PROGRAM AR:

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41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
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41309 = 0000 Decimal
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41356 = 0000 Decimal
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41359 = 0000 Decimal
41360 = 0000 Decimal 1501

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-19- Run 2

Full Page Data: State:RUNNING Mode:PROGRAM AR:

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✓41323 = 0081 Decimal 78
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Full Page Data: State:RUNNING Mode:PROGRAM AR:

1800

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41320 = 0000 Decimal

End 1st traverse

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41359 = 0000 Decimal
41360 = 0000 Decimal 1701

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-19-Run 2

Full Page Data: State:RUNNING Mode:PROGRAM AR:

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41305 = 0000 Decimal
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41316 = 0000 Decimal
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41318 = 0000 Decimal
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41320 = 0000 Decimal

Start 2nd traverse

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41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
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41330 = 0000 Decimal
41331 = 0000 Decimal
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41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
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41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
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41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
✓41360 = 0081 Decimal 1801

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:PROGRAM AR:

41301 = 0000 Decimal
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0078 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal

41321 = 0080 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0080 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0078 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0080 Decimal

41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0079 Decimal
41315 = 0080 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0081 Decimal

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-19-91, Run 2

Full Page Data: State:RUNNING Mode:PROGRAM AR:

41301 = 0000 Decimal -2000	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
√41303 = 0090 Decimal 58	41323 = 0000 Decimal	√41343 = 0071 Decimal 18
41304 = 0000 Decimal	√41324 = 0079 Decimal 31	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	√41347 = 0077 Decimal 14
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	√41353 = 0079 Decimal 8
√41314 = 0085 Decimal 41	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	√41338 = 0067 Decimal 33	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	√41359 = 0083 Decimal 2
41320 = 0078 Decimal 41	41340 = 0000 Decimal	41360 = 0000 Decimal 1901

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11/19 2192 Run 2

Full Page Data: State:RUNNING Mode:PROGRAM AR:

41301 = 0073 Decimal 2100	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0073 Decimal 39	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0070 Decimal 15
41306 = 0000 Decimal 2055	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal end	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal 2nd	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal traverse	41330 = 0000 Decimal	41350 = 0077 Decimal 1
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0084 Decimal 49	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0053 Decimal 23	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0083 Decimal 6
41316 = 0000 Decimal	41336 = 0086 Decimal 25	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0058 Decimal 43	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0069 Decimal 2
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 2091

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

PRETEST CHECKLIST

Facility:	Morristown Memorial	**Person:**	Neulicht
Location:	Morristown, N.J.	**Date:**	11-20-91
		Run No.:	Three

Kiln clear ?	yes @ 1050
Charging begun at?	1102
Lime slurry mixed ?	yes @ 1050 15 Bags/60 min
Baghouse hopper checked?	—
Ash hopper clear?	≈ 1310 New clean cart
Data logger operating?	NO AT 12:30. WORKING AT 15:15
Time synchronized?	yes - Neulicht with Control Room

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-20-91
Run No.: Three

Time	~~10~~ 1315	1440	1625	1710	2330
Primary chamber temp., F	1425				1425
Secondary chamber temp., F	1800				1800
Primary chamber draft, in. w.c.	-.18				-.18
Primary chamber min O2, %	8				8
Primary Chamber idle temp, F	1000				100
Secondary chamber idle temp., F	1200				1200
Atomizer Speed	80				85
Water quench on, F	1495				1495
Water quench off, F	1485				1485
Maximum charge rate, lb/hr	780				780
Baghouse cleaning on, in. w.c. (10 sec Delay)	4	4.5		4 [a]	4
Raw Delay Baghouse cleaning off, in. w.c. (5 sec Delay)	15 sec 3	30 sec. 3.5	15 sec	15 sec 3. [a]	3
Lime slurry conc.	15 Temp 60 min 9.%				
Target SR	2:1				
Kiln speed	1 rpm				
Spray Dryer Temp	280				280

SETPOINT

[a] calibrated Magnehelic & Reset Setpoints

DATA LOG

Facility: Morristown memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-20-91
Run No.: Three
Test condition:

	Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed Rpm	Kiln O2 %	Prim. air damper %	Sec. air damper %	Natural gas reading cf
Begin 1st traverse 1230	1230	1477	1814	-.20		10.5	0	82	@1240 548900
	1300	1474	1795	-.18	1	10.7	0	59	—
	1340	1478	1808	-.14	—	10.6	0	74	—
Ends at 1430	1400	1456	1778	-.24	—	13.2	0	61	—
	1430	1466	1817	-.22	—	9.2	0	76	@1434 549325
	Port charge 1600	1510	1825	-.14	—	10.3	0	76	
	1632	1459	1803	-.22	—	10.2	0	67	@1636 549987
1645	Begin Traverse #2 1645	1529	1823	-.12	—	7.9	0	53	
1655	1705 — unit down 2006 Begin Charging								
	2030	1512	1837	-.12	—	7.9	0	92	
2100	Begin 2nd TRAVERSE 2100	1438	1774	-.22	1.0	9.7	0	65	@2108 550655
2nd traverse	2130	1497	1815	-.16	—	8.7	0	76	—
	2201	1439	1773	-.24	—	11.1	0	66	
	2231	1456	1818	-.22	—	11.1	0	80	
2250	2250	1526	1818	-.20	1.0	8.1	0	66	@2255 551105

End DATALOG 2330 1435
Remove Ash Cont

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neulicht
Date: 11-20-91
Run No.: Three
Test condition:

Time	Quench flow, ~~gal/h~~ GPM	SD outlet temp. F	SD atomiz Rotation ~~RPM~~ %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
1230	—	282	81	62	58	1.6	13.1	3.7	
1300	—	274	81	59	58	1.1	13.0	3.9	
1340	—	284	81	57	58	1.4	13.1	2.9	
1400	—	280	81	55	58	1.2	13.1	2.8	
1430	0	274	81	54	58	1.8	13.0	3.2	
Pontchange 1602	—	288	81	51	58	1.2	13.0	3.6	
1632	—	292	81	49	59	1.4	12.9	4.1	
Begin 2nd Transect 1645	—	283	81	48	59	1.3	13.0	4.1	
1705 — Unit Down									
2006 — Begin Charging									
2030	—	283	80	46	59	0.9	13.0	3.7	
2100	3.5	282	80	44	59	~~0~~ 2.2	12.9	3.5	
2130	—	276	80	43	59	1.0	13.0	3.8	
2201	—	255	80	41	59	1.8	13.0	3.7	
2231	—	287	80	40	59	2.7	12.9	3.0	
2250	—	279	80	39	59	1.6	12.9	2.6	

DATALOGC

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Neulicht
Location:	Morristown, N.J.	**Date:**	11-20-91
		Run No.:	THREE

@ 1050 Mixed Lime slurry in Tank #1
@ 1055 Up to operating Temp.
@ 1100 Switched to slurry Tank #1

@ 1102 Began charging

@ 1230 Began Run Number 1

@ ≈ 1310 Placed clean Ash Cart @ kiln

@ 1330 It was noted that the BH pulse cleaning cycle did not appear to be normal; BH was pulsing much more frequently and the dp never really dropped significantly during the pulse. Decided to checkout at port change.

@ 1430 Checked CEMS: HCl @ outlet near baseline; one CO spike of ≈ 100ppm @ ≈ 1400
@ 1430 Ended first traverse.

@ 1440 - Checked BH pressure meter lines: no apparent problem
@ 1450 - Lost Air pressure to ID Fan Damper and ID Fan tripped off: A large amount of BH residue was discharged due to loss of dp across bags when unit went to bypass.
@ 1457 ID Fan and BH back on-line
@ 1500 Stopped charging while checking out BH
@ 1545 Charging restarted, BH appears to be operating normally. Hopper may have been full, hindering cleaning

DNOTES

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Randall
Location:	Morristown, N.J.	**Date:**	11-20-91
		Run No.:	Three

- Startup at 16:45
- WHB level low at 16:54 so system shutdown
- Towel wrapped around inlet part was sucked into the spray dryer just after the shutdown. Now looking for it at 17:05.

17:30

- Actually, water level is fine, but there was no pressure at outlet of pump. Turned on second pump and pressure came back. Turned the 2nd pump off and pressure is holding. When we turn the kiln back on we will have someone watch the guage to make sure it doesn't drop. They don't want to leave the 2nd pump on full time because it doesn't have good seals.
- Trouble restarting the rotary atomizer ⇒ 17:36

19:30 Unit Back on Line, Atomizer wheel was removed & cleaned

20:00 Begin Charging

DNOTES

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Neidt
Location:	Morristown, N.J.	**Date:**	11-20-91
		Run No.:	Three

Begin Second Traverse @ 21:00

@ 2215 BH pulsed; Dropped Back to 3"; Dropped About 1/2 to 1/4 Box of Residue; Appears to now be operating properly again.

End Run @ 2250; stopped charging

@ 1130 Removed Ad Cart

DNOTES

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON:
DATE:
RUN NO.: 5

SYSTEM CHECK:

SLURRY TANK NUMBER: ONE

ADDITIONS

Time	Water	Lime	Tank level
1050	60"	15 Bags 750#	
1100			66" *
1645			49" *
2010			48" *
2250			40" *

COMMENTS: * Agitator off

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulist
Date: 11-20-91
Run No.: THREE

Time	PCCT	SCCT							
1230	1477	1814	1400	1456	1778				
1235	1495	1827	1405	1453	1772				
1240	1454	1817	1410	1413	1779				
1245	—	—	1415	1471	1817				
1250	1460	1788							
1255	1505	1802	1425	1394	1789				
1300	1474	1795	1430	1466	1817	end 1st traverse 1430			
1305	1460	1776	1435	1463	1816				
1310	1450	1778	1440	1450	1787				
1315	1477	1804							
1320	1426	1794	1450						
1325	1424	1789							
1330	1460	1807							
1335	1467	1801							
1340	1518	1819	Data logger on-line						
1345	1519	1827							
1350	1473	1811							
1355	1448	1785							

DNOTES

Date:11-20-1991
Location:Morristown
Project #:6500-13
Operator:DDR
Filename:threec
Name:Run 3
Date:11-20-1991
Location:Morristown
Project #:6500-13
Operator:DDR

	0 PCCT	1 SCCT
15:15	139.40	178.20
5:15	1394	1782
15:16	138.84	178.32
15:16	1388	1783
15:17	140.39	179.09
15:17	1404	1791
15:18	141.32	179.47
15:18	1413	1795
15:19	141.55	179.57
15:19	1416	1796
15:20	142.14	179.60
5:20	1421	1796
15:21	140.61	179.58
15:21	1406	1796
15:22	141.53	179.68
15:22	1415	1797
15:23	140.58	179.50
15:23	1406	1795
15:24	141.29	179.24
15:24	1413	1792
15:25	141.56	179.15
15:25	1416	1791
15:26	140.36	179.63
15:26	1404	1796
15:27	141.18	179.59
15:27	1412	1796
15:28	142.15	180.06
15:28	1421	1801
15:29	141.90	180.67
15:29	1419	1807
15:30	141.79	179.78
5:30	1418	1798
15:31	141.37	178.61
15:31	1414	1786
15:32	140.28	177.88
15:32	1403	1779
15:33	139.76	177.71
15:33	1398	1777
15:34	138.70	177.52
15:34	1387	1775
15:35	139.32	177.48
15:35	1393	1775
15:36	141.05	177.52

[illegible]	[illegible]	[illegible]
16:31	1453	1792
16:32	149.20	181.04
16:32	1492	1810
16:33	145.35	179.52
16:33	1453	1795
16:34	147.06	179.71
16:34	1471	1797
16:35	148.53	180.58
16:35	1485	1806
16:36	145.05	179.01
16:36	1451	1790
16:37	148.54	180.99
16:37	1485	1810
16:38	146.18	180.52
16:38	1462	1805
16:39	144.60	179.14
16:39	1446	1791
16:40	150.56	181.74
16:40	1506	1817
16:41	144.36	178.93
16:41	1444	1789
16:42	144.44	178.35
16:42	1444	1784
16:43	148.70	180.06
16:43	1487	1801
16:44	144.65	177.96
16:44	1446	1780
16:45	146.56	178.79
16:45	1466	1788
16:46	151.17	180.96
16:46	1512	1810
16:47	145.84	178.53
16:47	1458	1785
16:48	145.08	177.23
16:48	1451	1772
16:49	148.98	179.13
16:49	1490	1791
16:50	144.55	177.40
16:50	1445	1774
16:51	143.18	176.24
16:51	1432	1762
16:52	146.74	178.01
16:52	1467	1780
16:53	144.10	177.13
16:53	1441	1771
16:54	144.96	176.60
16:54	1450	1766
16:55	145.77	177.50
16:55	1458	1775
16:56	142.50	175.48
16:56	1425	1755
16:57	143.23	173.63
16:57	1432	1736

Begin 2nd traverse

Down due to [illegible] problems

20:37	1496	1823
20:38	144.43	180.20
20:38	1444	1802
20:39	148.30	181.20
20:39	1483	1812
20:40	144.99	180.44
20:40	1450	1804
20:41	140.78	177.62
20:41	1408	1776
20:42	146.31	180.16
20:42	1463	1802
20:43	147.22	180.80
20:43	1472	1808
20:44	140.78	176.86
20:44	1408	1769
20:45	143.48	176.91
20:45	1435	1769
20:46	148.24	179.64
20:46	1482	1796
20:47	144.62	178.39
20:47	1446	1784
20:48	145.31	178.31
20:48	1453	1783
20:49	148.00	180.70
20:49	1480	1807
20:50	143.46	179.18
20:50	1435	1792
20:51	144.95	180.06
20:51	1450	1801
20:52	146.98	181.46
20:52	1470	1815
20:53	144.04	179.40
20:53	1440	1794
20:54	147.76	181.07
20:54	1478	1811
20:55	147.10	180.52
20:55	1471	1805
20:56	143.89	179.03
20:56	1439	1790
20:57	149.52	181.81
20:57	1495	1818
20:58	147.17	180.61
20:58	1472	1806
20:59	142.62	178.31
20:59	1426	1783
21:00	147.88	179.58
21:00	1479	1796
21:01	144.92	178.64
21:01	1449	1786
21:02	143.93	176.22
21:02	1439	1762
21:03	147.72	177.39
21:03	1477	1774

21:04	1464	1768
21:05	141.89	175.43
21:05	1419	1754
21:06	144.73	176.40
21:06	1447	1764
21:07	147.35	177.52
21:07	1474	1775
21:08	142.15	175.96
21:08	1421	1760
21:09	139.54	174.52
21:09	1395	1745
21:10	136.90	173.71
21:10	1369	1737
21:11	134.72	173.45
21:11	1347	1735
21:12	134.08	174.01
21:12	1341	1740
21:13	136.14	175.24
21:13	1361	1752
21:14	140.67	176.87
21:14	1407	1769
21:15	144.41	178.51
21:15	1444	1785
21:16	148.56	179.34
21:16	1486	1793
21:17	143.79	179.03
21:17	1438	1790
21:18	143.06	178.22
21:18	1431	1782
21:19	142.37	178.46
21:19	1424	1785
21:20	144.29	179.28
21:20	1443	1793
21:21	145.73	180.12
21:21	1457	1801
21:22	147.15	180.80
21:22	1471	1808
21:23	146.82	181.89
21:23	1468	1819
21:24	144.29	180.83
21:24	1443	1808
21:25	146.71	181.68
21:25	1467	1817
21:26	144.43	180.47
21:26	1444	1805
21:27	144.01	179.76
21:27	1440	1798
21:28	147.60	180.77
21:28	1476	1808
21:29	143.51	179.39
21:29	1435	1794
21:30	143.74	178.42
21:30	1437	1784

21:32	146.56	180.12
21:32	1466	1801
21:33	142.31	178.31
21:33	1423	1783
21:34	146.89	179.66
21:34	1469	1797
21:35	146.89	180.55
21:35	1469	1805
21:36	142.37	178.91
21:36	1424	1789
21:37	149.30	181.33
21:37	1493	1813
21:38	149.14	181.51
21:38	1491	1815
21:39	143.71	179.58
21:39	1437	1796
21:40	149.32	181.61
21:40	1493	1816
21:41	146.60	180.72
21:41	1466	1807
21:42	144.54	179.13
21:42	1445	1791
21:43	148.73	180.09
21:43	1487	1801
21:44	143.67	178.10
21:44	1437	1781
21:45	144.53	176.98
21:45	1445	1770
21:46	146.00	177.18
21:46	1460	1772
21:47	144.60	176.74
21:47	1446	1767
21:48	145.47	176.79
21:48	1455	1768
21:49	149.27	179.47
21:49	1493	1795
21:50	145.01	179.18
21:50	1450	1792
21:51	145.58	178.69
21:51	1456	1787
21:52	148.19	180.45
21:52	1482	1804
21:53	143.76	178.97
21:53	1438	1790
21:54	147.09	179.18
21:54	1471	1792
21:55	146.54	179.75
21:55	1465	1797
21:56	142.33	177.24
21:56	1423	1772
21:57	145.45	178.75
21:57	1454	1788
21:58	147.99	180.33
21:58	1480	1803

[illegible]	[illegible]	[illegible]
21:59	143.39	176.22
21:59	1434	1782
22:00	144.72	178.10
22:00	1447	1781
22:01	147.03	178.90
22:01	1470	1789
22:02	141.68	176.74
22:02	1417	1767
22:03	144.06	176.58
22:03	1441	1766
22:04	147.41	177.48
22:04	1474	1775
22:05	142.77	176.06
22:05	1428	1761
22:06	140.69	174.90
22:06	1407	1749
22:07	140.57	175.12
22:07	1406	1751
22:08	140.68	175.43
22:08	1407	1754
22:09	140.44	175.53
22:09	1404	1755
22:10	136.50	175.20
22:10	1365	1752
22:11	134.79	174.91
22:11	1348	1749
22:12	133.89	174.98
22:12	1339	1750
22:13	135.01	175.85
22:13	1350	1759
22:14	139.51	177.66
22:14	1395	1777
22:15	143.51	179.02
22:15	1435	1790
22:16	144.35	179.57
22:16	1443	1796
22:17	146.29	179.85
22:17	1463	1798
22:18	144.36	179.17
22:18	1444	1792
22:19	142.00	178.61
22:19	1420	1786
22:20	145.83	180.15
22:20	1458	1801
22:21	147.87	181.83
22:21	1479	1818
22:22	141.37	179.70
22:22	1414	1797
22:23	139.00	178.26
22:23	1390	1783
22:24	140.50	177.88
22:24	1405	1779
22:25	140.37	178.13

22:26	1417	1783
22:27	140.03	178.31
22:27	1400	1783
22:28	140.24	178.13
22:28	1402	1781
22:29	139.31	178.16
22:29	1393	1782
22:30	140.71	178.64
22:30	1407	1786
22:31	144.20	179.88
22:31	1442	1799
22:32	147.37	181.03
22:32	1474	1810
22:33	145.09	180.92
22:33	1451	1809
22:34	142.62	179.37
22:34	1426	1794
22:35	144.51	179.31
22:35	1445	1793
22:36	146.81	180.34
22:36	1468	1803
22:37	145.59	180.14
22:37	1456	1801
22:38	143.57	179.54
22:38	1436	1795
22:39	149.25	181.92
22:39	1492	1819
22:40	143.49	180.23
22:40	1435	1802
22:41	142.05	179.24
22:41	1420	1792
22:42	146.92	180.64
22:42	1469	1806
22:43	147.95	180.82
22:43	1480	1808
22:44	142.97	178.49
22:44	1430	1785
22:45	146.47	179.52
22:45	1465	1795
22:46	146.85	179.71
22:46	1468	1797
22:47	142.24	177.61
22:47	1422	1776
22:48	147.75	179.67
22:48	1477	1797
22:49	145.37	178.84
22:49	1454	1788
22:50	144.03	177.73
22:50	1440	1777
22:51	148.66	180.25
22:51	1487	1803
22:52	145.47	179.29
22:52	1455	1793

End Run 3

INCINERATOR DAILY CHARGING REPORT

DATE: 11/20/91

OPERATOR'S NAME:

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	11:02	92.0	RB						
2	11.06	59.0	B						
3	11.13	60.0	RB						
4	11.19.	86.5	B						
5	11:23	71.5	B						
6	11:27	69.5	B						
7	11:31	79.5	B						
8	11:35	85.0	RB						
9	11:39	75.5	B						
10	11:42	79.5	B						
11	~~11:46~~ 12:02	90.5	RB						
12	12:07	700	B						
13	12:19	76.5	B						
14	12:23	68.5	RB						
15	12.27	79-	RB						
16	12.31	65.0	RB	↓					
17	12.35	91.5	B	start 1st travelling					
18	12:39	41.0	RB						
19	12.44	75.0	B						
20	12:49	58.5	R, B						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11/20/91

OPERATOR'S NAME:

.ed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	13:03	72.5	B						
2	13:08	86.0	RB						
3	13:20	84.0	B						
4	13:24	75.0	B						
5	13:27	81.5	RB						
6	13:32	77.0	RB						
7	13:36	79.0	B						
8	13:40	76.5	B						
9	13:44	75.5	RB						
10	14:04	75.5	B						
	14:8	80.0	B						
12	14:12	96.0	RB						
13	14:24	100.5	RB	end 1st traverse 1430	omitted from datalogger printout				
14	14:28	106.0	RB	↑					
15	14:34	100.0	B						
16	14:40	113.5	RB						
17	14:44	97.5	RB						
18	14:49	79.0	B						
20									

waste type:
R = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

AILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-20-91 15:00 - 23:00

OPERATOR'S NAME: Mario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	15:47	115	R.B						
2	15:51	92	R.B						
3	15:58	86.5	B						
4	~~15:58~~ 16:02	70.0	B						
5	16:06	66.0	RB						
6	16:20	73.5	B						
7	16:24	74.5	RB						
8	16.30	68.0	B						
9	16:34	44.5	B						
10	16.38	67.5	B						
11	16.48	78.0	RB	1645 start 2nd trav					
12	16.52	85.5	RB	1655 stop 2nd trav.					
13	20.07	78.5	RB						
14	20.12	81.5	RB						
15	20:17	71.5	B						
16	20:22	91.5	B						
17	20.26	80.0	B						
18	20.30	90.0	RB						
19	20.34	75.5	RB						
20	20.40	79.0	B						

waste type:

B = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

ILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-20-91 15:00 - 23:00

OPERATOR'S NAME: Mario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	20.44	70.5	B						
2	20.48	59.0	B						
-	20:08	76.0	RB	2100					
4	21.12	81.5	B	resume 2nd					
5	21:18	62.5	B	traffic					
6	21:22	79.0	RB						
7	2127	74.0	B						
8	21.30	76.5	RB						
9	21:34	71.5	RB						
10	21:41	88.0	B						
1	21.45	68.5	RB						
2	21:49	79.0	B						
3	22:09	77.5	B						
4	22:13	75.0	RB						
5	22:19	73.5	RB						
6	22:23	74.5	RB						
7	22:28	79.5	B						
8	22:32	70.0	B						
	22:36	69.5	R.B						
0	22:42	75.0	B						

waste type:

B = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

LYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11/20/91 15:00 - 23:00 hrs.

OPERATOR'S NAME: Mario Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	22:46	76.0	RB	1st 2nd traverse					
2	22:50	83.5	RB	2250 ↑					
3									
4									
5									
6									
7									
8									
9									
10									
1									
12									
13									
14									
15									
16									
17									
18									
19									
20									

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

11-20-91
Run 3

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

1235

41301 = 0092 Decimal
41302 = 0000 Decimal start of traverse
41303 = 0000 Decimal
41304 = 0066 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal 1230
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0079 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0069 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0077 Decimal
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0070 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0091 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal 1200
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0080 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0076 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1136

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

41301 = 0000 Decimal 1300
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
1306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
1312 = 0059 Decimal 49
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0075 Decimal 44
1318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
✓41322 = 0042 Decimal 39
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
✓41326 = 0092 Decimal 35
41327 = 0000 Decimal start
41328 = 0000 Decimal 1st traverse
✓41329 = 0066 Decimal 32
41330 = 0000 Decimal
41331 = 0000 Decimal 1230
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0079 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0069 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0077 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0070 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0091 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1201

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-20-91 Run 3

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

1400

1301 = 0000 Decimal	✓41321 = 0077 Decimal 40	41341 = 0000 Decimal
1302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
1303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
1304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
1305 = 0000 Decimal	✓41325 = 0080 Decimal 36	41345 = 0000 Decimal
1306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
1307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
1308 = 0000 Decimal	✓41328 = 0078 Decimal 30	41348 = 0000 Decimal
1309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
1310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
1311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
1312 = 0000 Decimal	41332 = 0000 Decimal	✓41352 = 0086 Decimal 1
1313 = 0000 Decimal	✓41333 = 0082 Decimal 28	41353 = 0000 Decimal
1314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
1315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
1316 = 0076 Decimal 45	41336 = 0000 Decimal	41356 = 0000 Decimal
1317 = 0000 Decimal	✓41337 = 0075 Decimal 24	✓41357 = 0073 Decimal 0
1318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
1319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
1320 = 0000 Decimal	✓41340 = 0084 Decimal 2	41360 = 0000 Decimal 1301

-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

✓1404 75.5 ✓1424 68.5 ✓1440 113.5
✓1408 80 ✓1428 106 ✓1444 97.5
✓1432 96 ✓1434 100 ✓1449 79

omitted from datalogger printout

11-20-91 Run 3

Full Page Data: State:RUNNING Mode:PROGRAM AR: 10

1602

1301 = 0070 Decimal	41321 = 0000 Decimal	41341 = 0000 Decimal
1302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
1303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
1304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
1305 = 0087 Decimal 58	41325 = 0000 Decimal	41345 = 0000 Decimal
1306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
1307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
1308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
1309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
1310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
1311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
1312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0080 Decimal 0
1313 = 0093 Decimal 50	41333 = 0000 Decimal	41353 = 0000 Decimal
1314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
1315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
1316 = 0116 Decimal 47	41336 = 0000 Decimal	41356 = 0000 Decimal
1317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
1318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
1319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
1320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1503

Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

~~Full Page Data:~~ State:RUNNING Mode:PROGRAM AR: ~~00030~~

~~301 = 0000 Decimal~~ 1700	~~41321 = 0000 Decimal~~	✓~~41341 = 0074 Decimal~~ 0
~~302 = 0000 Decimal~~	~~41322 = 0000 Decimal~~	~~41342 = 0000 Decimal~~
~~303 = 0000 Decimal~~	✓~~41323 = 0068 Decimal~~ 38	~~41343 = 0000 Decimal~~
~~304 = 0000 Decimal~~	~~41324 = 0000 Decimal~~	~~41344 = 0000 Decimal~~
~~305 = 0000 Decimal~~	~~41325 = 0000 Decimal~~	~~41345 = 0000 Decimal~~
~~306 = 0000 Decimal~~ 1655	~~41326 = 0000 Decimal~~	~~41346 = 0000 Decimal~~

41316 = 0076 Decimal
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41336 = 0000 Decimal
41337 = 0075 Decimal 24
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0084 Decimal 21

41356 [redacted]
41357 = [redacted]
41358 = 000[redacted]
41359 = 000[redacted]
41360 = 000[redacted]

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

11-20-91 Rem 3

1004 75.5 1424 68.5 1440 113.5
1408 80 1428 106 1444 92.5
1412 96 1434 100 1449 79

omitted printer data

Full Page Data: State:RUNNING Mode:PROGRAM AR: 10

41301 = 0070 Decimal 1602
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0087 Decimal 58
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0093 Decimal 50
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0116 Decimal 47
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0080 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1503

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:PROGRAM AR: 00030

41301 = 0000 Decimal 1700
41302 = 0000 Decimal
1303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal 1655
41307 = 0000 Decimal
1308 = 0086 Decimal 53
1309 = 0000 Decimal stop 2nd traverse
1310 = 0000 Decimal
1311 = 0000 Decimal
1312 = 0000 Decimal
1313 = 0078 Decimal 48 start 2nd traverse
1314 = 0000 Decimal
1315 = 0000 Decimal
1316 = 0000 Decimal 1645
1317 = 0000 Decimal
1318 = 0000 Decimal
1319 = 0000 Decimal
1320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0068 Decimal 38
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0046 Decimal 34
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0068 Decimal 30
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0075 Decimal 24
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0074 Decimal 20
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0067 Decimal 6
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal 1603
41359 = 0070 Decimal
41360 = 0000 Decimal 1601

-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:PROGRAM AR: 00030
1301 = 0000 Decimal
302 = 0000 Decimal
303 = 0000 Decimal

Run 3
11-20-91

Full Page Data: 1808 State:RUNNING Mode:PROGRAM AR: 00030

41301 = 0000 Decimal	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 1709

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Run3 11-20-91

Full Page Data: State:RUNNING Mode:MONITOR AR: 41341

resume 2nd traverse

41301 = 0000 Decimal - 2100	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	✓41343 = 0072 Decimal 18
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	✓41327 = 0076 Decimal 34	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	✓41349 = 0082 Decimal 12
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0000 Decimal	✓41331 = 0091 Decimal 30	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
✓41313 = 0055 Decimal 48	41333 = 0000 Decimal	✓41353 = 0079 Decimal 8
41314 = 0000 Decimal	✓41334 = 0081 Decimal 27	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
✓41317 = 0071 Decimal 44	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	✓41339 = 0092 Decimal 22	41359 = 0000 Decimal
✓41320 = 0080 Decimal 41	41340 = 0000 Decimal	41360 = 0000 Decimal 2001

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

Run3 11-20-91

Full Page Data: State:RUNNING Mode:MONITOR AR:

41301 = 0000 Decimal 2200	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	✓41342 = 0063 Decimal 19
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
[illegible] = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal

~~41318 = 0000 Decimal~~
~~41319 = 0000 Decimal~~
~~41320 = 0080 Decimal 41~~

~~41336 = 0000 Decimal~~
~~41337 = 0000 Decimal~~
~~41338 = 0000 Decimal~~
~~✓41339 = 0082 Decimal 22~~
~~41340 = 0000 Decimal~~

~~41357 = 0000 Decimal~~
~~41358 = 0000 Decimal~~
~~41359 = 0000 Decimal~~
~~41360 = 0000 Decimal 200~~

~~1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev~~

RUN 3 11-20-91

Full Page Data:

State:RUNNING Mode:MONITOR AR:

41301 = 0000 Decimal 22:00
1302 = 0000 Decimal
1303 = 0000 Decimal
1304 = 0000 Decimal
1305 = 0000 Decimal
1306 = 0000 Decimal
1307 = 0000 Decimal
1308 = 0000 Decimal
1309 = 0000 Decimal
1310 = 0000 Decimal
1311 = 0000 Decimal
1312 = 0079 Decimal 49
1313 = 0000 Decimal
1314 = 0000 Decimal
1315 = 0000 Decimal
1316 = 0069 Decimal 45
1317 = 0000 Decimal
1318 = 0000 Decimal
1319 = 0088 Decimal 42
1320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
✓41326 = 0072 Decimal 35
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
✓41330 = 0077 Decimal 31
41331 = 0000 Decimal
41332 = 0000 Decimal
✓41333 = 0074 Decimal 28
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
✓41338 = 0079 Decimal 23
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
✓41342 = 0063 Decimal 19
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
✓41348 = 0082 Decimal 13
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
✓41352 = 0077 Decimal 7
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 210

Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

RUN 3 11-20-91

Full Page Data:

State:RUNNING Mode:MONITOR AR:

301 = 0000 Decimal 23:00
302 = 0000 Decimal
303 = 0000 Decimal
304 = 0000 Decimal
305 = 0000 Decimal
306 = 0000 Decimal
307 = 0000 Decimal
308 = 0000 Decimal
309 = 0000 Decimal
310 = 0000 Decimal
311 = 0084 Decimal 2250
312 = 0000 Decimal
313 = 0000 Decimal end
314 = 0000 Decimal 2nd
315 = 0077 Decimal 46
316 = 0000 Decimal
317 = 0000 Decimal
318 = 0076 Decimal 43
319 = 0000 Decimal
320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
✓41325 = 0070 Decimal 36
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
✓41329 = 0071 Decimal 32
41330 = 0000 Decimal
41331 = 0000 Decimal
✓41332 = 0080 Decimal 31
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
✓41337 = 0075 Decimal 24
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

✓41341 = 0074 Decimal 20
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
✓41347 = 0075 Decimal 14
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
✓41351 = 0078 Decimal 10
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 220

ec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

PRETEST CHECKLIST

Facility: Morristown Memorial
Location: Morristown, N.J.

Person: Neulicht / Randall
Date: 11-21-91
Run No.: FOUR

Kiln clear ?	No; was operating when arrived on-site
Charging begun at?	≈ 9 AM
Lime slurry mixed ?	yes
Baghouse hopper checked?	NO -- appears to be flow after pulse
Ash hopper clear?	New cart @ 1327
Data logger operating?	Yes, at 10:28
Time synchronized?	Neulight with Control room

PRECHK

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht / Randall
Date: 11-21-91
Run No.: FOUR

Time	1233	1325	1336		
Primary chamber temp., F	1425				
Secondary chamber temp., F	1800				
Primary chamber draft, in. w.c.	-.20	-.18	-.20		
Primary chamber min O2, %	8				
Primary Chamber idle temp, F	1000				
Secondary chamber idle temp., F	1200				
Atomizer Speed	85				
Water quench on, F	1495				
Water quench off, F	1485				
Maximum charge rate, lb/hr	780				
Baghouse cleaning on, in. w.c.	4"				
cleaning Delay Baghouse cleaning off, in. w.c.	15 SEC. 3"				
15 Bmp = 75016 / 60" H_2O Lime slurry conc.	9%				
Target SR	2				
SD Temp.	280				

SETPOINT

DATA LOG

Facility: Morristown memorial
Location: Morristown, N.J.
Person: Neuhart / Randall
Date: 11-21-91
Run No.: FOUR
Test condition: CARBON Added

	Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed	Kiln O2 %	Prim. air damper %	Sec. air damper %	Natural gas reading cf
	1230	1447	1804	-.26	—	10.8	0	62	—
BEGIN RUN 1245	1245	1508	1827	-.18	1.0	8.1	0	60	@1243 555975
STOP TRAVERSE 1310	1319	1490	1793	-0.08	—	10.8	0	63	
RESTART 1345	1345	1456	1802	-0.24	—	9.5	0	58	
1st Traverse	1415	1493	1793	-.20	—	11.7	0	50	@1421 556173
	1445	1502	1828	-.20	—	10.0	0	54	
	1515	1447	1796	-.16	—	10.8	0	-	@1538 556566
1519 — Complete Traverse #1	1545	1474	1811	-.22	—	10.7	0	68	—
1550 — Beg ~ Traverse #2	1615	1448	1793	-.20	—	11.6	0	78	—
2nd Traverse	1645	1517	1836	-.12	—	7.0	0	55	—
	1715	1468	1797	-.16	—	13.2	0	77	@1709 556886
1750 — Complete Trav. #2	1750	1411	1766	-.22	1.0	14.2	6	71	@1755 557065
	1850	1355							

DATALOG

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neulich / Randall
Date: 11-21-91
Run No.: Four
Test condition: Carbon Added

	Time	Quench flow, ~~gal/h~~ GPM	SD outlet temp. F	SD atomiz Rotation ~~RPM~~ %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
245 Begin Traverse 1	1230	—	264	80	64	36	1.2	13.0	3.7	
	1245	3.5	288	80	63	39	1.9	13.0	3	
Stop Traverse 1 310	1319	— ~~1.8~~	265	80	61	38	1.5	12.9	2.8	
Start Traverse 1 345	1345	— ~~1.0~~	279	80	60	38	0.9	12.9	4.1	
	1415	— ~~1.3~~	282	80	58	40	1.3	13.0	3.4	
	1445	0	288	80	57	38	1.4	13.0	2.3	
	1515	3.5	283	80	56	39	1.4	13.0	3.6	
19 Complete Traverse 1 1519	1545	—	274	80	54	39	1.8	13.0	2.7	
50 Begin Traverse 2 1550	1615	—	264	80	52	39	1.1	12.9	3.3	
	1645	—	273	80	51	39	1.6	13.0	3.9	
	1715	—	284	80	49	39	2.0	12.9	2.7	
Complete Traverse 2 1750	1750	0	281	80	48	61	1.3	12.9	3.6	

DATALOGC

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neuhart / Randall
Date: 11-21-91
Run No.: FOUR

Unit on-line and running when arrived on-site
@ 1218 Switched to slurry Tank 1 which was
a mixture of lime and carbon
B.H. operation / Pulse cycle is normal today
13:09 Power failure that affected most of the lights
and the spray dryer. Temperature in SD outlet
rose to about 299°F before atomizer was
back to full speed. Probes were pulled out
within a couple minutes of the power failure.
Radian indicated the gas flows were low and monitor
showed the kiln draft was about 0". Problem was kiln
setpoint was not set. Setpoint was reset at
-0.18 at 13:25 and then reset to -0.20 at
13:36.
1345 Restart Traverse
15:19 Complete Traverse #1
15:50 Begin Second Traverse
@ 16:00 Tightened Fitting on Feeder Hydraulic Line;
Stopped Charging for about 10 minutes.

DNOTES

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht / Randall
Date: 11-21-91
Run No.: FOUR

~~1645~~ 1750 Complete test
1755 Switch Slurry Tanks
1830 Remove Ash Cart

DNOTES

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON: Neuhart / Randall
DATE: 11-21-91
RUN NO.: Four

SYSTEM CHECK: —

SLURRY TANK NUMBER: ONE

ADDITIONS

Time	Water	Lime	
1120			24 *
	Add 36" to 60" MARK	9 Bags = 450#	
	Add Carbon [a]		61 *[b]
1218	Switch to tank 1	59 lbs carbon	64 *[c]
1533			55 *
1750	check level		48

COMMENTS:
* Agitator off; Tank mix from previous day
[a] Added Carbon while Tank was filling
[b] reading with Carbon added
[c] reading after Lime added

23:36 140.73 178.35
23:36 1407 1783
Filename:Run4
Name:Run 4
Date:11-21-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT
10:09:5	0.00	4.00
10:09:5	0	40

Filename:Run4a
Name:Run 4
Date:11-21-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT

Filename:Run4b
Name:Run 4
Date:11-21-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT

Filename:Run4c
Name:Run 4
Date:11-21-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT
10:21	21.74	7.32
10:21	217	73
10:22	17.61	8.11
10:22	176	81
10:23	17.86	8.35
10:23	179	84
10:24	21.01	8.50
10:24	210	85
10:25	20.74	7.86
10:25	207	79
10:26	18.82	7.32
10:26	188	73

Filename:Run4d
Name:Run 4
Date:11-21-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1

12:44	144.15	178.27
12:44	1442	1783
12:45	148.65	181.33
12:45	1486	1813
12:46	147.74	181.00
12:46	1477	1810
12:47	144.90	179.30
12:47	1449	1793
12:48	150.74	182.23
12:48	1507	1822
12:49	150.82	182.10
12:49	1508	1821
12:50	144.77	179.57
12:50	1448	1796
12:51	145.93	179.21
12:51	1459	1792
12:52	149.97	181.07
12:52	1500	1811
12:53	145.21	178.92
12:53	1452	1789
12:54	144.90	177.78
12:54	1449	1778
12:55	148.90	179.26
12:55	1489	1793
12:56	144.58	177.70
12:56	1446	1777
12:57	143.26	176.26
12:57	1433	1763
12:58	149.02	178.69
12:58	1490	1787
12:59	149.09	179.91
12:59	1491	1799
13:00	143.56	177.55
13:00	1436	1775
13:01	146.65	178.92
13:01	1467	1789
13:02	149.54	181.30
13:02	1495	1813
13:03	144.75	178.70
13:03	1447	1787
13:04	145.66	178.30
13:04	1457	1783
13:05	149.04	180.40
13:05	1490	1804
13:06	144.42	178.06
13:06	1444	1781
13:07	146.29	178.28
13:07	1463	1783
13:08	150.60	180.32
13:08	1506	1803
13:09	147.06	178.54
13:09	1471	1785
13:10	144.95	177.22
13:10	1449	1772

← Begin 1st traverse

13:12	147.68	177.93
13:12	1477	1779
13:13	143.13	175.96
13:13	1431	1760
13:14	146.31	176.53
13:14	1463	1765
13:15	148.06	176.97
13:15	1481	1770
13:16	143.03	175.39
13:16	1430	1754
13:17	141.30	174.55
13:17	1413	1745
13:18	144.90	175.95
13:18	1449	1760
13:19	148.36	178.18
13:19	1484	1782
13:20	144.54	178.17
13:20	1445	1782
13:21	141.80	177.20
13:21	1418	1772
13:22	141.30	177.60
13:22	1413	1776
13:23	142.65	178.55
13:23	1426	1785
13:24	147.90	179.52
13:24	1479	1795
13:25	146.52	179.93
13:25	1465	1799
13:26	144.50	179.27
13:26	1445	1793
13:27	147.69	179.46
13:27	1477	1795
13:28	146.83	179.25
13:28	1468	1793
13:29	142.42	177.47
13:29	1424	1775
13:30	143.58	177.07
13:30	1436	1771
13:31	146.02	177.41
13:31	1460	1774
13:32	147.43	177.78
13:32	1474	1778
13:33	142.80	176.86
13:33	1428	1769
13:34	145.47	177.31
13:34	1455	1773
13:35	148.66	179.09
13:35	1487	1791
13:36	144.08	177.97
13:36	1441	1780
13:37	147.13	178.96
13:37	1471	1790
13:38	150.29	181.38

Spray dryer problem

13:39	145.92	180.58
13:39	1459	1806
13:40	147.42	180.96
13:40	1474	1810
13:41	148.82	181.60
13:41	1488	1816
13:42	144.10	179.49
13:42	1441	1795
13:43	147.04	179.82
13:43	1470	1798
13:44	148.77	180.90
13:44	1488	1809
13:45	142.73	178.69
13:45	1427	1787
13:46	146.84	179.87
13:46	1468	1799
13:47	147.52	180.30
13:47	1475	1803
13:48	143.21	178.13
13:48	1432	1781
13:49	147.06	179.69
13:49	1471	1797
13:50	148.19	180.70
13:50	1482	1807
13:51	143.02	177.73
13:51	1430	1777
13:52	142.08	176.49
13:52	1421	1765
13:53	143.84	177.27
13:53	1438	1773
13:54	149.98	179.49
13:54	1500	1795
13:55	145.95	178.29
13:55	1460	1783
13:56	142.08	177.56
13:56	1421	1776
13:57	145.50	179.56
13:57	1455	1796
13:58	150.06	182.43
13:58	1501	1824
13:59	146.81	180.63
13:59	1468	1806
14:00	143.27	178.97
14:00	1433	1790
14:01	145.84	180.56
14:01	1458	1806
14:02	149.23	182.14
14:02	1492	1821
14:03	144.61	180.08
14:03	1446	1801
14:04	144.77	179.67
14:04	1448	1797
14:05	148.02	181.21

14:06	[illegible]	[illegible]
14:06	1455	1794
14:07	143.92	178.26
14:07	1439	1783
14:08	149.91	180.03
14:08	1499	1800
14:09	145.36	178.43
14:09	1454	1784
14:10	144.78	176.93
14:10	1448	1769
14:11	147.70	178.96
14:11	1477	1790
14:12	146.55	178.49
14:12	1466	1785
14:13	143.41	175.98
14:13	1434	1760
14:14	144.26	176.59
14:14	1443	1766
14:15	146.69	177.68
14:15	1467	1777
14:16	149.76	178.34
14:16	1498	1783
14:17	142.79	175.77
14:17	1428	1758
14:18	141.21	174.95
14:18	1412	1750
14:19	145.20	176.05
14:19	1452	1760
14:20	146.80	176.64
14:20	1468	1766
14:21	144.26	176.01
14:21	1443	1760
14:22	142.79	175.17
14:22	1428	1752
14:23	143.46	175.58
14:23	1435	1756
14:24	143.48	176.10
14:24	1435	1761
14:25	143.09	176.96
14:25	1431	1770
14:26	144.39	177.30
14:26	1444	1773
14:27	144.93	177.18
14:27	1449	1772
14:28	144.62	177.22
14:28	1446	1772
14:29	146.41	177.97
14:29	1464	1780
14:30	146.27	178.37
14:30	1463	1784
14:31	141.81	177.00
14:31	1418	1770
14:32	144.32	178.43
14:32	1443	1784

14:32	144.87	181.64
14:32	1448	1817
14:34	144.96	180.55
14:34	1450	1806
14:35	141.44	178.83
14:35	1414	1788
14:36	147.18	180.83
14:36	1472	1808
14:37	148.44	182.33
14:37	1484	1823
14:38	143.25	179.84
14:38	1432	1798
14:39	143.27	179.83
14:39	1433	1798
14:40	145.41	180.97
14:40	1454	1810
14:41	146.43	181.49
14:41	1464	1815
14:42	148.06	182.42
14:42	1481	1824
14:43	144.11	179.60
14:43	1441	1796
14:44	142.92	179.26
4:44	1429	1793
14:45	146.93	181.12
14:45	1469	1811
14:46	145.52	179.99
14:46	1455	1800
14:47	143.46	178.51
14:47	1435	1785
14:48	145.72	179.19
14:48	1457	1792
14:49	147.24	179.41
14:49	1472	1794
14:50	143.75	176.76
14:50	1438	1768
14:51	143.45	176.38
14:51	1435	1764
14:52	144.96	176.82
14:52	1450	1768
14:53	145.92	176.74
14:53	1459	1767
14:54	145.50	176.38
14:54	1455	1764
14:55	143.33	175.83
14:55	1433	1758
14:56	141.94	175.12
14:56	1419	1751
14:57	140.44	174.53
14:57	1404	1745
14:58	136.57	174.01
14:58	1366	1740
14:59	134.68	173.81
14:59	1347	1738

15:01	135.43	175.31
15:01	1354	1753
15:02	138.01	176.89
15:02	1380	1769
15:03	145.46	179.38
15:03	1455	1794
15:04	150.37	181.16
15:04	1504	1812
15:05	146.28	180.12
15:05	1463	1801
15:06	142.88	178.64
15:06	1429	1786
15:07	143.51	178.87
15:07	1435	1789
15:08	147.13	180.60
15:08	1471	1806
15:09	145.29	180.20
15:09	1453	1802
15:10	145.91	180.54
15:10	1459	1805
15:11	146.90	181.93
15:11	1469	1819
15:12	143.06	179.75
15:12	1431	1797
15:13	143.38	179.33
15:13	1434	1793
15:14	145.14	179.96
15:14	1451	1800
15:15	145.63	179.75
15:15	1456	1797
15:16	144.37	178.62
15:16	1444	1786
15:17	147.25	180.48
15:17	1472	1805
15:18	143.31	179.18
15:18	1433	1792
15:19	144.00	179.17
15:19	1440	1792
15:20	148.85	181.53
15:20	1488	1815
15:21	145.30	179.82
15:21	1453	1798
15:22	144.83	180.12
15:22	1448	1801
15:23	149.15	182.09
15:23	1492	1821
15:24	143.58	179.24
15:24	1436	1792
15:25	145.87	179.29
15:25	1459	1793
15:26	148.36	179.97
15:26	1484	1800
15:27	141.15	176.58
[illegible]	[illegible]	[illegible]

← End 1st traverse

15:28	140.85	175.11
15:28	1408	1751
15:29	145.76	177.09
15:29	1458	1771
15:30	150.32	180.06
15:30	1503	1801
15:31	143.98	177.73
15:31	1440	1777
15:32	142.98	177.31
15:32	1430	1773
15:33	148.37	178.03
15:33	1484	1780
15:34	143.79	176.69
15:34	1438	1767
15:35	144.93	177.30
15:35	1448	1773
15:36	148.78	179.30
15:36	1488	1793
15:37	143.41	177.80
15:37	1434	1778
15:38	142.03	177.34
15:38	1420	1773
15:39	145.96	178.06
15:39	1460	1781
15:40	148.03	179.17
15:40	1480	1792
15:41	143.11	177.64
15:41	1431	1776
15:42	143.84	178.22
15:42	1438	1782
15:43	147.21	180.21
15:43	1472	1802
15:44	144.15	179.27
15:44	1441	1793
15:45	146.90	180.25
15:45	1469	1803
15:46	146.29	180.17
15:46	1463	1802
15:47	143.29	178.37
15:47	1433	1784
15:48	148.76	180.04
15:48	1488	1800
15:49	146.90	180.17
15:49	1469	1802
15:50	142.44	178.41
15:50	1424	1784
15:51	146.10	179.90
15:51	1461	1799
15:52	146.18	179.85
15:52	1462	1799
15:53	143.32	177.86
15:53	1433	1779
15:54	145.95	178.38
15:54	1459	1784

← Begin 2nd traverse

15:55	1459	1784
15:56	142.83	176.49
15:56	1428	1765
15:57	147.65	177.87
15:57	1477	1779
15:58	147.33	178.78
15:58	1473	1788
15:59	141.85	177.09
15:59	1418	1771
16:00	145.61	178.25
16:00	1456	1783
16:01	149.71	180.34
16:01	1497	1803
16:02	144.60	178.93
16:02	1446	1789
16:03	143.73	178.58
16:03	1437	1786
16:04	147.86	180.03
16:04	1479	1800
16:05	144.49	179.00
16:05	1445	1790
16:06	142.35	177.84
16:06	1423	1778
16:07	141.33	177.71
16:07	1413	1777
16:08	141.63	177.21
16:08	1416	1772
16:09	139.78	176.37
16:09	1398	1764
16:10	138.13	175.77
16:10	1381	1758
16:11	137.96	175.69
16:11	1380	1757
16:12	139.19	176.81
16:12	1392	1768
16:13	143.26	178.07
16:13	1433	1781
16:14	144.50	178.55
16:14	1445	1785
16:15	144.41	178.47
16:15	1444	1785
16:16	143.20	178.25
16:16	1432	1783
16:17	145.12	179.02
16:17	1451	1790
16:18	146.87	179.67
16:18	1469	1797
16:19	144.64	179.04
16:19	1446	1790
16:20	142.67	178.21
16:20	1427	1782
16:21	142.53	178.20
16:21	1425	1782

16:22	142.14	178.15
16:23	1421	1782
16:24	141.21	178.05
16:24	1412	1781
16:25	141.28	178.02
16:25	1413	1780
16:26	143.09	178.70
16:26	1431	1787
16:27	146.83	179.68
16:27	1468	1797
16:28	147.72	180.59
16:28	1477	1806
16:29	144.40	179.54
16:29	1444	1795
16:30	147.38	181.44
16:30	1474	1814
16:31	148.84	182.40
16:31	1488	1824
16:32	145.24	180.23
16:32	1452	1802
16:33	148.01	181.09
16:33	1480	1811
16:34	144.59	179.50
16:34	1446	1795
16:35	143.89	178.76
16:35	1439	1788
16:36	149.47	180.59
16:36	1495	1806
16:37	143.58	179.20
16:37	1436	1792
16:38	145.40	179.51
16:38	1454	1795
16:39	150.35	181.75
16:39	1503	1817
16:40	143.14	179.20
16:40	1431	1792
16:41	145.38	179.53
16:41	1454	1795
16:42	149.50	181.34
16:42	1495	1813
16:43	144.86	179.49
16:43	1449	1795
16:44	144.91	179.38
16:44	1449	1794
16:45	149.10	182.40
16:45	1491	1824
16:46	147.17	181.87
16:46	1472	1819
16:47	143.05	179.29
16:47	1431	1793
16:48	148.82	181.58
16:48	1488	1816
16:49	148.69	181.40

16:50	144.08	178.56
16:50	1441	1786
16:51	147.76	179.97
16:51	1478	1800
16:52	147.69	179.25
16:52	1477	1792
16:53	144.80	176.59
16:53	1448	1766
16:54	146.20	177.11
16:54	1462	1771
16:55	147.58	176.73
16:55	1476	1767
16:56	144.69	174.81
16:56	1447	1748
16:57	147.53	176.11
16:57	1475	1761
16:58	145.18	175.50
16:58	1452	1755
16:59	142.50	174.74
16:59	1425	1747
17:00	146.80	176.67
17:00	1468	1767
17:01	146.41	177.47
17:01	1464	1775
17:02	142.39	176.02
17:02	1424	1760
17:03	146.21	177.57
17:03	1462	1776
17:04	147.77	179.39
17:04	1478	1794
17:05	142.00	177.45
17:05	1420	1774
17:06	144.21	177.90
17:06	1442	1779
17:07	146.43	179.01
17:07	1464	1790
17:08	144.75	177.86
17:08	1448	1779
17:09	141.38	176.58
17:09	1414	1766
17:10	141.31	176.56
17:10	1413	1766
17:11	141.88	176.59
17:11	1419	1766
17:12	143.20	176.94
17:12	1432	1769
17:13	143.57	177.41
17:13	1436	1774
17:14	144.92	177.98
17:14	1449	1780
17:15	144.70	178.35
17:15	1447	1784
17:16	144.51	178.54

17:17	145.55	178.38
17:17	1455	1784
17:18	142.03	178.03
17:18	1420	1780
17:19	143.50	178.46
17:19	1435	1785
17:20	145.17	179.55
17:20	1452	1795
17:21	147.25	180.16
17:21	1472	1802
17:22	142.14	179.22
17:22	1421	1792
17:23	144.29	179.76
17:23	1443	1798
17:24	147.99	180.84
17:24	1480	1808
17:25	143.84	179.73
17:25	1438	1797
17:26	145.59	180.04
17:26	1456	1800
17:27	148.21	181.16
17:27	1482	1812
17:28	143.85	179.50
17:28	1439	1795
17:29	146.46	179.66
17:29	1465	1797
17:30	147.10	180.03
17:30	1471	1800
17:31	143.90	178.52
17:31	1439	1785
17:32	145.21	178.80
17:32	1452	1788
17:33	147.21	179.50
17:33	1472	1795
17:34	146.60	178.73
17:34	1466	1787
17:35	145.71	177.55
17:35	1457	1775
17:36	146.58	177.44
17:36	1466	1774
17:37	146.47	177.48
17:37	1465	1775
17:38	143.03	176.72
17:38	1430	1767
17:39	147.03	178.22
17:39	1470	1782
17:40	147.96	179.29
17:40	1480	1793
17:41	143.13	178.03
17:41	1431	1780
17:42	146.27	179.20
17:42	1463	1792
17:43	147.40	180.30
17:43	1474	1807

17:45	148.45	180.50
17:45	1485	1805
17:46	147.68	180.73
17:46	1477	1807
17:47	145.60	179.27
17:47	1456	1793
17:48	147.32	179.85
17:48	1473	1798
17:49	144.78	178.88
17:49	1448	1789
17:50	141.46	176.72
17:50	1415	1767
17:51	139.73	175.71
17:51	1397	1757
17:52	140.08	175.40
17:52	1401	1754
17:53	138.15	175.15
17:53	1382	1751
17:54	137.00	174.72
17:54	1370	1747
17:55	135.47	174.90
17:55	1355	1749
17:56	136.09	175.52
17:56	1361	1755
17:57	138.64	176.50
17:57	1386	1765
17:58	142.26	178.17
17:58	1423	1782
17:59	146.17	179.55
17:59	1462	1796
18:00	147.54	180.19
18:00	1475	1802
18:01	144.72	179.24
18:01	1447	1792
18:02	147.41	180.73
18:02	1474	1807
18:03	146.69	181.67
18:03	1467	1817
18:04	143.39	180.29
18:04	1434	1803
18:05	148.59	181.63
18:05	1486	1816
18:06	145.07	180.07
18:06	1451	1801
18:07	142.21	179.09
18:07	1422	1791
18:08	145.61	179.52
18:08	1456	1795
18:09	145.20	179.46
18:09	1452	1795
18:10	145.66	178.84
18:10	1457	1788

Complete Run 4

INCINERATOR DAILY CHARGING REPORT

DATE: 11-21-91

OPERATOR'S NAME: R Muñoz

1

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	09:05	86	B						
2	9:09	46	B						
3	9:16	68.5	B						
4	9:20	70.5	B						
5	9:24	69.5	B						
6	9:28	67	B						
7	9:32	57	B						
8	9:35	67.5	B						
9	9:38	58.5	RB						
10	9:41	55.5	RB						
11	9:45	74.5	RB						
12	9:48	98	B						
13	10:15	77.5	RB						
14	10.18	35.5	B						
15	10:21	62.5	RB						
16	10:24	71.5	RB						
17	10.27	52.	B						
18	10:31	65	B						
19	10:35	95 *	B						
20		70	B						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-21-91

OPERATOR'S NAME: R. MUNOZ

(2)

Bed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	10.43	85	B						
2	10.46	84.5	B						
3	10.49	66.	B						
4	11:13	59.5	B						
5	11:17	69.	B						
6	11:20	81	RB						
7	11:24	78.5	RB						
8	11:29	73:	B						
9	11:36	66.5	RB						
10	11.39	75.5	RB						
11	11:44	70	RB						
12	11 47	83.5	RB						
13	12.11 ~~11.50~~	81.5	B						
14	12:19	65.5	B						
15	12.19	60.	R						
16	12:24	52.5	B						
17	12:26	77.5	B						
18	12:31	76	B						
19	12:36	71	RB						
20	12.40	68-5	B						

waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

AILYRPT

INCINERATOR DAILY CHARGING REPORT

(3)

DATE: 11/21/91

OPERATOR'S NAME: R Muñoz

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	12.45	68.5	not in datalogger printout	1245 start 1st trouble					
2	12.48	73.0	RB						
3	12.53	69.0	RB						
4	~~12.57~~	67.0	RB						
5	1:00	~~90~~	~~B~~	1310 stop 1st trouble					
6	1:22	87.5	B						
7	1:25	59.0	RB						
8	1:27	62	RB						
9	1:31	80.0	RB						
10	1:34	72	RB						
11	1:37	84	RB						
12	1:40	65	RB						
13	1:49	79	RB	1345 resume 1st trouble					
14	1:53	83.5	RB						
15	1:59	74.	RB						
16	2.04	16.	RB						
17	2.16	80.5	RB						
18	2:25	71.5	B						
19	2.28	69.0	B						
20	2.32	73.5	RB	not in datalogger printout					

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

(4)

*INCINERATOR DAILY CHARGING REPORT

DATE: 11/21/91

OPERATOR'S NAME:

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	2:35	76.5	RB						
2	2:38	76	B						
3	2:50	79	RB						
4	3:00	51	B						
5	3:03	59	B						
6	3:06	42.5	B						
7	3:10	77	B						
8	3:17	65	B	1519 ↑ end 1st traverse					
9	3:26	66	B						
10	3:29	70.5	B RB						
	3:33	59	RB, B						
12	3:37	69.0	B						
13	3:41	76.5	B						
14	3:51	70.5	RB	1550 start 2nd traverse					
15	3:58	69.0	RB						
16	4:09	64.0	B						
17	4:13	70.0	B						
18	4:17	75.5	B						
	4:21	61.0	B						
20	4:27	52.0	RB	not in the data logger printout					

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

...LYRPT

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INCINERATOR DAILY CHARGING REPORT

DATE: 11-21-91

OPERATOR'S NAME: M. Vizoso

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	4.30	74.√	RB						
2	4.33	72.0	RB	not in the datalogger printout					
3	4.37	73.0	R.B						
4	4.41	72.√	RB						
5	4.52	75.0	R.B						
6	4.√9	73.√	R.B						
7	√.10	72.√	B						
8	√.15	73.√	R.B						
9	√.18	63.√	R.B						
10	√.21	61.√	R.B						
11	√.29	70.√	R.B						
12	√.34	66.√	R.B						
13	√.38	76.√	B						
14	√.42	74.√	B	1750 ↑ end 2nd traverse					
15	√.52	71.0	B						
16	6.00	67.√	B						
17	6.	74.0	B						
18	6.15	62-5	RB						
19	6-19	75	B						
20									

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

11-21-91 RUN 4

Full Page Data: State:RUNNING Mode:MONITOR AR:[41341]

41301 = 0000 Decimal 12:30	41321 = 0081 Decimal	41341 = 0000 Decimal
41302 = 0077 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0078 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0084 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0053 Decimal	41328 = 0000 Decimal	41348 = 0071 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0069 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0078 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0067 Decimal
41318 = 0066 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	~~41341 = 0000 Decimal~~

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[41341]

41301 = 0000 Decimal 13:31	41321 = 0000 Decimal 1311	Oper. Log 1259 ✓41341 = 0069 Decimal Datalogger 1251
41302 = 0080 Decimal 1330	41322 = 0000 Decimal 1310	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal stop 1st transfer	41344 = 0000 Decimal
41305 = 0000 Decimal	41325 = 0000 Decimal	1248 ✓41345 = 0074 Decimal 1247 stop 1st trans
41306 = 0063 Decimal 1316	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal 1245 ? 685	41347 = 0000 Decimal 1245
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
5 41309 = 0060 Decimal 1323	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal
41311 = 0003 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	1240 ✓41353 = 0069 Decimal 1239
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	1300 ✓41335 = 0067 Decimal 1237	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	1230 ✓41357 = 0071 Decimal 1235
2 41318 = 0088 Decimal 1314	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal 1252	~~41341 = 0069 Decimal~~

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR

41301 = 0000 Decimal 14:30
41302 = 0000 Decimal
41303 = 0000 Decimal
41304 = 0070 Decimal 1427
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0072 Decimal 1424
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0081 Decimal 1415
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal 1411

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
1404 41328 = 0017 Decimal 1403
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
1359 41333 = 0074 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
1353 41339 = 0084 Decimal 1352
41340 = 0000 Decimal 1351

41341 = 0000 Decimal
41342 = 0000 Decimal
1343 41343 = 0080 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
1340 41351 = 0065 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
1337 41355 = 0084 Decimal 1336
41356 = 0000 Decimal
41357 = 0000 Decimal
1334 41358 = 0073 Decimal 1333
41359 = 0000 Decimal
~~41341 = 0000 Decimal~~ 1331

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR . AR:[ ]

41301 = 0000 Decimal 15:30
41302 = 0000 Decimal
41303 = 0071 Decimal 1528
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0067 Decimal 1525
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal 1519
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0065 Decimal 1516
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal 1511

41321 = 0000 Decimal
41322 = 0000 Decimal
1510 41323 = 0078 Decimal 1508
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
1506 41327 = 0043 Decimal 1504
41328 = 0000 Decimal
1503 41329 = 0059 Decimal 1502
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
1500 41333 = 0052 Decimal 1458
41334 = 0000 Decimal
41335 = 0002 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0001 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal 1451

41341 = 0000 Decimal
1450 41342 = 0080 Decimal 1449
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
1432 41354 = 0077 Decimal 1429
41355 = 0000 Decimal
41356 = 0000 Decimal
1435 41357 = 0077 Decimal 1434
41358 = 0000 Decimal
? 41359 = 0000 Decimal
~~41341 = 0000 Decimal~~ 1431
1432 73.5

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

11-21-91 -1604

Full Page Data: State:RUNNING Mode:MONITOR AR:[ ]

41301 = 0000 Decimal 1630
41302 = 0000 Decimal
41303 = 0075 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0063 Decimal
41312 = 0000 Decimal
41313 = 0000 Decimal
41314 = 0000 Decimal
41315 = 0076 Decimal
41316 = 0000 Decimal
41317 = 0000 Decimal
41318 = 0071 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0000 Decimal
41323 = 0064 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0069 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0071 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0077 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0069 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0059 Decimal
~~41341 = 0071 Decimal~~

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[ ]

41301 = 0000 Decimal 17:30
41302 = 0071 Decimal
41303 = 0000 Decimal
41304 = 0000 Decimal
41305 = 0000 Decimal
41306 = 0000 Decimal
41307 = 0000 Decimal
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0062 Decimal
41313 = 0000 Decimal
41314 = 0064 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0074 Decimal
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal

41321 = 0000 Decimal
41322 = 0070 Decimal
41323 = 0000 Decimal
41324 = 0000 Decimal
41325 = 0000 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0074 Decimal
41334 = 0000 Decimal
41335 = 0000 Decimal
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0075 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0000 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0073 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0074 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
~~41341 = 0000 Decimal~~

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

41301 = 0000 Decimal 1753
41302 = 0072 Decimal 1752
41303 = 0000 Decimal
41304 = 0000 Decimal 1750
41305 = 0000 Decimal
41306 = 0000 Decimal end
41307 = 0000 Decimal 2nd traverse
41308 = 0000 Decimal
41309 = 0000 Decimal
41310 = 0000 Decimal
41311 = 0000 Decimal
41312 = 0000 Decimal
41313 = 0075 Decimal 1741
41314 = 0000 Decimal
41315 = 0000 Decimal
41316 = 0000 Decimal
41317 = 0077 Decimal 1737
41318 = 0000 Decimal
41319 = 0000 Decimal
41320 = 0000 Decimal 1734
41321 = 0000 Decimal 1733
1734 41322 = 0067 Decimal 1732
41323 = 0000 Decimal 1731
41324 = 0000 Decimal
41325 = 0071 Decimal
41326 = 0000 Decimal
41327 = 0000 Decimal
41328 = 0000 Decimal
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0062 Decimal
41336 = 0000 Decimal
41337 = 0064 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0074 Decimal 1714
41341 = 0000 Decimal
41342 = 0000 Decimal
41343 = 0000 Decimal
41344 = 0000 Decimal
41345 = 0073 Decimal
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
41351 = 0000 Decimal
41352 = 0000 Decimal
41353 = 0000 Decimal
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0074 Decimal
41357 = 0000 Decimal
41358 = 0000 Decimal
41359 = 0000 Decimal
~~41341 = 0000 Decimal~~ 1654

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

PRETEST CHECKLIST

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-22-91
Run No.: Five

Kiln clear ?	yes @ 10:15 am
Charging begun at?	10:28
Lime slurry mixed ?	Using Same Mix as Run 4; Tank #1
Baghouse hopper checked?	yes; discharge occuring after probe
Ash hopper clear?	
Data logger operating?	yes
Time synchronized?	Neulicht with Control room

PRECHK

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-22-91
Run No.: Five

Time	1040				
Primary chamber temp., F	1425				
Secondary chamber temp., F	1800				
Primary chamber draft, in. w.c.	-.20				
Primary chamber min O2, %	8				
Primary Chamber idle temp, F	1000				
Secondary chamber idle temp., F	1200				
Atomizer Speed	85				
Water quench on, F	1495				
Water quench off, F	1485				
Maximum charge rate, lb/hr	780				
Baghouse cleaning on, in. w.c.	4"/10sec				
Pulse Delay	15sec				
Baghouse cleaning off, in. w.c.	3"/5sec				
Lime slurry conc.	9%				
Target SR	2				
Spray Dryer temp, °F	280				

SETPOINT

DATA LOG

Facility: Morristown memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-22-91
Run No.: Five
Test condition: Carbon Added

Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed RPM	Kiln O2 %	Prim. air damper %	Sec. air damper %	Natural gas reading cf X10
1045	1402	1807	-.12	—	6.8	80	90	—
1115	1461	1793	-.26	1.0	10.2	0	53	@1112 562732
Begin Run 1200	1445	1793	-.26	—	12.4	0	75	@1206 562930
1230	1475	1791	-.22	—	13.9	0	75	—
1300	1455	1805	-.20	—	10.6	0	80	—
1330	1414	1765	-.28	—	14.4	2	58	
1400	1453	1785	-.20	—	12.5	0	75	@1405 563425
1415	1425	1796	-.06	—	14.0	76	82	
1500	1508	1803	-.14	—	9.8	0	62	@1513 563756
Stop 15:10 START TRAVERSE #2 1530	1405	1791	-.20	—	14.0	82	85	
1650	1464	1758	-.24	—	11.4	0	56	@1654 564291
1730	1472	1816	-.16	@1734 0.95	9.6	25	82	
1800	[illegible]	1814	-.20	—	10.4	0	63	@1805 564560
1830	1475	1804	-.18	—	11.1	0	79	
1845	1474	1801	-.20	—	10.9	0	68	@1848 564733

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neulicht
Date: 11-22-91
Run No.: Five
Test condition: Carbon Added

Time	Quench flow, ~~gal/h~~ GPM	SD outlet temp. F	SD atomiz Rotation ~~RPM~~ %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
1045		285	80	48	30	1.3	12.8	4.2	
1115		274	80	48	29	1.6	12.8	3.3	
Begin Run 1200		283	80	46	29	1.1	12.8	3.2	
1230	0	275	80	44	29	1.3	12.9	3.8	
1300		291	80	43	29	1.6	12.8	3.9	
1330	0	276	80	~~40~~ 41	29	1.6	12.9	3.4	
1400	0	284	80	40	30	1.3	12.9	3.3	
1415	—	286	80	39	34	1.8	12.8	3.1	
1500	—	282	80	36	63	1.3	12.8	3.2	
START Traverse #2 1530	0	283	80	36	63	1.4	12.9	3.0	
START 1650	3.5	276	80	34	61	1.2	12.8	4.1	
1730	4.6	298	80	32	59	1.8	12.8	3.9	
1800	0	280	80	30	58	1.4	12.9	3.0	
1830	4.8	283	80	29	59	1.0	12.8	3.6	
1845	—	281	80	28	59	1.5	12.9	3.5	

DATA LOG NOTES

Facility:	Morristown Memorial	**Person:**	Neulicht
Location:	Morristown, N.J.	**Date:**	11-22-91
		Run No.:	Five
			Carbon Added

Arrive facility @ 0700; unit up to temperature
No change in slurry #1 tank level
10:15 Repair on Hydraulic line fixed
10:28 Begin Charging; using slurry Tank #2
11:30 Turn off Agitator & measure slurry Tank #1;
Switch to Tank #1 with Carbon
12:00 Begin Run 5; BH & SD Residue - New Boxes
12:05 Shut down Sampling Train - Broken impinger
12:15 Restart Test
@ 1410 Loader Malfunctioning
@ 14:15 Complete first Traverse.
Due to Loader Malfunction, hand loading
waste Bags into Skip without Cart
@ 1505 Begin Second Traverse
@ 1510 Shut down - Ram problem
@ 1513 Shut off hydraulic system, which shut off kiln
@ 1515 switched to slurry tank # 2
@ 1525 Shut off agitator on tank #1 to measure level

DNOTES
@ 1550 ram and kiln operational again. First "cart" fed, too.

@ 1635 switched back to slurry tank # 1.

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, NJ.

Person: NJR
Date: 11-22-91
Run No.: Five

@ 16:50 Restart Second traverse

@ 17:00 Scale area washed down. Water adds 1 to 2 pounds for next few loads.

Since discarding the cart in favor of manually loading the skip loader, one big on a load sometimes doesn't dump. It is left on the loader to be dumped with the next load.

@ 1845 Complete Rinse

Switched back to slurry tank #2

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON: Neulicht
DATE: 11-22-91
RUN NO.: Five

SYSTEM CHECK:

SLURRY TANK NUMBER: ONE

ADDITIONS ~ using Tank mix from 11-21-91

Time	Water	Lime	LEVEL
1130	—	—	48" *
1428	—	—	39" *
1525	—	—	36" *
1850	—	—	29 *

COMMENTS: * Agitator off

Filename:Run5
Name:Run 5
Date:11-22-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

0	1
PCCT	SCCT

Filename:Run5a
Name:Run 5
Date:11-22-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

0	1
PCCT	SCCT

Filename:Run5b
Name:Run 5
Date:11-22-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

0	1
PCCT	SCCT

Filename:Run5c
Name:Run 5
Date:11-22-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

0	1
PCCT	SCCT

07:14	142.23	179.08
07:14	1422	1791
07:15	141.08	179.17
07:15	1411	1792
07:16	139.83	179.16
07:16	1398	1792
07:17	140.19	179.13
07:17	1402	1791
07:18	138.69	179.10
07:18	1387	1791
07:19	141.06	178.95
07:19	1411	1789
07:20	140.87	178.78
07:20	1409	1788
07:21	140.62	178.69
07:21	1406	1787
07:22	140.87	178.69
07:22	1409	1787
07:23	140.25	178.79
07:23	1403	1788
07:24	140.56	178.87
[illegible]	[illegible]	[illegible]

11:56	1433	1795
11:59	145.23	179.52
11:59	1452	1795
12:00	146.04	180.34
12:00	1460	1803
12:01	143.26	179.14
12:01	1433	1791
12:02	142.60	178.23
12:02	1426	1782
12:03	142.97	177.96
12:03	1430	1780
12:04	144.02	178.23
12:04	1440	1782
12:05	145.80	179.11
12:05	1458	1791
12:06	145.70	178.76
12:06	1457	1788
12:07	144.64	178.52
12:07	1446	1785
12:08	148.20	180.10
12:08	1482	1801
12:09	144.13	179.02
12:09	1441	1790
12:10	146.68	179.66
12:10	1467	1797
12:11	144.54	179.08
12:11	1445	1791
12:12	141.97	178.11
12:12	1420	1781
12:13	146.24	179.52
12:13	1462	1795
12:14	145.85	179.78
12:14	1458	1798
12:15	144.09	179.05
12:15	1441	1791
12:16	145.95	179.79
12:16	1460	1798
12:17	145.17	179.49
12:17	1452	1795
12:18	144.57	178.91
12:18	1446	1789
12:19	148.18	181.47
12:19	1482	1815
12:20	144.39	179.48
12:20	1444	1795
12:21	143.20	178.43
12:21	1432	1784
12:22	144.97	178.58
12:22	1450	1786
12:23	147.35	178.67
12:23	1474	1787
12:24	141.74	177.36
12:24	1417	1774

shut down to replace broken impinger

Begin 1st traverse

12:26	146.14	178.39
12:26	1461	1784
12:27	143.16	177.25
12:27	1432	1773
12:28	144.10	178.05
12:28	1441	1781
12:29	146.25	178.64
12:29	1463	1786
12:30	146.03	178.45
12:30	1460	1784
12:31	145.57	177.99
12:31	1456	1780
12:32	142.96	177.37
12:32	1430	1774
12:33	138.93	176.79
12:33	1389	1768
12:34	138.88	176.66
12:34	1389	1767
12:35	139.89	177.31
12:35	1399	1773
12:36	140.41	178.07
12:36	1404	1781
12:37	142.66	178.88
12:37	1427	1789
12:38	144.75	179.36
12:38	1448	1794
12:39	145.70	179.87
12:39	1457	1799
12:40	147.07	180.87
12:40	1471	1809
12:41	146.02	181.39
12:41	1460	1814
12:42	144.62	180.27
12:42	1446	1803
12:43	146.37	181.35
12:43	1464	1813
12:44	144.77	180.35
12:44	1448	1803
12:45	144.17	179.87
12:45	1442	1799
12:46	148.01	181.07
12:46	1480	1811
12:47	144.08	179.28
12:47	1441	1793
12:48	146.95	180.10
12:48	1470	1801
12:49	147.47	180.48
12:49	1475	1805
12:50	143.43	178.79
12:50	1434	1788
12:51	146.77	179.00
12:51	1468	1790
12:52	144.36	178.60

[illegible]	[illegible]	[illegible]
12:53	1441	1774
12:54	140.04	175.88
12:54	1400	1759
12:55	136.91	174.68
12:55	1369	1747
12:56	135.24	174.71
12:56	1352	1747
12:57	135.31	175.85
12:57	1353	1758
12:58	140.00	177.59
12:58	1400	1776
12:59	145.12	179.28
12:59	1451	1793
13:00	145.69	180.42
13:00	1457	1804
13:01	145.15	179.92
13:01	1452	1799
13:02	146.05	179.95
13:02	1461	1799
13:03	143.80	179.82
13:03	1438	1798
13:04	143.69	179.35
13:04	1437	1793
13:05	145.59	179.68
13:05	1456	1797
13:06	145.18	179.81
13:06	1452	1798
13:07	146.94	179.76
13:07	1469	1798
13:08	144.85	179.50
13:08	1448	1795
13:09	143.54	178.56
13:09	1435	1786
13:10	146.18	179.45
13:10	1462	1794
13:11	146.70	180.03
13:11	1467	1800
13:12	144.16	178.91
13:12	1442	1789
13:13	148.23	180.21
13:13	1482	1802
13:14	143.68	179.18
13:14	1437	1792
13:15	146.30	179.69
13:15	1463	1797
13:16	148.96	181.46
13:16	1490	1815
13:17	143.78	179.53
13:17	1438	1795
13:18	143.99	179.18
13:18	1440	1792
13:19	149.13	181.05
13:19	1491	1811

13:20	1434	1799
13:21	145.29	178.87
13:21	1453	1789
13:22	147.47	179.85
13:22	1475	1799
13:23	145.93	179.27
13:23	1459	1793
13:24	146.81	180.05
13:24	1468	1800
13:25	151.48	183.34
13:25	1515	1833
13:26	146.83	181.06
13:26	1468	1811
13:27	144.88	180.25
13:27	1449	1803
13:28	147.75	182.52
13:28	1477	1825
13:29	145.70	180.12
13:29	1457	1801
13:30	141.88	176.75
13:30	1419	1768
13:31	138.12	174.33
13:31	1381	1743
13:32	135.73	172.75
13:32	1357	1728
13:33	132.52	172.16
13:33	1325	1722
13:34	132.99	172.58
13:34	1330	1726
13:35	135.85	173.91
13:35	1358	1739
13:36	137.52	175.53
13:36	1375	1755
13:37	139.74	176.77
13:37	1397	1768
13:38	140.51	177.79
13:38	1405	1778
13:39	145.24	179.24
13:39	1452	1792
13:40	147.09	180.40
13:40	1471	1804
13:41	145.93	179.86
13:41	1459	1799
13:42	143.26	178.52
13:42	1433	1785
13:43	145.50	178.80
13:43	1455	1788
13:44	147.78	180.30
13:44	1478	1803
13:45	143.79	179.59
13:45	1438	1796
13:46	142.42	179.10
13:46	1424	1791

[illegible]	[illegible]	[illegible]
13:46	147.07	181.63
13:48	1471	1816
13:49	145.25	180.55
13:49	1453	1806
13:50	143.86	179.45
13:50	1439	1794
13:51	147.41	180.49
13:51	1474	1805
13:52	146.15	180.97
13:52	1461	1810
13:53	142.04	179.05
13:53	1420	1791
13:54	144.35	178.93
13:54	1443	1789
13:55	144.54	179.08
13:55	1445	1791
13:56	145.38	178.64
13:56	1454	1786
13:57	146.41	178.37
13:57	1464	1784
13:58	146.74	178.41
13:58	1467	1784
13:59	145.08	178.00
13:59	1451	1780
14:00	142.48	177.10
14:00	1425	1771
14:01	143.69	177.54
14:01	1437	1775
14:02	143.27	177.67
14:02	1433	1777
14:03	141.45	177.60
14:03	1415	1776
14:04	139.76	177.25
14:04	1398	1773
14:05	137.75	176.70
14:05	1377	1767
14:06	133.29	176.25
14:06	1333	1762
14:07	133.44	175.99
14:07	1334	1760
14:08	133.42	176.58
14:08	1334	1766
14:09	134.90	177.82
14:09	1349	1778
14:10	137.67	179.00
14:10	1377	1790
14:11	139.76	179.89
14:11	1398	1799
14:12	142.96	180.38
14:12	1430	1804
14:13	144.21	180.40
14:13	1442	1804
14:14	142.64	179.89

14:15	142.96	179.14
14:15	1430	1791
14:16	141.03	178.59
14:16	1410	1786
14:17	139.68	178.78
14:17	1397	1788
14:18	138.67	178.06
14:18	1387	1781
14:19	138.64	177.23
14:19	1386	1772
14:20	138.01	177.05
14:20	1380	1771
14:21	139.75	177.66
14:21	1398	1777
14:22	142.98	179.27
14:22	1430	1793
14:23	148.04	180.85
14:23	1480	1808
14:24	149.38	180.90
14:24	1494	1809
14:25	145.80	179.47
14:25	1458	1795
14:26	145.21	179.20
14:26	1452	1792
14:27	147.24	180.58
14:27	1472	1806
14:28	148.16	179.89
14:28	1482	1799
14:29	144.39	178.91
14:29	1444	1789
14:30	145.81	179.86
14:30	1458	1799
14:31	147.61	181.02
14:31	1476	1810
14:32	144.50	180.57
14:32	1445	1806
14:33	150.27	182.58
14:33	1503	1826
14:34	148.14	181.27
14:34	1481	1813
14:35	144.43	178.51
14:35	1444	1785
14:36	148.77	179.70
14:36	1488	1797
14:37	148.14	180.17
14:37	1481	1802
14:38	148.16	178.76
14:38	1482	1788
14:39	145.78	178.21
14:39	1458	1782
14:40	147.27	180.23
14:40	1473	1802
14:41	144.15	179.07
14:41	1441	1791

14:41	147.66	18[illegible].65
14:42	1479	1809
14:43	146.83	180.50
14:43	1468	1805
14:44	143.71	179.55
14:44	1437	1795
14:45	148.43	180.57
14:45	1484	1806
14:46	144.48	178.50
14:46	1445	1785
14:47	147.28	179.64
14:47	1473	1796
14:48	146.52	180.47
14:48	1465	1805
14:49	143.50	179.08
14:49	1435	1791
14:50	148.23	181.32
14:50	1482	1813
14:51	144.84	180.08
14:51	1448	1801
14:52	146.21	179.73
14:52	1462	1797
14:53	148.03	179.92
14:53	1480	1799
14:54	143.29	177.38
14:54	1433	1774
14:55	146.84	178.32
14:55	1468	1783
14:56	144.39	177.90
14:56	1444	1779
14:57	143.13	176.42
14:57	1431	1764
14:58	147.72	179.06
14:58	1477	1791
14:59	144.81	177.99
14:59	1448	1780
15:00	144.35	177.36
15:00	1443	1774
15:01	147.49	178.81
15:01	1475	1788
15:02	143.43	177.16
15:02	1434	1772
15:03	144.04	177.45
15:03	1440	1774
15:04	147.96	179.34
15:04	1480	1793
15:05	142.86	178.47 ← Begin 2nd inverse
15:05	1429	1785
15:06	146.93	180.12
15:06	1469	1801
15:07	146.72	180.45
15:07	1467	1805
15:08	144.18	179.50
15:08	1442	1795

15:10	144.01	180.04
15:10	1440	1800
15:11	143.05	178.41
15:11	1431	1784
15:12	144.66	178.90
15:12	1447	1789
15:13	147.17	179.26
15:13	1472	1793
15:14	142.84	176.42
15:14	1428	1764
15:15	138.62	173.96
15:15	1386	1740
15:16	137.45	172.89
15:16	1375	1729
15:17	135.48	172.89
15:17	1355	1729
15:18	135.63	173.01
15:18	1356	1730
15:19	136.21	173.74
15:19	1362	1737
15:20	135.80	175.02
15:20	1358	1750
15:21	137.28	176.50
15:21	1373	1765
15:22	138.72	177.80
15:22	1387	1778
15:23	141.61	178.65
15:23	1416	1787
15:24	140.42	179.22
15:24	1404	1792
15:25	142.04	179.54
15:25	1420	1795
15:26	143.74	179.64
15:26	1437	1796
15:27	141.82	179.38
15:27	1418	1794
15:28	141.42	178.89
15:28	1414	1789
15:29	140.85	178.44
15:29	1409	1784
15:30	139.11	177.89
15:30	1391	1779
15:31	138.59	177.59
15:31	1386	1776
15:32	139.07	177.60
15:32	1391	1776
15:33	139.25	177.76
15:33	1392	1778
15:34	139.95	178.22
15:34	1400	1782
15:35	140.66	178.55
15:35	1407	1786
15:36	141.15	178.67

Shut down due to some problem

[illegible]	1428	1774
16:31	148.46	180.70
16:32	1485	1807
16:33	150.64	181.99
16:33	1506	1820
16:34	146.22	180.03
16:34	1462	1800
16:35	144.54	178.83
16:35	1445	1788
16:36	151.65	182.03
16:36	1516	1820
16:37	149.01	181.35
16:37	1490	1814
16:38	143.63	178.36
16:38	1436	1784
16:39	144.46	178.82
16:39	1445	1788
16:40	147.87	180.64
16:40	1479	1806
16:41	145.00	178.63
16:41	1450	1786
16:42	144.23	178.06
16:42	1442	1781
16:43	147.67	179.98
16:43	1477	1800
16:44	145.59	179.84
16:44	1456	1798
16:45	143.84	176.80
16:45	1438	1768
16:46	142.80	175.81
16:46	1428	1758
16:47	145.41	176.72
16:47	1454	1767
16:48	146.56	176.71
16:48	1466	1767
16:49	142.29	173.90
16:49	1423	1739
16:50	141.85	173.77
16:50	1419	1738
16:51	145.93	175.87
16:51	1459	1759
16:52	145.45	176.13
16:52	1454	1761
16:53	140.33	174.33
16:53	1403	1743
16:54	141.39	174.43
16:54	1414	1744
16:55	143.23	174.88
16:55	1432	1749
16:56	143.56	175.23
16:56	1436	1752
16:57	142.82	175.47
16:57	1428	1755

16:59	146.[illegible]	177.70
16:59	1462	1777
17:00	146.49	177.68
17:00	1465	1777
17:01	142.58	177.13
17:01	1426	1771
17:02	142.29	177.21
17:02	1423	1772
17:03	141.96	177.60
17:03	1420	1776
17:04	143.27	177.74
17:04	1433	1777
17:05	141.81	177.84
17:05	1418	1778
17:06	140.44	177.94
17:06	1404	1779
17:07	141.14	178.40
17:07	1411	1784
17:08	142.55	179.45
17:08	1426	1794
17:09	147.44	181.05
17:09	1474	1810
17:10	146.61	181.30
.7:10	1466	1813
17:11	142.94	180.12
17:11	1429	1801
17:12	146.68	181.28
17:12	1467	1813
17:13	147.79	181.42
17:13	1478	1814
17:14	144.74	180.14
17:14	1447	1801
17:15	147.48	181.85
17:15	1475	1818
17:16	144.46	180.03
17:16	1445	1800
17:17	142.18	178.20
17:17	1422	1782
17:18	142.64	177.73
17:18	1426	1777
17:19	144.98	178.09
17:19	1450	1781
17:20	146.49	178.47
17:20	1465	1785
17:21	142.42	176.94
17:21	1424	1769
17:22	143.77	176.86
17:22	1438	1769
17:23	144.83	176.95
17:23	1448	1769
17:24	143.10	176.44
17:24	1431	1764
17:25	141.86	175.95
17:25	1419	1759

17:26	136.27	175.44
17:26	1383	1755
17:27	134.47	175.20
17:27	1345	1752
17:28	135.17	175.71
17:28	1352	1757
17:29	137.21	177.19
17:29	1372	1772
17:30	142.62	179.01
17:30	1426	1790
17:31	146.62	180.72
17:31	1466	1807
17:32	145.86	180.76
17:32	1459	1808
17:33	141.63	179.52
17:33	1416	1795
17:34	145.25	180.68
17:34	1453	1807
17:35	145.66	181.50
17:35	1457	1815
17:36	144.56	180.12
17:36	1446	1801
17:37	144.53	180.66
17:37	1445	1807
17:38	148.01	181.47
17:38	1480	1815
17:39	142.89	179.31
17:39	1429	1793
17:40	140.68	177.80
17:40	1407	1778
17:41	141.49	177.31
17:41	1415	1773
17:42	140.05	176.89
17:42	1401	1769
17:43	140.38	176.71
17:43	1404	1767
17:44	143.45	177.75
17:44	1435	1777
17:45	147.67	179.61
17:45	1477	1796
17:46	145.26	179.18
17:46	1453	1792
17:47	145.16	179.27
17:47	1452	1793
17:48	149.64	180.99
17:48	1496	1810
17:49	143.48	179.23
17:49	1435	1792
17:50	143.79	179.30
17:50	1438	1793
17:51	149.21	181.04
17:51	1492	1810
17:52	143.84	179.54
17:52	1438	1795

17:53	1472	1805
17:54	146.76	181.05
17:54	1468	1811
17:55	143.54	179.11
17:55	1435	1791
17:56	145.62	179.97
17:56	1456	1800
17:57	145.86	180.46
17:57	1459	1805
17:58	141.40	177.89
17:58	1414	1779
17:59	142.10	177.30
17:59	1421	1773
18:00	144.90	178.85
18:00	1449	1789
18:01	146.36	179.37
18:01	1464	1794
18:02	142.43	176.83
18:02	1424	1768
18:03	141.38	176.33
18:03	1414	1763
18:04	145.38	177.47
18:04	1454	1775
18:05	145.80	178.20
18:05	1458	1782
18:06	139.90	176.31
18:06	1399	1763
18:07	141.70	176.71
18:07	1417	1767
18:08	145.53	178.32
18:08	1455	1783
18:09	146.79	179.18
18:09	1468	1792
18:10	143.83	178.59
18:10	1438	1786
18:11	142.21	177.34
18:11	1422	1773
18:12	143.94	177.80
18:12	1439	1778
18:13	144.40	178.30
18:13	1444	1783
18:14	147.28	178.83
18:14	1473	1788
18:15	145.14	179.36
18:15	1451	1794
18:16	143.47	178.06
18:16	1435	1781
18:17	144.09	178.23
18:17	1441	1782
18:18	145.98	179.72
18:18	1460	1797
18:19	145.12	179.62
18:19	1451	1796
18:20	143.76	178.06

[illegible]	[illegible]	[illegible]
18:21	1443	1784
18:22	146.28	179.21
18:22	1463	1792
18:23	145.76	179.36
18:23	1458	1794
18:24	142.31	177.70
18:24	1423	1777
18:25	139.77	176.58
18:25	1398	1766
18:26	138.83	175.79
18:26	1388	1758
18:27	138.11	175.91
18:27	1381	1759
18:28	140.37	176.89
18:28	1404	1769
18:29	143.30	178.30
18:29	1433	1783
18:30	143.57	179.05
18:30	1436	1791
18:31	146.14	180.00
18:31	1461	1800
18:32	146.05	179.84
18:32	1460	1798
18:33	142.08	179.03
18:33	1421	1790
18:34	145.16	179.93
18:34	1452	1799
18:35	146.63	180.32
18:35	1466	1803
18:36	143.48	178.74
18:36	1435	1787
18:37	143.79	179.18
18:37	1438	1792
18:38	147.99	180.73
18:38	1480	1807
18:39	145.65	179.95
18:39	1457	1800
18:40	142.51	178.82
18:40	1425	1788
18:41	145.14	179.61
18:41	1451	1796
18:42	148.44	180.27
18:42	1484	1803
18:43	144.18	178.37
18:43	1442	1784
18:44	146.18	179.28
18:44	1462	1793
18:45	145.59	179.16
18:45	1456	1792
18:46	143.82	178.84
18:46	1438	1788
18:47	147.27	180.89

RUN 5 COMPLETE

INCINERATOR DAILY CHARGING REPORT

DATE: 11/22/9 07:00 — 15:00

OPERATOR'S NAME: R Munoz

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	10.29	76.5	RB						
2	10.34	93.0	B						
3	10.39	71.5	B						
4	10.44	68.0	B						
5	10.51	83.0	RB						
6	10.54	69.0	B						
7	11.03	68.5	B						
8	11.07	(73.5) ~~7~~3.5	B						
9	11.11	83.5	B						
10	11.16	77.5	B						
11	11.31	73.0	RB, B						
12	11.36	73.0	RB						
13	11.40	82.0	B						
14	11.51	76.0	RB						
15	11.55	67.5	RB, B						
16	12.01	73.0	RB, B	omitted from data logger printout					
17	12:05	64:	B.						
18	12.09	84	RB						
19	12:13	67	B						
20	12:16	88	B	↓ 12:15 start 1st tray.					

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-22-91 07:00 – 15:00 hrs.

OPERATOR'S NAME: K minor

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	12:22	74	B						
2	12:30	65	RB						
3	12:40	65	RB						
4	12:45	80.5	B						
5	12:55	97.0	B						
6	13:04	92.0	B						
7	13:08	88.0	B						
8	13:11	65	B						
9	13:14	85	RB						
10	13:21	47	B						
11	13:27	79	B						
12	13:36	63.5	RB						
13	13:43	63.5	RB B						
14	13:48	59.0	RB B						
15	13:50	45.0	RB	end 1st traverse					
16	14:07	70.5	RB	1415					
17	14:20	45.0	RB	not in datalogger printout					
18	14:25	55.5	RB						
19	14:28	56.5	RB						
20	14:32	52:	RB						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11/22/91

OPERATOR'S NAME:

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	14:34	55.5	RB.						
2	14.37	54.5	B						
3	14:41	46	B						
4	14.44	70.5	BB.B						
5	14.48	53.5	B						
6		42	RB						
7	15:00	46.5	RB	start + stop					
8	15:01	60.5	RB	2nd trouble 1505					
9		57.5	RB, B	1509					
10		50.0	B, RB						
11		49	RB						
12	16:05	6.5	RB						
13		40	RB						
14		45	B						
15		52	RB						
16		52.	RB						
17	16.20	50.5	RB						
18		49.5	RB						
19		47.0	RB						
20		56.5	RB						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11/22/91

OPERATOR'S NAME:

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1		55	RB						
2	16:58	51.0	RB	1650					
3	16:55	43.5	RB	resume 2nd traverse					
4	17:05	53.5	RB	not in datalogger printout					
5	17:07	48.5	R.B						
6	17:10	52.0	RB						
7		45.5	B						
8		45.5	R						
9		51.0	RB						
10		56.0	RB						
11		52.0	RB						
12		43.0	B, RB						
13		62.5	B						
14		60.0	B RB						
15		52.0	B						
16		53.0	RB						
17		48.5	R.B						
18		54.5	RB						
19		47.0	RB						
20		54.0	B						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11/22/91

OPERATOR'S NAME:

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1		60.0	RB						
2		64.0	RB						
3		51.5	RB						
4		50.5	B						
5		55.0	RB						
6		50.5	RB	end of 2nd traverse					
7		51.0	RB	↑1845					
8		52.0	R.B						
9		60.5	B						
10		51.5	B						
11		49	B						
12		54	RB						
13		47.5	B						
14									
15									
16									
17									
18									
19									
20									

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

RUN5

Full Page Data: State:RUNNING Mode:MONITOR AR:[+3

41301 = 0000 Decimal 1302	41321 = 0066 Decimal 42	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	✓41344 = 0089 Decimal 19
41305 = 0048 Decimal 53	✓41325 = 0066 Decimal 38	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal 1215
41309 = 0081 Decimal 54	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	✓41330 = 0075 Decimal 33	✓41350 = 0068 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	✓41354 = 0085 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	✓41357 = 0065 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	? ~~41341 = 0000 Decimal~~ 1203

1201
73 → 1201

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[+3

41301 = 0000 Decimal 1400	✓41321 = 0064 Decimal 40	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0046 Decimal 56	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	✓41326 = 0080 Decimal 35	✓41346 = 0085 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	✓41350 = 0066 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal 59	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	✓41353 = 0088 Decimal 7
41314 = 0060 Decimal 47	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0064 Decimal 44	41337 = 0000 Decimal	✓41357 = 0092 Decimal
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0048 Decimal 21	~~41341 = 0000 Decimal~~ 1301

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

RUN 5

Full Page Data: State:RUNNING Mode:MONITOR AR:[+]

not in open log

41301 = 0000 Decimal 1500	41321 = 0047 Decimal 40	? 41341 = 0055 Decimal 20	1430
41302 = 0047 Decimal 59	41322 = 0000 Decimal	41342 = 0000 Decimal	
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal	
41304 = 0000 Decimal	41324 = 0055 Decimal 37	41344 = 0000 Decimal	
41305 = 0042 Decimal 56	41325 = 0000 Decimal	41345 = 0000 Decimal	
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal	1415
41307 = 0000 Decimal	41327 = 0056 Decimal 34	41347 = 0000 Decimal	
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal	
41309 = 0000 Decimal	41329 = 0000 Decimal	41349 = 0000 Decimal	
41310 = 0000 Decimal	41330 = 0053 Decimal 31	41350 = 0000 Decimal	
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal	
41312 = 0001 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal	
41313 = 0000 Decimal	41333 = 0057 Decimal 35	41353 = 0000 Decimal	
41314 = 0054 Decimal 47	41334 = 0000 Decimal	? 41354 = 0000 Decimal	70.5
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal	
41316 = 0000 Decimal	41336 = 0056 Decimal 35	41356 = 0000 Decimal	
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal	
41318 = 0071 Decimal 43	41338 = 0046 Decimal 23	41358 = 0000 Decimal	
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal	
41320 = 0000 Decimal	41340 = 0000 Decimal	~~41341 = 0055 Decimal~~	1401

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: 1600 State:RUNNING Mode:MONITOR AR:[+]

not in open log

41301 = 0000 Decimal	41321 = 0000 Decimal	41341 = 0000 Decimal	
41302 = 0060 Decimal 1559 49	41322 = 0000 Decimal	41342 = 0000 Decimal	
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal	
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal	
41305 = 0000 Decimal	41325 = 0000 Decimal	41345 = 0000 Decimal	
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal	
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal	
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal	
41309 = 0051 Decimal 52	41329 = 0000 Decimal	41349 = 0000 Decimal	
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0000 Decimal	
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal	1510
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal	
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal	2nd [illegible]
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal	
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal	
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0058 Decimal	1505
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal	
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal	
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0067 Decimal 2	
41320 = 0000 Decimal	41340 = 0000 Decimal	~~41341 = 0000 Decimal~~	1501

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

2241
Pw 35

Full Page Data: State:RUNNING Mode:MONITOR AR:[+]

41301 = 0000 Decimal 17:00	41321 = 0000 Decimal	41341 = 0000 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	✓41342 = 0051 Decimal 19
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
1304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0000 Decimal 16:5	41325 = 0000 Decimal	✓41345 = 0058 Decimal 16
41306 = 0000 Decimal 43.5	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0052 Decimal 54	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal Lo + Hi reg.	41329 = 0000 Decimal	✓41349 = 0052 Decimal 12
1310 = 0000 Decimal	✓41330 = 0056 Decimal 31	41350 = 0000 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
~~41312 = 0000 Decimal~~	✓41332 = 0057 Decimal 39	✓41352 = 0046 Decimal 9
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	✓41354 = 0041 Decimal 7
41315 = 0000 Decimal	? 41335 = 0061 Decimal 26 not in oper. log	41355 = 0000 Decimal
1316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	✓41357 = 0066 Decimal 4
41318 = 0000 Decimal	41338 = 0047 Decimal 23	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	✓41359 = 0049 Decimal 2
41320 = 0000 Decimal	✓41340 = 0050 Decimal 21	~~41341 = 0000 Decimal~~ 1601

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[+]

41301 = 0000 Decimal 18:00	? 41321 = 0048 Decimal 40 not in oper. log	41341 = 0000 Decimal
1302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	✓41324 = 0044 Decimal 37	✓41344 = 0046 Decimal 17
41305 = 0054 Decimal 56	41325 = 0000 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
1308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0000 Decimal
41309 = 0000 Decimal	41329 = 0053 Decimal 37	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	✓41350 = 0052 Decimal
41311 = 0000 Decimal	41331 = 0057 Decimal 30	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0000 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
1314 = 0052 Decimal 47	✓41334 = 0052 Decimal 27	✓41354 = 0049 Decimal 7
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0061 Decimal 44	✓41337 = 0046 Decimal 24	✓41357 = 0053 Decimal 9
41318 = 0000 Decimal	41338 = 0000 Decimal	41358 = 0000 Decimal
41319 = 0063 Decimal 40	41339 = 0000 Decimal	41359 = 0000 Decimal
1320 = 0000 Decimal	41340 = 0000 Decimal	~~41341 = 0000 Decimal~~ 1701

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

.1 Page Data: 183 ✓ State:RUNNING Mode:MONITOR AR:[illegible]

1301 = 0000 Decimal
1302 = 0000 Decimal
1303 = 0000 Decimal
1304 = 0000 Decimal
1305 = 0061 Decimal 49
1306 = 0000 Decimal
1307 = 0052 Decimal 47
1308 = 0000 Decimal
1309 = 0000 Decimal 1205
1310 = 0052 Decimal 49
1311 = 0000 Decimal ✓
1312 = 0051 Decimal 49
1313 = 0000 Decimal
1314 = 0000 Decimal
1315 = 0056 Decimal 37
1316 = 0000 Decimal
1317 = 0000 Decimal
1318 = 0000 Decimal
1319 = 0000 Decimal
1320 = 0051 Decimal 34

41321 = 0000 Decimal
✓41322 = 0052 Decimal 32
41323 = 0000 Decimal
41324 = 0000 Decimal
✓41325 = 0065 Decimal 27
41326 = 0000 Decimal
41327 = 0000 Decimal
✓41328 = 0061 Decimal 26
41329 = 0000 Decimal
41330 = 0000 Decimal
41331 = 0000 Decimal
41332 = 0000 Decimal
41333 = 0000 Decimal
41334 = 0000 Decimal
41335 = 0054 Decimal 19
41336 = 0000 Decimal
41337 = 0000 Decimal
41338 = 0000 Decimal
41339 = 0000 Decimal
41340 = 0000 Decimal

41341 = 0000 Decimal
41342 = 0000 Decimal
✓41343 = 0048 Decimal
41344 = 0000 Decimal
✓41345 = 0055 Decimal 9
41346 = 0000 Decimal
41347 = 0000 Decimal
41348 = 0000 Decimal
41349 = 0000 Decimal
41350 = 0000 Decimal
✓41351 = 0049 Decimal 3
41352 = 0000 Decimal
41353 = 0000 Decimal 1801
41354 = 0000 Decimal
41355 = 0000 Decimal
41356 = 0000 Decimal
41357 = 0000 Decimal
41358 = 0054 Decimal
41359 = 0000 Decimal
41360 = 0000 Decimal 1754

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

PRETEST CHECKLIST

Facility: Morristown Memorial
Location: Morristown, N.J.
Person:
Date: 11-23-91
Run No.: 5.x

Kiln clear ?	yes 0745
Charging begun at?	0845
Lime slurry mixed ?	yes; 08
Baghouse hopper checked?	yes -- okay have flow
Ash hopper clear?	charged @
Data logger operating?	yes @ 0755
Time synchronized?	yes - Newlight / Control Room

PRECHK

INCINERATOR SETPOINTS

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: 11-23-91
Run No.: Six

Time	0915	1400			
Primary chamber temp., F	1425	1425			
Secondary chamber temp., F	1800	1800			
Primary chamber draft, in. w.c.	-0.20	-0.20			
Primary chamber min O2, %	8	8			
Primary Chamber idle temp, F	1000	1000			
Secondary chamber idle temp., F	1200	1200			
Atomizer Speed	85	85			
Water quench on, F	1495	1495			
Water quench off, F	1465	1465			
Maximum charge rate, lb/hr	780	780			
Baghouse cleaning on, in. w.c.	4"	4"			
Pulse: 15 SEC Delay Baghouse cleaning off, in. w.c.	3"	3"			
Lime slurry conc.	9%	—			
Target SR	2	—			
Spray Dryer Temp.	280	280			

SETPOINT

DATA LOG

Facility:	Morristown memorial	**Person:**	Neulicht
Location:	Morristown, N.J.	**Date:**	11-23-91
		Run No.:	Six
		Test condition:	Carbon Added

Time	Primary chamber temp., F	Second. chamber temp., F	Primary draft in. w.c.	Kiln speed	Kiln O2 %	Prim. air damper %	Sec. air damper %	Natural gas reading cf
Begin Test 0930	1476	1803	-.22		11.8	0	65	@0932 569907
1000	1464	1806	-.20		12.8	0	79	—
1030	1452	1786	-.20		12.0	0	74	@1033 570162
1100	1468	1804	-.22		12.3	0	74	—
1132	1475	1800	-.22		11.8	0	66	@11:41 570425
1151	1450	1808	-.24		11.6	0	72	—
1220	1467	1806	-.22		11.0	0	77	
1250	1458	1803	-.18	0.95	12.4	0	75	
1320	1460	1791	-.20		11.2	0	59	
1350	1450	1783	-.10		11.2	0	66	@13.52 570949
1456	1512							

DATA LOG (continued)

Facility: Morristown Memorial
Locatio Morristown, N.J.
Person: Neulicht
Date: 11-23-91
Run No.: Six
Test condition: Carbon Added

Time	Quench flow, ~~gal/h~~ gpm	SD outlet temp. F	SD atomiz Rotation ~~RPM~~ %	Slurry tank #1 level inch	Slurry tank #2 level inch	Slurry feed GPM	Slurry pH	Baghouse pressure drop in. w.c.	
0930		283	80	41	28	2.5	12.9	3.3	
1000	0	282	80	40	28	1.7	12.9	3.0	
1030	0	280	80	38	27	1.3	12.9	3.9	
1100	3.3	292	80	37	53	1.4	12.9	3.8	
1132	—	290	80	35	62	0.9	12.9	3.6	
1151	—	273	80	35	60	1.2	12.9	3.4	
1220	0	279	80	34	62	1.3	12.9	3.0	
1250		279	80	32	62	1.3	12.9	3.2	
1320	0	281	80	30	62	1.5	12.9	3.5	
1350	—	270	80	29	62	1.2	12.8	3.2	

DATALOGC

DATA LOG NOTES

Facility: Morristown Memorial
Location: Morristown, N.J.
Person: Neulicht
Date: ~~Six~~ 11-23-91
Run No.: ~~5~~ Six

0745 - Arrive on-site; Unit up to temp.
0830 - Measure Tank 1 and then add water, lime and Carbon
0845 Begin charging
@ 0908 Switch to Spent Tank #1
0930 Begin Test #6
@ 1103 Lowered ash cart to examine contents/level
@ 1135 End first traverse
@ 1150 Start second traverse
@ 1235 -- Having problems with waste charge System -- Lower Rate of charge
1250 - 1312 Additional 80 lbs (sharps) Added manually @ Conveyor to make up for weight Logged By Computer But not charged
@ 1350 end test
1450 Remove Ash Cart

DNOTES

LIME SLURRY

FACILITY: Morristown Memorial
LOCATION: Morristown, N.J.
PERSON: Neuhart
DATE: 11-23-91
RUN NO.: Six

SYSTEM CHECK:

SLURRY TANK NUMBER: # 1

ADDITIONS

Time	Water	Lime	
0830	—	—	29 *
0848	Add water		42 *
0850	~~Add 3~~	150 lb	
0905		11 lb Carbon	44 *
0908	Switch Tanks to	#1	
1355			35 *

COMMENTS:
* Ag. turn off

Filename:Run6
Name:Run 6
Date:11-23-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT

Filename:Run6a
Name:Run 6
Date:11-23-1991
Location:Morristown Memorial Hospital
Project #:6500-13
Operator:DDR

	0	1
	PCCT	SCCT
07:52	133.51	0.00
07:52	1335	0
07:53	134.20	0.00
07:53	1342	0
07:54	134.56	0.00
07:54	1346	0
07:55	134.26	5.40
07:55	1343	54
07:56	134.73	0.00
07:56	1347	0
07:57	135.77	0.00
07:57	1358	0
07:58	136.42	25.88
07:58	1364	259
07:59	141.76	151.86
07:59	1418	1519
08:00	141.05	178.06
08:00	1411	1781
08:01	140.52	178.41
08:01	1405	1784
08:02	142.07	178.70
08:02	1421	1787
08:03	141.83	178.73
08:03	1418	1787
08:04	142.42	178.76
08:04	1424	1788
08:05	141.29	178.74
08:05	1413	1787
08:06	141.17	178.73
08:06	1412	1787
08:07	141.31	178.83
08:07	1413	1788

09:30	146.41	180.40
09:30	1464	1804
09:31	143.63	178.05
09:31	1436	1781
09:32	142.24	176.22
09:32	1422	1762
09:33	143.04	175.88
09:33	1430	1759
09:34	140.87	175.08
09:34	1409	1751
09:35	142.25	174.91
09:35	1423	1749
09:36	141.00	175.41
09:36	1410	1754
09:37	141.34	176.10
09:37	1413	1761
09:38	142.25	176.73
09:38	1423	1767
09:39	143.19	177.58
09:39	1432	1776
09:40	145.00	178.57
09:40	1450	1786
09:41	145.50	179.05
09:41	1455	1791
09:42	146.56	179.11
09:42	1466	1791
09:43	145.92	179.25
09:43	1459	1792
09:44	145.30	179.06
09:44	1453	1791
09:45	144.92	179.14
09:45	1449	1791
09:46	143.12	179.18
09:46	1431	1792
09:47	143.00	178.92
09:47	1430	1789
09:48	142.38	178.35
09:48	1424	1783
09:49	138.64	177.64
09:49	1386	1776
09:50	139.86	177.66
09:50	1399	1777
09:51	139.96	178.00
09:51	1400	1780
09:52	141.72	178.48
09:52	1417	1785
09:53	142.28	178.57
09:53	1423	1786
09:54	140.88	178.71
09:54	1409	1787
09:55	144.10	179.01
09:55	1441	1790
09:56	144.26	178.98
09:56	1443	1790

09:58	145.59	179.75
09:58	1456	1798
09:59	143.68	179.51
09:59	1437	1795
10:00	143.86	179.27
10:00	1439	1793
10:01	144.52	179.33
10:01	1445	1793
10:02	146.73	179.98
10:02	1467	1800
10:03	145.05	180.31
10:03	1450	1803
10:04	142.52	178.51
10:04	1425	1785
10:05	143.44	177.92
10:05	1434	1779
10:06	142.71	177.68
10:06	1427	1777
10:07	145.23	178.23
10:07	1452	1782
10:08	146.70	178.92
10:08	1467	1789
10:09	145.18	178.70
10:09	1452	1787
10:10	143.72	177.84
10:10	1437	1778
10:11	146.10	178.32
10:11	1461	1783
10:12	146.96	179.17
10:12	1470	1792
10:13	142.68	177.57
10:13	1427	1776
10:14	141.14	176.58
10:14	1411	1766
10:15	143.57	177.68
10:15	1436	1777
10:16	143.95	178.84
10:16	1439	1788
10:17	145.90	179.64
10:17	1459	1796
10:18	148.54	180.66
10:18	1485	1807
10:19	144.67	180.08
10:19	1447	1801
10:20	144.21	180.03
10:20	1442	1800
10:21	147.23	180.82
10:21	1472	1808
10:22	146.35	179.80
10:22	1463	1798
10:23	144.67	179.11
10:23	1447	1791
10:24	147.40	179.75
10:24	1474	1798

10:25	142.18	177.69
10:26	1422	1777
10:27	143.56	177.82
10:27	1436	1778
10:28	145.29	178.59
10:28	1453	1786
10:29	146.92	178.79
10:29	1469	1788
10:30	144.85	177.85
10:30	1448	1778
10:31	143.85	177.76
10:31	1439	1778
10:32	147.02	179.34
10:32	1470	1793
10:33	144.71	178.87
10:33	1447	1789
10:34	143.65	178.09
10:34	1437	1781
10:35	146.18	179.10
10:35	1462	1791
10:36	146.06	178.92
10:36	1461	1789
10:37	144.94	178.51
10:37	1449	1785
10:38	148.90	179.41
10:38	1489	1794
10:39	145.83	178.30
10:39	1458	1783
10:40	145.25	179.11
10:40	1452	1791
10:41	148.65	180.01
10:41	1486	1800
10:42	144.81	179.12
10:42	1448	1791
10:43	147.64	179.48
10:43	1476	1795
10:44	147.27	179.70
10:44	1473	1797
10:45	144.44	177.68
10:45	1444	1777
10:46	145.68	178.50
10:46	1457	1785
10:47	148.43	179.88
10:47	1484	1799
10:48	145.87	178.66
10:48	1459	1787
10:49	144.33	177.69
10:49	1443	1777
10:50	143.63	177.71
10:50	1436	1777
10:51	144.83	177.33
10:51	1448	1773

10:53	140.52	176.03
10:53	1405	1760
10:54	139.67	176.27
10:54	1397	1763
10:55	139.70	177.08
10:55	1397	1771
10:56	143.15	178.75
10:56	1431	1788
10:57	145.99	180.35
10:57	1460	1803
10:58	146.45	180.99
10:58	1464	1810
10:59	145.05	179.68
10:59	1451	1797
11:00	144.79	179.27
11:00	1448	1793
11:01	145.19	179.22
11:01	1452	1792
11:02	146.54	179.75
11:02	1465	1798
11:03	145.95	179.37
11:03	1459	1794
11:04	142.76	177.71
11:04	1428	1777
11:05	144.68	178.66
11:05	1447	1787
11:06	148.63	180.48
11:06	1486	1805
11:07	147.49	179.71
11:07	1475	1797
11:08	143.31	178.26
11:08	1433	1783
11:09	146.38	179.80
11:09	1464	1798
11:10	146.07	180.08
11:10	1461	1801
11:11	145.58	179.50
11:11	1456	1795
11:12	148.66	181.53
11:12	1487	1815
11:13	146.29	180.42
11:13	1463	1804
11:14	144.69	179.15
11:14	1447	1791
11:15	149.35	180.43
11:15	1493	1804
11:16	145.95	179.80
11:16	1459	1798
11:17	142.75	178.35
11:17	1427	1783
11:18	148.51	179.70
11:18	1485	1797

11:20	144.17	177.26	
11:20	1442	1773	
11:21	146.25	178.37	
11:21	1462	1784	
11:22	147.20	178.83	
11:22	1472	1788	
11:23	143.41	177.15	
11:23	1434	1772	
11:24	145.92	178.28	
11:24	1459	1783	
11:25	146.42	178.66	
11:25	1464	1787	
11:26	142.61	177.00	
11:26	1426	1770	
11:27	145.00	178.08	
11:27	1450	1781	
11:28	147.67	179.70	
11:28	1477	1797	
11:29	144.67	178.63	
11:29	1447	1786	
11:30	145.32	178.70	
11:30	1453	1787	
11:31	146.73	179.42	
11:31	1467	1794	
11:32	146.35	178.98	
11:32	1464	1790	
11:33	142.53	177.68	
11:33	1425	1777	
11:34	141.56	177.25	
11:34	1416	1772	
11:35	140.52	176.36	← End 1st traverse
11:35	1405	1764	
11:36	140.15	175.90	
11:36	1401	1759	
11:37	138.50	175.75	
11:37	1385	1757	
11:38	140.07	175.95	
11:38	1401	1759	
11:39	138.71	176.26	
11:39	1387	1763	
11:40	139.25	176.68	
11:40	1392	1767	
11:41	139.40	177.04	
11:41	1394	1770	
11:42	139.04	177.65	
11:42	1390	1777	
11:43	140.15	178.28	
11:43	1402	1783	
11:44	141.27	178.82	
11:44	1413	1788	
11:45	143.72	179.48	
11:45	1437	1795	
11:46	144.89	180.55	
	1449	1805	

11:47	147.46	181.57
11:47	1475	1816
11:48	145.13	180.88
11:48	1451	1809
11:49	146.01	181.26
11:49	1460	1813
11:50	147.33	181.87
11:50	1473	1819
11:51	143.34	179.76
11:51	1433	1798
11:52	142.80	178.96
11:52	1428	1790
11:53	144.09	179.13
11:53	1441	1791
11:54	144.00	178.80
11:54	1440	1788
11:55	143.01	178.21
11:55	1430	1782
11:56	143.03	177.73
11:56	1430	1777
11:57	142.72	177.48
11:57	1427	1775
11:58	141.70	177.02
11:58	1417	1770
11:59	141.04	176.90
11:59	1410	1769
12:00	139.66	177.07
12:00	1397	1771
12:01	139.30	177.44
12:01	1393	1774
12:02	141.86	178.36
12:02	1419	1784
12:03	144.64	179.84
12:03	1446	1798
12:04	148.05	180.89
12:04	1481	1809
12:05	144.77	180.29
12:05	1448	1803
12:06	142.40	179.33
12:06	1424	1793
12:07	144.39	179.79
12:07	1444	1798
12:08	144.24	179.86
12:08	1442	1799
12:09	146.52	180.26
12:09	1465	1803
12:10	144.22	179.22
12:10	1442	1792
12:11	142.17	177.58
12:11	1422	1776
12:12	142.87	177.60
12:12	1429	1776
12:13	143.76	177.65
12:13	1438	1776

← start 2nd traverse

12:14	1456	1780
12:15	144.82	178.05
12:15	1448	1781
12:16	144.59	178.39
12:16	1446	1784
12:17	144.28	178.03
12:17	1443	1780
12:18	141.25	177.45
12:18	1413	1774
12:19	141.99	177.57
12:19	1420	1776
12:20	143.18	178.68
12:20	1432	1787
12:21	145.64	179.61
12:21	1456	1796
12:22	146.17	179.37
12:22	1462	1794
12:23	141.71	178.48
12:23	1417	1785
12:24	137.38	177.59
12:24	1374	1776
12:25	139.62	177.75
12:25	1396	1778
12:26	140.98	178.42
12:26	1410	1784
12:27	142.87	179.28
12:27	1429	1793
12:28	144.03	179.72
12:28	1440	1797
12:29	146.51	180.65
12:29	1465	1807
12:30	145.69	180.61
12:30	1457	1806
12:31	143.32	179.11
12:31	1433	1791
12:32	144.27	178.83
12:32	1443	1788
12:33	143.62	178.43
12:33	1436	1784
12:34	141.55	177.70
12:34	1416	1777
12:35	139.82	176.54
12:35	1398	1765
12:36	135.56	175.18
12:36	1356	1752
12:37	131.43	174.51
12:37	1314	1745
12:38	131.59	175.13
12:38	1316	1751
12:39	133.55	176.97
12:39	1335	1770
12:40	140.53	179.07
12:40	1405	1791

12:42	148.72	181.73
12:42	1487	1817
12:43	146.40	180.29
12:43	1464	1803
12:44	143.93	178.42
12:44	1439	1784
12:45	143.65	178.65
12:45	1437	1786
12:46	144.55	179.18
12:46	1445	1792
12:47	143.97	179.15
12:47	1440	1791
12:48	145.29	179.72
12:48	1453	1797
12:49	146.48	180.31
12:49	1465	1803
12:50	144.00	179.01
12:50	1440	1790
12:51	143.40	179.06
12:51	1434	1791
12:52	145.18	179.44
12:52	1452	1794
12:53	147.23	180.14
12:53	1472	1801
12:54	143.50	178.84
12:54	1435	1788
12:55	145.86	179.48
12:55	1459	1795
12:56	148.64	180.91
12:56	1486	1809
12:57	145.00	179.86
12:57	1450	1799
12:58	146.27	180.08
12:58	1463	1801
12:59	149.24	181.88
12:59	1492	1819
13:00	146.38	180.68
13:00	1464	1807
13:01	145.94	179.83
13:01	1459	1798
13:02	149.22	182.17
13:02	1492	1822
13:03	145.43	180.15
13:03	1454	1802
13:04	145.77	179.91
13:04	1458	1799
13:05	148.51	180.94
13:05	1485	1809
13:06	144.34	178.64
13:06	1443	1786
13:07	147.16	179.95
13:07	1472	1800
13:08	146.70	179.81
13:08	[illegible]	[illegible]

13:09	144.32	177.82
13:09	1443	1778
13:10	150.30	179.97
13:10	1503	1800
13:11	147.28	179.49
13:11	1473	1795
13:12	143.27	177.22
13:12	1433	1772
13:13	148.42	178.69
13:13	1484	1787
13:14	145.53	177.78
13:14	1455	1778
13:15	144.24	177.69
13:15	1442	1777
13:16	147.25	179.06
13:16	1472	1791
13:17	144.78	177.27
13:17	1448	1773
13:18	142.76	175.86
13:18	1428	1759
13:19	148.76	178.10
13:19	1488	1781
13:20	147.33	178.72
13:20	1473	1787
13:21	144.99	177.99
13:21	1450	1780
13:22	148.40	180.72
13:22	1484	1807
13:23	144.97	179.96
13:23	1450	1800
13:24	142.60	178.25
13:24	1426	1782
13:25	142.98	178.14
13:25	1430	1781
13:26	142.52	177.05
13:26	1425	1770
13:27	143.23	175.79
13:27	1432	1758
13:28	143.24	175.45
13:28	1432	1755
13:29	143.84	175.85
13:29	1438	1758
13:30	146.18	176.21
13:30	1462	1762
13:31	146.81	177.02
13:31	1468	1770
13:32	143.96	176.56
13:32	1440	1766
13:33	144.16	177.36
13:33	1442	1774
13:34	149.03	179.89
13:34	1490	1799
13:35	144.44	179.00

13:36	1441	1788
13:37	149.09	182.06
13:37	1491	1821
13:38	147.79	181.95
13:38	1478	1820
13:39	142.65	179.64
13:39	1427	1796
13:40	145.46	179.94
13:40	1455	1799
13:41	147.91	180.90
13:41	1479	1809
13:42	143.91	178.18
13:42	1439	1782
13:43	142.24	176.89
13:43	1422	1769
13:44	147.16	177.70
13:44	1472	1777
13:45	147.13	177.96
13:45	1471	1780
13:46	144.89	177.23
13:46	1449	1772
13:47	147.73	178.83
13:47	1477	1788
13:48	145.87	178.38
13:48	1459	1784
13:49	143.56	177.83
13:49	1436	1778
13:50	147.29	179.08
13:50	1473	1791
13:51	144.48	177.76
13:51	1445	1778
13:52	143.38	177.25
13:52	1434	1772
13:53	148.76	179.67
13:53	1488	1797
13:54	145.10	177.92
13:54	1451	1779
13:55	145.41	177.60
13:55	1454	1776
13:56	149.12	180.71
13:56	1491	1807
13:57	145.49	180.25
13:57	1455	1803
13:58	145.76	181.26
13:58	1458	1813
13:59	149.59	183.40
13:59	1496	1834
14:00	145.15	180.48
14:00	1452	1805
14:01	147.50	180.91
14:01	1475	1809
14:02	147.00	180.49
14:02	1470	1805
14:03	144.09	177.35

← End test

INCINERATOR DAILY CHARGING REPORT

DATE: 11-23-91 07:00 — 15:00 hrs shift

OPERATOR'S NAME: R Munoz

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	8:45	52	B						
2	8:49	41	B						
3	8:53	51.	B						
4	8:57	51	RB						
5	9:00	50	B						
6	9:04	55.5	RB						
7	9:07	49.5	RB						
8	9:11	56	RB						
9	9:15	55	RB						
10	9:19	45.5	RB						
11	9:23	53.5	B						
12	9:27	17	B						
13	9:33	46	B						
14	9:37	46.5	B						
15	9:41	50	RB						
16 D.W.	9:45	58	RB						
17	09:50	47.5	RB						
18	09:54	49.5	RB						
19	09:58	49.5	B						
20	10:02	46.5	B						

30 ← 1st

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-23-91 07:00 - 15:00

OPERATOR'S NAME: R Munoz

2

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	10:06	48	B						
2	10:10	52.5	RB						
3	10:14	47.5	RB						
4	10:18	50.5	RB						
5	10:22	42	RB						
6	10:26	41.5	RB						
7	10:30	57.0	RB						
8	10:34	43.5	B						
9	10:38	51	B						
10	10:42	46.5	RB						
11	10:46	48.5	RB						
12	10:53	52	B						
13	10:57	50.5	RB						
14	11:01	48	RB						
15	11:05	55	RB						
16	11:09	50	B						
17	11:13	53	B						
18	11:16	53	B						
19	11:19	47	B						
20	11:22	49.5	B						

35 [illegible]

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

3

DATE: 11-23-9 07:00 - ~~[illegible]~~: 1500

OPERATOR'S NAME: R Muñoz

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	11:36 ~~[illegible]~~	~~[illegible]~~ 30	RB	not in datalogger printout	missing charge? 65 lbs				
2	11:39	53	RB		(in printout) 11:35				
3	11:48	41.5	RB	not in datalogger printout	missing charge? 66 lbs				
4	11:46	47.5	RB		(in printout) 11:43				
5	11:49	53	RB	not in datalogger printout	missing charge? 84 lbs				
6	11:58	50	RB		(in printout) 11:55				
7	12.01	45.5	RB						
8	12.04	46	RB	not in datalogger printout	missing charge? 60 lbs				
9	12:10	32.5	RB		(in printout) 12:07				
10	12:13	41.5	RB						
11	12.17	32.	RB						
12	12:20	43	RB						
13	12-27	50.5	RB						
14	12-30	39 ~~[illegible]~~ 5	RB	In datalogger printout at 119					
15	12.40	46	RB						
16	12.44	35	RB						
17	12:47	39	RB						
18	12:50	39	RB						
19	12:53	40	RB	not in datalogger printout	missing charge? 21 lbs				
20	12:56	40	RB		(in printout) 12:53				

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

INCINERATOR DAILY CHARGING REPORT

DATE: 11-23-91. 07:00 – 15:00

OPERATOR'S NAME: R Muñoz

(4)

Feed No.	Time	Weight (lb)	Waste Type (*)	Comment					
1	13:00	40.5	RB						
2	13:03	39.	RB	omitted from datalogger printout					
3	13:06	43	RB						
4	13:09	37.5	RB						
5	13:12	40.	RB						
6	13:15	37.5	RB						
7	13:19	36.5	RB						
8	13:26	40.0	RB						
9	13:30	33.5	RB						
10	13:32	44.5	B						
11	13:34	39	B						
12	13:39	46.5	RB						
13	13:42	41.5	B						
14	13:45	50	RB						
15	13:47	49.5	RB						
16	13:50	44.5	RB B						
17		35.5	B						
18		35.5	RB	not in datagger printout	missing charge? 85 lbs (13:59) (in printout)				
19		31.5	RB						
20	14:05	41	RB						

* waste type:

RB = red bag; B = brown/black bag; BL = blue bag; OR = orange bag

DAILYRPT

11-25-91
09:35

Full Page Data: State:RUNNING Mode:MONITOR AR:[41360]

41301 = 0000 Decimal	41321 = 0055 Decimal	41341 = 0052 Decimal
41302 = 0000 Decimal	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0047 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0052 Decimal
41305 = 0000 Decimal	41325 = 0057 Decimal	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0000 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	41328 = 0000 Decimal	41348 = 0042 Decimal
41309 = 0018 Decimal	41329 = 0050 Decimal	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal	41350 = 0053 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
41313 = 0053 Decimal	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0000 Decimal	41354 = 0000 Decimal
41315 = 0000 Decimal	41335 = 0056 Decimal	41355 = 0000 Decimal
41316 = 0046 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0050 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0000 Decimal 8-26

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[41360]

41301 = 0000 Decimal 10:00	✓41321 = 0051 Decimal 46	41341 = 0046 Decimal
✓41302 = 0050 Decimal 59	41322 = 0000 Decimal	41342 = 0000 Decimal
41303 = 0000 Decimal	41323 = 0000 Decimal	41343 = 0000 Decimal
41304 = 0000 Decimal	41324 = 0000 Decimal	41344 = 0000 Decimal
41305 = 0050 Decimal 56	✓41325 = 0047 Decimal 36	41345 = 0000 Decimal
41306 = 0000 Decimal	41326 = 0000 Decimal	41346 = 0055 Decimal
41307 = 0000 Decimal	41327 = 0000 Decimal	41347 = 0000 Decimal
41308 = 0000 Decimal	✓41328 = 0047 Decimal 33 ↑	41348 = 0000 Decimal
✓41309 = 0048 Decimal 52	41329 = 0000 Decimal start list	41349 = 0000 Decimal
41310 = 0000 Decimal	41330 = 0000 Decimal traverse	41350 = 0057 Decimal
41311 = 0000 Decimal	41331 = 0000 Decimal 9:30	41351 = 0000 Decimal
41312 = 0000 Decimal	41332 = 0000 Decimal	41352 = 0000 Decimal
✓41313 = 0059 Decimal 48	41333 = 0000 Decimal	41353 = 0000 Decimal
41314 = 0000 Decimal	41334 = 0018 Decimal	41354 = 0050 Decimal
41315 = 0000 Decimal	41335 = 0000 Decimal	41355 = 0000 Decimal
41316 = 0000 Decimal	41336 = 0000 Decimal	41356 = 0000 Decimal
41317 = 0000 Decimal	41337 = 0000 Decimal	41357 = 0000 Decimal
41318 = 0000 Decimal	41338 = 0053 Decimal	41358 = 0000 Decimal
41319 = 0000 Decimal	41339 = 0000 Decimal	41359 = 0000 Decimal
41320 = 0000 Decimal	41340 = 0000 Decimal	41360 = 0056 Decimal 9:01

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Run 6

Full Page Data: State:RUNNING Mode:MONITOR AR:[413601

41301 = 0000 Decimal 11:00		41321 = 0000 Decimal		41341 = 0000 Decimal	
41302 = 0000 Decimal		41322 = 0000 Decimal		41342 = 0000 Decimal	
✓41303 = 0051 Decimal 58		✓41323 = 0052 Decimal 38		✓41343 = 0051 Decimal 18	
41304 = 0000 Decimal		41324 = 0000 Decimal		41344 = 0000 Decimal	
41305 = 0000 Decimal		41325 = 0000 Decimal		41345 = 0000 Decimal	
41306 = 0000 Decimal		✓41326 = 0044 Decimal 35		41346 = 0000 Decimal	
✓41307 = 0052 Decimal 54		41327 = 0000 Decimal		✓41347 = 0048 Decimal 14	
41308 = 0000 Decimal		41328 = 0000 Decimal		41348 = 0000 Decimal	
41309 = 0000 Decimal		41329 = 0000 Decimal		41349 = 0000 Decimal	
41310 = 0000 Decimal		41330 = 0000 Decimal		41350 = 0000 Decimal	
✓41311 = 0049 Decimal 50		✓41331 = 0058 Decimal 30		41351 = 0000 Decimal	
41312 = 0000 Decimal		41332 = 0000 Decimal		✓41352 = 0053 Decimal 9	
41313 = 0000 Decimal		41333 = 0000 Decimal		41353 = 0000 Decimal	
41314 = 0000 Decimal		41334 = 0000 Decimal		41354 = 0000 Decimal	
41315 = 0000 Decimal		✓41335 = 0042 Decimal 26		✓41355 = 0049 Decimal 6	
41316 = 0000 Decimal		41336 = 0000 Decimal		41356 = 0000 Decimal	
41317 = 0000 Decimal		41337 = 0000 Decimal		41357 = 0000 Decimal	
41318 = 0000 Decimal		41338 = 0000 Decimal		41358 = 0000 Decimal	
✓41319 = 0047 Decimal 42		✓41339 = 0043 Decimal 22		✓41359 = 0047 Decimal 2	
41320 = 0000 Decimal		41340 = 0000 Decimal		41360 = 0000 Decimal 10:01	

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[413601

✓41301 = 0040 Decimal 12:00		41321 = 0000 Decimal 11:40		✓41341 = 0047 Decimal 20	
41302 = 0000 Decimal		41322 = 0000 Decimal		41342 = 0000 Decimal	
41303 = 0000 Decimal		✓41323 = 0053 Decimal 11:38		41343 = 0000 Decimal	
✓41304 = 0050 Decimal 11:57		41324 = 0000 Decimal		✓41344 = 0055 Decimal 17	
41305 = 0000 Decimal		41325 = 0000 Decimal 11:36		41345 = 0000 Decimal	
41306 = 0084 Decimal 11:55 not in record	not in record ?	41326 = 0065 Decimal 11:35	30?	41346 = 0000 Decimal	
41307 = 0000 Decimal		41327 = 0000 Decimal		41347 = 0000 Decimal	
41308 = 0000 Decimal	begin 2nd traverse	41328 = 0000 Decimal	end 1st traverse	✓41348 = 0053 Decimal 13	
41309 = 0000 Decimal		41329 = 0000 Decimal		41349 = 0000 Decimal	
41310 = 0000 Decimal		41330 = 0000 Decimal		41350 = 0000 Decimal	
41311 = 0000 Decimal 11:50		41331 = 0000 Decimal		41351 = 0000 Decimal	
41312 = 0000 Decimal 11:49		41332 = 0000 Decimal		✓41352 = 0051 Decimal 9	
41313 = 0000 Decimal	53?	41333 = 0000 Decimal		41353 = 0000 Decimal	
41314 = 0000 Decimal		41334 = 0000 Decimal		41354 = 0000 Decimal	
✓41315 = 0048 Decimal 11:46		41335 = 0000 Decimal		41355 = 0000 Decimal	
41316 = 0000 Decimal		41336 = 0000 Decimal		✓41356 = 0056 Decimal 5	
41317 = 0000 Decimal 11:22		✓41337 = 0050 Decimal 11:24		41357 = 0000 Decimal	
41318 = 0066 Decimal 11:43 not in record		41338 = 0000 Decimal		41358 = 0000 Decimal	
41319 = 0000 Decimal 11:42		41339 = 0000 Decimal		41359 = 0000 Decimal	
41320 = 0000 Decimal 11:41		41340 = 0000 Decimal 11:21		✓41360 = 0049 Decimal 11:01	

41 5?

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Note 1/9 # change @ 1237
Should be 39#
80 # Added mtrically
1250 —

11-23-91
Row 6

Full Page Data: State:RUNNING Mode:MONITOR AR:[illegible]

✓41301	= 0041	Decimal 12:00	✓41321	= 0047	Decimal 12:40	41341	= 0000	Decimal [illegible]
41302	= 0000	Decimal	41322	= 0000	Decimal	41342	= 0000	Decimal
41303	= 0000	Decimal	41323	= 0000	Decimal	41343	= 0000	Decimal
✓41304	= 0041	Decimal 12:37	✓41324	= 0119	Decimal Really 39	41344	= 0000	Decimal
41305	= 0000	Decimal	41325	= 0000	Decimal 12:37	✓41345	= 0033	Decimal 12:[illegible]6
41306	= 0000	Decimal	41326	= 0000	Decimal	41346	= 0000	Decimal
41307	= 0000	Decimal	41327	= 0000	Decimal	41347	= 0000	Decimal
?41308	= 0021	Decimal 12:53 40	41328	= 0000	Decimal	✓41348	= 0042	Decimal 12:[illegible]3
41309	= 0000	Decimal	41329	= 0000	Decimal	41349	= 0000	Decimal
41310	= 0000	Decimal	41330	= 0000	Decimal	41350	= 0000	Decimal
41311	= 0000	Decimal	41331	= 0000	Decimal	✓41351	= 0033	Decimal 12:[illegible]0
41312	= 0040	Decimal 12:49	41332	= 0000	Decimal	41352	= 0000	Decimal
41313	= 0000	Decimal	41333	= 0000	Decimal	41353	= 0000	Decimal
41314	= 0000	Decimal	✓41334	= 0051	Decimal 12:29	?41354	= 0060	Decimal 12:07 not a recep
✓41315	= 0040	Decimal 12:46	41335	= 0000	Decimal	41355	= 0000	Decimal
41316	= 0000	Decimal	41336	= 0000	Decimal	41356	= 0000	Decimal
41317	= 0000	Decimal	41337	= 0000	Decimal	41357	= 0000	Decimal 1204
✓41318	= 0036	Decimal 12:43	✓41338	= 0044	Decimal 12:23	41358	= 0000	Decimal
41319	= 0000	Decimal	41339	= 0000	Decimal	41359	= 0000	Decimal
41320	= 0000	Decimal 1241	41340	= 0000	Decimal 1221	41360	= 0000	Decimal 1201

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8Logic 9-Next 10-Prev

Full Page Data: State:RUNNING Mode:MONITOR AR:[41341]

41301	= 0000	Decimal 14:06	41321	= 0000	Decimal	✓41341	= 0041	Decimal 13:26
41302	= 0042	Decimal 14:05	41322	= 0000	Decimal	41342	= 0000	Decimal
41303	= 0000	Decimal	✓41323	= 0050	Decimal 13:44	41343	= 0000	Decimal
41304	= 0000	Decimal	41324	= 0000	Decimal	✓41344	= 0038	Decimal 13:23
41305	= 0032	Decimal 14:02	41325	= 0000	Decimal	41345	= 0000	Decimal
41306	= 0000	Decimal	✓41326	= 0042	Decimal 13:41	41346	= 0000	Decimal
41307	= 0000	Decimal	41327	= 0000	Decimal	41347	= 0000	Decimal
?41308	= 0085	Decimal 13:54 35	✓41328	= 0047	Decimal 13:39	41348	= 0000	Decimal
41309	= 0000	Decimal	41329	= 0000	Decimal	41349	= 0000	Decimal
41310	= 0000	Decimal	41330	= 0000	Decimal	41350	= 0000	Decimal
41311	= 0000	Decimal	41331	= 0000	Decimal	✓41351	= 0038	Decimal 13:16
41312	= 0000	Decimal	41332	= 0000	Decimal	41352	= 0000	Decimal
41313	= 0035	Decimal 13:54	✓41333	= 0040	Decimal 13:34	41353	= 0000	Decimal
41314	= 0000	Decimal	41334	= 0000	Decimal	✓41354	= 0041	Decimal 13:03
41315	= 0000	Decimal	41335	= 0000	Decimal	41355	= 0000	Decimal
41316	= 0000	Decimal	✓41336	= 0045	Decimal 13:31	41356	= 0000	Decimal
✓41317	= 0045	Decimal 13:50	41337	= 0000	Decimal	✓41357	= 0038	Decimal 13:10
41318	= 0000	Decimal	✓41338	= 0034	Decimal 13:29	41358	= 0000	Decimal
41319	= 0000	Decimal end 2nd traverse	41339	= 0000	Decimal	41359	= 0000	Decimal
✓41320	= 0050	Decimal 13:47	41340	= 0000	Decimal	✓41360	= 0044	Decimal 13:07

39 → 13:03

1-Dec 2-Hex 3Binary 4ASCII 5 6Column 7 8-Logic 9-Next 10-Prev

13.03 39

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Inlet
RUN NUMBER: 1

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.03
Absolute Stack Pressure,Ps(in. Hg)	29.55
Stack Static Pressure* (in. H2O)	-6.60
Average Stack Temperature (deg. F)	406.77
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	109.59
Average Meter Pressure (in.H2O)	0.65
Average Meter Temperature (deg. F)	107.69
Moisture Collected (g)	412.70
Carbon Dioxide Concentration (%V)	6.40
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	82.50
Dry Gas Meter Factor	1.01150
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.43
Standard Metered Volume,Vm(std) (dscf)	103.66
Standard Metered Volume,Vm(std) (dscm)	2.936
Standard Volume Water Vapor,Vw (scf)	19.46
Standard Volume Water Vapor,Vw (scm)	0.551
Stack Moisture (%V)	15.81
Mole Fraction Dry Stack Gas	0.842
Dry Molecular Weight	29.47
Wet Molecular Weight	27.66
Stack Gas Velocity,Vs (fpm)	4223.29
Stack Gas Velocity,Vs (mpm)	1287.26
Volumetric Flow Rate (acfm)	6656.97
Volumetric Flow Rate (acmm)	188.525
Volumetric Flow Rate (dscfm)	3369.96
Volumetric Flow Rate (dscmm)	95.437
Percent Isokinetic	102.57
Percent Excess Air	103.77
Fuel Factor,Fo	1.531
Ultimate CO2	13.65

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Inlet
RUN NUMBER: 2.00

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	29.51
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	407.92
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	172.11
Average Meter Pressure (in.H2O)	1.68
Average Meter Temperature (deg. F)	108.54
Moisture Collected (g)	622.70
Carbon Dioxide Concentration (%V)	7.80
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	81.10
Dry Gas Meter Factor	1.01150
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.68
Standard Metered Volume,Vm(std) (dscf)	162.75
Standard Metered Volume,Vm(std) (dscm)	4.609
Standard Volume Water Vapor,Vw (scf)	29.36
Standard Volume Water Vapor,Vw (scm)	0.831
Stack Moisture (%V)	15.28
Mole Fraction Dry Stack Gas	0.847
Dry Molecular Weight	29.69
Wet Molecular Weight	27.91
Stack Gas Velocity,Vs (fpm)	4344.36
Stack Gas Velocity,Vs (mpm)	1324.16
Volumetric Flow Rate (acfm)	6847.80
Volumetric Flow Rate (acmm)	193.930
Volumetric Flow Rate (dscfm)	3478.75
Volumetric Flow Rate (dscmm)	98.518
Percent Isokinetic	101.98
Percent Excess Air	107.49
Fuel Factor,Fo	1.256
Ultimate CO2	16.63

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Inlet
RUN NUMBER: 3.00

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.83
Absolute Stack Pressure,Ps(in. Hg)	29.35
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	405.29
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	174.56
Average Meter Pressure (in.H2O)	1.72
Average Meter Temperature (deg. F)	110.10
Moisture Collected (g)	603.10
Carbon Dioxide Concentration (%V)	6.70
Oxygen Concentration (%V)	10.60
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	1.01150
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.68
Standard Metered Volume,Vm(std) (dscf)	163.75
Standard Metered Volume,Vm(std) (dscm)	4.637
Standard Volume Water Vapor,Vw (scf)	28.44
Standard Volume Water Vapor,Vw (scm)	0.805
Stack Moisture (%V)	14.80
Mole Fraction Dry Stack Gas	0.852
Dry Molecular Weight	29.50
Wet Molecular Weight	27.80
Stack Gas Velocity,Vs (fpm)	4395.32
Stack Gas Velocity,Vs (mpm)	1339.69
Volumetric Flow Rate (acfm)	6928.12
Volumetric Flow Rate (acmm)	196.204
Volumetric Flow Rate (dscfm)	3531.28
Volumetric Flow Rate (dscmm)	100.006
Percent Isokinetic	101.08
Percent Excess Air	94.23
Fuel Factor,Fo	1.537
Ultimate CO2	13.60

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: INLET
RUN NUMBER: 4.00

SAMPLING PARAMETER	DIOXIN
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.45
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	408.94
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	162.63
Average Meter Pressure (in.H2O)	1.56
Average Meter Temperature (deg. F)	107.64
Moisture Collected (g)	542.60
Carbon Dioxide Concentration (%V)	6.60
Oxygen Concentration (%V)	10.40
Nitrogen Concentration (%V)	83.00
Dry Gas Meter Factor	1.00500
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.64
Standard Metered Volume,Vm(std) (dscf)	152.70
Standard Metered Volume,Vm(std) (dscm)	4.324
Standard Volume Water Vapor,Vw (scf)	25.58
Standard Volume Water Vapor,Vw (scm)	0.725
Stack Moisture (%V)	14.35
Mole Fraction Dry Stack Gas	0.856
Dry Molecular Weight	29.47
Wet Molecular Weight	27.83
Stack Gas Velocity,Vs (fpm)	4142.11
Stack Gas Velocity,Vs (mpm)	1262.52
Volumetric Flow Rate (acfm)	6529.01
Volumetric Flow Rate (acmm)	184.901
Volumetric Flow Rate (dscfm)	3342.86
Volumetric Flow Rate (dscmm)	94.670
Percent Isokinetic	99.57
Percent Excess Air	90.21
Fuel Factor,Fo	1.591
Ultimate CO2	13.14

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Inlet
RUN NUMBER: 5.00

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.98
Absolute Stack Pressure,Ps(in. Hg)	29.50
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	401.22
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	166.93
Average Meter Pressure (in.H2O)	1.57
Average Meter Temperature (deg. F)	106.74
Moisture Collected (g)	530.90
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.80
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	1.01150
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.66
Standard Metered Volume,Vm(std) (dscf)	158.26
Standard Metered Volume,Vm(std) (dscm)	4.482
Standard Volume Water Vapor,Vw (scf)	25.03
Standard Volume Water Vapor,Vw (scm)	0.709
Stack Moisture (%V)	13.66
Mole Fraction Dry Stack Gas	0.863
Dry Molecular Weight	29.47
Wet Molecular Weight	27.91
Stack Gas Velocity,Vs (fpm)	4155.22
Stack Gas Velocity,Vs (mpm)	1266.51
Volumetric Flow Rate (acfm)	6549.67
Volumetric Flow Rate (acmm)	185.487
Volumetric Flow Rate (dscfm)	3416.35
Volumetric Flow Rate (dscmm)	96.751
Percent Isokinetic	100.97
Percent Excess Air	97.74
Fuel Factor,Fo	1.554
Ultimate CO2	13.45

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Inlet
RUN NUMBER: 6

SAMPLING PARAMETER	MM5
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.90
Absolute Stack Pressure,Ps(in. Hg)	29.48
Stack Static Pressure (in. H2O)	-5.80
Average Stack Temperature (deg. F)	407.10
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	173.09
Average Meter Pressure (in.H2O)	1.63
Average Meter Temperature (deg. F)	107.80
Moisture Collected (g)	526.60
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.70
Nitrogen Concentration (%V)	82.80
Dry Gas Meter Factor	1.00000
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.67
Standard Metered Volume,Vm(std) (dscf)	161.52
Standard Metered Volume,Vm(std) (dscm)	4.574
Standard Volume Water Vapor,Vw (scf)	24.83
Standard Volume Water Vapor,Vw (scm)	0.703
Stack Moisture (%V)	13.32
Mole Fraction Dry Stack Gas	0.867
Dry Molecular Weight	29.47
Wet Molecular Weight	27.94
Stack Gas Velocity,Vs (fpm)	4265.15
Stack Gas Velocity,Vs (mpm)	1300.02
Volumetric Flow Rate (acfm)	6722.95
Volumetric Flow Rate (acmm)	190.394
Volumetric Flow Rate (dscfm)	3493.88
Volumetric Flow Rate (dscmm)	98.947
Percent Isokinetic	100.77
Percent Excess Air	95.74
Fuel Factor,Fo	1.569
Ultimate CO2	13.32

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Outlet
RUN NUMBER:1

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.04
Absolute Stack Pressure,Ps(in. Hg)	30.03
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	279.25
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	128.69
Average Meter Pressure (in.H2O)	1.02
Average Meter Temperature (deg. F)	102.89
Moisture Collected (g)	449.90
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.51
Standard Metered Volume,Vm(std) (dscf)	123.43
Standard Metered Volume,Vm(std) (dscm)	3.495
Standard Volume Water Vapor,Vw (scf)	21.21
Standard Volume Water Vapor,Vw (scm)	0.601
Stack Moisture (%V)	14.67
Mole Fraction Dry Stack Gas	0.853
Dry Molecular Weight	29.36
Wet Molecular Weight	27.70
Stack Gas Velocity,Vs (fpm)	3958.81
Stack Gas Velocity,Vs (mpm)	1206.65
Volumetric Flow Rate (acfm)	7794.70
Volumetric Flow Rate (acmm)	220.746
Volumetric Flow Rate (dscfm)	4765.39
Volumetric Flow Rate (dscmm)	134.956
Percent Isokinetic	92.66
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Outlet
RUN NUMBER: 2.00

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.00
Absolute Stack Pressure,Ps(in. Hg)	29.99
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	292.13
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	137.35
Average Meter Pressure (in.H2O)	1.20
Average Meter Temperature (deg. F)	105.32
Moisture Collected (g)	479.00
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.55
Standard Metered Volume,Vm(std) (dscf)	131.05
Standard Metered Volume,Vm(std) (dscm)	3.711
Standard Volume Water Vapor,Vw (scf)	22.58
Standard Volume Water Vapor,Vw (scm)	0.640
Stack Moisture (%V)	14.70
Mole Fraction Dry Stack Gas	0.853
Dry Molecular Weight	29.36
Wet Molecular Weight	27.69
Stack Gas Velocity,Vs (fpm)	4206.68
Stack Gas Velocity,Vs (mpm)	1282.20
Volumetric Flow Rate (acfm)	8282.74
Volumetric Flow Rate (acmm)	234.567
Volumetric Flow Rate (dscfm)	4968.44
Volumetric Flow Rate (dscmm)	140.706
Percent Isokinetic	94.37
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Outlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	M23
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.84
Absolute Stack Pressure,Ps(in. Hg)	29.84
Stack Static Pressure (in. H2O)	0.10
Average Stack Temperature (deg. F)	292.50
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	138.68
Average Meter Pressure (in.H2O)	1.21
Average Meter Temperature (deg. F)	106.18
Moisture Collected (g)	475.20
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.40
Nitrogen Concentration (%V)	81.30
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.55
Standard Metered Volume,Vm(std) (dscf)	131.42
Standard Metered Volume,Vm(std) (dscm)	3.722
Standard Volume Water Vapor,Vw (scf)	22.41
Standard Volume Water Vapor,Vw (scm)	0.635
Stack Moisture (%V)	14.57
Mole Fraction Dry Stack Gas	0.854
Dry Molecular Weight	29.38
Wet Molecular Weight	27.73
Stack Gas Velocity,Vs (fpm)	4211.99
Stack Gas Velocity,Vs (mpm)	1283.82
Volumetric Flow Rate (acfm)	8293.20
Volumetric Flow Rate (acmm)	234.863
Volumetric Flow Rate (dscfm)	4955.99
Volumetric Flow Rate (dscmm)	140.354
Percent Isokinetic	94.87
Percent Excess Air	165.85
Fuel Factor,Fo	1.415
Ultimate CO2	14.77

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: Outlet
RUN NUMBER: 4.00

SAMPLING PARAMETER M23	
Total Sampling Time (min.)	236.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.95
Stack Static Pressure (in. H2O)	0.11
Average Stack Temperature (deg. F)	292.84
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	136.31
Average Meter Pressure (in.H2O)	1.20
Average Meter Temperature (deg. F)	109.90
Moisture Collected (g)	480.70
Carbon Dioxide Concentration (%V)	5.20
Oxygen Concentration (%V)	13.80
Nitrogen Concentration (%V)	81.00
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.55
Standard Metered Volume,Vm(std) (dscf)	128.75
Standard Metered Volume,Vm(std) (dscm)	3.646
Standard Volume Water Vapor,Vw (scf)	22.67
Standard Volume Water Vapor,Vw (scm)	0.642
Stack Moisture (%V)	14.97
Mole Fraction Dry Stack Gas	0.850
Dry Molecular Weight	29.38
Wet Molecular Weight	27.68
Stack Gas Velocity,Vs (fpm)	4122.90
Stack Gas Velocity,Vs (mpm)	1256.66
Volumetric Flow Rate (acfm)	8117.79
Volumetric Flow Rate (acmm)	229.896
Volumetric Flow Rate (dscfm)	4842.41
Volumetric Flow Rate (dscmm)	137.137
Percent Isokinetic	96.74
Percent Excess Air	181.57
Fuel Factor,Fo	1.365
Ultimate CO2	15.31

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Outlet
RUN NUMBER: 5.00

SAMPLING PARAMETER	M23
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	30.00
Stack Static Pressure (in. H2O)	0.11
Average Stack Temperature (deg. F)	291.35
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	140.56
Average Meter Pressure (in.H2O)	1.07
Average Meter Temperature (deg. F)	105.03
Moisture Collected (g)	435.80
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	13.60
Nitrogen Concentration (%V)	81.40
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	134.09
Standard Metered Volume,Vm(std) (dscm)	3.797
Standard Volume Water Vapor,Vw (scf)	20.55
Standard Volume Water Vapor,Vw (scm)	0.582
Stack Moisture (%V)	13.29
Mole Fraction Dry Stack Gas	0.867
Dry Molecular Weight	29.34
Wet Molecular Weight	27.84
Stack Gas Velocity,Vs (fpm)	4205.43
Stack Gas Velocity,Vs (mpm)	1281.82
Volumetric Flow Rate (acfm)	8280.28
Volumetric Flow Rate (acmm)	234.498
Volumetric Flow Rate (dscfm)	5055.37
Volumetric Flow Rate (dscmm)	143.168
Percent Isokinetic	94.89
Percent Excess Air	172.02
Fuel Factor,Fo	1.460
Ultimate CO2	14.32

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Outlet
RUN NUMBER: 6

SAMPLING PARAMETER	MM5
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.91
Absolute Stack Pressure,Ps(in. Hg)	29.92
Stack Static Pressure (in. H2O)	0.17
Average Stack Temperature (deg. F)	291.60
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	140.80
Average Meter Pressure (in.H2O)	1.26
Average Meter Temperature (deg. F)	104.24
Moisture Collected (g)	434.90
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.50
Nitrogen Concentration (%V)	81.20
Dry Gas Meter Factor	1.01590
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	134.21
Standard Metered Volume,Vm(std) (dscm)	3.801
Standard Volume Water Vapor,Vw (scf)	20.51
Standard Volume Water Vapor,Vw (scm)	0.581
Stack Moisture (%V)	13.25
Mole Fraction Dry Stack Gas	0.867
Dry Molecular Weight	29.39
Wet Molecular Weight	27.88
Stack Gas Velocity,Vs (fpm)	4150.93
Stack Gas Velocity,Vs (mpm)	1265.20
Volumetric Flow Rate (acfm)	8172.97
Volumetric Flow Rate (acmm)	231.458
Volumetric Flow Rate (dscfm)	4977.57
Volumetric Flow Rate (dscmm)	140.965
Percent Isokinetic	96.47
Percent Excess Air	169.75
Fuel Factor,Fo	1.396
Ultimate CO2	14.97

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Inlet
RUN NUMBER: 1

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.03
Absolute Stack Pressure,Ps(in. Hg)	29.55
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	407.50
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	122.88
Average Meter Pressure (in.H2O)	0.82
Average Meter Temperature (deg. F)	159.56
Moisture Collected (g)	433.00
Carbon Dioxide Concentration (%V)	6.40
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	82.50
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	2.41300
Average Sampling Rate (dscfm)	0.44
Standard Metered Volume,Vm(std) (dscf)	105.44
Standard Metered Volume,Vm(std) (dscm)	2.986
Standard Volume Water Vapor,Vw (scf)	20.42
Standard Volume Water Vapor,Vw (scm)	0.578
Stack Moisture (%V)	16.22
Mole Fraction Dry Stack Gas	0.838
Dry Molecular Weight	29.47
Wet Molecular Weight	27.61
Stack Gas Velocity,Vs (fpm)	4550.85
Stack Gas Velocity,Vs (mpm)	1387.10
Volumetric Flow Rate (acfm)	7173.28
Volumetric Flow Rate (acmm)	203.147
Volumetric Flow Rate (dscfm)	3610.34
Volumetric Flow Rate (dscmm)	102.245
Percent Isokinetic	96.37
Percent Excess Air	103.77
Fuel Factor,Fo	1.531
Ultimate CO2	13.65
Concentration of Particulate (grains/acf)	0.17775
Concentration of Particulate (g/acm)	0.40671
Concentration of Particulate (grains/dscf)	0.35317
Concentration of Particulate (g/dscm)	0.80807
Concentration of Particulate (grains/dscf @12% CO2)	0.66219

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Inlet
RUN NUMBER: 2.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	29.51
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	407.92
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	122.37
Average Meter Pressure (in.H2O)	0.81
Average Meter Temperature (deg. F)	157.72
Moisture Collected (g)	422.00
Carbon Dioxide Concentration (%V)	7.80
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	81.10
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	2.53730

Average Sampling Rate (dscfm)	0.44
Standard Metered Volume,Vm(std) (dscf)	105.17
Standard Metered Volume,Vm(std) (dscm)	2.978
Standard Volume Water Vapor,Vw (scf)	19.90
Standard Volume Water Vapor,Vw (scm)	0.563
Stack Moisture (%V)	15.91
Mole Fraction Dry Stack Gas	0.841
Dry Molecular Weight	29.69
Wet Molecular Weight	27.83
Stack Gas Velocity,Vs (fpm)	4452.15
Stack Gas Velocity,Vs (mpm)	1357.02
Volumetric Flow Rate (acfm)	7017.70
Volumetric Flow Rate (acmm)	198.741
Volumetric Flow Rate (dscfm)	3538.71
Volumetric Flow Rate (dscmm)	100.216
Percent Isokinetic	98.07
Percent Excess Air	107.49
Fuel Factor,Fo	1.256
Ultimate CO2	16.63
Concentration of Particulate (grains/acf)	0.18774
Concentration of Particulate (g/acm)	0.42957
Concentration of Particulate (grains/dscf)	0.37231
Concentration of Particulate (g/dscm)	0.85189
Concentration of Particulate (grains/dscf @12% CO2)	0.57279

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Inlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.83
Absolute Stack Pressure,Ps(in. Hg)	29.35
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	406.85
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	129.65
Average Meter Pressure (in.H2O)	0.92
Average Meter Temperature (deg. F)	155.90
Moisture Collected (g)	444.00
Carbon Dioxide Concentration (%V)	6.70
Oxygen Concentration (%V)	10.60
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	2.40530
Average Sampling Rate (dscfm)	0.46
Standard Metered Volume,Vm(std) (dscf)	111.20
Standard Metered Volume,Vm(std) (dscm)	3.149
Standard Volume Water Vapor,Vw (scf)	20.93
Standard Volume Water Vapor,Vw (scm)	0.593
Stack Moisture (%V)	15.84
Mole Fraction Dry Stack Gas	0.842
Dry Molecular Weight	29.50
Wet Molecular Weight	27.67
Stack Gas Velocity,Vs (fpm)	4760.93
Stack Gas Velocity,Vs (mpm)	1451.13
Volumetric Flow Rate (acfm)	7504.42
Volumetric Flow Rate (acmm)	212.525
Volumetric Flow Rate (dscfm)	3771.17
Volumetric Flow Rate (dscmm)	106.800
Percent Isokinetic	97.29
Percent Excess Air	94.23
Fuel Factor,Fo	1.537
Ultimate CO2	13.60
Concentration of Particulate (grains/acf)	0.16775
Concentration of Particulate (g/acm)	0.38383
Concentration of Particulate (grains/dscf)	0.33382
Concentration of Particulate (g/dscm)	0.76381
Concentration of Particulate (grains/dscf @12% CO2)	0.59789

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: INLET
RUN NUMBER: 4.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.45
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	399.38
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	159.41
Average Meter Pressure (in.H2O)	1.44
Average Meter Temperature (deg. F)	159.94
Moisture Collected (g)	555.30
Carbon Dioxide Concentration (%V)	6.60
Oxygen Concentration (%V)	10.40
Nitrogen Concentration (%V)	83.00
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	3.70790
Average Sampling Rate (dscfm)	0.57
Standard Metered Volume,Vm(std) (dscf)	136.47
Standard Metered Volume,Vm(std) (dscm)	3.865
Standard Volume Water Vapor,Vw (scf)	26.18
Standard Volume Water Vapor,Vw (scm)	0.741
Stack Moisture (%V)	16.10
Mole Fraction Dry Stack Gas	0.839
Dry Molecular Weight	29.47
Wet Molecular Weight	27.63
Stack Gas Velocity,Vs (fpm)	4610.55
Stack Gas Velocity,Vs (mpm)	1405.29
Volumetric Flow Rate (acfm)	7267.38
Volumetric Flow Rate (acmm)	205.812
Volumetric Flow Rate (dscfm)	3685.55
Volumetric Flow Rate (dscmm)	104.375
Percent Isokinetic	95.53
Percent Excess Air	90.21
Fuel Factor,Fo	1.591
Ultimate CO2	13.14
Concentration of Particulate (grains/acf)	0.21265
Concentration of Particulate (g/acm)	0.48656
Concentration of Particulate (grains/dscf)	0.41931
Concentration of Particulate (g/dscm)	0.95942
Concentration of Particulate (grains/dscf @12% CO2)	0.76239

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Inlet
RUN NUMBER: 5.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.98
Absolute Stack Pressure,Ps(in. Hg)	29.50
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	408.56
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	160.40
Average Meter Pressure (in.H2O)	1.48
Average Meter Temperature (deg. F)	147.00
Moisture Collected (g)	498.10
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.80
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	3.12500
Average Sampling Rate (dscfm)	0.59
Standard Metered Volume,Vm(std) (dscf)	140.48
Standard Metered Volume,Vm(std) (dscm)	3.978
Standard Volume Water Vapor,Vw (scf)	23.49
Standard Volume Water Vapor,Vw (scm)	0.665
Stack Moisture (%V)	14.32
Mole Fraction Dry Stack Gas	0.857
Dry Molecular Weight	29.47
Wet Molecular Weight	27.83
Stack Gas Velocity,Vs (fpm)	4730.55
Stack Gas Velocity,Vs (mpm)	1441.87
Volumetric Flow Rate (acfm)	7456.52
Volumetric Flow Rate (acmm)	211.169
Volumetric Flow Rate (dscfm)	3826.77
Volumetric Flow Rate (dscmm)	108.374
Percent Isokinetic	94.71
Percent Excess Air	97.74
Fuel Factor,Fo	1.554
Ultimate CO2	13.45
Concentration of Particulate (grains/acf)	0.17619
Concentration of Particulate (g/acm)	0.40313
Concentration of Particulate (grains/dscf)	0.34330
Concentration of Particulate (g/dscm)	0.78550
Concentration of Particulate (grains/dscf @12% CO2)	0.63379

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Inlet
RUN NUMBER:6

SAMPLING PARAMETER TM	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.90
Absolute Stack Pressure,Ps(in. Hg)	29.48
Stack Static Pressure (in. H2O)	-5.80
Average Stack Temperature (deg. F)	406.98
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	157.88
Average Meter Pressure (in.H2O)	1.42
Average Meter Temperature (deg. F)	152.43
Moisture Collected (g)	486.70
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.70
Nitrogen Concentration (%V)	82.80
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Particulate Catch (g)	2.84380
Average Sampling Rate (dscfm)	0.57
Standard Metered Volume,Vm(std) (dscf)	136.66
Standard Metered Volume,Vm(std) (dscm)	3.870
Standard Volume Water Vapor,Vw (scf)	22.95
Standard Volume Water Vapor,Vw (scm)	0.650
Stack Moisture (%V)	14.38
Mole Fraction Dry Stack Gas	0.856
Dry Molecular Weight	29.47
Wet Molecular Weight	27.82
Stack Gas Velocity,Vs (fpm)	4581.36
Stack Gas Velocity,Vs (mpm)	1396.40
Volumetric Flow Rate (acfm)	7221.36
Volumetric Flow Rate (acmm)	204.509
Volumetric Flow Rate (dscfm)	3707.81
Volumetric Flow Rate (dscmm)	105.005
Percent Isokinetic	95.09
Percent Excess Air	95.74
Fuel Factor,Fo	1.569
Ultimate CO2	13.32
Concentration of Particulate (grains/acf)	0.16489
Concentration of Particulate (g/acm)	0.37729
Concentration of Particulate (grains/dscf)	0.32115
Concentration of Particulate (g/dscm)	0.73481
Concentration of Particulate (grains/dscf @12% CO2)	0.59288

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Outlet
RUN NUMBER: 1

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.04
Absolute Stack Pressure,Ps(in. Hg)	30.03
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	284.56
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	130.57
Average Meter Pressure (in.H2O)	1.06
Average Meter Temperature (deg. F)	92.28
Moisture Collected (g)	458.10
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.00330
Average Sampling Rate (dscfm)	0.52
Standard Metered Volume,Vm(std) (dscf)	125.48
Standard Metered Volume,Vm(std) (dscm)	3.554
Standard Volume Water Vapor,Vw (scf)	21.60
Standard Volume Water Vapor,Vw (scm)	0.612
Stack Moisture (%V)	14.69
Mole Fraction Dry Stack Gas	0.853
Dry Molecular Weight	29.36
Wet Molecular Weight	27.70
Stack Gas Velocity,Vs (fpm)	3909.37
Stack Gas Velocity,Vs (mpm)	1191.57
Volumetric Flow Rate (acfm)	7697.35
Volumetric Flow Rate (acmm)	217.989
Volumetric Flow Rate (dscfm)	4671.23
Volumetric Flow Rate (dscmm)	132.289
Percent Isokinetic	100.97
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37
Concentration of Particulate (grains/acf)	0.00025
Concentration of Particulate (g/acm)	0.00056
Concentration of Particulate (grains/dscf)	0.00041
Concentration of Particulate (g/dscm)	0.00093
Concentration of Particulate (grains/dscf @12% CO2)	0.00097

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Outlet
RUN NUMBER: 2.00

SAMPLING PARAMETER TM	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.00
Absolute Stack Pressure,Ps(in. Hg)	29.99
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	285.35
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	133.18
Average Meter Pressure (in.H2O)	1.07
Average Meter Temperature (deg. F)	94.15
Moisture Collected (g)	378.30
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.00460
Average Sampling Rate (dscfm)	0.53
Standard Metered Volume,Vm(std) (dscf)	127.39
Standard Metered Volume,Vm(std) (dscm)	3.608
Standard Volume Water Vapor,Vw (scf)	17.84
Standard Volume Water Vapor,Vw (scm)	0.505
Stack Moisture (%V)	12.28
Mole Fraction Dry Stack Gas	0.877
Dry Molecular Weight	29.36
Wet Molecular Weight	27.97
Stack Gas Velocity,Vs (fpm)	3884.66
Stack Gas Velocity,Vs (mpm)	1184.04
Volumetric Flow Rate (acfm)	7648.70
Volumetric Flow Rate (acmm)	216.611
Volumetric Flow Rate (dscfm)	4761.05
Volumetric Flow Rate (dscmm)	134.833
Percent Isokinetic	97.62
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37
Concentration of Particulate (grains/acf)	0.00035
Concentration of Particulate (g/acm)	0.00079
Concentration of Particulate (grains/dscf)	0.00056
Concentration of Particulate (g/dscm)	0.00128
Concentration of Particulate (grains/dscf @12% CO2)	0.00134

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Outlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.84
Absolute Stack Pressure,Ps(in. Hg)	29.83
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	285.21
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	138.93
Average Meter Pressure (in.H2O)	1.12
Average Meter Temperature (deg. F)	94.68
Moisture Collected (g)	495.70
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.40
Nitrogen Concentration (%V)	81.30
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.04310
Average Sampling Rate (dscfm)	0.55
Standard Metered Volume,Vm(std) (dscf)	132.08
Standard Metered Volume,Vm(std) (dscm)	3.740
Standard Volume Water Vapor,Vw (scf)	23.37
Standard Volume Water Vapor,Vw (scm)	0.662
Stack Moisture (%V)	15.04
Mole Fraction Dry Stack Gas	0.850
Dry Molecular Weight	29.38
Wet Molecular Weight	27.67
Stack Gas Velocity,Vs (fpm)	4031.88
Stack Gas Velocity,Vs (mpm)	1228.92
Volumetric Flow Rate (acfm)	7938.58
Volumetric Flow Rate (acmm)	224.821
Volumetric Flow Rate (dscfm)	4761.83
Volumetric Flow Rate (dscmm)	134.855
Percent Isokinetic	99.23
Percent Excess Air	165.85
Fuel Factor,Fo	1.415
Ultimate CO2	14.77
Concentration of Particulate (grains/acf)	0.00302
Concentration of Particulate (g/acm)	0.00691
Concentration of Particulate (grains/dscf)	0.00504
Concentration of Particulate (g/dscm)	0.01152
Concentration of Particulate (grains/dscf @12% CO2)	0.01140

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: Outlet
RUN NUMBER: 4.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	239.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.95
Stack Static Pressure (in. H2O)	0.11
Average Stack Temperature (deg. F)	288.91
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	140.79
Average Meter Pressure (in.H2O)	1.14
Average Meter Temperature (deg. F)	97.82
Moisture Collected (g)	487.90
Carbon Dioxide Concentration (%V)	5.20
Oxygen Concentration (%V)	13.80
Nitrogen Concentration (%V)	81.00
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.00280
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	133.54
Standard Metered Volume,Vm(std) (dscm)	3.782
Standard Volume Water Vapor,Vw (scf)	23.00
Standard Volume Water Vapor,Vw (scm)	0.651
Stack Moisture (%V)	14.70
Mole Fraction Dry Stack Gas	0.853
Dry Molecular Weight	29.38
Wet Molecular Weight	27.71
Stack Gas Velocity,Vs (fpm)	4012.89
Stack Gas Velocity,Vs (mpm)	1223.13
Volumetric Flow Rate (acfm)	7901.17
Volumetric Flow Rate (acmm)	223.761
Volumetric Flow Rate (dscfm)	4753.14
Volumetric Flow Rate (dscmm)	134.609
Percent Isokinetic	100.94
Percent Excess Air	181.57
Fuel Factor,Fo	1.365
Ultimate CO2	15.31
Concentration of Particulate (grains/acf)	0.00019
Concentration of Particulate (g/acm)	0.00045
Concentration of Particulate (grains/dscf)	0.00032
Concentration of Particulate (g/dscm)	0.00074
Concentration of Particulate (grains/dscf @12% CO2)	0.00075

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Outlet
RUN NUMBER: 5.00

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	30.00
Stack Static Pressure (in. H2O)	0.14
Average Stack Temperature (deg. F)	270.43
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	141.54
Average Meter Pressure (in.H2O)	1.22
Average Meter Temperature (deg. F)	94.89
Moisture Collected (g)	453.90
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	13.60
Nitrogen Concentration (%V)	81.40
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.00830
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	135.21
Standard Metered Volume,Vm(std) (dscm)	3.829
Standard Volume Water Vapor,Vw (scf)	21.40
Standard Volume Water Vapor,Vw (scm)	0.606
Stack Moisture (%V)	13.67
Mole Fraction Dry Stack Gas	0.863
Dry Molecular Weight	29.34
Wet Molecular Weight	27.79
Stack Gas Velocity,Vs (fpm)	4090.10
Stack Gas Velocity,Vs (mpm)	1246.66
Volumetric Flow Rate (acfm)	8053.20
Volumetric Flow Rate (acmm)	228.067
Volumetric Flow Rate (dscfm)	5035.88
Volumetric Flow Rate (dscmm)	142.616
Percent Isokinetic	96.06
Percent Excess Air	172.02
Fuel Factor,Fo	1.460
Ultimate CO2	14.32
Concentration of Particulate (grains/acf)	0.00059
Concentration of Particulate (g/acm)	0.00136
Concentration of Particulate (grains/dscf)	0.00095
Concentration of Particulate (g/dscm)	0.00217
Concentration of Particulate (grains/dscf @12% CO2)	0.00227

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Outlet
RUN NUMBER: 6

SAMPLING PARAMETER	TM
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.91
Absolute Stack Pressure,Ps(in. Hg)	29.92
Stack Static Pressure (in. H2O)	0.17
Average Stack Temperature (deg. F)	286.90
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	143.17
Average Meter Pressure (in.H2O)	1.22
Average Meter Temperature (deg. F)	94.51
Moisture Collected (g)	395.70
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.50
Nitrogen Concentration (%V)	81.20
Dry Gas Meter Factor	0.99870
Pitot Constant	0.84
Particulate Catch (g)	0.00410
Average Sampling Rate (dscfm)	0.57
Standard Metered Volume,Vm(std) (dscf)	136.50
Standard Metered Volume,Vm(std) (dscm)	3.866
Standard Volume Water Vapor,Vw (scf)	18.66
Standard Volume Water Vapor,Vw (scm)	0.528
Stack Moisture (%V)	12.02
Mole Fraction Dry Stack Gas	0.880
Dry Molecular Weight	29.39
Wet Molecular Weight	28.02
Stack Gas Velocity,Vs (fpm)	4095.47
Stack Gas Velocity,Vs (mpm)	1248.30
Volumetric Flow Rate (acfm)	8063.78
Volumetric Flow Rate (acmm)	228.366
Volumetric Flow Rate (dscfm)	5012.03
Volumetric Flow Rate (dscmm)	141.941
Percent Isokinetic	102.37
Percent Excess Air	169.75
Fuel Factor,Fo	1.396
Ultimate CO2	14.97
Concentration of Particulate (grains/acf)	0.00029
Concentration of Particulate (g/acm)	0.00066
Concentration of Particulate (grains/dscf)	0.00046
Concentration of Particulate (g/dscm)	0.00106
Concentration of Particulate (grains/dscf @12% CO2)	0.00105

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Inlet
RUN NUMBER: 1

SAMPLING PARAMETER M101A	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.03
Absolute Stack Pressure,Ps(in. Hg)	29.55
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	409.08
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	110.80
Average Meter Pressure (in.H2O)	0.67
Average Meter Temperature (deg. F)	115.31
Moisture Collected (g)	403.40
Carbon Dioxide Concentration (%V)	6.40
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	82.50
Dry Gas Meter Factor	1.00750
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.43
Standard Metered Volume,Vm(std) (dscf)	103.01
Standard Metered Volume,Vm(std) (dscm)	2.917
Standard Volume Water Vapor,Vw (scf)	19.02
Standard Volume Water Vapor,Vw (scm)	0.539
Stack Moisture (%V)	15.59
Mole Fraction Dry Stack Gas	0.844
Dry Molecular Weight	29.47
Wet Molecular Weight	27.68
Stack Gas Velocity,Vs (fpm)	4252.98
Stack Gas Velocity,Vs (mpm)	1296.31
Volumetric Flow Rate (acfm)	6703.76
Volumetric Flow Rate (acmm)	189.850
Volumetric Flow Rate (dscfm)	3393.42
Volumetric Flow Rate (dscmm)	96.102
Percent Isokinetic	101.22
Percent Excess Air	103.77
Fuel Factor,Fo	1.531
Ultimate CO2	13.65

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Inlet
RUN NUMBER: 2.00

SAMPLING PARAMETER M101A	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	29.51
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	409.67
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	114.39
Average Meter Pressure (in.H2O)	0.73
Average Meter Temperature (deg. F)	115.72
Moisture Collected (g)	405.90
Carbon Dioxide Concentration (%V)	7.80
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	81.10
Dry Gas Meter Factor	1.00750
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.44
Standard Metered Volume,Vm(std) (dscf)	106.15
Standard Metered Volume,Vm(std) (dscm)	3.006
Standard Volume Water Vapor,Vw (scf)	19.14
Standard Volume Water Vapor,Vw (scm)	0.542
Stack Moisture (%V)	15.28
Mole Fraction Dry Stack Gas	0.847
Dry Molecular Weight	29.69
Wet Molecular Weight	27.91
Stack Gas Velocity,Vs (fpm)	4312.54
Stack Gas Velocity,Vs (mpm)	1314.46
Volumetric Flow Rate (acfm)	6797.64
Volumetric Flow Rate (acmm)	192.509
Volumetric Flow Rate (dscfm)	3446.61
Volumetric Flow Rate (dscmm)	97.608
Percent Isokinetic	102.69
Percent Excess Air	107.49
Fuel Factor,Fo	1.256
Ultimate CO2	16.63

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Inlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	M101A
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.83
Absolute Stack Pressure,Ps(in. Hg)	29.35
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg F)	409.77
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	112.49
Average Meter Pressure (in.H2O)	0.72
Average Meter Temperature (deg. F)	120.97
Moisture Collected (g)	359.20
Carbon Dioxide Concentration (%V)	6.70
Oxygen Concentration (%V)	10.60
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	1.00750
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.43
Standard Metered Volume,Vm(std) (dscf)	102.89
Standard Metered Volume,Vm(std) (dscm)	2.914
Standard Volume Water Vapor,Vw (scf)	16.94
Standard Volume Water Vapor,Vw (scm)	0.480
Stack Moisture (%V)	14.13
Mole Fraction Dry Stack Gas	0.859
Dry Molecular Weight	29.50
Wet Molecular Weight	27.87
Stack Gas Velocity,Vs (fpm)	4311.59
Stack Gas Velocity,Vs (mpm)	1314.17
Volumetric Flow Rate (acfm)	6796.14
Volumetric Flow Rate (acmm)	192.467
Volumetric Flow Rate (dscfm)	3472.94
Volumetric Flow Rate (dscmm)	98.354
Percent Isokinetic	98.79
Percent Excess Air	94.23
Fuel Factor,Fo	1.537
Ultimate CO2	13.60

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: INLET
RUN NUMBER: 4.00

SAMPLING PARAMETER	Hg
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.45
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	412.25
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	116.45
Average Meter Pressure (in.H2O)	0.77
Average Meter Temperature (deg. F)	128.29
Moisture Collected (g)	350.90
Carbon Dioxide Concentration (%V)	6.60
Oxygen Concentration (%V)	10.40
Nitrogen Concentration (%V)	83.00
Dry Gas Meter Factor	1.00750
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.44
Standard Metered Volume,Vm(std) (dscf)	105.56
Standard Metered Volume,Vm(std) (dscm)	2.990
Standard Volume Water Vapor,Vw (scf)	16.54
Standard Volume Water Vapor,Vw (scm)	0.469
Stack Moisture (%V)	13.55
Mole Fraction Dry Stack Gas	0.865
Dry Molecular Weight	29.47
Wet Molecular Weight	27.92
Stack Gas Velocity,Vs (fpm)	4483.94
Stack Gas Velocity,Vs (mpm)	1366.71
Volumetric Flow Rate (acfm)	7067.82
Volumetric Flow Rate (acmm)	200.161
Volumetric Flow Rate (dscfm)	3638.69
Volumetric Flow Rate (dscmm)	103.048
Percent Isokinetic	96.74
Percent Excess Air	90.21
Fuel Factor,Fo	1.591
Ultimate CO2	13.14

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Inlet
RUN NUMBER: 5.00

SAMPLING PARAMETER M101A	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.98
Absolute Stack Pressure,Ps(in. Hg)	29.50
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	410.13
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	110.72
Average Meter Pressure (in.H2O)	0.65
Average Meter Temperature (deg. F)	115.95
Moisture Collected (g)	346.70
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.80
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	0.99680
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.42
Standard Metered Volume,Vm(std) (dscf)	101.56
Standard Metered Volume,Vm(std) (dscm)	2.876
Standard Volume Water Vapor,Vw (scf)	16.35
Standard Volume Water Vapor,Vw (scm)	0.463
Stack Moisture (%V)	13.86
Mole Fraction Dry Stack Gas	0.861
Dry Molecular Weight	29.47
Wet Molecular Weight	27.88
Stack Gas Velocity,Vs (fpm)	4214.94
Stack Gas Velocity,Vs (mpm)	1284.71
Volumetric Flow Rate (acfm)	6643.80
Volumetric Flow Rate (acmm)	188.152
Volumetric Flow Rate (dscfm)	3421.74
Volumetric Flow Rate (dscmm)	96.904
Percent Isokinetic	98.96
Percent Excess Air	97.74
Fuel Factor,Fo	1.554
Ultimate CO2	13.45

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Inlet
RUN NUMBER: 6

SAMPLING PARAMETER	HG
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.90
Absolute Stack Pressure,Ps(in. Hg)	29.48
Stack Static Pressure (in. H2O)	-5.80
Average Stack Temperature (deg. F)	407.06
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	111.52
Average Meter Pressure (in.H2O)	0.67
Average Meter Temperature (deg. F)	119.06
Moisture Collected (g)	356.70
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.70
Nitrogen Concentration (%V)	82.80
Dry Gas Meter Factor	0.99680
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.42
Standard Metered Volume,Vm(std) (dscf)	101.48
Standard Metered Volume,Vm(std) (dscm)	2.874
Standard Volume Water Vapor,Vw (scf)	16.82
Standard Volume Water Vapor,Vw (scm)	0.476
Stack Moisture (%V)	14.22
Mole Fraction Dry Stack Gas	0.858
Dry Molecular Weight	29.47
Wet Molecular Weight	27.84
Stack Gas Velocity,Vs (fpm)	4266.54
Stack Gas Velocity,Vs (mpm)	1300.44
Volumetric Flow Rate (acfm)	6725.14
Volumetric Flow Rate (acmm)	190.456
Volumetric Flow Rate (dscfm)	3459.18
Volumetric Flow Rate (dscmm)	97.964
Percent Isokinetic	97.82
Percent Excess Air	95.74
Fuel Factor,Fo	1.569
Ultimate CO2	13.32

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Outlet
RUN NUMBER:1

SAMPLING PARAMETER	M101A
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.04
Absolute Stack Pressure,Ps(in. Hg)	30.03
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	284.56
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	136.77
Average Meter Pressure (in.H2O)	0.96
Average Meter Temperature (deg. F)	92.31
Moisture Collected (g)	458.30
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.54
Standard Metered Volume,Vm(std) (dscf)	129.16
Standard Metered Volume,Vm(std) (dscm)	3.658
Standard Volume Water Vapor,Vw (scf)	21.61
Standard Volume Water Vapor,Vw (scm)	0.612
Stack Moisture (%V)	14.33
Mole Fraction Dry Stack Gas	0.857
Dry Molecular Weight	29.36
Wet Molecular Weight	27.74
Stack Gas Velocity,Vs (fpm)	3906.54
Stack Gas Velocity,Vs (mpm)	1190.71
Volumetric Flow Rate (acfm)	7691.77
Volumetric Flow Rate (acmm)	217.831
Volumetric Flow Rate (dscfm)	4687.18
Volumetric Flow Rate (dscmm)	132.741
Percent Isokinetic	97.63
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Outlet
RUN NUMBER: 2.00

SAMPLING PARAMETER M101A	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	30.00
Absolute Stack Pressure,Ps(in. Hg)	29.99
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	285.35
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	137.14
Average Meter Pressure (in.H2O)	0.95
Average Meter Temperature (deg. F)	94.15
Moisture Collected (g)	461.60
Carbon Dioxide Concentration (%V)	5.00
Oxygen Concentration (%V)	14.10
Nitrogen Concentration (%V)	80.90
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.54
Standard Metered Volume,Vm(std) (dscf)	128.91
Standard Metered Volume,Vm(std) (dscm)	3.651
Standard Volume Water Vapor,Vw (scf)	21.76
Standard Volume Water Vapor,Vw (scm)	0.616
Stack Moisture (%V)	14.44
Mole Fraction Dry Stack Gas	0.856
Dry Molecular Weight	29.36
Wet Molecular Weight	27.72
Stack Gas Velocity,Vs (fpm)	3901.84
Stack Gas Velocity,Vs (mpm)	1189.28
Volumetric Flow Rate (acfm)	7682.52
Volumetric Flow Rate (acmm)	217.569
Volumetric Flow Rate (dscfm)	4664.20
Volumetric Flow Rate (dscmm)	132.090
Percent Isokinetic	98.88
Percent Excess Air	193.85
Fuel Factor,Fo	1.360
Ultimate CO2	15.37

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Outlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	M101A
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.84
Absolute Stack Pressure,Ps(in. Hg)	29.83
Stack Static Pressure (in. H2O)	-0.10
Average Stack Temperature (deg. F)	285.21
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	142.76
Average Meter Pressure (in.H2O)	1.02
Average Meter Temperature (deg. F)	94.68
Moisture Collected (g)	477.00
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.40
Nitrogen Concentration (%V)	81.30
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	133.37
Standard Metered Volume,Vm(std) (dscm)	3.777
Standard Volume Water Vapor,Vw (scf)	22.49
Standard Volume Water Vapor,Vw (scm)	0.637
Stack Moisture (%V)	14.43
Mole Fraction Dry Stack Gas	0.856
Dry Molecular Weight	29.38
Wet Molecular Weight	27.74
Stack Gas Velocity,Vs (fpm)	4026.87
Stack Gas Velocity,Vs (mpm)	1227.39
Volumetric Flow Rate (acfm)	7928.70
Volumetric Flow Rate (acmm)	224.541
Volumetric Flow Rate (dscfm)	4789.81
Volumetric Flow Rate (dscmm)	135.647
Percent Isokinetic	99.62
Percent Excess Air	165.85
Fuel Factor,Fo	1.415
Ultimate CO2	14.77

FACILITY : Morristown Hosp

DATE: 11/21/91
LOCATION: Outlet
RUN NUMBER: 4.00

SAMPLING PARAMETER	M101A
Total Sampling Time (min.)	239.00
Corrected Barometric Pressure (in. Hg)	29.94
Absolute Stack Pressure,Ps(in. Hg)	29.95
Stack Static Pressure (in. H2O)	0.11
Average Stack Temperature (deg. F)	288.91
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	143.35
Average Meter Pressure (in.H2O)	1.02
Average Meter Temperature (deg. F)	97.82
Moisture Collected (g)	484.10
Carbon Dioxide Concentration (%V)	5.20
Oxygen Concentration (%V)	13.80
Nitrogen Concentration (%V)	81.00
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.56
Standard Metered Volume,Vm(std) (dscf)	133.62
Standard Metered Volume,Vm(std) (dscm)	3.784
Standard Volume Water Vapor,Vw (scf)	22.83
Standard Volume Water Vapor,Vw (scm)	0.646
Stack Moisture (%V)	14.59
Mole Fraction Dry Stack Gas	0.854
Dry Molecular Weight	29.38
Wet Molecular Weight	27.72
Stack Gas Velocity,Vs (fpm)	4012.02
Stack Gas Velocity,Vs (mpm)	1222.86
Volumetric Flow Rate (acfm)	7899.47
Volumetric Flow Rate (acmm)	223.713
Volumetric Flow Rate (dscfm)	4757.96
Volumetric Flow Rate (dscmm)	134.745
Percent Isokinetic	100.89
Percent Excess Air	181.57
Fuel Factor,Fo	1.365
Ultimate CO2	15.31

FACILITY : Morristown Hosp

DATE: 11/22/91
LOCATION: Outlet
RUN NUMBER: 5.00

SAMPLING PARAMETER Hg	
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	30.00
Stack Static Pressure (in. H2O)	0.14
Average Stack Temperature (deg. F)	270.43
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu:ft.)	146.54
Average Meter Pressure (in.H2O)	1.10
Average Meter Temperature (deg. F)	94.89
Moisture Collected (g)	449.50
Carbon Dioxide Concentration (%V)	6.50
Oxygen Concentration (%V)	10.80
Nitrogen Concentration (%V)	82.70
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.57
Standard Metered Volume,Vm(std) (dscf)	137.56
Standard Metered Volume,Vm(std) (dscm)	3.896
Standard Volume Water Vapor,Vw (scf)	21.19
Standard Volume Water Vapor,Vw (scm)	0.600
Stack Moisture (%V)	13.35
Mole Fraction Dry Stack Gas	0.867
Dry Molecular Weight	29.47
Wet Molecular Weight	27.94
Stack Gas Velocity,Vs (fpm)	4079.35
Stack Gas Velocity,Vs (mpm)	1243.39
Volumetric Flow Rate (acfm)	8032.03
Volumetric Flow Rate (acmm)	227.467
Volumetric Flow Rate (dscfm)	5041.00
Volumetric Flow Rate (dscmm)	142.761
Percent Isokinetic	97.63
Percent Excess Air	97.74
Fuel Factor,Fo	1.554
Ultimate CO2	13.45

FACILITY : Morristown Hosp

DATE: 11/23/91
LOCATION: Outlet
RUN NUMBER: 6

SAMPLING PARAMETER	HG
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.91
Absolute Stack Pressure,Ps(in. Hg)	29.92
Stack Static Pressure (in. H2O)	0.17
Average Stack Temperature (deg. F)	286.90
Stack Area (sq.in.)	283.53
Metered Volume,Vm (cu.ft.)	148.60
Average Meter Pressure (in.H2O)	1.10
Average Meter Temperature (deg. F)	94.51
Moisture Collected (g)	469.80
Carbon Dioxide Concentration (%V)	5.30
Oxygen Concentration (%V)	13.50
Nitrogen Concentration (%V)	81.20
Dry Gas Meter Factor	0.98170
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.58
Standard Metered Volume,Vm(std) (dscf)	139.22
Standard Metered Volume,Vm(std) (dscm)	3.943
Standard Volume Water Vapor,Vw (scf)	22.15
Standard Volume Water Vapor,Vw (scm)	0.627
Stack Moisture (%V)	13.73
Mole Fraction Dry Stack Gas	0.863
Dry Molecular Weight	29.39
Wet Molecular Weight	27.82
Stack Gas Velocity,Vs (fpm)	4109.71
Stack Gas Velocity,Vs (mpm)	1252.64
Volumetric Flow Rate (acfm)	8091.81
Volumetric Flow Rate (acmm)	229.160
Volumetric Flow Rate (dscfm)	4932.17
Volumetric Flow Rate (dscmm)	139.679
Percent Isokinetic	100.99
Percent Excess Air	169.75
Fuel Factor,Fo	1.396
Ultimate CO2	14.97

FACILITY : Morristown Hosp

DATE: 11/18/91
LOCATION: Inlet
RUN NUMBER:1

SAMPLING PARAMETER	SPORE
Total Sampling Time (min.)	231.00
Corrected Barometric Pressure (in. Hg)	30.03
Absolute Stack Pressure,Ps(in. Hg)	29.55
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	413.38
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	153.26
Average Meter Pressure (in.H2O)	1.39
Average Meter Temperature (deg. F)	123.69
Moisture Collected (g)	588.90
Carbon Dioxide Concentration (%V)	6.40
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	82.50
Dry Gas Meter Factor	1.00100
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.61
Standard Metered Volume,Vm(std) (dscf)	139.78
Standard Metered Volume,Vm(std) (dscm)	3.959
Standard Volume Water Vapor,Vw (scf)	27.77
Standard Volume Water Vapor,Vw (scm)	0.786
Stack Moisture (%V)	15.87
Mole Fraction Dry Stack Gas	0.841
Dry Molecular Weight	29.47
Wet Molecular Weight	27.65
Stack Gas Velocity,Vs (fpm)	4437.96
Stack Gas Velocity,Vs (mpm)	1352.69
Volumetric Flow Rate (acfm)	6995.34
Volumetric Flow Rate (acmm)	198.108
Volumetric Flow Rate (dscfm)	3511.75
Volumetric Flow Rate (dscmm)	99.453
Percent Isokinetic	96.61
Percent Excess Air	103.77
Fuel Factor,Fo	1.531
Ultimate CO2	13.65

FACILITY : Morristown Hosp

DATE: 11/19/91
LOCATION: Inlet
RUN NUMBER: 2.00

SAMPLING PARAMETER	Spore
Total Sampling Time (min.)	240.00
Corrected Barometric Pressure (in. Hg)	29.99
Absolute Stack Pressure,Ps(in. Hg)	29.51
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	411.19
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	154.65
Average Meter Pressure (in.H2O)	1.29
Average Meter Temperature (deg. F)	125.40
Moisture Collected (g)	609.70
Carbon Dioxide Concentration (%V)	7.80
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	81.10
Dry Gas Meter Factor	0.99680
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.58
Standard Metered Volume,Vm(std) (dscf)	139.83
Standard Metered Volume,Vm(std) (dscm)	3.960
Standard Volume Water Vapor,Vw (scf)	28.75
Standard Volume Water Vapor,Vw (scm)	0.814
Stack Moisture (%V)	15.49
Mole Fraction Dry Stack Gas	0.845
Dry Molecular Weight	29.69
Wet Molecular Weight	27.88
Stack Gas Velocity,Vs (fpm)	4290.15
Stack Gas Velocity,Vs (mpm)	1307.64
Volumetric Flow Rate (acfm)	6762.36
Volumetric Flow Rate (acmm)	191.510
Volumetric Flow Rate (dscfm)	3414.07
Volumetric Flow Rate (dscmm)	96.686
Percent Isokinetic	95.67
Percent Excess Air	107.49
Fuel Factor,Fo	1.256
Ultimate CO2	16.63

FACILITY : Morristown Hosp

DATE: 11/20/91
LOCATION: Inlet
RUN NUMBER: 3.00

SAMPLING PARAMETER	Spore
Total Sampling Time (min.)	151.00
Corrected Barometric Pressure (in. Hg)	29.83
Absolute Stack Pressure,Ps(in. Hg)	29.35
Stack Static Pressure (in. H2O)	-6.60
Average Stack Temperature (deg. F)	410.07
Stack Area (sq.in.)	226.98
Metered Volume,Vm (cu.ft.)	101.33
Average Meter Pressure (in.H2O)	1.45
Average Meter Temperature (deg. F)	124.16
Moisture Collected (g)	142.00
Carbon Dioxide Concentration (%V)	7.80
Oxygen Concentration (%V)	11.10
Nitrogen Concentration (%V)	81.10
Dry Gas Meter Factor	0.99680
Pitot Constant	0.84
Average Sampling Rate (dscfm)	0.61
Standard Metered Volume,Vm(std) (dscf)	91.36
Standard Metered Volume,Vm(std) (dscm)	2.587
Standard Volume Water Vapor,Vw (scf)	6.70
Standard Volume Water Vapor,Vw (scm)	0.190
Stack Moisture (%V)	14.92
Mole Fraction Dry Stack Gas	0.851
Dry Molecular Weight	29.69
Wet Molecular Weight	27.95
Stack Gas Velocity,Vs (fpm)	4533.25
Stack Gas Velocity,Vs (mpm)	1381.73
Volumetric Flow Rate (acfm)	7145.53
Volumetric Flow Rate (acmm)	202.361
Volumetric Flow Rate (dscfm)	3616.83
Volumetric Flow Rate (dscmm)	102.429
Percent Isokinetic	93.79
Percent Excess Air	107.49
Fuel Factor,Fo	1.256
Ultimate CO2	16.63

EPA/EMB

Current Time =

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Field Testing and Process Engineering Sect.
Continuous Emissions Monitoring Data

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Field Testing and Process Engineering Dept.
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RADIAN CORPORATION RUN 2 INLET

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
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[illegible]	[illegible]	-2.3	5.0	-2.5	62.9	[illegible]	[illegible]
[illegible]	[illegible]	-2.7	6.1	1.3	60.3	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	6.7	3.0	62.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.9	-0.5	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	5.2	-3.1	52.4	[illegible]	[illegible]
[illegible]	[illegible]	-3.1	6.9	2.1	60.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	54.4	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44.0	[illegible]	375.3

off line

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	THC	[illegible]
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[illegible]	[illegible]	-3.4	5.4	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.4	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	5.8	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	47.5	[illegible]	[illegible]
[illegible]	[illegible]	-4.1	5.5	-2.2	48.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	7.5	8.3	56.8	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	5.2	-1.6	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.9	-4.8	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	7.2	8.5	[illegible]	[illegible]	[illegible]
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11-17-1991 TIME	O2 %	CO PPMV	CO2 %	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
[illegible]	12.0	-2.7	6.2	8.2	50.0	[illegible]	[illegible]
[illegible]	10.1	-3.3	7.4	22.5	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	-2.9	4.5	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	-2.6	6.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	7.9	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-3.7	[illegible]
[illegible]	[illegible]	-2.7	4.9	-8.9	60.5	[illegible]	[illegible]
[illegible]	11.6	[illegible]	6.6	4.9	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	6.3	7.7	64.1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.7	-2.4	57.9	[illegible]	[illegible]
[illegible]	[illegible]	-2.8	6.0	1.8	56.4	[illegible]	[illegible]
[illegible]	[illegible]	-2.7	5.9	3.5	61.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	58.5	-3.7	[illegible]
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RADIAN CORPORATION

O2 [illegible] pt 1

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:23:16
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:23:33	11.6	7.1	6.3	8.7	56.3	5.2	575.7
21:24:03	11.0	8.3	7.6	13.4	61.2	3.2	758.1
21:24:32	9.8	9.1	8.3	22.1	64.7	1.9	991.2
21:25:02	9.0	9.7	8.5	33.1	67.3	2.9	1078.0
21:25:33	8.9	9.3	7.4	27.4	66.5	2.7	884.0
21:26:03	10.0	8.1	6.1	13.4	59.3	2.7	697.6
21:26:33	11.3	7.2	5.5	6.2	53.0	2.3	618.5
21:27:02	11.5	7.6	6.8	7.6	56.4	1.2	746.8
21:27:32	10.4	8.9	7.8	14.4	62.7	0.7	907.2
21:28:03	9.6	9.4	8.3	20.9	63.7	0.6	1031.4
Avg.=	10.3	8.5	7.3	16.7	61.1	2.3	828.8

RADIAN CORPORATION pt 2

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
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11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:28:33	0.0	9.9	8.3	31.1	64.3	0.5	943.8
21:28:48	8.7	9.5	7.4	26.0	62.7	0.4	816.6
21:29:03	9.2	8.9	6.6	18.8	58.4	0.4	698.7
21:29:18	10.2	7.7	5.7	12.5	54.4	1.0	612.7
21:29:32	11.1	7.1	5.2	7.4	50.5	3.3	555.9
21:29:46	11.6	6.7	5.3	5.2	49.4	8.0	569.2
21:30:02	11.9	7.0	5.8	4.7	50.3	8.7	623.4
21:30:17	11.8	7.5	6.5	6.3	52.9	8.2	696.5
21:30:33	11.4	8.2	7.1	8.3	55.0	6.8	795.6
21:30:48	10.9	8.7	7.6	11.5	56.5	4.7	896.7
21:31:03	10.4	9.1	7.8	13.9	57.2	3.8	1005.7
21:31:18	10.0	9.2	8.0	15.5	57.6	2.1	1061.9
21:31:33	9.6	9.3	8.0	16.2	56.7	0.6	1095.7
21:31:48	9.1	10.0	8.2	17.1	56.0	0.2	1093.8
21:32:03	8.9	10.0	8.1	18.2	56.8	0.1	1127.0
21:32:17	8.8	10.0	8.2	18.8	57.6	0.1	1088.3
21:32:33	8.6	10.0	7.6	19.7	57.6	-0.0	945.4
21:32:48	8.9	9.3	6.6	16.0	53.5	-0.1	806.8
Avg.=	10.0	8.8	7.1	14.9	56.0	2.7	857.4

RADIAN CORPORATION ot3

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:33:22
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:33:23	10.6	7.7	5.4	5.5	47.9	0.0	680.4
21:33:33	11.1	7.8	6.1	6.2	49.6	-0.0	726.4
21:33:48	10.9	8.2	6.6	5.4	51.0	-0.0	763.3
21:34:03	10.8	8.5	6.8	7.2	52.5	-0.1	796.5
21:34:18	10.5	8.6	6.7	8.1	52.3	-0.1	790.8
21:34:33	10.5	7.8	6.1	7.7	48.9	-0.3	774.3
21:34:47	10.9	7.5	5.5	5.6	46.5	0.0	792.0
21:35:02	11.3	7.1	5.3	3.8	47.0	-0.0	868.8
21:35:17	11.6	7.1	5.5	3.6	49.0	-0.1	992.4
21:35:33	11.5	7.8	6.3	6.6	51.5	-0.1	1052.8
21:35:48	11.1	8.4	6.8	10.3	52.6	-0.1	1067.3
21:36:03	10.6	8.9	7.1	13.0	54.2	-0.1	1058.4
21:36:18	10.4	8.3	7.1	14.3	55.8	-0.7	1058.5
21:36:33	10.1	8.6	7.4	14.7	56.4	-0.5	1104.4
21:36:48	9.9	8.9	7.7	16.9	58.1	-0.5	1204.7
21:37:03	9.4	9.4	7.8	20.5	58.8	-0.3	1277.1
21:37:17	9.3	9.0	7.6	22.2	59.5	-0.7	1316.2
21:37:32	9.2	8.8	7.7	23.8	60.0	-0.7	1322.6
21:37:48	9.1	8.9	7.5	26.3	60.9	-0.7	1295.7
21:38:02	9.2	8.4	6.7	23.1	59.7	-0.7	1122.9
21:38:18	9.8	7.6	5.7	15.2	54.6	-0.8	952.9
Avg.=	10.4	8.3	6.6	12.4	53.7	-0.3	1000.9

RADIAN CORPORATION ot4

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:39:14
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:39:18	11.9	6.7	5.7	6.1	49.8	-0.7	947.5
21:39:33	11.4	7.5	6.2	7.6	50.9	-0.3	1100.8
21:39:47	11.2	7.8	6.5	9.5	51.7	-0.0	1209.2
21:40:02	10.9	7.7	6.7	11.9	53.6	-0.7	1309.7
21:40:17	10.6	8.0	6.9	14.1	55.6	-0.7	1322.6
21:40:32	10.3	7.9	6.8	14.3	55.9	-0.7	1322.6
21:40:48	10.2	7.7	6.7	14.2	55.5	-0.8	1321.7
21:41:03	10.4	7.7	6.5	13.5	54.2	-0.5	1295.2
21:41:18	10.3	7.2	6.1	11.5	52.3	-0.7	1245.9
21:41:33	10.6	7.2	6.3	9.9	52.2	-0.5	1282.1
21:41:48	10.8	7.4	6.9	12.0	55.3	-0.5	1320.6
21:42:03	10.3	7.8	7.0	14.6	56.5	-0.8	1322.6
21:42:18	10.1	7.9	7.0	14.7	56.1	-0.7	1322.6
21:42:32	10.1	7.9	7.2	16.0	57.6	-0.8	1322.6
21:42:47	9.9	7.9	6.6	15.4	59.8	-0.8	1255.6
21:43:03	10.2	7.2	5.6	10.4	56.6	-0.8	1037.3
21:43:18	11.3	6.7	4.9	4.7	52.1	-0.4	875.4
21:43:33	11.8	6.1	4.8	1.8	50.8	-0.7	801.1
21:43:48	12.2	6.5	5.7	2.2	53.4	-0.3	898.1
21:44:03	11.8	7.0	6.4	6.1	56.0	-0.6	1056.0
21:44:18	11.4	7.6	6.9	9.4	56.6	-0.5	1171.7
21:44:33	10.8	7.9	7.3	12.0	59.0	-0.8	1246.0
Avg.=	10.8	7.4	6.4	10.5	54.6	-0.6	1181.2

RADIAN CORPORATION ot5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:45:22
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\ati1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:45:24	9.6	8.5	7.7	16.1	62.8	-0.8	1286.0
21:45:32	9.4	8.6	7.6	19.0	62.5	-0.8	1254.0
21:45:47	10.0	8.3	7.2	17.0	63.1	0.0	1193.2
21:46:03	9.6	7.5	6.0	13.9	62.4	-0.8	1016.4
21:46:18	11.3	6.7	5.1	7.9	56.7	0.1	852.1
21:46:33	11.4	6.1	4.6	3.5	52.9	-0.9	719.4
21:46:48	12.9	5.8	4.6	1.6	50.2	0.1	637.1
21:47:03	12.6	5.9	5.0	1.9	52.0	-0.8	636.5
21:47:18	12.5	6.2	5.5	3.1	54.1	-0.8	680.5
21:47:32	12.2	6.6	5.7	4.3	56.5	-0.9	718.9
21:47:47	12.0	6.6	5.7	5.9	56.1	-0.8	718.1
21:48:02	11.9	6.7	5.9	6.6	56.3	-0.9	718.1
21:48:18	12.5	7.0	6.0	7.0	57.3	0.0	722.4
21:48:33	12.3	7.2	6.2	7.6	58.2	0.0	724.5
21:48:48	11.4	7.1	6.3	8.2	56.7	-0.9	735.4
21:49:03	11.2	7.4	6.5	8.2	57.3	-0.9	752.4
21:49:18	11.1	7.4	6.5	9.0	64.8	-0.9	754.8
21:49:33	11.8	7.5	6.5	9.1	103.4	0.0	746.3
21:49:48	11.8	7.4	6.4	9.3	101.2	0.0	740.7
21:50:03	11.8	7.3	6.6	10.5	82.6	0.0	750.3
21:50:17	10.5	7.8	6.7	11.4	70.9	-0.8	745.5
21:50:33	10.3	8.1	6.6	11.1	65.5	-0.8	731.3
Avg.=	11.4	7.2	6.1	8.7	63.8	-0.5	810.6

RADIAN CORPORATION Dtc

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:50:59
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:51:03	10.6	7.7	6.1	12.0	59.9	-0.5	668.2
21:51:18	10.8	7.5	5.7	8.5	57.2	-0.7	637.7
21:51:33	12.1	6.5	5.5	7.4	58.1	-0.0	612.9
21:51:48	11.5	6.9	5.3	6.7	55.3	-0.6	579.0
21:52:03	11.6	6.8	5.0	5.6	52.0	-0.7	551.0
21:52:18	11.9	6.6	4.8	4.7	50.8	-0.7	516.8
21:52:33	13.5	5.5	4.6	4.8	51.8	-0.1	478.7
21:52:47	13.7	5.3	4.3	4.0	50.9	-0.0	444.1
21:53:02	13.4	5.5	4.1	3.6	50.3	-0.4	408.3
21:53:17	13.1	5.7	3.9	2.9	49.4	-0.7	380.1
21:53:33	13.4	5.5	3.7	2.8	49.9	-0.7	346.4
21:53:48	13.6	5.4	3.6	2.1	49.6	-0.7	323.3
21:54:03	15.0	4.4	3.4	1.7	49.8	-0.1	302.8
21:54:18	14.1	5.0	3.3	1.1	48.8	-0.7	292.7
21:54:33	14.4	4.9	3.2	0.8	48.4	-0.6	278.7
21:54:48	15.5	4.2	3.4	0.8	50.1	-0.1	280.5
21:55:03	14.8	4.9	4.0	0.6	52.4	-0.5	304.3
21:55:17	13.9	5.9	4.5	1.3	53.7	-0.7	325.8
21:55:32	13.4	6.4	5.2	2.5	56.5	-0.7	364.0
21:55:47	12.7	7.1	6.0	4.9	58.7	-0.7	433.3
Avg.=	13.1	5.9	4.5	3.9	52.7	-0.5	426.4

RADIAN CORPORATION pt7

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:56:16
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:56:18	12.1	7.0	6.5	7.6	61.5	-0.3	606.1
21:56:33	11.7	6.9	6.6	7.0	61.9	-0.1	676.5
21:56:46	11.3	7.2	6.8	6.9	62.1	-0.2	690.3
21:57:03	11.1	7.0	6.9	8.4	62.7	-0.1	659.7
21:57:18	10.9	7.0	7.0	8.2	64.5	-0.1	641.3
21:57:33	9.4	8.2	7.6	7.8	66.3	-0.3	669.8
21:57:47	8.9	9.1	8.4	11.4	65.7	-0.8	755.2
21:58:02	9.4	8.7	8.7	16.9	66.1	-0.0	855.4
21:58:17	8.9	8.8	8.9	20.8	66.1	-0.0	937.3
21:58:32	8.4	9.2	9.2	23.6	67.6	0.0	1053.0
21:58:48	7.2	9.5	9.1	24.3	67.6	-0.9	1159.6
21:59:03	7.1	9.3	9.2	24.9	71.7	-0.9	1227.3
21:59:18	7.0	9.4	9.4	26.9	70.8	-0.9	1285.7
21:59:33	6.7	9.6	9.2	28.6	70.4	-0.9	1224.0
21:59:48	7.7	8.9	7.8	23.8	68.6	-0.0	1064.9
22:00:03	7.5	8.1	6.7	14.8	62.3	-0.9	886.2
22:00:18	8.4	7.5	6.0	8.2	59.1	-0.8	783.0
22:00:32	9.3	7.1	5.5	5.2	57.5	-0.8	695.2
22:00:47	10.2	6.6	5.0	3.5	53.5	-0.8	627.2
22:01:03	11.2	5.8	5.0	3.1	51.8	-0.9	596.0
22:01:18	11.8	5.7	5.2	3.6	52.9	-0.9	626.0
22:01:33	12.9	5.5	5.4	4.1	54.0	-0.0	676.6
Avg.=	9.5	7.8	7.3	13.2	62.9	-0.5	836.2

RADIAN CORPORATION at8

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:01:54
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\at111191.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:02:03	12.2	6.3	6.0	6.2	55.7	0.5	898.8
22:02:18	11.9	6.5	6.1	4.5	57.5	0.5	942.6
22:02:33	11.6	6.9	7.0	4.3	62.7	0.7	1057.1
22:02:48	11.0	8.0	8.2	9.2	73.3	0.7	1171.9
22:03:02	9.9	9.1	8.9	20.7	72.6	0.8	1253.8
22:03:18	9.1	9.3	8.6	26.5	71.7	0.8	1298.4
22:03:32	8.8	8.9	8.3	24.1	67.4	0.9	1308.9
22:03:47	8.8	8.9	8.8	26.1	66.3	1.0	1322.6
22:04:03	8.4	9.3	8.7	30.6	69.0	1.1	1322.6
22:04:18	8.4	8.7	7.5	25.0	67.8	1.1	1271.5
22:04:33	9.1	7.5	6.4	13.5	63.2	1.2	1059.0
22:04:48	10.0	6.6	5.8	6.7	59.0	1.1	932.3
22:05:03	10.8	6.2	5.5	3.3	56.6	1.0	816.1
22:05:18	11.4	6.2	5.7	2.2	55.0	0.9	786.3
22:05:32	11.6	6.5	6.3	4.0	56.5	1.0	846.7
22:05:47	11.4	6.9	6.8	6.8	59.9	1.0	966.6
22:06:02	11.1	7.4	7.3	10.5	65.9	0.9	1097.2
22:06:17	10.6	7.7	7.5	12.9	64.9	0.9	1148.1
22:06:33	10.2	7.8	7.5	14.4	63.4	0.8	1169.4
22:06:48	10.0	7.8	7.5	14.8	63.8	0.8	1181.2
22:07:03	9.9	7.8	7.6	14.5	65.3	0.8	1165.2
22:07:18	9.7	8.1	8.1	16.5	65.6	0.9	1169.1
22:07:33	9.4	8.5	8.2	18.8	66.0	1.1	1175.3
22:07:48	9.2	9.1	7.1	16.1	67.6	1.2	1067.8
22:08:03	9.8	7.1	6.1	8.8	66.4	1.2	907.0
Avg.=	10.2	7.7	7.3	13.6	64.1	0.9	1091.5

RADIAN CORPORATION pt 8 cont

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:08:38
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mt11119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:08:39	11.3	6.0	5.3	1.7	60.9	1.1	716.1
22:08:47	12.2	6.0	5.4	3.7	58.7	1.0	670.3
22:09:03	12.1	6.1	5.9	3.9	57.1	1.0	698.9
22:09:18	11.8	6.8	6.7	8.5	60.3	1.0	762.2
22:09:33	11.3	7.6	7.7	14.7	64.9	1.0	823.2
22:09:48	10.6	8.4	8.0	19.1	66.4	0.9	837.3
22:10:03	10.2	8.5	8.1	19.6	67.0	1.0	833.2
22:10:18	9.8	8.8	8.5	21.7	70.3	1.0	843.9
22:10:33	9.4	9.2	8.5	23.4	71.1	1.1	835.6
22:10:47	9.2	8.6	7.2	19.7	66.6	1.1	773.6
22:11:02	9.9	7.4	6.0	10.6	60.8	1.1	686.4
22:11:17	10.8	6.5	5.4	5.2	59.4	1.1	607.3
22:11:33	11.6	6.1	5.2	3.1	57.4	1.0	536.3
22:11:48	12.2	6.3	5.7	4.2	60.5	1.0	503.1
22:12:03	12.1	6.7	6.2	7.2	69.8	0.9	496.6
22:12:18	11.9	7.2	6.8	9.7	69.1	1.1	532.5
22:12:33	11.4	7.8	7.4	12.6	68.9	8.9	561.4
22:12:48	10.9	8.2	6.8	16.3	61.5	5.7	567.7
22:13:03	11.4	6.1	3.2	11.9	17.3	4.0	570.5
22:13:17	13.9	3.4	1.1	3.8	2.3	3.4	572.0
22:13:32	16.2	2.1	0.4	-0.2	0.9	3.1	560.2
Avg.=	11.4	6.8	6.0	10.5	55.8	2.0	666.1

RADIAN CORPORATION old probe

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:24:02
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:24:04	14.2	5.4	4.0	1.4	37.2	0.7	392.3
22:24:17	14.0	5.9	4.5	3.0	38.3	0.8	453.3
22:24:33	13.8	6.3	5.0	3.4	40.1	0.7	499.5
22:24:48	13.3	6.7	5.4	5.2	41.9	0.7	539.0
22:25:03	12.9	7.1	5.8	6.4	42.6	0.9	588.3
22:25:18	12.6	7.5	6.0	9.0	41.4	1.1	584.9
22:25:33	12.2	7.8	6.1	12.3	40.0	0.9	529.9
22:25:48	11.8	7.7	5.8	14.2	41.2	0.8	476.1
22:26:03	11.8	7.3	5.3	12.9	40.0	0.8	436.3
22:26:18	12.2	6.7	4.7	9.7	39.1	0.7	407.7
22:26:32	12.7	6.2	4.2	5.8	39.4	0.7	381.9
22:26:47	13.2	5.8	4.0	3.0	40.5	0.7	403.1
22:27:03	13.5	5.7	4.1	1.3	40.9	0.7	450.6
22:27:18	13.6	5.9	4.6	1.8	41.7	0.7	501.3
22:27:33	13.4	6.4	5.0	4.1	42.8	0.7	556.8
22:27:48	13.0	6.9	5.4	7.1	44.4	0.8	578.0
22:28:03	12.6	7.3	5.8	10.7	44.2	1.3	542.8
22:28:18	12.1	7.5	5.6	13.7	44.3	0.7	484.2
22:28:33	11.7	7.7	5.2	13.2	39.5	0.2	435.1
22:28:47	12.1	7.0	4.3	10.7	36.6	0.2	405.3
22:29:02	12.6	6.3	3.8	6.9	34.6	-0.0	372.7
22:29:17	13.2	6.3	4.0	3.0	35.8	0.0	351.9
22:29:32	13.3	6.5	4.4	2.[illegible]	39.9	0.1	382.0
Avg.=	12.9	6.7	4.9	7.1	40.3	0.6	467.6

RADIAN CORPORATION cal plugged

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:29:54
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\mti1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:29:55	13.1	6.9	5.0	3.8	44.0	0.2	418.6
22:30:03	12.4	7.5	6.0	7.1	45.9	0.1	467.0
22:30:18	11.8	8.0	6.5	7.2	47.6	0.1	482.3
22:30:33	11.0	8.6	7.2	10.9	51.2	0.1	513.6
22:30:48	10.1	9.1	7.5	14.1	50.2	0.1	534.2
22:31:03	9.4	9.6	7.9	17.1	49.3	0.1	521.6
22:31:17	8.7	9.5	8.0	20.3	46.8	0.1	479.3
22:31:32	8.3	9.8	7.7	20.4	45.9	0.1	430.5
22:31:48	8.2	9.5	7.1	17.6	43.3	0.0	401.1
22:32:02	8.7	9.0	6.4	13.8	44.6	-0.0	371.1
22:32:18	9.4	8.3	5.8	9.7	45.7	0.0	359.7
22:32:33	10.1	7.7	5.5	5.3	46.3	0.0	389.7
22:32:48	10.6	7.8	5.9	3.7	46.0	0.0	423.6
22:33:03	10.6	8.2	6.5	5.1	46.9	-0.0	462.0
22:33:18	10.3	8.6	7.1	7.3	48.4	0.0	483.0
22:33:32	9.8	9.1	7.4	10.5	49.6	0.0	505.5
22:33:47	9.3	9.2	7.4	12.5	45.3	0.0	502.2
22:34:02	8.9	9.1	7.4	13.8	43.0	-0.0	462.7
22:34:18	8.9	8.0	7.0	14.2	41.8	-0.1	413.4
22:34:32	9.1	8.6	6.5	12.7	41.3	-0.1	378.9
22:34:48	9.5	7.6	5.9	10.4	44.5	-0.6	343.2
22:35:03	10.1	7.6	5.2	6.9	44.7	-0.0	323.3
22:35:19	10.8	7.0	5.0	3.9	43.6	-0.0	339.4
Avg.=	10.0	8.5	6.6	10.8	45.9	0.0	435.0

[illegible]	O_2 (%v)	CO (ppm)	CO_2 (%v)	SO_2 (ppm)	NO_x (ppm)	THC (ppm)	HCl (ppm)
[illegible]	[illegible].0	5.4	3.0	-0.[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	5.[illegible]	3.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43.0	2.5	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45.[illegible]	2.4	55[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.5	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-0.[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	0.5	[illegible]	2.4	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-1.1	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible].0	[illegible]	2.4	[illegible]
[illegible]	[illegible]	[illegible]	3.8	2.4	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible].1	3.7	2.8	[illegible].0	[illegible]	[illegible]

Gas conditioner
Image

[illegible] INLET RUN [illegible]

[illegible] Testing and Process Engineering Dept.
[illegible] Emissions Monitoring Data
[illegible]

EPA EM[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39.8	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.2	3.4	32.2	2.1	[illegible]
[illegible]	[illegible]	13.2	4.1	1.2	35.1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.6	3.6	48.1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4.3	4.1	39.7	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	5.3	4.3	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	47.1	[illegible]	385.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	36.9	2.2	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RADIAN CORPORATION ot3

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:33:30
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:33:32	16.1	0.4	-0.9	6.3	33.8	3.4	17.9
21:33:40	15.6	0.5	-0.7	3.3	35.8	3.4	17.6
21:33:55	15.2	0.4	-0.9	2.5	36.8	3.4	21.5
21:34:10	15.0	0.3	-0.8	1.4	37.3	3.4	20.4
21:34:25	15.0	0.4	-0.8	1.0	36.1	3.5	19.7
21:34:40	15.5	0.3	-0.7	1.0	34.4	3.6	18.8
21:34:55	15.9	0.2	-0.7	1.3	33.7	3.7	23.1
21:35:10	16.1	0.1	-0.7	0.9	34.0	3.8	21.5
21:35:25	15.9	0.1	-0.7	0.7	35.4	3.7	25.9
21:35:40	15.4	0.2	-0.7	0.7	36.5	3.7	26.3
21:35:55	14.9	0.3	-0.6	0.8	37.5	3.7	24.9
21:36:10	14.6	0.3	-0.6	0.7	38.5	3.7	24.4
21:36:25	14.5	0.3	-0.6	0.1	39.0	3.6	21.8
21:36:40	14.3	0.5	-0.6	0.4	40.4	3.7	19.5
21:36:55	14.1	0.6	-0.5	0.0	41.4	3.7	21.6
21:37:10	14.0	0.6	-0.5	0.5	41.9	3.6	21.3
21:37:25	13.9	0.6	-0.5	1.1	41.8	3.8	23.0
21:37:40	13.8	0.5	-0.5	3.4	42.1	4.0	23.3
21:37:55	14.1	0.6	-0.5	5.6	41.0	4.1	25.6
21:38:10	14.9	0.6	-0.6	6.6	38.1	4.1	21.1
21:38:25	15.7	0.8	-0.6	5.7	35.7	4.1	18.2
Avg.=	15.0	0.4	-0.7	2.1	37.7	3.7	21.8

RADIAN CORPORATION ot4

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:39:22
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:39:25	15.8	0.7	-0.6	1.7	35.3	3.9	16.3
21:39:40	15.3	0.4	-0.6	2.4	36.2	3.9	22.2
21:39:55	15.0	0.2	-0.6	5.9	36.8	4.1	30.7
21:40:10	14.8	0.3	-0.6	14.0	37.7	4.0	40.3
21:40:25	14.6	0.2	-0.6	22.4	38.6	4.0	46.0
21:40:40	14.6	0.3	-0.6	29.1	38.8	4.1	50.7
21:40:55	14.7	0.2	-0.6	33.3	38.4	4.3	61.8
21:41:10	14.8	0.2	-0.6	35.3	37.5	4.4	71.4
21:41:25	15.1	0.0	-0.6	34.5	36.7	4.3	81.9
21:41:40	15.1	0.0	-0.7	32.7	37.3	4.4	91.8
21:41:55	14.7	0.1	-0.6	32.1	38.7	4.4	106.4
21:42:10	14.5	-0.1	-0.6	32.4	39.0	4.5	123.7
21:42:25	14.5	-0.0	-0.6	32.7	39.3	4.5	137.2
21:42:40	14.3	0.0	-0.6	33.2	40.1	4.6	137.0
21:42:55	14.8	0.0	-0.6	31.2	39.4	4.7	111.5
21:43:10	15.7	0.2	-0.7	25.4	36.9	4.6	68.7
21:43:25	16.4	0.3	-0.7	18.0	35.3	4.5	50.5
21:43:40	16.6	0.4	-0.7	12.3	35.7	4.3	41.9
21:43:55	16.0	0.4	-0.7	10.1	37.7	4.7	42.8
21:44:10	15.4	0.2	-0.6	12.4	38.7	4.3	57.4
21:44:25	14.9	0.0	-0.6	17.1	39.5	4.4	82.7
21:44:40	14.5	-0.0	-0.6	22.1	41.0	4.5	112.4
Avg.=	15.1	0.2	-0.6	22.3	37.9	4.3	72.1

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
18:33:57	10.3	8.0	6.8	0.6	65.0	2.5	710.7
18:34:57	9.9	7.9	6.7	7.7	62.0	2.7	867.5
18:35:57	12.2	6.4	5.1	1.2	53.7	2.6	634.7
18:36:57	10.9	7.5	6.6	7.1	60.7	2.6	762.0
18:37:57	9.3	8.6	7.7	11.8	64.8	2.4	926.7
18:38:57	10.2	7.7	6.2	10.3	62.5	2.6	783.3
18:39:57	11.6	7.0	5.9	1.4	59.3	2.6	602.7
18:40:57	10.3	7.8	7.0	6.9	60.6	2.6	820.6
18:41:57	9.1	8.4	7.4	13.0	63.8	2.9	903.6
18:42:57	12.0	6.3	5.4	0.3	56.7	2.9	609.2
18:43:57	10.0	8.0	7.4	0.6	66.5	3.1	874.7
18:44:57	10.1	7.5	6.5	5.2	63.1	3.3	876.9
Avg.=	10.9	7.3	6.2	11.7	55.9	3.2	707.8

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:37:57	9.4	8.2	7.2	16.7	61.1	3.2	849.5
17:38:57	11.7	6.5	5.1	7.2	56.2	3.1	635.2
17:39:57	12.1	6.5	5.3	2.7	55.1	3.1	594.5
17:40:57	11.6	6.8	5.6	7.1	57.4	3.0	654.2
17:41:57	11.7	6.8	5.5	14.1	54.8	3.1	591.3
17:42:57	12.1	6.6	5.4	14.8	54.1	3.2	554.1
17:43:57	10.7	7.9	6.7	23.6	59.0	3.4	583.9
17:44:57	8.9	9.2	8.0	42.5	66.8	3.4	740.6
17:45:57	10.1	8.0	6.2	38.2	56.9	3.4	622.3
17:46:57	10.7	8.1	6.7	27.7	55.9	3.6	505.2
17:47:57	8.3	9.6	8.1	62.4	63.3	3.4	696.7
17:48:57	11.1	7.4	5.5	31.0	55.2	3.0	528.3
17:49:57	10.8	8.3	6.8	29.9	59.6	2.9	541.2
17:50:57	8.4	10.0	8.3	51.9	63.0	2.7	653.6
17:51:57	10.9	7.9	5.8	32.5	54.0	2.7	512.4
17:52:57	9.8	9.3	7.5	35.4	61.4	2.6	579.4
17:53:57	9.1	9.3	7.1	47.7	61.1	2.6	622.8
17:54:57	11.7	7.7	5.5	19.4	52.4	2.6	443.7
17:55:57	10.3	8.8	6.9	28.3	57.4	2.5	464.9
17:56:57	10.0	8.9	6.8	31.2	57.6	2.4	505.2
17:57:57	12.2	7.3	4.9	16.2	46.5	2.5	424.5
17:58:57	11.8	7.8	5.9	18.6	50.1	2.5	451.3
17:59:57	9.9	9.3	7.3	32.1	57.6	2.5	791.8
18:00:57	9.5	9.2	6.9	33.3	58.3	2.3	960.6
18:01:57	12.6	7.2	4.8	10.1	47.7	2.3	526.0
18:02:57	11.7	7.9	5.9	8.6	55.8	2.2	648.1
18:03:57	10.4	8.8	7.0	13.4	59.0	2.2	963.4
18:04:57	9.7	8.9	6.9	19.6	57.6	2.3	1095.6
18:05:57	12.9	6.5	4.6	4.0	47.6	2.3	640.9
18:06:57	11.1	8.3	6.7	8.3	55.2	2.2	906.6
18:07:57	10.0	8.6	6.9	14.6	55.3	2.2	1353.3
18:08:57	10.3	8.0	6.5	13.6	53.5	2.2	1375.6
18:09:57	11.3	7.4	5.5	7.0	52.1	2.2	1236.6
18:10:57	12.5	6.7	5.1	-0.1	50.0	2.4	919.7
18:11:57	10.8	8.2	6.6	4.7	60.3	2.5	1115.1
18:12:57	10.5	8.1	6.5	7.8	60.2	2.7	1196.3
18:13:57	10.3	8.0	6.4	7.7	58.0	3.1	1184.4
18:14:57	10.0	8.5	6.9	10.7	59.2	3.4	1302.9
18:15:57	11.4	7.4	5.4	4.4	52.7	3.4	961.9
18:16:57	11.1	7.9	6.3	5.2	57.9	3.2	1041.3
18:17:57	9.8	8.7	7.1	11.1	60.0	3.1	1203.3
18:18:57	10.4	8.0	6.2	10.7	59.0	3.0	1113.2
18:19:57	12.4	6.9	5.1	0.4	53.4	3.1	765.3
18:20:57	10.9	8.1	6.5	5.9	58.4	3.0	910.0
18:21:57	10.2	8.2	6.7	7.4	60.4	3.0	1043.3
18:22:57	10.6	7.8	6.1	5.7	57.5	3.0	996.3
18:23:57	12.8	6.3	4.5	-0.1	48.3	3.1	622.7
18:24:57	12.8	6.4	4.8	0.9	51.8	2.9	573.5
18:25:57	13.1	6.0	4.5	1.6	50.2	2.9	568.5
18:26:57	12.6	6.6	5.3	3.6	55.1	3.1	589.4
18:27:57	11.2	7.5	6.2	7.8	58.3	4.0	624.5
18:28:57	10.1	8.1	6.9	11.6	63.3	3.9	679.5
18:29:57	10.5	7.8	6.5	9.6	58.3	4.0	681.4
18:30:57	10.3	7.9	6.7	14.6	59.3	2.7	787.4
18:31:57	10.4	7.8	6.3	12.6	57.7	2.1	743.2
18:32:57	11.7	6.9	5.7	-1.9	57.5	2.3	539.2

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 16:51:53
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:51:57	10.8	7.4	5.8	18.0	58.2	2.9	943.4
16:52:57	12.9	6.2	4.8	3.7	50.4	3.1	578.3
16:53:57	11.9	6.6	5.5	7.7	53.1	3.0	613.2
16:54:57	11.6	6.7	5.8	5.0	53.2	3.0	640.3
16:55:57	11.1	6.9	6.1	2.9	53.9	3.1	679.8
16:56:57	11.2	6.9	6.2	6.9	51.2	3.0	673.0
16:57:57	10.4	7.2	6.7	12.8	53.1	3.1	691.0
16:58:57	10.3	7.1	6.5	9.9	54.1	3.2	654.0
16:59:57	11.4	6.1	5.6	4.6	49.9	3.3	542.8
17:00:57	12.4	5.4	4.9	0.9	47.3	3.5	440.8
17:01:57	12.0	6.1	5.7	1.6	51.6	4.1	430.3
17:02:57	11.2	6.4	5.9	7.9	51.2	4.5	502.4
17:03:57	11.6	6.0	5.6	8.5	52.1	4.7	503.4
17:04:57	11.9	5.7	5.3	6.5	52.6	4.6	472.7
17:05:57	11.8	5.8	5.5	3.9	52.3	4.6	486.3
17:06:57	11.2	6.2	6.0	8.4	54.4	4.4	563.2
17:07:57	10.1	6.9	6.6	16.4	55.4	4.3	702.3
17:08:57	9.3	7.6	7.6	22.3	58.2	4.3	768.8
17:09:57	9.3	7.3	6.8	25.2	54.2	4.1	749.6
17:10:57	11.2	6.1	5.9	7.7	53.7	3.9	567.8
17:11:57	9.7	7.2	7.2	16.0	55.7	3.7	764.3
17:12:57	9.4	7.3	6.9	19.0	54.8	3.5	774.1
17:13:57	11.2	6.3	6.0	6.5	49.5	3.5	562.7
17:14:57	9.0	7.9	7.7	18.3	57.1	3.5	706.1
17:15:57	11.0	6.2	5.5	9.8	47.1	3.3	594.3
17:16:57	12.1	5.7	5.4	3.0	47.7	3.3	502.0
17:17:57	11.6	6.0	5.8	4.6	48.5	3.1	576.8
17:18:57	11.0	6.6	6.4	5.0	51.2	3.6	560.4
17:19:57	10.4	6.8	6.6	5.6	53.5	3.8	517.4
17:20:57	11.9	5.8	5.1	1.9	46.6	3.9	446.0
17:21:57	10.9	7.1	6.6	5.3	53.3	4.0	407.0
17:22:57	11.2	6.4	5.9	5.1	51.9	4.0	455.6
17:23:57	12.1	5.6	5.2	3.6	50.0	4.0	410.4
17:24:57	12.8	5.1	4.7	1.5	49.8	4.2	340.3
17:25:57	13.4	4.7	4.2	0.2	47.9	4.4	309.3
17:26:57	13.5	4.7	4.1	-0.7	45.9	4.5	318.3
17:27:57	12.7	5.4	4.9	0.4	53.0	4.4	424.2
17:28:57	10.6	6.9	6.4	5.7	60.8	3.7	654.1
17:29:57	9.0	7.8	7.3	10.6	65.9	3.4	801.3
17:30:57	8.3	8.2	7.7	13.4	65.3	3.7	852.5
17:31:57	9.7	7.3	6.2	11.8	59.0	3.4	793.5
17:32:57	12.0	6.1	5.2	1.1	52.2	3.4	607.8
17:33:57	9.9	7.9	7.2	7.0	62.2	3.3	891.8
17:34:57	9.4	8.1	7.3	8.7	63.6	3.3	907.2
17:35:57	11.0	7.0	5.8	5.4	55.1	3.3	725.4
17:36:57	10.3	7.7	6.8	7.6	60.9	3.4	791.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 14:43:42
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:43:57	10.3	8.9	6.7	11.0	60.9	-1.5	506.1
14:44:57	8.6	10.0	7.6	26.0	72.1	-1.5	588.2
14:45:57	11.3	7.8	5.5	10.0	59.3	-1.5	459.0
14:46:57	9.7	9.2	7.5	22.3	71.1	-1.7	678.2
14:47:57	9.2	8.6	6.8	29.2	67.1	-2.0	837.6
14:48:57	11.3	7.3	6.0	11.2	58.8	-2.0	680.7
14:49:57	8.9	10.1	8.1	25.9	76.3	4.8	897.8
14:50:57	10.6	8.4	6.1	15.7	71.0	5.1	674.8
14:51:57	10.2	9.1	7.4	9.0	79.4	5.4	571.4
14:52:57	9.4	9.3	7.2	13.3	122.9	5.2	586.5
14:53:57	12.2	7.6	5.5	1.8	125.6	5.6	416.4
14:54:57	10.3	9.0	7.2	7.7	130.2	5.5	449.5
14:55:57	10.7	8.5	6.1	7.4	117.0	5.4	460.5
14:56:57	12.2	7.9	5.6	0.5	107.7	5.7	358.1
14:57:57	8.8	10.6	8.3	9.4	83.7	5.4	489.7
14:58:57	10.4	8.8	6.0	7.5	79.0	5.4	447.1
14:59:57	10.9	9.1	6.7	6.8	71.6	5.6	367.4
15:00:57	9.3	9.9	7.5	14.4	72.2	5.4	465.2
15:01:57	11.4	8.3	5.5	3.4	70.3	5.5	403.5
15:02:57	10.8	9.0	6.7	7.9	67.7	5.5	410.3
15:03:57	9.2	9.7	7.5	15.4	70.5	5.4	634.2
15:04:57	11.1	8.2	5.7	7.1	61.1	5.5	521.6
15:05:57	9.5	9.9	7.8	14.4	74.6	5.5	593.6
15:06:57	9.6	9.3	6.7	17.4	69.1	5.3	596.4
15:07:57	11.1	8.4	6.4	2.2	64.6	5.4	478.9
15:08:57	8.3	10.8	8.6	10.4	76.7	5.3	604.5
15:09:57	11.2	8.1	5.5	-0.2	59.4	5.3	504.0
15:10:57	11.7	8.2	6.1	-0.9	56.6	5.3	525.8
15:11:57	10.7	8.5	6.7	-0.6	60.8	5.4	729.5
15:12:57	10.2	8.5	6.7	-3.1	63.8	5.3	880.6
15:13:57	12.9	6.6	4.5	-5.9	52.0	5.5	597.9
15:14:57	14.0	5.6	3.8	-7.2	51.2	5.6	503.4
15:15:57	14.0	5.7	4.1	-7.9	52.5	5.5	499.8
15:16:57	13.2	6.0	4.4	-8.0	56.4	5.5	506.8
15:17:57	13.7	5.2	3.8	-7.8	54.4	5.7	408.2
15:18:57	13.5	5.3	3.9	-8.0	55.2	5.8	330.1
15:19:57	12.8	5.6	4.3	-8.2	56.9	5.8	288.2
15:20:57	12.2	6.0	4.5	-8.4	58.5	5.8	262.9
15:21:57	11.7	6.3	4.7	-8.2	59.3	5.9	235.8
15:22:57	11.7	6.2	4.7	-7.5	59.0	6.1	209.5
15:23:57	11.7	6.0	4.6	-7.0	58.2	6.3	188.7
15:24:57	11.8	6.0	4.6	-6.4	57.6	6.4	171.4
15:25:57	12.0	5.9	4.5	-6.0	56.7	6.6	160.1
15:26:57	12.3	5.7	4.3	-5.8	55.1	6.9	151.9
Avg.=	11.1	7.9	6.0	4.5	70.5	4.6	484.8

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:42:45	10.0	8.7	6.8	6.0	89.4	-1.5	217.0
13:43:45	8.7	9.6	8.0	20.9	79.0	-1.6	339.1
13:44:45	9.9	7.8	6.5	18.4	97.9	-2.2	382.4
13:45:45	11.1	7.4	6.3	7.6	77.7	-2.1	287.4
13:46:45	10.2	7.7	6.8	13.4	70.8	-2.3	425.0
13:47:45	9.4	8.2	7.3	17.2	72.1	-2.2	627.0
13:48:45	9.8	8.3	6.3	11.9	65.8	-1.5	625.0
13:49:45	11.1	7.8	6.0	4.7	62.7	-1.4	493.5
13:50:45	10.0	8.6	7.1	9.0	64.7	-1.7	618.4
13:51:45	8.5	9.1	7.6	15.4	67.0	-1.9	700.8
13:52:45	11.1	7.5	5.6	9.8	60.0	-1.6	518.0
13:53:45	10.5	8.1	6.5	9.6	60.7	-1.7	543.7
13:54:45	10.4	7.5	6.5	7.7	59.2	-2.1	616.8
13:55:45	10.9	7.2	6.1	6.2	57.2	-2.0	597.3
13:56:45	11.0	7.2	6.2	5.6	56.7	-2.1	581.8
13:57:45	10.5	7.6	6.6	6.2	55.3	-2.0	624.0
13:58:45	10.4	7.5	6.2	5.8	53.0	-1.9	716.4
13:59:45	11.8	7.3	5.4	-3.6	50.9	-1.4	563.4
14:00:45	10.6	8.0	6.3	-6.5	53.4	-1.3	791.8
14:01:45	10.9	7.7	6.0	-4.6	53.1	-1.4	744.1
14:02:45	11.3	7.3	5.5	-8.3	50.2	-1.4	645.3
14:03:45	12.5	6.3	4.8	-8.5	49.5	-0.9	537.1
14:04:45	13.0	5.5	4.2	-8.2	47.2	-0.4	419.0
14:05:45	14.5	5.0	3.6	-7.7	46.4	0.2	348.2
14:06:45	14.3	4.9	3.5	-7.1	46.7	0.3	273.5
14:07:45	13.6	5.4	3.8	-6.7	50.4	0.4	229.2
14:08:45	13.0	5.7	4.3	-6.2	55.4	0.5	204.0
14:09:45	12.6	5.9	4.6	-5.6	57.7	0.6	181.7
14:10:45	12.3	5.9	4.7	-5.1	58.3	0.5	161.6
14:11:45	12.3	5.7	4.6	-5.0	57.7	0.3	149.3
14:12:45	12.2	5.8	4.5	-5.0	55.9	0.0	136.8
14:13:45	12.3	5.6	4.2	-5.5	52.6	-0.3	118.5
14:14:45	13.4	5.2	4.0	-5.7	51.0	0.5	107.5
14:15:45	13.8	4.9	3.9	-5.7	50.2	0.4	95.4
14:16:45	13.2	5.2	4.1	-5.8	52.5	0.1	91.0
14:17:45	12.8	5.4	3.8	-5.8	48.2	-0.6	85.3
14:18:45	13.4	5.2	3.7	-5.5	47.4	-0.3	83.5
14:19:45	13.9	4.9	3.8	-5.4	49.5	0.3	79.3
14:20:45	12.8	5.6	4.2	-5.2	56.1	-0.1	82.7
14:21:45	10.3	7.5	6.3	0.3	77.5	-0.6	98.2
14:22:45	8.0	9.0	7.7	11.7	82.8	-0.6	155.1
14:23:45	9.5	8.2	6.8	7.8	72.8	-0.4	184.7
14:24:45	10.4	7.8	5.9	1.3	57.6	-1.2	160.5
14:25:45	10.7	8.1	6.4	5.0	58.4	-1.2	143.8
14:26:45	8.9	9.2	7.8	21.3	59.4	-0.5	181.2
14:27:45	9.9	8.3	6.7	13.8	57.7	-0.6	194.2
14:28:45	11.6	7.4	5.9	4.5	55.1	-0.6	159.9
14:29:45	10.3	8.6	6.8	8.4	59.4	-1.2	163.7
14:30:45	8.9	9.7	7.6	17.4	62.9	-1.4	265.5
14:31:45	10.4	8.4	6.2	9.9	55.2	-1.5	266.9
14:32:45	8.7	10.0	8.2	20.8	61.5	-1.6	319.7
14:33:45	9.2	9.2	6.8	18.0	56.6	-1.5	346.1
14:34:45	12.2	6.5	5.0	2.3	49.5	-2.0	264.4

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:46:45	11.2	4.9	5.7	51.8	54.3	2.4	604.3
12:47:45	10.4	6.0	7.3	93.1	60.9	2.3	648.0
12:48:45	9.2	6.4	7.4	137.4	58.8	2.1	818.8
12:49:45	11.9	4.7	5.4	73.1	51.8	3.4	628.2
12:50:45	10.9	5.4	6.5	152.6	54.6	3.2	780.4
12:51:45	11.2	4.9	6.0	161.5	50.3	3.0	798.1
12:52:45	12.3	4.1	5.2	132.7	45.9	2.8	665.7
12:53:45	13.4	3.3	4.2	73.5	41.6	3.0	494.7
12:54:45	14.3	2.7	3.5	34.4	39.8	3.3	373.0
12:55:45	13.9	3.4	4.3	20.3	45.2	4.0	324.5
12:56:45	12.3	4.5	5.4	19.6	49.2	3.5	333.3
12:57:45	10.0	6.3	7.2	40.3	55.1	3.4	390.3
12:58:45	8.5	7.2	8.1	68.3	64.2	2.7	434.4
12:59:45	9.3	7.4	8.2	68.2	63.5	2.6	425.6
13:00:45	9.9	6.3	6.5	42.3	63.9	2.6	400.2
13:01:45	10.8	6.5	6.9	24.3	56.3	2.6	316.5
13:02:45	10.9	6.0	6.1	20.3	53.8	3.1	340.0
13:03:45	12.1	5.6	5.8	10.5	53.9	4.1	294.6
13:04:45	10.6	7.1	6.9	20.9	59.3	4.9	298.7
13:05:45	10.4	7.1	6.9	22.6	58.9	5.0	279.7
13:06:45	11.1	6.7	6.4	18.6	62.6	7.2	275.3
13:07:45	10.3	7.4	6.7	20.1	78.5	8.2	329.0
13:08:45	11.7	6.5	5.8	11.0	65.9	8.9	261.7
13:09:45	10.1	8.1	7.3	22.6	68.6	8.5	277.2
13:10:45	9.1	8.8	7.7	35.5	67.7	5.2	347.1
13:11:45	11.5	7.0	5.8	14.1	60.9	1.4	300.2
13:12:45	8.8	9.7	8.2	32.8	77.9	0.9	456.9
13:13:45	10.0	8.5	6.2	25.1	64.1	0.5	487.9
13:14:45	10.7	8.5	7.0	20.1	66.0	0.3	402.0
13:15:45	8.8	10.0	8.3	45.6	71.1	0.5	527.2
13:16:45	12.0	7.4	5.5	15.8	54.7	0.5	414.6
13:17:45	12.1	7.6	6.2	14.2	60.1	0.4	408.5
13:18:45	9.3	9.5	7.9	39.3	70.6	-0.2	539.1
13:19:45	10.2	8.3	6.1	28.7	62.2	-0.5	498.2
13:20:45	11.7	7.7	5.9	12.2	60.2	-0.5	400.8
13:21:45	10.2	8.5	7.1	24.5	68.0	-0.4	494.6
13:22:45	11.1	8.0	6.1	19.0	69.4	-0.3	489.8
13:23:45	11.3	8.5	6.7	11.8	76.1	-0.3	403.0
13:24:45	7.3	244.6	9.6	102.9	87.1	3.2	625.2
13:25:45	10.3	27.9	6.4	30.7	66.9	-0.0	481.5
13:26:45	11.3	8.7	6.3	8.9	60.8	-0.8	402.8
13:27:45	8.6	9.8	8.2	26.9	70.8	-0.8	471.7
13:28:45	10.5	9.3	6.0	15.3	59.7	-0.9	412.3
13:29:45	12.8	6.9	5.0	3.0	52.6	-0.8	269.4
13:30:45	13.1	6.7	4.8	1.2	54.5	-0.8	225.5
13:31:45	13.3	5.9	4.3	-1.3	54.3	-2.0	203.7
13:32:45	13.4	5.5	4.1	-2.7	54.1	-2.2	181.1
13:33:45	13.1	5.8	4.3	-3.6	55.0	-1.8	167.1
13:34:45	12.4	6.4	4.5	-4.2	56.8	-1.5	170.1
13:35:45	11.7	6.7	4.6	-4.0	56.9	-1.5	162.2
13:36:45	11.5	6.6	4.7	-4.2	57.1	-1.5	144.7
13:37:45	11.2	6.7	4.8	-4.2	57.3	-1.4	142.0
13:38:45	9.6	8.4	6.6	0.3	96.9	-1.5	163.5
13:39:45	8.5	9.0	7.3	6.9	148.6	-1.4	211.8
13:40:45	8.3	9.2	7.0	12.3	274.7	-1.5	270.3
13:41:45	10.6	7.9	5.7	1.0	198.7	-1.4	215.2

RADIAN CORPORATION DAY 5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 12:00:42
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:00:45	11.2	5.1	5.8	-4.6	54.2	3.2	587.8
12:01:45	12.1	4.7	5.6	-4.2	57.3	3.3	467.0
12:02:45	11.7	4.8	5.8	-5.4	60.2	3.2	529.3
12:03:45	11.1	5.5	6.6	-0.6	60.4	3.2	603.5
12:04:45	9.6	6.8	7.8	6.7	62.6	3.1	710.9
12:05:45	10.1	6.2	7.0	5.6	58.6	3.0	582.2
12:06:45	11.3	5.6	6.7	2.3	53.6	3.5	437.6
12:07:45	8.2	7.9	8.7	15.8	57.6	3.5	470.9
12:08:45	11.0	5.3	6.1	2.7	50.3	3.7	408.3
12:09:45	9.6	7.0	8.2	7.6	59.0	3.7	346.5
12:10:45	10.3	5.8	6.7	7.3	58.8	3.4	387.6
12:11:45	12.0	4.8	5.9	2.4	57.1	3.5	304.4
12:12:45	9.7	6.6	7.9	13.0	67.9	3.2	470.7
12:13:45	9.4	6.2	7.2	13.9	66.7	3.2	557.1
12:14:45	11.6	4.8	5.9	3.6	65.2	3.6	458.2
12:15:45	10.7	5.5	6.7	7.6	69.8	3.5	557.4
12:16:45	10.9	5.1	6.3	7.8	67.2	3.4	643.5
12:17:45	12.1	5.3	5.5	2.2	63.4	3.6	566.8
12:18:45	8.0	144.3	8.9	25.8	88.5	4.5	781.2
12:19:45	11.1	7.7	5.7	3.8	64.0	3.5	553.1
12:20:45	11.5	5.0	6.3	2.4	70.6	3.4	445.8
12:21:45	10.4	5.6	7.0	6.6	75.5	3.3	548.3
12:22:45	9.8	5.9	7.4	10.2	72.1	3.3	568.9
12:23:45	11.8	4.6	5.7	2.6	63.0	3.6	439.3
12:24:45	10.3	5.9	7.5	9.0	70.4	3.5	468.4
12:25:45	9.8	5.9	7.1	11.6	68.4	3.4	572.4
12:26:45	12.2	4.3	5.5	2.7	59.0	3.6	420.2
12:27:45	10.9	5.4	6.8	8.5	64.1	3.5	427.8
12:28:45	10.6	5.4	6.7	8.5	63.7	3.5	461.8
12:29:45	11.2	4.8	6.1	5.3	61.1	3.5	440.3
12:30:45	11.9	4.1	5.5	3.2	60.5	3.6	409.6
12:31:45	12.6	3.6	5.1	1.5	57.9	3.6	399.3
12:32:45	13.0	3.3	4.7	0.8	56.6	3.5	356.8
12:33:45	12.9	3.5	5.0	0.7	55.1	3.4	332.8
12:34:50	12.2	4.0	5.5	2.8	57.0	3.4	350.2
12:35:45	11.4	4.5	6.0	2.2	66.4	3.2	334.7
12:36:45	10.2	5.5	7.3	7.3	65.6	3.1	627.7
12:37:45	10.2	5.1	6.7	6.5	64.9	3.1	662.0
12:38:45	10.5	5.1	6.8	7.0	63.2	3.2	721.6
12:39:45	9.9	5.2	7.0	8.1	63.8	3.1	831.4
12:40:45	8.7	17.6	7.7	15.7	73.3	3.0	829.9
12:41:45	11.0	5.2	6.3	5.3	57.3	3.1	601.4
12:42:45	8.7	6.9	8.4	18.2	64.4	2.8	859.3
12:43:45	9.6	5.7	6.8	47.4	60.8	2.6	897.7
12:44:45	10.9	5.4	6.7	68.5	60.8	2.6	666.3
12:45:45	7.9	7.7	8.7	95.9	65.3	2.3	855.5

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:15:05	10.9	4.8	6.5	14.5	58.8	5.7	466.0
17:16:05	11.1	4.4	6.0	13.3	58.8	6.1	446.2
17:17:05	11.7	3.9	5.7	10.4	61.6	7.6	424.2
17:18:05	12.3	3.3	5.2	8.5	55.3	8.6	411.2
17:19:05	11.5	4.5	6.8	8.8	62.8	8.2	500.9
17:20:05	10.1	5.1	7.4	13.0	65.9	7.7	549.5
17:21:05	10.1	4.7	6.9	14.5	63.4	7.4	568.6
17:22:05	11.6	3.5	5.4	9.0	55.4	7.1	450.7
17:23:05	10.9	4.4	7.0	7.4	60.2	6.7	599.3
17:24:05	9.7	5.1	7.8	18.3	64.5	6.8	820.2
17:25:05	10.6	3.9	6.1	20.3	59.9	6.7	684.0
17:26:05	10.7	4.5	7.2	13.9	62.0	6.5	839.4
17:27:05	9.3	5.0	7.5	32.5	67.9	6.6	822.4
17:28:05	11.5	3.3	5.6	15.4	60.3	6.5	537.4
17:29:05	11.1	3.8	6.7	10.1	63.8	6.4	649.6
17:30:05	10.4	3.7	6.7	14.9	64.0	6.7	811.9
17:31:05	11.9	2.6	5.4	8.0	56.1	6.7	655.6
17:32:05	11.4	3.1	6.3	6.1	59.5	6.7	841.9
17:33:05	10.7	3.5	7.0	9.4	60.8	6.9	1032.0
17:34:05	10.7	3.1	6.2	11.[illegible]	59.9	7.2	824.1
17:35:05	11.8	2.8	6.1	3.[illegible]	56.0	6.9	699.4
17:36:05	11.1	2.8	6.4	2.9	61.9	7.0	748.5
17:37:05	10.9	3.0	6.7	-2.5	63.8	7.4	753.1
17:38:05	12.2	1.7	5.2	-2.9	55.6	5.4	598.1
17:39:05	10.3	4.0	7.7	-3.4	62.0	5.2	797.0
17:40:05	8.9	3.7	7.5	4.7	61.8	5.2	752.0
17:41:05	12.0	1.5	5.3	-2.3	52.3	5.1	523.8
17:42:05	10.3	3.5	7.6	-3.5	60.9	5.0	678.7
17:43:05	8.9	3.7	7.7	5.0	63.5	5.0	676.6
17:44:05	11.4	1.6	5.7	-0.9	55.7	5.0	512.0
17:45:05	10.3	2.9	7.5	-1.2	64.2	4.9	682.1
17:46:05	10.0	2.3	6.6	4.9	64.9	4.9	658.0
17:47:05	11.8	1.1	5.6	-0.2	56.9	4.9	561.4
17:48:05	10.9	1.7	6.8	1.1	60.1	4.8	645.5
17:49:05	11.2	1.0	5.7	2.6	57.7	4.8	564.8
Avg.=	10.5	6.8	6.6	17.3	62.6	2.4	618.6

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:19:05	10.9	5.2	5.9	11.3	88.5	4.8	507.1
16:20:05	12.2	4.6	5.5	4.9	74.9	4.6	438.7
16:21:05	11.9	4.9	5.9	7.4	63.5	4.5	449.6
16:22:05	11.8	4.8	5.7	8.4	58.6	4.3	386.9
16:23:05	12.0	4.8	5.9	7.0	58.8	4.4	404.8
16:24:05	11.9	4.7	5.7	7.3	59.3	4.3	472.8
16:25:05	11.9	5.0	6.1	6.1	60.9	4.2	477.3
16:26:05	10.2	6.3	7.4	8.9	63.1	4.1	600.5
16:27:05	9.7	6.4	7.5	12.5	64.9	4.0	644.4
16:28:05	9.5	6.5	7.5	13.2	67.4	4.1	683.3
16:29:05	11.3	5.0	5.5	8.9	61.3	4.1	508.3
16:30:05	9.5	7.6	8.3	8.8	65.1	4.0	806.0
16:31:05	7.9	7.7	8.0	28.4	68.9	4.1	774.4
16:32:05	11.6	5.1	5.8	10.0	60.2	4.2	529.0
16:33:05	9.4	7.2	8.1	10.3	65.0	3.9	694.7
16:34:05	10.6	5.5	5.9	12.3	59.9	4.1	577.0
16:35:05	11.2	5.9	6.9	5.0	59.6	3.9	568.9
16:36:05	8.7	7.8	8.6	11.5	64.6	3.9	714.7
16:37:05	11.1	5.4	5.8	14.1	54.2	4.1	506.8
16:38:05	10.9	6.3	7.0	6.9	59.5	3.8	638.9
16:39:05	8.2	8.6	8.5	22.5	72.4	3.8	911.7
16:40:05	11.7	5.1	5.4	13.3	53.8	3.9	635.2
16:41:05	10.7	6.8	7.2	7.5	61.8	3.6	958.1
16:42:05	8.8	7.9	8.2	19.5	70.6	3.6	1167.9
16:43:05	11.1	5.9	5.8	16.4	62.4	3.7	815.6
16:44:05	11.0	6.4	7.0	9.1	64.3	3.6	1050.4
16:45:05	8.2	10.8	9.4	27.8	78.0	3.6	1464.4
16:46:05	9.0	8.4	6.9	44.9	77.2	3.7	1042.9
16:47:05	12.0	5.6	5.8	12.0	60.8	3.6	953.7
16:48:05	9.3	8.0	8.3	23.9	74.1	3.5	1475.9
16:49:05	9.4	7.1	6.8	39.6	73.6	3.6	1194.4
16:50:05	12.4	5.3	5.5	12.6	58.4	3.7	936.9
16:51:05	10.2	7.0	7.5	24.3	67.7	3.5	1260.2
16:52:05	10.5	5.9	6.2	44.1	64.6	3.7	1023.2
16:53:05	12.8	5.0	5.2	17.6	53.8	3.7	761.2
16:54:05	11.0	6.4	7.0	27.3	58.8	3.6	829.2
16:55:05	10.6	6.1	6.4	42.4	57.9	3.7	717.3
16:56:05	12.6	5.2	5.5	21.1	52.9	3.6	556.0
16:57:05	10.3	6.9	7.5	33.5	62.1	3.6	739.6
16:58:05	11.2	5.6	5.7	36.4	56.5	3.8	607.6
16:59:05	12.5	5.2	5.7	17.1	54.2	3.6	587.2
17:00:05	10.3	6.3	7.2	33.6	62.0	3.6	834.8
17:01:05	10.3	5.7	6.4	42.2	59.8	3.8	825.9
17:02:05	12.5	4.5	5.0	21.1	52.9	3.7	637.5
17:03:05	10.5	6.6	7.4	26.6	64.1	3.6	938.1
17:04:05	8.9	7.3	7.8	40.3	70.2	3.7	1017.7
17:05:05	12.1	4.5	5.0	21.2	57.6	3.7	688.8
17:06:05	11.4	5.5	6.5	14.5	63.4	3.7	867.4
17:07:05	10.5	5.7	6.8	23.7	65.5	3.8	946.8
17:08:05	11.7	4.5	5.4	21.2	60.3	4.0	783.7
17:09:05	12.7	4.2	5.2	9.4	54.9	3.8	733.8
17:10:05	12.0	4.4	5.6	11.1	58.1	4.0	675.1
17:11:05	12.0	4.5	5.8	9.4	59.9	4.2	559.9
17:12:05	11.3	4.8	6.2	10.8	62.4	4.5	488.7
17:13:05	11.2	5.1	6.6	11.5	62.4	5.0	471.7
17:14:05	10.8	5.1	6.8	14.8	61.8	5.4	467.2

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:23:05	7.7	8.6	8.4	23.3	72.2	1.0	780.3
15:24:05	11.1	4.5	5.3	14.0	57.5	0.7	509.5
15:25:05	10.9	5.2	6.7	6.5	58.4	0.8	521.7
15:26:05	9.2	6.1	7.2	13.0	62.7	0.9	562.0
15:27:05	12.3	3.3	4.5	7.3	51.6	0.5	378.2
15:28:05	12.6	3.6	5.2	2.6	49.8	0.6	441.4
15:29:05	10.3	6.7	7.3	8.4	60.8	2.9	593.3
15:30:05	7.3	155.9	8.7	23.9	74.5	1.2	631.2
15:31:05	11.2	12.0	5.1	14.0	68.2	0.8	406.8
15:32:05	11.5	5.4	6.6	3.8	63.8	0.9	427.1
15:33:05	9.8	6.1	7.1	8.7	61.8	1.0	421.6
15:34:05	11.3	4.4	5.5	7.9	55.9	0.7	390.4
15:35:05	11.3	5.6	6.7	5.2	56.0	1.1	447.4
15:36:05	8.4	6.9	8.2	14.7	63.4	0.5	485.9
15:37:05	11.3	4.4	5.5	9.5	53.9	0.7	341.0
15:38:05	11.6	4.6	6.2	4.6	56.9	0.7	346.6
15:39:05	10.1	5.8	7.3	7.4	61.6	0.6	389.4
15:40:05	8.9	6.2	7.6	10.6	65.5	0.6	425.6
15:41:05	11.5	4.1	5.3	6.1	56.6	0.7	323.5
15:42:05	11.1	5.2	6.7	3.1	57.8	0.6	331.2
15:43:05	8.7	6.6	8.0	11.1	66.3	0.5	428.9
15:44:05	10.5	5.1	6.0	10.7	60.8	0.7	376.1
15:45:05	9.9	6.1	7.4	7.1	65.6	0.4	436.7
15:46:05	9.3	6.0	7.0	12.5	66.9	0.5	414.5
15:47:05	12.5	4.6	5.6	5.1	57.4	1.2	314.0
15:48:05	9.4	6.7	8.0	7.1	62.9	0.4	408.3
15:49:05	8.5	6.8	7.5	17.8	64.3	0.5	391.6
15:50:05	12.2	4.7	5.6	6.9	55.6	1.2	316.6
15:51:05	9.9	6.2	7.4	8.5	65.8	0.4	426.8
15:52:05	9.5	5.8	6.9	14.3	67.9	0.5	430.0
15:53:05	12.7	4.5	5.3	5.7	56.1	1.2	357.8
15:54:05	10.8	5.3	6.7	6.1	63.3	0.6	424.4
15:55:05	10.1	5.5	6.8	8.7	64.2	0.4	460.1
15:56:05	12.7	4.4	5.2	6.7	59.6	1.1	351.5
15:57:05	10.2	6.3	7.7	6.8	63.9	0.6	572.7
15:58:05	8.6	6.6	7.7	17.8	68.7	0.5	632.0
15:59:05	12.7	4.3	5.2	9.3	58.5	1.2	414.5
16:00:05	11.2	5.8	7.1	7.2	62.1	1.1	635.7
16:01:05	8.7	7.2	8.3	15.6	66.6	1.1	810.9
16:02:05	10.7	5.3	5.8	14.8	61.1	2.2	506.1
16:03:05	11.0	5.7	6.9	6.8	60.2	3.3	692.0
16:04:05	9.6	6.2	7.5	12.2	64.3	3.8	1054.8
16:05:05	11.0	4.9	5.6	11.2	56.8	3.9	739.2
16:06:05	12.1	4.5	5.7	4.6	52.4	4.1	685.3
16:07:05	11.5	4.8	5.9	8.4	51.9	4.6	735.5
16:08:05	11.7	4.4	5.5	9.7	48.9	4.7	706.2
16:09:05	12.5	3.7	4.9	9.7	46.2	4.5	662.7
16:10:05	13.0	3.4	4.7	7.3	46.0	4.7	625.2
16:11:05	13.0	3.5	4.7	5.5	47.4	4.9	602.9
16:12:05	11.3	5.4	6.7	7.6	72.5	5.1	654.7
16:13:05	9.9	5.8	7.0	10.6	91.7	5.1	611.7
16:14:05	11.2	4.9	6.2	8.4	104.7	5.3	532.3
16:15:05	11.5	4.9	5.9	7.8	114.7	5.1	463.6
16:16:05	12.0	4.8	5.8	5.5	117.9	5.0	457.3
16:17:05	9.9	6.5	7.6	10.5	96.1	4.8	602.7
16:18:05	9.7	6.3	7.4	13.3	84.1	4.7	603.3

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:27:05	11.0	4.3	6.0	10.2	52.9	1.3	484.3
14:28:05	10.8	4.6	6.2	10.4	55.0	1.2	514.3
14:29:05	9.9	5.2	7.0	17.8	59.1	1.1	576.2
14:30:05	9.6	5.0	6.6	20.3	58.6	1.0	550.6
14:31:05	12.1	2.7	5.0	9.1	51.1	0.5	373.3
14:32:05	10.4	5.0	7.2	10.4	59.0	0.8	425.4
14:33:05	7.2	7.9	9.2	26.3	72.2	1.0	560.9
14:34:05	9.6	5.1	6.1	24.6	59.2	0.9	410.0
14:35:05	11.6	3.9	5.9	6.3	52.6	0.6	344.2
14:36:05	9.0	7.0	8.4	13.0	65.0	1.1	547.6
14:37:05	7.5	7.4	8.3	29.4	71.8	1.2	624.4
14:38:05	11.0	4.1	5.5	12.4	57.5	0.7	459.8
14:39:05	10.7	5.1	6.7	9.0	59.6	1.0	578.4
14:40:05	9.5	6.1	7.3	15.1	66.2	1.1	712.6
14:41:05	9.7	5.9	7.1	13.6	64.7	1.2	787.6
14:42:05	8.7	6.9	7.9	18.6	74.8	1.3	939.2
14:43:05	11.0	4.9	5.6	12.3	60.4	1.1	618.9
14:44:05	10.8	5.8	6.9	6.8	59.8	1.2	689.1
14:45:05	9.0	7.1	8.1	15.8	69.4	1.3	928.2
14:46:05	10.1	5.7	6.1	17.5	65.5	1.2	727.2
14:47:05	11.4	5.2	6.0	6.3	54.5	1.1	761.3
14:48:05	10.0	6.1	7.0	13.8	60.6	1.3	1089.4
14:49:05	9.7	6.1	6.8	16.8	62.5	1.3	1120.9
14:50:05	12.0	4.7	5.0	6.3	52.0	1.0	728.4
14:51:05	11.4	5.2	6.0	3.8	51.9	1.1	944.6
14:52:05	10.8	5.5	6.3	7.1	54.4	1.3	1130.1
14:53:05	10.8	5.4	6.0	6.2	53.8	1.3	1196.5
14:54:05	11.1	5.0	5.8	6.6	51.6	1.4	1211.1
14:55:05	11.3	4.7	5.6	5.2	48.9	1.4	1126.4
14:56:05	11.9	4.1	5.2	3.4	49.1	1.4	1031.1
14:57:05	12.3	3.8	4.8	2.3	48.8	1.3	802.2
14:58:05	12.9	3.3	4.3	0.7	49.6	1.2	631.1
14:59:05	13.4	2.3	4.0	-0.5	51.7	0.6	526.0
15:00:05	13.3	2.0	4.1	-0.6	51.9	0.4	462.4
15:01:05	12.6	2.6	4.6	-0.7	54.2	0.4	421.0
15:02:05	10.9	3.8	6.0	0.0	62.4	0.6	721.2
15:03:05	7.2	6.8	8.5	12.1	92.7	0.7	1143.6
15:04:05	5.7	7.8	8.9	35.2	79.4	1.1	987.7
15:05:05	8.8	5.4	6.1	16.2	63.8	1.0	619.0
15:06:05	11.4	3.5	5.3	1.5	62.0	0.5	478.6
15:07:05	10.5	5.1	6.5	3.7	62.9	1.1	688.6
15:08:05	8.8	6.3	7.6	11.1	69.3	0.9	843.8
15:09:05	9.6	5.4	6.3	12.0	61.8	1.1	680.6
15:10:05	10.2	5.8	6.9	4.4	66.6	1.1	601.6
15:11:05	8.2	6.9	7.9	11.6	74.3	1.2	574.3
15:12:05	10.8	4.9	5.5	5.7	59.1	1.1	412.1
15:13:05	10.6	5.4	6.4	3.9	58.6	1.1	403.4
15:14:05	9.7	6.0	7.2	9.2	62.7	1.2	512.6
15:15:05	9.4	5.9	6.9	13.3	63.1	1.1	536.0
15:16:05	11.0	5.1	6.0	6.5	58.2	1.0	436.9
15:17:05	8.7	6.9	8.0	12.6	65.3	1.1	569.9
15:18:05	10.3	4.7	5.8	13.7	58.9	0.7	429.9
15:19:05	11.0	5.1	6.5	4.8	60.7	0.7	509.0
15:20:05	8.2	7.5	8.4	15.4	74.9	1.0	734.2
15:21:05	10.2	4.8	5.9	14.7	64.2	0.7	566.9
15:22:05	10.3	5.8	7.1	6.3	62.2	0.9	755.2

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:31:05	10.1	6.3	7.3	8.4	54.1	1.1	245.9
13:32:05	9.3	6.6	7.7	11.4	56.9	0.9	270.3
13:33:05	11.1	4.8	5.8	7.6	48.9	0.8	232.7
13:34:05	9.9	6.8	7.9	8.4	58.2	1.0	268.9
13:35:05	7.6	8.2	8.7	17.0	68.5	1.0	445.0
13:36:05	11.0	5.1	5.8	7.6	53.7	1.1	321.0
13:37:05	9.2	7.4	8.2	24.9	61.5	1.1	472.8
13:38:05	7.1	9.7	9.2	69.2	68.7	1.2	570.2
13:39:05	9.7	6.3	6.7	48.1	57.4	1.1	431.1
13:40:05	9.3	7.3	8.2	48.2	62.7	1.1	484.2
13:41:05	8.7	7.1	7.6	69.4	68.7	1.1	495.6
13:42:05	11.1	5.5	6.0	38.8	57.1	1.1	372.8
13:43:05	9.8	7.0	7.8	48.9	63.7	1.2	432.0
13:44:05	8.5	7.2	7.7	89.2	72.5	1.1	517.6
13:45:05	11.4	5.3	5.9	43.2	60.4	1.0	466.9
13:46:05	9.2	7.4	8.4	110.4	68.3	1.2	767.1
13:47:05	8.9	6.8	7.3	154.2	67.5	1.1	711.7
13:48:05	11.5	5.2	5.9	107.5	52.2	1.1	579.2
13:49:05	9.2	7.3	8.4	183.4	65.8	1.3	724.7
13:50:05	8.6	6.9	7.7	213.2	83.6	1.4	733.9
13:51:05	11.7	4.8	5.4	114.9	63.3	1.3	516.5
13:52:05	11.6	5.1	6.1	98.8	58.3	1.3	532.4
13:53:05	10.4	6.1	7.3	94.3	65.3	1.3	640.2
13:54:05	8.7	7.2	8.3	93.7	72.7	1.2	785.2
13:55:05	10.7	5.2	5.8	59.5	62.2	1.1	631.5
13:56:05	11.4	5.0	6.0	37.1	58.2	1.1	692.3
13:57:05	9.9	6.0	7.4	44.0	69.0	1.3	999.7
13:58:05	7.7	7.8	9.0	67.2	87.3	1.3	1313.9
13:59:05	10.0	5.4	6.0	50.1	84.4	1.2	906.1
14:00:05	11.5	4.9	5.9	17.1	67.4	1.2	841.8
14:01:05	9.8	6.1	7.5	24.0	73.8	1.4	1117.3
14:02:05	8.7	6.5	7.7	34.8	86.4	1.4	1112.9
14:03:05	10.4	5.5	6.1	22.9	94.1	1.3	842.9
14:04:05	10.7	5.5	6.7	15.3	75.1	1.3	901.1
14:05:05	9.4	6.1	7.6	25.2	81.3	1.4	1093.9
14:06:05	10.5	5.2	5.9	21.3	79.6	1.3	858.9
14:07:05	11.2	5.2	6.3	11.2	66.3	1.3	883.5
14:08:05	9.1	6.5	7.9	23.8	76.1	1.4	1102.3
14:09:05	10.4	5.3	6.0	20.1	74.1	1.3	851.4
14:10:05	11.6	5.1	6.1	8.5	60.4	1.2	820.3
14:11:05	9.3	6.5	7.9	17.6	69.2	1.3	913.8
14:12:05	10.0	5.5	6.4	19.1	69.7	1.3	787.6
14:13:05	12.1	4.4	5.4	6.7	54.2	1.1	630.8
14:14:05	11.2	4.9	6.3	8.9	56.4	1.3	714.9
14:15:05	10.9	4.7	6.5	12.0	59.4	1.4	790.6
14:16:05	10.1	5.2	6.8	16.5	64.0	1.4	819.1
14:17:05	12.0	4.0	4.8	9.1	52.0	1.2	560.8
14:18:05	12.1	4.3	5.7	5.6	48.8	1.2	611.4
14:19:05	10.0	5.8	7.2	12.9	58.5	1.2	732.0
14:20:05	10.0	5.3	6.7	15.3	55.3	1.2	700.3
14:21:05	10.7	4.8	5.9	13.8	54.9	1.2	612.2
14:22:05	11.8	4.4	5.6	7.1	49.2	1.0	481.4
14:23:05	10.9	4.7	6.1	10.9	49.6	1.1	469.2
14:24:05	10.9	4.6	6.1	12.0	51.0	1.2	489.7
14:25:05	10.6	4.8	6.4	12.7	53.2	1.2	547.3
14:26:05	10.6	4.6	6.2	12.4	52.9	1.2	518.7

RADIAN CORPORATION 1121RUN1

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 12:45:13
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:45:15	7.9	7.5	9.2	17.0	78.4	0.5	512.1
12:46:05	10.2	4.4	6.2	19.6	72.9	0.6	384.2
12:47:05	11.3	4.7	6.5	6.2	63.1	0.8	356.5
12:48:05	7.5	8.6	9.4	21.9	78.2	1.1	451.5
12:49:05	9.4	5.8	7.2	26.8	76.7	0.6	388.2
12:50:05	11.5	4.5	5.9	6.1	63.0	1.4	299.6
12:51:05	10.2	7.0	7.8	8.1	66.9	1.6	302.9
12:52:05	8.6	8.9	8.1	22.4	78.7	1.5	364.5
12:53:05	11.1	4.9	5.9	7.7	66.4	1.4	300.2
12:54:05	11.3	5.0	6.8	5.6	60.6	1.6	271.0
12:55:05	9.2	6.5	8.0	13.5	71.0	1.4	380.8
12:56:05	11.0	5.0	5.7	8.7	62.9	1.2	328.9
12:57:05	11.6	5.1	6.3	4.9	54.4	1.2	289.2
12:58:05	8.5	31.5	9.2	17.7	73.8	1.6	484.0
12:59:05	8.3	19.7	7.5	27.5	75.9	1.2	455.9
13:00:05	11.5	5.2	5.7	5.3	56.4	1.1	349.5
13:01:05	9.7	87.2	8.5	15.5	67.6	8.4	597.6
13:02:05	7.3	144.9	8.6	47.9	79.5	1.3	698.2
13:03:05	11.1	6.7	5.7	8.6	59.4	1.2	568.0
13:04:05	11.1	6.0	6.7	4.6	56.4	1.3	726.5
13:05:05	7.9	8.3	8.6	20.5	70.9	1.4	999.0
13:06:05	11.2	5.6	5.5	8.0	54.4	1.4	717.8
13:07:05	9.8	7.5	7.9	8.0	60.1	1.3	796.0
13:08:05	8.0	8.2	8.2	21.4	67.2	1.3	780.4
13:09:05	10.9	5.9	5.8	5.7	55.7	1.3	550.2
13:10:05	11.3	6.0	6.2	2.9	52.7	1.3	453.1
13:11:05	8.9	7.6	8.3	10.6	64.4	1.5	510.5
13:12:05	10.6	5.9	5.9	7.0	53.4	1.3	424.0
13:13:05	11.7	5.5	5.9	2.7	46.9	1.3	341.2
13:14:05	10.3	6.1	7.0	5.6	54.8	1.4	356.8
13:15:05	10.1	5.8	6.8	5.9	54.8	1.4	350.0
13:16:05	11.7	4.8	5.0	3.0	50.8	1.1	321.0
13:17:05	11.8	4.9	5.7	2.5	51.8	1.1	313.3
13:18:05	10.2	5.8	6.9	5.8	55.3	1.1	402.5
13:19:05	8.7	6.6	7.5	9.2	57.1	1.1	463.8
13:20:05	10.1	5.3	5.9	7.0	53.0	1.1	436.4
13:21:05	12.0	4.2	5.3	2.0	49.2	1.0	320.0
13:22:05	10.9	5.2	6.4	4.3	51.6	1.2	354.6
13:23:05	9.3	6.4	7.6	5.6	54.2	1.0	369.0
13:24:05	8.4	6.8	8.2	6.9	55.1	0.9	339.6
13:25:05	8.6	6.7	7.6	6.0	52.7	1.1	328.2
13:26:05	10.9	5.3	6.4	2.6	52.2	1.2	252.0
13:27:05	8.7	7.4	8.5	7.7	67.0	1.0	251.9
13:28:05	8.8	6.6	7.4	10.5	59.3	1.1	251.5
13:29:05	12.2	3.9	5.1	4.1	47.9	0.7	197.8
13:30:05	11.1	5.6	6.8	4.5	52.9	1.1	194.3

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:41:46	8.7	7.8	8.8	13.7	72.3	0.8	614.2
22:42:46	10.7	5.0	6.1	12.1	60.5	0.8	452.5
22:43:46	11.5	5.7	6.6	2.5	63.6	0.7	478.2
22:44:46	9.3	6.8	8.0	7.4	69.3	0.8	993.5
22:45:46	11.2	4.6	5.8	9.6	55.9	0.8	640.5
22:46:46	11.1	6.5	7.1	4.9	61.4	0.7	682.6
22:47:46	8.6	7.1	8.3	19.7	66.3	0.8	774.8
22:48:46	11.5	4.7	5.7	10.6	55.2	0.7	546.1
22:49:46	10.2	6.9	7.8	7.1	69.3	0.7	755.4
22:50:46	8.8	6.8	8.0	18.2	69.8	0.8	790.0
Avg.=	10.4	5.7	6.8	12.5	67.3	0.5	609.5

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:45:46	9.7	6.5	7.1	14.8	62.1	0.4	578.0
21:46:46	11.2	5.5	6.2	11.2	57.5	0.6	599.5
21:47:46	8.9	7.8	8.1	16.4	66.3	0.4	939.3
21:48:46	7.6	8.4	8.5	31.7	72.8	0.4	938.7
21:49:46	10.7	5.9	6.5	14.0	59.6	0.6	612.8
21:50:46	8.6	8.7	8.7	14.8	70.2	0.4	756.6
21:51:46	9.0	6.8	7.4	21.6	64.2	0.5	657.2
21:52:46	11.3	6.0	6.6	9.4	58.9	0.7	584.1
21:53:46	9.2	7.9	8.2	18.8	70.1	0.7	791.7
21:54:46	11.2	5.2	6.0	14.4	55.6	0.8	538.0
21:55:46	11.3	6.8	7.1	8.0	60.9	0.9	580.2
21:56:46	8.4	8.9	9.2	22.2	74.6	0.8	819.3
21:57:46	9.7	6.6	7.1	21.8	69.5	0.8	653.5
21:58:46	11.7	5.7	6.3	7.4	63.9	0.7	571.0
21:59:46	10.0	7.2	7.8	13.5	71.6	0.7	769.5
22:00:46	10.7	5.6	6.5	14.1	65.3	0.7	694.1
22:01:46	12.1	5.3	6.1	6.1	62.3	0.7	576.5
22:02:46	10.5	6.4	7.3	10.5	67.9	0.8	718.6
22:03:46	10.2	5.9	6.7	11.7	64.1	0.6	705.8
22:04:46	12.5	4.4	5.1	4.7	54.9	0.8	520.8
22:05:46	11.9	5.0	5.9	4.2	61.0	0.7	621.6
22:06:46	11.2	5.3	6.0	5.7	59.3	0.7	672.4
22:07:46	11.7	4.8	5.9	5.7	57.5	0.8	667.4
22:08:46	12.4	4.0	5.2	5.2	54.3	0.8	584.1
22:09:46	13.4	3.3	4.5	3.1	54.5	0.8	476.4
22:10:46	13.9	3.0	4.2	1.9	54.0	0.8	369.6
22:11:46	13.7	3.3	4.4	0.4	55.0	0.7	303.8
22:12:46	11.3	5.2	6.3	2.2	73.6	0.7	366.8
22:13:46	9.1	6.2	7.6	7.3	127.1	0.6	418.2
22:14:46	9.2	5.7	7.1	9.2	128.2	0.5	363.0
22:15:46	9.4	5.6	6.8	7.5	107.4	0.2	329.0
22:16:46	9.6	5.4	6.9	9.9	101.0	0.6	367.9
22:17:46	10.7	4.5	5.7	6.6	130.0	-0.1	304.1
22:18:46	10.2	5.8	6.9	8.2	77.5	-0.0	393.6
22:19:46	8.2	7.4	8.6	17.6	86.4	0.1	474.9
22:20:46	9.5	5.7	6.9	19.1	80.3	0.5	417.7
22:21:46	11.7	4.4	5.2	5.7	64.2	-0.2	276.1
22:22:46	11.5	5.0	5.8	6.4	61.9	0.1	325.8
22:23:46	11.0	5.0	6.0	10.2	62.5	-0.2	483.7
22:24:46	11.0	4.8	6.0	14.3	61.4	-0.0	628.1
22:25:46	11.3	4.5	5.8	14.2	59.8	-0.1	621.5
22:26:46	11.2	4.7	5.9	13.7	59.9	0.0	633.0
22:27:46	11.8	4.5	5.6	11.2	58.8	0.4	615.4
22:28:46	11.4	4.6	5.7	9.1	57.4	0.0	688.1
22:29:46	10.9	5.2	6.6	9.3	64.6	0.6	803.7
22:30:46	9.8	5.8	7.4	11.9	65.9	0.6	943.8
22:31:46	9.4	6.4	8.0	13.6	65.0	0.6	898.2
22:32:46	11.0	4.7	6.3	11.8	58.7	0.6	593.0
22:33:46	10.9	5.4	6.8	6.5	65.8	0.4	539.1
22:34:46	10.4	5.6	7.2	11.0	68.8	0.6	621.9
22:35:46	9.5	6.7	7.9	13.9	71.4	0.8	703.2
22:36:46	11.3	5.0	6.0	11.5	61.5	0.8	502.2
22:37:46	9.8	7.7	8.5	11.0	74.4	0.8	558.7
22:38:46	8.7	6.8	8.1	23.2	69.4	0.9	517.7
22:39:46	11.8	4.9	5.8	8.7	60.2	0.8	350.1
22:40:46	11.0	6.3	7.2	5.6	68.2	0.7	388.8

RUN 3 CONT.

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 20:59:27
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
20:59:46	8.6	7.5	8.3	22.8	87.6	0.9	846.0
21:00:46	11.5	4.8	5.7	10.0	67.7	0.5	540.3
21:01:46	10.2	6.4	7.3	13.6	72.1	0.4	674.7
21:02:46	8.9	6.6	7.6	25.6	74.5	0.4	912.8
21:03:46	11.8	4.5	5.7	13.4	64.4	0.6	567.1
21:04:46	10.9	5.3	6.7	14.9	66.0	0.6	620.0
21:05:46	9.6	5.9	7.2	19.3	65.8	0.4	687.1
21:06:46	10.4	4.9	6.4	15.5	62.1	0.6	632.9
21:07:46	12.7	3.7	5.1	5.3	54.7	0.6	409.1
21:08:46	12.3	3.8	5.2	5.5	53.7	0.5	419.7
21:09:46	13.2	3.3	4.9	5.3	55.0	0.7	436.8
21:10:46	13.1	3.4	4.9	4.9	57.1	0.6	454.8
21:11:46	12.0	4.2	5.8	5.1	59.3	0.6	531.1
21:12:46	10.5	4.9	6.8	7.9	60.7	0.6	598.4
21:13:46	8.5	6.7	8.5	16.1	79.9	0.6	845.4
21:14:46	8.1	6.0	8.2	22.7	67.8	0.5	773.7
21:15:46	9.2	5.2	7.3	16.9	61.5	0.5	654.0
21:16:46	10.6	4.3	5.6	8.0	53.4	-0.1	437.0
21:17:46	10.6	5.0	6.5	6.1	58.3	-0.0	428.9
21:18:46	9.4	5.8	7.2	9.5	59.0	-0.1	562.3
21:19:46	8.6	6.2	7.6	12.9	65.8	-0.2	629.5
21:20:46	9.1	5.7	7.2	13.1	64.7	-0.1	593.4
21:21:46	9.3	6.2	7.9	14.9	76.4	0.5	647.7
21:22:46	9.9	4.9	6.8	17.2	57.7	0.4	533.0
21:23:46	9.7	5.9	7.6	10.5	65.1	0.2	563.2
21:24:46	9.3	5.7	7.7	16.4	65.1	0.5	673.3
21:26:00	11.0	4.8	6.2	9.2	57.5	0.3	500.1
21:26:46	9.4	6.5	8.2	17.7	67.0	0.6	781.9
21:27:46	9.2	6.0	7.5	20.4	64.2	0.5	753.8
21:28:46	12.0	4.2	5.8	8.8	58.9	0.6	530.3
21:29:46	10.8	5.5	7.1	11.2	66.5	0.7	721.9
21:30:46	9.2	6.5	8.0	18.4	70.7	0.6	869.1
21:31:46	10.5	5.1	6.4	15.8	59.5	0.6	593.2
21:32:46	10.9	6.0	7.1	9.1	68.0	0.7	637.3
21:33:46	8.2	7.7	8.7	24.6	74.9	0.6	942.7
21:34:46	10.5	4.8	6.3	20.2	61.5	0.7	697.2
21:35:46	10.3	6.8	7.6	12.8	69.1	0.7	869.0
21:36:46	7.3	8.1	9.2	36.5	80.7	0.5	1008.8
21:37:46	10.6	5.0	6.3	20.4	66.3	0.7	643.8
21:38:46	10.2	6.8	7.8	13.2	72.3	0.6	743.9
21:39:46	8.4	7.3	8.5	29.3	80.5	0.7	783.6
21:40:46	11.0	5.1	6.3	13.8	64.9	0.6	529.5
21:41:46	9.9	7.0	7.9	13.7	69.2	0.6	549.2
21:42:46	9.4	6.4	7.3	19.2	68.5	0.6	541.0
21:43:46	11.9	5.0	5.9	7.9	56.9	0.6	396.0
21:44:46	11.1	5.8	6.9	11.2	61.8	0.7	444.5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 14:57:18
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\mti1120a.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:57:50	11.2	171.6	7.3	-12.3	33.7	-1.5	1374.2
14:58:51	11.3	28.3	6.9	-14.3	30.1	-1.6	1415.3
14:59:50	11.0	13.9	7.0	-14.7	27.7	-1.3	1163.9
15:00:50	13.6	12.1	4.8	-5.4	31.2	18.6	1046.5
15:01:51	15.5	28.6	3.6	-9.2	32.3	8.9	1051.6
15:02:50	15.5	14.2	3.7	-16.7	34.6	8.0	1093.3
15:03:50	15.1	6.6	3.8	-17.0	40.9	8.5	921.9
15:04:50	14.6	6.0	4.0	-18.5	43.5	8.9	958.7
15:05:51	12.2	6.4	5.5	-20.7	50.6	8.4	831.5
15:06:50	11.9	5.8	5.6	-21.7	60.2	8.1	654.3
15:07:50	11.7	5.6	5.3	-22.0	64.2	7.9	529.2
15:08:50	11.6	5.4	5.2	-21.3	65.9	7.6	414.8
15:09:51	12.0	5.0	4.9	-19.6	61.8	7.3	340.9
15:10:50	12.4	4.8	4.6	-17.2	59.5	7.1	282.3
15:11:50	12.5	4.5	4.5	-15.3	59.1	7.0	245.4
15:12:50	12.6	4.3	4.4	-13.9	58.2	6.9	212.8
15:13:50	12.6	4.3	4.4	-12.5	57.8	6.9	194.4
15:14:51	12.6	4.3	4.4	-11.5	56.3	6.8	175.0
15:15:50	12.5	4.3	4.4	-10.6	55.7	6.8	158.2
15:16:50	12.1	4.3	4.6	-10.0	57.1	6.7	147.8
Avg.=	12.7	17.0	4.9	-15.2	49.0	6.8	660.6

THC OVERRANGE (MAX)
CO

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:11:49	10.4	6.6	6.7	0.1	63.7	2.4	304.3
14:12:49	10.2	6.6	6.7	1.5	64.7	2.4	346.6
14:13:49	9.5	7.4	7.5	2.5	69.6	2.4	514.9
14:14:49	8.8	7.4	7.8	8.7	66.9	2.6	434.4
14:15:49	11.4	6.1	6.0	2.0	59.1	2.7	378.4
14:16:49	10.1	7.2	7.2	1.5	62.5	2.4	553.1
14:17:49	10.1	6.5	6.8	6.2	62.8	2.6	471.2
14:18:49	12.0	5.8	5.5	-0.0	56.9	2.5	495.7
14:19:49	11.8	5.9	6.0	0.5	58.9	2.9	566.6
14:20:49	12.0	5.7	5.7	2.8	57.7	3.1	480.9
14:21:49	12.4	5.5	5.2	3.2	56.0	2.8	365.6
14:22:49	13.1	4.9	4.6	0.9	53.0	2.7	264.7
14:23:49	13.9	4.6	4.0	-1.8	49.6	2.7	222.0
14:24:49	13.6	5.0	4.1	-4.0	49.8	2.6	238.9
14:25:49	12.3	5.8	5.4	-5.8	55.0	2.6	359.2
14:26:49	10.0	7.0	6.9	-5.3	61.8	2.4	581.8
14:27:49	8.2	7.1	8.0	1.8	65.7	2.4	724.1
14:28:49	8.4	7.6	7.9	2.7	66.4	2.6	773.4
14:29:49	9.2	6.5	7.2	6.5	60.1	2.7	541.7
14:30:49	10.6	6.9	6.9	-2.3	59.4	2.6	670.6
14:31:49	8.5	7.3	8.4	7.1	69.5	2.6	700.2
14:32:49	10.8	5.5	6.1	9.6	61.5	2.6	580.9
14:33:49	10.9	7.2	6.5	-2.1	60.7	2.5	1038.8
14:34:49	8.8	7.4	8.1	8.5	70.1	2.7	977.7
14:35:49	11.2	6.0	6.2	6.3	57.9	2.8	768.5
14:36:49	11.4	6.7	6.2	-1.2	54.3	2.6	761.0
14:37:49	11.1	6.6	6.4	0.8	57.0	2.9	700.7
14:38:49	11.2	6.6	6.4	-0.3	58.5	3.3	837.8
14:39:49	10.8	6.6	6.7	1.9	61.3	3.2	762.0
14:40:49	12.0	6.3	5.8	-0.9	56.1	2.9	687.9
14:41:49	11.4	6.6	6.3	-1.3	56.2	2.8	627.6
14:42:49	11.4	6.5	6.4	0.1	58.6	3.1	532.6
14:43:49	11.8	6.3	6.1	0.5	58.4	3.4	491.4
14:44:49	12.0	5.7	5.9	1.2	58.0	3.5	392.4
14:45:49	12.7	5.6	5.1	-1.3	54.0	3.4	381.6
14:46:49	12.6	6.0	5.4	-2.6	57.0	3.1	497.9
14:47:49	10.9	7.0	6.7	-1.3	62.3	2.8	691.5
14:48:49	9.6	7.5	7.5	1.8	65.8	2.8	800.3
14:49:49	9.6	6.7	7.2	5.3	66.7	3.0	553.5
14:50:49	11.8	5.8	5.6	-6.8	56.7	2.8	607.1
14:51:49	16.9	407.7	31.3	1450.9	1368.1	66.2	1101.2

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:15:49	12.5	4.6	5.6	0.9	56.4	1.8	612.2
13:16:49	11.0	5.6	7.1	3.5	58.7	1.7	663.1
13:17:49	10.5	5.4	7.2	16.1	59.2	1.8	585.1
13:18:49	11.1	4.9	5.9	12.1	54.7	1.8	387.1
13:19:49	12.8	4.3	5.1	1.1	51.6	1.6	363.7
13:20:49	12.3	4.4	5.3	0.4	53.6	1.1	427.9
13:21:49	11.9	4.4	5.4	0.7	52.3	0.9	498.3
13:22:49	12.1	4.4	5.2	0.3	50.1	0.8	534.5
13:23:49	11.8	5.2	5.9	0.9	52.9	1.1	440.6
13:24:49	11.3	5.6	6.4	1.5	54.0	0.8	367.0
13:25:49	10.9	5.5	6.9	1.6	54.3	0.8	302.5
13:26:49	12.2	4.5	5.7	0.6	56.5	0.9	227.0
13:27:49	13.1	4.5	5.3	-1.9	59.5	0.9	188.6
13:28:49	12.5	5.4	6.1	-3.0	67.2	1.0	182.3
13:29:49	11.6	5.6	7.1	-2.1	62.9	1.2	198.2
13:30:49	10.7	5.5	7.6	-4.2	66.2	1.2	208.4
13:31:49	9.9	6.5	7.6	-6.5	66.4	0.9	276.2
13:32:49	8.4	6.1	8.2	-6	65.7	0.9	252.2
13:33:49	10.2	6.0	6.8	-7.3	61.3	0.8	193.0
13:34:49	9.5	7.0	7.5	-8.1	61.4	0.8	223.9
13:35:49	10.1	5.3	7.1	-8.3	58.5	1.0	194.7
13:36:49	11.2	6.2	6.8	-8.7	56.8	1.8	283.3
13:37:49	10.1	6.7	7.2	-9.8	60.0	1.8	464.8
13:38:49	10.1	5.8	6.8	-7.1	60.8	1.4	355.5
13:39:49	11.3	6.0	6.5	-8.7	59.5	1.7	392.8
13:40:49	9.1	6.5	7.9	-5.5	64.3	1.3	382.2
13:41:49	11.1	4.9	5.9	-4.9	53.8	1.1	288.8
13:42:49	9.9	7.2	7.4	-6.6	61.5	1.2	458.1
13:43:49	8.9	6.6	7.9	1.9	63.5	1.4	352.0
13:44:49	11.0	5.9	6.3	-3.3	56.4	1.5	381.3
13:45:49	9.0	7.7	7.9	-2.1	64.9	1.8	442.7
13:46:49	10.5	6.4	6.3	-1.2	63.6	1.9	406.7
13:47:49	8.7	107.7	8.7	4.3	77.4	8.2	699.9
13:48:49	7.8	68.2	8.7	50.0	80.1	2.4	493.5
13:49:49	10.9	7.2	6.5	8.1	68.7	2.6	475.7
13:50:49	11.5	6.6	6.6	-4.5	64.5	2.8	594.8
13:51:49	9.0	7.4	8.2	3.2	76.2	2.6	503.9
13:52:49	11.5	6.2	6.2	0.4	62.8	2.7	411.7
13:53:49	10.2	8.4	7.6	-3.2	68.6	2.7	654.9
13:54:49	9.0	8.1	7.9	7.3	75.3	2.8	507.0
13:55:49	12.2	6.2	5.6	-0.6	57.8	3.0	478.8
13:56:49	10.9	7.7	7.0	-2.8	63.4	2.9	762.6
13:57:49	9.9	7.1	7.4	4.8	69.6	3.0	607.6
13:58:49	12.5	5.9	5.4	-1.0	54.2	2.8	473.9
13:59:49	11.1	7.4	6.8	-2.4	60.0	2.7	575.5
14:00:49	10.9	6.2	6.3	1.4	59.6	2.8	408.3
14:01:49	13.2	5.7	4.9	-3.6	48.5	2.7	351.4
14:02:49	12.0	6.3	5.9	-3.6	54.7	2.8	401.3
14:03:49	11.6	6.3	6.0	-4.8	56.1	3.1	462.1
14:04:49	11.4	6.4	6.2	-7.1	57.5	3.2	463.8
14:05:49	12.0	5.8	5.9	-6.3	55.3	3.7	395.4
14:06:49	12.5	5.4	5.2	-5.9	51.5	3.5	305.6
14:07:49	13.2	5.2	4.6	-5.5	51.9	3.3	249.4
14:08:49	13.0	5.7	5.0	-4.8	55.6	2.9	253.7
14:09:49	12.5	5.9	5.7	-2.7	63.2	2.9	263.0
14:10:49	11.1	6.5	6.4	-1.6	66.4	2.5	293.1

RADIAN CORPORATION mti1120

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:29:53
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\mti1120a.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:29:54	11.1	15.4	5.9	-1.2	51.9	2.1	238.9
12:30:49	9.4	15.8	8.0	7.1	63.2	2.3	449.8
12:31:49	9.5	15.2	7.3	12.7	59.6	2.2	379.5
12:32:49	11.2	14.2	6.3	1.5	52.6	2.1	472.6
12:33:49	9.1	14.4	8.2	12.5	60.9	2.2	614.9
12:34:49	10.5	12.5	6.4	16.0	56.8	2.1	423.6
12:35:49	11.1	12.0	6.6	3.7	60.9	2.1	638.8
12:36:49	8.7	11.7	8.5	17.7	77.0	2.3	847.0
12:37:49	10.1	10.0	6.5	21.9	65.2	2.1	554.5
12:38:49	10.5	9.3	7.3	4.6	67.6	2.5	957.6
12:39:49	7.8	9.1	9.1	34.2	70.9	2.3	859.5
12:40:49	10.9	10.6	6.2	18.9	54.6	2.2	619.5
12:41:49	9.4	10.6	8.2	7.7	65.5	2.3	952.3
12:42:49	9.2	9.9	7.8	27.4	67.7	2.3	720.9
12:43:49	11.1	9.8	6.4	7.7	60.3	2.2	719.6
12:44:49	9.1	7.9	8.4	4.1	70.9	2.3	839.1
12:45:49	10.0	9.6	6.8	3.4	75.9	2.2	571.4
12:46:49	11.9	9.2	5.6	-6.2	64.6	2.1	542.0
12:47:49	9.7	5.7	8.2	-5.6	72.9	2.5	793.5
12:48:49	9.7	6.7	7.0	8.1	65.0	2.1	490.0
12:49:49	12.1	6.2	5.5	-0.8	52.9	2.2	484.6
12:50:49	8.7	10.5	8.3	6.3	77.4	2.2	629.7
12:51:49	10.8	19.7	6.0	8.0	60.7	2.0	401.0
12:52:49	11.6	8.7	6.1	-1.2	55.4	2.0	462.1
12:53:49	9.5	5.7	8.2	6.8	68.8	2.5	538.7
12:54:49	9.9	6.6	6.8	11.6	61.9	1.9	380.9
12:55:49	10.8	6.3	6.6	1.2	63.1	2.0	510.4
12:56:49	7.8	6.9	8.7	10.6	82.9	2.0	522.2
12:57:49	10.3	7.0	6.3	7.7	71.0	1.8	374.6
12:58:49	11.0	6.6	6.3	-0.5	64.3	1.9	486.9
12:59:49	9.3	6.4	7.8	5.7	73.0	2.1	532.8
13:00:49	11.0	6.0	5.9	5.8	63.2	1.8	387.9
13:01:49	11.4	5.5	6.3	-0.5	58.7	2.1	456.4
13:02:49	9.8	6.1	7.4	4.3	65.1	2.1	447.9
13:03:49	11.5	4.6	5.8	3.9	58.4	1.3	304.0
13:04:49	11.6	5.2	5.9	-1.1	54.3	1.8	264.9
13:05:49	11.3	5.1	5.9	0.3	53.5	1.8	251.5
13:06:49	12.0	4.4	5.6	-0.0	53.9	1.3	251.5
13:07:49	12.1	4.9	6.2	2.0	56.5	1.6	266.1
13:08:49	10.6	5.9	7.6	6.7	58.2	1.8	251.3
13:09:49	11.4	5.4	6.5	5.2	60.2	1.7	246.9
13:10:49	12.3	4.8	6.2	-0.8	71.5	1.8	284.3
13:11:49	12.2	4.7	6.1	0.0	70.9	1.8	353.3
13:12:49	12.9	4.4	5.5	-1.1	66.2	1.7	391.2
13:13:49	12.3	5.1	6.1	-4.9	64.7	1.8	690.9
13:14:49	11.4	5.0	6.6	3.0	61.9	1.8	686.8

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
20:20:59	15.5	5.8	4.7	42.1	31.9	1.5	464.5
20:21:59	15.0	5.7	4.3	37.7	31.8	1.7	487.2
20:22:59	16.3	4.7	3.4	12.7	28.5	1.5	355.9
20:23:59	15.9	5.6	4.5	20.3	32.1	1.6	363.7
20:24:59	15.4	5.6	4.0	15.9	30.7	1.7	404.8
20:25:59	16.5	4.8	3.2	4.5	27.9	1.5	312.3
20:26:59	16.2	5.7	4.2	9.4	31.7	1.6	323.0
20:27:59	15.1	6.4	4.9	15.4	34.5	1.6	385.3
20:28:59	15.2	6.0	3.8	11.6	31.0	1.6	405.8
20:29:59	16.1	6.0	4.3	6.1	31.9	1.5	341.5
20:30:59	14.8	6.9	5.0	15.1	33.7	1.6	447.1
20:31:59	15.7	5.6	3.3	5.2	29.8	1.5	373.4
20:32:59	16.3	5.6	3.9	5.0	31.3	1.5	338.0
20:33:59	15.8	5.9	4.2	8.9	31.4	1.5	405.1
20:34:59	15.5	5.9	4.2	9.9	32.2	1.5	422.7
20:35:59	15.6	5.8	4.1	9.1	32.1	1.6	419.0
20:36:59	15.6	5.7	3.9	8.1	33.3	1.6	410.9
20:37:59	15.9	5.6	3.7	5.6	32.3	1.6	388.9
20:38:59	16.1	5.6	3.8	5.0	31.7	1.6	372.0
20:39:59	16.3	5.5	3.6	3.4	32.1	1.5	336.4
20:40:59	16.1	5.5	3.8	3.9	32.8	1.6	365.4
20:41:59	15.4	5.9	4.4	7.3	33.2	1.2	424.9
20:42:59	15.1	5.8	4.5	8.5	33.2	-3.9	370.5
20:43:59	15.5	5.5	3.8	7.2	29.0	3.6	373.9
20:44:59	16.3	5.0	3.4	2.0	27.4	0.4	295.2
20:45:59	16.1	5.6	4.2	7.7	29.6	0.4	309.7
20:46:59	15.2	6.1	4.7	14.2	30.5	0.4	457.7
20:47:59	14.9	5.9	4.3	14.0	30.4	0.4	581.7
20:48:59	16.1	4.7	3.1	2.1	26.9	0.3	390.4
20:49:59	16.2	5.1	4.0	3.3	31.8	0.3	386.8
20:50:59	15.6	5.3	4.2	6.2	33.7	0.3	399.0
20:51:59	15.0	6.1	5.0	11.8	33.6	0.3	457.3
20:52:59	15.5	5.0	3.5	5.9	28.8	0.3	392.9
20:53:59	16.2	5.0	4.1	3.1	31.4	0.2	309.0

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
19:24:59	16.2	5.1	3.8	13.0	31.5	1.4	642.2
19:25:59	14.6	6.7	5.5	34.7	39.1	1.5	913.6
19:26:59	14.7	5.6	3.8	23.7	34.3	1.6	753.3
19:27:59	16.3	4.6	3.3	8.1	30.4	1.4	580.1
19:28:59	15.3	6.2	5.1	31.5	39.0	1.5	877.4
19:29:59	14.8	5.7	3.9	29.5	34.3	1.5	815.2
19:30:59	16.4	4.7	3.2	9.0	28.4	1.3	581.7
19:31:59	15.5	8.2	5.2	28.1	35.5	1.5	797.8
19:32:59	14.2	16.4	4.8	44.1	33.0	1.5	796.5
19:33:59	16.1	5.2	3.3	9.2	27.0	1.3	518.9
19:34:59	15.5	6.3	5.0	21.1	35.0	1.4	741.8
19:35:59	15.2	5.5	3.7	22.2	30.8	1.5	774.9
19:36:59	16.6	4.0	3.3	9.7	27.0	1.4	645.4
19:37:59	15.5	6.1	4.9	29.7	32.9	1.5	935.8
19:38:59	15.1	5.7	3.9	25.2	29.6	1.5	814.2
19:39:59	16.7	4.8	3.0	9.6	24.8	1.3	537.5
19:40:59	15.9	6.0	4.5	22.6	32.0	1.4	556.2
19:41:59	15.0	6.5	4.7	25.2	33.9	1.5	603.0
19:42:59	16.3	4.9	2.9	8.3	25.7	1.4	413.6
19:43:59	16.9	5.0	3.5	10.2	29.4	1.4	381.8
19:44:59	15.8	6.1	4.7	18.8	35.4	1.4	578.2
19:45:59	15.0	6.1	4.6	18.5	36.2	1.5	643.1
19:46:59	16.0	4.8	3.2	7.2	29.0	1.4	485.5
19:47:59	16.2	5.4	4.2	11.7	34.4	1.4	537.0
19:48:59	14.9	6.2	5.0	28.2	36.3	1.5	862.4
19:49:59	15.5	4.9	3.4	17.8	29.6	1.5	793.5
19:50:59	16.2	4.8	3.9	14.1	31.1	1.5	961.2
19:51:59	14.8	6.4	5.3	42.9	35.4	1.5	1312.0
19:52:59	14.5	5.6	4.1	34.1	32.7	1.5	1151.6
19:53:59	16.2	4.4	3.2	6.6	29.3	1.5	761.7
19:54:59	15.8	5.4	4.4	16.5	33.0	1.5	867.5
19:55:59	15.0	5.5	4.5	21.3	32.5	1.6	894.7
19:56:59	15.6	4.8	3.4	9.9	28.8	1.6	763.7
19:57:59	16.6	4.4	3.2	2.4	26.9	1.5	543.5
19:58:59	16.3	4.9	3.8	6.6	28.2	1.5	651.8
19:59:59	15.7	5.3	4.4	11.1	31.6	1.5	923.5
20:00:59	15.1	5.5	4.2	13.8	30.8	1.6	995.0
20:01:59	16.6	4.2	2.9	0.1	26.8	1.4	621.1
20:02:59	16.4	4.8	3.8	2.0	29.9	1.5	729.0
20:03:59	16.0	5.0	4.0	3.7	31.2	1.5	806.8
20:04:59	15.1	6.0	5.1	9.2	31.4	1.5	812.7
20:05:59	15.2	5.2	3.7	5.6	32.8	1.6	671.5
20:06:59	16.3	4.9	3.8	0.7	40.2	1.5	556.7
20:07:59	14.9	6.3	5.2	10.9	35.2	1.6	675.2
20:08:59	15.1	5.4	3.7	4.6	36.2	1.6	579.4
20:09:59	16.3	5.2	3.8	0.9	44.6	1.5	412.4
20:10:59	15.2	6.2	5.0	20.7	36.2	1.6	494.7
20:11:59	15.3	5.2	3.5	18.1	45.0	1.6	482.1
20:12:59	16.6	4.5	3.3	12.5	35.3	1.5	379.0
20:13:59	16.0	5.4	4.3	40.9	34.0	1.6	498.7
20:14:59	14.7	6.4	5.3	105.8	35.4	1.6	638.5
20:15:59	14.9	5.5	3.9	87.9	34.9	1.7	566.9
20:16:59	16.3	4.7	3.6	59.0	30.1	1.4	450.0
20:17:59	15.2	6.1	5.1	101.1	32.0	1.5	515.2
20:18:59	15.1	5.3	3.9	55.3	29.5	1.5	452.1
20:19:59	16.3	4.8	3.7	24.8	29.5	1.4	364.5

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
18:28:59	16.1	6.3	4.2	-5.2	28.4	1.7	693.4
18:29:59	15.1	6.7	4.5	-2.3	31.1	1.7	894.2
18:30:59	15.9	5.7	3.1	-4.3	26.7	1.5	714.8
18:31:59	16.6	5.5	3.3	-4.7	28.5	1.6	730.5
18:32:59	16.1	6.0	3.9	-2.5	32.3	1.6	1057.7
18:33:59	15.5	6.2	4.1	-0.3	33.0	1.5	1099.2
18:34:59	15.6	5.8	3.8	-3.0	31.8	1.5	913.8
18:35:59	16.2	5.3	3.2	-3.9	30.1	1.5	647.4
18:36:59	16.6	4.9	2.8	-4.2	29.1	1.5	495.3
18:37:59	17.2	4.7	2.6	-3.8	29.6	1.6	401.2
18:38:59	17.4	4.7	2.7	-4.0	30.6	1.5	399.5
18:39:59	16.7	5.4	3.4	-2.8	34.5	1.5	412.3
18:40:59	15.6	6.2	4.2	-2.7	36.5	1.6	467.1
18:41:59	15.1	6.0	4.1	-2.7	38.8	1.6	543.7
18:42:59	14.7	6.4	4.6	-2.2	37.5	1.6	640.6
18:43:59	13.9	7.1	5.3	1.6	36.0	1.6	684.8
18:44:59	14.2	6.4	4.1	1.7	30.0	1.6	545.6
18:45:59	16.2	5.2	3.2	-2.5	28.2	1.4	387.6
18:46:59	15.7	5.8	4.3	-0.5	32.9	1.5	599.4
18:47:59	15.0	6.1	4.5	1.2	33.4	1.5	688.5
18:48:59	15.4	5.5	3.6	-0.7	28.2	1.5	589.7
18:49:59	16.3	5.2	3.6	-1.6	29.1	1.4	431.0
18:50:59	15.3	6.2	4.8	2.1	32.8	1.5	533.2
18:51:59	14.2	6.7	5.0	5.9	36.0	1.6	706.2
18:52:59	15.7	5.2	3.2	-1.3	30.2	1.4	467.4
18:53:59	16.1	5.5	4.0	-1.2	34.6	1.4	459.8
18:54:59	15.1	6.0	4.6	2.3	36.5	1.5	599.9
18:55:59	14.5	6.3	4.5	2.7	37.9	1.6	637.0
18:56:59	15.9	5.3	3.4	-2.5	32.9	1.5	450.3
18:57:59	15.2	6.4	5.1	0.7	37.7	1.6	694.8
18:58:59	14.1	6.5	4.7	4.4	37.4	1.6	792.7
18:59:59	15.7	5.3	3.9	-2.2	32.8	1.4	626.4
19:00:59	13.9	11.6	6.2	14.2	41.5	1.5	776.1
19:01:59	14.4	6.8	4.1	5.6	34.0	1.6	561.7
19:02:59	16.0	5.2	3.4	-1.9	30.5	1.5	423.5
19:03:59	15.9	5.9	4.6	-0.6	35.3	1.6	459.6
19:04:59	14.4	6.7	4.8	3.7	39.9	1.6	566.2
19:05:59	15.8	5.2	3.3	-1.7	33.7	1.5	436.8
19:06:59	16.3	5.6	4.1	-2.1	35.2	1.4	431.9
19:07:59	14.6	6.9	5.1	4.0	37.6	1.6	586.7
19:08:59	15.9	5.2	3.3	-1.5	28.0	1.5	424.2
19:09:59	16.1	5.7	4.3	-2.1	32.2	1.5	452.5
19:10:59	14.8	6.3	4.7	1.9	36.1	1.6	606.1
19:11:59	16.1	4.8	3.1	-1.7	28.7	1.4	426.4
19:12:59	16.1	5.9	4.7	0.8	34.4	1.5	544.2
19:13:59	14.4	6.6	5.1	8.1	37.7	1.5	759.1
19:14:59	15.8	5.0	3.3	0.4	33.5	1.4	496.7
19:15:59	16.3	5.5	4.1	2.3	35.3	1.4	521.0
19:16:59	15.1	6.1	4.8	8.5	36.4	1.5	684.7
19:17:59	15.8	5.0	3.3	3.4	27.7	1.4	564.3
19:18:59	16.4	5.1	4.0	6.9	30.8	1.3	508.4
19:19:59	14.9	6.5	5.4	22.7	37.2	1.4	740.9
19:20:59	14.7	5.9	4.1	22.7	33.1	1.5	690.0
19:21:59	16.2	4.8	3.5	8.8	30.4	1.3	509.8
19:22:59	15.0	6.2	5.2	26.5	37.1	1.5	889.1
19:23:59	14.9	5.4	3.8	24.4	31.4	1.6	829.0

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:32:59	15.2	5.5	4.9	-2.0	38.9	1.7	400.3
17:33:59	14.9	5.3	4.1	-3.3	35.1	1.7	438.4
17:34:59	16.3	4.5	3.6	-4.4	32.9	1.5	342.8
17:35:59	15.5	5.1	4.3	-3.3	35.7	1.6	404.8
17:36:59	15.4	5.0	4.0	-3.6	34.1	1.6	373.1
17:37:59	16.3	4.5	3.5	-3.9	32.2	1.5	324.3
17:38:59	15.3	5.7	4.9	0.0	39.1	1.6	319.9
17:39:59	15.4	5.0	3.9	-2.1	32.5	1.6	324.9
17:40:59	16.7	4.2	3.0	-3.5	30.8	1.5	237.2
17:41:59	16.7	4.6	3.4	-3.1	35.4	1.6	264.1
17:42:59	15.9	5.7	4.4	-1.2	40.4	1.6	360.4
17:43:59	15.1	5.9	4.5	2	44.7	1.6	355.5
17:44:59	15.7	5.5	4.1	-0.8	61.3	1.6	326.9
17:45:59	15.7	5.5	4.2	-1.6	48.4	1.6	361.6
17:46:59	15.4	5.6	4.2	-1.1	51.9	1.6	347.9
17:47:59	16.0	4.9	3.3	-1.7	57.8	1.6	309.9
17:48:59	16.2	5.3	4.1	-0.9	44.8	1.5	326.3
17:49:59	15.0	6.2	4.9	2.3	42.2	1.6	450.2
17:50:59	14.2	6.4	4.8	0.2	44.9	1.6	525.0
17:51:59	15.8	5.0	3.3	-4.1	40.3	1.5	373.0
17:52:59	15.7	6.0	4.7	-2.9	37.3	1.4	349.8
17:53:59	14.0	9.8	5.5	3.6	42.6	1.5	452.1
17:54:59	15.2	5.9	3.7	-2.5	33.2	1.5	364.4
17:55:59	16.2	5.7	4.0	-2.7	33.5	1.4	313.7
17:56:59	15.3	6.2	4.4	-1.3	36.4	1.5	396.3
17:57:59	16.3	5.0	2.9	-3.0	29.7	1.5	332.9
17:58:59	16.6	5.5	3.8	-2.9	33.1	1.5	332.4
17:59:59	15.7	6.1	4.4	-2.4	34.5	1.5	436.5
18:00:59	14.8	6.5	4.5	-1.1	36.3	1.6	621.9
18:01:59	16.1	5.3	3.1	-3.6	31.8	1.4	400.8
18:02:59	16.1	5.6	4.0	-3.3	35.5	1.5	475.7
18:03:59	15.1	6.0	4.5	-2.4	37.1	1.5	715.7
18:04:59	15.6	5.4	3.4	-3.9	33.4	1.5	616.7
18:05:59	16.2	5.4	4.0	-3.5	36.0	1.6	554.8
18:06:59	14.7	6.7	5.3	-0.3	39.5	1.6	760.2
18:07:59	14.6	6.1	4.1	-1.4	35.7	1.6	679.0
18:08:59	16.2	5.5	3.7	-3.4	34.8	1.4	581.2
18:09:59	14.5	7.1	5.5	6.6	40.3	1.6	1045.4
18:10:59	14.9	5.8	3.5	-0.2	34.7	1.5	775.7
18:11:59	16.3	5.5	3.7	-4.6	33.0	1.4	631.6
18:12:59	14.5	7.4	5.5	-1.6	41.1	1.5	973.9
18:13:59	15.0	6.1	3.6	-3.8	35.1	1.5	752.7
18:14:59	16.0	6.1	4.2	-4.0	34.9	1.4	646.0
18:15:59	14.1	7.5	5.2	2.5	39.4	1.5	771.3
18:16:59	15.6	6.0	3.4	-2.9	32.4	1.4	557.0
18:17:59	15.5	6.9	4.8	-2.5	39.6	1.4	680.2
18:18:59	14.4	7.2	4.7	-0.4	37.8	1.5	820.8
18:19:59	16.4	5.6	2.9	-4.9	27.7	1.4	529.2
18:20:59	16.1	6.5	4.0	-4.4	31.2	1.5	635.5
18:21:59	15.0	7.2	4.7	-4.1	34.8	1.5	845.5
18:22:59	14.5	7.3	4.7	-6.1	37.8	1.7	918.3
18:23:59	15.4	6.3	3.5	-7.6	34.8	1.8	741.1
18:24:59	16.3	6.0	3.6	-7.7	30.6	1.6	700.4
18:25:59	15.0	7.2	5.0	-6.8	36.3	1.6	976.1
18:26:59	14.8	6.6	3.9	-5.6	33.2	1.7	839.7
18:27:59	16.3	5.6	3.1	-7.7	27.3	1.5	567.2

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:36:59	16.3	3.5	4.3	-1.9	37.5	2.1	353.7
16:37:59	15.0	4.4	5.1	-0.8	37.7	2.0	367.3
16:38:59	14.1	5.0	5.6	0.6	38.9	2.0	370.8
16:39:59	13.9	5.0	5.6	0.4	39.0	2.0	433.0
16:40:59	14.1	4.3	4.8	-1.6	36.0	1.9	458.2
16:41:59	16.0	3.1	4.0	-4.0	34.7	1.9	323.0
16:42:59	14.7	4.3	5.4	-1.0	40.0	1.9	374.7
16:43:59	14.2	4.1	4.9	-1.5	40.3	2.0	425.5
16:44:59	15.6	3.0	3.8	-5.0	36.0	1.8	332.5
16:45:59	15.5	3.5	4.6	-2.6	39.3	1.9	293.7
16:46:59	14.4	4.3	5.2	-0.7	42.1	1.9	362.7
16:47:59	15.7	3.0	3.8	-4.2	35.6	1.8	319.3
16:48:59	15.2	4.1	5.3	-0.5	41.4	1.8	344.7
16:49:59	14.2	4.2	5.0	0.8	41.8	1.9	506.8
16:50:59	15.9	3.0	3.9	-3.6	39.3	1.8	373.8
16:51:59	14.4	4.9	6.0	0.9	46.1	1.8	412.5
16:52:59	14.3	4.1	4.6	-1.5	39.9	1.9	388.0
16:53:59	15.8	3.4	4.3	-3.0	37.5	1.7	266.2
16:54:59	15.0	4.1	5.0	0.9	42.2	1.8	290.4
16:55:59	14.9	3.9	4.4	-0.3	40.2	1.8	311.1
16:56:59	16.4	3.1	3.9	-2.3	36.6	1.8	237.0
16:57:59	15.5	3.7	4.5	1.4	39.3	1.8	268.9
16:58:59	15.2	3.8	4.5	1.5	37.7	1.8	337.6
16:59:59	16.2	3.1	3.6	-2.4	33.2	1.8	324.8
17:00:59	16.8	2.8	3.5	-3.4	34.1	2.0	280.4
17:01:59	16.8	2.9	3.6	-4.2	34.4	2.0	382.3
17:02:59	16.2	3.4	4.2	-4.2	35.6	1.9	470.2
17:03:59	15.7	4.0	4.6	-6.1	43.6	1.9	520.3
17:04:59	15.1	3.9	4.2	-8.1	38.6	1.8	493.0
17:05:59	16.0	3.6	4.1	-6.5	35.3	1.8	377.2
17:06:59	14.9	4.8	5.1	-5.6	39.3	1.8	387.4
17:07:59	14.4	5.2	5.4	-3.1	41.4	1.8	380.0
17:08:59	14.9	4.5	4.2	-4.5	35.8	1.7	330.5
17:09:59	15.5	4.6	4.7	-3.7	36.2	1.6	236.1
17:10:59	14.9	5.0	4.8	-1.9	37.7	1.8	246.8
17:11:59	16.0	3.9	3.6	-4.1	33.8	1.6	239.3
17:12:59	15.9	4.6	4.3	-2.6	39.2	1.6	208.5
17:13:59	14.9	5.6	5.3	-0.9	39.5	1.7	234.6
17:14:59	15.3	4.9	3.9	-3.0	35.3	1.6	238.0
17:15:59	15.5	5.5	4.9	-2.4	39.4	1.6	187.6
17:16:59	14.6	6.1	5.0	-1.2	42.7	1.7	222.8
17:17:59	15.7	5.2	4.0	-3.9	39.8	1.6	206.4
17:18:59	14.2	9.5	5.9	-5.1	52.8	1.8	277.2
17:19:59	15.2	6.1	3.8	-4.8	56.9	1.7	225.2
17:20:59	15.7	6.0	4.7	-4.5	42.8	1.5	175.2
17:21:59	14.8	6.1	4.9	-4.2	44.5	1.7	211.2
17:22:59	15.9	4.8	3.7	-4.6	38.8	1.7	211.4
17:23:59	15.1	6.1	5.5	-1.1	44.0	1.7	280.1
17:24:59	14.7	5.5	4.3	-1.9	42.5	1.7	303.2
17:25:59	16.2	4.8	4.1	-4.0	39.1	1.6	211.0
17:26:59	14.7	6.3	5.5	-0.3	41.6	1.7	323.9
17:27:59	14.9	4.7	4.1	-3.0	39.6	1.7	333.7
17:28:59	16.2	4.6	4.0	-4.2	35.6	1.6	267.7
17:29:59	14.9	5.7	5.2	-1.9	39.1	1.7	372.5
17:30:59	14.5	5.5	4.5	-2.2	37.8	1.7	401.5
17:31:59	16.1	4.5	3.6	-4.4	33.2	1.6	297.6

RADIAN CORPORATION day 2 111991

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 15:51:04
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\MTI1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:51:06	14.6	8.4	5.0	4.1	47.4	1.7	647.8
15:51:59	14.3	8.5	5.0	4.7	46.7	1.7	796.0
15:52:59	15.6	7.3	4.1	-0.1	44.0	1.7	526.6
15:53:59	14.7	8.3	5.6	4.3	46.9	1.7	571.4
15:54:59	13.8	8.7	5.8	4.6	45.4	1.7	560.2
15:55:59	15.2	7.2	4.2	-0.8	39.0	1.6	411.4
15:56:59	15.3	7.7	5.1	0.9	42.5	1.7	388.7
15:57:59	14.4	7.9	5.4	2.0	41.9	1.7	426.3
15:58:59	14.9	7.4	4.8	-0.8	36.9	1.6	408.8
15:59:59	14.2	8.7	6.3	3.0	40.3	1.7	400.1
16:00:59	14.7	7.1	4.4	-0.7	33.1	1.6	345.5
16:01:59	15.8	6.7	4.6	-1.9	33.9	1.7	259.1
16:02:59	14.9	7.4	5.5	0.1	38.8	1.7	282.9
16:03:59	14.2	7.5	5.5	0.9	38.8	1.7	356.1
16:04:59	15.4	6.1	4.1	-2.3	34.6	1.6	305.9
16:05:59	15.1	6.7	5.2	-1.1	39.6	1.7	343.6
16:06:59	14.8	6.3	4.5	-1.6	38.6	1.7	403.0
16:07:59	15.7	5.7	4.4	-3.1	38.5	1.7	415.9
16:08:59	14.4	6.5	5.4	-2.4	43.2	1.8	683.7
16:09:59	15.0	5.6	4.2	-3.9	34.8	1.7	536.2
16:10:59	14.8	6.1	5.4	-3.2	41.1	1.9	619.6
16:11:59	13.8	6.3	5.2	-1.3	41.0	1.8	795.3
16:12:59	15.5	4.9	3.8	-4.7	36.4	1.7	509.8
16:13:59	14.6	6.5	6.1	0.3	44.2	2.0	861.3
16:14:59	13.2	6.8	5.7	6.1	44.6	1.8	1077.8
16:15:59	14.9	5.0	4.2	-4.1	38.1	1.8	800.3
16:16:59	15.5	4.9	4.6	-5.5	37.8	1.9	759.1
16:17:59	13.6	6.8	6.3	3.1	45.6	1.9	1073.9
16:18:59	14.3	5.3	4.7	-3.5	42.0	1.8	850.4
16:19:59	15.7	4.4	4.0	-5.6	37.5	1.8	663.3
16:20:59	14.5	5.9	6.0	0.9	43.9	1.9	927.9
16:21:59	14.2	5.2	4.7	0.2	40.9	1.8	814.7
16:22:59	15.9	4.2	3.9	-5.2	37.4	1.8	600.7
16:23:59	14.9	5.3	5.5	-0.6	44.2	1.9	801.9
16:24:59	14.7	4.5	4.2	-1.1	39.2	1.8	773.7
16:25:59	17.2	2.9	2.9	-5.0	31.9	2.0	472.1
16:26:59	17.0	3.6	3.9	-4.2	35.1	2.0	506.9
16:27:59	14.5	5.4	5.7	0.8	44.1	1.9	752.3
16:28:59	14.3	4.8	4.7	-0.3	40.5	1.9	757.7
16:29:59	16.2	3.7	3.7	-4.5	35.3	1.8	511.4
16:30:59	16.0	4.0	4.3	-2.6	36.6	1.8	441.1
16:31:59	15.8	3.9	4.2	-1.9	37.5	1.8	412.7
16:32:59	15.9	3.7	4.1	-1.6	37.4	1.8	376.5
16:33:59	16.4	3.2	3.7	-2.7	36.8	1.9	336.3
16:34:59	16.7	2.7	3.1	-3.4	34.9	2.0	267.9
16:35:59	17.2	2.5	3.1	-3.8	35.1	2.0	250.9

RADIAN CORPORATION ot 2

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:28:37
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:28:40	14.0	0.3	-0.5	21.8	41.7	3.4	29.5
21:28:55	14.8	0.2	-0.9	16.5	39.3	3.4	24.5
21:29:10	15.5	0.5	-1.0	11.2	36.8	3.4	17.8
21:29:25	16.2	0.5	-1.1	6.9	34.9	3.4	13.4
21:29:40	16.4	0.6	-1.1	4.3	34.5	3.4	13.2
21:29:55	16.2	0.5	-1.1	2.7	35.0	3.3	15.8
21:30:10	15.7	0.4	-1.0	1.7	36.9	3.2	17.4
21:30:25	15.2	0.3	-0.9	2.4	38.3	3.3	17.3
21:30:40	14.8	0.3	-0.9	5.5	39.2	3.3	20.9
21:30:55	14.4	0.1	-0.8	10.2	39.7	3.4	27.7
21:31:10	14.1	0.1	-0.8	14.9	40.0	3.3	36.9
21:31:25	14.0	0.0	-0.8	19.4	39.7	3.4	43.3
21:31:40	13.9	0.1	-0.8	21.2	39.4	3.4	48.4
21:31:55	13.8	0.1	-0.7	23.4	39.8	3.4	51.3
21:32:10	13.7	0.1	-0.6	25.0	40.2	3.6	56.6
21:32:25	13.9	0.2	-0.6	25.9	38.8	3.7	53.0
21:32:40	14.6	0.2	-0.6	22.4	36.2	3.7	42.0
21:32:55	15.4	0.4	-0.7	15.9	34.2	3.7	29.5
Avg.=	14.8	0.3	-0.8	13.9	38.0	3.4	31.0

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:23:23
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:23:25	16.0	0.5	-1.0	-0.5	38.6	3.0	8.9
21:23:55	15.2	0.4	-0.9	-1.1	41.1	2.9	9.5
21:24:25	14.1	0.4	-0.8	-0.1	44.4	2.9	10.1
21:24:55	13.5	0.4	-0.7	8.9	46.6	3.0	11.7
21:25:25	13.9	0.5	-0.7	15.0	44.9	3.1	12.1
21:25:55	15.2	0.7	-1.0	7.8	40.4	3.2	10.5
21:26:25	16.0	0.6	-1.1	2.9	37.3	3.1	10.2
21:26:55	15.7	0.5	-1.0	1.3	38.5	3.1	10.5
21:27:25	14.4	0.5	-0.9	6.2	43.5	3.1	14.7
21:27:55	13.8	0.3	-0.8	14.7	44.5	3.2	22.3
Avg.=	14.8	0.5	-0.9	5.5	42.0	3.1	12.0

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:39:45	13.5	6.9	0.0	-2.4	44.7	0.3	-2.4
15:40:45	11.2	8.4	-0.2	1.0	45.8	-0.7	-2.7
15:41:45	13.4	6.6	-0.3	0.7	43.7	-0.8	-2.0
15:42:45	13.5	6.9	-0.1	-2.2	44.8	0.1	-1.5
15:43:45	10.4	194.3	0.1	4.0	48.2	5.2	-2.0
15:44:45	13.0	31.4	-0.2	2.0	46.2	-0.4	-2.7
15:45:45	13.7	7.2	-0.1	-1.8	43.5	-0.1	-1.4
15:46:45	11.7	8.1	0.1	-2.2	50.6	0.2	-1.4
15:47:45	12.7	7.0	-0.2	-1.0	48.4	-0.5	-2.3
15:48:45	14.2	6.2	-0.3	-2.4	42.4	0.2	-2.8
15:49:45	12.2	7.7	-0.0	-1.6	48.6	-0.1	-2.7
15:50:45	12.1	7.5	-0.3	2.7	48.6	-0.8	-2.9
15:51:45	14.3	5.9	-0.3	-0.5	43.9	-0.5	-2.8
15:52:45	13.9	6.2	-0.2	-1.1	44.7	-0.3	-2.4
15:53:45	14.1	6.2	-0.4	1.8	43.5	-0.8	-3.2
15:54:45	14.3	5.9	-0.4	2.1	43.8	-0.6	-2.2
15:55:45	11.6	7.9	-0.2	4.6	46.5	-0.8	-2.0
15:56:45	12.9	6.6	-0.2	2.5	43.9	-0.8	-2.3
15:57:45	13.8	6.2	-0.3	-1.0	41.8	-0.5	-2.1
15:58:45	11.9	7.7	-0.2	0.0	45.4	-0.6	-2.3
15:59:45	13.1	6.6	-0.3	1.6	44.2	-0.8	-1.9
16:00:45	13.6	6.3	-0.3	-1.1	42.6	-0.6	-2.2
16:01:45	11.7	8.3	-0.0	-2.3	49.2	0.1	-1.4
16:02:45	12.8	7.2	-0.2	-2.3	95.5	0.2	-2.1
16:03:45	14.0	6.4	-0.3	-3.0	64.4	0.2	-2.1
16:04:45	11.2	9.5	-0.1	-3.3	57.9	-0.1	-2.0
16:05:45	12.0	8.4	-0.0	-2.8	90.2	0.2	-2.9
16:06:45	14.1	6.5	-0.2	-2.6	85.4	0.2	-2.3
16:07:45	12.6	7.9	-0.2	-3.2	58.1	0.0	-2.2
16:08:45	11.8	9.0	-0.1	-2.7	90.7	0.1	-1.3
16:09:45	14.0	6.6	-0.3	-2.8	73.9	0.2	-2.4
16:10:45	13.0	7.4	-0.2	-3.3	53.0	0.1	-1.8
16:11:45	12.1	8.0	-0.2	-3.4	53.1	-0.0	-2.0
16:12:45	14.0	6.5	-0.4	-3.3	55.0	0.1	-2.0
16:13:45	12.3	7.9	-0.1	-3.3	57.3	0.1	-1.3
16:14:45	12.4	7.5	-0.1	-3.1	68.0	0.1	-1.8
16:15:45	14.0	6.3	-0.4	-3.1	65.1	0.2	-2.1
16:16:45	12.8	7.4	-0.2	-3.2	58.7	0.1	-1.2
16:17:45	12.2	7.8	-0.1	-3.0	61.2	0.2	-1.6
16:18:45	14.1	6.2	-0.4	-3.1	57.0	0.2	-1.2
16:19:45	13.0	7.1	-0.2	-3.3	51.4	0.1	-1.4
16:20:45	12.1	7.7	-0.1	-3.3	57.6	0.1	-1.2
16:21:45	14.2	5.8	-0.6	-2.9	53.5	0.2	-1.9
16:22:45	13.4	6.5	-0.3	-3.3	50.6	0.1	-1.9
16:23:45	12.6	6.9	-0.1	-3.4	55.0	-0.1	-1.9
16:24:45	14.3	5.5	-0.6	-2.9	54.2	0.2	-1.6
16:25:45	14.0	5.9	-0.5	-3.1	47.1	0.1	-1.6
16:26:45	13.0	6.6	-0.2	-3.3	48.5	0.1	-0.7
16:27:45	12.8	6.6	-0.2	-3.4	49.7	-0.0	-0.9
16:28:45	13.8	5.7	-0.6	-3.2	46.9	0.0	-0.6
Avg.=	13.1	8.7	-0.3	-0.7	50.1	-0.1	-2.4

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:43:45	14.1	6.9	-0.4	-3.1	41.3	0.2	-2.8
14:44:45	13.5	7.3	-0.2	-2.9	42.8	0.3	-2.5
14:45:45	13.4	7.4	-0.1	-2.9	43.8	0.3	-1.9
14:46:45	14.8	6.4	-0.4	-2.9	39.5	0.3	-2.7
14:47:45	14.3	6.8	-0.3	-2.9	40.6	0.3	-2.7
14:48:45	14.0	6.8	-0.3	-3.1	42.0	0.2	-2.1
14:49:45	14.2	6.6	-0.5	-3.0	41.0	0.1	-1.5
14:50:45	14.9	5.8	-0.8	-3.2	40.5	0.0	-1.8
14:51:45	15.9	5.0	-1.1	-2.9	40.9	0.2	-2.7
14:52:45	16.3	4.6	-1.0	-2.8	41.6	0.3	-2.4
14:53:45	15.3	5.2	-1.0	-3.2	44.5	0.0	-2.7
14:54:45	13.1	6.7	-0.2	-2.3	52.6	0.0	-2.3
14:55:45	12.2	7.0	-0.1	-0.3	56.0	-0.5	-1.5
14:56:45	11.5	7.4	-0.2	5.5	56.9	-0.7	-1.6
14:57:45	10.9	8.0	-0.3	12.5	58.5	-0.7	-2.2
14:58:45	11.0	8.2	-0.3	12.0	51.5	-0.6	-2.0
14:59:45	13.9	6.1	-0.3	-0.4	45.8	-0.4	-2.5
15:00:45	14.2	6.2	-0.3	-2.3	50.4	0.2	-2.5
15:01:45	12.6	7.5	-0.0	-3.2	55.9	0.1	-2.7
15:02:45	11.7	8.3	-0.1	-3.4	53.0	-0.2	-2.0
15:03:45	12.2	7.8	-0.2	-3.3	50.8	0.0	-1.7
15:04:45	14.4	6.2	-0.6	-3.3	45.1	0.1	-1.7
15:05:45	13.3	7.0	-0.3	-3.4	48.3	-0.0	-2.0
15:06:45	11.3	8.5	-0.1	-3.3	53.9	0.1	-2.6
15:07:45	13.1	7.0	-0.4	-3.0	46.6	0.1	-2.2
15:08:45	14.7	6.1	-0.7	-3.2	41.7	0.1	-2.0
15:09:45	13.6	7.0	-0.4	-3.1	44.2	0.0	-1.9
15:10:45	12.7	7.4	-0.2	-0.2	46.0	-0.6	-1.0
15:11:45	11.9	8.1	-0.2	5.1	48.8	-0.8	-2.1
15:12:45	13.3	6.9	-0.3	3.8	45.5	-0.8	-2.8
15:13:45	13.5	6.9	-0.1	-1.6	46.8	-0.2	-2.0
15:14:45	11.4	8.4	-0.2	10.6	53.8	-0.8	-2.4
15:15:45	13.4	6.7	-0.3	5.5	51.0	-0.8	-2.3
15:16:45	13.5	6.7	-0.2	-1.2	49.5	-0.4	-2.6
15:17:45	11.2	8.4	-0.7	-1.5	55.2	-0.2	-2.3
15:18:45	13.6	6.3	-0.3	-0.8	51.9	-0.5	-2.7
15:19:45	14.0	6.5	-0.3	-2.6	46.6	0.2	-2.4
15:20:45	11.7	8.0	-0.1	-0.5	53.1	-0.4	-2.2
15:21:45	13.6	6.4	-0.3	1.5	43.5	-0.7	-2.2
15:22:45	13.9	6.2	-0.3	-0.5	42.0	-0.8	-3.1
15:23:45	11.9	7.9	-0.3	3.8	48.7	-0.8	-2.8
15:24:45	12.8	6.8	-0.3	6.6	44.2	-0.7	-2.1
15:25:45	14.4	6.0	-0.4	-0.0	38.0	-0.6	-3.2
15:26:45	12.5	7.5	-0.3	-1.6	46.0	-0.1	-2.0
15:27:45	12.9	7.2	-0.2	-1.7	44.3	-0.1	-2.4
15:28:45	14.0	6.6	-0.4	-2.8	42.8	0.2	-2.6
15:29:45	11.4	8.9	-0.1	-3.2	51.7	0.0	-2.2
15:30:45	12.9	7.5	-0.2	-3.0	50.4	0.1	-1.9
15:31:45	14.3	6.3	-0.5	-3.2	43.4	0.1	-2.6
15:32:45	13.1	7.3	-0.2	-1.2	45.9	-0.3	-2.1
15:33:45	12.2	7.7	-0.3	19.4	50.5	-0.8	-1.9
15:34:45	14.6	5.8	-0.5	6.5	42.6	-0.7	-2.5
15:35:45	14.0	6.5	-0.4	8.0	40.4	-0.8	-3.0
15:36:45	12.1	7.9	-0.3	14.9	45.9	-0.8	-1.1
15:37:45	12.2	7.5	-0.4	10.6	47.1	-0.8	-2.4
15:38:45	14.6	5.8	-0.3	-0.7	44.2	-0.4	-2.4

RADIAN CORPORATION RUN 2 OUTLET

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 13:56:57
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:57:45	13.0	7.5	-0.3	2.4	45.5	-0.7	-2.8
13:58:48	12.2	8.1	-0.2	2.9	49.9	-0.5	-2.9
13:59:45	14.2	6.5	-2.3	-1.9	45.4	0.1	-2.5
14:00:45	12.7	8.1	-0.2	-2.6	48.4	0.3	-2.6
14:01:45	11.1	9.2	-0.2	-0.3	50.3	-0.6	-2.5
14:02:45	13.0	7.6	-0.2	-1.7	47.0	-0.0	-3.0
14:03:45	12.4	8.4	-0.1	-2.7	51.2	0.1	-2.9
14:04:45	12.1	8.6	-0.2	-2.8	51.2	0.1	-2.7
14:05:45	14.0	7.1	-0.4	-2.8	45.6	0.2	-2.6
14:06:45	12.4	8.6	-0.2	-2.9	50.6	0.1	-2.1
14:07:45	12.9	7.9	-0.3	-2.8	46.9	0.1	-2.1
14:08:45	13.9	7.2	-0.4	-2.9	43.9	0.2	-2.4
14:09:45	12.8	8.3	-0.2	-2.7	52.0	0.2	-1.9
14:10:45	13.2	8.0	-0.1	-2.6	50.5	0.2	-3.2
14:11:45	13.4	8.1	-0.0	-2.6	48.4	0.3	-3.0
14:12:45	12.4	8.9	0.2	-2.4	52.6	0.2	-3.3
14:13:45	13.3	8.1	0.1	-2.6	47.7	0.3	-4.1
14:14:45	12.5	9.0	0.1	-2.3	51.3	0.2	-3.4
14:15:45	12.5	8.7	0.1	-2.5	49.5	0.3	-1.7
14:16:45	13.3	8.1	-0.1	-2.7	49.4	0.3	-2.9
14:17:45	12.2	9.0	0.1	-2.6	56.0	0.2	-3.6
14:18:45	13.4	7.8	-0.1	-2.6	51.7	0.2	-3.2
14:19:45	14.0	7.5	-0.2	-2.6	50.3	0.3	-3.5
14:20:45	12.3	8.6	-0.0	-1.8	56.0	-0.1	-3.1
14:21:45	13.4	7.4	-0.2	-0.6	48.9	-0.5	-3.3
14:22:45	13.9	7.4	-0.1	-2.2	49.0	0.2	-3.8
14:23:45	11.6	9.3	0.3	-2.6	57.9	0.4	-3.7
14:24:45	13.1	7.8	-0.0	-2.6	57.1	0.2	-3.5
14:25:45	14.5	6.9	-0.2	-2.4	56.9	0.3	-3.5
14:26:45	13.3	7.8	-0.0	-2.5	55.6	0.2	-3.2
14:27:45	12.6	8.3	0.1	-2.4	56.1	0.2	-3.1
14:28:45	13.7	7.1	-0.1	-1.7	49.9	-0.1	-2.7
14:29:45	14.4	6.9	-0.3	-2.6	48.3	0.3	-3.1
14:30:45	12.4	8.6	0.1	-2.6	54.6	0.3	-3.7
14:31:45	11.8	8.7	-0.1	-1.2	54.1	-0.5	-3.1
14:32:45	13.6	7.4	-0.2	-1.9	48.1	-0.1	-2.7
14:33:45	12.6	8.2	-0.1	-0.7	50.4	-0.3	-2.2
14:34:45	12.3	8.1	-0.3	6.3	49.9	-0.8	-2.3
14:35:45	14.1	6.7	-0.3	-0.6	42.4	-0.7	-3.1
14:36:45	12.5	7.9	-0.2	2.0	47.7	-0.8	-2.9
14:37:45	12.0	8.2	-0.3	8.3	48.3	-0.8	-3.1
14:38:45	14.7	6.2	-0.4	-0.5	38.2	-0.6	-3.6
14:39:45	13.1	7.6	-0.0	-2.2	42.4	0.1	-3.0
14:40:45	11.8	8.4	-0.2	0.2	47.6	-0.7	-3.6
14:41:45	13.9	6.7	-0.3	-0.8	43.2	-0.5	-2.6
14:42:45	14.8	6.2	-0.4	-2.6	38.8	0.3	-3.1

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:42:25	17.7	4.7	-0.3	-0.6	38.9	0.7	-2.4
13:42:35	15.2	6.1	-0.7	1.1	46.6	-0.5	-3.4
13:42:45	14.4	6.6	-0.5	0.7	45.8	-0.6	-2.8
13:42:55	14.0	6.9	-0.3	-0.0	45.5	-0.7	-2.6
13:43:05	13.7	7.0	-0.3	-0.2	46.3	-0.5	-3.1
13:43:15	13.3	7.4	-0.4	0.1	47.4	-0.5	-3.0
13:43:25	13.0	7.6	-0.3	0.9	49.0	-0.5	-2.2
13:43:35	12.5	8.4	-0.2	3.1	51.6	-0.6	-1.7
13:43:45	11.9	8.9	-0.2	6.7	54.5	-0.5	-2.9
13:43:55	11.5	9.1	-0.3	9.9	56.5	-0.3	-4.2
13:44:05	11.1	9.5	-0.3	12.6	58.4	-0.2	-3.3
13:44:15	10.8	9.6	-0.3	14.8	61.7	-0.3	-1.8
13:44:25	11.0	9.3	-0.3	14.6	62.7	-0.3	-1.4
13:44:35	11.6	8.8	-0.3	11.8	62.0	-0.4	-1.8
13:44:45	12.2	8.2	-0.3	9.2	61.6	-0.3	-3.4
13:45:45	13.4	7.3	-0.2	1.3	56.4	-0.4	-3.6
13:46:45	14.4	6.5	-0.2	-1.1	49.0	0.3	-2.8
13:47:45	14.0	7.0	-0.4	-2.3	45.1	0.3	-2.2
13:48:45	13.7	7.0	-0.2	-0.0	43.2	-0.0	-2.7
13:49:45	13.1	7.6	-0.3	6.2	48.0	-0.5	-3.1
13:50:45	12.4	8.0	-0.3	9.8	52.2	-0.5	-2.4
13:51:45	14.3	6.6	-0.3	0.0	45.1	-0.4	-2.9
13:52:45	13.2	7.4	-0.1	0.2	45.8	-0.2	-2.4
13:53:45	12.7	7.8	-0.3	8.2	47.9	-0.7	-1.5
13:54:45	14.1	6.7	-0.4	3.4	47.3	-0.4	-2.5
13:55:45	15.0	6.1	-0.5	-1.3	40.0	0.1	-3.0
Avg.=	17.5	3.4	-1.0	-0.5	19.0	-0.1	-2.6

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 13:34:36
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MT01117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:34:45	20.0	1.0	-1.1	-2.8	1.2	0.1	-3.5
13:34:55	20.0	1.0	-1.4	-2.7	1.1	-0.0	-4.2
13:35:05	20.0	1.2	-1.5	-3.1	1.1	0.0	-2.2
13:35:15	19.9	1.0	-1.4	-3.1	1.0	-0.0	-1.3
13:35:25	20.0	1.0	-1.4	-3.0	0.7	-0.1	-1.4
13:35:35	19.9	1.1	-1.5	-2.8	1.0	-0.2	-2.1
13:35:45	20.0	1.0	-1.5	-2.9	1.0	-0.1	-2.1
13:35:55	19.9	1.1	-1.5	-3.1	0.9	-0.0	-2.6
13:36:05	20.0	1.0	-1.6	-3.2	1.0	-0.1	-2.9
13:36:15	19.9	1.2	-1.5	-3.2	1.0	-0.0	-2.8
13:36:25	20.0	1.1	-1.4	-3.0	0.9	-0.0	-2.7
13:36:35	19.9	1.1	-1.3	-3.0	1.0	0.1	-2.9
13:36:45	19.9	1.1	-1.6	-3.1	1.2	-0.0	-3.0
13:36:55	19.9	1.1	-1.4	-3.3	1.1	0.1	-2.1
13:37:05	19.9	1.1	-1.5	-3.0	1.1	-0.1	-1.7
13:37:15	20.0	1.0	-1.5	-3.3	1.3	-0.1	-2.3
13:37:25	19.9	1.0	-1.5	-3.3	1.4	-0.1	-2.5
13:37:35	20.0	1.0	-1.5	-3.2	1.4	-0.0	-3.5
13:37:45	19.9	1.1	-1.5	-3.2	1.3	-0.1	-3.7
13:37:55	19.9	1.0	-1.5	-3.1	1.6	-0.0	-2.2
13:38:05	19.9	1.0	-1.4	-3.2	1.6	-0.1	-2.3
13:38:15	19.9	1.0	-1.5	-3.3	1.7	0.1	-2.8
13:38:25	19.9	1.1	-1.6	-3.1	1.3	-0.0	-3.0
13:38:35	19.9	1.0	-1.5	-3.2	1.2	0.0	-2.7
13:38:45	19.9	1.0	-1.5	-3.2	1.3	-0.0	-2.1
13:38:55	19.9	0.9	-1.4	-3.2	1.5	0.1	-2.3
13:39:05	19.9	1.2	-1.5	-3.2	1.4	0.0	-3.3
13:39:15	20.0	0.8	-1.5	-3.1	1.2	-0.1	-3.2
13:39:25	19.9	1.1	-1.5	-3.0	1.3	-0.2	-2.6
13:39:35	19.9	1.1	-1.5	-3.2	1.2	-0.1	-2.7
13:39:45	19.9	1.3	-1.5	-3.1	1.0	-0.2	-2.5
13:39:55	19.9	1.3	-1.5	-2.9	1.1	-0.1	-2.3
13:40:05	20.0	1.0	-1.6	-3.0	1.1	-0.1	-1.1
13:40:15	19.9	1.2	-1.5	-3.2	1.1	0.0	-1.6
13:40:25	19.9	1.1	-1.5	-3.3	0.7	-0.1	-2.9
13:40:35	19.9	1.2	-1.4	-3.3	1.1	-0.1	-2.3
13:40:45	19.9	1.1	-1.4	-3.2	1.3	-0.1	-1.9
13:40:55	19.9	1.1	-1.4	-3.2	1.4	-0.0	-2.3
13:41:05	19.9	0.3	-1.4	-3.1	1.1	0.0	-2.7
13:41:15	19.9	1.2	-1.1	-3.1	1.2	0.4	-3.4
13:41:25	19.9	1.1	-1.0	-3.1	1.4	0.5	-3.8
13:41:35	19.9	1.4	-1.3	-3.1	1.1	0.2	-3.2
13:41:45	19.9	1.1	-1.0	-3.0	1.2	0.6	-3.7
13:41:55	19.9	1.3	-1.1	-3.1	1.5	0.5	-3.6
13:42:05	19.9	1.2	-1.3	-3.1	1.5	0.3	-2.6
13:42:15	19.3	1.6	-1.0	-3.0	5.1	0.7	-2.1

RADIAN CORPORATION HCl=93.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = [illegible]
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:17:05	13.0	7.8	-1.8	0.9	41.6	-0.3	99.5
13:17:15	13.3	7.5	-4.3	0.5	40.2	-0.5	102.4
13:17:25	13.6	7.3	-4.6	-0.2	39.5	-0.7	104.2
13:17:35	13.9	7.1	-4.5	-0.7	38.6	-0.8	99.8
Avg.=	13.5	7.4	-3.8	0.1	40.0	-0.6	101.4

RADIAN CORPORATION RUN 1 CONT.

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 13:02:33
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:03:25	10.4	12.6	-0.9	1.3	58.8	-0.5	-4.2
Avg.=	10.4	12.6	-0.9	1.3	58.8	-0.5	-4.2

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:02:25	14.4	6.9	-0.4	-2.6	40.4	0.6	-3.5
12:03:25	12.3	9.3	0.2	-1.6	45.3	0.9	-4.8
12:04:25	11.5	16.0	0.3	4.8	48.7	1.6	-5.4
12:05:25	13.5	7.7	0.2	-0.7	42.5	1.1	-4.6
12:06:25	12.7	8.2	-0.1	-1.9	42.5	0.4	-4.6
12:07:25	12.1	8.5	0.3	-1.8	44.5	0.7	-5.4
12:08:25	13.5	7.5	-0.1	-2.1	41.7	0.4	-5.1
12:09:25	11.2	9.6	0.1	-2.0	49.7	0.4	-5.1
12:10:25	12.3	8.5	0.2	-1.1	49.3	0.9	-4.3
12:11:25	13.7	7.4	-0.2	-2.1	42.1	0.4	-5.2
12:12:25	11.0	9.7	0.1	-1.5	52.1	0.4	-4.9
12:13:25	12.0	8.7	0.2	-1.0	56.9	0.7	-4.8
12:14:25	13.6	7.5	-0.2	-1.9	49.2	0.5	-4.1
12:15:25	14.1	7.1	-0.2	-2.1	45.4	0.6	-4.3
12:16:25	13.0	8.2	-0.2	-2.5	47.3	0.3	-4.4
12:17:25	11.3	9.5	0.1	-0.6	56.8	0.2	-4.7
12:18:25	13.6	7.5	0.1	-1.4	54.7	0.7	-4.3
12:19:25	13.9	7.5	-0.3	-2.1	51.6	0.3	-4.1
12:20:25	12.9	8.5	-0.1	-2.3	50.7	0.3	-3.7
12:21:25	13.0	8.5	-0.1	-1.8	49.3	0.4	-4.3
12:22:25	14.6	7.4	-0.3	-1.8	41.7	0.3	-3.4
12:23:25	13.8	8.1	-0.2	-1.9	42.2	0.3	-4.0
12:24:25	13.3	8.4	-0.2	-2.1	43.7	0.4	-3.2
12:25:25	13.1	8.6	-0.1	-1.8	45.8	0.2	-3.3
12:26:25	12.3	8.9	-0.1	-0.4	50.4	-0.4	-2.5
12:27:25	14.3	7.3	-0.1	-1.1	45.5	0.2	-2.6
12:28:25	13.6	7.6	-0.2	-2.0	44.8	0.2	-3.7
12:29:25	11.8	9.0	0.0	-2.1	50.7	0.2	-2.8
12:30:25	11.8	8.9	-0.0	-2.0	50.1	0.3	-1.4
12:31:25	13.9	7.3	-0.2	-1.8	44.3	0.2	-1.5
12:32:25	11.7	9.1	0.1	-1.7	51.6	-0.0	-1.8
12:33:25	12.4	8.3	-0.0	-1.6	53.4	0.2	-2.7
12:34:25	13.6	7.4	-0.1	-1.6	46.3	-0.1	-3.6
12:35:25	11.8	8.7	-0.2	-0.0	52.1	-0.5	-3.0
12:36:25	13.6	7.2	-0.3	0.3	45.5	-0.6	-3.4
12:37:25	14.4	6.6	-0.2	-1.2	40.4	-0.3	-3.5
12:38:25	13.2	7.4	-0.3	1.2	45.4	-0.7	-3.8
12:39:25	12.9	7.6	-0.2	1.9	46.5	-0.7	-3.5
12:40:25	12.6	7.8	-0.2	0.5	47.0	-0.8	-3.7
12:41:25	12.5	8.0	-0.2	0.3	48.5	-0.8	-3.2
12:42:25	12.5	7.9	-0.2	1.1	47.1	-0.8	-3.1
12:43:25	13.9	6.8	-0.3	1.0	41.8	-0.7	-3.5
12:44:25	13.6	8.5	-0.3	-0.9	45.1	-0.6	-2.7
12:45:25	11.1	25.1	-0.1	2.1	56.8	-0.7	-2.8
12:46:25	14.1	7.7	-0.4	-0.0	45.6	-0.6	-3.4
12:47:25	14.1	7.2	-0.2	-1.6	46.6	-0.1	-2.4
12:48:25	12.9	9.1	-0.1	0.9	49.8	0.0	-2.7
12:49:25	12.2	62.7	-0.0	6.0	53.3	0.9	-3.1
12:50:25	14.7	9.2	-0.4	-0.1	42.0	-0.7	-3.7
12:51:25	12.8	8.1	-0.3	6.3	46.7	-0.7	-3.4
Avg.=	12.8	8.7	0.1	-1.1	58.5	1.4	-3.7

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:06:25	13.3	7.6	0.5	-1.1	74.2	2.4	-4.3
11:07:25	14.6	6.7	0.3	-1.0	59.1	2.1	-3.5
11:08:25	12.6	8.1	0.4	-0.9	52.4	1.8	-4.2
11:09:25	11.5	8.7	0.5	-1.0	55.9	2.1	-3.9
11:10:25	14.0	6.8	0.3	-1.0	46.8	1.9	-4.6
11:11:25	12.7	8.0	0.4	-0.7	50.6	1.6	-4.2
11:12:25	11.3	9.1	0.5	-1.0	56.3	1.9	-3.8
11:13:25	13.8	7.2	0.3	-1.0	66.9	1.9	-4.4
11:14:25	12.9	7.8	0.5	-0.9	73.1	1.7	-4.9
11:15:25	11.7	8.8	0.6	-1.0	93.6	1.9	-4.6
11:16:25	13.9	7.5	0.1	-0.8	211.9	2.2	-4.9
11:17:25	12.5	8.7	0.5	-0.8	125.2	1.8	-3.9
11:18:25	10.9	9.8	0.6	-1.0	112.1	1.7	-3.8
11:19:25	13.4	8.0	-1.8	-1.2	184.1	2.2	-3.3
11:20:25	13.2	8.3	-0.4	-0.9	117.7	1.8	-3.8
11:21:25	11.8	9.3	0.5	-0.9	97.5	1.9	-3.6
11:22:25	13.8	7.7	0.5	-1.0	101.7	2.1	-4.2
11:23:25	14.0	7.6	0.2	-0.7	76.0	1.4	-4.3
11:24:25	13.2	8.2	0.3	-0.8	65.4	1.4	-3.4
11:25:25	12.2	8.8	0.3	-1.0	60.3	1.4	-3.5
11:26:25	13.9	7.4	-1.9	-1.2	65.2	1.4	-4.2
11:27:25	13.7	7.7	0.0	-1.3	51.3	1.1	-4.4
11:28:25	11.7	9.2	0.3	-1.3	56.4	1.4	-4.0
11:29:25	12.0	8.9	0.3	-1.2	62.3	1.5	-4.0
11:30:25	14.2	7.2	0.1	-1.4	53.5	1.1	-5.6
11:31:25	13.1	8.1	0.2	-1.7	51.6	0.8	-4.5
11:32:25	11.0	9.8	0.3	-1.6	60.4	0.9	-4.5
11:33:25	12.6	8.2	0.2	-1.4	57.4	1.1	-4.2
11:34:25	13.4	7.5	0.0	-1.6	53.4	0.7	-3.7
11:35:25	11.0	9.6	0.3	-1.7	61.0	0.8	-3.9
11:36:25	12.6	8.1	0.2	-1.5	58.5	1.1	-4.4
11:37:25	14.0	7.1	-0.1	-1.6	49.3	0.8	-3.3
11:38:25	12.3	8.5	0.2	-1.9	53.9	0.8	-3.8
11:39:25	12.0	8.4	0.3	-1.4	58.6	1.1	-3.9
11:40:25	14.3	6.9	-0.0	-1.5	49.3	0.9	-3.9
11:41:25	11.1	9.6	0.3	-1.5	61.8	0.7	-4.7
11:42:25	11.9	8.8	0.3	-1.5	63.9	1.0	-5.2
11:43:25	14.3	7.0	-0.0	-1.7	53.0	0.8	-5.1
11:44:25	12.8	8.1	0.2	-1.4	61.6	0.5	-4.7
11:45:25	11.1	9.6	0.3	-1.7	73.2	0.8	-4.4
11:46:25	13.6	7.6	0.1	-1.4	73.8	0.9	-4.3
11:47:25	14.1	7.3	-0.1	-1.6	58.9	0.6	-4.9
11:48:25	12.1	8.8	0.1	-1.8	59.8	0.5	-3.7
11:49:25	12.2	8.7	0.2	-1.9	62.6	0.9	-4.3
11:50:25	14.1	7.2	-0.1	-1.9	55.8	0.9	-5.0
11:51:25	12.5	8.4	0.1	-2.0	52.9	0.7	-4.4
11:52:25	11.8	8.9	0.3	-1.9	57.3	1.0	-4.8
11:53:25	13.8	7.3	-0.0	-2.2	48.0	0.8	-5.1
11:54:25	12.6	8.3	0.1	-2.2	48.3	0.6	-4.3
11:55:25	10.7	9.8	0.3	-2.4	57.0	0.8	-4.9
11:56:25	12.8	8.0	0.2	-2.6	49.4	0.8	-4.7
11:57:25	13.5	7.6	-0.1	-2.7	45.5	0.8	-4.9
11:58:25	13.8	7.5	-0.4	-2.9	41.9	0.4	-3.6
11:59:25	13.0	8.0	-0.1	-2.8	46.0	0.5	-4.9
12:00:25	11.2	9.8	0.0	-2.7	53.6	0.7	-3.8
12:01:25	12.8	8.2	-0.1	-2.5	47.9	0.8	-4.4

RADIAN CORPORATION RUN 1

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 10:20:24
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:20:25	13.0	6.6	0.5	-1.1	73.4	2.6	-3.1
10:21:25	12.4	7.1	0.5	-1.0	65.9	2.3	-2.9
10:22:25	11.7	7.6	-1.5	-1.0	60.8	2.2	-2.7
10:23:25	11.8	7.5	-1.6	-1.0	60.1	2.2	-2.5
10:24:25	13.4	6.5	0.3	-1.1	57.3	2.8	-2.9
10:25:25	12.5	7.3	0.4	-1.1	52.8	2.3	-3.1
10:26:25	12.0	7.6	0.5	-1.1	72.8	3.3	-2.8
10:27:25	14.0	6.3	0.4	-1.1	81.5	4.2	-2.8
10:28:25	13.6	6.6	0.4	-1.2	56.7	3.5	-2.4
10:29:25	13.5	6.5	0.3	-1.2	55.0	3.4	-2.6
10:30:25	14.3	5.8	0.3	-1.2	50.3	3.8	-3.4
10:31:25	15.0	5.2	0.1	-1.2	46.6	4.0	-2.5
10:32:25	15.7	4.6	0.2	-1.2	43.2	4.3	-2.4
10:33:25	15.4	4.9	0.1	-1.2	42.5	4.7	-2.3
10:34:25	12.7	6.9	0.5	-1.1	48.6	5.0	-3.2
10:35:25	10.7	8.8	0.5	-1.2	52.3	4.4	-2.9
10:36:25	9.8	11.9	0.5	-1.1	55.0	4.6	-2.6
10:37:25	12.7	7.3	0.5	-1.1	56.4	4.7	-2.8
10:38:25	14.4	5.9	0.3	-1.1	50.6	3.6	-2.7
10:39:25	13.4	6.8	0.3	-1.1	53.5	3.1	-3.3
10:40:25	12.3	7.7	0.4	-1.1	53.4	2.9	-3.3
10:41:25	11.4	8.6	0.4	-1.2	52.6	3.1	-3.1
10:42:25	12.5	8.1	0.4	-1.2	47.4	3.2	-3.5
10:43:25	13.2	7.8	0.3	-1.1	47.3	2.4	-3.6
10:44:25	10.6	10.1	0.3	-1.1	55.0	2.2	-2.7
10:45:25	12.4	8.5	0.3	-1.1	50.5	2.4	-3.1
10:46:25	14.0	7.4	0.3	-1.1	46.7	2.6	-2.4
10:47:25	11.6	9.8	0.6	-1.1	54.6	2.6	-3.4
10:48:25	11.1	13.6	0.7	-1.1	80.7	2.9	-3.3
10:49:25	13.8	7.5	0.4	-1.0	77.1	2.7	-2.8
10:50:25	12.3	8.4	0.4	-1.0	64.0	2.1	-2.9
10:51:25	12.3	8.5	0.6	-1.1	65.4	2.7	-3.4
10:52:25	13.7	7.4	0.4	-1.1	69.0	2.5	-3.5
10:53:25	11.0	10.0	0.6	-1.1	61.3	2.5	-3.1
10:54:25	12.8	8.0	0.5	-1.1	59.8	2.6	-3.1
10:55:25	13.6	7.4	0.4	-1.1	55.3	2.3	-2.8
10:56:25	11.9	8.7	0.6	-1.1	58.6	2.3	-3.5
10:57:25	14.3	6.8	0.3	-1.1	49.7	2.4	-3.3
10:58:25	13.8	7.2	0.3	-1.0	49.6	1.9	-3.3
10:59:25	11.6	9.0	0.6	-1.0	57.4	1.9	-3.4
11:00:25	13.2	7.7	0.5	-1.1	51.9	2.3	-3.5
11:01:25	13.4	9.4	0.4	-1.1	49.8	3.9	-3.7
11:02:25	10.1	25.4	0.7	-1.1	75.2	3.2	-3.3
11:03:25	13.3	8.6	0.3	-1.3	110.7	2.5	-4.0
11:04:25	14.1	7.2	0.4	-1.1	77.0	2.4	-3.9
11:05:25	12.4	8.4	0.7	-1.1	72.0	2.3	-3.9

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
18:42:28	13.7	1.0	-0.6	-4.0	50.7	1.2	-1.1
18:43:28	15.1	1.1	-0.8	-3.9	46.0	1.2	-1.0
Avg.=	14.1	1.0	-1.1	2.1	49.2	1.1	8.8

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:46:28	14.0	1.5	-0.8	25.4	55.6	1.2	10.8
17:47:28	15.7	1.2	-1.1	7.7	48.0	1.1	4.8
17:48:28	14.8	1.0	-1.0	5.7	47.8	1.2	2.9
17:49:28	13.0	1.2	-0.6	15.7	57.5	1.3	2.5
17:50:28	13.1	1.7	-2.4	23.1	61.9	1.2	25.4
17:51:28	14.6	1.5	-0.5	13.5	51.9	1.2	10.3
17:52:28	15.2	1.4	-0.9	1.6	47.5	1.1	5.1
17:53:28	14.0	1.7	-0.7	-2.6	52.7	1.1	2.8
17:54:28	13.1	1.2	-0.5	-1.3	58.9	1.1	1.5
17:55:28	14.3	1.1	-0.7	1.4	56.2	1.1	2.1
17:56:28	14.9	1.2	-0.9	1.4	60.0	1.1	1.1
17:57:28	13.9	1.2	-0.7	3.6	60.2	1.0	0.7
17:58:28	13.7	1.2	-0.6	7.0	61.5	1.1	0.1
17:59:28	14.8	1.2	-0.9	3.8	54.8	1.0	0.3
18:00:28	14.1	1.2	-0.8	2.2	51.3	1.1	-0.4
18:01:28	15.3	1.1	-1.0	4.5	43.5	1.1	-1.2
18:02:28	15.9	1.1	-1.1	3.6	38.1	1.2	-1.3
18:03:28	15.3	1.0	-0.9	6.2	39.4	1.3	-0.5
18:04:28	15.3	1.0	-1.4	7.5	39.8	1.3	9.2
18:05:28	15.2	0.5	-4.1	7.5	40.2	1.2	76.2
18:06:28	14.7	0.5	-2.5	9.6	47.6	1.2	-74.5
18:07:28	13.9	0.6	-3.2	10.9	46.5	1.3	16.2
18:08:28	13.7	0.8	-4.3	13.2	46.0	1.2	220.9
18:09:28	15.4	0.9	-3.6	5.9	38.3	1.2	113.1
18:10:28	14.4	1.0	-2.0	3.4	43.3	1.1	40.8
18:11:28	12.7	1.2	-0.5	9.4	49.5	1.2	22.3
18:12:28	14.2	1.4	-0.8	9.1	41.5	1.2	24.8
18:13:28	15.1	1.2	-1.0	1.4	40.9	1.1	22.0
18:14:23	14.7	1.1	-0.9	0.0	44.8	1.1	12.3
18:15:29	13.0	1.2	-0.5	-2.5	54.3	1.1	8.9
18:16:28	13.3	1.4	-0.5	-3.9	53.4	1.1	6.5
18:17:28	14.8	1.4	-0.8	-4.1	47.4	1.1	4.5
18:18:28	14.3	1.1	-0.8	-3.8	49.5	1.1	3.9
18:19:28	14.0	1.2	-0.6	-3.5	52.6	1.0	4.0
18:20:28	14.3	1.2	-0.7	-2.7	49.3	1.1	2.2
18:21:29	15.5	1.3	-0.9	-2.3	43.2	1.0	1.8
18:22:28	14.0	1.2	-0.6	-3.8	51.4	1.1	1.4
18:23:28	12.5	1.3	-0.3	-3.0	62.2	1.0	1.3
18:24:28	14.1	1.3	-0.7	1.2	81.0	1.1	0.0
18:25:28	14.3	1.3	-0.7	0.7	72.5	1.0	0.2
18:26:28	13.2	1.3	-0.5	4.1	72.7	1.1	0.1
18:27:28	14.8	1.3	-0.9	3.7	73.9	1.1	0.3
18:28:28	14.4	1.3	-0.8	3.9	69.3	1.1	0.0
18:29:28	13.8	1.1	-1.2	7.8	66.1	1.2	-0.3
18:30:28	14.9	1.2	-0.8	5.6	59.3	1.2	-1.5
18:31:28	14.5	1.1	-0.7	5.3	63.7	1.2	0.5
18:32:28	12.6	1.3	-0.3	6.7	70.1	1.2	-0.2
18:33:28	14.5	1.4	-0.7	3.2	70.9	1.1	-0.2
18:34:28	14.3	1.2	-0.7	1.2	68.9	1.1	0.1
18:35:28	12.9	1.2	-0.4	5.0	75.1	1.1	-0.1
18:36:28	14.5	1.2	-0.8	1.3	69.8	1.1	0.0
18:37:28	15.2	1.1	-0.8	-1.7	56.5	1.1	0.3
18:38:28	14.0	1.0	-0.7	-3.6	55.9	1.1	0.7
18:39:28	13.5	1.1	-0.5	-3.6	59.1	1.1	-0.0
18:40:28	15.5	1.1	-0.9	-3.6	53.0	1.1	-0.2
18:41:28	14.6	1.0	-0.7	-3.8	47.6	1.2	-0.8

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:50:28	14.4	1.3	-0.7	4.6	56.1	1.0	1.6
16:51:28	15.4	1.2	-0.9	1.6	47.5	1.0	0.8
16:52:28	15.3	1.2	-0.8	1.4	44.3	1.0	0.3
16:53:28	13.2	1.1	-0.6	16.9	52.6	1.1	4.9
16:54:28	13.9	1.0	-1.9	17.7	53.3	1.1	19.7
16:55:28	15.4	1.2	-1.0	3.3	46.4	1.0	5.2
16:56:29	14.0	1.0	-0.7	4.5	48.8	1.0	2.7
16:57:29	13.5	1.3	-3.1	11.8	47.3	1.1	43.8
16:58:28	15.3	1.0	-2.0	4.3	41.6	1.1	17.5
16:59:28	13.4	1.0	-1.9	1.3	47.4	1.0	13.7
17:00:28	14.1	1.0	-1.7	2.7	43.8	1.0	16.7
17:01:29	15.9	1.1	-1.0	0.1	36.4	1.0	7.7
17:02:29	14.5	1.3	-1.6	-3.2	41.9	1.1	24.0
17:03:28	13.9	0.6	-3.9	-1.4	44.8	1.1	71.4
17:04:29	13.8	0.7	-3.6	3.5	45.6	1.1	57.6
17:05:28	15.4	1.0	-1.7	1.3	46.0	1.0	17.9
17:06:28	13.5	0.9	-2.6	3.6	55.4	1.0	28.7
17:07:28	13.9	0.8	-3.3	8.7	50.4	1.1	42.1
17:08:28	15.8	1.0	-1.4	1.9	44.2	1.1	13.1
17:09:28	15.0	0.7	-3.1	0.0	45.0	1.1	28.5
17:10:28	13.4	0.8	-3.1	3.1	49.6	1.1	37.3
17:11:28	12.4	0.9	-2.6	3.8	52.7	1.1	30.0
17:12:28	14.0	1.1	-1.7	4.5	45.2	1.1	17.0
17:13:28	15.2	1.0	-0.8	-0.4	41.2	1.1	7.2
17:14:28	13.6	0.7	-2.5	-0.2	46.4	1.1	22.1
17:15:28	12.2	0.8	-2.6	9.0	50.7	1.1	32.3
17:16:28	14.0	1.0	-1.9	8.4	45.2	1.1	17.4
17:17:28	14.9	1.0	-0.9	-0.1	43.8	1.0	5.6
17:18:28	12.3	1.1	-0.4	6.1	56.7	1.1	10.1
17:19:28	14.3	1.1	-0.8	7.8	49.3	1.1	8.4
17:20:28	14.9	1.1	-0.9	0.7	46.7	1.0	1.8
17:21:28	13.9	0.7	-2.1	1.9	49.2	1.1	25.2
17:22:28	13.3	0.5	-3.3	11.3	52.4	1.1	47.2
17:23:28	15.3	0.7	-2.1	7.8	44.6	1.1	20.7
17:24:28	15.0	0.7	-2.5	6.2	44.9	1.2	30.7
17:25:28	13.4	0.6	-3.9	16.6	50.9	1.2	76.8
17:26:28	13.8	0.7	-4.0	15.6	52.0	1.2	77.1
17:27:28	15.6	1.0	-2.0	3.4	45.1	1.1	19.9
17:28:28	14.4	0.7	-2.1	1.3	46.3	1.1	23.9
17:29:28	12.9	0.7	-3.3	10.4	56.5	1.1	49.2
17:30:28	15.1	0.8	-2.9	8.6	60.3	1.1	29.7
17:31:28	15.5	0.8	-1.9	2.9	48.7	1.2	20.9
17:32:28	15.0	0.5	-3.9	6.4	47.8	1.2	62.5
17:33:28	13.1	0.6	-3.9	12.3	53.1	1.2	73.3
17:34:28	12.4	0.9	-3.0	21.3	57.4	1.2	43.5
17:35:28	15.0	0.9	-2.0	11.5	52.0	1.1	16.9
17:36:28	14.9	1.0	-0.8	7.2	49.9	1.2	8.2
17:37:28	12.9	0.7	-3.0	17.6	57.9	1.2	55.1
17:38:28	12.8	1.0	-3.3	29.3	63.1	1.2	55.8
17:39:28	15.4	1.0	-2.1	14.3	53.6	1.2	15.8
17:40:28	15.2	1.0	-1.0	3.7	47.5	1.1	8.2
17:41:28	13.5	1.0	-0.7	13.3	53.3	1.2	4.7
17:42:28	12.6	1.2	-1.7	28.3	59.9	1.2	19.6
17:43:28	15.2	1.2	-1.3	14.1	53.6	1.2	12.3
17:44:28	14.6	1.1	-0.9	5.6	53.0	1.2	6.0
17:45:28	12.2	1.4	-0.4	25.2	62.0	1.3	5.5

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:54:28	15.3	0.8	-0.9	1.9	49.5	1.0	0.0
15:55:28	14.6	0.7	-0.9	-0.9	46.4	1.0	1.7
15:56:28	13.5	0.7	-0.5	-3.8	46.2	1.0	0.7
15:57:28	12.9	0.7	-0.7	-0.5	47.2	1.0	0.1
15:58:28	15.3	0.8	-0.8	3.2	43.7	1.0	-0.2
15:59:28	15.1	0.8	-1.1	3.0	43.1	1.1	3.4
16:00:28	13.5	0.7	-0.7	14.1	45.1	1.1	15.7
16:01:28	11.9	0.8	-0.4	18.5	50.5	1.1	14.0
16:02:28	14.2	0.7	-1.5	7.9	49.1	1.0	2.6
16:03:28	14.3	0.8	-0.8	3.9	48.1	1.0	1.5
16:04:28	12.9	0.8	-0.5	12.6	50.7	1.1	9.8
16:05:28	14.1	0.9	-0.8	18.6	46.7	1.1	9.4
16:06:28	4.3	0.8	-0.8	3.3	45.6	1.0	4.4
16:07:28	13.3	0.7	-1.4	12.9	49.4	1.0	16.0
16:08:28	15.2	0.7	-1.6	11.7	42.3	1.0	11.7
16:09:28	14.3	0.9	-0.6	7.0	48.4	1.0	10.1
16:10:28	12.7	1.0	-0.3	3.5	53.1	1.1	11.8
16:11:28	14.8	1.0	-0.9	0.8	44.8	1.1	5.8
16:12:28	14.4	1.0	-0.8	-2.2	49.0	1.0	2.9
16:13:28	13.8	1.0	-0.6	-3.5	48.1	1.2	9.9
16:14:28	15.8	1.2	-0.9	-3.4	41.4	1.2	4.5
16:15:28	14.6	1.1	-0.8	-0.9	47.5	1.1	7.9
16:16:28	14.1	0.8	-3.2	13.3	47.2	1.2	33.3
16:17:28	14.1	1.0	-2.9	18.3	49.2	1.2	35.0
16:18:28	15.6	1.1	-1.0	4.7	44.4	1.0	6.5
16:19:28	14.2	1.0	-0.8	-0.3	48.2	1.0	10.0
16:20:28	12.9	1.2	-0.5	1.4	47.2	1.2	11.4
16:21:28	15.1	1.4	-0.8	1.0	43.7	1.1	4.2
16:22:28	14.6	1.0	-0.7	-2.4	44.2	1.0	3.8
16:23:28	13.1	0.9	-0.4	-3.8	48.3	1.0	5.2
16:24:28	15.0	1.0	-0.8	-3.9	43.2	1.0	2.6
16:25:28	13.6	0.9	-0.6	-4.3	50.3	1.0	2.7
16:26:28	12.9	0.9	-0.7	-3.4	46.8	1.1	5.6
16:27:28	14.9	1.1	-0.9	-0.6	40.4	1.1	1.3
16:28:28	14.9	0.9	-0.8	-3.9	41.9	1.1	0.9
16:29:28	13.5	0.9	-0.6	-2.1	48.4	1.1	5.3
16:30:28	15.0	0.9	-0.9	1.9	44.3	1.0	3.5
16:31:28	15.1	0.9	-0.8	-1.8	45.8	1.0	1.1
16:32:28	14.1	0.8	-0.7	-3.8	45.0	1.1	3.8
16:33:28	13.5	0.9	-0.5	-4.2	45.9	1.1	4.2
16:34:28	15.8	0.8	-1.1	-4.2	41.0	1.0	0.6
16:35:28	16.0	0.8	-1.0	-4.2	41.7	1.1	2.7
16:36:28	14.4	0.8	-1.2	-4.2	45.6	1.1	6.5
16:37:28	13.3	0.8	-0.6	-3.0	49.9	1.0	5.9
16:38:28	12.7	0.9	-0.4	9.0	53.6	1.0	10.7
16:39:28	14.8	0.9	-0.9	5.5	47.5	1.0	3.3
16:40:28	14.5	0.8	-0.8	1.4	47.5	1.0	6.5
16:41:28	12.5	0.7	-2.0	11.2	53.5	1.1	24.9
16:42:28	13.2	0.8	-2.1	14.7	51.4	1.1	20.4
16:43:28	15.4	0.9	-1.3	3.0	43.3	1.0	4.1
16:44:28	13.5	0.9	-0.5	-2.9	49.5	1.0	11.1
16:45:28	12.1	3.5	-0.1	3.0	52.4	1.0	7.5
16:46:28	14.8	1.7	-0.8	1.5	43.6	1.0	3.3
16:47:28	15.2	1.1	-0.7	-2.6	43.6	1.0	1.7
16:48:28	13.2	1.1	-0.5	0.1	54.3	1.0	1.7
16:49:28	12.5	1.7	-0.3	9.1	62.8	1.0	5.8

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:58:28	15.2	0.9	-0.8	-2.8	40.0	1.1	-2.5
14:59:28	14.2	0.8	-0.7	-3.7	43.6	1.1	-1.9
15:00:28	12.8	0.9	-0.4	-4.1	49.7	1.1	-1.1
15:01:28	15.2	0.9	-0.8	-4.5	40.1	1.1	-1.6
15:02:28	15.1	0.7	-0.9	-4.4	41.4	1.1	-1.9
15:03:28	12.9	0.8	-0.4	-4.5	52.8	1.1	0.0
15:04:28	12.8	1.1	-0.6	-3.6	55.1	1.1	-0.8
15:05:28	15.7	1.9	-1.9	-3.7	44.4	1.1	-2.9
15:06:28	14.6	1.1	-1.7	-3.8	48.3	1.1	-1.3
15:07:28	13.2	0.8	-0.5	7.9	56.9	1.1	2.8
15:08:28	13.8	0.9	-0.6	14.[illegible]	53.7	1.1	2.8
15:09:28	15.4	0.9	-0.8	2.2	44.2	1.1	-2.3
15:10:28	14.6	0.7	-0.9	5.3	46.0	1.1	3.1
15:11:28	13.8	0.6	-1.5	20.0	49.1	1.1	17.0
15:12:28	14.1	0.6	-2.3	22.1	44.1	1.1	20.0
15:13:28	15.1	0.8	-1.0	6.1	38.3	1.0	4.9
15:14:28	13.6	0.6	-0.7	-0.0	43.2	1.1	5.7
15:15:28	12.7	1.1	-0.7	-3.6	46.5	1.1	3.2
15:16:28	14.9	1.0	-0.8	-4.1	40.4	1.1	0.5
15:17:28	13.1	0.9	-0.4	-4.3	43.9	1.1	-0.2
15:18:28	11.7	1.2	-0.0	-4.2	45.9	1.1	-0.8
15:19:28	14.9	0.9	-1.1	-4.3	36.6	1.1	-1.5
15:20:28	15.1	0.8	-0.8	-4.4	43.4	1.1	-2.2
15:21:28	12.7	0.9	-0.3	-4.3	47.6	1.1	0.9
15:22:28	12.9	0.8	-0.6	-4.4	48.8	1.1	0.1
15:23:28	15.1	1.1	-0.8	-4.3	43.5	1.0	-2.3
15:24:28	12.8	0.9	-0.4	-4.4	51.3	1.1	-0.4
15:25:28	13.2	1.2	-0.5	-4.4	50.1	1.1	-1.3
15:26:28	15.2	0.9	-1.0	-4.5	44.4	1.1	-2.2
15:27:28	13.0	0.9	-0.5	-4.5	50.5	1.1	-0.5
15:28:28	12.7	1.0	-0.4	-3.6	51.9	1.1	0.4
15:29:28	15.2	0.9	-0.8	-3.2	42.8	1.0	-2.0
15:30:28	13.2	0.8	-0.3	-4.2	50.3	1.0	-0.0
15:31:28	11.9	1.2	-0.3	-0.9	67.0	1.1	-0.2
15:32:28	14.4	0.9	-0.7	0.4	69.9	1.0	-2.5
15:33:28	14.4	0.5	-0.7	-2.5	59.6	1.0	-2.3
15:34:28	12.3	1.7	-0.2	-3.8	59.8	1.0	2.1
15:35:28	14.2	0.8	-0.7	-2.5	64.6	1.0	-0.1
15:36:28	15.1	0.8	-0.7	-3.7	49.7	1.0	-1.2
15:37:28	13.2	0.6	-0.4	-4.1	52.1	1.0	-1.1
15:38:28	12.8	0.7	-0.6	-4.2	59.5	1.0	-0.7
15:39:28	15.3	0.8	-0.8	-4.2	55.6	1.0	-2.6
15:40:28	15.3	0.7	-0.8	-4.5	46.5	1.0	-1.5
15:41:28	13.8	0.6	-0.7	-4.5	50.7	1.0	-0.2
15:42:28	13.0	0.6	-0.5	-4.5	53.6	1.0	0.4
15:43:28	14.6	0.6	-0.8	-4.5	49.1	1.0	-0.7
15:44:28	15.5	0.7	-0.8	-4.6	41.4	1.0	-2.5
15:45:28	14.6	0.6	-0.8	-4.6	44.2	1.1	0.4
15:46:28	13.9	0.6	-0.8	-4.5	48.7	1.1	4.8
15:47:28	14.5	0.6	-1.0	-4.2	48.5	1.1	2.2
15:48:28	16.0	0.7	-1.0	-4.3	38.7	1.0	-1.0
15:49:28	15.2	0.6	-1.1	-4.3	40.4	1.1	1.6
15:50:28	15.0	0.6	-1.1	1.9	42.3	1.1	6.0
15:51:28	13.6	0.7	-0.7	13.6	46.2	1.1	8.0
15:52:28	11.7	0.8	-0.2	26.1	52.7	1.1	7.5
15:53:28	14.8	0.8	-0.9	11.0	53.9	1.1	-0.5

RADIAN CORPORATION OUTLET RUN 1 11-18-9.

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-18-1991 Current Time = 14:12:35
File Name = E:\CEMDATA\111891.PRN Calibration File:E: CEMDATA\MTO1118A.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:12:27	15.4	0.9	-0.9	6.1	37.2	1.2	0.0
14:13:28	12.8	0.7	-0.5	0.2	49.8	1.1	2.5
14:14:28	12.7	0.6	-0.7	-2.7	52.7	1.1	1.6
14:15:28	14.7	0.8	-0.8	-1.5	43.4	1.2	-1.6
14:16:28	14.6	0.7	-0.7	-3.9	42.2	1.1	-1.3
14:17:28	12.5	0.9	-0.7	-4.2	49.9	1.1	0.2
14:18:28	14.9	0.9	-1.0	-4.4	41.7	1.1	-1.7
14:19:28	14.1	0.7	-0.6	-4.4	45.8	1.1	-2.2
14:20:28	13.2	0.8	-0.6	-4.3	49.2	1.1	-0.1
14:21:28	15.2	0.8	-0.8	-4.6	43.2	1.1	-2.2
14:22:28	15.0	0.8	-0.7	-4.6	43.4	1.1	-2.6
14:23:28	13.6	0.7	-0.7	-4.5	48.1	1.1	-1.2
14:24:28	14.2	0.7	-0.9	-4.5	44.4	1.1	-1.4
14:25:28	15.2	0.7	-1.0	-4.6	38.9	1.1	-2.3
14:26:28	13.9	0.7	-0.7	-4.5	43.6	1.1	0.4
14:27:28	13.5	0.6	-0.8	-4.6	44.9	1.1	1.9
14:28:28	15.2	0.8	-0.9	-4.5	39.3	1.1	-2.1
14:29:28	14.4	0.7	-0.8	-4.5	41.5	1.1	-1.6
14:30:28	13.3	0.7	-0.7	-4.6	44.5	1.1	0.1
14:31:28	14.5	0.8	-0.8	-4.5	41.7	1.1	-0.6
14:32:28	14.0	0.9	-0.7	-4.6	49.1	1.0	-3.4
14:33:28	12.7	0.9	-0.7	-4.4	51.8	1.0	-1.8
14:34:28	13.8	1.0	-0.7	-4.6	43.3	1.1	-2.6
14:35:28	14.0	0.9	-0.7	-4.6	45.4	1.0	-2.7
14:36:28	12.8	1.0	-0.6	-4.4	49.4	1.1	-1.9
14:37:28	14.6	0.9	-1.0	-4.6	39.7	1.1	-2.9
14:38:28	13.5	0.8	-0.6	-4.5	44.5	1.0	-2.8
14:39:28	13.2	1.0	-0.6	-4.3	42.8	1.1	-2.7
14:40:28	15.0	0.9	-1.0	-4.5	36.6	1.1	-3.3
14:41:28	14.7	0.7	-0.9	-4.3	45.6	1.1	-2.0
14:42:28	14.1	0.7	-0.8	-2.5	45.7	1.1	1.6
14:43:28	14.6	0.7	-0.9	2.4	46.7	1.2	8.5
14:44:28	11.8	1.3	-0.1	5.5	49.9	1.1	8.1
14:45:28	13.9	1.3	-0.6	3.5	41.6	1.1	1.6
14:46:28	14.6	1.1	-0.7	-1.3	42.6	1.1	-0.6
14:47:28	12.9	1.1	-0.4	-3.6	49.6	1.1	1.6
14:48:28	13.7	1.2	-0.6	-4.2	44.9	1.1	-1.1
14:49:28	14.7	1.0	-1.0	-4.3	42.1	1.1	-1.5
14:50:28	13.0	1.0	-0.5	-4.3	49.7	1.1	-0.3
14:51:28	13.8	1.0	-0.9	-3.8	48.3	1.1	-1.7
14:52:28	14.7	0.9	-0.8	-4.0	44.4	1.1	-3.2
14:53:28	12.3	1.0	-0.5	-4.3	53.0	1.1	-2.4
14:54:28	13.1	1.3	-0.5	-4.2	48.8	1.1	-2.9
14:55:28	14.9	1.0	-0.9	-4.5	40.7	1.0	-4.4
14:56:28	13.6	0.8	-0.5	-4.5	47.4	1.0	-1.3
14:57:28	12.9	1.0	-0.4	-3.4	49.2	1.1	-0.2

11-13-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:02:08	12.5	0.7	-0.3	-1.3	67.1	1.1	-3.2
12:03:08	15.0	0.7	-0.9	-3.6	50.1	1.0	-3.5
12:04:08	15.2	0.7	-0.8	-3.7	44.0	1.0	-3.0
12:05:08	14.0	0.6	-0.7	-2.9	48.8	1.0	-3.0
12:06:08	12.8	0.9	-0.7	-1.5	55.7	1.8	-2.9
Avg.=	13.3	5.1	-1.5	3.7	52.9	1.1	-3.9

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:06:08	12.2	0.9	-0.2	-1.4	53.9	1.0	-2.9
11:07:08	13.5	0.9	-0.7	-0.2	54.6	1.1	-2.2
11:08:08	14.3	0.8	-0.9	0.2	49.7	1.0	-2.6
11:09:08	12.9	0.8	-0.4	0.2	55.8	1.0	-2.9
11:10:08	12.7	0.8	-0.2	0.7	58.1	1.0	-2.1
11:11:08	17.4	0.9	-1.6	1.4	53.4	1.1	-1.8
11:12:08	15.7	1.5	-1.7	0.2	44.2	1.1	-2.6
11:13:08	13.7	0.8	-1.5	-0.8	50.7	1.0	-1.9
11:14:08	12.7	0.9	-0.4	-0.7	51.5	1.0	-2.7
11:15:08	14.6	1.9	-0.9	0.2	47.6	1.0	-3.1
11:16:08	12.9	0.7	-0.4	0.7	49.6	1.0	-1.9
11:17:08	12.7	0.8	-0.5	0.2	53.0	1.0	-2.8
11:18:08	15.2	0.8	-1.0	0.2	44.2	1.1	-2.9
11:19:08	14.1	0.8	-0.7	0.2	47.1	1.0	-2.7
11:20:08	11.7	1.2	-0.3	-1.2	59.2	1.0	-2.7
11:21:08	12.8	2.9	-0.4	-2.6	58.9	1.1	-2.0
11:22:08	14.6	1.1	-0.8	-2.8	48.9	1.0	-2.6
11:23:08	12.1	0.9	-0.2	-0.2	57.4	1.0	-2.7
11:24:08	12.5	1.2	-0.4	2.1	58.4	1.0	-2.7
11:25:08	15.0	0.9	-0.9	0.8	48.0	1.0	-2.5
11:26:08	13.3	0.7	-0.5	1.6	52.3	1.0	-3.2
11:27:08	12.2	0.9	-0.3	9.7	60.1	1.0	-2.0
11:28:08	15.0	0.8	-0.9	4.4	48.7	1.0	-2.6
11:29:08	14.3	0.7	-0.8	0.7	48.4	1.0	-2.6
11:30:08	12.9	0.7	-0.5	1.4	52.5	1.0	-2.3
11:31:08	15.1	0.7	-0.9	2.1	45.5	1.1	-2.5
11:32:08	15.6	0.7	-0.9	-0.1	41.9	1.0	-2.3
11:33:08	14.2	0.6	-0.6	2.0	45.5	1.0	-2.1
11:34:08	13.3	0.6	-0.6	3.8	46.5	1.1	-2.8
11:35:08	13.1	0.6	-0.6	9.4	47.5	1.1	-1.7
11:36:08	13.6	0.7	-0.7	6.4	47.2	1.1	-2.3
11:37:08	14.6	0.7	-0.9	1.6	44.0	1.0	-2.7
11:38:08	12.7	0.7	-0.4	0.8	50.0	1.0	-2.1
11:39:08	11.4	0.8	-0.1	4.7	54.8	1.1	-1.8
11:40:08	14.1	0.9	-0.8	2.8	47.3	1.1	-1.7
11:41:08	12.2	0.7	-0.2	2.0	56.3	1.0	-1.7
11:42:08	11.3	1.8	-0.2	6.4	61.6	1.1	-2.8
11:43:08	14.5	1.0	-0.9	2.0	51.3	1.1	-1.9
11:44:08	13.5	0.7	-0.6	0.5	52.4	1.0	-2.9
11:45:08	11.8	0.8	0.0	-0.4	58.6	1.0	-2.3
11:46:08	13.9	0.8	-0.7	-2.8	50.4	1.1	-2.8
11:47:08	14.6	0.7	-0.8	-0.8	46.2	1.0	-2.8
11:48:08	11.9	0.9	-0.2	-1.6	57.9	1.0	-2.6
11:49:08	12.7	1.2	-0.3	-2.7	52.1	1.1	-2.7
11:50:08	14.4	0.8	-0.8	-0.7	47.4	1.0	-2.2
11:51:08	12.1	0.9	-0.2	-0.3	62.1	1.0	-2.6
11:52:08	12.6	2.7	-1.0	-0.2	64.3	1.1	-3.1
11:53:08	14.6	1.0	-0.9	-0.8	52.8	1.1	-3.3
11:54:08	14.3	0.7	-0.8	-0.2	51.7	1.0	-3.6
11:55:08	12.4	0.7	-0.2	-2.9	63.9	1.0	-3.3
11:56:08	14.0	0.9	-0.7	-0.7	60.2	1.1	-2.7
11:57:08	14.0	0.8	-0.7	-0.2	56.2	1.0	-4.6
11:58:08	11.9	0.8	-0.1	-2.3	64.7	1.0	-3.1
11:59:08	13.5	0.9	-0.5	-3.1	62.4	1.1	-3.8
12:00:08	14.8	0.8	-0.8	-2.0	56.6	1.1	-3.5
12:01:08	13.0	0.7	-0.4	-3.3	62.7	1.0	-2.6

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:10:08	14.7	0.7	-0.9	0.9	47.0	1.1	-2.8
10:11:08	14.1	0.7	-0.8	1.5	49.3	1.1	-2.0
10:12:08	12.9	0.7	-0.5	3.3	50.8	1.0	-2.0
10:13:08	13.5	0.7	-0.7	3.6	50.7	1.1	-2.5
10:14:08	12.9	0.7	-0.5	2.6	55.7	1.1	-2.9
10:15:08	11.9	0.7	-0.2	3.4	54.2	1.1	-2.4
10:16:08	13.9	0.9	-0.8	1.7	50.3	1.1	-2.5
10:17:08	13.6	0.7	-0.6	1.7	50.2	1.0	-3.4
10:18:08	12.5	0.7	-0.4	0.5	51.4	1.0	-3.2
10:19:08	13.0	0.9	-0.6	0.5	50.5	1.1	-2.7
10:20:08	13.6	0.8	-0.6	-2.2	49.0	1.0	-3.0
10:21:08	11.5	0.9	-0.0	2.9	51.7	1.0	-2.0
10:22:08	13.7	0.9	-0.7	3.8	46.9	1.1	-2.3
10:23:08	11.5	59.9	-0.1	2.9	60.8	3.2	-2.4
10:24:08	12.9	56.7	-0.1	2.0	53.0	1.2	-2.5
10:25:08	13.8	2.9	-0.7	2.8	48.8	1.1	-2.0
10:26:08	11.6	1.1	-0.1	1.7	53.6	1.0	-2.4
10:27:17	13.8	1.1	-0.8	1.7	48.4	1.1	-2.2
10:28:08	13.2	1.0	-0.5	0.8	51.0	1.0	-2.1
10:29:08	12.4	1.0	-0.4	0.4	50.6	1.1	-2.9
10:30:08	14.9	0.9	-0.9	0.3	42.4	1.1	-2.5
10:31:08	12.4	0.9	-0.4	0.2	50.7	1.0	-2.8
10:32:08	11.4	1.6	-0.2	0.4	56.5	1.1	-2.5
10:33:08	14.2	1.1	-0.8	0.3	48.2	1.1	-2.2
10:34:08	13.4	0.9	-0.6	0.2	52.9	1.0	-3.0
10:35:08	12.1	1.2	-0.3	0.4	58.7	1.1	-2.3
10:36:08	13.9	1.3	-0.7	-2.3	52.8	1.1	-2.1
10:37:08	14.2	1.0	-0.8	0.2	49.5	1.0	-2.3
10:38:08	12.1	1.0	-0.2	0.4	58.2	1.0	-1.8
10:39:08	13.2	1.1	-0.6	0.3	56.1	1.1	-2.7
10:40:08	14.5	0.9	-0.8	0.2	48.4	1.0	-2.0
10:41:08	13.9	1.3	-0.7	0.2	50.6	1.1	-1.8
10:42:08	11.3	58.3	0.0	0.5	63.4	1.1	-2.7
10:43:08	14.2	8.3	-0.5	0.4	50.4	1.1	-2.8
10:44:08	12.8	1.2	-0.3	-2.0	53.7	1.0	-2.0
10:45:08	11.1	2.9	0.0	0.6	61.1	1.1	-1.9
10:46:08	14.0	2.2	-0.7	0.4	51.8	1.1	-2.3
10:47:08	15.0	1.0	-0.8	0.3	45.2	1.1	-1.6
10:48:08	13.8	0.8	-0.7	0.4	51.1	1.1	-2.5
10:49:08	11.4	11.4	-0.1	0.3	56.7	1.1	-2.8
10:50:08	14.1	10.1	-0.6	-0.3	46.8	1.2	-2.5
10:51:08	15.0	1.4	-1.0	0.2	42.4	1.1	-2.7
10:52:08	11.9	1.1	-0.2	0.3	53.3	1.1	-2.6
10:53:08	13.3	1.2	-0.6	0.3	51.2	1.1	-3.1
10:54:08	15.2	0.9	-1.0	0.3	43.5	1.1	-2.3
10:55:08	12.8	0.8	-0.4	-1.3	48.5	1.0	-2.9
10:56:08	12.1	1.0	-0.2	-2.7	51.6	1.1	-2.5
10:57:08	14.5	0.9	-0.9	-0.3	44.4	1.1	-3.0
10:58:08	14.9	0.8	-1.5	0.3	41.9	1.1	-3.1
10:59:08	13.4	0.8	-0.6	0.2	49.2	1.1	-2.5
11:00:08	13.3	0.8	-0.6	-2.6	51.1	1.2	-2.6
11:01:08	14.3	0.8	-0.8	0.4	50.4	1.1	-2.7
11:02:08	11.4	1.1	-0.1	0.3	57.5	1.1	-2.4
11:03:08	12.9	1.2	-0.6	0.5	56.2	1.1	-3.0
11:04:08	14.8	0.9	-1.0	0.3	49.2	1.1	-2.9
11:05:08	13.2	0.7	-0.6	0.3	49.8	1.0	-2.7

RADIAN CORPORATION 1118 PRETEST

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NC
Performed for: EPA/EMB
Data Printed = 11-18-1991 Current Time = 09:29:08
File Name = E:\CEMDATA 111891.PRN Calibration File:E:\CEMDATA\MT01118A.CAL

11-18-1991 Time	O2 %	CO PPMV	CO2 %	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:29:08	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:29:08	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:29:09	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:29:09	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:29:09	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:29:10	12.1	47.7	-2.2	2.2	57.2	1.4	41.0
09:30:08	13.2	2.9	-0.6	1.9	55.0	1.8	8.3
09:31:08	13.6	89.9	-0.1	2.4	59.2	2.1	3.5
09:32:08	14.2	39.0	-0.5	1.7	51.6	1.3	1.8
09:33:08	13.8	2.4	-0.7	1.4	51.8	1.1	0.2
09:34:08	12.1	1.4	-0.3	1.5	55.0	1.1	-0.7
09:35:08	14.6	1.4	-1.0	1.4	47.6	1.2	-1.9
09:36:08	13.4	1.2	-0.6	1.3	50.4	1.1	-1.8
09:37:08	11.4	1.4	-0.1	1.3	54.0	1.1	-2.2
09:38:08	13.7	1.5	-0.7	1.4	49.1	1.2	-2.3
09:39:08	13.1	1.2	-0.5	1.3	53.5	1.1	-1.7
09:40:08	11.9	1.5	-0.3	1.3	55.5	1.2	-2.8
09:41:08	14.1	1.3	-0.8	1.4	49.8	1.2	-2.5
09:42:08	12.2	1.2	-0.3	1.5	55.7	1.1	-2.9
09:43:08	12.9	1.6	-0.5	1.4	55.2	1.2	-3.2
09:44:08	14.4	1.2	-0.9	1.4	50.0	1.1	-3.5
09:45:08	10.7	2.3	-0.1	1.3	63.2	1.1	-3.2
09:46:08	12.5	2.2	-0.6	1.5	59.7	1.2	-3.5
09:47:08	14.3	1.2	-0.9	1.3	51.7	1.1	-3.0
09:48:08	12.4	1.0	-0.4	1.2	56.7	1.1	-3.0
09:49:08	13.4	1.2	-0.6	1.2	52.4	1.2	-3.7
09:50:08	14.6	1.0	-0.9	1.2	47.3	1.1	-3.8
09:51:08	11.5	6.7	-0.1	1.0	59.7	1.1	-4.2
09:52:08	11.6	70.8	-0.1	1.2	62.4	1.1	-3.7
09:53:08	14.3	2.8	-0.9	1.2	53.3	1.1	-3.8
09:54:08	12.2	1.3	-0.3	1.0	61.9	1.1	-4.4
09:55:08	12.8	1.4	-0.5	1.2	67.7	1.2	-3.6
09:56:08	14.6	1.0	-0.9	1.3	58.5	1.1	-3.7
09:57:08	12.2	1.1	-0.3	1.1	64.3	1.1	-3.0
09:58:08	13.1	1.2	-0.5	1.2	66.1	1.2	-3.8
09:59:08	15.0	1.1	-1.0	1.1	57.2	1.2	-3.7
10:00:08	13.9	0.8	-0.3	0.9	54.9	1.1	-3.5
10:01:08	12.4	0.9	-0.4	1.0	61.1	1.1	-3.4
10:02:08	13.5	0.9	-0.7	2.0	58.2	1.2	-3.4
10:03:08	14.8	0.9	-1.0	1.4	50.6	1.1	-2.8
10:04:08	13.1	0.8	-0.5	1.0	53.2	1.1	-2.6
10:05:08	13.0	0.8	-0.5	1.4	53.4	1.1	-3.2
10:06:08	15.4	1.1	-1.0	1.3	44.7	1.1	-2.5
10:07:08	15.5	0.8	-1.0	0.9	42.9	1.0	-2.0
10:08:08	15.1	0.7	-1.0	0.7	45.0	1.1	-2.8
10:09:08	14.9	0.7	-1.0	0.7	46.4	1.1	-3.0

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:05:16	9.1	6.4	7.6	22.2	63.4	2.6	759.0
13:06:16	11.5	4.7	6.0	8.0	53.9	1.2	552.2
13:07:16	9.3	6.3	8.0	12.1	62.5	1.1	657.9
13:08:16	10.3	5.3	6.6	16.9	61.0	0.7	577.7
13:09:16	11.6	4.3	6.0	5.6	53.9	0.6	473.6
13:10:16	8.6	6.7	8.4	14.3	67.5	0.6	652.4
13:11:16	10.6	5.0	6.4	19.4	64.5	0.5	507.1
13:12:16	11.7	4.3	5.7	4.9	54.1	0.3	421.8
13:13:16	8.9	6.1	7.9	11.2	67.3	0.3	573.0
13:14:16	10.9	4.7	6.0	9.5	68.3	0.2	463.2
13:15:16	10.2	5.1	6.8	5.7	58.0	0.2	454.7
13:16:16	9.0	5.8	7.7	15.5	65.4	0.2	663.4
13:17:16	11.3	4.3	5.7	14.9	66.0	0.2	502.3
13:18:16	11.3	4.2	6.1	7.1	60.7	0.2	569.5
13:19:16	8.9	5.5	7.6	19.7	70.4	0.2	902.9
13:20:16	9.9	4.7	6.6	25.9	74.2	0.2	773.2
13:21:16	10.7	4.1	6.2	16.1	69.7	0.2	785.6
13:22:16	8.6	5.1	7.7	31.2	81.7	0.2	909.9
13:23:16	10.7	3.8	5.9	20.8	80.5	0.2	628.7
13:24:16	11.6	3.3	5.7	5.6	63.9	0.2	543.5
13:25:16	11.0	3.6	6.1	8.5	61.5	0.2	680.1
13:26:16	11.8	2.9	5.4	9.7	56.5	0.2	709.3
13:27:16	12.2	2.7	5.2	8.3	55.4	0.2	674.2
13:28:16	11.5	3.4	5.9	7.9	58.6	0.2	699.1
13:29:16	10.7	3.8	6.5	9.3	61.3	0.2	806.3
13:30:16	10.4	3.9	6.6	6.4	62.6	0.2	1034.7
13:31:16	9.8	4.1	7.1	8.4	64.2	0.3	1296.7
13:32:16	11.1	3.3	5.7	9.5	60.4	0.2	947.8
13:33:16	9.7	4.4	7.3	8.7	61.3	0.2	1202.9
13:34:16	8.0	5.5	8.3	20.9	67.0	0.2	1242.8
13:35:16	10.6	3.7	5.9	12.9	62.6	0.2	835.2
13:36:16	10.2	4.0	6.7	2.0	60.7	0.2	1095.0
13:37:16	7.2	6.4	8.8	14.9	71.6	0.2	1309.1
13:38:16	9.5	4.6	6.6	14.2	68.2	0.2	852.0
13:39:16	11.4	3.4	5.7	0.1	58.6	0.1	666.3
13:40:16	9.8	4.6	7.2	1.0	61.1	0.2	772.9
13:41:16	8.9	5.3	7.5	5.1	67.2	0.2	790.8
13:42:16	11.7	3.4	5.4	-0.1	62.7	0.1	527.9
13:43:16	11.1	4.0	6.3	-1.5	62.0	0.1	541.7
13:44:16	9.7	4.7	7.2	2.5	62.3	0.1	616.0
13:45:16	10.1	4.2	6.6	4.5	60.1	0.1	603.4
13:46:16	10.8	4.0	6.4	0.1	60.3	0.1	521.2
13:47:16	9.5	4.5	7.2	3.3	59.2	0.1	588.2
13:48:16	10.5	3.8	6.2	2.8	56.5	0.1	527.4
13:49:16	10.6	3.9	6.5	-0.9	54.9	0.1	524.5
13:50:16	9.0	5.1	7.7	3.6	62.0	0.1	691.6
13:51:16	11.2	3.4	5.7	4.5	60.3	0.1	537.3
13:52:16	10.4	4.2	6.7	-0.4	57.7	0.2	638.9
13:53:16	7.7	6.3	8.7	12.5	66.1	0.2	764.6
13:54:16	11.3	3.2	5.5	8.3	56.5	0.1	503.8
13:55:16	10.5	4.0	6.7	1.3	57.6	0.2	668.0

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:09:16	9.6	2.7	7.4	1.0	64.4	0.4	1076.2
12:10:16	10.8	1.9	6.1	0.4	59.4	0.3	802.5
12:11:16	11.7	1.6	5.7	-2.3	55.1	0.2	635.0
12:12:16	10.5	2.5	6.6	-2.8	61.0	0.2	630.6
12:13:16	10.7	2.3	6.4	-6.2	61.5	0.2	576.9
12:14:16	10.2	2.8	6.8	-7.1	59.3	0.2	598.4
12:15:16	10.8	2.3	6.3	-7.7	54.8	0.2	636.2
12:16:16	10.9	2.1	6.1	-7.7	54.2	0.2	702.4
12:17:16	11.7	1.6	5.4	-7.0	52.5	0.2	610.3
12:18:16	12.2	1.4	5.1	-6.5	50.1	0.2	549.2
12:19:16	11.3	2.1	6.0	-4.1	57.0	0.2	600.4
12:20:16	9.8	3.1	7.0	1.7	58.4	0.2	641.0
12:21:16	9.7	2.9	6.8	3.8	58.6	0.2	604.8
12:22:16	11.4	1.6	5.5	2.2	54.8	0.2	487.3
12:23:16	12.6	1.0	4.7	-0.1	49.3	0.1	399.3
12:24:16	13.1	0.7	4.5	-2.3	48.8	0.1	427.1
12:25:16	11.2	2.4	6.0	-2.2	54.6	0.1	579.2
12:26:16	10.3	2.7	6.5	-0.7	53.3	0.1	645.7
12:27:16	10.4	2.6	6.3	-1.1	53.0	0.1	670.2
12:28:16	10.4	2.9	6.6	-0.7	54.5	0.1	642.9
12:29:16	9.0	3.9	7.6	0.5	57.7	0.2	593.5
12:30:16	9.4	3.7	6.9	0.2	52.9	0.2	548.1
12:31:16	11.0	2.9	6.0	-2.3	50.2	0.1	382.0
12:32:16	10.5	3.2	6.5	-2.0	53.6	0.1	360.4
12:33:16	11.4	2.5	5.6	-1.5	52.0	0.1	287.8
12:34:16	12.5	1.9	4.9	-2.2	50.1	0.1	222.8
12:35:16	13.4	1.2	4.1	-3.1	46.5	0.1	182.7
12:36:16	14.4	0.4	3.2	-4.0	43.0	0.1	151.3
12:37:16	14.5	0.5	3.2	-4.4	43.5	0.1	146.1
12:38:16	13.4	1.3	3.8	-4.7	48.6	0.0	139.9
12:39:16	11.4	2.8	5.2	-5.0	60.1	0.0	149.3
12:40:16	9.5	4.2	6.5	-4.8	68.2	0.1	168.2
12:41:16	8.0	5.4	7.6	-3.1	76.3	0.2	238.4
12:42:16	7.1	6.2	8.2	1.0	83.8	0.2	368.5
12:43:16	9.4	4.9	6.3	-0.4	75.1	0.2	321.9
12:44:16	11.2	4.1	5.5	-3.3	66.4	0.1	256.3
12:45:16	10.0	5.2	6.8	-1.6	70.6	0.1	351.2
12:46:16	10.4	4.8	6.4	-0.4	67.0	0.1	372.7
12:47:16	10.9	4.7	6.2	-0.7	66.1	0.1	364.0
12:48:16	9.9	5.6	7.1	2.0	73.4	0.1	442.1
12:49:16	9.4	6.0	7.1	4.5	74.9	0.1	451.2
12:50:16	11.2	5.0	5.9	-0.2	73.9	0.1	370.1
12:51:16	10.7	5.3	6.3	-0.8	73.6	0.1	395.1
12:52:16	10.2	5.8	6.9	1.5	83.2	0.1	450.5
12:53:16	9.4	6.4	7.3	5.7	72.4	0.1	555.0
12:54:16	11.3	5.2	5.7	3.1	67.1	0.1	515.1
12:55:16	9.0	7.0	7.7	9.1	69.4	0.2	784.7
12:56:16	8.1	7.5	7.9	38.2	70.6	0.2	761.4
12:57:16	10.4	6.0	6.2	19.9	68.7	0.2	557.8
12:58:16	9.7	6.3	7.0	9.9	64.5	0.2	615.0
12:59:16	7.9	7.5	8.0	19.5	64.1	0.2	744.8
13:00:16	9.9	6.1	6.5	10.1	57.7	0.2	554.2
13:01:16	9.9	6.2	6.7	2.5	57.5	0.2	711.9
13:02:16	7.4	8.1	8.4	22.0	67.8	0.2	990.5
13:03:16	10.6	5.5	6.0	13.7	58.5	0.2	722.4
13:04:16	9.5	6.4	7.5	9.0	60.8	4.3	891.1

11-23-1991 Time	O2 %	CO PPMV	CO2 %	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:13:16	10.8	4.0	6.4	13.1	60.8	0.8	741.6
11:14:16	11.1	3.6	6.6	2.8	59.8	0.8	653.2
11:15:16	9.4	4.9	7.9	6.9	68.1	1.1	719.5
11:16:16	10.7	4.0	6.5	9.2	65.5	1.0	577.1
11:17:16	11.2	3.7	6.5	2.4	58.4	1.0	531.7
11:18:16	9.3	5.1	8.0	7.7	64.9	1.0	588.2
11:19:16	11.3	3.6	6.1	8.0	57.7	0.9	452.7
11:20:16	11.3	3.5	6.4	2.4	54.5	0.9	379.2
11:21:16	10.1	4.2	7.3	4.6	57.3	0.9	397.7
11:22:16	10.4	4.0	6.8	8.9	55.9	0.8	396.0
11:23:16	11.9	2.9	5.9	3.4	48.6	0.7	308.6
11:24:16	9.8	4.5	7.6	5.9	57.1	0.7	407.6
11:25:16	10.5	3.8	6.7	10.7	56.1	0.7	398.8
11:26:16	12.1	2.7	5.7	3.5	49.2	0.6	312.5
11:27:16	10.2	4.0	7.3	5.1	57.8	0.7	395.8
11:28:16	9.6	4.2	7.5	10.2	61.5	0.7	483.4
11:29:16	11.6	2.8	5.8	5.5	54.9	0.6	370.6
11:30:16	10.6	3.4	6.9	4.4	56.5	0.5	411.6
11:31:16	10.2	3.4	6.9	6.6	58.8	0.5	469.0
11:32:16	11.2	2.9	6.0	6.0	56.0	0.6	445.1
11:33:16	12.0	2.5	5.5	1.4	50.3	0.4	318.8
11:34:16	11.7	2.5	5.5	1.4	51.1	0.3	318.0
11:35:16	12.5	2.0	5.1	1.0	50.4	0.3	317.3
11:36:16	12.6	2.0	4.8	0.6	49.4	0.3	296.4
11:37:16	12.0	2.7	5.3	1.2	57.8	0.2	321.4
11:38:16	11.5	3.1	5.7	5.3	57.2	0.2	328.5
11:39:16	11.5	3.0	5.8	3.4	59.0	0.2	304.0
11:40:16	11.4	3.1	5.9	2.3	62.5	0.2	270.9
11:41:16	11.6	2.8	5.5	1.3	61.6	0.2	254.7
11:42:16	10.9	3.3	6.2	1.0	65.2	0.2	276.6
11:43:16	10.7	3.2	6.3	1.8	69.8	0.2	333.4
11:44:16	10.3	3.4	6.5	2.8	70.4	0.2	480.0
11:45:16	9.6	3.8	6.9	6.2	71.7	0.2	646.2
11:46:16	9.0	3.9	7.3	6.9	72.5	0.2	757.3
11:47:16	9.0	3.7	7.4	9.5	73.6	0.4	702.3
11:48:16	10.7	2.7	6.2	6.3	68.5	0.4	482.5
11:49:16	9.3	3.7	7.6	6.1	63.7	0.4	560.0
11:50:16	9.2	3.4	7.4	12.0	62.6	0.5	634.8
11:51:16	11.4	2.1	5.6	6.7	55.1	0.3	527.9
11:52:16	11.1	2.3	6.0	4.4	55.9	0.3	736.9
11:53:16	11.3	1.8	6.0	5.1	55.8	0.4	737.7
11:54:16	12.0	1.3	5.5	3.7	53.1	0.5	647.6
11:55:16	12.5	0.8	5.1	2.9	52.5	0.5	562.8
11:56:16	12.0	1.4	5.5	3.1	56.8	0.3	636.5
11:57:16	11.4	1.9	5.8	6.8	57.7	0.2	639.8
11:58:16	12.0	1.5	5.4	4.1	54.0	0.2	544.6
11:59:16	11.7	1.8	5.7	3.2	55.6	0.2	598.7
12:00:16	11.6	1.6	5.7	1.9	55.7	0.2	774.1
12:01:16	11.3	1.5	5.7	1.0	54.7	0.2	905.2
12:02:16	10.4	2.0	6.6	-0.3	56.9	0.2	1298.5
12:03:16	9.0	3.0	7.5	2.9	60.9	0.2	1425.9
12:04:16	9.3	2.6	7.5	5.7	62.2	0.3	1301.8
12:05:16	10.3	2.1	6.4	4.7	64.1	0.3	940.5
12:06:16	10.8	1.9	6.2	0.7	59.2	0.2	879.7
12:07:16	10.2	2.2	6.6	1.7	57.8	0.2	1018.9
12:08:16	10.7	1.6	6.4	0.7	58.1	0.3	1109.6

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:17:16	10.3	6.8	7.1	3.9	66.3	0.9	601.5
10:18:16	9.4	7.0	7.4	5.8	69.9	1.1	808.4
10:19:16	11.2	6.0	6.0	2.4	67.7	1.0	540.9
10:20:16	10.7	6.1	6.7	0.7	65.7	1.0	666.5
10:21:16	10.2	6.3	7.2	5.1	64.4	1.1	808.1
10:22:16	11.2	5.6	6.1	4.2	59.7	1.0	689.6
10:23:16	10.8	5.8	6.7	1.3	60.6	0.9	970.4
10:24:16	10.0	6.2	7.3	6.0	54.9	0.9	1065.9
10:25:16	11.1	5.3	6.2	6.3	58.3	1.0	818.2
10:26:16	11.8	5.0	6.0	1.6	58.1	0.9	648.6
10:27:16	10.6	5.8	7.0	4.2	64.0	0.9	741.3
10:28:16	10.3	5.7	7.1	6.5	42.6	0.9	799.2
10:29:16	10.6	5.3	6.7	10.0	28.0	0.9	746.9
10:30:16	11.5	4.8	5.8	10.8	4.7	0.8	614.7
10:31:16	10.8	5.1	6.7	10.0	6.0	0.8	816.9
10:32:16	9.3	6.2	7.8	22.6	5.7	0.8	912.1
10:33:16	10.9	5.0	6.3	19.5	4.8	0.8	633.0
10:34:16	11.2	4.7	6.5	14.0	5.5	0.8	581.2
10:35:16	9.9	5.3	7.3	23.0	8.0	0.8	703.2
10:36:16	10.9	4.7	6.3	18.0	7.0	0.9	631.1
10:37:16	11.0	4.9	6.6	6.3	7.2	0.9	531.3
10:38:16	9.7	5.6	7.6	12.0	5.3	0.9	598.2
10:39:16	11.5	4.3	6.1	11.2	7.3	0.9	488.6
10:40:16	9.8	5.4	7.7	14.1	10.4	0.9	530.0
10:41:16	9.9	5.0	7.2	18.6	5.6	0.9	544.1
10:42:16	10.8	4.5	6.7	10.7	7.9	0.8	455.1
10:43:16	10.1	5.6	7.4	13.1	11.4	0.8	482.0
10:44:16	10.2	7.3	7.0	17.6	12.8	0.8	477.8
10:45:16	12.2	3.3	5.6	7.5	49.3	0.7	365.0
10:46:16	9.7	5.2	7.9	14.4	63.9	0.7	498.6
10:47:16	9.5	5.1	7.5	25.0	67.7	0.8	491.2
10:48:16	11.3	3.8	6.1	9.8	59.5	0.7	387.5
10:49:16	11.8	3.3	6.0	6.1	57.0	0.6	320.4
10:50:16	11.7	3.4	6.0	8.0	58.0	0.5	300.8
10:51:16	12.2	3.0	5.4	9.1	55.0	0.5	267.7
10:52:16	13.0	2.3	4.7	8.7	52.6	0.3	227.5
10:53:16	12.5	3.1	5.2	9.4	61.0	0.2	257.1
10:54:16	11.5	4.0	6.0	13.2	61.3	0.2	354.5
10:55:16	10.6	4.5	6.6	15.1	65.7	0.2	438.4
10:56:16	9.3	5.4	7.5	21.7	72.9	0.2	503.1
10:57:16	9.4	5.2	7.3	26.0	68.1	0.2	553.3
10:58:16	9.7	4.7	6.8	21.8	65.8	0.2	596.8
10:59:16	11.0	4.1	6.0	10.7	59.4	0.2	461.8
11:00:16	10.6	4.5	6.4	9.3	59.1	0.2	509.3
11:01:16	10.4	4.5	6.4	8.3	67.1	0.2	734.4
11:02:16	10.3	4.3	6.7	6.1	67.3	0.4	865.7
11:03:16	10.9	3.9	5.9	3.3	62.5	0.3	641.5
11:04:16	12.8	2.3	4.8	-0.9	57.1	0.4	483.6
11:05:16	9.4	5.0	7.9	2.8	65.4	0.5	743.4
11:06:16	8.3	5.6	8.4	14.6	71.0	0.6	935.3
11:07:16	10.6	3.9	6.4	9.4	64.8	0.6	706.8
11:08:16	11.5	3.3	6.0	2.3	60.0	0.7	654.9
11:09:16	9.1	5.1	8.1	7.4	69.0	0.8	1048.5
11:10:16	10.1	4.3	6.8	12.0	64.7	0.8	850.6
11:11:16	10.8	3.8	6.7	4.3	60.7	0.8	876.9
11:12:16	8.8	5.3	8.3	15.8	67.3	0.9	1017.3

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 09:30:30
File Name = c:\CEMDATA\112391.PRN Calibration File:c:\CEMDATA\ati1123.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:31:16	12.6	7.4	5.2	3.2	62.5	1.4	452.7
09:32:16	11.8	8.0	6.2	2.1	73.7	1.3	370.2
09:33:16	11.5	7.8	6.3	3.5	79.6	1.3	383.8
09:34:16	12.8	6.6	5.3	2.3	67.9	1.4	443.4
09:35:16	11.8	7.4	6.1	7.3	73.6	1.2	539.1
09:36:16	10.8	8.1	6.8	19.1	69.9	1.0	527.9
09:37:16	11.0	7.8	6.6	11.3	67.0	0.9	443.7
09:38:16	11.1	7.7	6.6	6.5	68.3	0.8	400.1
09:39:16	10.4	8.2	7.2	7.5	70.0	0.8	412.7
09:40:16	10.0	8.3	7.4	10.2	65.9	0.7	386.9
09:41:16	10.7	7.6	6.8	8.5	66.6	0.6	405.4
09:42:16	11.0	7.2	6.5	5.0	69.7	0.6	648.5
09:43:16	11.1	7.0	6.5	4.4	68.7	0.7	715.0
09:44:16	11.6	6.7	6.3	1.2	67.7	0.8	834.7
09:45:16	11.2	6.7	6.5	0.5	64.9	0.9	1085.3
09:46:16	11.5	6.3	6.2	-0.1	55.7	1.1	1048.3
09:47:16	11.9	5.9	5.7	-1.9	64.2	0.9	884.1
09:48:16	12.6	5.4	5.1	-2.9	61.9	1.1	745.9
09:49:16	13.0	4.9	4.9	-3.9	59.2	1.0	701.1
09:50:16	11.6	6.0	6.0	-0.8	58.0	0.8	753.2
09:51:16	10.9	6.9	7.0	3.3	58.7	0.7	656.0
09:52:16	10.7	7.2	7.0	7.4	58.4	0.5	551.3
09:53:16	11.5	6.5	6.4	3.7	63.1	0.6	463.1
09:54:16	10.9	7.0	6.8	1.4	69.8	0.5	395.5
09:55:16	10.1	7.8	7.0	2.7	68.2	0.3	369.9
09:56:16	10.8	7.3	6.3	2.1	67.5	0.2	329.9
09:57:16	10.6	7.5	6.9	1.7	60.5	0.4	319.3
09:58:16	9.9	8.0	7.0	4.7	73.3	0.3	305.7
09:59:16	11.1	7.1	6.1	1.4	70.9	0.2	251.1
10:00:16	11.1	7.0	6.2	0.5	67.9	0.3	268.1
10:01:16	10.7	7.4	6.7	3.0	63.9	0.4	338.0
10:02:16	10.1	8.0	7.4	4.0	70.6	0.5	411.9
10:03:16	10.6	7.5	6.6	1.9	70.8	0.7	403.6
10:04:16	12.2	6.5	5.8	-1.8	68.7	0.7	296.2
10:05:16	11.4	7.2	6.6	1.9	65.3	0.6	294.1
10:06:16	11.7	6.8	6.4	2.0	65.5	0.6	303.9
10:07:16	10.4	8.0	7.5	5.4	66.7	0.6	332.7
10:08:16	10.3	7.9	7.5	6.3	64.6	0.6	337.5
10:09:16	11.0	7.3	6.5	3.4	61.9	0.8	357.0
10:10:16	11.4	7.1	6.6	0.5	62.3	0.8	296.6
10:11:16	10.1	8.0	7.6	4.2	67.7	0.7	413.8
10:12:16	9.5	8.3	7.7	6.9	66.9	0.8	450.6
10:13:16	12.6	5.9	5.0	0.1	56.1	0.8	305.3
10:14:16	12.8	5.6	5.2	-3.1	61.0	0.9	259.4
10:15:16	10.8	7.0	6.7	0.0	70.3	0.9	360.1
10:16:16	10.5	6.9	6.9	2.3	66.3	0.9	511.1

RADIAN CORPORATION pt5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:45:30
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:45:30	14.0	-0.2	-0.5	29.1	43.4	4.6	160.7
21:45:40	13.9	-0.0	-0.1	29.8	43.1	4.8	171.5
21:45:55	14.3	0.3	4.1	29.5	43.2	4.8	161.1
21:46:10	15.2	-0.0	-0.7	25.9	40.2	4.8	126.2
21:46:25	16.0	0.2	-0.7	19.9	37.7	4.8	78.7
21:46:40	16.6	0.2	-0.7	14.6	35.4	4.7	58.5
21:46:55	16.8	0.3	-0.7	9.6	35.0	4.5	48.4
21:47:10	16.6	0.2	-0.7	7.2	36.2	4.4	48.5
21:47:25	16.1	0.2	-0.7	6.7	37.6	4.5	61.8
21:47:40	15.8	0.1	-0.7	7.8	38.7	4.6	82.7
21:47:55	15.7	-0.1	-0.7	9.6	38.6	4.7	103.7
21:48:10	15.6	-0.1	-0.7	11.0	38.9	4.7	106.2
21:48:25	15.5	-0.0	-1.1	11.5	39.8	4.7	109.8
21:48:40	15.3	-0.1	-0.7	12.1	39.8	4.7	113.0
21:48:55	15.3	-0.0	-0.6	12.4	39.6	4.7	117.0
21:49:10	15.1	-0.1	-0.6	12.5	39.7	4.8	118.0
21:49:25	15.1	-0.2	-0.6	13.1	50.8	4.9	121.2
21:49:40	15.1	-0.1	-0.6	13.3	66.1	4.9	122.9
21:49:55	15.1	-0.0	-0.6	13.8	65.3	4.8	122.6
21:50:10	14.9	-0.1	-0.6	14.0	57.6	4.8	123.8
21:50:25	14.8	-0.2	-0.6	14.2	51.0	4.8	127.0
21:50:40	14.8	-0.2	-0.6	14.3	47.0	4.8	127.3
Avg.=	15.3	-0.0	-0.4	15.1	43.9	4.7	109.6

RADIAN CORPORATION ot6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:51:07
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:51:10	15.2	-0.1	-0.5	13.4	42.2	5.0	129.1
21:51:25	15.5	-0.1	-0.7	12.6	40.8	5.0	124.6
21:51:40	15.7	-0.2	-0.7	11.8	39.9	5.0	120.7
21:51:55	15.9	-0.1	-0.7	10.8	38.6	5.1	116.8
21:52:10	16.2	-0.1	-0.7	10.1	37.1	5.1	112.6
21:52:25	16.4	-0.1	-0.7	9.4	36.1	5.1	108.3
21:52:40	16.6	-0.1	-0.7	8.5	35.6	5.2	102.6
21:52:55	16.8	-0.1	-0.7	7.6	35.0	5.2	95.6
21:53:10	17.0	-0.2	-0.8	6.7	34.9	5.2	88.6
21:53:25	17.2	-0.1	-0.8	5.9	34.7	5.2	81.8
21:53:40	17.4	-0.1	-0.8	5.4	34.9	5.3	76.9
21:53:55	17.6	-0.1	-0.8	4.9	34.7	5.4	71.7
21:54:10	17.7	-0.0	-0.8	4.7	34.4	5.4	63.2
21:54:25	17.8	-0.0	-0.8	3.7	34.3	5.4	58.4
21:54:40	17.9	0.1	-0.8	2.9	34.2	5.4	50.8
21:54:55	17.8	-0.1	-0.8	2.6	34.5	5.2	47.5
21:55:10	17.5	-0.0	-0.8	1.7	36.0	5.2	42.4
21:55:25	17.1	-0.0	-0.7	1.7	37.0	4.9	41.9
21:55:40	16.5	-0.0	-0.7	1.4	39.0	4.6	36.1
21:55:55	15.7	0.1	-0.6	1.2	40.6	4.6	33.1
Avg.=	16.8	-0.1	-0.7	6.3	36.7	5.1	80.1

RADIAN CORPORATION dt7

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 21:56:24
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:56:25	14.9	0.1	-0.5	2.6	42.1	4.4	40.2
21:56:40	14.7	0.0	-0.5	4.6	42.4	4.5	49.1
21:56:55	14.5	-0.3	-0.6	6.5	42.4	4.4	56.2
21:57:10	14.4	-0.1	-0.5	7.2	42.8	4.4	55.8
21:57:25	14.3	-0.0	-0.5	6.8	44.1	4.3	50.3
21:57:40	13.9	-0.1	-0.5	5.2	45.2	4.1	41.6
21:57:55	13.3	0.0	-0.4	4.1	45.3	4.2	33.6
21:58:10	12.9	-0.0	-0.3	3.8	44.9	4.1	34.4
21:58:25	12.7	-0.0	-0.3	5.0	45.3	4.1	32.6
21:58:40	12.4	-0.1	-0.2	7.1	45.7	4.1	35.3
21:58:55	12.4	0.1	-0.3	9.1	46.6	4.0	37.0
21:59:10	12.4	0.2	-0.2	10.7	48.3	4.1	38.2
21:59:25	12.2	0.0	-0.2	12.7	48.1	4.3	37.9
21:59:40	12.4	0.2	-0.3	13.2	47.1	4.5	38.5
21:59:55	13.4	0.1	-0.4	10.4	44.2	4.7	30.5
22:00:10	14.4	0.3	-0.5	6.9	41.2	4.8	23.4
22:00:25	15.1	0.5	-0.5	4.6	39.9	4.8	19.3
22:00:40	15.7	0.5	-0.6	3.2	38.3	4.8	16.0
22:00:55	16.2	0.4	-0.6	2.1	36.5	4.7	15.1
22:01:10	16.4	0.4	-0.6	1.9	36.2	4.6	15.7
22:01:25	16.3	0.3	-0.6	1.2	36.7	4.6	17.5
22:01:40	16.2	0.3	-0.6	1.1	37.3	4.6	19.9
Avg.=	14.1	0.1	-0.4	5.9	42.8	4.4	33.5

RADIAN CORPORATION ot8

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:02:02
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:02:10	15.7	0.3	-0.4	1.1	38.9	4.5	20.8
22:02:25	15.5	0.1	-0.6	1.0	39.9	4.4	24.4
22:02:40	15.0	0.1	-0.5	1.1	44.4	4.3	28.2
22:02:55	14.0	0.1	-0.4	1.3	49.5	4.2	28.9
22:03:10	13.3	0.1	-0.4	2.2	49.9	4.4	32.0
22:03:25	13.2	0.1	-0.3	3.7	49.5	4.5	38.0
22:03:40	13.4	0.2	-0.4	5.9	47.2	4.4	49.6
22:03:55	13.2	0.2	-0.4	8.9	47.0	4.5	59.8
22:04:10	13.1	0.1	-0.4	11.9	47.1	4.7	64.7
22:04:25	13.8	0.1	-0.5	13.4	45.7	4.9	58.1
22:04:40	14.8	0.3	-0.6	10.7	42.6	5.0	43.1
22:04:55	15.5	0.2	-0.6	7.4	40.2	4.9	31.1
22:05:10	15.9	0.2	-0.7	5.1	38.6	4.7	26.1
22:05:25	15.9	0.1	-0.7	3.7	38.7	4.6	25.8
22:05:40	15.6	0.2	-0.6	3.2	39.8	4.6	26.8
22:05:55	15.1	0.1	-0.6	4.2	42.4	4.5	38.0
22:06:10	14.6	0.0	-0.6	6.6	45.1	4.5	55.3
22:06:25	14.3	-0.1	-0.6	10.0	44.9	4.5	90.6
22:06:40	14.2	-0.1	-0.6	13.5	44.6	4.6	118.6
22:06:55	14.2	-0.2	-0.6	15.9	44.7	4.6	145.1
22:07:10	14.1	-0.2	-0.4	17.1	45.3	4.5	163.3
22:07:25	13.9	-0.2	-0.1	17.9	45.5	4.6	173.3
22:07:40	13.6	-0.1	-0.0	18.8	45.8	4.9	172.5
22:07:55	14.1	-0.1	-0.6	18.2	45.4	5.0	146.4
22:08:10	15.0	0.0	-0.6	15.6	44.5	5.1	102.5
Avg.=	14.4	0.1	-0.5	8.7	44.3	4.6	70.5

RADIAN CORPORATION ot 8 cont

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:08:47
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:08:48	16.0	0.2	-0.7	8.5	41.7	4.9	55.6
22:08:55	16.1	0.2	-0.4	5.1	42.1	4.4	40.5
22:09:10	15.6	0.1	-0.7	3.7	43.9	4.3	42.5
22:09:25	14.7	-0.0	-0.6	2.8	46.9	4.1	44.6
22:09:40	13.8	0.0	-0.5	2.6	50.4	4.1	43.0
22:09:55	13.1	-0.0	-0.4	3.9	51.8	4.0	46.4
22:10:10	12.9	0.0	-0.4	5.8	53.2	4.0	56.5
22:10:25	12.6	0.1	-0.4	8.0	54.9	4.1	59.6
22:10:40	12.4	0.1	-0.3	9.1	55.1	4.3	54.1
22:10:55	13.1	0.1	-0.4	8.2	51.7	4.4	48.2
22:11:10	14.2	0.2	-0.5	6.3	48.7	4.6	35.7
22:11:25	15.0	0.2	-0.6	4.9	46.6	4.5	28.6
22:11:40	15.5	0.1	-0.7	3.6	45.2	4.4	24.6
22:11:55	15.4	0.1	-0.7	2.5	48.6	4.2	22.6
22:12:10	15.0	0.1	-0.6	2.2	52.9	4.1	26.8
22:12:25	14.4	-0.0	-0.6	1.5	54.0	4.0	28.9
22:12:40	13.9	0.1	-0.5	1.4	54.3	4.0	26.2
22:12:55	13.5	0.1	-0.5	1.2	54.4	4.0	29.3
22:13:10	13.3	0.1	-0.5	1.2	54.9	4.0	29.1
22:13:25	13.1	0.1	-0.4	1.4	55.2	4.0	34.6
22:13:40	12.9	-0.0	-0.4	1.4	56.1	4.0	32.3
Avg.=	14.1	0.1	-0.5	4.1	50.6	4.2	38.6

RADIAN CORPORATION old probe

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:24:11
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:24:12	14.1	0.3	-0.5	1.0	55.3	66.0	15.6
22:24:25	13.3	0.3	-0.3	1.0	56.8	63.8	14.0
22:24:40	12.8	0.2	-0.3	1.2	57.9	62.6	15.6
22:24:55	12.2	0.5	-0.2	1.2	60.1	59.9	15.7
22:25:10	11.7	0.5	-0.2	1.1	62.7	60.9	14.9
22:25:25	12.1	0.4	-0.2	1.3	60.6	62.7	13.9
22:25:40	13.2	0.4	-0.4	1.4	57.3	64.4	15.4
22:25:55	14.1	0.6	-0.5	1.3	55.7	58.8	15.4
22:26:10	14.7	0.4	-0.6	1.3	54.1	34.6	12.8
22:26:25	15.1	0.4	-0.6	1.1	54.1	42.0	12.8
22:26:40	15.2	0.3	-0.6	1.3	53.1	43.8	11.7
22:26:55	14.7	0.3	-0.6	1.2	54.8	32.5	11.0
22:27:10	13.7	0.2	-0.5	1.1	58.3	30.2	10.9
22:27:25	12.9	0.2	-0.4	1.4	60.9	31.2	14.3
22:27:40	12.3	0.2	-0.3	1.3	63.7	33.3	14.2
22:27:55	12.2	0.3	-0.2	1.2	62.8	36.5	15.0
22:28:10	13.0	0.3	-0.4	1.0	58.8	40.0	14.0
22:28:25	14.0	0.4	-0.5	1.0	55.1	22.8	11.7
22:28:40	14.8	0.3	-0.6	1.3	52.2	23.0	12.8
22:28:55	15.3	0.3	-0.6	1.3	49.8	25.7	11.0
22:29:10	15.7	0.4	-0.6	1.1	47.1	29.1	11.7
22:29:25	15.5	0.3	-0.6	1.1	46.5	22.0	10.7
22:29:40	14.7	0.3	-0.6	1.1	48.0	16.7	12.3
Avg.=	13.8	0.3	-0.4	1.2	55.9	41.9	13.4

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 22:30:02
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\mto1119c.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:30:10	13.0	0.2	-0.1	1.0	53.0	19.5	15.2
22:30:25	12.5	0.3	-0.3	1.1	55.5	16.9	15.0
22:30:40	12.0	0.3	-0.2	1.6	56.5	10.8	15.8
22:30:55	11.7	0.3	-0.1	1.2	56.3	12.6	17.1
22:31:10	12.3	0.3	-0.2	1.1	52.6	14.7	16.2
22:31:25	13.5	0.3	-0.4	1.0	48.6	16.4	15.8
22:31:40	14.5	0.4	-0.5	1.3	45.9	18.3	14.9
22:31:55	15.2	0.4	-0.6	1.0	44.0	19.9	12.7
22:32:10	15.6	0.4	-0.6	0.9	42.6	21.2	11.5
22:32:25	15.2	0.3	-0.6	1.0	43.8	9.4	12.8
22:32:40	14.4	0.2	-0.5	1.1	47.0	9.8	13.6
22:32:55	13.6	0.2	-0.4	1.1	49.9	10.6	12.8
22:33:10	13.0	0.2	-0.3	0.9	51.8	7.6	13.9
22:33:25	12.8	0.3	-0.3	1.0	51.7	8.0	13.9
22:33:40	12.6	0.3	-0.3	1.2	51.7	9.2	15.2
22:33:55	13.1	0.3	-0.3	1.1	49.2	8.9	17.5
22:34:10	14.2	0.4	-0.5	1.0	45.8	9.5	16.5
22:34:25	15.0	0.3	-0.5	1.2	43.3	10.4	14.7
22:34:40	15.7	0.3	-0.6	0.7	41.6	11.5	15.2
22:34:55	16.0	0.3	-0.7	0.9	41.0	10.9	11.8
22:35:10	15.9	0.3	-0.6	1.0	42.0	8.1	12.9
22:35:25	15.4	0.2	-0.6	0.8	43.0	8.4	13.3
Avg.=	14.0	0.3	-0.4	1.1	48.0	12.4	14.5

RADIAN CORPORATION day 2 111991

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 15:51:05
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:51:06	14.3	-0.0	-1.6	7.2	48.1	1.0	5.1
15:52:04	13.7	-0.0	-1.5	7.0	50.8	1.0	5.9
15:53:04	15.4	0.1	-1.8	7.0	44.7	1.0	4.8
15:54:04	13.9	-0.0	-1.5	6.9	50.0	1.0	5.5
15:55:04	12.8	0.0	-1.3	7.0	49.6	1.0	6.1
15:56:04	14.7	0.2	-1.7	6.9	43.2	1.0	4.6
15:57:04	14.4	0.0	-1.6	6.9	45.5	1.0	5.2
15:58:04	13.5	-0.0	-1.5	6.9	45.9	1.0	6.6
15:59:04	14.1	0.1	-1.6	6.7	41.4	1.0	5.3
16:00:04	12.9	0.1	-1.3	6.7	43.9	0.9	5.7
16:01:04	14.0	0.1	-1.6	6.8	38.0	1.0	4.9
16:02:04	15.0	0.0	-1.7	6.6	36.7	1.0	5.6
16:03:04	13.7	-0.1	-1.5	6.4	42.7	1.0	5.9
16:04:04	13.0	0.0	-1.3	6.8	44.1	1.0	5.5
16:05:04	14.6	0.1	-1.7	6.7	39.7	0.9	4.9
16:06:04	14.0	0.0	-1.6	6.5	43.6	0.9	5.4
16:07:04	13.8	-0.1	-1.5	6.6	44.3	1.0	4.5
16:08:04	14.7	0.1	-1.7	6.5	43.3	0.9	4.1
16:09:04	13.1	-0.0	-1.4	6.7	49.1	0.9	5.8
16:10:04	14.2	0.0	-1.6	6.6	40.7	1.0	4.8
16:11:04	13.8	-0.1	-1.5	6.5	45.1	0.9	5.7
16:12:04	12.6	0.0	-1.2	6.6	48.7	1.0	5.1
16:13:04	14.9	0.1	-1.7	6.5	42.5	0.9	5.2
16:14:04	13.0	0.0	-1.3	6.6	50.3	0.9	4.8
16:15:04	11.9	0.4	-1.1	6.7	52.1	0.9	4.8
16:16:04	14.2	0.3	-1.6	6.7	45.1	0.9	4.3
16:17:04	14.5	0.1	-1.7	6.7	43.8	0.9	5.2
16:18:04	11.8	0.2	-1.0	6.7	52.3	0.9	5.3
16:19:04	13.5	0.3	-1.4	6.9	49.9	1.0	4.3
16:20:04	15.0	0.1	-1.7	6.8	43.9	1.0	4.8
16:21:04	12.8	0.1	-1.3	6.6	50.0	1.0	5.1
16:22:04	13.2	0.2	-1.4	6.9	48.6	1.0	5.1
16:23:04	15.1	0.2	-1.7	6.6	43.8	1.0	3.9
16:24:04	13.4	0.1	-1.4	6.8	50.1	1.0	4.8
16:25:04	14.0	0.1	-1.5	6.8	46.1	1.0	5.6
16:26:04	16.6	0.0	-1.9	6.7	36.8	1.1	4.6
16:27:04	15.8	-0.1	-1.7	6.8	39.5	1.1	7.4
16:28:04	12.9	-0.1	-1.3	6.7	50.1	1.1	6.3
16:29:04	13.2	-0.0	-1.4	6.8	48.3	1.1	6.1
16:30:04	15.4	0.2	-1.7	6.7	41.1	1.1	5.3
16:31:04	15.1	-0.0	-1.6	7.0	40.9	1.2	5.8
16:32:04	14.9	-0.1	-1.6	6.8	42.3	1.1	5.8
16:33:04	15.0	-0.1	-1.7	6.7	42.1	1.1	5.7
16:34:04	15.4	-0.1	-1.7	6.8	41.3	1.0	5.3
16:35:04	16.2	-0.1	-1.8	6.7	39.5	1.0	4.9
16:36:04	16.6	-0.2	-1.8	6.8	39.0	1.1	5.3

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:37:04	15.2	-0.1	-1.7	6.8	42.5	1.0	5.0
16:38:04	13.8	-0.2	-1.5	6.7	42.3	1.0	5.6
16:39:04	12.8	-0.1	-1.3	6.8	44.3	0.9	5.3
16:40:04	12.7	-0.2	-1.3	6.8	44.6	0.9	5.9
16:41:04	13.2	-0.1	-1.4	6.7	42.4	0.8	5.5
16:42:04	14.9	0.0	-1.7	6.6	39.7	0.7	5.7
16:43:04	13.5	-0.1	-1.5	6.7	45.2	0.7	5.2
16:44:04	13.1	-0.0	-1.4	6.6	47.1	0.7	6.4
16:45:04	14.8	-0.0	-1.7	6.7	42.6	0.7	5.5
16:46:04	14.3	-0.0	-1.6	6.6	44.6	0.7	6.0
16:47:04	13.1	-0.1	-1.4	6.6	48.8	0.7	6.8
16:48:04	14.8	0.1	-1.7	6.7	42.8	0.7	7.2
16:49:04	13.9	0.0	-1.6	6.7	47.2	0.6	6.3
16:50:04	13.0	0.1	-1.4	6.8	49.7	0.6	7.1
16:51:04	14.9	0.2	-1.7	6.7	46.2	0.6	5.9
16:52:04	12.8	0.2	-1.3	6.8	53.9	0.6	6.6
16:53:04	13.4	0.3	-1.5	7.0	48.4	0.6	6.1
16:54:04	14.8	0.1	-1.7	7.0	44.1	0.6	6.6
16:55:04	13.7	0.0	-1.6	6.9	49.4	0.6	7.8
16:56:04	13.8	0.0	-1.6	6.9	49.2	0.6	7.4
16:57:04	15.2	0.1	-1.8	6.8	43.2	0.6	7.2
16:58:04	14.3	0.0	-1.7	7.0	47.0	0.6	7.3
16:59:04	14.1	0.0	-1.6	7.0	46.0	0.6	8.3
17:00:04	15.0	0.0	-1.8	7.0	41.6	0.6	8.2
17:01:04	15.7	0.0	-1.9	7.0	40.8	0.6	7.5
17:02:04	15.4	-0.0	-1.8	7.1	41.8	0.6	9.4
17:03:04	14.9	-0.0	-1.8	7.1	43.8	0.6	9.2
17:04:04	14.4	-0.0	-1.7	7.3	50.0	0.6	9.0
17:05:04	14.1	0.2	-1.6	7.5	49.7	0.6	8.6
17:06:04	14.9	-0.0	-1.8	7.5	44.0	0.6	8.3
17:07:04	13.5	-0.0	-1.5	7.5	46.9	0.6	8.1
17:08:04	12.9	0.0	-1.4	7.8	51.8	0.6	8.5
17:09:04	13.7	0.0	-2.1	7.5	46.3	0.6	7.9
17:10:04	14.2	0.2	-1.7	7.6	45.1	0.5	7.5
17:11:04	13.4	0.0	-1.5	7.6	47.0	0.6	8.3
17:12:04	15.0	0.1	-1.8	7.6	43.3	0.6	7.8
17:13:04	14.6	0.1	-1.8	7.7	47.9	0.6	8.2
17:14:04	13.3	0.1	-1.5	7.8	49.1	0.6	8.7
17:15:04	14.1	0.2	-1.7	7.8	45.7	0.6	8.2
17:16:04	14.1	0.2	-1.7	7.9	47.7	0.6	8.1
17:17:04	13.0	0.2	-1.4	7.9	53.3	0.6	8.1
17:18:04	14.6	0.4	-1.7	8.0	50.6	0.6	7.3
17:19:04	12.0	2.6	-1.1	8.2	64.4	0.6	8.1
17:20:04	14.2	1.4	-1.6	8.7	72.5	0.6	6.9
17:21:04	14.3	0.5	-1.7	8.5	54.1	0.6	7.8
17:22:04	13.2	0.4	-1.5	8.3	55.4	0.6	8.0
17:23:04	14.9	0.5	-1.8	8.1	50.2	0.6	7.4
17:24:04	13.3	0.6	-1.5	8.2	53.7	0.6	8.1
17:25:04	13.5	0.5	-1.5	8.4	54.3	0.6	6.9
17:26:04	15.0	0.5	-1.8	8.4	49.5	0.5	7.3
17:27:04	12.9	0.4	-1.4	8.4	51.3	0.6	7.2
17:28:04	13.8	0.5	-1.6	8.2	51.0	0.6	7.2
17:29:04	15.0	0.4	-1.8	8.2	45.4	0.5	6.9
17:30:04	13.2	0.3	-1.5	8.3	48.8	0.5	7.8
17:31:04	13.1	0.4	-1.4	8.2	49.2	0.6	8.2
17:32:04	15.1	0.4	-1.8	8.1	43.2	0.5	6.8

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:33:04	13.7	0.3	-1.6	8.1	47.9	0.5	8.1
17:34:04	13.7	0.3	-1.6	8.2	46.1	0.6	8.6
17:35:04	15.4	0.3	-1.9	8.1	42.0	0.6	7.9
17:36:04	14.2	0.2	-1.7	8.1	44.9	0.6	9.0
17:37:04	14.3	0.2	-1.8	8.4	43.5	0.6	10.0
17:38:04	15.4	0.2	-1.9	8.2	41.0	0.7	9.6
17:39:04	13.7	0.2	-1.6	8.5	48.6	0.7	9.7
17:40:04	14.4	0.1	-1.7	8.5	43.2	0.7	9.4
17:41:04	16.0	0.2	-2.0	8.4	39.3	0.7	8.5
17:42:04	15.7	0.1	-1.9	8.6	44.5	0.7	9.7
17:43:04	14.3	0.2	-1.7	8.8	51.3	0.7	10.0
17:44:04	13.7	0.2	-1.6	8.8	55.4	0.6	9.6
17:45:04	14.5	0.3	-1.7	9.1	74.9	0.6	8.8
17:46:04	14.3	0.2	-1.7	9.1	63.9	0.6	9.2
17:47:04	14.0	0.2	-1.7	8.9	65.4	0.6	8.8
17:48:04	15.0	0.1	-1.8	9.1	73.3	0.6	8.5
17:49:04	14.9	0.2	-1.8	8.8	59.8	0.6	8.0
17:50:04	13.3	0.1	-1.5	8.6	54.6	0.6	8.4
17:51:04	12.6	0.2	-1.3	8.8	58.3	0.6	8.5
17:52:04	15.2	0.2	-1.9	8.7	51.8	0.6	8.3
17:53:04	14.5	0.2	-1.8	8.6	45.4	0.7	7.9
17:54:04	12.4	2.4	-1.3	8.7	52.6	0.7	8.3
17:55:04	15.0	1.6	-1.9	8.9	41.4	0.7	8.2
17:56:04	15.6	0.3	-1.9	8.7	40.2	0.7	7.2
17:57:04	14.1	0.1	-1.7	8.8	47.7	0.6	7.7
17:58:04	15.6	0.2	-1.9	8.8	42.5	0.6	8.2
17:59:04	15.1	0.2	-1.8	8.5	44.6	0.5	8.3
18:00:04	14.0	0.2	-1.6	8.7	46.7	0.5	8.2
18:01:04	13.0	0.3	-1.4	8.7	50.3	0.6	7.6
18:02:04	15.3	0.3	-1.8	8.9	45.0	0.5	7.0
18:03:04	14.8	0.2	-1.8	8.8	46.9	0.5	7.5
18:04:04	13.6	0.2	-1.5	8.8	50.1	0.5	7.8
18:05:04	14.6	0.1	-1.7	8.9	46.8	0.6	7.3
18:06:04	14.9	0.2	-1.8	8.7	47.9	0.5	7.7
18:07:04	12.7	0.2	-1.4	8.8	53.4	0.5	8.4
18:08:04	13.3	0.3	-1.5	8.9	50.4	0.6	7.4
18:09:04	15.0	0.3	-1.9	8.9	47.7	0.6	7.0
18:10:04	12.3	0.3	-1.3	8.8	53.5	0.6	8.6
18:11:04	14.0	0.3	-1.7	9.0	48.6	0.6	7.5
18:12:04	15.3	0.3	-1.9	8.9	44.8	0.6	7.4
18:13:04	12.1	0.3	-1.2	9.0	54.5	0.6	8.0
18:14:04	13.8	0.3	-1.6	9.1	49.4	0.6	8.4
18:15:04	14.6	0.3	-1.7	9.2	46.7	0.5	6.9
18:16:04	12.0	0.3	-1.1	9.2	52.5	0.5	8.1
18:17:04	14.5	0.3	-1.7	9.1	45.8	[illegible].5	7.0
18:18:04	13.5	0.3	-1.5	9.1	52.3	[illegible].5	7.5
18:19:04	12.5	0.3	-1.2	9.1	52.1	0.5	8.4
18:20:04	15.7	0.3	-1.9	9.0	39.2	0.4	7.0
18:21:04	14.6	0.2	-1.8	8.9	41.4	0.5	8.2
18:22:04	13.3	0.1	-1.5	8.9	46.0	0.5	8.5
18:23:04	12.7	0.2	-1.4	8.8	50.2	0.6	8.5
18:24:04	14.3	0.3	-1.7	9.1	47.8	0.6	7.3
18:25:04	15.0	0.3	-1.9	9.1	41.8	0.6	6.9
18:26:04	12.9	0.2	-1.5	9.3	47.9	0.6	8.4
18:27:04	13.8	0.2	-1.6	9.5	43.8	0.7	8.8
18:28:04	15.9	0.3	-2.0	9.5	35.4	0.6	8.0

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
18:29:04	14.8	0.1	-1.8	9.3	35.6	0.6	8.9
18:30:04	13.7	0.1	-1.6	9.3	40.8	0.6	9.5
18:31:04	15.2	0.2	-1.8	9.2	36.5	0.6	9.5
18:32:04	15.8	0.2	-1.9	9.0	37.3	0.6	8.9
18:33:04	14.6	0.1	-1.8	9.0	42.1	0.6	10.9
18:34:04	14.2	0.2	-1.7	8.8	43.3	0.6	11.7
18:35:04	14.5	0.1	-1.8	8.8	41.9	0.6	13.1
18:36:04	15.4	0.0	-1.9	8.8	39.7	0.6	14.5
18:37:04	16.2	-0.0	-2.0	8.9	38.1	0.7	14.8
18:38:04	16.5	0.0	-2.0	8.6	38.4	0.7	14.6
18:39:04	16.5	0.0	-2.0	8.6	39.5	0.7	13.8
18:40:04	15.3	-0.0	-1.9	8.8	43.7	0.7	12.6
18:41:04	14.2	0.0	-1.7	8.9	44.7	0.7	11.4
18:42:04	13.8	0.1	-1.6	8.8	49.4	0.7	11.3
18:43:04	13.1	0.1	-1.4	9.1	48.1	0.6	12.1
18:44:04	11.9	0.1	-1.1	9.2	46.4	0.6	12.7
18:45:04	13.2	0.3	-1.4	9.2	39.9	0.6	9.9
18:46:04	15.5	0.2	-1.8	8.5	36.4	0.6	8.5
18:47:04	14.1	0.1	-1.6	8.8	42.8	0.5	9.4
18:48:04	13.5	-0.0	-1.5	8.8	43.7	0.6	9.9
18:49:04	14.4	0.0	-1.7	8.7	38.4	0.6	9.7
18:50:04	15.2	0.1	-1.8	8.5	37.6	0.6	8.6
18:51:04	13.6	0.0	-1.6	8.6	42.1	0.6	10.0
18:52:04	12.5	0.1	-1.3	8.4	46.7	0.6	8.6
18:53:04	15.1	0.1	-1.8	8.6	41.1	0.6	8.3
18:54:04	14.7	0.1	-1.8	8.8	44.3	0.6	8.8
18:55:04	13.6	0.1	-1.6	8.8	46.6	0.7	9.3
18:56:04	13.3	0.1	-1.5	9.0	47.9	0.7	9.7
18:57:04	15.1	0.1	-1.8	8.7	43.1	0.6	8.4
18:58:04	13.2	0.2	-1.5	8.6	47.9	0.6	8.6
18:59:04	12.8	0.2	-1.3	8.8	48.1	0.6	8.8
19:00:04	14.7	0.2	-1.7	8.7	43.3	0.6	8.0
19:01:04	11.4	2.9	-1.0	8.8	52.6	0.5	8.0
19:02:04	13.6	2.9	-1.5	8.6	45.0	0.6	7.6
19:03:04	15.2	0.3	-1.8	8.7	40.6	0.4	7.7
19:04:04	14.0	0.2	-1.6	8.6	45.9	0.5	7.9
19:05:04	12.9	0.2	-1.3	8.9	51.8	0.6	7.8
19:06:04	15.1	0.3	-1.8	8.6	45.3	0.6	7.0
19:07:04	14.8	0.2	-1.8	8.5	46.3	0.5	8.6
19:08:04	12.7	0.3	-1.4	8.6	49.8	0.6	8.2
19:09:04	15.2	0.3	-1.9	8.7	39.7	0.6	7.6
19:10:04	14.5	0.2	-1.8	8.7	42.4	0.6	8.7
19:11:04	13.1	0.1	-1.5	8.8	47.5	0.6	8.7
19:12:04	15.3	0.2	-1.9	9.0	39.9	0.6	8.7
19:13:04	14.2	0.1	-1.7	9.0	45.2	0.6	8.9
19:14:04	12.5	0.3	-1.3	9.1	50.5	0.6	8.1
19:15:04	15.0	0.3	-1.8	9.1	46.2	0.6	7.3
19:16:04	14.8	0.2	-1.8	9.1	47.1	0.5	8.0
19:17:04	13.3	0.2	-1.5	8.9	48.8	0.5	8.0
19:18:04	14.8	0.2	-1.7	8.8	40.2	0.6	8.4
19:19:04	15.0	0.2	-1.8	8.7	41.1	0.4	8.4
19:20:04	12.7	0.2	-1.3	8.7	49.2	0.5	8.6
19:21:04	13.3	0.4	-1.5	8.8	46.3	0.5	8.6
19:22:04	15.3	0.3	-1.8	8.4	41.3	0.5	7.8
19:23:04	12.9	0.3	-1.4	8.6	48.7	0.5	9.5
19:24:04	13.7	0.3	-1.6	8.9	43.9	0.6	8.6

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
19:25:04	14.8	0.4	-1.8	8.9	42.4	0.6	8.7
19:26:04	12.3	0.4	-1.2	8.7	51.4	0.6	9.7
19:27:04	13.6	0.6	-1.6	8.7	47.6	0.6	8.4
19:28:04	15.4	0.4	-1.9	8.7	41.8	0.6	7.9
19:29:04	13.0	0.3	-1.4	8.6	50.3	0.5	8.7
19:30:04	13.4	0.5	-1.5	8.7	48.4	0.6	8.2
19:31:04	15.6	0.5	-1.9	8.6	39.7	0.6	7.7
19:32:04	13.3	0.7	-1.5	8.8	46.5	0.5	8.6
19:33:04	12.4	14.1	-1.0	11.8	45.8	0.5	8.2
19:34:04	15.4	2.1	-1.9	10.4	38.0	0.5	7.5
19:35:04	13.6	0.6	-1.5	12.6	45.4	0.3	8.5
19:36:04	14.3	0.5	-1.7	22.6	42.4	0.6	10.2
19:37:04	15.8	0.4	-1.9	12.4	37.2	0.6	9.4
19:38:04	13.6	0.3	-1.6	10.1	43.0	0.5	10.5
19:39:04	13.9	0.4	-1.6	13.2	41.3	0.6	10.8
19:40:04	15.9	0.4	-2.0	10.4	34.8	0.6	8.6
19:41:04	14.3	0.2	-1.7	9.0	41.3	0.6	9.7
19:42:04	13.3	0.3	-1.5	8.8	45.2	0.6	9.9
19:43:04	15.7	0.4	-1.9	8.8	36.3	0.6	9.5
19:44:04	15.7	0.2	-1.9	8.7	38.8	0.6	8.5
19:45:04	13.9	0.3	-1.6	9.9	46.4	0.6	10.0
19:46:04	13.4	0.2	-1.5	18.2	47.8	0.6	11.4
19:47:04	15.5	0.3	-1.8	17.5	38.8	0.6	10.0
19:48:04	14.8	0.2	-1.7	11.2	44.2	0.5	10.3
19:49:04	12.9	0.2	-1.4	25.8	48.8	0.5	12.4
19:50:04	14.5	0.4	-1.7	31.5	42.4	0.6	12.0
19:51:04	15.0	0.2	-1.8	16.6	40.4	0.6	10.9
19:52:04	13.5	0.2	-1.5	48.1	41.3	0.7	16.5
19:53:04	13.4	0.3	-1.7	49.1	44.7	0.7	19.3
19:54:04	15.4	0.3	-1.9	17.9	41.1	0.6	11.7
19:55:04	13.9	0.2	-1.6	11.3	44.2	0.6	11.9
19:56:04	13.3	0.1	-1.5	9.7	44.3	0.6	12.7
19:57:04	14.4	0.2	-1.7	9.1	41.0	0.7	10.9
19:58:04	15.5	0.2	-1.9	8.9	37.5	0.6	10.4
19:59:04	14.8	0.0	-1.8	8.7	38.5	0.6	12.0
20:00:04	14.0	0.1	-1.6	8.8	42.5	0.6	14.7
20:01:04	13.6	0.1	-1.6	9.1	42.6	0.6	13.4
20:02:04	15.8	0.2	-1.9	9.1	38.2	0.6	10.4
20:03:04	14.9	0.1	-1.8	9.3	41.1	0.5	10.8
20:04:04	14.3	0.0	-1.7	17.9	43.0	0.6	14.5
20:05:04	12.9	0.1	-1.4	30.9	43.4	0.6	17.0
20:06:04	14.0	0.1	-1.6	28.6	44.9	0.6	15.6
20:07:04	15.0	0.2	-1.8	14.8	54.2	0.5	12.0
20:08:04	12.6	0.1	-1.3	22.7	48.6	0.6	15.8
20:09:04	13.7	0.2	-2.0	23.1	51.5	0.7	14.8
20:10:04	14.7	0.2	-1.8	13.0	60.1	0.6	10.9
20:11:04	13.0	0.2	-1.4	10.0	48.2	0.6	12.3
20:12:04	14.2	0.2	-1.7	9.6	60.0	0.7	11.1
20:13:04	15.6	0.2	-1.9	9.6	49.5	0.6	10.1
20:14:04	14.1	0.1	-1.7	9.1	45.8	0.7	10.8
20:15:04	12.3	0.2	-1.2	9.0	47.6	0.6	10.6
20:16:04	13.6	0.3	-1.5	9.1	48.2	0.6	9.0
20:17:04	15.0	0.3	-1.8	9.0	42.2	0.6	7.6
20:18:04	12.8	0.2	-1.3	8.8	43.7	0.5	9.5
20:19:04	13.7	0.3	-1.5	8.8	42.0	0.6	8.2
20:20:04	14.8	0.3	-1.8	8.6	40.9	0.5	7.9

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
20:21:04	13.4	0.3	-1.5	8.7	43.6	0.5	8.9
20:22:04	13.4	0.2	-1.5	8.7	44.2	0.6	10.3
20:23:04	15.2	0.4	-1.8	8.6	40.3	0.6	8.7
20:24:04	13.8	0.2	-1.6	8.7	43.6	0.6	10.7
20:25:04	13.9	0.3	-1.6	8.7	42.7	0.7	10.7
20:26:04	15.4	0.3	-1.9	8.7	39.3	0.6	9.8
20:27:04	14.2	0.3	-1.7	8.7	42.9	0.6	11.1
20:28:04	12.9	0.4	-1.4	8.9	47.0	0.6	12.2
20:29:04	13.8	0.4	-1.6	8.8	43.9	0.7	12.4
20:30:04	14.3	0.5	-1.7	9.0	43.7	0.6	10.3
20:31:04	12.6	0.5	-1.3	8.9	46.3	0.6	10.4
20:32:04	14.6	0.4	-1.7	9.0	43.0	0.6	9.6
20:33:04	14.7	0.3	-1.7	9.0	43.2	0.5	8.9
20:34:04	14.0	0.3	-1.6	9.0	43.3	0.5	11.1
20:35:04	13.9	0.2	-1.6	8.9	43.6	0.6	14.3
20:36:04	14.2	0.2	-1.7	8.8	42.7	0.6	16.2
20:37:04	14.2	0.2	-1.7	8.8	45.0	0.6	15.0
20:38:04	14.6	0.1	-1.7	8.9	44.0	0.7	15.1
20:39:04	14.6	0.2	-1.7	8.9	43.0	0.7	13.9
20:40:04	14.8	0.1	-1.8	8.9	42.6	0.7	13.2
20:41:04	15.0	0.1	-1.8	8.7	40.2	0.8	13.1
20:42:04	14.5	0.1	-1.7	9.1	41.5	0.6	11.5
20:43:04	13.9	0.0	-1.6	9.5	43.5	0.0	11.9
20:44:04	14.5	0.0	-1.7	9.2	39.3	0.4	11.2
20:45:04	15.4	0.2	-1.8	9.3	36.5	0.4	9.8
20:46:04	14.6	0.1	-1.6	9.3	38.9	0.3	10.3
20:47:04	13.3	0.1	-1.4	9.4	41.4	0.3	9.9
20:48:04	13.2	0.1	-1.4	9.6	42.2	0.3	9.9
20:49:04	15.2	0.2	-1.6	9.8	38.3	0.3	8.7
20:50:04	14.7	0.1	-1.6	9.6	41.2	0.3	9.3
20:51:04	14.1	0.1	-1.5	9.8	44.9	0.3	9.3
20:52:04	13.2	0.1	-1.3	9.8	44.6	0.3	9.4
20:53:04	14.7	0.2	-1.6	9.6	40.4	0.4	9.1
20:54:04	14.6	0.2	-1.6	9.7	42.4	0.3	8.9
20:55:04	13.9	0.0	-1.5	9.6	45.3	0.3	9.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:30:01
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120B.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:30:02	13.9	-0.1	4.9	-2.2	43.4	2.3	1.7
12:30:55	11.8	-0.2	6.6	-2.1	47.4	2.0	3.7
12:31:55	13.6	-0.1	4.7	-2.2	40.2	2.1	3.7
12:32:55	13.2	-0.1	5.8	-2.0	43.3	1.8	3.9
12:33:55	12.3	-0.3	6.2	-1.7	45.7	1.8	3.9
12:34:55	14.4	-0.4	4.2	-1.6	41.0	2.0	3.3
12:35:55	13.0	-0.4	5.9	-1.4	51.8	1.5	3.6
12:36:55	11.9	-0.3	6.3	-1.4	56.2	1.6	3.5
12:37:55	14.2	-0.2	4.3	-1.5	45.9	1.7	2.1
12:38:55	11.9	0.3	7.0	-1.8	54.7	1.5	2.8
12:39:55	12.3	2.4	5.9	-1.6	46.5	1.5	2.1
12:40:55	13.6	-0.2	5.3	-1.9	43.7	1.4	1.6
12:41:55	11.7	-0.2	6.9	-2.1	52.8	1.3	2.6
12:42:55	13.4	-0.0	5.0	-2.1	46.5	1.4	2.2
12:43:55	13.4	-0.2	5.6	-2.0	47.8	1.0	2.2
12:44:55	12.1	-0.1	6.4	-1.9	55.3	0.9	2.8
12:45:55	14.2	-0.1	4.4	-1.3	53.8	1.3	2.2
12:46:55	14.1	-0.3	5.2	-0.7	49.8	0.9	2.7
12:47:55	11.7	-0.1	7.0	-0.1	54.8	0.8	3.8
12:48:55	14.4	-0.0	4.3	-0.3	41.7	1.1	2.4
12:49:55	13.7	1.3	5.6	-0.6	47.1	0.8	3.2
12:50:55	12.3	21.2	6.0	-0.9	53.1	0.9	3.8
12:51:55	14.9	1.0	4.0	-1.5	40.4	0.9	3.0
12:52:55	13.4	-0.3	5.7	-1.5	47.2	0.5	4.1
12:53:55	12.1	-0.2	6.4	-1.8	50.7	0.7	3.3
12:54:55	14.4	-0.1	4.3	-2.1	42.5	0.8	2.0
12:55:55	12.4	-0.1	6.7	-2.1	57.7	0.4	2.7
12:56:55	12.3	0.1	6.0	-2.0	58.1	0.5	2.8
12:57:55	14.4	-0.1	4.3	-2.1	47.8	0.7	2.4
12:58:55	13.2	-0.3	5.8	-2.2	52.9	0.4	2.1
12:59:55	12.9	-0.3	5.5	-2.3	51.5	0.5	2.5
13:00:55	14.8	-0.3	4.1	-2.5	43.6	0.5	2.4
13:01:55	13.3	-0.4	5.6	-2.4	47.4	0.2	2.0
13:02:55	13.0	-0.4	5.4	-2.5	47.5	0.3	3.6
13:03:55	14.8	-0.3	4.1	-2.6	41.3	0.3	3.6
13:04:55	14.0	-0.4	4.9	-2.6	41.7	0.2	4.2
13:05:55	14.2	-0.5	4.6	-2.5	41.1	0.3	4.0
13:06:55	14.5	-0.5	4.4	-2.4	41.7	0.4	3.2
13:07:55	13.4	-0.6	5.7	-2.4	44.0	0.4	4.1
13:08:55	12.8	-0.5	5.9	-2.4	43.6	0.6	4.0
13:09:55	14.4	-0.4	4.4	-2.5	47.4	0.7	2.7
13:10:55	14.1	-0.4	4.8	-2.5	53.8	0.4	3.2
13:11:55	14.3	-0.5	4.5	-2.5	51.1	0.4	2.7
13:12:55	14.5	-0.5	4.4	-2.5	49.9	0.2	2.4
13:13:55	13.5	-0.5	5.4	-2.3	48.6	0.1	3.3
13:14:55	13.9	-0.6	4.7	-2.2	45.2	0.1	3.3

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:15:55	13.9	-0.6	5.1	-2.4	43.8	0.1	3.9
13:16:55	12.5	-0.5	6.1	-2.0	45.6	-0.0	6.3
13:17:55	13.1	-0.5	5.3	-1.0	44.3	0.2	7.9
13:18:55	14.7	-0.4	4.0	-2.3	39.4	0.1	4.3
13:19:55	14.6	-0.5	4.1	-2.5	41.6	0.1	5.0
13:20:55	14.4	-0.5	4.3	-2.5	41.6	-0.1	4.2
13:21:55	14.5	-0.5	4.2	-2.6	40.3	-0.0	3.7
13:22:55	14.4	-0.5	4.4	-2.8	40.6	-0.1	4.5
13:23:55	13.9	-0.6	5.1	-3.4	42.2	-0.0	6.0
13:24:55	13.6	-0.5	5.6	-4.2	42.4	-0.1	5.3
13:25:55	13.9	-0.6	5.1	-4.1	43.5	-0.1	4.7
13:26:55	14.8	-0.6	4.2	-4.1	44.5	-0.0	4.4
13:27:55	14.7	-0.6	4.6	-4.0	50.8	-0.0	4.0
13:28:55	13.7	-0.6	5.6	-4.0	49.9	-0.1	3.8
13:29:55	13.1	-0.6	6.0	-4.1	47.4	0.1	3.5
13:30:55	13.0	-0.5	6.0	-3.8	50.9	-0.0	4.5
13:31:55	12.4	-0.6	6.5	-2.8	47.1	0.2	4.1
13:32:55	13.2	-0.5	5.3	-2.2	45.4	0.3	3.3
13:33:55	13.3	-0.5	5.9	-2.4	46.6	0.0	3.2
13:34:55	12.5	-0.5	6.1	-2.7	45.4	0.1	4.2
13:35:55	14.2	-0.4	4.7	-3.0	40.3	0.2	2.6
13:36:55	13.3	-0.6	5.8	-3.1	44.9	0.0	2.6
13:37:55	12.9	-0.6	5.9	-3.3	47.0	0.0	3.5
13:38:55	14.2	-0.4	4.5	-3.1	42.4	0.1	2.2
13:39:55	12.7	-0.4	6.2	-3.1	47.3	0.0	2.4
13:40:55	13.1	-0.4	5.2	-3.2	42.9	0.1	2.8
13:41:55	14.2	-0.3	4.8	-3.3	40.9	-0.1	2.3
13:42:55	11.6	-0.2	7.1	-3.5	49.8	-0.1	2.8
13:43:55	13.7	-0.1	4.8	-3.3	41.5	0.1	2.2
13:44:55	13.2	-0.3	5.9	-3.7	47.0	-0.1	2.3
13:45:55	12.9	-0.2	5.5	-3.6	48.5	0.1	3.1
13:46:55	13.6	-0.1	5.5	-3.6	52.6	-0.0	1.2
13:47:55	10.5	61.9	8.2	-3.1	62.4	4.0	1.5
13:48:55	13.2	41.7	5.4	-3.6	54.6	0.1	1.2
13:49:55	14.3	1.0	4.6	-3.8	46.6	-0.1	0.9
13:50:55	13.1	0.0	6.2	-3.7	52.2	-0.1	1.8
13:51:55	13.5	0.0	5.1	-3.7	49.9	-0.1	2.3
13:52:55	14.2	-0.0	5.1	-3.7	46.5	-0.2	2.4
13:53:55	11.7	0.1	7.2	-3.7	58.4	-0.3	3.7
13:54:55	13.9	0.3	4.7	-3.5	46.3	0.0	1.8
13:55:55	14.6	0.1	4.6	-3.7	42.7	-0.2	2.5
13:56:55	12.6	-0.1	6.4	-3.7	52.8	-0.2	3.4
13:57:55	14.1	0.1	4.5	-3.6	44.0	-0.0	3.1
13:58:55	14.6	-0.0	4.7	-3.8	41.6	-0.2	3.8
13:59:55	12.9	-0.1	5.9	-3.8	48.6	-0.1	3.5
14:00:55	15.4	-0.1	3.4	-3.7	35.1	0.2	2.5
14:01:55	14.9	-0.2	4.3	-3.9	38.7	-0.1	3.1
14:02:55	14.1	-0.2	4.8	-3.7	42.6	-0.2	3.0
14:03:55	13.9	-0.3	5.0	-3.5	43.7	-0.1	2.9
14:04:55	13.9	-0.4	5.0	-3.4	43.2	-0.1	2.3
14:05:55	14.3	-0.4	4.5	-3.1	40.9	0.1	2.6
14:06:55	15.1	-0.4	3.9	-3.0	39.0	0.2	2.6
14:07:55	15.3	-0.4	3.8	-3.2	40.4	0.2	2.7
14:08:55	14.7	-0.5	4.3	-3.4	44.4	0.1	2.8
14:09:55	14.0	-0.4	4.9	-3.6	49.6	-0.0	2.5
14:10:55	13.5	-0.4	5.2	-3.7	47.6	-0.0	2.8

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:11:55	13.1	-0.5	5.4	-3.8	47.9	-0.1	3.4
14:12:55	12.9	-0.5	5.6	-3.9	50.6	-0.1	3.3
14:13:55	11.9	-0.6	6.5	-4.1	51.7	-0.1	3.5
14:14:55	13.4	-0.4	4.8	-3.8	44.1	0.1	2.3
14:15:55	13.7	-0.4	5.2	-4.0	45.3	-0.1	1.8
14:16:55	12.6	-0.5	5.9	-3.8	47.6	-0.2	2.3
14:17:55	14.1	-0.4	4.3	-3.9	43.1	0.0	1.5
14:18:55	14.3	-0.5	4.6	-3.9	44.0	-0.1	2.3
14:19:55	14.1	-0.5	4.7	-4.0	44.1	0.0	2.6
14:20:55	14.4	-0.5	4.3	-4.0	43.1	0.1	2.3
14:21:55	14.9	-0.5	3.9	-4.0	41.8	0.2	1.9
14:22:55	15.6	-0.5	3.4	-4.0	39.0	0.2	1.7
14:23:55	16.0	-0.5	3.2	-4.1	37.5	0.1	1.7
14:24:55	15.1	-0.5	3.8	-4.0	39.4	0.1	2.1
14:25:55	13.7	-0.5	4.9	-3.9	43.8	-0.0	1.7
14:26:55	11.9	-0.5	6.4	-3.9	48.7	-0.1	2.2
14:27:55	12.0	-0.4	6.0	-3.9	50.3	-0.2	2.3
14:28:55	11.8	-0.4	6.4	-4.0	45.3	-0.0	1.6
14:29:55	13.9	-0.3	4.7	-4.1	41.4	-0.0	2.2
14:30:55	12.5	-0.4	6.4	-3.9	49.1	-0.2	2.6
14:31:55	13.0	-0.4	5.4	-4.0	47.6	0.1	2.7
14:32:55	14.6	-0.3	4.3	-4.0	41.9	0.0	2.7
14:33:55	12.4	-0.4	6.6	-3.7	51.8	-0.2	3.6
14:34:55	12.8	-0.3	5.6	-4.0	47.4	-0.0	2.7
14:35:55	14.2	-0.2	4.7	-4.2	42.0	-0.2	2.6
14:36:55	13.5	-0.4	5.5	-4.2	44.5	-0.1	2.1
14:37:55	13.6	-0.5	5.4	-4.0	45.7	-0.1	2.8
14:38:55	13.4	-0.4	5.6	-4.0	47.3	-0.1	2.2
14:39:55	14.0	-0.4	4.7	-4.0	44.6	0.1	2.6
14:40:55	13.8	-0.3	5.2	-4.3	43.8	-0.3	2.4
14:41:55	13.7	-0.4	5.3	-4.4	44.5	-0.2	3.7
14:42:55	13.9	-0.4	5.1	-4.1	45.8	-0.2	2.8
14:43:55	13.7	-0.5	5.3	-4.2	46.3	-0.1	4.0
14:44:55	14.4	-0.5	4.4	-4.2	43.7	0.0	2.8
14:45:55	14.8	-0.6	4.2	-4.3	42.4	0.2	2.9
14:46:55	13.9	-0.5	5.1	-4.4	47.3	0.1	1.4
14:47:55	12.7	-0.6	6.1	-4.2	50.5	0.1	2.3
14:48:55	11.9	-0.6	6.4	-4.4	51.8	0.1	2.4
14:49:55	13.7	-0.4	4.7	-4.4	46.3	0.4	2.3
14:50:55	14.0	-0.4	5.0	-4.2	41.7	0.3	2.3
14:51:55	11.9	30.4	7.2	-2.3	40.0	-26.8	1.7
14:52:55	9.5	92.7	9.1	11.4	36.7	-59.3	2.9
14:53:55	8.2	103.2	10.1	16.5	32.8	-90.2	3.2
14:54:55	8.1	102.9	10.0	8.8	31.1	-86.0	1.6
14:55:55	11.9	100.1	7.1	2.4	29.1	11.3	0.2
14:56:55	13.7	100.1	5.4	-1.5	29.5	18.1	-0.2
14:57:55	13.6	91.2	5.5	-2.8	27.2	8.2	0.7
14:58:55	14.6	30.4	4.9	-3.5	23.5	3.3	2.7
14:59:55	14.1	8.8	5.2	-2.9	23.2	1.5	3.6
15:00:55	16.4	4.5	3.5	-1.4	24.8	1.3	11.1
15:01:55	17.2	20.2	3.0	0.2	26.4	1.1	41.6
15:02:55	16.7	12.6	3.3	1.8	28.9	1.2	65.4
15:03:55	16.6	1.9	3.1	5.1	33.1	1.1	70.0
15:04:55	15.0	0.1	4.2	7.0	35.6	1.0	59.4
15:05:55	13.8	0.0	4.7	6.6	43.4	0.9	38.8
15:06:55	13.8	-0.2	4.5	5.2	48.0	0.7	29.4

Purge

THC FLAME OUT

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11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:07:55	13.7	-0.2	4.4	2.4	51.4	0.6	24.1
15:08:55	14.0	-0.3	4.2	-0.1	49.0	0.6	19.0
15:09:55	14.3	-0.3	3.9	-1.7	46.7	0.4	15.3
15:10:55	14.4	-0.4	3.8	-2.6	46.2	0.4	12.3
15:11:55	14.5	-0.3	3.7	-3.3	46.0	0.3	10.3
15:12:55	14.5	-0.2	3.7	-3.6	45.6	0.3	8.6
15:13:55	14.4	-0.3	3.7	-4.2	44.6	0.3	8.8
15:14:55	14.4	-0.3	3.7	-3.9	43.0	0.2	7.7
15:15:55	14.2	-0.3	3.7	-4.3	43.8	0.2	6.6
15:16:55	14.0	-0.3	3.8	-4.4	44.3	0.1	6.4
15:17:55	14.3	-0.3	3.7	-4.6	43.1	1.3	4.9
Avg.=	13.6	4.6	5.2	-2.5	44.9	-1.0	5.2

RADIAN CORPORATION RUN 3 CONT

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 20:59:41
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:00:04	12.5	0.6	6.1	-0.2	59.6	1.4	4.1
21:01:04	14.7	0.4	4.3	-0.7	46.9	1.3	3.4
21:02:04	13.1	0.1	5.9	-0.6	50.8	1.2	4.5
21:03:04	13.0	0.2	5.6	-0.7	51.3	1.6	3.5
21:04:04	14.7	0.2	4.3	-0.5	44.4	1.5	2.7
21:05:04	13.5	-0.0	5.4	-0.7	46.3	1.3	4.0
21:06:04	12.9	-0.0	5.7	-0.9	46.5	1.3	4.4
21:07:04	14.0	-0.0	4.5	-0.9	42.3	1.6	3.3
21:08:04	14.9	-0.1	4.0	-0.6	38.5	1.4	3.9
21:09:04	14.9	-0.2	4.0	-0.9	38.3	1.5	3.1
21:10:04	15.2	-0.2	3.8	-0.7	39.1	1.5	3.5
21:11:04	14.9	-0.2	3.9	-0.9	40.6	1.6	2.5
21:12:04	13.7	-0.1	4.9	-0.7	42.7	1.5	2.6
21:13:04	12.7	-0.1	5.6	-0.6	45.3	1.3	2.7
21:14:04	11.0	-0.0	7.1	0.2	55.7	1.3	3.5
21:15:04	11.6	-0.0	6.4	3.6	48.3	1.1	5.8
21:16:04	12.6	-0.1	5.5	3.8	42.1	1.4	7.3
21:17:04	14.2	-0.0	4.3	0.0	38.7	1.3	4.4
21:18:04	13.3	-0.2	5.5	-0.7	41.8	1.3	6.8
21:19:04	12.7	-0.2	5.9	0.1	43.0	1.3	6.8
21:20:04	12.5	-0.2	6.1	0.1	47.0	1.3	7.0
21:21:04	13.0	-0.2	5.6	-0.4	45.6	1.3	5.9
21:22:05	12.1	-0.1	6.4	-0.6	53.0	1.4	5.7
21:23:04	13.5	0.1	4.9	-0.8	39.8	1.4	3.6
21:24:05	12.4	-0.1	6.2	-0.6	46.1	1.3	4.1
21:25:11	12.8	-0.0	5.6	-0.8	43.5	1.5	4.2
21:26:04	13.5	0.0	5.3	-0.7	41.9	1.2	3.3
21:27:04	12.1	0.0	6.5	-0.5	47.1	1.3	3.7
21:28:04	13.2	0.2	5.2	-0.8	43.0	1.5	3.5
21:29:04	14.2	0.0	4.7	-0.6	42.0	1.3	3.1
21:30:04	12.9	-0.1	5.8	-0.5	47.4	1.2	4.3
21:31:04	12.2	-0.0	6.3	-0.4	48.9	1.2	4.0
21:32:05	14.0	0.1	4.7	-0.7	41.7	1.4	3.3
21:33:04	12.8	0.0	6.2	-0.7	49.0	1.2	3.7
21:34:04	11.7	0.3	6.8	-0.6	51.4	1.3	4.6
21:35:04	14.1	0.2	4.5	-0.9	42.2	1.5	3.2
21:36:04	12.1	0.1	6.8	-0.6	51.4	1.3	4.6
21:37:05	11.6	0.5	6.7	-0.5	54.5	1.5	4.4
21:38:05	14.0	0.2	4.6	-0.7	45.6	1.6	2.8
21:39:04	12.1	0.1	6.7	-0.7	52.5	1.4	3.1
21:40:04	12.3	0.3	6.0	-0.7	53.8	1.6	2.8
21:41:04	13.9	0.1	4.9	-0.7	45.4	1.6	2.3
21:42:04	12.3	0.1	6.5	-0.6	50.1	1.6	3.6
21:43:04	13.5	0.2	5.0	-0.8	46.0	1.5	2.8
21:44:04	14.2	0.1	4.8	-0.6	41.2	1.5	2.6
21:45:04	13.3	-0.0	5.6	-0.6	44.6	1.4	4.3

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
21:46:04	13.1	-0.0	5.6	-0.5	44.2	1.4	4.2
21:47:04	13.8	0.1	5.1	-0.5	41.9	1.4	3.6
21:48:04	11.9	0.1	7.0	-0.6	49.2	1.3	4.5
21:49:04	12.4	0.4	6.1	-0.6	49.2	1.5	4.5
21:50:04	13.6	0.2	5.3	-0.7	43.1	1.6	3.5
21:51:04	11.6	0.2	7.2	-0.8	49.8	1.7	3.7
21:52:04	13.6	0.3	4.9	-0.5	42.0	1.8	3.5
21:53:04	13.4	0.1	5.6	-0.7	43.6	1.5	3.4
21:54:04	12.0	0.2	6.6	-0.3	49.4	1.6	4.9
21:55:04	14.3	0.2	4.3	-0.2	38.6	1.6	4.1
21:56:04	12.5	-0.0	6.5	-0.3	46.3	1.6	4.7
21:57:04	11.2	0.3	7.4	-0.3	53.8	1.6	4.4
21:58:04	13.6	0.3	4.9	0.1	47.1	1.8	3.1
21:59:04	13.6	0.2	5.4	-0.2	46.9	1.5	3.2
22:00:04	12.3	0.1	6.4	-0.5	51.3	1.5	2.7
22:01:04	14.1	0.2	4.5	-0.3	44.0	1.7	3.1
22:02:04	13.9	0.0	5.2	-0.4	45.3	1.6	2.8
22:03:04	12.9	0.0	5.9	-0.4	48.5	1.6	5.0
22:04:04	13.7	-0.1	4.9	-0.6	43.9	1.9	4.5
22:05:04	14.8	-0.0	4.1	-0.5	40.1	1.7	4.6
22:06:04	14.0	-0.2	4.8	-0.7	44.2	1.8	4.9
22:07:04	13.9	-0.2	4.8	-0.5	43.0	1.7	4.0
22:08:04	14.0	-0.2	4.7	-0.4	41.4	1.4	3.4
22:09:04	14.7	-0.2	4.0	-0.5	39.3	1.5	3.2
22:10:04	15.3	-0.3	3.6	-0.6	39.5	1.5	3.3
22:11:05	15.6	-0.2	3.3	-0.7	38.8	1.6	3.9
22:12:05	14.9	-0.2	3.8	-0.5	40.4	1.5	4.2
22:13:04	12.9	-0.3	5.4	-0.4	55.9	1.3	3.5
22:14:05	11.9	-0.2	6.1	0.3	89.5	1.2	3.6
22:15:04	12.4	-0.3	5.5	0.3	88.9	1.3	4.4
22:16:04	12.6	-0.2	5.6	0.1	74.9	1.2	4.6
22:17:04	12.9	-0.2	5.2	-0.0	78.4	1.5	4.2
22:18:04	14.1	-0.1	4.4	0.2	79.5	1.5	3.9
22:19:04	12.5	-0.2	6.0	-0.4	56.8	1.4	4.8
22:20:04	11.4	-0.1	6.9	-0.3	59.7	1.3	4.3
22:21:04	13.9	0.2	4.4	-0.6	51.3	1.5	3.6
22:22:04	14.7	-0.1	4.2	-0.6	45.1	1.5	4.6
22:23:04	14.0	-0.3	4.8	-0.4	44.3	1.2	4.3
22:24:04	13.8	-0.2	4.9	-0.3	44.4	1.2	5.2
22:25:04	13.9	-0.2	4.8	-0.4	43.9	1.2	4.5
22:26:04	14.0	-0.2	4.7	-0.5	43.0	1.2	4.7
22:27:04	14.0	-0.3	4.7	0.4	43.0	1.2	5.9
22:28:04	14.2	-0.3	4.5	0.9	41.5	1.3	7.2
22:29:04	14.0	-0.2	4.7	0.7	41.7	1.2	8.0
22:30:04	13.0	-0.2	5.6	1.9	46.0	1.3	10.5
22:31:04	12.5	-0.3	6.1	5.6	45.8	1.3	13.1
22:32:04	12.4	-0.3	6.3	7.8	44.5	1.4	18.1
22:33:04	14.1	-0.1	4.7	2.0	41.3	1.6	9.9
22:34:04	13.3	-0.2	5.6	0.2	46.4	1.5	8.1
22:35:04	12.9	-0.2	5.9	-0.3	49.0	1.4	8.9
22:36:04	12.5	-0.1	6.0	-0.4	48.8	1.5	6.8
22:37:04	14.1	-0.1	4.8	-0.7	43.4	1.5	4.4
22:38:04	11.5	-0.1	7.5	-0.6	53.8	1.4	4.8
22:39:04	13.0	0.0	5.5	-0.5	45.4	1.7	3.9
22:40:04	14.4	-0.1	4.6	-0.5	42.5	1.6	3.7
22:41:04	12.7	-0.2	6.3	-0.6	48.8	1.5	5.8

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
22:42:05	11.6	-0.1	6.9	-0.6	49.6	1.5	5.7
22:43:04	14.5	0.0	4.2	-0.8	41.1	1.7	4.0
22:44:04	13.1	-0.1	5.9	-0.4	46.2	1.5	5.3
22:45:04	12.2	-0.1	6.3	-0.8	47.4	1.6	6.3
22:46:04	14.6	0.0	4.1	-1.0	38.1	1.7	4.4
22:47:04	12.3	0.0	6.6	-0.8	45.5	1.5	5.5
22:48:04	12.4	0.1	5.9	-0.7	43.5	1.8	4.9
22:49:04	14.3	0.1	4.5	-0.9	40.2	1.5	4.0
22:50:04	11.8	-0.0	6.9	-0.6	50.3	1.5	5.4
22:51:04	12.9	0.2	5.4	-0.6	44.2	1.8	3.6
Avg.=	13.3	-0.0	5.4	-0.2	47.4	1.5	4.6

RADIAN CORPORATION 1121 RUN1

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN MWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 12:45:17
File Name = E:\CEMDATA\112191.PRN Calibration File:E:\CEMDATA\MTO1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:45:18	14.4	-0.3	4.8	0.5	46.5	1.4	-0.3
12:45:21	13.0	-0.1	5.5	0.2	56.0	1.6	-2.7
12:46:21	14.4	-0.2	4.4	0.7	47.4	1.4	1.1
12:47:21	13.3	-0.3	6.0	0.5	50.9	1.4	1.0
12:48:21	11.5	0.3	7.2	0.7	61.4	1.4	1.5
12:49:21	13.7	-0.1	5.1	0.8	54.5	1.4	0.5
12:50:21	14.7	-0.3	4.4	0.7	47.2	1.3	0.6
12:51:21	12.7	0.3	6.5	0.7	54.3	1.4	1.3
12:52:21	13.1	1.4	5.6	0.8	55.7	1.4	0.9
12:53:21	14.7	-0.2	4.3	0.9	47.2	1.3	0.5
12:54:21	13.7	-0.2	5.6	0.6	47.3	1.4	0.8
12:55:21	12.9	-0.3	5.9	0.9	52.4	1.4	1.6
12:56:21	15.1	-0.2	4.0	0.8	41.7	1.3	1.3
12:57:21	14.3	-0.4	5.1	0.8	43.2	1.3	0.4
12:58:21	11.7	11.2	7.3	1.0	56.5	1.5	0.7
12:59:21	13.8	12.1	4.8	1.2	48.5	1.4	0.9
13:00:21	14.8	0.0	4.4	0.7	41.2	1.4	0.5
13:01:21	11.9	42.1	7.2	0.9	53.1	6.7	1.8
13:02:21	13.1	105.4	5.5	1.2	52.6	1.7	1.1
13:03:21	14.9	2.8	4.2	0.8	41.1	1.4	-0.0
13:04:28	13.3	-0.1	6.0	0.4	45.8	1.4	2.2
13:05:21	13.0	0.0	5.6	0.7	47.5	1.4	2.2
13:06:21	15.0	-0.0	4.1	0.8	37.7	1.4	1.2
13:07:21	12.5	-0.0	6.7	0.8	48.2	1.3	1.1
13:08:21	13.0	-0.0	5.6	1.0	46.1	1.4	0.9
13:09:21	14.7	-0.2	4.2	0.9	40.0	1.4	1.1
13:10:21	14.0	-0.2	5.3	0.7	41.4	1.3	2.2
13:11:21	12.6	-0.1	6.2	0.8	46.9	1.3	1.7
13:12:21	14.8	-0.2	4.2	0.9	36.7	1.3	1.3
13:13:21	14.4	-0.2	4.9	0.5	37.2	1.3	1.7
13:14:21	13.5	-0.2	5.6	0.9	41.2	1.2	3.2
13:15:21	13.7	-0.6	5.1	1.1	41.0	1.3	7.6
13:16:21	15.3	-0.4	3.8	0.8	37.3	1.3	4.1
13:17:21	14.4	-0.4	4.6	0.4	39.7	1.2	4.1
13:18:21	13.2	-0.4	5.6	0.4	42.2	1.2	4.3
13:19:21	12.5	-0.3	5.9	0.3	42.5	1.2	3.6
13:20:21	14.3	-0.3	4.1	0.3	37.9	1.3	2.5
13:21:21	14.7	-0.3	4.2	0.3	37.0	1.3	3.1
13:22:21	13.7	-0.3	5.1	0.1	38.6	1.2	3.2
13:23:21	12.7	-0.3	6.1	0.3	41.0	1.2	3.5
13:24:21	12.2	-0.4	6.5	0.2	41.0	1.1	4.0
13:25:21	12.9	-0.3	5.6	0.4	38.6	1.3	2.6
13:26:21	13.9	-0.2	5.2	0.3	40.8	1.3	1.7
13:27:21	12.2	-0.3	6.8	0.4	49.5	1.2	2.3
13:28:21	13.5	-0.2	5.3	0.3	41.7	1.3	1.8
13:29:21	15.0	-0.3	4.3	0.2	36.4	1.2	1.4

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:30:21	13.7	-0.2	5.6	0.1	40.2	1.2	1.9
13:31:21	13.3	-0.2	6.0	0.1	41.3	1.3	2.3
13:32:21	13.2	-0.2	5.9	0.4	40.6	1.4	2.3
13:33:21	14.6	-0.3	4.5	0.1	36.3	1.4	0.9
13:34:21	12.4	-0.2	7.0	0.2	46.6	1.3	2.2
13:35:21	12.5	-0.1	6.1	0.3	48.2	1.4	2.0
13:36:21	14.5	-0.2	4.7	0.2	39.2	1.4	1.5
13:37:21	12.0	-0.1	7.3	0.4	49.1	1.3	2.1
13:38:21	12.2	0.6	6.5	0.4	46.9	1.3	1.2
13:39:21	14.0	-0.0	5.1	0.3	41.4	1.3	0.6
13:40:21	12.3	-0.1	6.8	0.5	50.5	1.2	2.1
13:41:21	13.5	-0.2	5.3	0.2	46.9	1.3	1.4
13:42:21	14.5	-0.3	4.8	0.3	42.0	1.2	0.7
13:43:21	12.5	-0.2	6.9	0.2	52.3	1.1	1.3
13:44:21	13.5	-0.2	5.3	0.3	50.3	1.3	1.2
13:45:21	14.4	-0.3	5.0	0.4	45.5	1.2	0.5
13:46:21	12.2	-0.1	7.0	0.2	53.6	1.2	2.0
13:47:21	14.0	-0.2	4.9	0.4	44.3	1.4	1.6
13:48:21	14.4	-0.3	5.1	0.5	40.4	1.3	1.6
13:49:21	12.3	-0.1	7.1	22.4	54.9	1.3	3.1
13:50:21	13.6	-0.1	5.3	16.2	58.1	1.5	2.6
13:51:21	15.1	-0.3	4.2	3.6	44.8	1.3	2.3
13:52:21	14.4	-0.3	5.0	1.5	45.3	1.4	2.8
13:53:21	13.3	-0.3	6.1	1.0	51.6	1.4	2.7
13:54:21	12.8	-0.1	6.1	1.1	52.3	1.4	2.0
13:55:21	14.8	-0.3	4.3	0.8	44.5	1.3	1.8
13:56:21	14.3	-0.3	5.0	0.6	45.3	1.2	1.8
13:57:21	13.2	-0.2	6.1	1.1	53.1	1.3	1.9
13:58:21	12.7	-0.1	6.2	6.8	63.8	1.3	2.2
13:59:21	14.8	-0.3	4.3	2.5	56.9	1.4	0.4
14:00:21	14.3	-0.3	5.1	4.3	50.9	1.2	1.9
14:01:21	13.0	-0.3	6.2	18.0	57.7	1.2	4.3
14:02:21	13.6	-0.3	5.4	12.4	65.8	1.4	7.1
14:03:21	14.6	-0.3	4.5	3.2	62.0	1.3	2.4
14:04:21	13.6	-0.4	5.6	7.6	56.6	1.3	5.0
14:05:21	13.2	-1.2	5.8	21.4	61.5	1.3	12.8
14:06:21	14.8	-0.9	4.3	6.1	53.5	1.3	6.9
14:07:21	13.9	-0.3	5.4	1.6	51.5	1.2	5.1
14:08:21	12.9	-0.2	6.1	1.0	58.7	1.2	5.8
14:09:21	14.9	-0.3	4.2	0.7	48.9	1.3	2.5
14:10:21	14.2	-0.3	5.3	0.4	46.6	1.1	3.9
14:11:21	12.8	-0.2	6.3	0.4	53.9	1.1	5.2
14:12:21	14.7	-0.3	4.4	0.3	46.3	1.3	3.3
14:13:21	15.0	-0.3	4.5	0.2	40.5	1.1	3.6
14:14:21	14.2	-0.5	5.1	0.2	43.4	1.0	4.1
14:15:21	13.8	-0.4	5.5	1.7	46.1	1.0	4.4
14:16:21	13.9	-0.4	5.0	8.8	45.8	1.2	4.6
14:17:21	15.6	-0.4	3.7	1.7	36.5	1.1	2.7
14:18:21	14.4	-0.4	5.0	5.4	40.4	1.0	5.6
14:19:21	13.3	-1.0	5.8	17.1	44.0	1.0	10.7
14:20:21	13.7	-1.3	5.4	13.9	41.7	1.0	14.0
14:21:21	14.8	-1.4	4.2	8.1	38.8	1.2	11.2
14:22:21	14.4	-1.4	4.8	1.8	37.7	1.0	7.5
14:23:21	14.2	-1.5	4.9	2.6	37.5	1.0	8.9
14:24:21	14.0	-1.2	5.0	2.0	39.6	0.9	8.3
14:25:21	13.8	-0.5	5.1	1.0	40.6	0.9	6.1

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:26:21	14.0	-0.7	5.0	0.6	39.9	0.9	5.4
14:27:21	14.1	-0.8	5.0	0.2	41.5	1.0	5.4
14:28:21	13.9	-0.8	5.2	0.1	42.9	1.1	5.4
14:29:21	13.1	-0.6	5.8	0.2	45.5	1.1	4.1
14:30:21	14.0	-0.7	4.7	-0.1	41.7	1.3	3.8
14:31:21	15.0	-0.5	4.3	-0.0	37.9	1.1	2.6
14:32:21	12.5	-0.8	6.5	0.3	49.9	1.1	4.5
14:33:21	11.7	-0.1	6.9	0.5	50.3	1.2	4.2
14:34:21	14.8	-0.3	4.1	0.2	38.6	1.4	2.4
14:35:21	14.0	-0.6	5.2	0.2	41.9	1.2	2.9
14:36:21	11.7	-0.1	7.4	0.2	52.3	1.2	4.0
14:37:21	13.2	-0.2	5.3	0.3	47.5	1.4	2.0
14:38:21	14.8	-0.3	4.3	0.1	40.4	1.2	2.1
14:39:21	13.5	-0.3	5.6	0.1	47.3	1.2	2.6
14:40:21	13.3	-0.3	5.7	0.3	48.8	1.2	3.7
14:41:21	13.2	-0.2	5.9	0.4	50.6	1.2	2.9
14:42:21	13.2	-0.2	5.6	0.2	52.5	1.3	2.4
14:43:21	15.0	-0.3	4.3	0.2	42.2	1.2	2.2
14:44:21	13.5	-0.3	5.9	1.6	48.0	1.2	3.9
14:45:21	12.7	-1.0	6.2	13.3	53.1	1.2	17.9
14:46:21	15.0	-1.3	4.1	5.7	40.8	1.3	13.9
14:47:21	14.3	-1.3	5.1	6.8	43.0	1.2	15.9
14:48:21	13.4	-1.8	5.8	22.5	46.2	1.1	68.8
14:49:21	14.0	-1.8	4.8	18.4	44.0	1.3	81.5
14:50:21	15.3	-1.3	4.0	3.1	37.7	1.2	24.0
14:51:21	14.2	-1.3	4.9	0.9	40.2	1.0	23.3
14:52:21	14.0	-1.3	5.0	0.2	41.1	1.1	17.8
14:53:21	14.3	-1.3	4.8	0.4	40.4	1.0	12.8
14:54:21	14.5	-1.3	4.6	3.0	38.3	1.1	14.2
14:55:21	14.7	-1.4	4.4	10.0	37.3	1.1	27.5
14:56:21	15.1	-1.7	4.1	14.7	37.2	1.2	60.8
14:57:21	15.5	-1.8	3.7	12.5	37.3	1.4	80.7
14:58:21	15.9	-1.9	3.4	10.2	38.2	1.3	86.8
14:59:21	16.0	-1.7	3.2	7.5	38.8	1.2	76.0
15:00:21	15.7	-1.8	3.4	3.8	38.3	1.4	58.5
15:01:21	14.8	-1.5	3.9	2.1	40.6	1.4	42.1
15:02:21	12.7	-1.6	5.7	8.0	60.4	1.3	63.7
15:03:21	10.4	-1.9	7.5	21.0	65.4	1.3	116.3
15:04:21	11.5	-1.8	6.2	17.9	49.6	1.4	94.0
15:05:21	14.3	-1.3	4.0	3.2	45.2	1.4	25.5
15:06:21	14.4	-1.3	4.6	0.9	46.7	1.2	20.9
15:07:21	13.1	-1.4	5.7	0.4	50.9	1.1	35.6
15:08:21	12.7	-1.2	6.0	0.3	48.9	1.1	25.4
15:09:21	14.3	-1.3	4.5	0.3	44.6	1.2	15.8
15:10:21	12.5	-1.2	6.5	0.5	55.7	1.0	13.5
15:11:21	13.1	-1.2	5.4	0.3	49.6	1.2	13.4
15:12:21	14.7	-1.0	4.4	0.3	42.4	1.0	8.4
15:13:21	13.7	-1.2	5.3	0.3	45.2	0.9	12.5
15:14:21	12.9	-1.1	6.0	0.5	48.5	0.9	11.5
15:15:21	14.0	-1.1	4.7	0.2	43.5	1.1	8.6
15:16:21	13.5	-0.3	5.7	0.6	46.9	0.8	6.9
15:17:21	12.7	-0.9	6.0	0.6	47.6	1.0	8.2
15:18:21	14.8	-0.7	4.2	0.2	40.2	1.0	5.0
15:19:21	13.0	-0.5	6.2	0.7	53.7	0.8	7.0
15:20:21	12.5	-0.6	6.2	0.5	52.2	1.0	7.1
15:21:21	14.9	-0.1	4.1	0.3	41.6	1.1	4.7

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
15:22:21	12.5	0.0	6.6	0.8	52.4	0.9	5.7
15:23:21	13.0	0.7	5.6	0.5	48.3	1.0	5.6
15:24:21	14.8	0.0	4.3	0.4	41.4	0.9	4.0
15:25:21	13.2	-0.2	5.8	0.3	45.4	0.9	6.5
15:26:21	14.2	-0.3	4.6	0.2	41.8	1.1	6.7
15:27:21	15.8	-0.3	3.6	0.6	37.4	0.9	4.1
15:28:21	14.4	-0.2	4.9	0.5	41.9	0.8	6.3
15:29:21	12.0	5.7	7.2	0.9	53.3	1.9	6.4
15:30:21	12.3	102.0	6.1	0.7	57.9	1.4	4.6
15:31:21	15.0	6.1	4.1	0.6	48.2	0.9	3.0
15:32:21	13.2	0.3	6.0	0.8	49.7	0.7	4.2
15:33:21	13.2	-0.1	5.7	0.7	46.9	0.8	4.8
15:34:21	14.9	0.2	4.2	0.6	40.9	0.8	3.5
15:35:21	12.6	0.0	6.7	0.6	47.4	0.6	3.6
15:36:21	12.8	0.1	5.9	0.4	45.1	0.9	3.7
15:37:21	14.7	-0.0	4.5	0.6	40.5	0.8	2.7
15:38:21	13.7	-0.1	5.6	0.7	46.5	0.7	4.2
15:39:21	12.6	-0.1	6.5	0.6	49.2	0.7	5.8
15:40:21	13.0	-0.2	5.6	0.6	47.7	0.9	5.0
15:41:21	14.8	-0.2	4.2	0.5	40.6	0.8	3.8
15:42:21	12.7	-0.1	6.4	0.6	49.5	0.7	5.1
15:43:21	12.4	-0.1	6.2	0.5	49.3	0.9	4.9
15:44:21	14.1	-0.2	4.9	0.4	45.7	0.9	3.0
15:45:21	12.2	-0.1	6.7	0.6	53.0	0.7	3.4
15:46:21	14.2	-0.2	4.5	0.5	43.6	1.0	2.7
15:47:21	14.6	-0.3	4.8	0.1	41.5	1.0	2.5
15:48:21	12.5	-0.1	6.5	0.3	45.3	1.0	3.1
15:49:21	14.8	-0.2	4.2	0.2	37.6	1.1	3.4
15:50:21	14.2	-0.2	5.2	0.5	44.9	0.6	2.8
15:51:21	12.6	-0.1	6.3	0.6	52.6	0.7	2.9
15:52:21	14.4	-0.2	4.4	0.3	43.4	1.0	2.7
15:53:21	14.5	-0.2	4.7	0.6	44.5	0.7	2.5
15:54:21	13.5	-0.3	5.6	0.6	48.7	0.7	3.1
15:55:21	14.0	-0.3	4.9	0.5	47.5	1.0	3.6
15:56:21	14.7	-0.3	4.7	0.6	43.5	0.8	3.4
15:57:21	12.1	-0.3	7.0	0.6	51.6	0.8	4.3
15:58:21	14.0	-0.3	4.7	0.5	46.1	1.1	3.4
15:59:21	14.8	-0.3	4.5	0.7	44.1	0.8	3.7
16:00:21	12.8	-0.1	6.2	0.8	47.9	0.7	4.6
16:01:21	12.5	-0.1	6.2	0.4	49.6	1.0	3.9
16:02:21	14.8	-0.2	4.3	0.4	42.8	0.9	2.1
16:03:21	13.4	-0.2	5.8	0.7	46.3	0.7	2.9
16:04:21	13.0	-0.1	5.8	0.8	47.2	0.8	2.3
16:05:21	15.1	-0.3	3.9	0.9	39.2	1.0	2.6
16:06:21	14.4	-0.2	4.7	1.2	39.9	0.7	3.6
16:07:21	14.3	-0.7	4.7	3.6	38.4	0.8	10.4
16:08:21	14.7	-1.3	4.3	5.1	36.0	0.9	16.7
16:09:21	15.3	-1.3	3.9	7.5	34.5	0.9	26.9
16:10:21	15.5	-1.4	3.8	8.7	34.8	1.1	42.1
16:11:21	15.2	-1.5	4.0	8.3	39.4	1.1	48.8
16:12:21	13.3	-1.3	5.7	3.8	58.3	1.0	27.8
16:13:21	13.2	-1.2	5.5	2.2	76.2	1.0	13.5
16:14:21	13.9	-1.2	5.0	1.9	79.3	0.9	10.5
16:15:21	14.4	-1.3	4.5	2.0	86.5	1.0	8.8
16:16:21	14.1	-1.2	5.1	1.9	82.3	0.9	7.5
16:17:21	12.8	-0.4	6.2	1.5	71.0	0.8	6.1

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:18:21	13.1	-0.4	5.8	1.1	61.6	0.9	6.2
16:19:21	14.8	-0.3	4.1	1.0	67.1	1.1	4.3
16:20:21	14.6	-0.3	4.5	1.2	52.9	0.9	4.6
16:21:21	14.4	-0.3	4.6	0.9	45.6	1.0	5.7
16:22:21	14.6	-0.4	4.5	0.7	43.1	1.0	5.9
16:23:21	14.4	-0.3	4.7	1.0	44.2	1.0	5.4
16:24:21	14.7	-0.3	4.4	1.4	44.4	1.0	6.2
16:25:21	14.2	-0.2	5.1	1.7	45.6	0.9	6.1
16:26:21	13.0	-0.2	6.0	1.6	47.6	0.8	6.8
16:27:21	12.9	-0.1	6.0	1.6	49.2	0.7	5.7
16:28:21	13.1	-0.2	5.5	1.6	49.7	1.0	6.3
16:29:21	14.6	-0.2	4.5	1.3	44.8	0.8	3.2
16:30:21	11.3	0.0	7.7	1.0	51.7	0.7	4.4
16:31:21	13.4	0.3	5.1	0.8	47.0	0.9	2.5
16:32:21	14.1	0.1	5.1	0.8	45.7	0.7	2.5
16:33:21	12.4	-0.1	6.4	0.8	48.6	0.7	3.6
16:34:21	14.7	-0.3	4.3	0.9	42.4	0.8	3.5
16:35:21	13.1	-0.2	6.2	1.0	46.6	0.7	3.5
16:36:21	12.5	-0.1	6.3	0.7	45.4	0.9	4.4
16:37:21	14.7	-0.2	4.4	0.8	39.5	0.9	2.9
16:38:21	12.7	-0.1	6.5	0.7	49.5	0.8	5.1
16:39:21	12.9	0.3	5.7	0.7	48.3	1.0	4.3
16:40:21	14.9	-0.2	4.3	0.6	39.7	0.9	3.0
16:41:21	12.8	-0.1	6.4	0.7	50.3	0.9	4.5
16:42:21	12.8	0.0	6.0	0.6	51.0	1.2	5.5
16:43:21	14.8	-0.0	4.4	0.6	44.9	1.3	3.7
16:44:21	13.2	-0.2	6.1	0.5	51.8	1.2	4.4
16:45:21	11.3	1.0	7.5	0.7	61.7	1.2	4.6
16:46:21	14.4	0.9	4.5	0.7	49.7	1.3	3.2
16:47:21	14.3	-0.1	5.2	0.6	46.9	1.1	2.4
16:48:21	12.0	0.1	6.9	0.7	59.2	1.2	4.3
16:49:21	14.3	0.1	4.5	0.6	47.9	1.3	2.8
16:50:21	14.7	-0.3	4.8	0.5	44.5	1.1	2.8
16:51:21	12.9	-0.2	6.1	0.5	51.9	1.1	4.2
16:52:21	14.8	-0.3	4.2	0.6	43.7	1.3	3.4
16:53:21	14.9	-0.4	4.6	0.5	41.3	1.2	3.8
16:54:21	13.4	-0.3	5.9	2.2	45.7	1.2	5.1
16:55:21	14.7	-0.3	4.4	5.4	39.6	1.2	3.6
16:56:21	14.6	-0.3	5.0	1.7	42.9	1.3	3.5
16:57:21	13.0	-0.2	6.0	6.7	46.2	1.2	4.8
16:58:21	15.2	-0.3	4.0	2.4	39.0	1.4	3.4
16:59:21	14.3	-0.3	5.1	0.8	43.7	1.3	4.0
17:00:21	13.1	-0.3	5.8	0.4	46.2	1.3	4.4
17:01:21	14.4	-0.3	4.3	0.5	41.4	1.5	1.3
17:02:21	14.8	-0.4	4.5	0.0	42.0	1.3	1.6
17:03:21	12.7	-0.3	6.4	0.2	50.3	1.3	3.3
17:04:21	13.4	-0.3	5.3	0.3	48.8	1.4	1.4
17:05:21	15.2	-0.4	4.1	-0.0	42.3	1.4	1.8
17:06:21	13.7	-0.4	5.5	1.7	49.1	1.4	2.1
17:07:21	13.7	-1.2	5.4	13.1	48.3	1.4	12.4
17:08:21	15.3	-1.4	3.8	8.7	41.2	1.4	14.8
17:09:21	14.9	-1.5	4.4	10.2	41.5	1.4	23.3
17:10:21	14.8	-1.9	4.4	15.7	43.0	1.6	63.1
17:11:21	14.4	-2.0	4.9	12.8	45.0	1.6	64.4
17:12:21	14.2	-2.0	5.0	10.2	45.8	1.6	53.3
17:13:21	13.7	-1.8	5.5	6.5	46.0	1.4	35.9

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:14:21	13.8	-1.7	5.3	7.7	44.4	1.5	30.8
17:15:21	13.8	-1.9	5.2	9.1	43.2	1.6	32.7
17:16:21	14.2	-1.8	4.8	5.7	43.5	1.6	30.1
17:17:21	14.6	-1.8	4.4	1.7	44.4	1.6	16.5
17:18:21	14.9	-1.6	4.3	0.4	41.4	1.6	10.3
17:19:21	13.3	-1.2	5.8	0.2	48.0	1.5	7.5
17:20:21	13.1	-0.7	5.9	0.0	47.6	1.5	5.4
17:21:21	13.7	-0.7	5.1	0.1	44.4	1.6	5.0
17:22:21	14.8	-0.4	4.3	0.1	40.5	1.5	3.3
17:23:21	13.1	-0.6	6.0	0.2	45.8	1.5	4.1
17:24:21	12.8	-0.5	6.0	-0.0	46.9	1.5	3.4
17:25:21	14.5	-0.6	4.6	-0.2	42.1	1.5	2.0
17:26:21	12.8	-0.6	6.3	0.1	48.9	1.5	3.2
17:27:21	13.5	-0.3	5.2	2.2	46.7	1.6	3.1
17:28:21	14.7	-0.3	4.6	0.2	44.2	1.4	2.3
17:29:21	13.6	-0.5	5.6	0.1	48.1	1.5	4.3
17:30:21	14.0	-0.5	4.9	0.5	44.4	1.6	2.4
17:31:21	14.9	-0.5	4.4	-0.2	41.2	1.5	1.8
17:32:21	14.0	-1.0	5.2	6.9	44.3	1.5	7.3
17:33:21	13.3	-1.7	5.8	18.0	45.8	1.6	30.5
17:34:21	14.7	-1.3	4.4	6.4	40.4	1.6	18.1
17:35:21	14.1	-1.4	5.3	0.5	43.3	1.5	9.8
17:36:21	14.0	-1.6	5.3	2.4	46.0	1.5	11.2
17:37:21	14.0	-1.6	5.1	3.6	44.8	1.5	19.6
17:38:21	14.9	-1.7	4.5	-0.2	41.2	1.4	11.4
17:39:21	12.3	-1.1	6.9	-0.3	46.1	1.3	7.8
17:40:21	13.7	-1.2	5.0	0.5	41.4	1.3	8.6
17:41:21	14.7	-0.4	4.6	-0.8	39.9	1.4	3.9
17:42:21	12.4	-0.3	6.7	-0.6	47.0	1.5	4.5
17:43:21	13.4	-0.3	5.4	-0.6	43.6	1.4	3.2
17:44:21	14.4	-0.4	4.8	-0.6	42.4	1.3	1.4
17:45:21	12.8	-0.3	6.2	-0.3	49.6	1.3	2.9
17:46:21	14.2	-0.4	4.7	-0.3	44.5	1.4	2.4
17:47:21	14.5	-0.6	4.7	-0.0	42.6	1.2	1.6
17:48:21	13.5	-0.6	5.6	0.1	45.5	1.3	3.4
17:49:21	15.0	-0.4	4.0	0.1	39.8	1.3	2.3
Avg.=	13.8	0.4	5.3	2.3	46.4	1.2	9.0

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN.NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 12:00:47
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MT01122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:01:39	14.7	0.2	4.1	2.1	40.6	1.3	0.7
12:02:39	14.2	-0.1	4.5	2.3	44.3	1.4	2.1
12:03:39	13.9	0.0	4.8	2.5	45.2	1.4	1.2
12:04:39	12.9	0.0	5.9	2.4	45.3	1.5	1.5
12:05:39	12.9	0.2	5.9	2.5	45.8	1.6	0.7
12:06:39	14.3	0.2	4.5	2.4	38.4	1.6	1.3
12:07:39	11.8	0.2	6.9	2.0	42.9	1.4	1.1
12:08:39	13.6	0.2	4.9	1.8	37.7	1.6	-0.0
12:09:39	13.3	0.2	5.7	1.6	40.9	1.4	0.7
12:10:39	13.0	0.0	5.7	1.7	43.1	1.4	-0.0
12:11:39	14.7	0.2	4.2	1.5	40.0	1.4	-0.2
12:12:39	13.3	-0.1	5.6	1.4	47.4	1.4	0.4
12:13:39	12.7	0.2	5.9	1.3	47.7	1.4	-0.3
12:14:39	14.5	0.2	4.3	1.1	45.2	1.3	-0.2
12:15:39	13.7	0.1	5.2	0.9	50.8	1.4	0.2
12:16:39	13.7	0.2	5.1	0.9	50.2	1.4	0.0
12:17:39	14.8	0.1	4.0	0.9	44.7	1.3	0.3
12:18:39	12.1	68.6	6.6	1.0	61.5	2.1	1.1
12:19:39	13.7	33.7	4.8	1.1	49.8	1.4	-0.1
12:20:39	14.4	1.2	4.5	0.6	48.9	1.4	0.1
12:21:39	13.5	0.2	5.4	0.8	54.9	1.2	0.7
12:22:39	13.0	0.2	5.8	0.7	53.6	1.3	0.8
12:23:39	14.3	0.2	4.5	0.8	46.5	1.4	1.0
12:24:39	13.7	0.2	5.3	0.6	49.5	1.2	1.3
12:25:39	12.9	0.2	5.8	0.7	51.2	1.2	1.1
12:26:39	14.6	0.1	4.1	0.5	43.4	1.3	1.5
12:27:39	13.9	0.2	5.1	0.5	46.6	1.2	1.0
12:28:39	13.4	0.2	5.4	0.4	47.1	1.1	0.8
12:29:39	13.8	0.1	5.0	0.4	45.9	1.2	2.3
12:30:39	14.3	0.1	4.5	0.6	45.5	1.2	1.4
12:31:39	14.7	0.0	4.1	0.4	43.9	1.2	3.8
12:32:39	15.1	-0.1	3.8	0.4	43.1	1.2	4.6
12:33:39	15.2	-0.1	3.8	0.4	41.7	1.2	5.0
12:34:39	14.5	-0.0	4.4	0.4	42.1	1.2	4.1
12:35:39	14.0	0.1	4.7	0.5	47.5	1.2	3.0
12:36:39	13.3	0.1	5.4	0.6	48.4	1.2	3.4
12:37:39	12.9	0.2	5.7	0.5	49.9	1.2	3.3
12:38:39	13.4	0.1	5.3	0.7	47.8	1.1	2.8
12:39:39	13.0	0.1	5.6	0.6	47.6	1.2	3.9
12:40:39	12.1	4.5	6.2	0.8	54.4	1.2	3.0
12:41:39	13.8	3.2	4.6	0.7	43.2	1.3	2.2
12:42:39	12.4	0.2	6.3	0.6	47.1	1.1	2.6
12:43:39	12.4	0.3	6.1	0.7	46.7	1.2	3.3
12:44:39	14.1	0.2	4.6	0.7	44.1	1.1	2.0
12:45:39	11.6	0.4	7.0	0.9	48.7	1.0	2.4
12:46:39	13.7	0.3	4.8	1.4	42.0	1.2	1.1

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:47:39	13.7	0.2	5.1	1.1	43.6	1.0	1.7
12:48:39	12.3	0.3	6.2	0.9	45.7	1.0	2.1
12:49:39	14.4	0.2	4.2	0.9	38.9	1.1	1.6
12:50:39	13.8	0.2	5.0	0.9	41.0	0.9	1.3
12:51:39	13.7	0.3	5.0	1.7	40.0	0.9	1.7
12:52:39	14.5	0.2	4.3	11.0	35.9	1.0	2.1
12:53:39	15.3	0.2	3.7	13.5	33.2	1.0	4.1
12:54:39	16.1	-0.4	3.0	8.3	31.0	1.2	5.9
12:55:39	16.0	-0.1	3.1	3.5	32.8	1.1	5.9
12:56:39	14.7	0.1	4.1	2.3	36.3	1.1	4.8
12:57:39	13.2	0.1	5.4	2.1	39.9	1.1	3.9
12:58:39	11.9	-0.2	6.4	5.5	46.0	1.1	4.8
12:59:39	11.7	0.2	6.6	9.2	49.7	1.1	3.8
13:00:39	12.8	0.1	5.5	7.9	45.9	1.2	4.0
13:01:39	13.9	0.2	4.8	2.9	42.7	1.2	3.0
13:02:39	13.3	0.1	5.5	1.9	42.4	1.1	4.4
13:03:39	14.6	-0.1	4.3	1.6	39.9	1.2	5.1
13:04:39	13.4	-0.0	5.5	1.5	44.4	1.3	4.3
13:05:39	13.2	0.2	5.6	1.5	44.3	1.3	4.1
13:06:39	13.6	0.2	5.2	1.6	44.6	1.4	3.8
13:07:39	13.2	0.3	5.4	2.2	57.3	1.4	4.6
13:08:39	14.3	0.2	4.3	2.1	49.3	1.3	3.7
13:09:39	13.2	0.3	5.5	2.1	51.7	1.4	3.2
13:10:39	12.3	0.3	6.2	1.9	50.3	1.3	3.7
13:11:39	14.0	0.4	4.5	2.2	44.7	1.3	2.5
13:12:39	12.5	0.3	6.1	2.1	56.8	1.2	3.2
13:13:39	13.0	0.3	5.3	2.1	50.9	1.3	2.8
13:14:39	13.8	0.3	4.9	1.8	47.4	1.2	2.4
13:15:39	11.7	0.4	6.7	1.8	52.6	1.2	2.3
13:16:39	13.7	0.6	4.7	2.0	43.5	1.3	2.4
13:17:39	14.2	0.3	4.5	1.8	42.4	1.2	1.5
13:18:39	12.5	0.3	6.1	1.9	51.1	1.2	2.2
13:19:39	12.8	0.6	5.5	2.2	49.3	1.3	2.1
13:20:39	14.4	0.6	4.2	1.9	43.3	1.3	2.2
13:21:39	13.0	0.4	5.6	1.8	50.4	1.3	3.3
13:22:39	13.1	0.4	5.2	1.9	51.0	1.4	3.4
13:23:39	13.9	0.7	4.7	2.1	54.3	1.3	2.3
13:24:39	10.9	57.4	7.5	2.4	62.7	5.6	3.3
13:25:39	12.8	132.7	5.5	2.4	53.6	1.6	2.9
13:26:39	14.2	4.5	4.5	1.9	44.5	1.2	1.8
13:27:39	12.0	0.9	6.4	1.7	51.8	1.1	3.2
13:28:39	12.9	0.9	5.4	1.8	47.6	1.4	2.7
13:29:39	15.0	0.9	3.9	1.7	40.2	1.1	2.8
13:30:39	15.0	0.4	4.0	1.8	41.5	0.9	2.8
13:31:39	15.5	0.4	3.6	1.5	41.7	1.1	2.7
13:32:39	15.7	0.4	3.4	1.6	41.8	1.0	5.2
13:33:39	15.4	0.2	3.5	1.5	41.9	1.2	5.4
13:34:39	15.0	0.1	3.6	1.5	43.3	1.2	7.5
13:35:39	14.5	0.1	3.7	1.1	43.8	1.4	5.6
13:36:39	14.4	0.3	3.7	1.4	43.3	1.3	5.0
13:37:39	14.2	0.4	3.8	1.4	43.9	1.3	5.6
13:38:39	13.2	0.3	4.8	1.4	59.7	1.3	4.8
13:39:39	12.2	0.5	5.6	2.5	105.3	1.2	3.3
13:40:39	12.0	0.5	5.8	3.8	158.3	1.4	3.8
13:41:39	13.9	0.5	4.2	7.1	186.7	1.3	3.0
13:42:39	13.3	0.6	5.3	2.5	73.5	1.0	2.5

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:43:39	12.5	0.5	6.1	1.9	60.0	1.0	2.9
13:44:39	12.9	0.5	5.6	1.8	66.3	1.2	2.5
13:45:39	14.2	0.5	4.5	2.0	65.3	1.0	1.6
13:46:39	13.4	0.6	5.3	1.9	52.1	0.9	2.3
13:47:39	12.8	0.5	5.8	1.7	54.3	1.0	2.7
13:48:39	13.0	0.5	5.4	1.5	51.4	1.1	2.7
13:49:39	14.3	0.5	4.5	1.4	46.9	1.1	1.7
13:50:39	13.3	0.5	5.5	1.4	48.4	1.1	2.7
13:51:39	12.1	0.5	6.3	1.5	49.9	1.1	2.9
13:52:39	14.1	0.5	4.4	1.4	45.7	1.3	3.1
13:53:39	13.7	0.5	5.0	1.2	45.6	1.1	2.3
13:54:39	13.5	0.6	5.2	1.4	45.0	1.0	2.8
13:55:39	13.8	0.4	4.9	1.1	43.2	1.3	3.9
13:56:39	14.0	0.5	4.8	1.4	42.7	1.2	4.8
13:57:39	13.6	0.5	5.2	1.2	41.9	1.1	3.9
13:58:39	13.5	0.5	5.2	1.2	40.8	1.1	3.7
13:59:39	14.7	0.5	4.1	1.2	37.8	1.1	3.5
14:00:39	13.8	0.5	5.0	1.3	41.0	1.1	3.2
14:01:39	13.9	0.5	4.9	1.3	41.2	1.2	3.1
14:02:39	14.3	0.5	4.5	1.5	39.3	1.1	3.7
14:03:39	14.7	0.4	4.0	1.6	38.2	1.1	3.9
14:04:39	15.4	0.4	3.5	1.3	36.5	1.2	4.1
14:05:39	15.9	0.2	3.0	1.4	35.3	1.3	4.8
14:06:39	16.1	0.4	2.9	1.4	35.1	1.3	4.7
14:07:39	15.7	0.4	3.0	1.5	37.2	1.2	4.5
14:08:39	15.0	0.5	3.4	1.4	40.8	1.4	4.6
14:09:39	14.4	0.4	3.6	1.8	42.6	1.4	5.2
14:10:39	14.2	0.5	3.7	1.5	43.5	1.4	4.6
14:11:39	14.2	0.5	3.7	1.6	43.3	1.2	4.1
14:12:39	14.3	0.5	3.6	1.5	42.4	1.3	4.2
14:13:39	14.7	0.4	3.4	1.5	40.5	1.3	3.8
14:14:39	15.0	0.4	3.2	1.5	38.9	1.2	3.2
14:15:39	15.2	0.4	3.1	1.3	37.9	1.2	2.6
14:16:39	15.5	0.5	2.9	1.6	35.5	1.2	3.9
14:17:39	15.4	0.5	3.0	1.5	36.4	1.0	3.6
14:18:39	15.3	0.4	3.1	1.4	37.0	1.0	3.2
14:19:39	15.2	0.3	3.1	1.2	37.8	1.1	3.7
14:20:39	14.8	0.4	3.4	1.4	41.1	1.1	3.3
14:21:39	13.4	0.5	4.5	1.5	54.7	1.1	4.0
14:22:39	11.3	0.5	6.3	1.8	62.9	1.1	3.0
14:23:39	12.1	0.6	5.6	1.6	56.9	1.1	3.3
14:24:39	13.4	0.5	4.7	1.5	45.3	1.2	2.9
14:25:39	13.8	0.5	4.7	1.6	42.9	1.0	3.7
14:26:39	12.1	0.5	6.3	1.5	46.1	0.8	2.6
14:27:39	12.8	0.5	5.7	1.3	44.6	1.1	3.2
14:28:39	14.1	0.5	4.6	1.3	41.9	1.1	1.7
14:29:39	13.3	0.5	5.4	1.4	44.7	0.7	2.7
14:30:39	12.6	0.5	6.1	1.2	47.3	1.0	2.5
14:31:39	13.8	0.5	4.8	1.4	41.4	1.1	3.0
14:32:39	13.1	0.6	5.7	1.3	41.8	1.0	3.1
14:33:39	12.6	0.5	5.9	1.4	44.0	1.1	2.5
14:34:39	14.9	0.5	3.9	1.5	38.0	1.1	2.1

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 14:43:42
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MTO1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
14:44:02	13.7	0.6	5.0	1.4	45.8	1.0	1.7
14:45:02	12.4	0.7	6.0	1.5	53.1	0.9	2.6
14:46:02	14.4	0.7	4.2	1.3	45.7	0.9	2.3
14:47:02	13.0	0.6	5.7	1.5	51.6	0.7	2.2
14:48:02	12.9	1.0	5.4	1.4	50.3	1.0	2.4
14:49:02	14.2	0.7	4.5	1.2	43.8	0.9	2.2
14:50:02	12.3	0.7	6.3	1.4	54.2	0.7	3.4
14:51:02	13.8	1.3	4.7	1.3	52.1	1.0	2.7
14:52:02	13.0	0.9	5.8	1.6	58.9	0.8	1.7
14:53:02	12.8	0.9	5.7	1.8	86.2	1.1	3.2
14:54:02	14.7	0.7	4.1	2.3	93.6	1.1	1.6
14:55:02	13.1	0.5	5.6	2.1	95.0	1.0	3.5
14:56:02	13.7	0.5	4.8	2.1	85.2	1.2	4.0
14:57:02	14.6	0.5	4.2	2.4	81.6	1.0	2.5
14:58:02	12.0	0.6	6.5	1.7	62.2	1.1	3.9
14:59:02	13.7	0.9	4.7	1.7	57.1	1.3	2.6
15:00:02	13.6	0.4	5.1	1.5	52.9	1.1	2.8
15:01:02	12.5	0.5	5.9	1.4	53.1	1.2	3.6
15:02:02	14.3	0.5	4.2	1.7	51.3	1.4	3.3
15:03:02	13.5	0.5	5.1	1.5	49.9	1.2	2.0
15:04:02	12.4	0.6	5.9	1.6	52.1	1.2	3.6
15:05:02	14.1	0.5	4.4	1.3	45.3	1.3	2.4
15:06:02	12.4	0.5	6.0	1.3	53.8	1.2	3.4
15:07:02	13.0	0.5	5.4	1.3	51.2	1.4	2.3
15:08:02	13.9	0.6	4.8	1.4	47.0	1.0	2.4
15:09:02	11.7	0.7	6.7	1.4	55.6	1.2	2.7
15:10:02	14.2	0.7	4.3	1.2	44.2	1.3	1.2
15:11:02	14.2	0.4	4.7	1.1	42.1	1.1	1.9
15:12:02	13.5	0.5	5.4	1.2	45.2	1.1	2.2
15:13:02	13.3	0.5	5.4	1.3	47.3	1.2	2.6
15:14:02	15.3	0.5	3.6	1.1	39.6	1.2	1.7
15:15:02	16.0	0.4	3.2	1.2	38.8	1.0	2.2
15:16:02	16.0	0.4	3.2	1.3	39.6	1.1	3.7
15:17:02	15.3	0.2	3.6	1.3	42.6	1.1	5.5
Avg.=	13.6	0.6	5.0	1.5	54.9	1.1	2.7

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 16:51:56
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MTO1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:52:02	13.7	0.4	4.9	3.9	43.6	1.3	2.4
16:53:02	15.2	0.4	3.8	1.2	38.0	1.1	1.9
16:54:02	14.4	0.3	4.5	0.9	40.1	1.2	2.2
16:55:02	14.1	0.3	4.7	2.9	40.0	1.1	5.7
16:56:02	13.8	-0.1	5.1	2.8	40.7	1.1	5.9
16:57:02	13.8	0.3	5.1	1.5	39.0	1.2	5.5
16:58:02	13.2	0.4	5.5	0.9	40.0	1.0	5.0
16:59:02	13.2	0.4	5.4	0.6	40.8	1.1	4.2
17:00:02	14.0	0.4	4.7	0.3	38.2	1.2	5.7
17:01:02	14.8	0.4	4.0	0.4	36.2	1.1	6.3
17:02:02	14.2	0.4	4.6	0.4	38.7	1.1	4.8
17:03:02	13.8	0.4	4.9	0.5	38.8	1.3	4.8
17:04:02	14.1	0.3	4.6	0.6	39.4	1.2	4.7
17:05:02	14.3	0.4	4.3	0.7	40.0	1.0	5.7
17:06:02	14.2	0.4	4.4	0.5	39.6	1.1	5.4
17:07:02	13.7	0.5	4.9	0.6	40.8	1.1	4.9
17:08:02	13.0	0.5	5.4	0.9	41.9	1.0	3.6
17:09:02	12.3	0.4	6.2	1.7	43.9	1.0	4.6
17:10:02	12.8	0.5	5.5	1.4	40.7	1.0	4.1
17:11:02	13.9	0.5	4.7	0.7	40.2	1.0	3.7
17:12:02	12.6	0.5	5.9	4.0	42.2	0.9	4.9
17:13:02	12.7	0.2	5.7	7.6	41.0	0.9	6.4
17:14:02	13.9	0.4	4.6	1.4	37.0	0.9	3.1
17:15:02	12.2	0.5	6.2	0.7	42.5	0.8	3.8
17:16:02	14.1	0.5	4.4	0.6	35.5	1.0	3.3
17:17:02	14.5	0.5	4.3	1.0	35.6	0.8	2.9
17:18:02	14.1	0.5	4.7	1.0	37.0	0.8	3.6
17:19:02	13.6	0.3	5.2	0.9	38.9	0.8	3.8
17:20:02	13.2	0.5	5.4	0.9	40.4	0.8	3.7
17:21:02	14.6	0.5	4.1	1.0	35.6	0.9	3.0
17:22:02	13.5	0.5	5.3	1.1	40.0	0.7	2.7
17:23:02	13.9	0.5	4.9	1.0	39.9	0.8	3.8
17:24:02	14.5	0.5	4.3	0.8	38.6	0.8	4.0
17:25:02	15.0	-0.3	3.9	1.0	38.2	0.8	7.3
17:26:02	15.5	-0.4	3.5	1.1	36.8	1.0	9.4
17:27:02	15.5	-0.3	3.4	1.0	35.4	0.9	7.2
17:28:02	14.7	-0.4	4.0	1.2	40.2	0.9	6.2
17:29:02	13.1	-0.1	5.3	1.6	46.1	0.8	5.5
17:30:02	12.1	0.5	6.0	2.1	49.9	0.7	4.6
17:31:02	11.8	0.5	6.3	3.9	49.8	0.8	5.1
17:32:02	13.1	0.5	5.0	3.0	44.6	1.0	3.8
17:33:02	14.5	0.5	4.1	1.5	40.0	0.8	2.7
17:34:02	12.7	0.5	5.9	1.4	47.0	0.7	4.3
17:35:02	12.5	0.6	6.0	1.4	48.1	0.8	3.3
17:36:02	14.0	0.5	4.6	1.2	41.6	0.8	3.1
17:37:02	13.1	0.5	5.5	1.4	45.6	0.7	3.8

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
17:38:02	12.6	0.5	5.8	1.5	46.2	0.9	3.9
17:39:02	14.5	0.5	4.1	1.4	42.5	1.0	4.5
17:40:02	14.5	0.4	4.3	1.4	41.9	0.9	4.4
17:41:02	14.1	0.5	4.5	1.7	43.9	0.9	4.4
17:42:02	14.2	0.4	4.5	1.7	42.2	1.0	4.5
17:43:02	14.4	0.5	4.4	1.6	41.7	1.0	5.1
17:44:02	13.3	0.4	5.5	1.7	44.8	0.9	5.2
17:45:02	12.1	0.5	6.5	1.9	49.5	1.0	5.3
17:46:02	13.6	0.5	4.9	1.8	42.1	1.2	4.5
17:47:02	13.3	0.5	5.4	1.9	42.1	1.0	4.6
17:48:02	11.9	0.4	6.5	2.0	46.6	1.0	4.8
17:49:02	14.3	0.3	4.2	1.6	41.0	1.0	4.3
17:50:02	13.3	0.5	5.4	1.9	44.3	0.9	4.9
17:51:02	11.9	0.5	6.6	4.2	47.0	1.0	5.0
17:52:02	14.1	0.5	4.5	2.1	40.3	1.2	3.6
17:53:02	12.6	0.5	5.9	1.5	45.6	1.0	4.8
17:54:02	12.7	0.5	5.6	1.5	44.7	1.2	4.6
17:55:02	14.5	0.5	4.3	1.4	39.0	1.2	4.8
17:56:02	13.1	0.5	5.6	1.7	42.9	1.0	4.6
17:57:02	13.1	0.5	5.5	1.4	42.7	1.2	3.9
17:58:02	14.9	0.3	3.9	1.5	35.1	1.3	4.7
17:59:02	14.2	0.4	4.7	1.7	37.7	1.1	4.8
18:00:02	12.8	0.5	5.9	1.8	43.0	1.1	3.9
18:01:02	12.9	0.5	5.6	2.8	43.2	1.1	4.3
18:02:02	15.1	0.6	3.8	1.6	36.3	1.3	3.1
18:03:02	14.1	0.5	4.8	1.5	42.1	1.1	4.6
18:04:02	13.1	0.5	5.7	7.9	44.5	1.1	4.6
18:05:02	12.9	0.5	5.7	12.3	43.4	1.0	5.0
18:06:02	15.3	0.5	3.6	2.9	35.9	1.0	4.0
18:07:02	13.7	0.3	5.3	4.2	40.8	1.0	5.2
18:08:02	13.1	0.1	5.7	18.3	41.4	1.0	7.9
18:09:02	13.3	-0.3	5.3	24.0	40.3	1.2	20.1
18:10:02	14.2	-0.4	4.5	18.6	38.5	1.3	29.7
18:11:03	14.9	-0.3	4.0	5.8	37.2	1.2	13.0
18:12:02	13.5	-0.2	5.3	17.1	44.5	1.2	25.2
18:13:02	13.5	-0.4	5.3	18.8	44.8	1.2	35.3
18:14:02	13.4	-0.4	5.2	18.6	43.3	1.3	46.4
18:15:02	13.0	-0.4	5.5	19.2	43.4	1.3	56.2
18:16:02	14.4	-0.1	4.1	5.2	38.8	1.3	21.3
18:17:02	13.7	-0.2	5.0	3.7	42.7	1.3	17.9
18:18:02	12.8	-0.3	5.7	19.2	44.4	1.3	37.3
18:19:02	13.6	-0.5	5.0	18.8	43.4	1.3	49.8
18:20:02	14.8	-0.3	4.0	2.9	39.8	1.3	19.9
18:21:02	13.6	-0.4	5.2	1.1	43.2	1.3	19.9
18:22:02	13.2	-0.2	5.4	1.1	44.8	1.3	20.8
18:23:02	13.7	-0.2	4.8	2.5	41.9	1.2	20.3
18:24:02	15.3	-0.3	3.6	0.9	36.2	1.4	11.3
18:25:02	15.1	-0.3	3.9	0.8	38.5	1.3	14.9
18:26:02	15.3	-0.3	3.7	0.8	37.8	1.4	24.0
18:27:02	14.7	-0.4	4.3	0.8	41.0	1.3	23.1
18:28:02	13.8	-0.2	5.0	0.9	43.2	1.4	14.2
18:29:02	13.1	-0.2	5.6	2.1	46.2	1.5	12.3
18:30:02	13.4	-0.2	5.3	4.7	43.2	1.4	11.5
18:31:02	13.2	-0.2	5.5	14.5	43.8	1.3	15.4
18:32:02	13.6	-0.2	5.0	12.0	41.5	1.3	17.2
18:33:02	14.3	-0.1	4.5	1.7	42.3	1.3	9.8

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
18:34:02	13.1	-0.4	5.6	5.2	47.7	1.4	10.7
18:35:02	13.2	-0.2	5.4	9.0	45.2	1.5	14.5
18:36:02	14.8	-0.3	3.9	1.4	39.5	1.5	8.6
18:37:02	13.6	-0.2	5.3	0.6	44.5	1.6	7.5
18:38:02	12.5	-0.1	6.1	0.9	47.1	1.4	7.9
18:39:02	13.8	0.3	4.8	0.9	44.3	1.3	4.6
18:40:02	14.2	0.4	4.7	0.7	43.6	1.4	4.3
18:41:02	13.1	0.3	5.7	1.0	44.8	1.3	6.9
18:42:02	12.7	0.1	5.8	0.8	45.6	1.4	5.8
18:43:02	14.7	0.4	4.1	1.0	41.6	1.3	3.8
18:44:02	12.9	0.4	5.9	0.8	48.3	1.4	4.7
18:45:02	13.5	0.4	5.1	1.3	45.0	1.3	5.7
Avg.=	13.7	0.2	5.0	3.5	41.8	1.1	9.0

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 09:30:33
File Name = E:\CEMDATA\112391.PRN Calibration File:E:\CEMDATA\mto1123a.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:31:16	15.0	1.2	4.0	1.9	45.7	1.6	2.5
09:32:16	14.1	1.1	4.9	1.8	55.3	1.6	2.6
09:33:16	13.9	0.8	5.1	2.0	59.7	1.5	4.3
09:34:16	14.7	0.2	4.3	1.6	51.4	1.6	9.2
09:35:16	14.1	0.2	4.9	1.8	54.7	1.6	10.3
09:36:16	13.4	0.2	5.5	1.6	51.8	1.6	7.7
09:37:16	13.5	0.3	5.3	1.7	49.7	1.6	7.8
09:38:16	13.6	0.1	5.3	1.8	50.6	1.5	6.3
09:39:16	13.1	0.2	5.8	1.7	51.4	1.6	6.2
09:40:16	12.9	0.3	5.9	1.7	49.3	1.7	5.6
09:41:16	13.4	0.1	5.4	1.6	49.1	1.6	5.9
09:42:16	13.6	0.1	5.3	1.5	52.3	1.6	5.2
09:43:16	13.6	0.2	5.2	1.7	52.2	1.6	5.8
09:44:16	13.9	0.4	5.1	1.6	51.5	1.6	4.6
09:45:16	13.7	0.4	5.2	1.6	49.4	1.6	3.8
09:46:16	13.8	0.6	5.0	1.6	48.5	1.6	4.9
09:47:16	14.3	0.3	4.5	1.7	47.7	1.7	4.4
09:48:16	14.8	0.8	4.1	1.6	46.2	1.7	4.1
09:49:16	15.1	0.6	3.9	1.5	44.6	1.7	4.2
09:50:16	14.1	0.8	4.8	1.5	45.0	1.8	4.5
09:51:16	13.4	0.8	5.6	1.3	45.3	2.0	3.5
09:52:16	13.3	0.8	5.7	1.3	45.1	2.1	3.4
09:53:16	13.7	0.8	5.2	1.5	49.1	2.1	3.0
09:54:16	13.4	0.7	5.5	1.5	53.7	2.0	4.0
09:55:16	13.2	0.6	5.7	1.5	52.3	2.0	2.7
09:56:16	13.8	0.7	5.1	1.6	52.8	2.3	2.2
09:57:16	13.3	0.8	5.7	1.4	53.3	2.6	2.1
09:58:16	13.1	0.8	5.7	1.5	54.9	2.5	2.4
09:59:16	14.0	0.8	4.9	1.3	52.8	2.4	2.7
10:00:16	13.9	0.7	5.0	1.3	52.6	2.4	1.7
10:01:16	13.5	0.8	5.5	1.5	50.5	2.5	1.6
10:02:16	12.8	0.9	6.0	1.4	54.4	2.6	2.6
10:03:16	13.5	1.2	5.1	1.4	55.6	2.4	0.5
10:04:16	14.4	0.9	4.7	1.4	51.1	1.9	1.0
10:05:16	13.7	0.6	5.4	1.1	48.5	1.9	0.6
10:06:16	13.9	0.7	5.3	1.1	48.8	1.7	0.8
10:07:16	13.0	0.8	6.3	1.3	49.5	1.7	0.9
10:08:16	13.0	0.8	6.2	1.4	47.8	1.7	1.1
10:09:16	13.7	0.8	5.1	1.0	44.2	1.9	-0.1
10:10:16	13.7	0.9	5.4	1.2	46.5	1.6	-0.0
10:11:16	12.8	0.8	6.3	1.3	50.0	1.7	0.8
10:12:16	12.6	0.9	6.2	1.3	47.2	1.6	0.2
10:13:16	15.0	0.9	3.9	1.0	40.4	1.6	-0.5
10:14:16	14.7	0.7	4.3	1.0	45.7	1.5	0.6
10:15:16	13.3	0.8	5.6	1.2	51.8	1.5	-0.4
10:16:16	13.1	0.8	5.7	1.1	49.2	1.7	-0.2

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:17:16	13.0	0.8	5.8	1.1	49.0	1.7	1.6
10:18:16	12.6	0.8	5.9	1.0	51.5	1.7	0.3
10:19:16	13.9	1.1	4.7	0.9	48.2	1.8	-0.1
10:20:16	13.2	0.8	5.5	0.9	48.7	1.7	0.3
10:21:16	12.8	0.7	5.9	0.5	47.7	1.8	0.4
10:22:16	14.0	0.8	4.7	0.7	43.4	1.7	-0.2
10:23:17	13.4	0.7	5.5	0.7	48.4	1.6	-0.6
10:24:16	12.8	0.8	6.0	0.9	49.1	1.4	0.2
10:25:16	14.0	0.8	4.8	0.6	43.1	1.7	-0.9
10:26:16	14.2	0.9	4.9	0.5	44.8	1.6	-0.8
10:27:16	13.3	0.7	5.8	0.2	48.5	1.7	-0.8
10:28:16	13.1	0.6	5.9	-0.1	46.7	1.7	0.4
10:29:16	13.3	0.7	5.5	0.6	46.0	1.3	0.1
10:30:16	14.3	0.9	4.5	0.5	40.5	1.6	-0.9
10:31:18	13.4	0.5	5.5	0.3	45.6	1.5	-0.5
10:32:16	12.3	0.7	6.4	0.1	49.2	1.8	0.1
10:33:16	14.0	0.9	4.7	0.6	42.9	1.6	-0.9
10:34:21	14.2	1.0	4.7	0.5	43.8	1.4	-3.4
10:35:16	12.8	0.4	6.0	0.2	46.6	1.4	0.4
10:37:42	12.9	0.5	5.7	0.3	44.8	1.5	-1.9
10:37:43	12.9	0.5	5.7	0.3	44.8	1.5	-1.9
10:38:16	12.7	0.6	6.1	0.1	48.3	1.5	-0.4
10:39:16	14.1	0.7	4.9	0.1	43.4	1.5	-0.6
10:40:16	12.5	0.7	6.4	-0.3	47.5	1.5	-1.1
10:41:16	13.1	0.7	5.6	-0.0	41.3	1.4	-0.5
10:42:16	13.5	0.6	5.5	-0.2	41.7	1.6	0.1
10:43:16	12.8	0.9	6.2	-0.2	49.7	1.6	-0.3
10:44:16	13.4	2.8	5.4	0.1	46.3	1.5	-0.7
10:45:16	14.6	0.8	4.4	-0.2	39.2	1.6	-1.4
10:46:16	12.5	0.7	6.5	-0.0	47.8	1.3	-1.5
10:47:16	12.8	0.9	5.9	0.2	47.6	1.5	-1.0
10:48:17	14.0	0.7	4.8	0.0	42.5	1.5	-1.1
10:49:16	14.1	0.7	4.8	-0.3	42.3	1.3	-0.7
10:50:16	14.1	0.5	4.9	-0.1	42.5	1.2	-0.8
10:51:16	14.5	0.7	4.4	-0.2	40.3	1.2	0.3
10:52:16	15.2	0.7	3.8	-0.4	39.0	1.2	0.2
10:53:16	14.9	0.7	4.2	-0.2	46.3	1.2	-0.5
10:54:16	14.2	0.7	4.9	-0.2	45.7	1.2	0.2
10:55:16	13.6	0.7	5.4	-0.1	49.4	1.2	-0.6
10:56:16	12.7	0.7	6.1	-0.0	54.5	1.1	-0.5
10:57:16	12.7	0.8	6.0	-0.1	51.3	1.1	-0.2
10:58:16	13.1	0.7	5.5	0.1	48.8	1.1	-0.3
10:59:16	13.9	0.7	4.9	-0.2	44.6	1.0	-0.5
11:00:16	13.6	0.8	5.3	0.0	45.5	0.8	-1.0
11:01:16	13.5	0.8	5.3	0.3	50.3	0.8	0.2
11:02:16	13.1	0.8	5.6	0.9	50.4	1.0	1.6
11:03:16	14.0	0.7	4.6	0.5	44.5	1.0	1.2
11:04:16	15.0	0.8	3.9	0.2	43.2	1.0	0.2
11:05:16	12.2	0.9	6.6	0.0	49.9	0.9	0.8
11:06:16	11.8	1.1	6.8	0.1	52.1	0.9	0.6
11:07:16	13.5	0.9	5.1	0.0	46.3	1.0	1.3
11:08:16	14.0	0.8	4.8	-0.1	45.0	1.0	0.2
11:09:16	12.0	0.7	6.8	-0.2	52.0	1.0	0.7
11:10:17	13.4	0.9	5.3	-0.2	45.1	1.1	1.2
11:11:16	13.3	1.0	5.6	-0.0	46.2	0.9	0.9
11:12:16	12.0	0.8	6.8	0.1	49.7	0.9	0.6

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:13:16	13.8	1.1	4.9	0.1	42.9	1.1	-0.3
11:14:16	13.5	0.9	5.4	0.3	45.4	0.9	1.4
11:15:16	12.3	0.8	6.6	0.9	51.6	0.9	3.0
11:16:16	13.9	0.9	4.9	1.0	44.1	1.0	2.8
11:17:16	13.6	0.8	5.4	0.6	43.8	0.8	2.8
11:18:16	12.4	0.8	6.6	0.9	47.3	0.9	2.6
11:19:16	14.2	0.9	4.6	0.9	40.0	1.0	1.9
11:20:16	13.7	0.8	5.3	0.5	40.3	0.8	1.2
11:21:16	12.8	0.8	6.1	0.3	42.6	0.8	0.6
11:22:16	13.4	0.7	5.4	-0.0	38.8	1.1	0.6
11:23:16	14.2	0.6	4.8	-0.1	36.3	0.9	0.7
11:24:16	12.5	0.8	6.5	-0.1	43.0	0.9	0.5
11:25:16	13.6	0.7	5.1	-0.3	38.4	1.0	-0.3
11:26:16	14.3	0.5	4.7	-0.1	36.9	0.9	-0.0
11:27:16	12.8	0.8	6.1	-0.0	43.8	0.9	0.0
11:28:16	12.7	0.8	6.0	-0.0	44.3	0.8	0.1
11:29:16	14.2	0.7	4.6	-0.1	39.4	0.9	0.0
11:30:16	13.2	0.8	5.7	-0.1	42.2	0.9	0.6
11:31:16	13.1	0.6	5.7	-0.1	43.5	1.0	3.3
11:32:16	14.0	0.7	4.7	-0.2	39.1	1.1	2.6
11:33:16	14.4	0.7	4.4	-0.2	37.5	1.0	1.0
11:34:16	14.4	0.6	4.5	-0.2	38.1	1.0	2.4
11:35:16	14.8	0.3	4.1	-0.2	37.3	1.1	4.2
11:36:16	15.2	0.7	3.8	-0.4	36.0	1.3	1.9
11:37:16	14.6	0.7	4.5	-0.0	43.7	1.3	2.3
11:38:16	14.2	0.5	4.8	-0.2	43.5	1.3	1.3
11:39:16	14.1	0.7	4.9	-0.1	45.1	1.2	0.4
11:40:16	14.0	0.7	4.9	0.0	47.8	1.2	1.7
11:41:16	14.2	0.7	4.7	-0.1	47.0	1.1	1.1
11:42:16	13.6	0.7	5.3	-0.1	50.3	1.3	1.1
11:43:16	13.5	0.7	5.3	-0.2	53.3	1.2	0.0
11:44:16	13.1	0.7	5.6	0.1	54.0	1.1	-0.8
11:45:16	12.7	0.7	5.8	-0.1	54.7	1.1	-0.4
11:46:16	12.3	0.6	6.1	-0.0	55.2	1.1	0.3
11:47:16	12.4	0.6	5.9	0.0	52.9	1.3	-0.2
11:48:16	14.3	0.7	4.4	-0.2	42.5	1.4	-0.8
11:49:16	13.7	0.7	5.2	-0.6	38.8	1.3	-0.0
11:50:16	13.8	0.7	4.9	-0.6	38.1	1.4	0.2
11:51:16	14.7	0.6	4.2	-0.4	39.2	1.0	-0.8
11:52:16	13.9	0.7	5.0	-0.6	41.9	1.2	0.6
11:53:16	13.9	0.7	4.9	-0.1	41.2	1.1	-0.1
11:54:16	14.3	0.4	4.5	1.1	39.2	1.1	6.3
11:55:16	14.7	-0.0	4.2	1.9	38.8	1.2	13.5
11:56:16	14.5	-0.0	4.5	2.0	42.3	1.2	18.0
11:57:16	14.3	-0.1	4.7	2.4	42.3	1.2	16.9
11:58:16	14.7	0.0	4.3	1.6	40.1	1.2	11.0
11:59:16	14.5	0.0	4.6	1.1	41.3	1.2	8.5
12:00:16	14.4	0.0	4.6	1.7	41.3	1.3	12.4
12:01:16	14.2	0.0	4.7	3.6	41.1	1.1	23.9
12:02:16	13.3	0.1	5.5	4.2	43.0	1.0	26.8
12:03:17	12.5	0.1	6.2	4.6	46.2	0.9	22.9
12:04:16	12.6	0.1	6.1	7.4	46.6	1.0	22.3
12:05:17	13.7	0.2	4.9	3.6	46.7	1.1	11.7
12:06:16	13.8	0.1	5.1	0.8	44.4	0.9	6.2
12:07:16	13.4	0.3	5.4	0.3	43.5	0.9	9.0
12:08:16	13.5	0.1	5.3	2.8	44.2	0.8	21.8

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:09:16	12.7	0.1	6.2	4.9	48.0	0.8	23.2
12:10:16	14.2	0.1	4.6	1.8	40.8	0.9	10.1
12:11:16	14.3	0.2	4.7	0.4	43.0	0.6	6.2
12:12:16	13.5	0.2	5.5	-0.1	46.3	0.7	7.7
12:13:16	13.6	0.1	5.4	-0.2	46.5	0.7	12.9
12:14:16	13.3	0.2	5.6	-0.1	44.2	0.5	14.6
12:15:16	13.7	0.2	5.2	-0.1	41.7	0.6	13.2
12:16:16	13.9	0.2	5.0	0.3	40.8	0.6	17.4
12:17:16	14.4	0.1	4.5	0.1	39.7	0.7	20.4
12:18:16	14.8	0.2	4.2	0.1	38.7	0.6	20.5
12:19:16	13.9	0.2	5.0	0.2	43.7	0.6	15.4
12:20:16	12.9	0.2	5.8	0.4	44.4	0.5	20.9
12:21:16	13.0	0.1	5.6	0.7	44.2	0.6	25.1
12:22:16	14.3	0.0	4.5	1.0	41.0	0.6	39.0
12:23:16	15.1	0.0	3.8	0.4	37.3	0.6	38.6
12:24:16	15.3	0.1	3.7	0.3	38.2	0.6	30.4
12:25:16	13.9	0.1	5.0	0.4	41.4	0.5	27.0
12:26:16	13.3	0.2	5.3	0.1	40.7	0.6	16.5
12:27:16	13.4	0.2	5.1	-0.1	40.7	0.6	13.2
12:28:16	13.2	0.2	5.5	-0.1	42.4	0.6	14.3
12:29:16	12.4	0.2	6.2	0.0	44.4	0.6	12.2
12:30:16	13.2	0.2	5.2	-0.1	39.6	0.7	7.8
12:31:16	13.9	0.3	4.8	0.0	38.7	0.6	4.7
12:32:16	13.4	0.2	5.3	0.0	41.0	0.6	7.6
12:33:19	14.2	0.1	4.6	0.4	39.2	0.5	10.1
12:34:16	15.0	0.1	3.9	0.1	38.0	0.6	11.5
12:35:16	15.7	0.2	3.3	0.4	35.0	0.6	12.2
12:36:16	16.5	0.1	2.6	0.3	32.7	0.7	9.6
12:37:16	16.4	0.1	2.6	0.2	33.7	0.9	8.5
12:38:16	15.5	0.1	3.1	0.3	38.4	0.8	7.2
12:39:16	13.9	0.1	4.2	0.3	47.3	0.9	5.9
12:40:16	12.5	0.2	5.4	0.5	52.4	0.9	6.6
12:41:16	11.5	0.2	6.2	0.7	60.7	0.8	5.2
12:42:16	11.3	0.2	6.3	0.9	65.5	0.9	4.6
12:43:16	13.4	0.6	4.6	1.0	57.4	0.9	3.7
12:44:16	14.1	0.8	4.3	0.8	48.9	0.8	3.4
12:45:16	13.0	0.3	5.6	1.1	53.5	0.7	5.2
12:46:16	13.5	0.5	5.2	1.0	49.6	0.8	4.7
12:47:16	13.7	0.2	5.2	0.8	51.4	0.9	5.7
12:48:16	12.9	0.4	5.9	0.9	56.5	0.8	5.5
12:49:16	13.2	0.5	5.4	1.0	54.7	1.0	4.1
12:50:16	14.0	0.6	4.9	1.1	56.5	0.8	3.8
12:51:16	13.7	0.7	5.1	1.1	56.4	0.8	4.1
12:52:16	13.1	0.3	5.8	1.1	60.9	0.8	4.5
12:53:16	12.8	0.2	5.9	1.0	53.5	0.9	4.6
12:54:16	14.3	0.7	4.4	0.7	48.6	0.9	4.0
12:55:16	12.1	0.8	6.6	0.8	53.8	0.8	3.6
12:56:16	12.3	1.0	6.2	1.0	55.1	0.9	1.9
12:57:16	13.8	0.9	4.8	0.8	50.0	1.0	1.8
12:58:16	12.7	0.8	5.9	0.8	48.8	0.8	2.1
12:59:16	11.9	0.9	6.4	0.7	48.0	0.9	2.4
13:00:16	13.5	1.2	5.0	0.4	41.7	0.9	0.7
13:01:16	12.9	1.0	5.7	0.5	44.8	0.8	1.2
13:02:17	11.6	1.1	6.8	0.4	49.5	0.9	1.4
13:03:16	14.0	0.9	4.6	0.3	41.2	0.9	0.9
13:04:16	12.1	0.9	6.7	0.2	47.4	0.8	1.4

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
13:05:16	12.7	1.2	5.9	0.3	42.9	0.8	0.9
13:06:16	14.0	0.8	4.9	0.3	39.4	0.9	-0.5
13:07:16	12.0	0.8	6.8	0.2	47.0	0.9	0.6
13:08:16	13.6	0.9	5.0	0.3	41.9	0.9	-0.5
13:09:16	13.9	1.0	4.9	0.3	40.5	0.8	-0.9
13:10:16	11.8	0.9	7.1	0.3	51.5	0.8	0.7
13:11:16	14.0	0.9	4.7	0.2	42.0	0.9	-0.3
13:12:16	14.3	0.8	4.7	-0.1	40.5	0.9	-0.4
13:13:16	12.3	0.8	6.5	0.2	51.9	0.8	-0.1
13:14:16	14.1	0.8	4.6	0.1	47.6	0.9	-0.1
13:15:16	13.2	0.7	5.6	-0.2	43.7	0.9	-0.0
13:16:16	12.5	0.7	6.2	-0.2	51.6	0.9	-0.6
13:17:16	14.6	0.7	4.3	0.0	45.9	1.0	-0.9
13:18:16	13.9	0.7	5.2	-0.1	47.1	0.8	-0.1
13:19:16	12.4	0.7	6.3	-0.0	54.4	0.9	-0.5
13:20:16	13.7	0.7	4.9	-0.0	52.9	1.1	-0.3
13:21:16	13.6	0.7	5.3	-0.1	53.3	0.8	-1.1
13:22:16	12.3	0.7	6.3	0.0	62.8	0.9	-1.2
13:23:16	14.1	0.6	4.5	0.2	55.2	0.9	-1.7
13:24:16	14.2	0.7	4.7	-0.1	47.7	0.9	-1.6
13:25:16	13.9	0.7	5.0	-0.4	45.7	0.7	-0.0
13:26:16	14.5	0.7	4.5	-0.4	42.7	0.7	-0.5
13:27:16	14.8	0.7	4.3	-0.4	42.3	0.7	0.2
13:28:16	14.2	0.7	4.9	-0.5	44.7	0.7	1.4
13:29:16	13.7	0.8	5.4	-0.3	46.4	0.6	0.8
13:30:16	13.5	0.8	5.5	-0.3	47.5	0.6	0.5
13:31:16	13.0	0.7	5.9	-0.5	48.0	0.8	0.7
13:32:16	14.4	0.8	4.4	-0.4	43.9	0.7	0.4
13:33:16	12.7	0.8	6.2	-0.3	47.4	0.5	0.3
13:34:16	12.0	0.9	6.7	-0.2	50.6	0.6	0.1
13:35:16	14.3	1.0	4.4	-0.4	44.2	0.6	-0.0
13:36:16	13.2	0.7	5.6	-0.3	46.8	0.5	0.6
13:37:16	11.3	1.0	7.3	0.4	55.4	0.5	0.5
13:38:16	13.7	1.2	4.8	-0.4	47.3	0.7	0.4
13:39:16	14.3	1.2	4.5	-0.2	42.9	0.6	0.4
13:40:17	12.9	0.8	5.9	-0.4	47.0	0.5	1.1
13:41:16	12.8	0.9	5.8	-0.1	49.4	0.6	1.3
13:42:16	14.7	1.2	4.1	-0.0	45.1	0.5	1.2
13:43:16	13.7	0.4	5.3	-0.1	47.5	0.4	1.7
13:44:16	12.9	0.7	6.0	-0.0	46.0	0.3	1.1
13:45:16	13.6	0.7	5.1	0.1	44.7	0.6	1.4
13:46:16	13.6	0.9	5.3	0.1	44.7	0.4	0.8
13:47:16	12.8	0.5	5.9	0.0	44.3	0.4	1.6
13:48:16	14.0	0.5	4.7	0.1	40.5	0.4	0.7
13:49:16	13.4	0.6	5.4	-0.2	42.2	0.3	2.0
13:50:16	12.6	0.6	6.2	-0.0	47.2	0.3	2.1
13:51:16	14.6	1.2	4.2	0.1	42.1	0.5	2.3
13:52:16	13.3	0.9	5.7	-0.1	43.4	0.4	2.0
13:53:16	11.9	1.2	6.9	-0.0	48.2	0.5	3.0
13:54:16	14.5	1.1	4.2	0.2	41.8	0.4	1.6
13:55:16	12.3	0.7	6.5	0.2	49.6	0.4	2.4
13:56:17	5.1	2.6	3.3	-0.5	17.2	0.1	3.1

CALIBRATION SUMMARY
11-18-1991 07:55:17
CALIBRATION FILE NAME =E:\CEMDATA\MTO1118.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0016	18.00	7.255	2.482	-0.00
2	CO	PPMV	0.00	0.0000	100.00	0.100	998.991	-0.03
3	CO2	%V	0.00	-.0000	18.00	0.002	9728.321	0.20
4	SO2	PPMV	0.00	0.0117	202.00	0.419	495.540	-5.78
5	NOx	PPMV	0.00	-.0025	202.00	0.204	977.719	2.44
6	THC	PPMV	0.00	0.0786	96.40	9.618	10.106	-0.79
7	HCl	PPMV	0.00	0.1547	93.60	4.530	21.393	-3.31

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-18-1991 19:01:37
CALIBRATION FILE NAME =E:\CEMDATA\MT01118B.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0144	18.00	7.294	2.472	-0.04
2	CO	PPMV	0.00	0.3068	100.00	0.100	1006.508	-0.79
3	CO2	%V	0.00	0.0060	18.00	0.002	9875.908	-0.07
4	SO2	PPMV	0.00	0.0030	202.00	0.416	489.263	-1.47
5	NOx	PPMV	0.00	-.0020	202.00	0.199	1002.535	2.00
6	THC	PPMV	0.00	0.0942	96.40	9.676	10.060	-0.95
7	HCl	PPMV	0.00	0.1300	93.60	4.131	22.394	-3.04

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-18-1991 19:02:13

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.032	18.00	18.10	0.13	0.39
2	CO	PPMV	0.000	0.752	100.00	100.01	0.75	0.01
3	CO2	%V	0.000	0.269	18.00	0.00	1.34	-90.00
4	SO2	PPMV	0.000	%-4.295	202.00	200.30	-0.86	-0.34
5	NOx	PPMV	0.000	0.491	202.00	197.49	0.05	-0.45
6	THC	PPMV	0.000	0.158	96.40	96.99	0.16	0.59
7	HCl	PPMV	0.000	0.000	93.60	0.00	0.00	-93.60

Press Shift-PrtSc to Print Out Table
Press (C) to Continue

CALIBRATION SUMMARY
11-18-1991 19:26:21
CALIBRATION FILE NAME =E:\CEMDATA\MTO1118C.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0144	18.00	7.294	2.472	-0.04
2	CO	PPMV	0.00	0.0008	100.00	0.100	1006.508	-0.79
3	CO2	%V	0.00	0.0000	18.00	0.002	9875.908	-0.07
4	SO2	PPMV	0.00	0.0030	202.00	0.416	489.263	-1.47
5	NOx	PPMV	0.00	-.0020	202.00	0.199	1002.535	2.00
6	THC	PPMV	0.00	0.0942	96.40	9.676	10.060	-0.95
7	HCl	PPMV	0.00	0.0446	93.60	3.994	23.697	-1.06

Press Shift-PrtSc to Print Out Table

CEM INSTRUMENT DRIFT SUMMARY
11-18-1991 19:28:01

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	100.00	0.00	0.00	%-100.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	%-1.999	97.60	90.40	-2.00	-3.20

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

HCl CAL ONLY

CALIBRATION SUMMARY
11-17-1991 09:41:09
CALIBRATION FILE NAME #: CEMDATA [illegible]

[illegible]	Comp		Span	
[illegible]	Resp	[illegible]	Resp.	

Press Shift-PrtSc to Print Cal Table
Press <C> to Continue

CALIBRATION SUMMARY
11-17-1991 09:40:33
CALIBRATION FILE NAME =E:\CEMDATA\MTO1117A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0118	18.00	7.558	2.385	-0.03
2	CO	PPMV	0.00	-.0022	200.00	0.403	492.963	1.11
3	CO2	%V	0.00	-.0000	18.00	0.002	9760.520	0.14
4	SO2	PPMV	0.00	-.0043	202.00	0.437	457.545	1.96
5	NOx	PPMV	0.00	-.0022	202.00	0.203	986.450	2.16
6	THC	PPMV	0.00	-.0711	96.40	9.644	9.923	0.71
7	HCl	PPMV	0.00	0.1547	93.60	4.530	21.393	-3.31

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

RADIAN CORPORATION QC O2=10 CO=100 CH4=48.5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 09:44:40
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:44:40	10.0	99.5	-0.5	4.1	-0.0	44.6	-2.3
09:44:40	10.0	99.5	-0.5	4.1	-0.0	44.6	-2.3
09:44:45	10.0	99.4	-0.2	2.4	-0.1	44.5	-1.4
09:44:55	10.0	99.4	-0.5	2.1	-0.2	44.5	-1.4
09:45:05	10.0	99.3	-0.5	1.6	-0.2	44.5	-1.4
09:45:15	10.0	99.4	-0.5	1.5	-0.2	44.6	-1.5
09:45:25	10.0	99.3	-0.4	1.0	-0.2	44.6	-1.2
09:45:35	10.0	99.5	0.1	1.0	-0.1	44.6	-0.8
09:45:45	10.0	99.3	0.1	0.6	-0.1	44.6	-0.9
Avg.=	10.0	99.4	-0.3	2.0	-0.1	44.6	-1.5

RADIAN CORPORATION QC SO2=80 NOx=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 09:48:44
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:48:45	1.3	1.5	-0.0	71.9	76.8	0.2	-1.9
09:48:55	1.3	1.3	-0.2	72.8	76.4	-0.7	-2.2
09:49:05	1.3	1.2	-0.2	72.5	76.3	-0.8	-2.8
09:49:15	1.3	1.3	-0.4	72.2	76.3	-0.7	-2.2
09:49:25	1.3	1.2	-0.3	72.7	76.3	-0.8	-2.1
09:49:35	1.3	1.2	-0.3	72.7	76.4	-0.6	-2.6
09:49:45	1.2	1.3	-0.3	72.9	76.4	-0.8	-2.6
09:49:55	1.2	1.2	-0.2	73.1	76.4	-0.7	-3.3
09:50:05	1.2	1.3	-0.3	73.2	76.4	-0.8	-3.4
09:50:15	1.2	1.2	-0.3	73.1	76.4	-0.8	-3.7
09:50:25	1.2	1.3	-0.3	73.7	76.4	-0.8	-1.7
09:50:35	1.2	1.4	-0.2	73.8	76.5	-0.8	-0.8
09:50:45	1.2	1.3	-0.2	74.0	76.7	-0.7	-1.9
09:50:55	1.2	1.3	-0.3	74.0	76.4	-0.8	-3.2
09:51:05	1.2	1.4	-0.3	74.1	76.4	-0.8	-3.7
09:51:15	1.2	1.4	-0.3	74.2	76.4	-0.9	-2.8
Avg.=	1.2	1.3	-0.2	73.2	76.4	-0.7	-2.6

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[illegible] Out Table

[illegible]

[illegible] INSTRUMENT [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Should read MT I 1118C.CAL

CALIBRATION SUMMARY

[illegible]

CALIBRATION FILE NAME [illegible]

[illegible]

Press [illegible] Print Out Table

Press [illegible] to Continue

CALIBRATION SUMMARY
11-19-1991 09:02:39
CALIBRATION FILE NAME =: [illegible]

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[illegible]	[illegible]	[illegible]	[illegible]

[illegible] to Print Out Table
Press [illegible] to Continue

CALIBRATION SUMMARY
11-19-1991 21:15:23
CALIBRATION FILE NAME =c:\CEMDATA\ati1119c.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0010	18.00	0.075	242.007	-0.24
2	CO	PPMV	0.00	0.0020	200.00	0.403	498.002	-1.00
3	CO2	%V	0.00	0.0013	18.00	0.984	18.324	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	50212.613	-10.21
5	NOx	PPMV	0.00	-.0003	202.00	0.194	1039.446	0.30
6	THC	PPMV	0.00	0.1178	96.40	7.848	12.471	-1.47
7	HCl	PPMV	0.00	0.2425	870.00	6.658	135.603	-32.88

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-19-1991 21:15:52

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.174	18.00	19.18	0.70	4.73
2	CO	PPMV	0.000	-.641	200.00	204.92	-0.13	0.98
3	CO2	%V	0.000	0.012	18.00	18.77	0.06	3.86
4	SO2	PPMV	0.000	%-1.647	202.00	200.33	-0.33	-0.33
5	NOx	PPMV	0.000	%-1.617	202.00	194.89	-0.16	-0.71
6	THC	PPMV	0.000	-.713	96.40	80.44	-0.71	-15.96
7	HCl	PPMV	0.000	0.000	870.00	0.00	0.00	-87.00

CALIBRATION SUMMARY
11-19-1991 22:50:39
CALIBRATION FILE NAME =c:\CEMDATA\mti1119d.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0010	18.00	0.075	242.007	-0.24
2	CO	PPMV	0.00	0.0020	200.00	0.403	498.502	-1.00
3	CO2	%V	0.00	0.0013	18.00	0.984	18.324	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	50212.621	-10.21
5	NOx	PPMV	0.00	-.0003	202.00	0.194	1039.446	0.30
6	THC	PPMV	0.00	0.1178	96.40	7.848	12.471	-1.47
7	HCl	PPMV	0.00	0.4481	870.00	6.765	137.735	-61.72

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-19-1991 22:51:26

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	200.00	0.00	0.00	-40.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	%27.883	870.00	884.42	2.79	1.44

CALIBRATION SUMMARY
11-19-1991 22:50:51
CALIBRATION FILE NAME =E:\CEMDATA\mto1119d.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0201	18.00	7.238	2.494	-0.05
2	CO	PPMV	0.00	0.0008	100.00	0.100	1007.769	-0.83
3	CO2	%V	0.00	-.0001	18.00	0.002	9533.768	0.55
4	SO2	PPMV	0.00	0.0240	202.00	0.397	541.307	-12.99
5	NOx	PPMV	0.00	-.0017	202.00	0.190	1054.434	1.84
6	THC	PPMV	0.00	-.0703	96.40	8.127	11.761	0.83
7	HCl	PPMV	0.00	0.3879	93.60	4.189	24.622	-9.55

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-19-1991 22:51:34

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	100.00	0.00	0.00	%-100.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	9.025	93.60	97.20	9.03	3.60

CALIBRATION SUMMARY
11-19-1991 07:57:02
CALIBRATION FILE NAME =E:\CEMDATA\MT01119A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0144	18.00	7.294	2.472	-0.04
2	CO	PPMV	0.00	0.0008	100.00	0.100	1006.508	-0.79
3	CO2	%V	0.00	0.0000	18.00	0.002	9875.908	-0.07
4	SO2	PPMV	0.00	0.0030	202.00	0.416	489.263	-1.47
5	NOx	PPMV	0.00	-.0020	202.00	0.199	1002.535	2.00
6	THC	PPMV	0.00	0.0942	96.40	9.676	10.060	-0.95
7	HCl	PPMV	0.00	-.0012	93.60	4.034	23.196	0.03

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-19-1991 09:03:07
CALIBRATION FILE NAME =E:\CEMDATA\MT01119B.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0093	18.00	7.274	2.478	-0.02
2	CO	PPMV	0.00	0.0008	100.00	0.100	1010.992	-0.80
3	CO2	%V	0.00	0.0000	18.00	0.002	9967.951	-0.24
4	SO2	PPMV	0.00	0.0048	202.00	0.409	499.539	-2.42
5	NOx	PPMV	0.00	-.0018	202.00	0.206	972.682	1.79
6	THC	PPMV	0.00	0.1231	96.40	9.443	10.344	-1.27
7	HCl	PPMV	0.00	-.0012	93.60	4.034	23.196	0.03

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-19-1991 21:07:56
CALIBRATION FILE NAME =E:\CEMDATA\mto1119c.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0201	18.00	7.274	2.481	-0.05
2	CO	PPMV	0.00	0.0008	100.00	0.100	1007.769	-0.83
3	CO2	%V	0.00	-.0001	18.00	0.002	9533.768	0.55
4	SO2	PPMV	0.00	0.0240	202.00	0.397	541.307	-12.99
5	NOx	PPMV	0.00	-.0017	202.00	0.190	1054.434	1.84
6	THC	PPMV	0.00	-.0703	96.40	9.443	10.134	0.71
7	HCl	PPMV	0.00	-.0012	93.60	4.034	23.196	0.03

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-19-1991 21:12:26

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.027	18.00	0.00	0.11	-72.00
2	CO	PPMV	0.000	0.027	100.00	100.35	0.03	0.35
3	CO2	%V	0.000	-.820	18.00	0.00	-4.10	-90.00
4	SO2	PPMV	0.000	9.570	202.00	195.98	1.91	-1.20
5	NOx	PPMV	0.000	0.093	202.00	186.43	0.01	-1.56
6	THC	PPMV	0.000	%-2.000	96.40	0.00	-2.00	-96.40
7	HCl	PPMV	0.000	0.000	93.60	0.00	0.00	-93.60

CALIBRATION SUMMARY
11-20-1991 11:13:27
CALIBRATION FILE NAME =c:\CEMDATA\mti1120.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0010	18.00	0.075	242.007	-0.24
2	CO	PPMV	0.00	0.0020	200.00	0.403	498.802	-1.00
3	CO2	%V	0.00	0.0013	18.00	0.984	18.324	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	50212.621	-10.21
5	NOx	PPMV	0.00	-.0003	202.00	0.194	1039.446	0.30
6	THC	PPMV	0.00	0.1178	96.40	7.848	12.471	-1.47
7	HCl	PPMV	0.00	0.5213	870.00	4.485	219.513	-114.43

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-20-1991 11:13:46

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	200.00	0.00	0.00	-40.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	%10.082	870.00	555.97	1.01	-31.40

CALIBRATION SUMMARY
11-20-1991 11:57:02
CALIBRATION FILE NAME =c:\CEMDATA\ati1120a.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	-.0006	18.00	0.075	238.315	0.14
2	CO	PPMV	0.00	-.0025	200.00	0.397	500.940	1.27
3	CO2	%V	0.00	0.0015	18.00	0.985	18.293	-0.03
4	SO2	PPMV	0.00	0.0003	202.00	0.004	52311.105	-15.27
5	NOx	PPMV	0.00	0.0004	202.00	0.203	996.700	-0.45
6	THC	PPMV	0.00	-.0555	96.40	9.470	10.120	0.56
7	HCl	PPMV	0.00	0.5213	870.00	4.485	219.513	-114.43

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-20-1991 15:33:25
CALIBRATION FILE NAME =c:\CEMDATA\MTI1120C.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0000	18.00	0.075	239.294	-0.01
2	CO	PPMV	0.00	-.0014	200.00	0.384	518.833	0.71
3	CO2	%V	0.00	0.0016	18.00	0.974	18.503	-0.03
4	SO2	PPMV	0.00	0.0002	202.00	0.004	50773.035	-8.10
5	NOx	PPMV	0.00	0.0003	202.00	0.195	1035.775	-0.32
6	THC	PPMV	0.00	-.0214	96.40	9.356	10.280	0.22
7	HCl	PPMV	0.00	0.5213	870.00	4.485	219.513	-114.43

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-20-1991 15:33:48

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.144	18.00	18.07	0.58	0.28
2	CO	PPMV	0.000	0.584	200.00	193.69	0.12	-1.26
3	CO2	%V	0.000	0.002	18.00	17.80	0.01	-1.01
4	SO2	PPMV	0.000	%-6.919	202.00	201.20	-1.38	-0.16
5	NOx	PPMV	0.000	-.142	202.00	194.24	-0.01	-0.78
6	THC	PPMV	0.000	0.345	96.40	95.25	0.35	-1.15
7	HCl	PPMV	0.000	0.000	870.00	0.00	0.00	-87.00

CALIBRATION SUMMARY
11-20-1991 23:16:03
CALIBRATION FILE NAME =c:\CEMDATA\MT111120D.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.2009	18.00	0.077	237.439	-0.22
2	CO	PPMV	0.00	-.0071	200.00	0.397	494.907	1.53
3	CO2	%V	0.00	0.0063	18.00	0.986	18.378	-0.12
4	SO2	PPMV	0.00	0.0001	202.00	0.004	51678.164	-7.48
5	NOx	PPMV	0.00	-.0000	202.00	0.198	1020.740	0.01
6	THC	PPMV	0.00	-.0008	96.40	9.274	10.394	0.01
7	HCl	PPMV	0.00	0.5395	870.00	4.486	220.441	-118.93

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-20-1991 23:16:12

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.212	18.00	18.35	0.85	1.41
2	CO	PPMV	0.000	%-2.988	200.00	206.68	-0.60	1.34
3	CO2	%V	0.000	0.087	18.00	18.21	0.43	1.05
4	SO2	PPMV	0.000	-.752	202.00	197.71	-0.15	-0.86
5	NOx	PPMV	0.000	-.328	202.00	204.65	-0.03	0.26
6	THC	PPMV	0.000	0.211	96.40	95.56	0.21	-0.84
7	HCl	PPMV	0.000	3.998	870.00	870.33	0.40	0.03

CALIBRATION SUMMAR

11-20-1991 11:06:30

CALIBRATION FILE NAME =E:\CEMDATA\MT01120.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0201	18.00	7.238	2.494	-0.05
2	CO	PPMV	0.00	0.0008	100.00	0.100	1007.769	-0.83
3	CO2	%V	0.00	-.0001	18.00	0.002	9533.768	0.55
4	SO2	PPMV	0.00	0.0240	202.00	0.397	541.307	-12.99
5	NOx	PPMV	0.00	-.0017	202.00	0.190	1054.434	1.84
6	THC	PPMV	0.00	-.0703	96.40	8.127	11.761	0.83
7	HCl	PPMV	0.00	0.4515	93.60	4.219	24.845	-11.22

Press Shift-PrtSc to Print Out Table

Press <C> to Continue

CALIBRATION SUMMARY
11-20-1991 11:57:06
CALIBRATION FILE NAME =E:\CEMDATA\MTO1120A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0093	18.00	7.590	2.375	-0.02
2	CO	PPMV	0.00	0.0009	100.00	0.100	1009.189	-0.93
3	CO2	%V	0.00	0.0023	18.00	0.805	22.417	-0.05
4	SO2	PPMV	0.00	0.0303	202.00	0.420	519.034	-15.74
5	NOx	PPMV	0.00	-.0015	202.00	0.203	985.977	1.47
6	THC	PPMV	0.00	0.0088	96.40	9.433	10.229	-0.09
7	HCl	PPMV	0.00	0.4515	93.60	4.219	24.845	-11.22

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-20-1991 12:16:41
CALIBRATION FILE NAME =E:\CEMDATA\MT01120B.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0093	18.00	7.590	2.375	-0.02
2	CO	PPMV	0.00	0.0009	100.00	0.100	1009.190	-0.93
3	CO2	%V	0.00	0.0023	18.00	0.805	22.417	-0.05
4	SO2	PPMV	0.00	0.0303	202.00	0.420	519.034	-15.74
5	NOx	PPMV	0.00	-.0015	202.00	0.203	985.977	1.47
6	THC	PPMV	0.00	0.0043	96.40	9.608	10.038	-0.04
7	HCl	PPMV	0.00	0.4515	93.60	4.219	24.845	-11.22

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-20-1991 15:37:48
CALIBRATION FILE NAME =E:\CEMDATA\MT01120C.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0141	18.00	7.627	2.364	-0.03
2	CO	PPMV	0.00	0.0007	100.00	0.097	1039.585	-0.68
3	CO2	%V	0.00	0.0022	18.00	0.813	22.189	-0.05
4	SO2	PPMV	0.00	0.0012	202.00	0.393	515.678	-0.64
5	NOx	PPMV	0.00	-.0014	202.00	0.200	1001.295	1.43
6	THC	PPMV	0.00	-.0331	96.40	9.269	10.364	0.34
7	HCl	PPMV	0.00	0.4515	93.60	4.219	24.845	-11.22

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-20-1991 15:38:10

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.011	18.00	18.09	0.05	0.35
2	CO	PPMV	0.000	-.275	100.00	96.80	-0.27	-3.20
3	CO2	%V	0.000	-.002	18.00	18.18	-0.01	0.92
4	SO2	PPMV	0.000	%-15.099	202.00	188.22	-3.02	-2.76
5	NOx	PPMV	0.000	0.065	202.00	198.97	0.01	-0.30
6	THC	PPMV	0.000	-.375	96.40	92.99	-0.38	-3.41
7	HCl	PPMV	0.000	0.000	93.60	0.00	0.00	-93.60

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-20-1991 23:13:34
CALIBRATION FILE NAME =E:\CEMDATA\MT01120D.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0290	18.00	7.637	2.366	-0.07
2	CO	PPMV	0.00	0.0006	100.00	0.101	994.371	-0.56
3	CO2	%V	0.00	0.0040	18.00	0.827	21.883	-0.09
4	SO2	PPMV	0.00	-.0022	202.00	0.388	518.156	1.14
5	NOx	PPMV	0.00	-.0012	202.00	0.198	1013.312	1.18
6	THC	PPMV	0.00	-.0443	96.40	9.191	10.438	0.46
7	HCl	PPMV	0.00	0.5618	93.60	3.941	27.700	-15.56

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-20-1991 23:13:45

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.035	18.00	18.02	0.14	0.10
2	CO	PPMV	0.000	-.094	100.00	104.45	-0.09	4.45
3	CO2	%V	0.000	0.040	18.00	18.29	0.20	1.46
4	SO2	PPMV	0.000	%-1.772	202.00	199.26	-0.35	-0.55
5	NOx	PPMV	0.000	0.259	202.00	199.86	0.03	-0.21
6	THC	PPMV	0.000	-.116	96.40	95.60	-0.12	-0.80
7	HCl	PPMV	0.000	2.740	93.60	86.69	2.74	-6.91

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-21-1991 10:55:47
CALIBRATION FILE NAME =c:\CEMDATA\MTI1121.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0009	18.00	0.077	237.439	-0.22
2	CO	PPMV	0.00	-.0071	200.00	0.397	494.907	3.53
3	CO2	%V	0.00	0.0063	18.00	0.986	18.378	-0.12
4	SO2	PPMV	0.00	0.0001	202.00	0.004	51678.164	-7.48
5	NOx	PPMV	0.00	-.0000	202.00	0.198	1020.740	0.01
6	THC	PPMV	0.00	-.0008	96.40	9.274	10.394	0.01
7	HCl	PPMV	0.00	0.5008	773.00	3.980	227.421	-132.08

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 10:56:02

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	200.00	0.00	0.00	-40.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	9.098	773.00	758.37	0.91	-1.46

CALIBRATION SUMMARY
11-21-1991 11:22:11
CALIBRATION FILE NAME =c:\CEMDATA\MTI1121A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	-.0001	18.00	0.074	244.331	0.02
2	CO	PPMV	0.00	-.0006	200.00	0.387	515.408	0.31
3	CO2	%V	0.00	0.0009	18.00	0.962	18.731	-0.02
4	SO2	PPMV	0.00	0.0001	202.00	0.004	51698.559	-7.56
5	NOx	PPMV	0.00	-.0005	202.00	0.198	1018.041	0.55
6	THC	PPMV	0.00	0.0008	96.40	9.529	10.126	-0.09
7	HCl	PPMV	0.00	0.5808	773.00	3.980	227.421	-132.08

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 11:22:18

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.236	18.00	17.26	-0.94	-2.97
2	CO	PPMV	0.000	3.237	200.00	195.28	0.65	-0.94
3	CO2	%V	0.000	-.099	18.00	17.56	-0.50	-2.19
4	SO2	PPMV	0.000	0.080	202.00	0.00	0.02	-40.40
5	NOx	PPMV	0.000	-.536	202.00	0.00	-0.05	-20.20
6	THC	PPMV	0.000	0.100	96.40	99.05	0.10	2.65
7	HCl	PPMV	0.000	0.000	773.00	0.00	0.00	-77.30

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-21-1991 11:27:30
CALIBRATION FILE NAME =c:\CEMDATA\MTI1121A.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	-.0001	18.00	0.074	244.331	0.02
2	CO	PPMV	0.00	-.0006	200.00	0.387	515.408	0.31
3	CO2	%V	0.00	0.0009	18.00	0.962	18.731	-0.02
4	SO2	PPMV	0.00	0.0001	202.00	0.004	52264.270	-7.65
5	NOx	PPMV	0.00	-.0005	202.00	0.200	1008.531	0.54
6	THC	PPMV	0.00	0.0088	96.40	9.529	10.126	-0.09
7	HCl	PPMV	0.00	0.5808	773.00	3.980	227.421	-132.08

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 11:27:52

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.236	18.00	17.26	-0.94	-2.97
2	CO	PPMV	0.000	3.237	200.00	195.28	0.65	-0.94
3	CO2	%V	0.000	-.099	18.00	17.56	-0.50	-2.19
4	SO2	PPMV	0.000	0.080	202.00	199.81	0.02	-0.44
5	NOx	PPMV	0.000	-.536	202.00	203.91	-0.05	0.19
6	THC	PPMV	0.000	0.100	96.40	99.05	0.10	2.65
7	HCl	PPMV	0.000	0.000	773.00	0.00	0.00	-77.30

CALIBRATION SUMMARY
11-21-1991 18:08:53
CALIBRATION FILE NAME =c:\CEMDATA\MTI1121B.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	-.0014	18.00	0.077	229.178	0.33
2	CO	PPMV	0.00	-.0158	200.00	0.382	502.475	7.95
3	CO2	%V	0.00	0.0009	18.00	0.989	18.212	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	48534.574	-8.51
5	NOx	PPMV	0.00	0.0007	202.00	0.197	1028.492	-0.73
6	THC	PPMV	0.00	0.0574	96.40	9.493	10.216	-0.59
7	HCl	PPMV	0.00	0.5581	773.00	3.994	224.979	-125.56

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 18:09:41

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.334	18.00	18.86	-1.34	3.42
2	CO	PPMV	0.000	%-7.851	200.00	197.30	-1.57	-0.54
3	CO2	%V	0.000	-.001	18.00	18.51	-0.00	2.56
4	SO2	PPMV	0.000	1.514	202.00	219.04	0.30	3.41
5	NOx	PPMV	0.000	1.256	202.00	199.34	0.13	-0.27
6	THC	PPMV	0.000	0.492	96.40	96.04	0.49	-0.36
7	HCl	PPMV	0.000	%-5.157	773.00	776.23	-0.52	0.32

CALIBRATION SUMMARY
11-21-1991 18:05:51
CALIBRATION FILE NAME =E:\CEMDATA\MT01121B.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0282	18.00	7.609	2.374	-0.07
2	CO	PPMV	0.00	0.0001	200.00	0.042	4775.583	-0.29
3	CO2	%V	0.00	0.0046	18.00	0.824	21.963	-0.10
4	SO2	PPMV	0.00	-.0049	202.00	0.391	510.519	2.52
5	NOx	PPMV	0.00	-.0010	202.00	0.199	1010.835	0.96
6	THC	PPMV	0.00	0.0500	96.40	9.557	10.140	-0.51
7	HCl	PPMV	0.00	0.7031	96.30	4.191	27.610	-19.41

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 18:05:57

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.028	18.00	18.35	0.11	1.42
2	CO	PPMV	0.000	-.563	200.00	197.99	-0.56	-2.01
3	CO2	%V	0.000	-.011	18.00	18.15	-0.06	0.73
4	SO2	PPMV	0.000	%-1.606	202.00	209.14	-0.32	1.43
5	NOx	PPMV	0.000	0.920	202.00	200.86	0.09	-0.11
6	THC	PPMV	0.000	0.337	96.40	95.64	0.34	-0.76
7	HCl	PPMV	0.000	1.557	96.30	94.01	1.56	-2.29

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMAR

11-21-1991 10:55:32

CALIBRATION FILE NAME =E:\CEMDATA\ato1121.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0290	18.00	7.637	2.366	-0.07
2	CO	PPMV	0.00	0.0006	100.00	0.101	994.371	-0.56
3	CO2	%V	0.00	0.0040	18.00	0.827	21.883	-0.09
4	SO2	PPMV	0.00	-.0022	202.00	0.388	518.156	1.14
5	NOx	PPMV	0.00	-.0012	202.00	0.198	1013.312	1.18
6	THC	PPMV	0.00	-.0443	96.40	9.191	10.438	0.46
7	HCl	PPMV	0.00	0.6444	96.30	4.277	26.506	-17.08

Press Shift-PrtSc to Print Out Table

Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 10:56:02

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.000	18.00	0.00	0.00	-72.00
2	CO	PPMV	0.000	0.000	100.00	0.00	0.00	%-100.00
3	CO2	%V	0.000	0.000	18.00	0.00	0.00	-90.00
4	SO2	PPMV	0.000	0.000	202.00	0.00	0.00	-40.40
5	NOx	PPMV	0.000	0.000	202.00	0.00	0.00	-20.20
6	THC	PPMV	0.000	0.000	96.40	0.00	0.00	-96.40
7	HCl	PPMV	0.000	2.286	96.30	102.92	2.29	6.62

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-21-1991 11:28:09
CALIBRATION FILE NAME =E:\CEMDATA\MTO1121A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0168	18.00	7.463	2.417	-0.04
2	CO	PPMV	0.00	0.0002	200.00	0.042	4740.999	-0.85
3	CO2	%V	0.00	0.0051	18.00	0.818	22.154	-0.11
4	SO2	PPMV	0.00	-.0019	202.00	0.377	532.620	1.03
5	NOx	PPMV	0.00	-.0019	202.00	0.200	1000.509	1.87
6	THC	PPMV	0.00	0.0165	96.40	9.633	10.024	-0.16
7	HCl	PPMV	0.00	0.6444	96.30	4.277	26.506	-17.08

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-21-1991 11:28:16

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.029	18.00	17.59	-0.12	-1.65
2	CO	PPMV	0.000	-.381	200.00	41.57	-0.38	%-158.43
3	CO2	%V	0.000	0.024	18.00	17.80	0.12	-0.98
4	SO2	PPMV	0.000	0.141	202.00	196.66	0.03	-1.07
5	NOx	PPMV	0.000	-.711	202.00	203.87	-0.07	0.19
6	THC	PPMV	0.000	0.634	96.40	101.01	0.63	4.61
7	HCl	PPMV	0.000	0.000	96.30	0.00	0.00	-96.30

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMAR

11-22-1991 08:55:00

CALIBRATION FILE NAME =c:\CEMDATA\MTI1122.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0006	18.00	0.074	244.982	-0.14
2	CO	PPMV	0.00	-.0126	200.00	0.379	510.164	6.45
3	CO2	%V	0.00	0.0011	18.00	0.970	18.587	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	51729.211	-8.72
5	NOx	PPMV	0.00	0.2000	202.00	0.195	1037.143	-0.02
6	THC	PPMV	0.00	0.0741	96.40	9.614	10.105	-0.75
7	HCl	PPMV	0.00	0.5979	773.00	3.954	230.327	-137.71

Press Shift-PrtSc to Print Out Table

Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY

11-22-1991 08:55:07

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.459	18.00	17.30	1.84	-2.81
2	CO	PPMV	0.000	1.598	200.00	198.58	0.32	-0.28
3	CO2	%V	0.000	0.004	18.00	17.64	0.02	-1.79
4	SO2	PPMV	0.000	-.328	202.00	189.20	-0.07	-2.56
5	NOx	PPMV	0.000	-.708	202.00	199.61	-0.07	-0.24
6	THC	PPMV	0.000	0.171	96.40	97.63	0.17	1.23
7	HCl	PPMV	0.000	8.949	773.00	764.00	0.89	-0.90

CALIBRATION SUMMARY
11-22-1991 19:00:54
CALIBRATION FILE NAME =c:\CEMDATA\ati1122a.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	-.0001	18.00	0.073	244.779	0.03
2	CO	PPMV	0.00	-.0141	200.00	0.373	516.718	7.30
3	CO2	%V	0.00	0.0019	18.00	0.919	19.630	-0.04
4	SO2	PPMV	0.00	0.0002	202.00	0.004	52387.664	-8.39
5	NOx	PPMV	0.00	0.0005	202.00	0.191	1061.831	-0.55
6	THC	PPMV	0.00	0.1063	96.40	9.348	10.431	-1.11
7	HCl	PPMV	0.00	0.6202	773.00	3.926	233.831	-145.02

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-22-1991 19:00:54
CALIBRATION FILE NAME =c:\CEMDATA\ati1122a.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	-.0001	18.00	0.073	244.779	0.03
2	CO	PPMV	0.00	-.0141	200.00	0.373	516.718	7.30
3	CO2	%V	0.00	0.0019	18.00	0.919	19.630	-0.04
4	SO2	PPMV	0.00	0.0002	202.00	0.004	52387.664	-8.39
5	NOx	PPMV	0.00	0.0005	202.00	0.191	1061.831	-0.55
6	THC	PPMV	0.00	0.1063	96.40	9.348	10.431	-1.11
7	HCl	PPMV	0.00	0.6202	773.00	3.926	233.831	-145.02

Press Shift-PrtSc to Print Out Table
Do You Wish Display The Drift Table? (Y/N)?

CEM INSTRUMENT DRIFT SUMMARY
11-22-1991 19:01:33

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.172	18.00	17.84	-0.69	-0.63
2	CO	PPMV	0.000	-.758	200.00	196.71	-0.15	-0.66
3	CO2	%V	0.000	0.014	18.00	17.06	0.07	-4.71
4	SO2	PPMV	0.000	-.433	202.00	199.03	-0.09	-0.59
5	NOx	PPMV	0.000	0.519	202.00	197.82	0.05	-0.42
6	THC	PPMV	0.000	0.325	96.40	93.71	0.32	-2.69
7	HCl	PPMV	0.000	5.141	773.00	766.56	0.51	-0.64

CALIBRATION SUMMARY
11-22-1991 08:50:25
CALIBRATION FILE NAME =E:\CEMDATA\MT01122.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0093	18.00	7.610	2.368	-0.02
2	CO	PPMV	0.00	0.0001	200.00	0.042	4767.233	-0.40
3	CO2	%V	0.00	0.0042	18.00	0.829	21.811	-0.09
4	SO2	PPMV	0.00	-.0021	202.00	0.393	511.230	1.05
5	NOx	PPMV	0.00	-.0022	202.00	0.196	1018.482	2.25
6	THC	PPMV	0.00	0.0162	96.40	9.666	9.990	-0.16
7	HCl	PPMV	0.00	0.7037	96.30	4.271	26.998	-19.00

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-22-1991 08:50:34

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	-.045	18.00	18.00	-0.18	0.01
2	CO	PPMV	0.000	0.112	200.00	200.46	0.11	0.46
3	CO2	%V	0.000	-.008	18.00	18.12	-0.04	0.59
4	SO2	PPMV	0.000	1.474	202.00	203.20	0.29	0.24
5	NOx	PPMV	0.000	%-1.272	202.00	199.23	-0.13	-0.28
6	THC	PPMV	0.000	-.343	96.40	97.51	-0.34	1.11
7	HCl	PPMV	0.000	0.016	96.30	98.50	0.02	2.20

CALIBRATION SUMMARY
11-22-1991 19:01:01
CALIBRATION FILE NAME =E:\CEMDATA\mto1122a.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0143	18.00	7.683	2.347	-0.03
2	CO	PPMV	0.00	0.0001	200.00	0.042	4743.318	-0.33
3	CO2	%V	0.00	0.0048	18.00	0.823	22.004	-0.11
4	SO2	PPMV	0.00	-.0051	202.00	0.383	520.121	2.65
5	NOx	PPMV	0.00	-.0017	202.00	0.191	1049.448	1.83
6	THC	PPMV	0.00	0.2060	96.40	9.529	10.341	-2.13
7	HCl	PPMV	0.00	0.7808	96.30	4.280	27.521	-21.49

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-22-1991 19:01:09

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.012	18.00	18.17	0.05	0.69
2	CO	PPMV	0.000	-.075	200.00	200.93	-0.07	0.93
3	CO2	%V	0.000	0.013	18.00	17.86	0.07	-0.72
4	SO2	PPMV	0.000	%-1.552	202.00	197.00	-0.31	-1.00
5	NOx	PPMV	0.000	0.476	202.00	196.52	0.05	-0.55
6	THC	PPMV	0.000	1.896	96.40	95.02	1.90	-1.38
7	HCl	PPMV	0.000	2.083	96.30	96.55	2.08	0.25

CALIBRATION SUMMARY
11-23-1991 08:45:38
CALIBRATION FILE NAME =c:\CEMDATA\mti1123.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	-.0007	18.00	0.073	243.624	0.16
2	CO	PPMV	0.00	-.0217	200.00	0.361	522.762	11.36
3	CO2	%V	0.00	0.0012	18.00	0.945	19.082	-0.02
4	SO2	PPMV	0.00	0.0002	202.00	0.004	53501.316	-10.07
5	NOx	PPMV	0.00	-.0005	202.00	0.190	1063.110	0.53
6	THC	PPMV	0.00	0.1247	96.40	9.661	10.109	-1.26
7	HCl	PPMV	0.00	0.6212	773.00	3.876	237.487	-147.54

11-23-1991 14:07:55

CALIBRATION FILE NAME =c:\CEMDATA\eti1123b.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0002	18.00	0.073	248.226	-0.04
2	CO	PPMV	0.00	-.0294	200.00	0.358	515.627	15.17
3	CO2	%V	0.00	0.0026	18.00	0.933	19.350	-0.05
4	SO2	PPMV	0.00	0.0002	202.00	0.004	55154.191	-10.53
5	NOx	PPMV	0.00	0.0001	202.00	0.190	1062.720	-0.07
6	THC	PPMV	0.00	0.2567	96.40	9.869	10.029	-2.57
7	HCl	PPMV	0.00	0.6604	773.00	3.836	243.430	-160.76

Press Shift-PrtSc to Print Out Table

Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-23-1991 14:08:01

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.196	18.00	17.86	0.79	-0.55
2	CO	PPMV	0.000	%-4.019	200.00	198.75	-0.80	-0.25
3	CO2	%V	0.000	0.027	18.00	17.78	0.13	-1.12
4	SO2	PPMV	0.000	0.144	202.00	196.09	0.03	-1.18
5	NOx	PPMV	0.000	0.602	202.00	202.68	0.06	0.07
6	THC	PPMV	0.000	1.334	96.40	98.51	1.33	2.11
7	HCl	PPMV	0.000	9.298	773.00	763.42	0.93	-0.96

CALIBRATION SUMMARY
11-23-1991 08:39:49
CALIBRATION FILE NAME =E:\CEMDATA\mto1123.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0159	18.00	7.683	2.348	-0.04
2	CO	PPMV	0.00	0.0001	200.00	0.042	4743.664	-0.34
3	CO2	%V	0.00	0.0051	18.00	0.823	22.011	-0.11
4	SO2	PPMV	0.00	-.0040	202.00	0.382	523.635	2.11
5	NOx	PPMV	0.00	-.0021	202.00	0.191	1044.365	2.16
6	THC	PPMV	0.00	0.1046	96.40	9.529	10.229	-1.07
7	HCl	PPMV	0.00	0.7605	96.30	4.280	27.366	-20.81

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-23-1991 08:59:36
CALIBRATION FILE NAME =E:\CEMDATA\mto1123a.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0093	18.00	7.656	2.354	-0.02
2	CO	PPMV	0.00	-.0001	200.00	0.043	4686.403	0.32
3	CO2	%V	0.00	0.0043	18.00	0.852	21.234	-0.09
4	SO2	PPMV	0.00	-.0040	202.00	0.382	523.635	2.11
5	NOx	PPMV	0.00	-.0021	202.00	0.191	1044.365	2.16
6	THC	PPMV	0.00	0.1176	96.40	9.733	10.026	-1.18
7	HCl	PPMV	0.00	0.7605	96.30	4.280	27.366	-20.81

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CALIBRATION SUMMARY
11-23-1991 14:06:03
CALIBRATION FILE NAME =E:\CEMDATA\mto1123b.CAL

Chan.	Name	Units	Zero Conc.	Zero Reso.	Span Conc.	Span Reso.	Slope	Int.
1	O2	%V	0.00	0.0217	18.00	7.601	2.375	-0.05
2	CO	PPMV	0.00	0.0000	200.00	0.042	4716.520	-0.08
3	CO2	%V	0.00	0.0050	18.00	0.838	21.597	-0.11
4	SO2	PPMV	0.00	-.0056	202.00	0.367	542.326	3.05
5	NOx	PPMV	0.00	-.0027	202.00	0.194	1027.562	2.79
6	THC	PPMV	0.00	0.0507	96.40	9.785	9.904	-0.50
7	HCl	PPMV	0.00	0.7418	96.30	4.413	26.234	-19.46

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

CEM INSTRUMENT DRIFT SUMMARY
11-23-1991 14:06:12

Chan.	Name	Units	Zero Conc. Actual	Zero Conc. Observed	Span Actual	Span Observed	Drift % of Scale Zero	Drift % of Scale Span
1	O2	%V	0.000	0.029	18.00	17.87	0.12	-0.52
2	CO	PPMV	0.000	0.400	200.00	199.12	0.40	-0.88
3	CO2	%V	0.000	0.014	18.00	17.71	0.07	-1.44
4	SO2	PPMV	0.000	-.827	202.00	194.21	-0.17	-1.56
5	NOx	PPMV	0.000	-.677	202.00	204.63	-0.07	0.26
6	THC	PPMV	0.000	-.671	96.40	96.92	-0.67	0.52
7	HCl	PPMV	0.000	-.512	96.30	99.94	-0.51	3.64

RADIAN CORPORATION QC O2=5 CO=50 CO2=5 CH4=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 20:51:16
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
20:51:17	4.8	50.1	5.1	-0.2	-0.2	9.5	619.7
20:51:18	4.8	50.1	5.1	-0.2	-0.2	9.5	619.7
20:51:31	4.6	50.2	5.0	0.5	-0.1	9.3	515.5
20:51:46	4.7	50.1	5.0	0.3	-0.2	9.2	488.6
20:52:01	4.6	50.0	5.0	0.1	-0.2	9.2	498.4
Avg.=	4.7	50.1	5.0	0.1	-0.2	9.3	548.4

RADIAN CORPORATION DAY 3 CONT.

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:44:59
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

THC OFF LINE

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:45:46	9.1	11.5	8.3	17.4	111.1	3.8	499.1
16:46:46	10.9	9.1	6.5	10.5	124.0	0.7	395.3
16:47:46	11.4	9.5	6.3	2.3	107.5	2.2	548.4
16:48:46	9.3	10.7	7.8	12.1	98.1	-0.0	533.7
16:49:46	11.4	8.7	6.0	8.1	80.9	-5.9	373.5
16:50:46	11.9	8.8	6.0	2.8	73.8	-5.8	468.1
16:51:46	9.9	10.5	7.5	4.2	77.8	-5.8	526.8
16:52:46	10.8	9.3	6.7	5.7	69.0	-4.0	393.4
16:53:46	11.0	9.5	6.7	3.6	66.3	-2.2	502.3
16:54:46	9.9	9.5	7.3	12.2	69.1	-1.3	443.7
16:55:46	12.5	7.8	5.5	6.3	52.3	0.5	391.5
16:56:46	10.6	10.7	7.1	2.0	41.7	1.5	836.6
16:57:46	5.2	13.9	11.4	16.1	32.7	-1.2	880.0
16:58:46	8.8	8.0	8.0	12.0	17.6	-4.4	826.6
Avg.=	10.1	9.8	7.2	8.2	73.0	-1.6	544.2

RADIAN CORPORATION QC O2=5 CO2=5 CO=50 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:32:51
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:32:54	4.5	51.9	4.9	2.4	0.5	9.3	145.4
16:32:54	4.5	51.9	4.9	2.4	0.5	9.3	145.4
16:33:01	4.6	51.9	4.9	1.4	0.2	9.2	455.0
16:33:16	4.6	51.7	4.9	0.0	0.1	9.2	519.3
16:33:31	4.6	51.8	4.9	-0.6	0.0	9.2	578.3
16:33:46	4.6	51.7	4.9	-0.4	0.0	9.2	531.5
16:34:01	4.6	51.8	4.9	0.1	0.0	9.2	444.2
16:34:16	4.6	51.8	4.9	0.2	0.1	9.2	388.9
16:34:31	4.6	51.9	4.9	-0.1	0.0	9.2	348.7
16:34:46	4.6	51.8	4.9	0.2	0.0	9.2	332.7
16:35:01	4.6	51.7	4.9	0.4	0.0	9.2	313.7
Avg.=	4.6	51.8	4.9	0.5	0.1	9.2	382.0

RADIAN CORPORATION QC SO2=20 NOX=20

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:27:44
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:27:47	0.2	-0.5	0.2	17.7	19.3	-1.6	138.4
16:27:47	0.2	-0.5	0.2	17.7	19.3	-1.6	138.4
16:28:01	0.1	-0.3	0.1	21.0	19.7	-1.6	32.7
16:28:16	0.1	-0.4	0.0	20.6	19.9	-1.6	32.4
16:28:31	0.0	-0.3	0.0	20.5	19.9	-1.6	26.4
16:28:46	0.0	-0.5	0.0	20.9	19.9	-1.6	17.7
Avg.=	0.1	-0.4	0.1	19.7	19.7	-1.6	64.3

RADIAN CORPORATION QC O2=5 CO=50 CO2=5 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:20:28
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:20:31	9.4	89.3	9.4	0.8	0.4	9.9	178.7
16:20:31	9.4	89.3	9.4	0.8	0.4	9.9	178.7
16:20:31	9.4	89.3	9.4	0.8	0.4	9.9	178.7
16:20:32	9.4	89.3	9.4	0.8	0.4	9.9	178.7
16:20:32	9.4	89.3	9.4	0.8	0.4	9.9	178.7
16:20:46	4.9	52.1	5.2	0.8	0.2	9.4	161.3
16:21:01	4.8	52.1	5.1	0.7	0.2	9.4	150.8
16:21:16	4.7	52.0	5.0	0.4	0.1	9.3	145.0
16:21:31	4.7	51.9	5.0	0.8	0.1	9.4	140.2
16:21:46	4.7	51.9	5.0	0.8	0.1	9.4	160.9
16:22:01	4.7	51.9	5.0	0.6	0.1	9.4	206.3
16:22:16	4.6	51.9	5.0	0.4	0.1	9.3	249.3
16:22:31	4.7	51.9	5.0	0.2	0.1	9.3	263.6
16:22:46	4.7	51.8	5.0	0.3	0.1	9.3	280.7
16:23:01	4.7	51.9	5.0	0.3	0.1	9.3	290.1
16:23:16	4.6	52.0	4.9	0.3	0.0	9.3	282.5
16:23:31	4.7	51.9	5.0	0.6	0.1	9.3	259.7
16:23:46	4.7	51.9	5.0	0.6	0.1	9.3	233.6
Avg.=	6.0	62.3	6.2	0.6	0.2	9.5	206.5

RADIAN CORPORATION QC O2=10 CO=100 CO2=10 THC=48.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:16:10
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:16:13	9.6	102.4	9.9	6.5	0.7	49.4	123.1
16:16:19	9.7	102.6	9.9	2.3	0.8	49.4	111.5
16:16:31	9.7	102.4	9.9	6.1	0.7	49.5	118.5
16:16:46	9.7	102.4	9.9	6.4	0.7	49.5	110.1
16:17:01	9.7	102.4	9.9	5.9	0.7	49.4	111.4
16:17:16	9.6	102.4	9.9	6.1	0.7	49.3	105.9
16:17:31	9.7	102.4	9.9	6.0	0.7	49.4	107.3
16:17:46	9.6	102.3	9.9	6.3	0.7	49.3	112.5
Avg.=	9.7	102.4	9.9	5.7	0.7	49.4	112.5

RADIAN CORPORATION QC SO2=80 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:06:11
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\MTI1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:06:13	0.6	5.3	0.0	71.9	82.1	-0.4	161.2
16:06:16	-0.2	5.1	-0.0	74.5	81.9	-1.3	142.9
16:06:31	-0.1	4.8	-0.0	72.2	81.8	-1.4	155.0
16:06:46	-0.1	4.6	-0.0	72.1	81.8	-1.3	150.6
16:07:01	-0.1	4.4	-0.0	72.0	81.8	-1.3	154.2
16:07:16	0.5	4.4	0.0	72.0	82.0	-0.4	156.9
16:07:31	-0.1	3.9	-0.0	72.3	81.7	-1.3	165.8
Avg.=	0.1	4.6	-0.0	72.4	81.9	-1.1	155.2

RADIAN CORPORATION ac so2=80 nox=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:10:19
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\mti1120a.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:10:22	-0.5	22.7	0.0	68.8	79.4	-0.0	487.0
12:10:34	-0.4	18.8	0.0	68.6	79.4	-0.0	496.7
12:10:49	-0.5	16.9	0.0	68.8	79.4	0.0	497.7
12:11:04	-0.5	14.9	0.0	69.1	79.4	-0.0	501.5
12:11:19	-0.5	13.1	0.0	68.7	79.5	-0.0	534.1
Avg.=	-0.5	17.3	0.0	68.8	79.4	-0.0	503.4

RADIAN CORPORATION ac o2=5 co2=5 ch4=10 co=50

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:04:03
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\mti1120a.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:04:05	4.8	57.9	5.0	-3.9	-0.9	9.5	389.0
12:04:05	4.8	57.9	5.0	-3.9	-0.9	9.5	389.0
12:04:19	4.8	53.5	5.0	-3.1	-0.8	9.6	336.1
12:04:34	4.8	52.2	5.0	-3.6	-0.8	9.6	321.2
12:04:49	4.8	51.3	5.0	-3.7	-0.9	9.5	305.7
Avg.=	4.8	54.5	5.0	-3.6	-0.9	9.6	348.2

RADIAN CORPORATION qc 02=10 co2=10 co=100 ch4=46

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 11:58:46
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\eti1120a.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:58:48	9.8	99.2	9.9	9.3	-0.3	45.9	417.8
11:58:48	9.8	99.2	9.9	9.3	-0.3	45.9	417.8
11:58:49	9.8	99.2	9.9	9.3	-0.3	45.9	417.8
11:58:49	9.1	99.8	9.9	-1.3	-1.1	45.7	444.5
11:59:04	9.8	98.9	9.9	10.1	-0.3	45.9	441.9
11:59:19	9.8	98.9	9.9	10.3	-0.3	45.9	440.2
11:59:34	9.8	98.9	9.9	10.6	-0.4	45.9	436.3
11:59:49	9.8	98.9	9.9	9.8	-0.4	46.0	416.0
12:00:04	9.8	98.8	9.9	8.7	-0.4	46.0	385.0
12:00:19	9.8	98.8	9.9	7.3	-0.4	45.9	346.5
Avg.=	9.7	99.1	9.9	8.3	-0.4	45.9	416.4

RADIAN CORPORATION oc hcl=177

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 11:17:15
File Name = c:\CEMDATA\112091.PRN Calibration File:c:\CEMDATA\mti1120.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:17:17	11.8	1.7	5.2	4.6	66.1	-1.0	182.9
11:17:26	11.7	1.4	6.3	3.7	85.6	-1.3	182.2
11:17:41	10.7	1.2	7.2	3.0	94.5	-1.1	182.0
11:17:56	10.3	1.1	7.1	4.3	98.2	-1.0	202.1
11:18:11	10.2	1.3	7.1	5.7	99.6	-1.3	191.2
11:18:26	9.0	1.8	8.1	6.9	103.1	-1.3	194.2
11:18:41	8.5	1.9	8.1	11.0	92.8	1.8	198.8
11:18:56	9.1	2.2	7.7	14.7	82.8	-0.7	184.6
Avg.=	10.2	1.6	7.1	6.7	87.8	-0.7	189.8

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 14:19:45
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991	O2	CO	CO2	SO2	NOx	THC	HCl
Time	%V	PPMV	%V	PPMV	PPMV	PPMV	PPMV

RADIAN CORPORATION

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 11:48:36
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:48:48	10.4	100.0	-0.0	8.8	0.5	46.6	0.4
11:49:03	10.4	100.5	-0.2	8.7	0.5	46.6	-0.5
11:49:18	10.4	100.4	-0.2	8.6	0.5	46.6	0.6
11:49:33	10.4	100.6	-0.0	8.9	0.5	46.6	-0.3
11:49:48	10.4	100.3	-0.2	8.7	0.5	46.7	-1.4
11:50:03	10.4	100.5	-0.3	8.7	0.6	46.7	-2.6
11:50:18	10.4	100.6	-0.2	8.8	0.6	46.7	-2.0
11:50:33	10.4	100.4	0.7	8.8	0.5	46.7	-1.6
11:50:48	10.4	100.4	-0.3	8.8	0.6	46.7	-2.3
11:51:03	10.4	100.6	0.1	8.7	0.6	46.7	-0.4
11:51:18	10.4	100.4	0.2	9.0	0.5	46.6	0.9
11:51:33	10.4	100.6	0.3	8.8	0.6	46.6	0.3
11:51:48	10.4	100.5	0.5	8.7	0.6	46.7	-0.6
11:52:03	10.4	100.2	0.2	8.8	0.5	46.7	-0.9
11:52:18	10.4	100.0	0.0	8.7	0.5	46.7	-0.6
11:52:48	10.4	100.3	-0.0	8.6	0.5	46.7	0.3
11:53:18	10.4	100.4	-0.2	8.7	0.5	46.7	0.7
11:53:48	10.4	100.6	0.6	9.0	0.6	46.7	0.3
11:54:18	10.4	100.6	0.3	9.0	0.5	46.8	0.7
11:54:48	10.4	100.6	-0.0	8.8	0.5	46.8	0.2
11:55:18	10.4	100.6	0.2	8.9	0.5	46.8	-1.0
11:55:48	10.4	100.6	0.4	8.6	0.5	46.8	0.9
11:56:18	10.4	100.4	0.7	8.8	0.6	46.8	0.8
Avg.=	10.4	100.5	0.1	8.8	0.5	46.7	-0.4

RADIAN CORPORATION O2=10 CO=100 CO2=10 THC=48.6 QC

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 10:19:55
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:19:57	10.4	100.6	-0.2	-1.0	0.4	46.8	-0.0
10:20:08	10.4	100.6	-0.1	-0.8	0.4	46.9	-0.0
10:20:38	10.4	100.4	-0.1	-0.8	0.4	46.9	0.8
10:21:08	10.4	100.5	-0.3	-0.8	0.4	46.9	1.6
10:21:38	10.4	100.2	-0.3	-0.7	0.4	46.9	0.7
10:22:08	10.4	100.4	-0.2	-0.6	0.4	46.8	0.3
10:22:38	10.4	100.6	-0.3	-0.6	0.4	46.9	1.3
10:23:08	10.4	100.7	0.8	-0.6	0.3	46.8	-0.2
10:23:38	10.4	100.3	-0.0	-0.8	0.4	47.0	-0.2
10:24:08	10.4	100.6	0.4	-0.7	0.4	47.0	-0.0
10:24:38	10.4	100.1	0.1	-0.6	0.4	47.0	-0.4
10:25:08	10.4	100.6	0.1	-0.7	0.4	46.9	1.1
10:25:38	10.4	100.6	-0.2	-1.0	0.4	46.9	0.5
10:26:08	10.4	100.6	-0.1	-0.9	0.4	46.9	0.6
10:26:38	10.4	100.5	-0.0	-0.8	0.4	46.9	0.4
10:27:08	10.4	100.3	0.0	-1.0	0.4	46.9	-0.2
10:27:38	10.4	100.1	-0.1	3.2	0.4	46.9	1.2
10:28:08	10.4	100.4	0.7	8.7	0.4	46.9	0.1
10:28:38	10.4	100.3	0.1	8.9	0.4	46.9	-0.6
10:29:08	10.4	100.2	-0.0	8.8	0.4	46.9	-0.9
10:29:38	10.4	100.3	0.2	8.9	0.3	46.8	-0.4
10:30:08	10.4	100.4	-0.1	8.8	0.3	46.8	0.7
10:30:38	10.4	100.6	-0.0	8.7	0.4	46.8	0.3
10:31:08	10.4	100.1	-0.2	8.9	0.4	46.8	1.4
10:31:38	10.4	100.5	-0.2	8.8	0.3	46.7	0.9
10:32:08	10.4	100.6	-0.1	8.7	0.3	46.7	1.0
10:32:38	10.4	100.3	-0.2	8.8	0.3	46.7	1.7
Avg.=	10.4	100.4	-0.0	2.9	0.4	46.9	0.4

RADIAN CORPORATION

NO_x, SO_2 = 80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 09:12:39
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:12:41	1.8	0.2	-0.1	66.5	75.3	0.4	-0.6
09:12:42	1.8	0.2	-0.1	66.5	75.3	0.4	-0.6
09:12:48	1.8	0.2	-0.1	67.0	75.5	0.6	0.7
09:12:58	1.8	0.2	-0.1	67.2	75.4	0.5	1.4
09:13:08	1.8	0.4	-0.0	67.7	75.4	0.6	2.4
09:13:18	1.8	0.1	0.0	67.4	75.6	0.7	4.0
09:13:28	1.8	0.3	0.0	67.7	75.5	0.6	3.6
09:13:38	1.8	0.4	-0.0	67.9	75.5	0.5	2.4
09:13:48	1.8	0.2	0.0	67.9	75.5	0.6	1.7
Avg.=	1.8	0.3	-0.0	67.3	75.5	0.5	1.7

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 09:08:19
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:08:21	10.4	100.5	-0.4	4.9	-0.0	46.6	1.5
09:08:22	10.4	100.5	-0.4	4.9	-0.0	46.6	1.5
09:08:28	10.4	100.6	-0.1	4.6	0.0	46.8	1.7
09:08:38	10.4	100.4	-0.2	4.4	0.1	46.8	1.5
09:08:48	10.4	100.6	-0.2	4.3	0.0	46.8	0.8
09:08:58	10.4	100.6	-0.2	4.6	0.0	46.9	0.0
09:09:08	10.4	100.6	0.3	4.5	-0.0	46.8	-0.5
09:09:18	10.4	100.2	0.6	4.4	0.1	46.9	0.2
Avg.=	10.4	100.5	-0.1	4.6	0.0	46.8	0.9

RADIAN CORPORATION QC HCl=46.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 08:02:29
File Name = E:\CEMDATA\111991.PRN Calibration File:E:\CEMDATA\MTO1119A.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:02:31	-0.0	-0.2	-2.4	0.9	-0.4	0.2	42.5
08:02:33	-0.0	0.0	-0.6	0.3	-0.0	0.4	43.9
08:02:43	-0.0	-0.2	-2.3	0.6	-0.3	0.2	43.9
08:02:53	-0.0	-0.2	-2.3	0.8	-0.4	0.2	42.5
08:03:03	-0.0	-0.1	-2.4	0.9	-0.3	0.3	44.1
08:03:13	-0.0	-0.2	-2.4	0.8	-0.3	0.2	42.8
08:03:23	-0.0	-0.2	-2.3	1.1	-0.4	0.1	42.1
08:03:33	-0.0	-0.2	-2.3	0.6	-0.3	0.2	41.7
08:03:43	-0.0	-0.2	-2.4	0.5	-0.3	0.2	43.2
Avg.=	-0.0	-0.2	-2.2	0.7	-0.3	0.2	43.0

RADIAN CORPORATION O2=10 CO=100 CO2=10 THC=48.6 QC

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 10:21:43
File Name = c:\CEMDATA\111991.PRN Calibration File:c:\CEMDATA\MTI1119B.CAL

11-19-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:21:45	10.4	103.2	10.6	2.5	-0.2	42.5	13.6
10:22:13	10.3	103.0	10.6	2.7	-0.2	42.5	14.0
10:22:43	10.3	102.9	10.6	4.1	-0.2	42.4	16.5
10:23:13	10.3	102.9	10.6	2.8	-0.2	42.3	16.0
10:23:43	10.3	103.0	10.6	2.6	-0.2	42.1	15.2
10:24:13	10.3	103.0	10.6	2.8	-0.2	42.1	16.4
10:24:43	10.3	103.0	10.6	2.7	-0.2	42.3	17.6
10:25:13	10.3	103.0	10.6	2.9	-0.2	42.5	19.8
10:25:43	10.3	102.9	10.6	2.9	-0.2	42.5	14.9
10:26:13	10.4	102.9	10.6	2.9	-0.2	42.6	15.8
10:26:43	10.4	102.8	10.6	2.8	-0.2	42.7	12.2
10:27:13	10.3	102.9	10.6	2.9	-0.3	42.7	13.8
10:27:43	10.3	102.7	10.6	2.8	-0.2	42.9	13.6
10:28:13	10.4	102.7	10.6	2.8	-0.2	43.2	13.3
10:28:43	10.3	102.7	10.6	2.9	-0.3	43.2	16.4
10:29:13	10.3	102.7	10.6	2.9	-0.3	43.2	14.8
10:29:43	10.4	102.7	10.6	2.7	-0.3	43.0	14.0
10:30:13	10.3	102.8	10.6	2.7	-0.3	43.1	13.8
10:30:43	10.4	102.9	10.6	2.9	-0.3	43.0	16.3
10:31:13	10.4	102.9	10.6	2.8	-0.3	43.1	18.6
10:31:43	10.4	102.8	10.6	2.8	-0.3	43.1	20.2
10:32:13	10.4	102.8	10.6	2.8	-0.3	43.2	21.1
Avg.=	10.3	102.9	10.6	2.9	-0.2	42.7	15.8

SO_2 NO_x = 80

RADIAN CORPORATION HCL QC CHECK

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 12:52:55
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MTO1117A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:53:25	15.1	6.3	-0.6	3.9	44.1	-0.4	-3.8
12:54:25	15.3	6.2	-0.4	-0.3	41.8	-0.3	-3.6
12:55:25	14.4	6.8	-0.5	2.5	43.7	-0.7	-3.8
12:56:25	11.4	9.1	-0.2	6.0	49.0	-0.8	-3.4
12:57:25	12.3	8.2	-0.3	7.7	46.0	-0.6	-4.0
12:58:25	14.2	6.8	-0.3	-0.2	41.0	-0.4	-3.8
12:59:25	12.6	8.0	-0.2	0.8	47.1	-0.5	-3.4
13:00:25	11.3	9.0	-0.2	4.6	51.7	-0.7	-2.8
13:01:25	13.9	6.9	-0.3	0.1	45.3	-0.4	-3.7
Avg.=	13.4	7.5	-0.3	2.8	45.5	-0.5	-3.6

RADIAN CORPORATION QC HCL=4e

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-17-1991 Current Time = 09:12:25
File Name = E:\CEMDATA\111791.PRN Calibration File:E:\CEMDATA\MT01116A.CAL

11-17-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:12:27	21.2	-5.5	-0.0	4.7	-1.4	1.1	45.6
09:12:37	21.1	-5.2	-0.1	5.2	-1.5	1.1	45.4
09:12:47	21.1	-5.6	-0.1	4.9	-1.6	1.0	45.8
09:12:57	21.1	-5.7	-0.1	5.2	-1.6	0.5	45.4
09:13:07	21.1	-5.6	-0.1	5.2	-1.6	0.5	45.2
09:13:17	21.2	-5.5	-0.1	5.3	-1.6	1.1	45.1
09:13:27	21.1	-5.6	-0.0	5.2	-1.5	28.3	44.4
09:13:37	21.2	-5.8	-0.1	5.0	-1.6	12.8	43.9
09:13:47	21.1	-5.8	-0.1	5.2	-1.5	7.3	43.9
Avg.=	21.1	-5.6	-0.1	5.1	-1.5	6.0	45.0

RADIAN CORPORATION SO2=10 CO=100 CH4=49.5

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-13-1991 Current Time = 12:17:17
File Name = E:\CEMDATA\111391.PRN Calibration File:E:\CEMDATA\MT111 3A.CAL

11-13-1991 Time	O2 %	CO PPM	CO2 %	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:17:15	10.5	100.2	1.0	0.7	-0.0	47.3	-4.4
12:17:18	10.5	100.2	1.0	0.1	0.0	47.3	-3.1
12:17:28	10.5	100.1	0.9	-0.7	0.1	47.4	-2.2
12:17:38	10.5	100.1	0.9	-1.4	0.1	47.4	-2.8
12:17:48	10.5	100.1	1.0	-1.8	0.1	47.4	-2.9
12:17:58	10.5	100.1	0.9	-1.7	0.1	47.4	-2.8
12:14:08	10.5	100.7	2.0	-2.2	0.2	47.4	-3.1
12:14:18	10.5	100.1	0.7	-2.7	0.1	47.4	-2.9
12:14:28	10.5	100.1	0.7	-1.9	0.0	47.4	-3.8
12:14:38	10.5	100.2	1.0	-1.1	-0.0	47.3	-4.4
Avg.=	10.5	100.1	1.0	-1.1	0.1	47.4	-3.2

RADIAN CORPORATION QC O2=5 CO=50 CH4=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-18-1991 Current Time = 12:09:54
File Name = E:\CEMDATA\111891.PRN Calibration File:E:\CEMDATA\MTO1118A.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:09:55	5.3	48.2	-1.6	-1.6	0.1	9.9	-3.9
12:09:58	5.2	48.4	-0.5	-2.5	0.2	9.9	-2.9
12:10:08	5.2	48.3	-1.5	-2.9	0.0	9.9	-2.8
12:10:18	5.2	48.8	-1.4	-2.4	0.0	9.9	-3.3
12:10:28	5.2	48.9	-1.7	-1.9	-0.0	9.9	-4.4
12:10:38	5.2	48.8	-1.6	-2.5	-0.1	9.9	-2.2
12:10:48	5.2	48.9	-1.6	-3.1	0.0	9.9	-2.8
12:10:58	5.2	49.0	-1.6	-3.0	-0.1	9.8	-3.2
12:11:08	5.2	48.5	-1.6	-2.6	-0.0	9.9	-3.6
Avg.=	5.2	48.7	-1.5	-2.5	0.0	9.9	-3.2

RADIAN CORPORATION O2 HCl=46 PPM

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Data Printed = 11-18-1991 Current Time = 09:27:02
File Name = E:\CEMDATA 111891.PRN Calibration File:E:\CEMDATA\MTO111SA.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:27:02	10.5	1.2	-2.7	2.4	52.9	8.6	41.5
09:27:08	11.4	27.9	-1.9	2.1	55.5	5.1	43.0
09:27:18	10.8	80.8	-2.5	3.2	56.7	3.5	42.2
09:27:28	10.2	99.9	-2.6	2.1	57.8	2.2	43.1
09:27:38	10.1	99.9	-2.7	2.2	59.3	1.6	41.1
09:27:48	10.2	99.8	-2.7	1.8	60.5	1.5	42.0
09:27:58	10.7	95.3	-2.7	1.8	60.4	1.4	42.6
Avg.=	10.9	71.5	-2.6	2.7	57.7	3.4	42.2

CALIBRATION SUMMARY

11-18-1991 09:24:52

CALIBRATION FILE NAME =E:\CEMDATA\MT01118A.CAL

Chan.	Name	Units	Zero Conc.	Zero Resp.	Span Conc.	Span Resp.	Slope	Int.
1	O2	%V	0.00	0.0016	18.00	7.255	2.482	-0.00
2	CO	PPMV	0.00	0.0000	100.00	0.100	998.990	-0.07
3	CO2	%V	0.00	-.0000	18.00	0.002	9728.321	0.20
4	SO2	PPMV	0.00	0.0117	202.00	0.419	495.540	-5.78
5	NOx	PPMV	0.00	-.0025	202.00	0.204	977.719	2.44
6	THC	PPMV	0.00	0.0796	96.40	9.618	10.106	-0.73
7	HCl	PPMV	0.00	0.1300	92.60	4.131	23.394	-3.04

Press Shift-PrtSc to Print Out Table

Press <C> to Continue

RADIAN CORPORATION GC O2=5 CO=50 CO2=1

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-19-1991 Current Time = 08:04:49
File Name = E:\CEMDATA\111891.PRN Calibration File:E:\CEMDATA\MTO1118.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:04:50	4.9	48.4	-0.2	2.4	-0.4	8.7	1.0
08:04:57	5.0	48.7	-0.1	1.7	-0.1	9.1	1.0
08:05:00	5.0	48.6	-0.2	1.5	-0.1	9.2	0.7
08:05:10	4.9	48.9	-0.2	1.6	-0.1	9.2	0.6
08:05:20	5.0	48.6	-0.1	1.5	-0.2	9.2	0.1
08:05:30	5.0	48.5	-0.1	1.5	-0.2	9.1	-0.1
08:05:40	5.0	48.5	-0.1	1.6	-0.2	9.2	0.9
Avg.=	4.9	48.6	-0.2	1.7	-0.2	9.1	0.6

RADIAN CORPORATION

SO_2 NOx = SC

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-18-1991 Current Time = 08:01:00
File Name = E:\CEMDATA\111891.PRN Calibration File:E:\CEMDATA\MTO1118.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:01:01	0.0	0.2	0.2	71.1	82.2	0.8	0.9
08:01:03	0.0	0.3	0.4	71.3	82.4	0.8	2.5
08:01:13	0.0	0.3	0.2	71.2	82.3	0.8	2.0
08:01:23	0.0	0.3	0.2	71.3	82.4	0.8	1.1
08:01:33	0.0	0.2	0.2	71.6	82.4	0.8	0.7
08:01:43	0.0	0.3	0.2	71.3	82.4	0.8	1.4
08:01:53	0.0	0.3	0.2	71.5	82.5	0.8	2.2
08:02:03	0.0	0.3	0.2	71.5	82.4	0.9	2.0
08:02:13	0.0	0.2	0.2	71.6	82.5	0.8	1.4
Avg.=	0.0	0.3	0.2	71.4	82.4	0.8	1.6

RADIAN CORPORATION 30 O2=10 CO=100 CH4=48.0

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-18-1991 Current Time = 07:57:05
File Name = E:\CEMDATA\111891.PRN Calibration File:E:\CEMDATA\MT01113.CAL

11-18-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
07:57:05	9.9	100.0	0.2	1.6	-0.2	45.7	0.6
07:57:17	9.9	100.1	0.2	1.2	-0.1	45.7	1.2
07:57:27	9.9	100.0	0.1	1.2	-0.2	45.7	1.8
07:57:37	9.9	100.1	0.2	1.7	-0.1	45.7	1.4
07:57:47	9.9	100.1	0.2	1.2	-0.2	45.7	0.6
07:57:57	9.9	100.1	0.2	0.9	-0.1	45.8	0.4
07:58:07	9.9	99.8	0.2	1.5	-0.2	45.8	0.4
07:58:17	9.9	100.1	0.1	1.1	-0.2	45.7	0.9
Avg.=	9.9	100.0	0.2	1.1	-0.2	45.7	0.9

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 11:10:10
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:10:16	15.5	-0.3	-0.2	1.2	51.1	8.9	41.6
11:10:31	15.6	-0.3	-0.6	1.3	51.7	8.9	44.7
11:10:46	15.6	-0.3	-0.6	1.0	51.5	8.9	45.3
11:11:01	15.7	-0.3	-0.6	0.8	50.3	8.9	43.8
11:11:16	15.8	-0.3	-0.6	1.2	49.2	8.9	45.3
11:11:31	15.8	-0.3	-0.6	0.9	49.4	9.0	43.0
11:11:46	15.8	-0.3	-0.6	0.9	49.1	8.9	43.0
Avg.=	15.7	-0.3	-0.6	1.0	50.3	8.9	43.8

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 11:59:13
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120A.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:59:15	10.0	100.2	10.3	-3.2	-0.5	40.7	5.0
11:59:25	10.0	100.0	10.3	-3.3	-0.4	40.7	7.5
11:59:40	10.0	99.5	10.3	-3.4	-0.4	40.9	8.5
11:59:55	10.0	99.9	10.4	-3.4	-0.4	42.2	6.1
12:00:10	10.0	99.5	10.3	-3.5	-0.4	42.2	7.6
12:00:25	10.0	100.2	10.3	-3.5	-0.3	42.1	6.0
12:00:40	10.0	100.0	10.3	-3.7	-0.4	42.1	5.8
Avg.=	10.0	99.9	10.3	-3.4	-0.4	41.5	6.6

RADIAN CORPORATION QC O2=5 CO2=5 CH4=10 CO=50

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:03:53
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MT01120A.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:03:55	5.0	48.1	5.2	-3.6	-0.3	4.7	5.2
12:03:55	5.0	48.1	5.2	-3.6	-0.3	4.7	5.2
12:04:10	5.0	48.4	5.2	-3.6	-0.4	4.7	5.6
12:04:25	5.0	48.5	5.2	-3.8	-0.4	4.6	3.4
12:04:40	5.0	48.3	5.2	-3.7	-0.4	4.6	5.0
12:04:55	5.0	48.4	5.2	-3.6	-0.4	4.6	5.7
Avg.=	5.0	48.3	5.2	-3.6	-0.4	4.7	5.0

RADIAN CORPORATION QC NOx=80 SO2=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:10:16
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120A.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:10:19	0.0	0.2	0.0	65.5	81.8	-5.3	6.0
12:10:25	0.0	0.3	-0.0	66.3	81.8	-5.3	3.3
12:10:40	-0.0	0.2	-0.0	66.5	81.9	-5.3	4.3
12:10:55	0.0	0.2	-0.0	66.6	81.9	-5.3	5.8
12:11:10	0.0	0.2	-0.0	67.0	82.0	-5.3	3.5
12:11:25	0.0	0.2	-0.0	67.4	81.9	-5.3	5.1
Avg.=	0.0	0.2	-0.0	66.5	81.9	-5.3	4.7

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 12:18:47
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120B.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
12:18:50	10.0	99.9	10.3	-2.4	-0.2	44.2	3.2
12:18:57	10.0	100.2	10.3	-3.3	-0.3	44.0	4.3
12:19:12	10.0	99.6	10.3	-3.1	-0.3	43.9	3.6
12:19:27	10.0	99.8	10.3	-3.1	-0.3	44.0	4.8
12:19:42	10.0	100.3	10.3	-3.2	-0.3	44.0	3.9
12:19:57	10.0	100.2	10.3	-3.2	-0.3	43.9	3.2

RADIAN CORPORATION QC SO2=80 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:06:39
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:06:44	-0.0	0.3	-0.0	72.5	80.4	0.2	3.1
16:06:49	-0.0	0.2	0.0	73.2	80.5	0.4	5.3
16:07:04	-0.0	0.2	0.0	72.5	80.8	0.4	2.3
16:07:19	-0.0	0.1	0.0	72.7	80.6	0.3	4.4
16:07:34	-0.0	0.2	0.0	73.3	80.5	0.3	4.5
16:07:49	-0.0	0.2	0.0	73.2	80.5	0.3	3.4
Avg.=	-0.0	0.2	0.0	72.9	80.5	0.3	3.8

RADIAN CORPORATION QC O2=10 CO=100 CO2=10 THC=48.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:16:51
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:16:55	10.0	100.2	10.3	1.1	0.1	45.0	3.1
16:17:05	10.0	100.2	10.3	-0.3	0.3	45.3	4.1
16:17:19	10.0	99.7	10.3	1.0	-0.2	44.3	3.9
16:17:34	10.0	100.2	10.3	1.2	-0.1	44.7	3.8
16:17:49	10.0	100.7	10.3	1.0	-0.1	44.5	2.5
16:18:04	10.0	100.6	10.3	0.9	-0.0	44.7	4.8
16:18:19	10.0	100.0	10.3	0.9	0.0	44.8	3.3
16:18:34	10.0	100.5	10.2	1.4	-0.2	44.4	1.5
Avg.=	10.0	100.3	10.3	0.9	-0.0	44.7	3.4

RADIAN CORPORATION QC CO=50 O2=5 CO2=5 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:19:27
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:19:32	10.0	101.0	10.2	2.1	0.0	10.8	1.3
16:19:34	5.5	76.0	5.4	1.0	-0.1	9.3	0.7
16:19:49	5.2	64.2	5.3	0.8	-0.1	9.7	1.7
16:20:04	5.0	52.0	5.2	0.6	-0.2	9.7	3.1
16:20:19	5.0	49.3	5.2	1.1	-0.3	9.6	2.1
16:20:34	5.0	49.2	5.1	0.8	-0.2	9.5	2.2
Avg.=	6.0	65.3	6.1	1.1	-0.1	9.8	1.9

RADIAN CORPORATION REPEAT QC O2=5 CO2=5 CO=50 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:21:17
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MT01120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:21:23	5.0	48.7	5.1	0.7	-0.4	9.1	0.7
16:21:23	5.0	48.7	5.1	0.7	-0.4	9.1	0.7
16:22:20	5.0	48.8	5.2	-0.1	-0.1	9.5	2.9
16:23:23	5.0	49.0	5.1	0.1	-0.1	9.4	3.4
16:23:24	5.0	49.0	5.1	0.1	-0.1	9.4	3.4
16:23:26	5.0	49.0	5.1	0.1	-0.1	9.4	3.4
16:23:27	5.0	49.0	5.1	0.1	-0.1	9.4	3.4
16:23:34	5.0	49.1	5.1	0.4	-0.3	9.3	2.7
16:23:49	5.0	49.0	5.2	-0.2	-0.1	9.5	3.2
16:24:04	5.0	49.1	5.2	0.2	-0.2	9.3	1.7
Avg.=	5.0	48.9	5.1	0.2	-0.2	9.3	2.6

RADIAN CORPORATION QC SO2=20 NOX=20

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:27:36
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:27:41	0.0	0.4	0.0	17.5	19.0	0.3	2.4
16:27:42	0.0	0.4	0.0	17.5	19.0	0.3	2.4
16:27:49	0.0	0.2	0.0	18.0	19.3	0.4	1.9
16:28:04	0.0	0.3	0.0	18.6	19.3	0.4	3.5
16:28:19	-0.0	0.2	0.0	19.0	19.2	0.2	3.4
16:28:34	-0.0	0.3	0.0	19.5	19.1	0.3	5.5
16:28:49	-0.0	0.3	0.0	19.6	19.2	0.2	3.9
Avg.=	0.0	0.3	0.0	18.5	19.2	0.3	3.3

RADIAN CORPORATION QC O2=5 CO2=5 CO=50 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:33:20
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:33:25	5.0	48.9	5.1	1.4	-0.1	9.4	1.6
16:33:26	5.0	48.9	5.1	1.4	-0.1	9.4	1.6
16:33:34	5.0	48.9	5.1	0.7	-0.1	9.3	2.8
16:33:49	5.0	48.7	5.1	0.8	-0.1	9.4	2.3
16:34:05	5.0	48.7	5.1	1.0	-0.1	9.4	3.9
16:34:19	5.0	49.1	5.1	0.7	-0.1	9.5	1.6
16:34:34	5.0	49.1	5.1	0.8	-0.2	9.1	3.1
16:34:49	5.0	48.8	5.1	0.6	-0.1	9.4	1.2
16:35:05	5.0	48.9	5.1	0.4	-0.2	9.4	1.8
16:35:19	5.0	49.2	5.1	0.5	-0.2	9.4	0.1
Avg.=	5.0	48.9	5.1	0.8	-0.1	9.4	2.0

RADIAN CORPORATION DAY 3 CONT

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 16:45:06
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
16:45:12	11.7	0.6	7.0	1.5	70.1	1.6	3.4
16:45:49	13.8	0.7	4.8	2.0	92.7	1.8	3.1
16:46:49	14.7	0.4	4.2	2.1	84.3	1.8	2.7
16:47:49	13.0	0.3	5.9	1.5	70.9	1.6	3.3
16:48:49	13.2	0.4	5.3	1.7	69.9	1.6	3.2
16:49:50	14.9	0.3	4.0	1.3	57.3	1.6	2.5
16:50:49	13.5	0.2	5.4	1.0	55.0	1.6	3.4
16:51:49	12.7	0.5	5.9	1.1	53.2	1.5	2.8
16:52:49	14.4	0.4	4.4	1.1	45.2	1.5	2.5
16:53:49	13.0	0.2	5.8	1.1	50.1	1.3	2.5
16:54:49	13.8	0.2	4.9	0.8	44.5	1.5	2.2
16:55:49	15.2	0.2	3.8	0.8	36.1	1.5	2.2
16:56:49	13.4	0.1	5.8	0.6	31.4	1.3	1.3
16:57:49	11.6	0.0	7.4	0.5	27.7	1.3	1.9
16:58:49	11.7	-0.0	7.3	0.6	27.9	1.4	2.8
Avg.=	13.4	0.3	5.5	1.2	54.4	1.5	2.7

RADIAN CORPORATION QC O2=5 CO2=5 CO=50 CH4=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-20-1991 Current Time = 20:51:04
File Name = E:\CEMDATA\112091.PRN Calibration File:E:\CEMDATA\MTO1120C.CAL

11-20-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
20:51:07	5.0	48.3	5.3	-1.2	0.1	9.1	3.3
20:51:08	5.0	48.3	5.3	-1.2	0.1	9.1	3.3
20:51:19	5.0	48.9	5.3	-1.7	0.1	9.3	2.5
20:51:35	5.0	48.5	5.3	-1.7	0.2	9.2	3.2
20:51:49	5.0	48.3	5.3	-1.5	0.1	9.2	1.5
20:52:04	5.0	48.7	5.3	-1.4	-0.0	9.1	0.6
20:52:19	5.0	48.8	5.3	-1.6	-0.0	9.0	1.3
Avg.=	5.0	48.6	5.3	-1.5	0.1	9.1	2.3

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

RADIAN CORPORATION QC HCL=17

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 10:57:08
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
Avg.=	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RADIAN CORPORATION QC HCL=177

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN , NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 10:58:10
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:58:12	11.3	7.4	5.4	3.8	56.0	2.1	458.4
Avg.=	11.3	7.4	5.4	3.8	56.0	2.1	458.4

RADIAN CORPORATION QC HCL=17

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:05:26
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:05:30	-0.4	4.0	-0.1	2.2	-0.6	-0.9	220.0
11:05:45	-0.3	3.2	-0.1	1.8	-0.2	-1.3	218.8
11:06:00	-0.2	3.3	-0.1	1.7	-0.2	-1.2	220.1
11:06:15	-0.3	3.2	-0.1	1.7	-0.1	-1.5	216.3
11:06:30	-0.3	3.2	-0.1	1.9	-0.1	-1.6	218.3
11:06:45	-0.4	3.1	-0.1	1.9	-0.1	-1.6	215.0
11:07:00	0.4	3.0	-0.1	1.4	-0.2	-0.7	216.4
11:07:15	0.4	3.2	-0.1	1.3	-0.1	-0.7	209.9
11:07:30	-0.3	2.6	-0.1	1.6	0.0	-1.8	207.6
Avg.=	-0.2	3.2	-0.1	1.7	-0.2	-1.3	215.8

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

RADIAN CORPORATION QC O2=10 CO2=12

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:32:29
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:32:34	9.8	418.2	9.9	2.0	0.0	-0.4	563.7
11:32:34	9.8	418.2	9.9	2.0	0.0	-0.4	563.7
11:32:35	9.8	418.2	9.9	2.0	0.0	-0.4	563.7
11:32:35	9.8	418.2	9.9	2.0	0.0	-0.4	563.7
11:32:50	9.6	418.9	9.9	1.4	-0.1	-0.4	727.8
11:33:05	9.8	418.6	9.9	0.3	-0.1	-0.4	821.2
11:33:20	9.9	418.2	9.9	-0.1	0.0	-0.4	874.3
11:33:35	9.7	418.8	9.9	0.0	-0.1	-0.5	841.5
Avg.=	9.8	418.4	9.9	1.2	-0.0	-0.4	689.9

RADIAN CORPORATION QC O2=5 CO=50 CO2=5 THC=50 / O

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:50:26
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:50:27	4.7	47.8	4.9	1.6	0.3	9.3	375.2
11:50:28	4.7	47.8	4.9	1.6	0.3	9.3	375.2
11:50:35	4.7	48.0	5.0	2.2	0.3	9.2	336.5
11:50:50	4.7	47.9	5.0	1.5	0.2	9.2	327.2
11:51:05	4.7	48.0	5.0	1.8	0.2	9.2	309.2
11:51:20	4.7	48.0	5.0	1.8	0.1	9.2	299.4
11:51:35	4.7	47.9	5.0	2.0	0.1	9.2	292.3
Avg.=	4.7	47.9	5.0	1.8	0.2	9.2	330.7

RADIAN CORPORATION QC SO2=80 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:57:56
File Name = c:\CEMDATA\112191.PRN Calibration File:c:\CEMDATA\MTI1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:57:50	0.4	-4.2	-0.0	74.6	81.7	0.2	432.4
11:58:05	0.5	-3.9	0.0	76.5	81.8	0.2	393.4
11:58:20	0.2	-4.1	-0.0	75.1	81.7	-0.0	375.5
11:58:35	0.3	-4.0	-0.0	74.9	81.7	0.0	382.8
11:58:50	0.4	-4.2	-0.0	74.8	81.9	0.1	387.2
11:59:05	0.4	-4.4	-0.0	74.4	82.0	0.1	406.7
11:59:20	0.5	-4.3	-0.0	74.4	82.0	0.2	423.7
Avg.=	0.4	-4.2	-0.0	75.0	81.8	0.1	400.2

RADIAN CORPORATION QC HCL=46.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN MWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 10:58:16
File Name = E:\CEMDATA\112191.PRN Calibration File:E:\CEMDATA\mtol121.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:58:17	13.3	-0.7	4.8	1.7	45.8	2.9	51.1
Avg.=	13.3	-0.7	4.8	1.7	45.8	2.9	51.1

RADIAN CORPORATION QC HCL=46.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 10:59:58
File Name = E:\CEMDATA\112191.PRM Calibration File:E:\CEMDATA\mto1121.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
10:59:59	12.5	-0.8	5.8	1.9	45.9	3.0	48.5
11:00:07	12.6	-0.6	5.7	1.5	45.6	3.2	50.0
11:00:22	12.7	-0.8	5.5	2.1	44.7	3.1	48.6
11:00:37	13.1	-0.7	4.9	1.7	42.8	3.5	47.0
11:00:52	13.9	-0.7	4.1	1.9	40.3	3.4	48.2
11:01:07	14.6	-0.7	3.7	1.7	38.4	3.5	49.5
11:01:22	14.9	-0.7	3.7	1.6	38.0	3.5	46.8
11:01:37	14.7	-0.7	3.9	1.6	38.8	3.4	48.2
Avg.=	13.6	-0.7	4.7	1.7	41.8	3.3	48.3

RADIAN CORPORATION QC O2=10 CO2=1[illegible]

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:45:08
File Name = E:\CEMDATA\112191.PRN Calibration File:E:\CEMDATA\MTO1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:45:10	10.0	449.6	10.4	0.3	0.6	-0.8	-0.8
11:45:21	10.0	451.9	10.3	1.5	0.2	-0.5	2.4
11:45:36	10.0	449.8	10.3	1.5	0.2	-0.5	1.0
11:45:51	10.0	451.3	10.3	1.0	-0.2	-0.5	1.7
11:46:06	10.0	452.0	10.3	1.4	0.2	-0.5	2.2
11:46:21	10.0	454.8	10.3	1.4	0.2	-0.4	4.3
11:46:36	10.0	455.8	10.3	1.3	0.2	-0.4	0.5
11:46:51	10.0	454.2	10.3	1.3	0.2	-0.5	3.7
[illegible]	[illegible]	452.4	10.4	[illegible]	[illegible]	[illegible]	[illegible]

RADIAN CORPORATION QC O2=5 CO2=5 CO=50 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:49:55
File Name = E:\CEMDATA\112191.PRN Calibration File:E:\CEMDATA\MTO1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:49:56	5.0	45.1	5.1	1.1	0.1	9.6	1.5
11:49:56	5.0	45.1	5.1	1.1	0.1	9.6	1.5
11:50:06	5.0	45.1	5.1	0.9	0.1	9.4	2.0
11:50:21	5.0	44.8	5.1	1.2	0.0	9.5	0.3
11:50:36	5.0	44.8	5.1	1.2	0.0	9.5	1.3
11:50:51	5.0	44.9	5.1	1.0	0.1	9.6	0.0
11:51:06	5.0	45.2	5.1	1.2	0.0	9.4	1.8
11:51:21	5.0	45.0	5.1	1.0	0.1	9.5	1.7
Avg.=	5.0	45.0	5.1	1.1	0.1	9.5	1.3

RADIAN CORPORATION QC SO2=80 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-21-1991 Current Time = 11:57:48
File Name = E:\CEMDATA\112191.PRN Calibration File:E:\CEMDATA\MTO1121A.CAL

11-21-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
11:57:51	-0.0	0.1	-0.0	75.1	82.2	-0.2	2.1
11:58:06	-0.0	0.0	-0.0	75.0	82.3	-0.3	0.1
11:58:21	-0.0	0.0	-0.0	75.5	82.3	-0.2	0.8
11:58:36	-0.0	-0.0	-0.0	75.6	82.5	-0.3	0.7
11:58:51	-0.0	0.0	-0.0	76.0	82.5	-0.2	0.6
11:59:06	-0.0	0.0	-0.0	76.1	82.5	-0.2	2.6
11:59:21	-0.0	0.0	-0.0	76.0	82.5	-0.1	2.7
Avg.=	-0.0	0.0	-0.0	75.6	82.4	-0.2	1.4

RADIAN CORPORATION QC O2=5 CO=50 CO2=5 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 09:01:18
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:01:18	4.6	50.6	4.9	0.6	-0.3	9.8	184.4
09:01:19	4.6	50.6	4.9	0.6	-0.3	9.8	184.4
09:01:29	4.5	50.5	4.9	0.8	-0.2	9.7	194.0
09:01:44	4.5	50.5	4.9	0.1	-0.3	9.8	196.8
09:01:59	4.5	50.6	4.9	-0.1	-0.3	9.8	202.0
09:02:14	4.5	50.5	4.9	-0.2	-0.3	9.8	201.1
09:02:29	4.5	50.5	4.9	-0.3	-0.4	9.8	195.8
09:02:44	4.5	50.5	4.9	-0.5	-0.4	9.8	202.2
Avg.=	4.5	50.6	4.9	0.1	-0.3	9.8	195.1

RADIAN CORPORATION QC HCL=177

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN .NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 09:03:14
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:03:15	4.4	50.4	4.9	-0.3	-0.3	9.6	198.6
09:03:29	4.6	50.3	4.9	-0.6	-0.4	9.8	196.7
09:03:44	4.5	50.4	4.9	-0.9	-0.4	9.8	201.6
09:03:59	4.5	50.3	4.9	-0.9	-0.4	9.8	212.8
09:04:14	4.5	50.1	4.8	-0.8	1.4	9.8	206.1
09:04:29	3.4	35.5	2.8	18.6	50.9	2.8	196.4
09:04:44	1.5	12.4	1.1	55.0	76.7	0.7	199.6
Avg.=	3.9	42.8	4.0	10.0	18.2	7.5	201.6

RADIAN CORPORATION QC SO2 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 09:07:36
File Name = c:\CEMDATA\112291.PRN Calibration File:c:\CEMDATA\MTI1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:07:36	-0.2	-0.5	0.0	71.3	79.5	0.2	174.1
09:07:44	-0.1	-0.4	0.0	72.2	79.6	0.6	180.7
09:07:59	-0.2	-0.7	-0.0	71.3	79.6	0.2	158.1
09:08:14	-0.3	-0.5	0.0	71.4	79.5	0.4	143.5
09:08:29	-0.0	-0.7	0.0	71.1	79.7	0.5	143.6
09:08:44	0.1	-0.8	0.0	71.4	79.8	0.6	145.4
09:08:59	0.1	-0.9	0.0	71.6	79.9	0.6	144.4
09:09:14	-0.0	-0.9	0.0	72.0	79.8	0.5	148.0
Avg.=	-0.1	-0.7	0.0	71.5	79.7	0.4	152.2

Press <C> to Continue

RADIAN CORPORATION QC HCL=46.7

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 08:52:41
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MTO1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:52:42	14.1	-1.6	3.7	14.5	44.5	4.4	50.1
08:52:43	14.1	-1.6	3.7	14.5	44.5	4.4	50.1
08:52:51	14.1	-1.0	3.7	9.3	45.0	4.3	47.9
08:53:06	14.1	-1.5	3.8	9.1	44.9	4.1	47.9
08:53:21	14.0	-1.6	3.8	8.0	45.2	4.1	51.1
08:53:36	14.0	-1.6	3.8	7.3	45.0	4.0	48.5
08:53:51	14.0	-1.5	3.8	5.9	44.8	3.9	49.5
08:54:06	14.0	-1.5	3.8	5.1	44.9	3.9	48.5
Avg.=	14.1	-1.5	3.8	9.2	44.9	4.1	49.2

RADIAN CORPORATION QC O2=5 CO2=5 CO=50 THC=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN.NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 09:00:39
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MT01122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:00:40	5.0	46.5	5.2	1.4	0.2	9.1	5.1
09:00:50	5.0	45.9	5.2	0.5	0.3	9.0	4.3
09:01:04	5.0	45.8	5.2	0.9	0.2	9.0	4.7
09:01:18	5.0	45.8	5.2	0.6	0.2	9.1	4.9
09:01:32	5.0	45.3	5.2	0.9	0.2	9.1	2.6
09:01:46	5.0	45.3	5.2	0.9	0.2	9.1	3.6
09:02:00	5.0	45.7	5.2	0.7	0.1	9.1	5.2
Avg.=	5.0	45.8	5.2	0.8	0.2	9.1	4.3

RADIAN CORPORATION QC SO2=80 NOX=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-22-1991 Current Time = 09:07:37
File Name = E:\CEMDATA\112291.PRN Calibration File:E:\CEMDATA\MTO1122.CAL

11-22-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:07:38	0.0	0.5	0.0	70.9	80.8	-0.2	4.5
09:07:50	0.0	0.5	0.0	72.2	80.9	-0.0	1.0
09:08:04	0.0	0.5	0.0	72.6	80.8	0.0	2.6
09:08:18	0.0	0.5	0.0	72.6	80.8	0.0	1.0
09:08:32	0.0	0.5	0.0	73.3	80.7	-0.1	1.5
09:08:46	0.0	0.5	0.0	73.4	80.7	0.0	1.3
09:09:00	0.0	0.5	0.0	73.5	80.8	0.1	1.3
09:09:14	0.0	0.5	0.0	73.6	80.8	-0.1	3.3
Avg.=	0.0	0.5	0.0	72.7	80.8	-0.0	2.0

Press Shift-PrtSc to Print Out Table
Press <C> to Continue

RADIAN CORPORATION ac so2 nox =00

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 08:46:59
File Name = c:\CEMDATA\112391.PRN Calibration File:c:\CEMDATA\mti1123.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:47:02	0.0	-1.3	-0.0	70.7	80.5	-0.5	490.5
08:47:17	-0.0	-1.5	-0.0	69.8	80.6	-0.7	444.8
08:47:32	-0.0	-1.5	-0.0	69.4	80.6	-0.7	478.6
08:47:47	-0.0	-1.5	-0.0	69.4	80.5	-0.7	521.5
08:48:02	-0.0	-1.5	-0.0	70.3	80.5	-0.7	422.5
08:48:17	-0.0	-1.5	-0.0	70.9	80.6	-0.8	295.8
Avg.=	-0.0	-1.5	-0.0	70.1	80.5	-0.7	442.3

RADIAN CORPORATION hcl=177 O_2 CO_2 = 5 CO = 50 CH_4 - 50

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI INLET
MORRISTOWN ,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 08:50:58
File Name = c:\CEMDATA\112391.PRN Calibration File:c:\CEMDATA\ati1123.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:51:02	4.7	50.2	4.9	-0.1	0.3	9.4	214.2
08:51:17	4.7	50.2	4.9	-0.6	0.1	9.4	213.4
08:51:32	4.7	50.1	4.9	-1.0	0.0	9.4	215.6
08:51:47	4.7	50.2	4.9	-1.1	0.0	9.4	201.5
08:52:02	4.7	50.3	4.9	-1.3	-0.0	9.4	201.1
08:52:17	4.7	50.2	4.9	-1.4	-0.0	9.4	206.1
08:52:32	4.7	50.2	4.9	-1.5	-0.1	9.4	205.3
Avg.=	4.7	50.2	4.9	-1.0	0.0	9.4	208.2

RADIAN CORPORATION ac so2 nox=80

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 08:46:26
File Name = E:\CEMDATA\112391.PRN Calibration File:E:\CEMDATA\mto1123.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:46:28	-0.0	-0.0	-0.0	75.4	81.3	-1.4	4.4
08:46:37	-0.0	0.3	-0.0	75.9	81.2	-1.5	3.0
08:46:52	-0.0	0.0	-0.0	75.8	81.4	-1.4	5.5
08:47:07	-0.0	0.0	-0.0	76.1	81.4	-1.4	7.9
08:47:22	-0.0	0.5	-0.0	76.6	81.5	-1.5	3.2
08:47:37	-0.0	0.6	-0.0	76.3	81.6	-1.4	5.3
08:47:52	-0.0	0.6	-0.0	76.6	81.5	-1.4	5.2
08:48:07	-0.0	0.6	-0.0	76.8	81.5	-1.4	4.8
Avg.=	-0.0	0.3	-0.0	76.2	81.4	-1.4	4.9

RADIAN CORPORATION hcl=46.6

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 08:50:54
File Name = E:\CEMDATA\112391.PRN Calibration File:E:\CEMDATA\mto1123.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
08:50:56	4.9	44.8	5.3	4.2	-0.3	8.1	43.4
08:51:07	4.9	44.4	5.3	2.9	-0.3	8.0	47.5
08:51:22	4.9	44.3	5.3	2.8	-0.2	8.0	46.6
08:51:37	4.9	44.7	5.3	2.4	-0.4	8.0	46.9
08:51:52	4.9	44.3	5.4	1.8	-0.3	8.0	49.5
08:52:07	4.9	44.7	5.4	1.9	-0.4	8.0	44.6
Avg.=	4.9	44.5	5.3	2.7	-0.3	8.0	46.4

RADIAN CORPORATION ac o2=5 co2=5 co=50 ch4=10

Field Testing and Process Engineering Dept.
Continuous Emissions Monitoring Data
MORRISTOWN HWI OUTLET
MORRISTOWN,NJ
Performed for: EPA/EMB
Date Printed = 11-23-1991 Current Time = 09:02:18
File Name = E:\CEMDATA\112391.PRN Calibration File:E:\CEMDATA\ato1123a.CAL

11-23-1991 Time	O2 %V	CO PPMV	CO2 %V	SO2 PPMV	NOx PPMV	THC PPMV	HCl PPMV
09:02:20	5.0	46.8	5.2	0.6	-0.2	9.0	3.3
09:02:31	5.0	46.4	5.2	0.3	-0.1	9.2	2.4
09:02:46	5.0	46.7	5.2	0.8	-0.3	8.8	4.7
09:03:01	5.0	46.4	5.2	0.7	-0.2	9.0	4.6
09:03:16	5.0	46.4	5.2	0.5	-0.1	9.1	1.8
Avg.=	5.0	46.5	5.2	0.6	-0.2	9.0	3.4

TRIANGLE LABORATORIES, INC.
801-10 CAPITOLA DRIVE
RESEARCH TRIANGLE PARK, NC 27713

Phone: (919) 544-5729
Fax: (919) 544-5491

DATE :	* 23 DECEMBER 1991
CLIENT ID :	* RADIAN CORPORATION
P.O. NUMBER :	* 5137836
TLI PROJECT No. :	* 19629A

CASE NARRATIVE
MODEL 8290X

ANALYSIS OF SAMPLES FOR THE PRESENCE OF

POLYCHLORINATED DIBENZO-p-DIOXINS

AND

DIBENZOFURANS

BY

HIGH-RESOLUTION GAS CHROMATOGRAPHY /
HIGH-RESOLUTION MASS SPECTROMETRY

Fourteen MDC samples were received from RADIAN CORPORATION in good condition November 27, 1991 and stored in a refrigerator at 4°C. The samples were extracted and analyzed according to procedures described in the Triangle Labs User Manual provided with this data package. Any particular difficulties encountered during the sample handling by Triangle Labs will be discussed in the QA/QC remark section below.

Quality Assurance/Quality Control Samples

A laboratory method blank -- identified as the TLI Blank -- is prepared along with the batch of samples.

QA/QC Remarks

The release of this particular set of RADIAN CORPORATION analytical data by Triangle Labs was authorized by the Quality Assurance Officer who has reviewed each sample data package individually following a series of inspections/reviews conducted at two other levels of the data production line. When applicable, general deviations from acceptable QA/QC requirements are identified below. Comments on the effect of these deviations upon the validity and reliability of the results can be obtained from the User Manual (Data Quality Objectives; Section 5). Specific QA/QC Problems Associated with this Particular Project are:

Sample Preparation Laboratory: None

Mass Spectrometry: None

Data Review:

Low levels of several isomers are detected in the TLI Blank. All are less than the target detection limit, which is acceptable under TLI guidelines.

Sample INLET 5 shows slight saturation of the OCDF analyte isomer. This isomer only slightly exceeds the dynamic range of the instrument; therefore, the reported concentration is not significantly impacted.

The presence of the 2378-TCDF isomer, where found on the DB-5 column at a concentration in excess of the Target Detection Limit, is confirmed on the isomer-specific DB-225 GC column.

Addendum to Section 2.3 of the Data User's Manual

All sample and calibration analyses are conducted using a 2 uL injection volume, unless otherwise specified.

Addendum to Section 4.6 of the Data User's Manual

Effective December 15, 1989, Triangle Laboratories has adopted a new procedure for calculating the analyte specific detection limits. Under this new policy two representative noise height

determinations are summed and multiplied by an empirically determined factor before the detection limit equation given in Section 4.6 of the Data User's Manual is applied. The effect of this procedure is to increase DB-225 analyses detection limits by a factor of 3.5, and DB-5 analyses detection limits by a factor of 5. This procedure will result in a more accurate estimate of detection limits.

The revised formula for DB-225 analyses is:

$$DL_{ai}^{DB-225} = \frac{2.5 * (3.5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$3.5 * H_{ai} = A_{noise}$$

The revised formula for DB-5 analyses is:

$$DL_{ai}^{DB-5} = \frac{2.5 * (5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$5 * H_{ai} = A_{noise}$$

The symbols are defined in Section 4.6 of the Data User's Manual.

As an example, consider a DB-225 confirmation analysis of a 10 g sample. The internal standard spike is 2000 pg, the $^{13}C_{12}$-2,3,7,8-TCDF internal standard area is 12000 area units. the $\overline{RRF}$ is 1.215 and the noise height is 11 units. The 2,3,7,8-TCDF detection limit is:

$$DL_{TCDF}^{DB-225} = \frac{2.5 * (3.5 * 11) * 2000}{12000 * 1.215 * 10.0} = 1.3 \text{ ppt}$$

Should RADIAN CORPORATION have any questions or comments to formulate regarding this data package please feel free to contact us.

For Triangle Laboratories,

Laboratory Management	Quality Assurance Unit	Report Preparation/ Quality Control
Signed:		
Title:		
Mary Collins	Jacek Bielawski	Todd Vilen
Project Coordinator Supervisor	QA Manager	Dioxin Data Review Officer

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915599
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1-3
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.06				0.74	25:23	—
12378-PeCDD	0.15				1.61	29:42	—
123478-HxCDD	0.21				1.23	32:49	—
123678-HxCDD	0.29				1.20	32:54	—
123789-HxCDD	0.52				1.16	33:11	PC
1234678-HpCDD	4.6				0.98	36:01	B
OCDD	22.1				0.83	39:28	B
2378-TCDF	7.9				0.71	24:39	—
12378-PeCDF	1.6				1.59	28:40	—
23478-PeCDF	4.4				1.58	29:21	—
123478-HxCDF	10.5				1.12	32:07	—
123678-HxCDF	2.7				1.14	32:14	—
234678-HxCDF	11.0				1.12	32:43	B
123789-HxCDF	0.29				1.08	33:26	—
1234678-HpCDF	19.5				0.92	35:02	B
1234789-HpCDF	7.3				0.93	36:30	—
OCDF	95.4				0.88	39:40	B
TOTAL TCDD	0.32	3		0.72	0.81		—
TOTAL PeCDD	1.4	10		1.4	1.61		—
TOTAL HxCDD	3.6	7			1.21		—
TOTAL HpCDD	9.7	2			0.99		—
TOTAL TCDF	23.2	15			0.73		—
TOTAL PeCDF	38.5	16		38.5	1.57		—
TOTAL HxCDF	47.0	14			1.12		—
TOTAL HpCDF	55.1	4			0.92		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

12/28/91

FILE NAME....: S915599
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1-3
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.6	115		25:23	___
13C12-PeCDF 234	5.6	139	1.51	29:21	___
13C12-HxCDF 478	4.8	120	0.50	32:08	___
13C12-HxCDD 478	5.2	130	1.16	32:49	___
13C12-HpCDF 789	4.4	109	0.42	36:29	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.4	84.9	0.50	33:26	___
13C12-HxCDF 234	4.2	106	0.49	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.60	15.1	0.76	24:38	✓
13C12-2378-TCDD	0.69	17.4	0.79	25:23	✓
13C12-PeCDF 123	2.0	49.4	1.52	28:39	___
13C12-PeCDD 123	3.1	77.7	1.54	29:42	___
13C12-HxCDF 678	3.3	82.5	0.49	32:13	___
13C12-HxCDD 678	3.6	90.4	1.19	32:54	___
13C12-HpCDF 678	3.8	95.6	0.42	35:01	___
13C12-HpCDD 678	3.5	88.1	1.00	36:01	___
13C12-OCDD	6.9	85.7	0.87	39:27	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	25:11	___
13C12-HxCDD 789	1.18	33:11	___

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES. INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W506701
CONCAL.....: W506502
ANALYST.....: VC
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET 1
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1-3
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.11				0.82	22:57	—
2378-TCDF	4.5				0.76	24:24	—
TOTAL TCDD	0.65	8		1.0	0.78		—
TOTAL TCDF	26.0	26		26.1	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.7	93.0		22:56	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.87	21.7	0.78	24:23	✓
13C12-2378-TCDD	1.0	25.8	0.80	22:56	✓

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:12	—

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915601
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 2
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-7-9
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng*)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.07				0.79	25:23	
12378-PeCDD	0.23				1.52	29:42	
123478-HxCDD	0.39				1.24	32:49	
123678-HxCDD	0.48				1.21	32:54	
123789-HxCDD	0.91				1.22	33:11	PR
1234678-HpCDD	7.1				1.02	36:01	B
OCDD	28.3				0.83	39:29	B
2378-TCDF	5.5				0.71	24:39	
12378-PeCDF	1.8				1.70	28:39	
23478-PeCDF	5.5				1.54	29:21	
123478-HxCDF	17.9				1.13	32:07	
123678-HxCDF	5.0				1.15	32:14	
234678-HxCDF	17.1				1.12	32:42	B
123789-HxCDF	EMPC			2.0			
1234678-HpCDF	33.6				0.88	35:02	B
1234789-HpCDF	12.6				0.89	36:30	
OCDF	137				0.88	39:40	B
TOTAL TCDD	0.47	8		0.64	0.77		
TOTAL PeCDD	1.8	10		1.9	1.58		
TOTAL HxCDD	6.0	7			1.23		
TOTAL HpCDD	14.8	2			1.02		
TOTAL TCDF	16.3	15			0.73		
TOTAL PeCDF	43.1	17			1.57		
TOTAL HxCDF	74.6	13		76.3	1.14		
TOTAL HpCDF	94.4	4			0.89		

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

12/28/91

FILE NAME....: S915601
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 2
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-7-9
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.2	105		25:23	___
13C12-PeCDF 234	5.4	135	1.51	29:20	___
13C12-HxCDF 478	5.1	126	0.50	32:07	___
13C12-HxCDD 478	4.8	120	1.20	32:49	___
13C12-HpCDF 789	4.8	119	0.42	36:29	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.2	78.8	0.49	33:26	___
13C12-HxCDF 234	3.3	82.6	0.50	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.87	21.6	0.74	24:37	✓
13C12-2378-TCDD	0.94	23.5	0.77	25:22	✓
13C12-PeCDF 123	2.3	57.4	1.48	28:39	___
13C12-PeCDD 123	3.4	85.1	1.54	29:42	___
13C12-HxCDF 678	2.9	73.1	0.50	32:13	___
13C12-HxCDD 678	3.2	81.0	1.22	32:53	___
13C12-HpCDF 678	4.1	104	0.42	35:01	___
13C12-HpCDD 678	4.1	103	0.99	36:01	___
13C12-OCDD	9.4	118	0.87	39:28	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:11	___
13C12-HxCDD 789	1.19	33:11	___

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506703
CONCAL.....: W506502
ANALYST.....: VC
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET 2
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-7-9
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.10				0.71	22:57	___
2378-TCDF	2.1				0.75	24:23	___
TOTAL TCDD	0.59	10		0.94	0.75		___
TOTAL TCDF	19.7	28		19.7	0.76		___

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.6	89.3		22:57	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.1	28.4	0.79	24:22	✓
13C12-2378-TCDD	1.3	32.2	0.80	22:55	✓

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:11	___

Reviewed By: [signature] 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915603
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2370B
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 3
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1315
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.11				0.65	25:23	—
12378-PeCDD	0.46				1.71	29:43	—
123478-HxCDD	0.93				1.23	32:49	—
123678-HxCDD	1.0				1.24	32:54	—
123789-HxCDD	2.3				1.25	33:11	PR
1234678-HpCDD	19.6				1.00	36:02	B
OCDD	72.9				0.83	39:29	B
2378-TCDF	9.8				0.72	24:40	—
12378-PeCDF	2.6				1.66	28:40	—
23478-PeCDF	8.2				1.53	29:21	—
123478-HxCDF	38.6				1.15	32:07	—
123678-HxCDF	10.4				1.08	32:14	—
234678-HxCDF	39.8				1.12	32:43	B
123789-HxCDF	0.96				1.25	33:26	—
1234678-HpCDF	81.2				0.89	35:02	B
1234789-HpCDF	29.9				0.89	36:30	—
OCDF	420				0.86	39:40	B
TOTAL TCDD	1.3	12		1.4	0.76		—
TOTAL PeCDD	4.0	10		4.3	1.61		—
TOTAL HxCDD	14.4	7			1.24		—
TOTAL HpCDD	39.7	2			1.01		—
TOTAL TCDF	36.2	15		36.3	0.72		—
TOTAL PeCDF	88.8	18			1.58		—
TOTAL HxCDF	174	14			1.14		—
TOTAL HpCDF	177	3		231	0.89		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915603
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23708
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 3
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1315
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.6	115		25:23	
13C12-PeCDF 234	4.8	121	1.55	29:21	
13C12-HxCDF 478	5.1	128	0.48	32:08	
13C12-HxCDD 478	5.3	132	1.18	32:49	
13C12-HpCDF 789	4.4	111	0.42	36:29	

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.6	89.2	0.48	33:26	
13C12-HxCDF 234	4.1	103	0.47	32:42	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.6	39.0	0.75	24:38	✓
13C12-2378-TCDD	1.5	38.3	0.78	25:22	✓
13C12-PeCDF 123	2.4	59.9	1.52	28:39	
13C12-PeCDD 123	2.8	69.4	1.58	29:42	
13C12-HxCDF 678	3.6	89.6	0.46	32:13	
13C12-HxCDD 678	3.5	86.4	1.19	32:54	
13C12-HpCDF 678	4.2	105	0.43	35:01	
13C12-HpCDD 678	3.8	94.7	0.99	36:01	
13C12-OCDD	7.5	93.5	0.87	39:28	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.75	25:11	
13C12-HxCDD 789	1.18	33:11	

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME. ..: W506803
CONCAL... ...: W506802
ANALYST. ....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF08

CLIENT.....: RADIAN
SAMPLE ID....: INLET 3
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1315
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.19				0.82	22:53	—
2378-TCDF	1.4				0.74	24:21	—
TOTAL TCDD	1.2	9		1.8	0.75		—
TOTAL TCDF	42.2	27		42.5	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.7	92.7		22:54	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.9	48.7	0.76	24:20	—
13C12-2378-TCDD	1.9	48.2	0.77	22:53	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	—

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915605
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 4
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1921

PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.08				0.71	25:23	—
12378-PeCDD	0.28				1.59	29:42	—
123478-HxCDD	0.55				1.28	32:49	—
123678-HxCDD	0.63				1.22	32:54	—
123789-HxCDD	1.3				1.22	33:11	PR
1234678-HpCDD	12.2				1.02	36:01	B
OCDD	50.6				0.83	39:29	B
2378-TCDF	5.6				0.71	24:39	—
12378-PeCDF	1.6				1.63	28:39	—
23478-PeCDF	5.3				1.56	29:21	—
123478-HxCDF	26.8				1.11	32:07	—
123678-HxCDF	7.3				1.12	32:14	—
234678-HxCDF	29.5				1.11	32:43	B
123789-HxCDF	0.77				1.10	33:26	—
1234678-HpCDF	58.5				0.90	35:02	B
1234789-HpCDF	22.2				0.90	36:30	—
OCDF	326				0.92	39:41	B
TOTAL TCDD	0.71	12		0.73	0.75		—
TOTAL PeCDD	1.7	10		1.9	1.61		—
TOTAL HxCDD	8.1	7		8.1	1.24		—
TOTAL HpCDD	26.3	2			1.02		—
TOTAL TCDF	19.0	15		19.1	0.72		—
TOTAL PeCDF	58.4	18		58.4	1.57		—
TOTAL HxCDF	125	14			1.12		—
TOTAL HpCDF	169	4			0.90		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY
12/28/91

FILE NAME....: S915605
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 4
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1921
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.3	106		25:23	___
13C12-PeCDF 234	5.1	127	1.52	29:21	___
13C12-HxCDF 478	5.1	128	0.50	32:07	___
13C12-HxCDD 478	4.9	123	1.18	32:48	___
13C12-HpCDF 789	4.1	103	0.41	36:29	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.5	86.3	0.49	33:26	___
13C12-HxCDF 234	4.1	102	0.50	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.1	28.4	0.74	24:37	✓
13C12-2378-TCDD	1.2	30.2	0.79	25:22	✓
13C12-PeCDF 123	2.4	59.2	1.55	28:39	___
13C12-PeCDD 123	4.0	101	1.51	29:42	___
13C12-HxCDF 678	3.4	85.5	0.50	32:13	___
13C12-HxCDD 678	3.7	92.3	1.20	32:53	___
13C12-HpCDF 678	4.7	118	0.43	35:01	___
13C12-HpCDD 678	3.8	96.0	1.03	36:01	___
13C12-OCDD	8.8	110	0.88	39:28	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:11	___
13C12-HxCDD 789	1.19	33:11	___

Reviewed By: [TV 12/28/91]

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506805
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET 4
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1921
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.12				0.74	22:53	
2378-TCDF	0.89				0.77	24:19	
TOTAL TCDD	0.89	11		1.1	0.76		
TOTAL TCDF	23.8	28		23.9	0.75		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.5	88.2		22:53	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.3	33.4	0.76	24:18	✓
13C12-2378-TCDD	1.4	35.8	0.80	22:52	✓

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	23:07	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915607
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 5
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2527
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.06				0.73	25:23	
12378-PeCDD	0.27				1.57	29:43	
123478-HxCDD	0.73				1.32	32:49	
123678-HxCDD	0.86				1.17	32:54	
123789-HxCDD	1.8				1.21	33:11	PR
1234678-HpCDD	18.2				1.01	36:01	B
OCDD	71.9				0.83	39:29	B
2378-TCDF	7.4				0.73	24:40	
12378-PeCDF	1.6				1.55	28:40	
23478-PeCDF	6.1				1.54	29:22	
123478-HxCDF	36.8				1.11	32:07	
123678-HxCDF	8.7				1.10	32:14	
234678-HxCDF	44.7				1.09	32:43	B
123789-HxCDF	0.82				1.23	33:26	
1234678-HpCDF	76.4				0.89	35:02	B
1234789-HpCDF	29.0				0.90	36:30	
OCDF	345				0.92	39:41	B, S
TOTAL TCDD	1.1	11		1.1	0.76		
TOTAL PeCDD	2.8	10		3.0	1.58		
TOTAL HxCDD	12.6	8		12.6	1.23		
TOTAL HpCDD	38.1	2			1.01		
TOTAL TCDF	25.5	15		25.5	0.74		
TOTAL PeCDF	66.9	15		67.6	1.57		
TOTAL HxCDF	157	14			1.12		
TOTAL HpCDF	224	4			0.90		

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915607
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 5
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2527
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.3	107		25:23	
13C12-PeCDF 234	4.5	113	1.52	29:21	
13C12-HxCDF 478	5.2	129	0.50	32:07	
13C12-HxCDD 478	5.6	140	1.19	32:49	
13C12-HpCDF 789	4.3	107	0.41	36:29	

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.6	90.5	0.50	33:26	
13C12-HxCDF 234	4.5	112	0.50	32:42	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.6	39.1	0.78	24:38	✓
13C12-2378-TCDD	1.6	40.7	0.79	25:22	
13C12-PeCDF 123	2.7	68.0	1.52	28:39	
13C12-PeCDD 123	3.1	78.3	1.51	29:42	
13C12-HxCDF 678	3.5	87.9	0.50	32:13	
13C12-HxCDD 678	3.6	89.9	1.20	32:54	
13C12-HpCDF 678	4.7	117	0.43	35:02	
13C12-HpCDD 678	4.1	103	1.00	36:01	
13C12-OCDD	9.9	124	0.87	39:29	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	25:11	
13C12-HxCDD 789	1.17	33:11	

Reviewed By: |_____ __/__/__|

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506807
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET 5
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2527
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.11				0.73	22:52	—
2378-TCDF	0.67				0.76	24:19	—
TOTAL TCDD	1.2	9		1.6	0.74		—
TOTAL TCDF	32.2	30		32.3	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.5	88.6		22:52	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.8	46.1	0.79	24:17	—
13C12-2378-TCDD	1.9	47.5	0.81	22:51	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:06	—

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915611
CONCAL.....: S915609
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 6
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3133
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.03				0.67	25:24	—
12378-PeCDD	0.10				1.60	29:43	—
123478-HxCDD	0.21				1.21	32:49	—
123678-HxCDD	0.25				1.24	32:54	—
123789-HxCDD	0.46				1.17	33:11	PR
1234678-HpCDD	4.0				1.00	36:01	B
OCDD	17.0				0.83	39:29	B
2378-TCDF	2.3				0.72	24:40	—
12378-PeCDF	0.56				1.52	28:40	—
23478-PeCDF	1.8				1.51	29:22	—
123478-HxCDF	9.1				1.10	32:07	—
123678-HxCDF	2.4				1.12	32:14	—
234678-HxCDF	9.3				1.10	32:43	B
123789-HxCDF	0.27				1.22	33:26	—
1234678-HpCDF	18.6				0.93	35:02	B
1234789-HpCDF	6.2				0.92	36:30	—
OCDF	61.3				0.88	39:40	B
TOTAL TCDD	0.62	12		0.63	0.77		—
TOTAL PeCDD	1.0	10		1.1	1.49		—
TOTAL HxCDD	3.9	7			1.22		—
TOTAL HpCDD	8.3	2			1.02		—
TOTAL TCDF	9.2	16			0.71		—
TOTAL PeCDF	18.1	15		18.2	1.51		—
TOTAL HxCDF	38.3	13		38.3	1.11		—
TOTAL HpCDF	50.2	4			0.92		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

12/28/91

FILE NAME....: S915611
CONCAL.....: S915609
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET 6
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3133
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.7	117		25:24	___
13C12-PeCDF 234	4.7	118	1.57	29:21	___
13C12-HxCDF 478	5.3	132	0.50	32:08	___
13C12-HxCDD 478	5.4	135	1.19	32:49	___
13C12-HpCDF 789	4.6	116	0.41	36:29	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	4.0	99.8	0.49	33:26	___
13C12-HxCDF 234	4.4	109	0.50	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.8	69.6	0.75	24:38	___
13C12-2378-TCDD	2.5	62.4	0.76	25:23	___
13C12-PeCDF 123	2.9	71.7	1.55	28:39	___
13C12-PeCDD 123	4.0	99.8	1.54	29:42	___
13C12-HxCDF 678	3.8	94.8	0.49	32:13	___
13C12-HxCDD 678	3.9	98.1	1.21	32:54	___
13C12-HpCDF 678	4.1	103	0.42	35:01	___
13C12-HpCDD 678	4.2	104	1.02	36:01	___
13C12-OCDD	9.7	121	0.88	39:28	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.76	25:12	___
13C12-HxCDD 789	1.17	33:11	___

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506809
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET 6
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3133
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.06				0.85	22:51	—
2378-TCDF	0.31				0.79	24:18	—
TOTAL TCDD	0.69	11		0.85	0.78		—
TOTAL TCDF	11.9	23		11.9	0.75		—

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.6	90.0		22:52	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.7	68.4	0.77	24:17	—
13C12-2378-TCDD	3.0	73.8	0.80	22:51	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	23:06	—

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915613
CONCAL.....: S915609
ANALYST.....: JA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET-FB
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3739
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				
12378-PeCDD	ND		0.005				
123478-HxCDD	0.006				1.18	32:49	
123678-HxCDD	ND		0.005				
123789-HxCDD	0.007				1.27	33:12	
1234678-HpCDD	0.15				0.91	36:01	B
OCDD	0.76				0.89	39:29	B
2378-TCDF	0.02				0.69	24:42	
12378-PeCDF	EMPC			0.008			
23478-PeCDF	0.02				1.76	29:22	
123478-HxCDF	0.14				1.10	32:07	
123678-HxCDF	EMPC			0.04			
234678-HxCDF	0.16				1.18	32:43	B
123789-HxCDF	0.003				0.98	33:26	
1234678-HpCDF	0.49				0.91	35:02	B
1234789-HpCDF	EMPC			0.22			
OCDF	2.9				0.88	39:40	B
TOTAL TCDD	ND		0.003				
TOTAL PeCDD	0.01	2			2.26		
TOTAL HxCDD	0.04	4		0.06	1.22		
TOTAL HpCDD	0.28	2			1.01		
TOTAL TCDF	0.04	5		0.06	0.81		
TOTAL PeCDF	0.09	5		0.19	1.64		
TOTAL HxCDF	0.56	10		0.64	1.12		
TOTAL HpCDF	1.2	3		1.4	0.92		

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915613
CONCAL.....: S915609
ANALYST.....: JA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: INLET-FB
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3739

PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.6	116		25:24	—
13C12-PeCDF 234	4.3	107	1.54	29:21	—
13C12-HxCDF 478	4.8	121	0.50	32:08	—
13C12-HxCDD 478	5.4	135	1.21	32:49	—
13C12-HpCDF 789	4.3	108	0.42	36:30	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.4	84.8	0.52	33:26	—
13C12-HxCDF 234	3.9	98.3	0.49	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.9	72.8	0.75	24:39	—
13C12-2378-TCDD	2.4	60.6	0.80	25:23	—
13C12-PeCDF 123	2.9	71.3	1.52	28:40	—
13C12-PeCDD 123	3.3	81.7	1.53	29:42	—
13C12-HxCDF 678	3.3	83.4	0.53	32:14	—
13C12-HxCDD 678	4.1	102	1.21	32:54	—
13C12-HpCDF 678	3.6	90.4	0.41	35:01	—
13C12-HpCDD 678	3.6	91.0	1.01	36:01	—
13C12-OCDD	5.9	74.2	0.80	39:28	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	25:12	—
13C12-HxCDD 789	1.17	33:12	—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W506811
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: INLET-FB
ANALYSIS DATE: 12/15/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3739
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.01				—
2378-TCDF	ND		0.008				—
TOTAL TCDD	ND		0.01				—
TOTAL TCDF	0.03	2			0.72		—

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC	RATIO	RT	FLAGS
37Cl-TCDD	3.5	86.7		22:51	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.7	67.2	0.76	24:17	—
13C12-2378-TCDD	2.8	70.9	0.81	22:50	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:06	—

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

FILE NAME....: S915600
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-4-6
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.03			
12378-PeCDD	0.07				1.66	29:42	
123478-HxCDD	0.09				1.19	32:49	
123678-HxCDD	0.13				1.24	32:54	
123789-HxCDD	0.19				1.23	33:11	PR
1234678-HpCDD	1.1				1.02	36:01	B
OCDD	2.0				0.83	39:28	B
2378-TCDF	6.4				0.72	24:38	
12378-PeCDF	1.0				1.73	28:39	
23478-PeCDF	2.9				1.58	29:21	
123478-HxCDF	5.3				1.13	32:07	
123678-HxCDF	1.4				1.05	32:13	
234678-HxCDF	3.6				1.11	32:42	B
123789-HxCDF	0.13				1.18	33:25	
1234678-HpCDF	7.2				0.94	35:01	B
1234789-HpCDF	1.5				0.93	36:29	
OCDF	11.9				0.89	39:39	B
TOTAL TCDD	0.52	6		0.65	0.76		
TOTAL PeCDD	1.1	10		1.1	1.58		
TOTAL HxCDD	1.9	7			1.23		
TOTAL HpCDD	2.5	2			1.04		
TOTAL TCDF	21.9	15			0.71		
TOTAL PeCDF	26.2	15		26.2	1.58		
TOTAL HxCDF	21.5	13			1.13		
TOTAL HpCDF	19.2	4			0.94		

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

12/28/91

FILE NAME....: S915600
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-4-6
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.1	102		25:22	___
13C12-PeCDF 234	5.1	127	1.51	29:20	___
13C12-HxCDF 478	4.6	114	0.50	32:07	___
13C12-HxCDD 478	5.0	125	1.17	32:48	___
13C12-HpCDF 789	4.4	110	0.42	36:28	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.4	85.0	0.49	33:25	___
13C12-HxCDF 234	3.5	87.9	0.48	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.90	22.6	0.76	24:37	✓
13C12-2378-TCDD	1.1	26.7	0.76	25:20	✓
13C12-PeCDF 123	2.3	56.7	1.46	28:38	___
13C12-PeCDD 123	3.2	79.2	1.52	29:40	___
13C12-HxCDF 678	3.4	84.3	0.50	32:13	___
13C12-HxCDD 678	3.4	85.9	1.18	32:53	___
13C12-HpCDF 678	3.7	93.7	0.42	35:00	___
13C12-HpCDD 678	3.8	93.9	0.98	36:00	___
13C12-OCDD	6.8	85.5	0.87	39:27	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:09	___
13C12-HxCDD 789	1.16	33:11	___

Reviewed By: [TV 12/28/91]

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W506702
CONCAL.....: W506502
ANALYST.....: VC
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 1
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-4-6
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.06				0.78	22:57	
2378-TCDF	3.2				0.76	24:24	
TOTAL TCDD	0.82	10		0.93	0.80		
TOTAL TCDF	23.9	26			0.75		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.5	87.3		22:57	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.2	31.1	0.78	24:23	✓
13C12-2378-TCDD	1.5	36.7	0.79	22:55	✓

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:11	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915602
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 2
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1012

PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.01			—
12378-PeCDD	EMPC			0.02			—
123478-HxCDD	0.03				1.24	32:49	—
123678-HxCDD	0.03				1.10	32:54	—
123789-HxCDD	0.05				1.12	33:10	PR
1234678-HpCDD	**0.26**				**1.04**	**36:01**	B
OCDD	0.63				0.86	39:27	B
2378-TCDF	0.98				0.68	24:39	—
12378-PeCDF	0.16				1.69	28:39	—
23478-PeCDF	0.57				1.59	29:21	—
123478-HxCDF	1.6				1.12	32:07	—
123678-HxCDF	0.42				1.14	32:13	—
234678-HxCDF	1.4				1.09	32:42	B
123789-HxCDF	EMPC			0.05			—
1234[illegible]-HpCDF	1.8				0.93	35:01	B
1234[illegible]-HpCDF	0.50				0.95	36:29	—
OCDF	2.7				0.89	39:39	B
TOTAL TCDD	0.10	5		0.13	0.77		—
TOTAL PeCDD	0.19	6		0.30	1.58		—
TOTAL HxCDD	0.52	7			1.20		—
TOTAL HpCDD	0.56	2			1.04		—
TOTAL TCDF	3.9	15		3.9	0.72		—
TOTAL PeCDF	6.9	13		6.9	1.54		—
TOTAL HxCDF	7.7	11		7.7	1.12		—
TOTAL HpCDF	5.1	4			0.94		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915602
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE....: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 2
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-76-1012

PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.8	119		25:23	___
13C12-PeCDF 234	5.0	125	1.64	29:20	___
13C12-HxCDF 478	4.9	122	0.50	32:07	___
13C12-HxCDD 478	5.6	139	1.18	32:48	___
13C12-HpCDF 789	4.7	118	0.41	36:28	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.4	84.1	0.49	33:25	___
13C12-HxCDF 234	3.5	87.3	0.49	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.4	35.1	0.74	24:37	✓
13C12-2378-TCDD	1.5	36.4	0.79	25:22	✓
13C12-PeCDF 123	2.4	59.1	1.58	28:38	___
13C12-PeCDD 123	3.1	77.9	1.53	29:40	___
13C12-HxCDF 678	3.3	82.5	0.51	32:13	___
13C12-HxCDD 678	3.4	84.3	1.18	32:53	___
13C12-HpCDF 678	3.6	89.5	0.43	35:00	___
13C12-HpCDD 678	3.6	90.2	1.01	36:00	___
13C12-OCDD	6.4	80.2	0.85	39:27	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	25:09	___
13C12-HxCDD 789	1.14	33:11	___

Reviewed By: |_____ __/__/__|

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506704
CONCAL.....: W506502
ANALYST.....: VC
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 2
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1012
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				
2378-TCDF	0.23				0.70	24:23	
TOTAL TCDD	0.11	2			0.79		
TOTAL TCDF	5.1	22		5.3	0.78		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.6	89.7		22:57	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.7	41.5	0.77	24:23	
13C12-2378-TCDD	1.7	42.5	0.81	22:55	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:11	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915604
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 3
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1618
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.04				0.78	25:23	—
12378-PeCDD	EMPC			0.03			—
123478-HxCDD	0.02				1.17	32:49	—
123678-HxCDD	0.03				1.30	32:54	—
123789-HxCDD	0.04				1.24	33:10	—
1234678-HpCDD	0.19				1.01	36:01	B
OCDD	0.53				0.87	39:28	B
2378-TCDF	1.6				0.69	24:39	—
12378-PeCDF	0.17				1.71	28:38	—
23478-PeCDF	0.61				1.61	29:21	—
123478-HxCDF	1.5				1.15	32:07	—
123678-HxCDF	0.39				1.05	32:13	—
234678-HxCDF	1.2				1.10	32:42	B
123789-HxCDF	EMPC			0.06			—
1234678-HpCDF	1.2				0.91	35:01	B
1234789-HpCDF	0.27				0.94	36:29	—
OCDF	1.7				0.83	39:39	B
TOTAL TCDD	0.20	4		0.28	0.77		
TOTAL PeCDD	0.21	5		0.36	1.56		—
TOTAL HxCDD	0.48	7			1.23		—
TOTAL HpCDD	0.40	2			1.02		—
TOTAL TCDF	6.5	13		6.7	0.69		—
TOTAL PeCDF	9.0	16		9.1	1.59		—
TOTAL HxCDF	7.5	12		7.6	1.13		—
TOTAL HpCDF	2.4	3		3.2	0.92		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915604
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 3
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-75-1618

PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.3	107		25:23	—
13C12-PeCDF 234	4.8	119	1.51	29:20	—
13C12-HxCDF 478	4.5	113	0.49	32:07	—
13C12-HxCDD 478	5.1	128	1.20	32:48	—
13C12-HpCDF 789	4.3	108	0.42	36:29	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.4	85.7	0.49	33:25	—
13C12-HxCDF 234	3.6	90.3	0.48	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.5	38.2	0.73	24:37	✓
13C12-2378-TCDD	1.6	39.2	0.77	25:22	✓
13C12-PeCDF 123	2.4	60.9	1.50	28:38	—
13C12-PeCDD 123	3.7	92.0	1.50	29:40	—
13C12-HxCDF 678	3.6	89.0	0.50	32:13	—
13C12-HxCDD 678	3.6	90.4	1.22	32:53	—
13C12-HpCDF 678	3.6	89.6	0.43	35:01	—
13C12-HpCDD 678	3.5	86.8	1.02	36:00	—
13C12-OCDD	6.1	76.8	0.86	39:27	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	25:11	—
13C12-HxCDD 789	1.20	33:11	—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506804
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 3
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-1618
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.08				0.85	22:53	
2378-TCDF	0.18				0.74	24:19	
TOTAL TCDD	0.29	4		0.42	0.83		
TOTAL TCDF	8.9	22		9.1	0.76		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.5	86.9		22:54	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.7	42.7	0.79	24:19	
13C12-2378-TCDD	1.8	45.5	0.80	22:53	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:09	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915606
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 4
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2224
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				
12378-PeCDD	EMPC			0.005			—
123478-HxCDD	0.006				1.15	32:49	—
123678-HxCDD	0.009				1.25	32:54	—
123789-HxCDD	0.02				1.27	33:10	PR
1234678-HpCDD	0.12				0.99	36:01	B
OCDD	0.33				0.80	39:28	B
2378-TCDF	0.26				0.73	24:39	—
12378-PeCDF	0.03				1.55	28:39	—
23478-PeCDF	0.10				1.53	29:21	—
123478-HxCDF	0.28				1.11	32:07	—
123678-HxCDF	0.08				1.16	32:13	—
234678-HxCDF	0.32				1.11	32:42	B
123789-HxCDF	0.01				1.07	33:26	—
1234678-HpCDF	0.41				0.93	35:01	B
1234789-HpCDF	0.13				0.97	36:30	—
OCDF	0.73				0.87	39:39	B
TOTAL TCDD	0.02	2		0.03	0.81		
TOTAL PeCDD	0.01	2		0.05	1.70		—
TOTAL HxCDD	0.09	6		0.13	1.23		—
TOTAL HpCDD	0.22	2			1.01		—
TOTAL TCDF	0.88	11		0.95	0.71		
TOTAL PeCDF	1.2	12		1.3	1.55		—
TOTAL HxCDF	1.4	12			1.11		—
TOTAL HpCDF	1.1	4			0.94		—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915606
CONCAL.....: S915593
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 4
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2224
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.5	113		25:23	___
13C12-PeCDF 234	5.2	129	1.56	29:20	___
13C12-HxCDF 478	4.9	123	0.50	32:07	___
13C12-HxCDD 478	5.1	128	1.20	32:48	___
13C12-HpCDF 789	4.9	121	0.41	36:29	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.7	91.3	0.49	33:26	___
13C12-HxCDF 234	3.8	95.4	0.47	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.2	29.6	0.74	24:37	✓
13C12-2378-TCDD	1.3	31.5	0.77	25:22	✓
13C12-PeCDF 123	2.4	60.1	1.54	28:38	___
13C12-PeCDD 123	4.3	107	1.53	29:42	___
13C12-HxCDF 678	3.3	82.9	0.49	32:13	___
13C12-HxCDD 678	3.8	93.9	1.22	32:53	___
13C12-HpCDF 678	4.1	102	0.42	35:01	___
13C12-HpCDD 678	4.4	111	1.01	36:00	___
13C12-OCDD	9.2	116	0.87	39:27	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:11	___
13C12-HxCDD 789	1.19	33:11	___

Reviewed By: TV 12/26/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506806
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 4
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2224
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				
2378-TCDF	EMPC			0.05			
TOTAL TCDD	0.02	1			0.65		
TOTAL TCDF	1.3	16		1.4	0.77		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.5	88.3		22:52	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.4	33.9	0.80	24:17	✓
13C12-2378-TCDD	1.5	38.6	0.80	22:51	✓

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:06	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915610
CONCAL.....: S915609
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 5
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2830
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				
12378-PeCDD	ND		0.005				
123478-HxCDD	0.02				1.28	32:50	
123678-HxCDD	0.02				1.39	32:54	
123789-HxCDD	0.04				1.29	33:11	PR
1234678-HpCDD	0.30				0.99	36:02	B
OCDD	0.81				0.86	39:29	B
2378-TCDF	0.11				0.69	24:42	
12378-PeCDF	0.02				1.54	28:40	
23478-PeCDF	0.05				1.58	29:22	
123478-HxCDF	0.22				1.12	32:08	
123678-HxCDF	EMPC			0.06			
234678-HxCDF	0.25				1.16	32:43	B
123789-HxCDF	0.01				1.12	33:26	
1234678-HpCDF	0.48				0.93	35:02	B
1234789-HpCDF	0.19				0.92	36:30	
OCDF	1.6				0.86	39:40	B
TOTAL TCDD	EMPC			0.005			
TOTAL PeCDD	0.05	3		0.11	1.53		
TOTAL HxCDD	0.28	7			1.29		
TOTAL HpCDD	0.57	2			0.99		
TOTAL TCDF	0.36	10		0.42	0.73		
TOTAL PeCDF	0.59	11		0.65	1.53		
TOTAL HxCDF	0.92	10		1.0	1.12		
TOTAL HpCDF	1.3	4			0.94		

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915610
CONCAL.....: S915609
ANALYST.....: SB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 5
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2830
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.8	120		25:24	—
13C12-PeCDF 234	5.2	129	1.58	29:21	—
13C12-HxCDF 478	4.9	122	0.52	32:08	—
13C12-HxCDD 478	5.3	133	1.19	32:49	—
13C12-HpCDF 789	4.6	116	0.41	36:30	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.0	74.3	0.49	33:26	—
13C12-HxCDF 234	3.3	81.4	0.50	32:43	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.5	36.6	0.74	24:39	✓
13C12-2378-TCDD	1.5	37.3	0.77	25:23	✓
13C12-PeCDF 123	2.1	53.6	1.55	28:40	—
13C12-PeCDD 123	2.8	70.8	1.55	29:43	—
13C12-HxCDF 678	2.9	71.7	0.48	32:14	—
13C12-HxCDD 678	3.0	74.2	1.20	32:54	—
13C12-HpCDF 678	2.8	70.3	0.41	35:02	—
13C12-HpCDD 678	2.7	68.0	1.01	36:01	—
13C12-OCDD	4.5	55.6	0.86	39:28	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.76	25:12	—
13C12-HxCDD 789	1.20	33:12	—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506808
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 5
ANALYSIS DATE: 12/14/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-2830
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				
2378-TCDF	0.03				0.66	24:16	
TOTAL TCDD	ND		0.02				
TOTAL TCDF	0.60	15		0.66	0.75		

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.8	95.1		22:51	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.7	42.5	0.77	24:17	
13C12-2378-TCDD	1.8	45.5	0.79	22:51	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:06	

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915612
CONCAL.....: S915609
ANALYST.....: JA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 6
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3436
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				
12378-PeCDD	0.004				1.50	29:41	
123478-HxCDD	EMPC			0.01			
123678-HxCDD	0.02				1.19	32:53	
123789-HxCDD	0.04				1.14	33:10	AL
1234678-HpCDD	0.29				1.01	36:01	B
OCDD	0.75				0.77	39:28	B
2378-TCDF	0.08				0.68	24:40	
12378-PeCDF	0.01				1.73	29:38	
23478-PeCDF	0.05				1.48	29:21	
123478-HxCDF	0.21				1.05	32:07	
123678-HxCDF	0.07				1.10	32:13	
234678-HxCDF	0.22				1.06	32:42	B
123789-HxCDF	EMPC			0.008			
1234678-HpCDF	0.51				0.90	35:01	B
1234789-HpCDF	0.17				1.01	36:29	
OCDF	1.7				0.90	39:39	B
TOTAL TCDD	0.007	1			0.80		
TOTAL PeCDD	0.04	3		0.06	1.54		
TOTAL HxCDD	0.28	5		0.30	1.20		
TOTAL HpCDD	0.61	2			1.00		
TOTAL TCDF	0.29	11		0.32	0.74		
TOTAL PeCDF	0.27	9		0.45	1.67		
TOTAL HxCDF	0.88	9		0.95	1.11		
TOTAL HpCDF	1.3	4			0.95		

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915612
CONCAL.....: S915609
ANALYST.....: JA
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 6
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3436
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.4	111		25:23	___
13C12-PeCDF 234	4.4	110	1.58	29:20	___
13C12-HxCDF 478	4.6	115	0.51	32:07	___
13C12-HxCDD 478	4.6	114	1.18	32:48	___
13C12-HpCDF 789	4.1	102	0.41	36:28	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.6	89.4	0.51	33:25	___
13C12-HxCDF 234	3.8	95.5	0.49	32:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.2	55.9	0.74	24:38	___
13C12-2378-TCDD	2.1	52.8	0.79	25:22	___
13C12-PeCDF 123	2.5	62.5	1.54	28:39	___
13C12-PeCDD 123	2.9	72.4	1.52	29:42	___
13C12-HxCDF 678	3.7	92.4	0.48	32:13	___
13C12-HxCDD 678	3.8	96.2	1.22	32:52	___
13C12-HpCDF 678	3.9	97.6	0.43	35:00	___
13C12-HpCDD 678	3.5	88.2	1.01	36:00	___
13C12-OCDD	5.5	69.3	0.90	39:27	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	25:11	___
13C12-HxCDD 789	1.16	33:11	___

Reviewed By: TU 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W506810
CONCAL.....: W506802
ANALYST.....: DB
SAMPLE SIZE..: 1.00
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF04

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET 6
ANALYSIS DATE: 12/15/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-3436
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				___
2378-TCDF	0.02				0.74	24:18	___
TOTAL TCDD	ND		0.02				___
TOTAL TCDF	0.43	15		0.50	0.77		___

SURROGATE STD. RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	3.4	85.9		22:51	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.3	58.1	0.75	24:17	___
13C12-2378-TCDD	2.5	61.5	0.79	22:50	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:06	___

Reviewed By: TV 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915614
CONCAL.....: S915609
ANALYST.....: NB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET-FB
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-4042
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				—
12378-PeCDD	ND		0.005				—
123478-HxCDD	ND		0.01				—
123678-HxCDD	ND		0.005				—
123789-HxCDD	ND		0.008				—
1234678-HpCDD	EMPC			0.04			B
OCDD	0.18				0.79	39:28	B
2378-TCDF	ND		0.005				—
12378-PeCDF	ND		0.005				—
23478-PeCDF	ND		0.005				—
123478-HxCDF	ND		0.008				—
123678-HxCDF	ND		0.005				—
234678-HxCDF	0.008				1.10	32:42	B
123789-HxCDF	ND		0.008				—
1234678-HpCDF	ND		0.008				—
1234789-HpCDF	ND		0.01				—
OCDF	EMPC			0.02			B
TOTAL TCDD	0.008	1		0.02	0.67		
TOTAL PeCDD	ND		0.005				—
TOTAL HxCDD	EMPC			0.007			—
TOTAL HpCDD	EMPC			0.07			—
TOTAL TCDF	ND		0.005				—
TOTAL PeCDF	EMPC			0.005			—
TOTAL HxCDF	0.007	1			1.10		—
TOTAL HpCDF	ND		0.008				—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a) QA/QC SUMMARY

FILE NAME....: S915614
CONCAL.....: S915609
ANALYST.....: NB
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: OUTLET-FB
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-4042
PROJECT NUMBER: 19629A
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.5	114		25:24	—
13C12-PeCDF 234	4.9	123	1.57	29:21	—
13C12-HxCDF 478	4.7	117	0.50	32:07	—
13C12-HxCDD 478	4.8	119	1.20	32:48	—
13C12-HpCDF 789	4.3	108	0.40	36:29	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE A)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.3	83.5	0.50	33:26	—
13C12-HxCDF 234	3.7	92.4	0.50	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	1.5	38.0	0.75	24:38	✓
13C12-2378-TCDD	1.5	37.4	0.78	25:23	✓
13C12-PeCDF 123	2.1	52.6	1.62	28:39	—
13C12-PeCDD 123	3.4	86.2	1.50	29:42	—
13C12-HxCDF 678	3.4	84.9	0.50	32:13	—
13C12-HxCDD 678	3.7	92.1	1.21	32:53	—
13C12-HpCDF 678	3.5	87.9	0.41	35:01	—
13C12-HpCDD 678	3.4	86.2	1.00	36:00	—
13C12-OCDD	5.8	72.5	0.87	39:27	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	25:12	—
13C12-HxCDD 789	1.19	33:11	—

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
801-10 CAPITOLA DRIVE
RESEARCH TRIANGLE PARK, NC 27713

Phone: (919) 544-5729
Fax: (919) 544-5491

DATE :	* 23 DECEMBER 1991
CLIENT ID :	* RADIAN
P.O. NUMBER :	* 5137836
TLI PROJECT No. :	* 19629C

CASE NARRATIVE
MODEL 8290X

ANALYSIS OF SAMPLES FOR THE PRESENCE OF

POLYCHLORINATED DIBENZO-p-DIOXINS

AND

DIBENZOFURANS

BY

HIGH-RESOLUTION GAS CHROMATOGRAPHY / HIGH-RESOLUTION MASS SPECTROMETRY

One water sample wa received from RADIAN in good condition November 27, 1991 and stored in a refrigerator at 4°C. The samples were extracted and analyzed according to procedures described in the Triangle Labs User Manual provided with this data package. Any particular difficulties encountered during the sample handling by Triangle Labs will be discussed in the QA/QC remark section below.

Quality Assurance/Quality Control Samples

A laboratory method blank -- identified as the TLI Blank -- is prepared along with the batch of samples.

QA/QC Remarks

The release of this particular set of RADIAN analytical data by Triangle Labs was authorized by the Quality Assurance Officer who has reviewed each sample data package individually following a series of inspections/reviews conducted at two other levels of the data production line. When applicable, general deviations from acceptable QA/QC requirements are identified below. Comments on the effect of these deviations upon the validity and reliability of the results can be obtained from the User Manual (Data Quality Objectives; Section 5). Specific QA/QC Problems Associated with this Particular Project are:

Sample Preparation Laboratory: None

Mass Spectrometry: None

Data Review:

Analytes were found in the TLI Blank at levels less than one-third the calculated theoretical method quantitation limit (TMQL). OCDD and 1234678-HpCDD were found at a level greater than one-third TMQL. Blank contamination levels of one-third TMQL or less are acceptable under TLI guidelines; however, the OCDD isomer is not required to follow blank contamination criteria. Blank contamination is discussed in section 5.1.3.2 of the Data User's Manual.

1234678-HpCDD levels in the blank and the sample are very close and slightly above the target detection limit 0.1 ppt ; therefore this level of contamination can be acceptable.

The presence of the 2378-TCDF isomer, where found on the DB-5 column at a concentration in excess of the Target Detection Limit, is confirmed on the isomer-specific DB-225 GC column.

Addendum to Section 2.3 of the Data User's Manual

All sample and calibration analyses are conducted using a 2 uL injection volume, unless otherwise specified.

Addendum to Section 4.6 of the Data User's Manual

Effective December 15, 1989, Triangle Laboratories has adopted a new procedure for calculating the analyte specific detection limits. Under this new policy two representative noise height determinations are summed and multiplied by an empirically determined factor before the detection limit equation given in Section 4.6 of the Data User's Manual is applied. The effect of this procedure is to increase DB-225 analyses detection limits by a factor of 3.5, and DB-5 analyses detection limits by a factor of 5. This procedure will result in a more accurate estimate of detection limits.

The revised formula for DB-225 analyses is:

$$DL_{ai}^{DB-225} = \frac{2.5 * (3.5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$3.5 * H_{ai} = A_{noise}$$

The revised formula for DB-5 analyses is:

$$DL_{ai}^{DB-5} = \frac{2.5 * (5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$5 * H_{ai} = A_{noise}$$

The symbols are defined in Section 4.6 of the Data User's Manual.

As an example, consider a DB-225 confirmation analysis of a 10 g sample. The internal standard spike is 2000 pg, the 13C12-2,3,7,8-TCDF internal standard area is 12000 area units, the $\overline{RRF}$ is 1.215 and the noise height is 11 units. The 2,3,7,8-TCDF detection limit is:

$$DL_{TCDF}^{DB-225} = \frac{2.5 * (3.5 * 11) * 2000}{12000 * 1.215 * 10.0} = 1.3 \text{ ppt}$$

Should RADIAN have any questions or comments to formulate regarding this data package please feel free to contact us.

For Triangle Laboratories,

Laboratory Management	Quality Assurance Unit	Report Preparation/ Quality Control
Signed:		
Robert W. Smith		
Title:		
Robert Smith	Jacek Bielawski	Todd Vilen
Process Control Manager	QA Manager	Dioxin Data Review Officer

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (c

Page [illegible]

FILE NAME....: S915488
CONCAL.....: S915481
ANALYST.....: SA
SAMPLE SIZE..: 488.40 mL
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372S
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-543-DAY
ANALYSIS DATE: 12/05/91
SAMPLE MATRIX: WATER
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-[illegible]
PROJECT NUMBER: 196290
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.001				—
12378-PeCDD	ND		0.003				—
123478-HxCDD	EMPC			0.002			—
123678-HxCDD	0.00				1.25	43:18	—
123789-HxCDD	0.007				1.28	44:16	—
1234678-HpCDD	0.11				0.99	48:39	B
OCDD	0.51				0.88	53:59	B
2378-TCDF	EMPC			0.003			B
12378-PeCDF	ND		0.001				—
23478-PeCDF	ND		0.001				—
123478-HxCDF	ND		0.001				—
123678-HxCDF	ND		0.001				—
234678-HxCDF	0.005				1.08	43:27	B
123789-HxCDF	ND		0.001				—
1234678-HpCDF	ND		0.001				—
1234789-HpCDF	ND		0.003				—
OCDF	0.007				0.77	54:12	—
TOTAL TCDD	EMPC			0.007			—
TOTAL PeCDD	EMPC			0.01			—
TOTAL HxCDD	0.04	4		0.07	1.30		—
TOTAL HpCDD	0.19	2			1.03		—
TOTAL TCDF	EMPC			0.01			—
TOTAL PeCDF	ND		0.001				—
TOTAL HxCDF	0.007	2			1.18		—
TOTAL HpCDF	EMPC			0.008			—

Reviewed By: KR 12/20/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/20/91

FILE NAME....:	S915488	CLIENT.....:	RADIAN	TLI SAMPLE ID.:	52-78-72
LOCAL.....:	S915481	SAMPLE ID....:	MO-543-DAY 1		
ANALYST.....:	SA	ANALYSIS DATE:	12/05/91	PROJECT NUMBER:	19629C
SAMPLE SIZE..:	488.40 mL	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	11/27/91
ICAL DATE....:	08/07/91	SAMPLE ORIGIN:	n/a	DATE COLLECTED:	/ /
SPIKE FILE...:	SPX2372S			CLIENT PROJECT:	MORRISTO
GC COLUMN....:	DB-5				

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	0.30	73.0		33:24	___
13C12-PeCDF 234	5.2	126	1.41	38:21	___
13C12-HxCDF 478	3.4	83.9	0.51	42:29	___
13C12-HxCDD 478	4.2	102	1.22	43:39	___
13C12-HpCDF 789	3.3	81.8	0.43	49:17	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.6	88.5	0.51	44:36	___
13C12-HxCDF 234	3.6	87.7	0.49	43:26	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.3	81.5	0.77	32:35	___
13C12-2378-TCDD	3.8	91.9	0.79	33:24	___
13C12-PeCDF 123	5.4	131	1.40	37:23	___
13C12-PeCDD 123	6.0	146	1.51	38:50	___
13C12-HxCDF 678	3.9	94.4	0.50	42:39	___
13C12-HxCDD 678	4.0	97.1	1.21	43:47	___
13C12-HpCDF 678	3.9	95.4	0.43	47:06	___
13C12-HpCDD 678	4.2	103	1.00	48:38	___
13C12-OCDD	10.1	123	0.85	53:58	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	33:12	___
13C12-HxCDD 789	1.21	44:15	___

Reviewed By: AR 12/20/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378> ANALYSIS D

12/20/91

FILE NAME..... S915487
CONCAL..... S915481
ANALYST..... SA
SAMPLE SIZE..: 500.00 mL
ICAL DATE..... 08/07/91
SPIKE FILE...: SPX2372S
GC COLUMN....: DB-5

CLIENT..... RADIAN
SAMPLE ID..... TLI WATER BLANK
ANALYSIS DATE: 12/05/91
SAMPLE MATRIX: WATER
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629C
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				—
12378-PeCDD	ND		0.008				—
23478-HxCDD	ND		0.008				—
123678-HxCDD	ND		0.005				—
123789-HxCDD	ND		0.005				—
1234678-HpCDD	0.13				1.05	48:37	—
OCDD	0.64				0.85	53:56	—
2378-TCDF	EMPC			0.003			—
12378-PeCDF	ND		0.005				—
23478-PeCDF	ND		0.003				—
123478-HxCDF	ND		0.005				—
123678-HxCDF	ND		0.003				—
234678-HxCDF	EMPC			0.006			—
123789-HxCDF	ND		0.005				—
1234678-HpCDF	ND		0.003				—
1234789-HpCDF	ND		0.005				—
OCDF	ND		0.008				—
TOTAL TCDD	ND		0.005				—
TOTAL PeCDD	ND		0.008				—
TOTAL HxCDD	0.03	2		0.03	1.36		—
TOTAL HpCDD	0.21	2			1.04		—
TOTAL TCDF	EMPC			0.01			—
TOTAL PeCDF	ND		0.003				—
TOTAL HxCDF	EMPC			0.008			—
TOTAL HpCDF	EMPC			0.006			—

Reviewed By: AK 12/20/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY
12/20/91

FILE NAME....: S915487 CLIENT.....: RADIAN TLI SAMPLE ID.: n/a
CONCAL.....: S915481 SAMPLE ID....: TLI WATER BLANK
ANALYST.....: SA ANALYSIS DATE: 12/05/91 PROJECT NUMBER: 196290
SAMPLE SIZE..: 500.00 mL SAMPLE MATRIX: WATER DATE RECEIVED.: / /
ICAL DATE....: 08/07/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE...: SPX2372S CLIENT PROJECT: n/a
GC COLUMN....: DB-5

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	0.23	58.5		33:23	___
13C12-PeCDF 234	3.7	93.5	1.38	38:19	___
13C12-HxCDF 478	2.9	72.7	0.51	42:27	___
13C12-HxCDD 478	3.9	98.2	1.19	43:36	___
13C12-HpCDF 789	3.0	75.4	0.43	49:15	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.2	80.1	0.51	44:34	___
13C12-HxCDF 234	3.3	81.5	0.49	43:24	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.1	53.7	0.77	32:34	___
13C12-2378-TCDD	2.3	58.6	0.80	33:23	___
13C12-PeCDF 123	3.1	77.8	1.42	37:22	___
13C12-PeCDD 123	3.0	74.4	1.48	38:48	___
13C12-HxCDF 678	2.8	69.9	0.51	42:37	___
13C12-HxCDD 678	3.2	79.3	1.23	43:44	___
13C12-HpCDF 678	2.8	69.7	0.44	47:04	___
13C12-HpCDD 678	3.2	79.7	1.02	48:36	___
13C12-OCDD	6.7	83.9	0.87	53:55	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	33:10	___
13C12-HxCDD 789	1.22	44:13	___

Reviewed By: [illegible] 12/20/91 X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

FILE NAME....: S915594
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.185 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-485-DAY 4
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-69
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	3.4				0.83	25:23	—
12378-PeCDD	14.9				1.52	29:42	—
123478-HxCDD	30.2				1.21	32:49	—
123678-HxCDD	39.0				1.20	32:54	—
123789-HxCDD	62.8				1.21	33:11	PR
1234678-HpCDD	205				1.01	36:0[illegible]	B
OCDD	2570				0.84	39:30	B
2378-TCDF	338				0.73	24:39	—
12378-PeCDF	77.8				1.67	28:39	—
23478-PeCDF	306				1.57	29:21	—
123478-HxCDF	1460				1.10	32:07	—
123678-HxCDF	445				1.11	32:[illegible]	—
234678-HxCDF	1590				1.11	3[illegible]	B
123789-HxCDF	40.0				1.13	3[illegible]	—
1234678-HpCDF	3450				0.90	3[illegible]	—
1234789-HpCDF	1440				0.91	36:30	—
OCDF	13040				0.94	39:41	S
TOTAL TCDD	34.4	10		41.2	0.79		—
TOTAL PeCDD	128	10		137	1.57		—
TOTAL HxCDD	515	7			1.22		—
TOTAL HpCDD	1460	2			1.01		—
TOTAL TCDF	1300	15			0.73		—
TOTAL PeCDF	3360	18			1.57		—
TOTAL HxCDF	6620	13		6630	1.11		—
TOTAL HpCDF	10590	4			0.91		—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915594
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.185 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-485-DAY 4
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-69
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.3	57.5		25:23	—
13C12-PeCDF 234	181	92.0	1.44	29:21	—
13C12-HxCDF 478	176	89.6	0.50	32:07	—
13C12-HxCDD 478	197	100	1.18	32:49	—
13C12-HpCDF 789	212	108	0.42	36:29	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	158	80.7	0.49	33:26	—
13C12-HxCDF 234	173	88.0	0.49	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	112	57.0	0.74	24:37	—
13C12-2378-TCDD	116	59.1	0.79	25:22	—
13C12-PeCDF 123	158	80.2	1.44	28:39	—
13C12-PeCDD 123	197	100	1.50	29:42	—
13C12-HxCDF 678	161	82.0	0.49	32:13	—
13C12-HxCDD 678	163	83.0	1.19	32:54	—
13C12-HpCDF 678	196	99.6	0.42	35:02	—
13C12-HpCDD 678	207	105	1.02	36:01	—
13C12-OCDD	436	111	0.86	39:29	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	25:11	—
13C12-HxCDD 789	1.17	33:11	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915768
CONCAL.....: S915765
ANALYST.....: SA
SAMPLE SIZE..: 10.185 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-485-DAY4
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-69
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		2.3				
12378-PeCDD	14.7				1.51	29:39	—
123478-HxCDD	27.8				1.18	32:46	—
123678-HxCDD	34.7				1.26	32:51	—
123789-HxCDD	73.1				1.35	33:08	PR
1234678-HpCDD	733				1.03	35:57	B
OCDD	2750				0.83	39:24	B
2378-TCDF	354				0.72	24:36	—
12378-PeCDF	98.2				1.57	28:35	—
23478-PeCDF	327				1.55	29:19	—
123478-HxCDF	1530				1.09	32:03	PR
123678-HxCDF	449				1.11	32:11	—
234678-HxCDF	1730				1.10	32:39	B,PR
123789-HxCDF	45.8				1.11	33:23	—
1234678-HpCDF	3850				0.90	34:58	—
1234789-HpCDF	1510				0.90	36:26	—
OCDF	17340				0.86	39:35	—
TOTAL TCDD	13.8	2		27.6	0.82		—
TOTAL PeCDD	108	7		143	1.52		—
TOTAL HxCDD	476	7			1.23		—
TOTAL HpCDD	1500	2			1.02		—
TOTAL TCDF	1290	12		1400	0.71		—
TOTAL PeCDF	3470	15			1.56		—
TOTAL HxCDF	7110	12		7120	1.10		—
TOTAL HpCDF	8930	3		11480	0.90		—

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915768
CONCAL.....: S915765
ANALYST.....: SA
SAMPLE SIZE..: 10.185 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-485-DAY4
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-69 (10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.4	58.2		25:19	—
13C12-PeCDF 234	195	99.5	1.48	29:17	—
13C12-HxCDF 478	176	89.5	0.49	32:04	—
13C12-HxCDD 478	181	92.2	1.28	32:45	—
13C12-HpCDF 789	207	106	0.41	36:25	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	172	87.6	0.49	33:23	—
13C12-HxCDF 234	176	89.5	0.45	32:39	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	112	57.0	0.75	24:33	—
13C12-2378-TCDD	122	61.9	0.76	25:18	—
13C12-PeCDF 123	167	85.2	1.41	28:35	—
13C12-PeCDD 123	216	110	1.62	29:38	—
13C12-HxCDF 678	163	83.2	0.48	32:10	—
13C12-HxCDD 678	182	92.4	1.24	32:50	—
13C12-HpCDF 678	192	97.9	0.42	34:57	—
13C12-HpCDD 678	204	104	1.00	35:57	—
13C12-OCDD	401	102	0.85	39:23	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	25:07	—
13C12-HxCDD 789	1.22	33:08	—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915569
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.439 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-490-DAY 5
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-62
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	2.2				0.73	33:12	—
12378-PeCDD	11.7				1.34	38:37	—
123478-HxCDD	28.3				1.18	43:24	—
123678-HxCDD	37.1				1.23	43:32	—
123789-HxCDD	64.6				1.20	43:59	PR
1234678-HpCDD	733				1.02	48:23	B
OCDD	3710				0.83	53:38	B
2378-TCDF	281				0.69	32:24	—
12378-PeCDF	72.5				1.58	37:09	—
23478-PeCDF	259				1.61	38:07	—
123478-HxCDF	1290				1.10	42:13	PR
123678-HxCDF	371				1.11	42:24	—
234678-HxCDF	1180				1.09	43:12	B,PR
123789-HxCDF	27.2				1.09	44:21	—
1234678-HpCDF	3790				0.92	46:52	—
1234789-HpCDF	1050				0.92	49:02	—
OCDF	17690				0.88	53:52	—
TOTAL TCDD	41.5	12		44.7	0.74		—
TOTAL PeCDD	169	11			1.54		—
TOTAL HxCDD	572	7			1.21		—
TOTAL HpCDD	1590	2			1.03		—
TOTAL TCDF	1170	13		1180	0.69		—
TOTAL PeCDF	3050	16		3060	1.60		—
TOTAL HxCDF	5930	13		5930	1.11		—
TOTAL HpCDF	10700	4			0.92		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915569
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.439 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-490-DAY 5
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-62
PROJECT NUMBER: 19629B
DATE RECEIVED.. 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	14.0	73.0		33:12	___
13C12-PeCDF 234	140	73.2	1.50	38:07	___
13C12-HxCDF 478	181	94.7	0.49	42:14	___
13C12-HxCDD 478	197	103	1.23	43:24	___
13C12-HpCDF 789	95.6	49.9	0.42	49:01	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	143	74.8	0.49	44:20	___
13C12-HxCDF 234	164	85.4	0.49	43:11	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	118	61.7	0.75	32:22	___
13C12-2378-TCDD	144	74.9	0.76	33:10	___
13C12-PeCDF 123	122	63.5	1.49	37:09	___
13C12-PeCDD 123	129	67.4	1.50	38:36	___
13C12-HxCDF 678	129	67.2	0.50	42:24	___
13C12-HxCDD 678	132	68.8	1.23	43:31	___
13C12-HpCDF 678	64.1	33.4	0.43	46:51	___
13C12-HpCDD 678	66.5	34.7	0.97	48:22	___
13C12-OCDD	69.2	18.1	0.81	53:37	V

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	32:58	___
13C12-HxCDD 789	1.22	43:59	___

Reviewed By: [illegible] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

FILE NAME....: S915596
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.224 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-495-DAY 6
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-73
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)*	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.3				0.78	25:23	—
12378-PeCDD	6.2				1.59	29:42	—
123478-HxCDD	12.3				1.28	32:49	—
123678-HxCDD	20.2				1.24	32:54	—
123789-HxCDD	29.3				1.28	33:10	PR
1234678-HpCDD	300				1.02	36:01	B
OCDD	1010				0.88	39:27	B
2378-TCDF	122				0.70	24:40	—
12378-PeCDF	33.7				1.74	28:39	—
23478-PeCDF	104				1.55	29:21	—
123478-HxCDF	506				1.10	32:07	PR
123678-HxCDF	160				1.11	32:13	—
234678-HxCDF	526				1.12	32:42	B
123789-HxCDF	11.5				1.08	33:25	—
1234678-HpCDF	1280				0.90	35:01	—
1234789-HpCDF	392				0.91	36:29	—
OCDF	4040				0.86	39:39	—
TOTAL TCDD	30.0	10		31.5	0.80		—
TOTAL PeCDD	87.0	10		91.2	1.52		—
TOTAL HxCDD	294	7			1.25		—
TOTAL HpCDD	652	2			1.01		—
TOTAL TCDF	512	14		512	0.71		—
TOTAL PeCDF	1200	15		1200	1.60		—
TOTAL HxCDF	2380	13			1.11		—
TOTAL HpCDF	3570	4		—	0.91		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915596
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.224 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-495-DAY 6
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-73
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	12.8	65.3		25:23	—
13C12-PeCDF 234	146	74.6	1.51	29:20	—
13C12-HxCDF 478	183	93.7	0.49	32:17	—
13C12-HxCDD 478	198	101	1.20	32:48	—
13C12-HpCDF 789	157	80.3	0.43	36:28	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	159	81.0	0.49	33:25	—
13C12-HxCDF 234	173	88.4	0.49	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	124	63.6	0.74	24:38	—
13C12-2378-TCDD	123	62.9	0.77	25:22	—
13C12-PeCDF 123	131	67.0	1.48	28:39	—
13C12-PeCDD 123	155	79.2	1.50	29:40	—
13C12-HxCDF 678	161	82.5	0.48	32:13	—
13C12-HxCDD 678	163	83.2	1.21	32:53	—
13C12-HpCDF 678	137	69.9	0.43	35:00	—
13C12-HpCDD 678	141	71.8	0.99	36:00	—
13C12-OCDD	206	52.6	0.84	39:27	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:11	—
13C12-HxCDD 789	1.18	33:11	—

Reviewed By: SG 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915595
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.28 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-500-DAY 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-71
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.86			—
12378-PeCDD	3.5				1.57	29:40	—
123478-HxCDD	7.8				1.22	32:48	—
12 678-HxCDD	10.8				1.20	32:53	—
12 89-HxCDD	20.7				1.24	33:10	PR
1234678-HpCDD	233				1.01	36:00	B
OCDD	1180				0.84	39:27	B
2378-TCDF	45.6				0.72	24:39	—
12378-PeCDF	19.7				1.52	28:39	—
23478-PeCDF	58.5				1.56	29:20	—
123478-HxCDF	280				1.08	32:06	PR
123678-HxCDF	108				1.10	32:13	—
234678-HxCDF	329				1.11	32:42	B,PR
123789-HxCDF	75.7				1.12	33:29	—
1234678-HpCDF	1140				0.89	35:01	—
1234789-HpCDF	268				0.89	36:29	—
OCDF	3060				0.87	39:38	—
TOTAL TCDD	6.5	6		9.9	0.73		—
TOTAL PeCDD	30.1	8		33.7	1.61		—
TOTAL HxCDD	144	7		144	1.23		—
TOTAL HpCDD	472	2			1.01		—
TOTAL TCDF	182	18			0.74		—
TOTAL PeCDF	621	15		622	1.59		—
TOTAL HxCDF	1520	12		1520	1.11		—
TOTAL HpCDF	2700	4			0.89		—

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915595
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 10.28 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-500-DAY 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-71
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.8	55.5		25:22	—
13C12-PeCDF 234	148	75.8	1.49	29:20	—
13C12-HxCDF 478	173	88.7	0.50	32:07	—
13C12-HxCDD 478	213	109	1.16	32:48	—
13C12-HpCDF 789	172	88.6	0.40	36:28	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	159	81.9	0.49	33:25	—
13C12-HxCDF 234	173	88.7	0.49	32:41	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	86.6	44.5	0.74	24:37	—
13C12-2378-TCDD	99.0	50.9	0.76	25:20	—
13C12-PeCDF 123	101	51.8	1.47	28:38	—
13C12-PeCDD 123	167	85.6	1.54	29:40	—
13C12-HxCDF 678	131	67.5	0.50	32:12	—
13C12-HxCDD 678	157	80.6	1.17	32:52	—
13C12-HpCDF 678	143	73.4	0.43	35:00	—
13C12-HpCDD 678	168	86.5	1.01	35:59	—
13C12-OCDD	325	83.6	0.87	39:26	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	25:09	—
13C12-HxCDD 789	1.16	33:10	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915598
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 8.17 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-528-DAY 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: SLUDGE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-104-1
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.5				—
12378-PeCDD	ND		0.6				—
123478-HxCDD	ND		1.5				—
123678-HxCDD	ND		0.9				—
123789-HxCDD	ND		1.3				—
1234678-HpCDD	5.2				1.19	36:01	B
OCDD	20.8				0.90	39:27	B
2378-TCDF	ND		0.4				—
12378-PeCDF	ND		0.5				—
23478-PeCDF	ND		0.5				—
123478-HxCDF	ND		0.9				—
123678-HxCDF	ND		0.6				—
234678-HxCDF	0.62				1.37	32:42	B, PR
123789-HxCDF	ND		1.0				—
1234678-HpCDF	ND		0.9				—
1234789-HpCDF	ND		1.6				—
OCDF	EMPC			2.3			B
TOTAL TCDD	ND		0.5				—
TOTAL PeCDD	ND		0.6				—
TOTAL HxCDD	0.83	1			1.15		—
TOTAL HpCDD	8.5	2			1.10		—
TOTAL TCDF	ND		0.4				—
TOTAL PeCDF	ND		0.5				—
TOTAL HxCDF	0.59	1			1.37		—
TOTAL HpCDF	ND		1.2				—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....:	S915598	CLIENT.....:	RADIAN	TLI SAMPLE ID.:	52-104-1
CONCAL.....:	S915593	SAMPLE ID....:	MO-528-DAY 1		
ANALYST.....:	SA	ANALYSIS DATE:	12/12/91	PROJECT NUMBER:	196298
SAMPLE SIZE..:	8.17 g	SAMPLE MATRIX:	SLUDGE	DATE RECEIVED.:	11/27/91
ICAL DATE....:	12/12/91	SAMPLE ORIGIN:	n/a	DATE COLLECTED:	/ /
SPIKE FILE...:	SPX2372K			CLIENT PROJECT:	MORRISTO
GC COLUMN....:	DB-5				

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	16.5	67.4		25:23	—
13C12-PeCDF 234	196	80.3	1.53	29:20	—
13C12-HxCDF 478	227	92.8	0.50	32:07	—
13C12-HxCDF 478	256	105	1.19	32:48	—
13C12-HpCDF 789	204	83.4	0.43	36:28	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	213	87.0	0.49	33:25	—
13C12-HxCDF 234	223	91.0	0.49	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	177	72.1	0.75	24:37	—
13C12-2378-TCDD	164	67.1	0.79	25:22	—
13C12-PeCDF 123	186	76.1	1.51	28:38	—
13C12-PeCDD 123	220	89.7	1.50	29:40	—
13C12-HxCDF 678	224	91.5	0.50	32:13	—
13C12-HxCDD 678	215	87.8	1.18	32:53	—
13C12-HpCDF 678	210	85.7	0.42	35:00	—
13C12-HpCDD 678	210	85.9	1.01	36:00	—
13C12-OCDD	362	74.0	0.87	39:27	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	25:11	—
13C12-HxCDD 789	1.16	33:11	—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915555
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.22 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-505-DAY 2
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-51
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.2				0.71	33:08	
12378-PeCDD	4.4				1.54	38:34	
123478-HxCDD	7.8				1.31	43:21	
123678-HxCDD	9.1				1.21	43:29	
123789-HxCDD	18.3				1.18	43:57	PR
1234678-HpCDD	197				1.04	48:20	B
OCDD	1420				0.84	53:35	B
2378-TCDF	21.5				0.71	32:22	
12378-PeCDF	12.3				1.72	37:06	
23478-PeCDF	33.8				1.58	38:04	
123478-HxCDF	172				1.15	42:10	PR
123678-HxCDF	55.2				1.15	42:21	
234678-HxCDF	184				1.15	43:09	BPR
123789-HxCDF	6.5				1.18	44:18	
1234678-HpCDF	657				0.93	46:48	
1234789-HpCDF	175				0.93	48:59	
OCDF	2620				0.88	53:49	
TOTAL TCDD	9.5	8		11.0	0.74		
TOTAL PeCDD	25.5	8		30.8	1.56		
TOTAL HxCDD	135	7			1.22		
TOTAL HpCDD	385	2			1.04		
TOTAL TCDF	84.6	14		85.1	0.70		
TOTAL PeCDF	321	14		326	1.56		
TOTAL HxCDF	797	14		797	1.18		
TOTAL HpCDF	1570	4			0.93		

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRI GLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915555
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.22 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-505-DAY 2
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-51
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.8	55.2		33:08	—
13C12-PeCDF 234	180	92.1	1.46	38:03	—
13C12-HxCDF 478	161	82.5	0.50	42:11	—
13C12-HxCDD 478	188	96.0	1.21	43:20	—
13C12-HpCDF 789	121	61.6	0.43	48:58	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	147	75.2	0.49	44:17	—
13C12-HxCDF 234	151	77.3	0.49	43:08	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	99.9	51.0	0.74	32:18	—
13C12-2378-TCDD	130	66.2	0.77	33:07	—
13C12-PeCDF 123	164	84.0	1.50	37:05	—
13C12-PeCDD 123	244	125	1.54	38:32	—
13C12-HxCDF 678	157	80.2	0.49	42:21	—
13C12-HxCDD 678	164	84.0	1.21	43:28	—
13C12-HpCDF 678	147	75.1	0.43	46:47	—
13C12-HpCDD 678	162	82.7	1.02	48:19	—
13C12-OCDD	335	85.5	0.87	53:34	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:55	—
13C12-HxCDD 789	1.20	43:56	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915563
CONCAL.....: S915553
ANALYST.....: SB
SAMPLE SIZE..: 10.037 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-510-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-58
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.78			
12378-PeCDD	3.5				1.45	38:35	—
123478-HxCDD	9.3				1.21	43:22	—
123678-HxCDD	9.6				1.29	43:30	—
123789-HxCDD	21.2				1.24	43:57	PR
1234678-HpCDD	187				1.02	48:20	B
OCDD	731				0.83	53:35	B
2378-TCDF	70.8				0.69	32:22	—
12378-PeCDF	26.5				1.57	37:06	—
23478-PeCDF	71.7				1.59	38:06	—
123478-HxCDF	375				1.13	42:10	PR
123678-HxCDF	128				1.13	42:22	—
234678-HxCDF	359				1.15	43:10	B,PR
123789-HxCDF	11.5				1.07	44:19	—
1234678-HpCDF	1100				0.92	46:49	—
1234789-HpCDF	265				0.91	49:00	—
OCDF	3160				0.86	53:49	—
TOTAL TCDD	7.2	6		9.9	0.77		—
TOTAL PeCDD	25.3	7		36.3	1.55		—
TOTAL HxCDD	140	7			1.24		—
TOTAL HpCDD	386	2			1.01		—
TOTAL TCDF	297	15			0.72		—
TOTAL PeCDF	819	16			1.58		—
TOTAL HxCDF	1800	13			1.15		—
TOTAL HpCDF	2670	4			0.92		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, IC.
PCDD/PCDF 2378X ANALYSIS (b) QA QC SUMMARY

FILE NAME....: S915563
CONCAL.....: S915553
ANALYST.....: SB
SAMPLE SIZE..: 10.037 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-510-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-58
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.0	50.1		33:09	—
13C12-PeCDF 234	115	57.6	1.48	38:04	—
13C12-HxCDF 478	148	74.2	0.48	42:12	—
13C12-HxCDD 478	172	86.3	1.21	43:21	—
13C12-HpCDF 789	85.9	43.1	0.40	48:59	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	125	62.8	0.47	44:18	—
13C12-HxCDF 234	135	67.5	0.47	43:09	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	81.6	40.9	0.75	32:20	—
13C12-2378-TCDD	109	54.9	0.78	33:08	—
13C12-PeCDF 123	107	53.5	1.47	37:06	—
13C12-PeCDD 123	146	73.5	1.54	38:34	—
13C12-HxCDF 678	125	62.8	0.47	42:21	—
13C12-HxCDD 678	142	71.4	1.19	43:29	—
13C12-HpCDF 678	103	51.8	0.41	46:49	—
13C12-HpCDD 678	109	54.6	0.99	48:20	—
13C12-OCDD	180	45.1	0.82	53:34	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	32:56	—
13C12-HxCDD 789	1.21	43:57	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915559
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.115 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-515-DAY 4
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-55
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.44			
12378-PeCDD	2.3				1.49	38:35	—
123478-HxCDD	4.9				1.17	43:22	—
123678-HxCDD	5.8				1.24	43:30	—
123789-HxCDD	11.4				1.23	43:56	PR
1234678-HpCDD	103				1.02	48:21	B
OCDD	468				0.84	53:36	B
2378-TCDF	32.0				0.71	32:22	—
12378-PeCDF	**12.3**				**1.55**	**37:06**	—
23478-PeCDF	36.4				1.60	38:06	—
123478-HxCDF	166				1.12	42:10	PR
123678-HxCDF	50.7				1.15	42:22	
234678-HxCDF	156				1.13	43:10	B,PR
123789-HxCDF	5.6				1.12	44:19	—
1234678-HpCDF	463				0.92	46:49	—
1234789-HpCDF	130				0.92	49:00	—
OCDF	1390				0.87	53:50	—
TOTAL TCDD	3.7	6		5.6	0.74		—
TOTAL PeCDD	17.9	9		21.3	1.67		—
TOTAL HxCDD	76.1	7			1.21		—
TOTAL HpCDD	203	2			1.02		—
TOTAL TCDF	130	15			0.71		—
TOTAL PeCDF	377	15			1.58		—
TOTAL HxCDF	755	13		756	1.13		—
TOTAL HpCDF	1170	4			0.92		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915559
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.115 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-515-DAY 4
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-55
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.4	57.6		33:09	—
13C12-PeCDF 234	183	92.6	1.46	38:04	—
13C12-HxCDF 478	152	76.7	0.49	42:12	—
13C12-HxCDD 478	198	99.9	1.18	43:21	—
13C12-HpCDF 789	140	70.8	0.42	48:59	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	153	77.2	0.48	44:18	—
13C12-HxCDF 234	150	75.9	0.48	43:09	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	103	52.0	0.76	32:20	—
13C12-2378-TCDD	135	68.2	0.78	33:08	—
13C12-PeCDF 123	167	84.3	1.49	37:06	—
13C12-PeCDD 123	217	110	1.56	38:34	—
13C12-HxCDF 678	138	69.9	0.48	42:21	—
13C12-HxCDD 678	160	80.8	1.20	43:29	—
13C12-HpCDF 678	135	68.4	0.43	46:49	—
13C12-HpCDD 678	160	80.8	1.01	48:20	—
13C12-OCDD	300	75.9	0.87	53:35	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.77	32:56	—
13C12-HxCDD 789	1.16	43:57	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915560
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.041 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-520-DAY 5
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-56
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.65			
12378-PeCDD	2.8				1.47	38:35	—
123478-HxCDD	6.8				1.25	43:22	—
123678-HxCDD	9.4				1.28	43:30	—
123789-HxCDD	17.9				1.23	43:58	PR
1234678-HpCDD	183				1.00	48:21	B
OCDD	921				0.84	53:36	B
2378-TCDF	51.1				0.69	32:22	—
12378-PeCDF	15.5				1.57	37:08	—
23478-PeCDF	50.1				1.58	38:06	—
123478-HxCDF	259				1.09	42:11	PR
123678-HxCDF	81.0				1.10	42:22	—
234678-HxCDF	271				1.11	43:10	B,PR
123789-HxCDF	6.1				1.25	44:19	—
1234678-HpCDF	796				0.92	46:50	—
1234789-HpCDF	211				0.91	49:00	—
OCDF	2500				0.87	53:50	—
TOTAL TCDD	6.1	7		7.9	0.73		—
TOTAL PeCDD	31.0	10		34.1	1.62		—
TOTAL HxCDD	132	7			1.24		—
TOTAL HpCDD	359	2			1.02		—
TOTAL TCDF	195	14			0.71		—
TOTAL PeCDF	569	17			1.59		—
TOTAL HxCDF	1240	14		1240	1.12		—
TOTAL HpCDF	1990	4			0.92		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABOR TORIES, INC.
PCDD/PCDF 2378X ANALY: S (b) QA/QC SUMMARY

FILE NAME....: S915560
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.041 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-520-DAY 5
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-56
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.4	52.1		33:09	—
13C12-PeCDF 234	165	82.7	1.46	38:04	—
13C12-HxCDF 478	162	81 1	0.52	42:12	—
13C12-HxCDD 478	203	102	1.19	43:22	—
13C12-HpCDF 789	131	65.9	0.42	48:59	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	155	77.7	0.50	44:19	—
13C12-HxCDF 234	157	78.8	0.50	43:09	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	87.6	44.0	0.75	32:20	—
13C12-2378-TCDD	124	62.3	0.78	33:08	—
13C12-PeCDF 123	152	76.5	1.47	37:06	—
13C12-PeCDD 123	197	98.8	1.50	38:34	—
13C12-HxCDF 678	145	73.0	0.51	42:22	—
13C12-HxCDD 678	166	83.5	1.19	43:29	—
13C12-HpCDF 678	143	72.0	0.43	46:49	—
13C12-HpCDD 678	164	82.5	0.98	48:20	—
13C12-OCDD	328	82.3	0.85	53:35	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	32:56	—
13C12-HxCDD 789	1.20	43:57	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915562
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.017 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-525-DAY 6
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-57
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)*	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.54				0.85	33:08	—
12378-PeCDD	2.3				1.48	38:34	—
123478-HxCDD	5.4				1.21	43:21	—
123678-HxCDD	8.3				1.23	43:29	—
123789-HxCDD	13.5				1.24	43:57	IA
1234678-HpCDD	169				1.01	48:20	B
OCDD	1050				0.84	53:35	B
2378-TCDF	25.5				0.74	32:21	—
12378-PeCDF	9.8				1.56	37:06	—
23478-PeCDF	29.2				1.57	38:04	—
123478-HxCDF	161				1.12	42:10	PR
123678-HxCDF	52.1				1.11	42:21	—
234678-HxCDF	173				1.11	43:09	B PR
123789-HxCDF	6.3				1.06	44:18	—
1234678-HpCDF	576				0.92	46:49	—
1234789-HpCDF	161				0.91	48:59	—
OCDF	1980				0.89	53:49	—
TOTAL TCDD	7.4	8		7.9	0.81		—
TOTAL PeCDD	28.6	9		32.6	1.52		—
TOTAL HxCDD	116	7			1.23		—
TOTAL HpCDD	326	2			1.01		—
TOTAL TCDF	96.7	14			0.73		—
TOTAL PeCDF	299	15			1.60		—
TOTAL HxCDF	739	14			1.13		—
TOTAL HpCDF	1420	4			0.92		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMA

FILE NAME....: S915562
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.017 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-525-DAY 6
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-57
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	9.9	49.6		33:08	—
13C12-PeCDF 234	169	84.5	1.52	38:03	—
13C12-HxCDF 478	136	68.2	0.51	42:11	—
13C12-HxCDF 678	177	88.7	1.20	43:20	—
13C12-HpCDF 789	128	64.3	0.42	48:58	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	135	67.5	0.49	44:17	—
13C12-HxCDF 234	134	67.2	0.50	43:08	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	81.6	40.9	0.75	32:18	—
13C12-2378-TCDD	111	55.5	0.80	33:07	—
13C12-PeCDF 123	152	75.9	1.52	37:05	—
13C12-PeCDD 123	188	94.0	1.53	38:32	—
13C12-HxCDF 678	120	60.0	0.50	42:20	—
13C12-HxCDD 678	142	71.2	1.18	43:28	—
13C12-HpCDF 678	128	64.3	0.43	46:48	—
13C12-HpCDD 678	157	78.6	0.98	48:19	—
13C12-OCDD	370	92.7	0.87	53:34	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:55	—
13C12-HxCDD 789	1.17	43:56	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.

SAMPLE DATA

CONFIRMATION ANALYSES

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505307
CONCAL.....: W505303
ANALYST..... VC
SAMPLE SIZE..: 10.074 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-440-DAY 1
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-67
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	161				0.77	22:53	—
2378-TCDF	349				0.76	24:17	—
TOTAL TCDD	6490	15		6570	0.78		—
TOTAL TCDF	16940	3		22330	0.76		S

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	16.2	81.6		22:51	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	162	81.6	0.78	24:16	—
13C12-2378-TCDD	160	80.7	0.80	22:50	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:06	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505207
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.148 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-445-DAY 2
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-63
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	31.4				0.76	22:53	—
2378-TCDF	148				0.75	24:19	—
TOTAL TCDD	313	18			0.78		—
TOTAL TCDF	7570	28		7580	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.6	53.9		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	104	53.0	0.77	24:18	—
13C12-2378-TCDD	117	59.5	0.79	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:08	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505201
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.07 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-450-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-52
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	51.5				0.80	22:55	___
2378-TCDF	263				0.74	24:21	___
TOTAL TCDD	473	18		473	0.78		___
TOTAL TCDF	11770	29			0.75		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.3	51.9		22:54	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	109	54.8	0.78	24:20	___
13C12-2378-TCDD	113	56.8	0.79	22:53	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:09	___

Reviewed By: DJH 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE ABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505204
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.163 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-455-DAY 4
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-59
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	23.6				0.78	22:53	—
2378-TCDF	110				0.75	24:19	—
TOTAL TCDD	282	18			0.78		—
TOTAL TCDF	4710	28		4720	0.75		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.6	53.7		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	98.5	50.0	0.79	24:19	—
13C12-2378-TCDD	114	57.8	0.78	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505202
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.137 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-460-DAY 5
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-54
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	43.7				0.79	22:53	
2378-TCDF	185				0.75	24:19	
TOTAL TCDD	470	18		471	0.78		
TOTAL TCDF	9 0	26		9090	0.77		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	9.6	48.5		22:53	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	87.1	44.2	0.78	24:19	
13C12-2378-TCDD	95.4	48.3	0.80	22:52	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505205
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.328 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-465-DAY 6
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-60
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	43.0				0.78	22:53	
2378-TCDF	206				0.76	24:20	
TOTAL TCDD	399	18		399	0.80		
TOTAL TCDF	8950	27		9000	0.74		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.1	52.4		22:53	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	100	51.8	0.78	24:18	
13C12-2378-TCDD	113	58.3	0.78	22:52	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:07	

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505002
CONCAL.....: W504902
ANALYST.....: VC
SAMPLE SIZE..: 10.072 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-470-DAY 1
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-53
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			4.7			
2378-TCDF	39.8				0.76	24:20	
TOTAL TCDD	34.4	8		51.0	0.74		
TOTAL TCDF	1390	18		1400	0.75		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.6	58.3		22:53	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	111	56.1	0.78	24:19	
13C12-2378-TCDD	127	63.9	0.78	22:52	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	23:08	

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505208 CLIENT.....: RADIAN TLI SAMPLE ID.: 52-78-64
CONCAL.....: W505102 SAMPLE ID....: MO-475-DAY 2
ANALYST.....: VA ANALYSIS DATE: 12/11/91 PROJECT NUMBER: 19629B
SAMPLE SIZE..: 10.038 g SAMPLE MATRIX: ASH DATE RECEIVED.: 11/27/91
ICAL DATE....: 02/05/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE...: SPC2NF2S CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	2.9				0.82	22:52	___
2378-TCDF	20.2				0.78	24:19	___
TOTAL TCDD	20.6	14		23.1	0.79		___
TOTAL TCDF	651	27		659	0.75		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	15.5	77.6		22:53	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	133	66.8	0.77	24:18	___
13C12-2378-TCDD	161	80.7	0.79	22:52	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	___

Reviewed By: DJY 12/28/91 C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505306
CONCAL.....: W505303
ANALYST.....: VC
SAMPLE SIZE..: 10.232 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-480-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-66
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	6.3				0.81	22:51	—
2378-TCDF	41.8				0.77	24:17	—
TOTAL TCDD	51.7	14		56.0	0.76		—
TOTAL TCDF	1480	27		1490	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	13.0	66.7		22:51	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	123	63.0	0.77	24:16	—
13C12-2378-TCDD	143	73.0	0.79	22:49	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:05	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505512
CONCAL.....: W505502
ANALYST.....: VC
SAMPLE SIZE..: [illegible].185 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-485-DAY 4
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-69
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	5.7				0.76	22:51	—
2378-TCDF	38.8				0.74	24:17	—
TOTAL TCDD	43.4	15		51.6	0.79		—
TOTAL TCDF	1470	25		149[illegible]	0.73		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	13.6	69.2		22:51	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	134	68.2	0.78	24:16	—
13C12-2378-TCDD	147	74.9	0.79	22:49	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	23:05	—

Reviewed By: DJY 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505206
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.439 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-490-DAY 5
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-62
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MOPRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.1				0.65	22:54	
2378-TCDF	29.6				0.75	24:20	
TOTAL TCDD	43.9	9		56.0	0.76		
TOTAL TCDF	1240	11			0.76		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	13.9	72.4		22:53	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	138	71.9	0.77	24:19	
13C12-2378-TCDD	144	75.2	0.79	22:52	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	23:08	

Reviewed By: DSM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W915059
CONCAL.....: W505602
ANALYST.....: SB
SAMPLE SIZE..: 10.224 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-495-DAY 6
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-73
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	2.1				0.66	22:53	___
2378-TCDF	13.3				0.74	24:20	___
TOTAL TCDD	30.0	10		34.0	0.75		___
TOTAL TCDF	456	19		477	0.75		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	14.8	75.4		22:53	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	155	79.2	0.76	24:19	___
13C12-2378-TCDD	160	82.0	0.79	22:52	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	23:08	___

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505513
CONCAL.....: W505502
ANALYST.....: VC
SAMPLE SIZE..: 10.28 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-500-DAY 1
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-71
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.3				0.85	22:50	
2378-TCDF	6.5				0.72	24:16	
TOTAL TCDD	10.7	12		12.3	0.78		
TOT/ TCDF	208	26		210	0.75		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	12.2	62.7		22:50	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	104	53.4	0.78	24:16	
13C12-2378-TCDD	127	65.1	0.79	22:50	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:05	

Reviewed By: DJU 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505001
CONCAL.....: W504902
ANALYST.....: VC
SAMPLE SIZE..: 10.22 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-505-DAY 2
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-51
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	L	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			1.4			___
2378-TCDF	4.1				0.67	24:20	___
TOTAL TCDD	8.7	4		12.0	0.74		___
TOTAL TCDF	102	14		107	0.72		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.5	58.8		22:53	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	118	60.3	0.78	24:19	___
13C12-2378-TCDD	131	66.8	0.77	22:52	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	___

Reviewed By: DJN 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505203
CONCAL.....: W505102
ANALYST.....: VA
SAMPLE SIZE..: 10.037 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-510-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 58-78-58
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.9				0.81	22:53	—
2378-TCDF	13.1				0.78	24:19	—
TOTAL TCDD	16.1	11		18.0	0.80		—
TOTAL TCDF	449	23		453	0.77		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.7	53.8		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	104	52.4	0.77	24:19	—
13C12-2378-TCDD	114	57.0	0.78	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	23:08	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505003
CONCAL.....: W504902
ANALYST.....: VC
SAMPLE SIZE..: 10.115 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-515-DAY 4
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-55
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.77				0.65	22:53	—
2378-TCDF	5.0				0.78	24:19	—
TOTAL TCDD	4.0	4		6.0	0.77		—
TOTAL TCDF	151	13		164	0.77		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.3	57.1		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	113	57.3	0.79	24:18	—
13C12-2378-TCDD	130	65.8	0.78	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	23:08	—

Reviewed By: DJM 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

12/28/91

FILE NAME....: W505004 CLIENT.....: RADIAN TLI SAMPLE ID.: 52-78-56
CONCAL.....: W504902 SAMPLE ID....: MO-520-DAY 5
ANALYST.....: VC ANALYSIS DATE: 12/11/91 PROJECT NUMBER: 19629B
SAMPLE SIZE..: 10.041 g SAMPLE MATRIX: ASH DATE RECEIVED.: 11/27/91
ICAL DATE....: 02/05/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE...: SPC2NF2S CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			0.91			
2378-TCDF	6.6				0.73	24:20	
TOTAL TCDD	5.0	3		8.7	0.80		
TOTAL TCDF	221	12		261	0.74		

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	**11.1**	**55.6**		**22:53**	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	102	51.2	0.80	24:19	
13C12-2378-TCDD	121	61.0	0.79	22:52	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:08	

Reviewed By: DJY 12/28/91 C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W505005
CONCAL.....: W504902
ANALYST.....: SB
SAMPLE SIZE..: 10.017 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-525-DAY 6
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-57
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.2				—
2378-TCDF	4.0				0.66	24:19	—
TOTAL TCDD	3.1	2		9.5	0.83		—
TOTAL TCDF	123	15		136	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.6	53.1		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	96.4	48.3	0.77	24:18	—
13C12-2378-TCDD	110	55.1	0.77	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	23:07	—

Reviewed By: DJH 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-225)

FILE NAME....: W915060
CONCAL.....: W505602
ANALYST.....: SB
SAMPLE SIZE..: 8.17 g
ICAL DATE....: 02/05/91
SPIKE FILE...: SPC2NF2S

CLIENT.....: RADIAN
SAMPLE ID....: MO-528-DAY 1
ANALYSIS DATE: 12/13/91
SAMPLE MATRIX: SLUDGE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-104-1
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.09				—
2378-TCDF	0.27				0.71	24:20	—
TOTAL TCDD	0.15	1			0.71		—
TOTAL TCDF	0.27	1		0.40	0.71		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	18.4	75.3		22:53	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	195	79.8	0.78	24:18	—
13C12-2378-TCDD	206	84.3	0.80	22:52	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	23:07	—

Reviewed By: DJY 12/28/91

C2NF_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
801-10 CAPITOLA DRIVE
RESEARCH TRIANGLE PARK, NC 27713

Phone: (919) 544-5729
Fax: (919) 544-5491

DATE :	* 30 DECEMBER 1991
CLIENT ID :	* RADIAN CORPORATION
P.O. NUMBER :	* S137836
TLI PROJECT No. :	* 19629B

CASE NARRATIVE
MODEL 8290X

¥¥

ANALYSIS OF SAMPLES FOR THE PRESENCE OF

POLYCHLORINATED DIBENZO-p-DIOXINS

AND

DIBENZOFURANS

BY

HIGH-RESOLUTION GAS CHROMATOGRAPHY /
HIGH-RESOLUTION MASS SPECTROMETRY

¥¥

One sludge and eighteen ash samples were received from RADIAN CORPORATION in good condition November 27, 1991 and stored in a refrigerator at 4°C. The samples were extracted and analyzed according to procedures described in the Triangle Labs User Manual provided with this data package. Any particular difficulties encountered during the sample handling by Triangle Labs will be discussed in the QA/QC remark section below.

Quality Assurance/Quality Control Samples

A laboratory method blank -- identified as the TLI Blank -- is prepared along with the batch of samples.

QA/QC Remarks

The release of this particular set of RADIAN CORPORATION analytical data by Triangle Labs was authorized by the Quality Assurance Officer who has reviewed each sample data package individually following a series of inspections/reviews conducted at two other levels of the data production line. When applicable, general deviations from acceptable QA/QC requirements are identified below. Comments on the effect of these deviations upon the validity and reliability of the results can be obtained from the User Manual (Data Quality Objectives; Section 5). Specific QA/QC Problems Associated with this Particular Project are:

Sample Preparation Laboratory: None

Mass Spectrometry: None

Data Review:

The following samples present saturated signals in several channels. The affected analytes and Totals are flagged with as "S" on the final report. The reported concentrations should be considered minimum estimates. The samples were diluted and reanalyzed on the DB-5 GC column.

Sample	TLI
MO-450-DAY 3	52-78-52
MO-460-DAY 5	52-78-54
MO-440 DAY 1	52-78-67
MO-485 DAY 4	52-78-69

Sample MO-445-DAY 2 (Sample ID 52-78-63) has some HpCDF saturation, but was not diluted and reanalyzed. Please inform TLI if you would like this sample diluted and reanalyzed.

Some samples in this project present QC ion instabilities as a result of quantitative interferences. The affected isomers are flagged "Q" on the report. Affected analytes may be overestimated or understimated due to this interference. Quantitative interference is described in section 5.1.2.4.1 of the Data User's Manual.

Analytes were found in both the TLI Ash Blank and the TLI Sludge Blank at levels less than one-third the calculated theoretical method quantitation limit (TMQL) or below the Target Detection LImit. Blank contamination levels less than one-third TMQL or less than the Target Detection Limit are acceptable under TLI guidelines; however, the OCDD isomer is not required to follow blank contamination criteria. Blank contamination is discussed in section 5.1.3.2 of the Data User's Manual.

The presence of the 2378-TCDF isomer, where found on the DB-5 column at a concentration in excess of the Target Detection Limit, is confirmed on the isomer-specific DB-225 GC column.

Addendum to Section 2.3 of the Data User's Manual

All sample and calibration analyses are conducted using a 2 uL injection volume, unless otherwise specified.

Addendum to Section 4.6 of the Data User's Manual

Effective December 15, 1989, Triangle Laboratories has adopted a new procedure for calculating the analyte specific detection limits. Under this new policy two representative noise height determinations are summed and multiplied by an empirically determined factor before the detection limit equation given in Section 4.6 of the Data User's Manual is applied. The effect of this procedure is to increase DB-225 analyses detection limits by a factor of 3.5, and DB-5 analyses detection limits by a factor of 5. This procedure will result in a more accurate estimate of detection limits.

The revised formula for DB-225 analyses is:

$$DL_{ai}^{DB-225} = \frac{2.5 * (3.5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$3.5 * H_{ai} = A_{noise}$$

The revised formula for DB-5 analyses is:

$$DL_{ai}^{DB-5} = \frac{2.5 * (5 * H_{ai}) * Q_{Bj}}{A_{Bj} * \overline{RRF} * W}$$

$$5 * H_{ai} = A_{noise}$$

The symbols are defined in Section 4.6 of the Data User's Manual.

As an example, consider a DB-225 confirmation analysis of a 10 g sample. The internal standard spike is 2000 pg, the 13C12-2,3,7,8-TCDF internal standard area is 12000 area units, the RRF is 1.215 and the noise height is 11 units. The 2,3,7,8-TCDF

detection limit is:

$$DL_{TCDF}^{DB-225} = \frac{2.5 * (3.5 * 11) * 2000}{12000 * 1.215 * 10.0} = 1.3 \text{ ppt}$$

Should RADIAN CORPORATION have any questions or comments to formulate regarding this data package please feel free to contact us.

For Triangle Laboratories,

Laboratory Management	Quality Assurance Unit	Report Preparation/ Quality Control
Signed: Mary C Collins for	Diane Williford	
Title:		
Robert Smith	Diane Williford	Todd Vilen
Process Control Manager	QA Specialist	Dioxin Data Review Officer

TRIANGLE LABORATORIES, INC.

SAMPLE DATA

FULLSCREEN ANALYSES

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

FILE NAME....: S915554
CONCAL.....: S915553
ANALYST.....: NB
SAMPLE SIZE..: 10.00 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: TLI ASH BLANK
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629B
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.3				—
12378-PeCDD	ND		0.3				—
123478-HxCDD	ND		0.5				—
123678-HxCDD	ND		0.3				—
123789-HxCDD	ND		0.4				—
1234678-HpCDD	2.5				1.20	48:21	—
OCDD	11.7				0.85	53:36	—
2378-TCDF	ND		0.2				—
12378-PeCDF	ND		0.2				—
23478-PeCDF	ND		0.2				—
123478-HxCDF	ND		0.3				—
123678-HxCDF	ND		0.3				—
234678-HxCDF	0.20				1.10	43:11	—
123789-HxCDF	ND		0.4				—
1234678-HpCDF	ND		0.3				—
1234789-HpCDF	ND		0.5				—
OCDF	ND		0.6				—
TOTAL TCDD	1.2	2			0.80		—
TOTAL PeCDD	1.4	2		2.3	1.59		—
TOTAL HxCDD	2.2	1		2.7	1.29		—
TOTAL HpCDD	4.1	2			1.13		—
TOTAL TCDF	ND		0.2				—
TOTAL PeCDF	ND		0.2				—
TOTAL HxCDF	0.20	1			1.10		—
TOTAL HpCDF	ND		0.4				—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LAB ATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915554
CONCAL.....: S915553
ANALYST.....: NB
SAMPLE SIZE..: 10.00 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: TLI ASH BLANK
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629B
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	8.1	40.6		33:09	___
13C12-PeCDF 234	146	73.2	1.49	38:04	___
13C12-HxCDF 478	141	70.5	0.49	42:13	___
13C12-HxCDD 478	200	99.8	1.18	43:22	___
13C12-HpCDF 789	113	56.7	0.41	48:59	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	137	68.5	0.49	44:19	___
13C12-HxCDF 234	137	68.3	0.49	43:10	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	73.6	36.8	0.74	32:20	V
13C12-2378-TCDD	97.9	49.0	0.79	33:08	___
13C12-PeCDF 123	151	75.6	1.50	37:06	___
13C12-PeCDD 123	177	88.5	1.50	38:34	___
13C12-HxCDF 678	148	73.9	0.48	42:22	___
13C12-HxCDD 678	174	87.0	1.19	43:30	___
13C12-HpCDF 678	132	66.0	0.43	46:49	___
13C12-HpCDD 678	156	78.2	1.01	48:20	___
13C12-OCDD	346	86.5	0.87	53:35	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	32:56	___
13C12-HxCDD 789	1.18	43:58	___

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915597
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 15.542 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: TLI SLUDGE BLANK
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: SLUDGE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629B
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.2				
12378-PeCDD	ND		0.1				—
123478-HxCDD	ND		0.2				—
123678-HxCDD	EMPC			0.10			—
123789-HxCDD	ND		0.2				—
1234678-HpCDD	2.3				0.93	36:01	—
OCDD	9.8				0.85	39:27	—
2378-TCDF	ND		0.2				
12378-PeCDF	ND		0.1				—
23478-PeCDF	ND		0.1				—
123478-HxCDF	EMPC			0.15			—
123678-HxCDF	ND		0.1				—
234678-HxCDF	0.35				1.11	32:42	—
123789-HxCDF	ND		0.2				—
1234678-HpCDF	EMPC			0.44			—
1234789-HpCDF	ND		0.2				—
OCDF	1.3				0.83	39:39	—
TOTAL TCDD	ND		0.2				
TOTAL PeCDD	ND		0.1				—
TOTAL HxCDD	0.35	1		0.47	1.37		—
TOTAL HpCDD	3.7	2			1.02		—
TOTAL TCDF	ND		0.2				
TOTAL PeCDF	ND		0.1				—
TOTAL HxCDF	0.33	1		0.47	1.11		—
TOTAL HpCDF	0.24	1		1.1	1.16		—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915597
CONCAL.....: S915593
ANALYST.....: SA
SAMPLE SIZE..: 15.542 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: TLI SLUDGE BLANK
ANALYSIS DATE: 12/12/91
SAMPLE MATRIX: SLUDGE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629B
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	4.6	35.8		25:22	√
13C12-PeCDF 234	89.9	69.9	1.50	29:20	—
13C12-HxCD 478	111	86.3	0.50	32:07	—
13C12-HxCD 478	125	97.3	1.28	32:48	—
13C12-HpCDF 789	122	95.0	0.42	36:28	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	106	82.0	[illegible].49	33:25	—
13C12-HxCDF 234	105	81.8	0.49	32:42	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	37.3	29.0	0.75	24:37	√
13C12-2378-TCDD	42.9	33.3	0.78	25:22	√
13C12-PeCDF 123	62.2	48.3	1.49	28:38	—
13C12-PeCDD 123	101	78.6	1.55	29:40	—
13C12-HxCDF 678	89.7	69.7	0.50	32:13	—
13C12-HxCDD 678	106	82.6	1.09	32:53	—
13C12-HpCDF 678	99.7	77.5	0.42	35:00	—
13C12-HpCDD 678	118	92.0	1.02	36:00	—
13C12-OCDD	221	85.7	0.86	39:27	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	25:09	—
13C12-HxCDD 789	1.18	33:11	—

Reviewed By: SC 12/28/91

X237_RPT 4.00, LARS 4.10.00

Bottom Ash 18.7 [illegible]

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915574
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.074 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-440-DAY 1
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-67
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			15.8			
12378-PeCDD	165				1.49	38:40	
123478-HxCDD	351				1.23	43:27	
123678-HxCDD	359				1.22	43:34	
123789-HxCDD	893				1.21	44:00	PR
1234678-HpCDD	3740				1.04	48:26	B
OCDD	12200				0.84	53:46	B
2378-TCDF	1870				0.82	32:26	S
12378-PeCDF	465				1.56	37:11	
23478-PeCDF	1100				1.56	38:09	
123478-HxCDF	EMPC			5030			S
123678-HxCDF	1400				1.10	42:28	
234678-HxCDF	2860				1.09	43:15	B,PR
123789-HxCDF	78.4				1.09	44:24	
1234678-HpCDF	7600				0.90	46:56	S
1234789-HpCDF	1310				0.91	49:05	
OCDF	10400				0.90	53:59	
TOTAL TCDD	3780	11		3800	0.79		Q
TOTAL PeCDD	4040	10		4260	1.56		Q
TOTAL HxCDD	7050	7			1.22		
TOTAL HpCDD	8670	2			1.03		Q
TOTAL TCDF	11530	18			0.73		S,Q
TOTAL PeCDF	9060	19		14490	1.56		S
TOTAL HxCDF	9550	12		18460	1.13		S,Q
TOTAL HpCDF	16760	4			0.91		S,Q

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915574 CLIENT.....: RADIAN TLI SAMPLE ID.: 52-78-67
CONCAL.....: S915566 SAMPLE ID....: MO-440-DAY 1
ANALYST.....: NB ANALYSIS DATE: 12/11/91 PROJECT NUMBER: 19629B
SAMPLE SIZE..: 10.074 g SAMPLE MATRIX: ASH DATE RECEIVED.: 11/27/91
ICAL DATE....: 08/07/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE...: SPX2372K CLIENT PROJECT: MORRISTO
GC COLUMN....: DB-5

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	19.9	100		33:13	—
13C12-PeCDF 234	223	112	1.55	38:08	—
13C12-HxCDF 478	152	76.4	0.51	42:18	Q
13C12-HxCDD 478	176	88.8	1.21	43:25	—
13C12-HpCDF 789	115	58.2	0.43	49:04	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	133	67.2	0.50	44:23	—
13C12-HxCDF 234	147	74.0	0.50	43:14	Q

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	163	82.2	0.75	32:23	—
13C12-2378-TCDD	189	95.0	0.79	33:12	—
13C12-PeCDF 123	234	118	1.52	37:11	—
13C12-PeCDD 123	255	128	1.52	38:38	—
13C12-HxCDF 678	148	74.6	0.50	42:27	—
13C12-HxCDD 678	150	75.8	1.21	43:34	—
13C12-HpCDF 678	101	50.9	0.44	46:55	Q
13C12-HpCDD 678	126	63.5	1.00	48:25	Q
13C12-OCDD	281	70.9	0.86	53:45	Q

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	33:00	—
13C12-HxCDD 789	1.18	44:02	—

Reviewed By: SL 12/28/91 X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915767
CONCAL.....: S915765
ANALYST.....: JA
SAMPLE SIZE..: 10.074 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-440-DAY1
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-67
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			28.0			
12378-PeCDD	166				1.42	29:39	
123478-HxCDD	338				1.19	32:46	
123678-HxCDD	388				1.26	[illegible]:51	
123789-HxCDD	868				1.26	[illegible]:08	PB
1234678-HpCDD	4690				0.99	35:58	B
OCDD	14620				0.83	39:24	B
2378-TCDF	3280				0.71	24:37	
12378-PeCDF	466				1.56	28:35	
23478-PeCDF	1370				1.57	29:19	
123478-HxCDF	7790				1.08	32:03	
123678-HxCDF	1770				1.15	32:11	
234678-HxCDF	3860				1.11	32:40	B
123789-HxCDF	EMPC			95.9			
1234678-HpCDF	17190				0.91	34:58	
1234789-HpCDF	1360				0.89	36:26	
OCDF	13960				0.84	39:35	
TOTAL TCDD	5530	7		5910	0.78		
TOTAL PeCDD	4500	10		4710	1.55		
TOTAL HxCDD	7340	7			1.21		
TOTAL HpCDD	9880	2			1.00		
TOTAL TCDF	18010	15			0.72		
TOTAL PeCDF	21030	14			1.60		
TOTAL HxCDF	27490	10		28020	1.12		
TOTAL HpCDF	29090	4			0.93		

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915767
CONCAL.....: S915765
ANALYST.....: JA
SAMPLE SIZE..: 10.074 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-440-DAY1
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-67
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	24.6	124		25:18	—
13C12-PeCDF 234	178	89.7	1.43	29:17	—
13C12-HxCDF 478	152	76.6	0.53	32:05	—
13C12-HxCDD 478	168	84.7	0.93	32:46	BO
13C12-HpCDF 789	179	90.1	0.54	36:25	BO

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	161	80.9	0.63	33:22	BO
13C12-HxCDF 234	148	74.7	0.47	32:40	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	147	74.1	0.66	24:34	—
13C12-2378-TCDD	134	67.6	0.83	25:18	—
13C12-PeCDF 123	159	80.2	1.40	28:35	—
13C12-PeCDD 123	215	108	1.61	29:38	—
13C12-HxCDF 678	140	70.5	0.54	32:10	—
13C12-HxCDD 678	161	80.9	1.41	32:51	—
13C12-HpCDF 678	158	79.6	0.37	34:58	—
13C12-HpCDD 678	153	77.2	1.12	35:57	—
13C12-OCDD	273	68.7	0.78	39:23	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.74	25:07	—
13C12-HxCDD 789	1.11	33:08	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915570
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.148 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-445-DAY 2
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-63
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	9.4				0.73	33:12	—
12378-PeCDD	77.0				1.70	38:37	—
123478-HxCDD	184				1.24	43:24	—
123678-HxCDD	126				1.22	43:32	—
123789-HxCDD	418				1.22	43:57	PR
1234678-HpCDD	2150				1.05	48:23	B
OCDD	11780				0.83	53:41	B
2378-TCDF	979				0.72	32:24	—
12378-PeCDF	311				1.58	37:10	—
23478-PeCDF	696				1.56	38:08	—
123478-HxCDF	5490				1.10	42:13	PR
123678-HxCDF	1160				1.11	42:25	—
234678-HxCDF	2800				1.09	43:12	B,PR
123789-HxCDF	79.4				1.10	44:21	—
1234678-HpCDF	12080				0.91	46:53	S
1234789-HpCDF	1030				0.92	49:02	—
OCDF	26440				0.87	53:55	—
TOTAL TCDD	192	12			0.78		—
TOTAL PeCDD	664	10			1.63		—
TOTAL HxCDD	1810	7			1.22		—
TOTAL HpCDD	4350	2			1.07		—
TOTAL TCDF	4860	14		4860	0.73		—
TOTAL PeCDF	10740	20		10740	1.58		—
TOTAL HxCDF	18690	12		18700	1.10		—
TOTAL HpCDF	21370	4			0.92		S

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915570
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.148 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-445-DAY 2
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-63
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.7	59.5		33:12	—
13C12-PeCDF 234	151	76.4	1.51	38:07	—
13C12-HxCDF 478	211	107	0.51	42:15	—
13C12-HxCDD 478	200	101	1.19	43:24	—
13C12-HpCDF 789	119	60.5	0.42	49:01	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	144	73.0	0.49	44:20	—
13C12-HxCDF 234	178	90.3	0.49	43:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	106	53.5	0.76	32:22	—
13C12-2378-TCDD	138	70.2	0.80	33:10	—
13C12-PeCDF 123	157	79.7	1.49	37:09	—
13C12-PeCDD 123	142	72.1	1.53	38:36	—
13C12-HxCDF 678	181	91.9	0.49	42:24	—
13C12-HxCDD 678	166	84.4	1.22	43:31	—
13C12-HpCDF 678	196	99.4	0.43	46:52	—
13C12-HpCDD 678	155	78.5	1.01	48:22	—
13C12-OCDD	340	86.2	0.87	53:39	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	32:58	—
13C12-HxCDD 789	1.21	43:59	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915556
CONCAL.....: S915553
ANALYST.....: VC
SAMPLE SIZE..: 10.07 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-450-DAY 3
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-52
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	18.4				0.76	33:08	—
12378-PeCDD	108				1.57	38:34	—
123478-HxCDD	242				1.23	43:22	—
123678-HxCDD	155				1.23	43:30	—
123789-HxCDD	499				1.23	43:55	PR
1234678-HpCDD	1790				1.01	48:20	B
OCDD	6480				0.84	53:37	B
2378-TCDF	1570				0.73	32:22	—
12378-PeCDF	491				1.56	37:06	—
23478-PeCDF	1090				1.55	38:04	—
123478-HxCDF	6440				1.14	42:10	PR
123678-HxCDF	1310				1.13	42:22	—
234678-HxCDF	2920				1.14	43:10	B,PR
123789-HxCDF	104				1.14	44:19	—
1234678-HpCDF	7050				0.91	46:50	S
1234789-HpCDF	878				0.92	48:59	—
OCDF	12610				0.87	53:51	—
TOTAL TCDD	271	12		307	0.77		—
TOTAL PeCDD	869	10		921	1.57		—
TOTAL HxCDD	2260	7			1.23		—
TOTAL HpCDD	3680	2			1.02		—
TOTAL TCDF	7930	17		7930	0.74		—
TOTAL PeCDF	14340	18		14340	1.56		—
TOTAL HxCDF	21240	13			1.13		S
TOTAL HpCDF	13980	4			0.92		S

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915556
CONCAL.....: S915553
ANALYST.....: VC
SAMPLE SIZE..: 10.07 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-450-DAY 3
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-52
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.3	52.1		33:08	—
13C12-PeCDF 234	161	81.1	1.51	38:03	—
13C12-HxCDF 478	210	106	0.50	42:12	—
13C12-HxCDD 478	192	96.7	1.25	43:21	—
13C12-HpCDF 789	123	62.1	0.43	48:59	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	140	70.5	0.50	44:17	—
13C12-HxCDF 234	173	87.3	0.49	43:08	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	94.6	47.6	0.75	32:20	—
13C12-2378-TCDD	115	58.1	0.77	33:08	—
13C12-PeCDF 123	166	83.8	1.51	37:05	—
13C12-PeCDD 123	162	81.4	1.50	38:32	—
13C12-HxCDF 678	177	89.4	0.49	42:21	—
13C12-HxCDD 678	157	78.9	1.20	43:28	—
13C12-HpCDF 678	212	107	0.45	46:50	—
13C12-HpCDD 678	172	86.7	1.00	48:19	—
13C12-OCDD	405	102	0.86	53:36	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:55	—
13C12-HxCDD 789	1.20	43:57	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915763
CONCAL.....: S915749
ANALYST.....: DB
SAMPLE SIZE..: 10.07 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-450-DAY3
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-52
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	EMPC			23.2			
12378-PeCDD	140				1.70	29:39	
123478-HxCDD	256				1.13	32:47	
123678-HxCDD	185				1.20	32:52	
123789-HxCDD	555				1.19	33:08	PR
1234678-HpCDD	2270				1.02	35:58	B
OCDD	7440				0.82	39:25	B
2378-TCDF	2030				0.74	24:37	
12378-PeCDF	498				1.69	28:36	
23478-PeCDF	1360				1.55	29:19	
123478-HxCDF	7850				1.12	32:04	PR
123678-HxCDF	1790				1.13	32:11	
234678-HxCDF	4390				1.15	32:40	B, PR
123789-HxCDF	139				1.25	33:23	
1234678-HpCDF	16180				0.90	34:59	
1234789-HpCDF	1600				0.93	36:27	
OCDF	14920				0.84	39:36	
TOTAL TCDD	265	8		377	0.77		
TOTAL PeCDD	982	10		1050	1.61		
TOTAL HxCDD	2430	7			1.21		
TOTAL HpCDD	4640	2			1.03		
TOTAL TCDF	10430	13		10500	0.74		
TOTAL PeCDF	17130	14		17140	1.59		
TOTAL HxCDF	27400	12		27410	1.13		
TOTAL HpCDF	29420	4			0.91		

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915763
CONCAL.....: S915749
ANALYST.....: DB
SAMPLE SIZE..: 10.07 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-450-DAY3
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-52 (10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	8.6	43.5		25:20	—
13C12-PeCDF 234	155	78.3	1.29	29:19	BO
13C12-HxCDF 47'	177	88.9	0.54	[illegible]:05	—
13C12-HxCDD 47	186	93.7	1.16	[illegible] 46	—
13C12-HpCDF 789	224	113	0.41	36:26	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	171	86.2	0.45	33:23	—
13C12-HxCDF 234	166	83.6	0.47	32:40	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	94.0	47.3	0.73	24:34	—
13C12-2378-TCDD	99.5	50.1	0.74	25:19	—
13C12-PeCDF 123	140	70.3	1.46	28:36	—
13C12-PeCDD 123	167	84.2	1.45	29:39	—
13C12-HxCDF 678	158	79.7	0.49	32:11	—
13C12-HxCDD 678	164	82.3	1.23	32:51	—
13C12-HpCDF 678	211	106	0.44	34:58	—
13C12-HpCDD 678	216	109	0.98	35:58	—
13C12-OCDD	465	117	0.79	39:24	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.77	25:08	—
13C12-HxCDD 789	1.24	33:09	—

Reviewed By: [illegible] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915567
CONCAL.....: S915566
ANALYST.....: JA
SAMPLE SIZE..: 10.163 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-455-DAY 4
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-59
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	7.1				0.73	33:12	—
12378-PeCDD	46.3				1.67	38:37	—
123478-HxCDD	87.7				1.22	43:25	—
123678-HxCDD	72.7				1.19	43:33	—
123789-HxCDD	199				1.22	43:57	PR
1234678-HpCDD	511				1.00	48:21	B
OCDD	3830				0.83	53:38	B
2378-TCDF	617				0.71	32:26	—
12378-PeCDF	165				1.56	37:10	—
23478-PeCDF	364				1.58	38:08	—
123478-HxCDF	2110				1.12	42:13	PR
123678-HxCDF	488				1.14	42:25	—
234678-HxCDF	1030				1.13	43:13	B PR
123789-HxCDF	37.0				1.12	44:22	—
1234678-HpCDF	4570				0.93	46:52	—
1234789-HpCDF	EMPC			262			—
OCDF	5250				0.86	53:52	—
TOTAL TCDD	185	12			0.77		—
TOTAL PeCDD	477	10			1.62		—
TOTAL HxCDD	1020	7			1.21		—
TOTAL HpCDD	3380	2			1.01		Q
TOTAL TCDF	3050	15			0.72		—
TOTAL PeCDF	5190	18		5190	1.56		—
TOTAL HxCDF	7160	12		7160	1.12		—
TOTAL HpCDF	7500	3		7700	0.93		—

Reviewed By: SC 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X NALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915567
CONCAL.....: S915566
ANALYST.....: JA
SAMPLE SIZE..: 10.163 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-455-DAY 4
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-59
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	11.2	57.0		33:12	—
13C12-PeCDF 234	129	65.7	1.51	38:07	—
13C12-HxCDF 478	185	94.2	0.49	42:15	—
13C12-HxCDD 478	186	94.7	1.21	43:24	—
13C12-HpCDF 789	57.7	29.3	0.57	49:01	RE V

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	148	75.2	0.46	44:20	—
13C12-HxCDF 234	156	79.2	0.47	43:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	95.0	48.3	0.77	32:22	—
13C12-2378-TCDD	125	63.6	0.78	33:10	—
13C12-PeCDF 123	137	69.9	1.51	37:09	—
13C12-PeCDD 123	124	62.8	1.53	38:36	—
13C12-HxCDF 678	168	85.4	0.49	42:24	—
13C12-HxCDD 678	165	84.1	1.17	43:31	—
13C12-HpCDF 678	151	76.6	0.43	46:51	—
13C12-HpCDD 678	54.1	27.5	0.92	48:20	V.G
13C12-OCDD	323	82.2	0.84	53:37	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	32:58	—
13C12-HxCDD 789	1.20	44:00	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915558
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.137 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-460-DAY 5
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-54
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	11.9						
12378-PeCDD	99.0				0.77	33:09	—
123478-HxCDD	236				1.61	38:35	—
123678-HxCDD	57				1.20	43:22	—
123789-HxCDD	3				1.23	43:3	—
1234678-HpCDD	2[illegible],0				1.21	43:5	PR
OCDD	10440				1.02	48:21	B
					0.84	53:38	B
2378-TCDF	1220						
12378-PeCDF	385				0.69	32:22	—
23478-PeCDF	917				1.58	37:06	—
123478-HxCDF	6800				1.57	38:04	—
123678-HxCDF	1340				1.08	42:10	PR
234678-HxCDF	3080				1.12	42:22	—
123789-HxCDF	125				1.11	43:10	B,PR
1234678-HpCDF	7760				1.21	44:19	—
1234789-HpCDF	1330				0.91	46:51	S
OCDF	17810				0.92	49:00	—
					0.94	53:52	S
TOTAL TCDD	297	13					
TOTAL PeCDD	863	10			0.78		—
TOTAL HxCDD	2330	7		914	1.61		—
TOTAL HpCDD	4830	2			1.22		—
					1.02		—
TOTAL TCDF	5880	16		5880			
TOTAL PeCDF	12730	19		12730	0.70		—
TOTAL HxCDF	21240	12		21250	1.59		—
TOTAL HpCDF	17110	4			1.12		—
					0.92		S

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915558
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.137 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-460-DAY 5
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-54
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	8.7	44.1		33:09	—
13C12-PeCDF 234	166	84.3	1.49	38:04	—
13C12-HxCDF 478	207	105	0.51	42:12	—
13C12-HxCDD 478	198	100	1.19	43:21	—
13C12-HpCDF 789	144	73.0	0.42	48:59	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	152	77.3	0.48	44:18	—
13C12-HxCDF 234	178	90.1	0.50	43:09	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	77.6	39.4	0.76	32:20	✓
13C12-2378-TCDD	98.9	50.1	0.78	33:08	—
13C12-PeCDF 123	159	80.7	1.47	37:06	—
13C12-PeCDD 123	148	74.8	1.55	38:34	—
13C12-HxCDF 678	167	84.5	0.49	42:21	—
13C12-HxCDD 678	153	77.5	1.19	43:29	—
13C12-HpCDF 678	202	102	0.46	46:50	—
13C12-HpCDD 678	184	93.4	1.00	48:20	—
13C12-OCDD	498	126	0.86	53:37	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:56	—
13C12-HxCDD 789	1.19	43:57	—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915766
CONCAL.....: S915765
ANALYST.....: NB
SAMPLE SIZE..: 10.137 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-460-DAY5
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-54
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	16.6				0.70	25:19	—
12378-PeCDD	96.0				1.70	29:39	—
123478-HxCDD	237				1.33	32:47	—
123678-HxCDD	190				1.17	32:52	—
123789-HxCDD	563				1.27	33:08	PR
1234678-HpCDD	3210				1.02	35:59	B
OCDD	12350				0.83	39:25	B
2378-TCDF	**1760**				0.70	24:36	—
12378-PeCDF	413				1.71	28:36	—
23478-PeCDF	1120				1.59	29:19	—
123478-HxCDF	8160				1.11	32:04	PR
123678-HxCDF	1730				1.12	32:11	—
234678-HxCDF	4400				1.11	32:40	B,PR
123789-HxCDF	EMPC			115			—
1234678-HpCDF	20300				0.90	34:59	—
1234789-HpCDF	2040				0.90	36:27	—
OCDF	27590				0.86	39:36	—
TOTAL TCDD	308	10		396	0.77		—
TOTAL PeCDD	719	10		764	1.56		—
TOTAL HxCDD	2380	7			1.24		—
TOTAL HpCDD	6510	2			1.03		—
TOTAL TCDF	8520	14			0.70		—
TOTAL PeCDF	15810	13		16190	1.59		—
TOTAL HxCDF	27710	12		27810	1.13		—
TOTAL HpCDF	36900	4			0.91		—

Reviewed By: SR 12/28/91

X237_RPT 4.00, LARS 4.10.00

RIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

12/28/91

FILE NAME....: S915766
CONCAL.....: S915765
ANALYST.....: NB
SAMPLE SIZE..: 10.137 g
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-460-DAY5
ANALYSIS DATE: 12/19/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-76-54
(10X DILUTION)
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	9.2	46.6		25:19	___
13C12-PeCDF 234	143	72.6	1.53	29:17	___
13C12-HxCDF 478	192	97.3	0.51	32:05	___
13C12-HxCDD 478	192	97.5	1.23	32:46	___
13C12-HpCDF 789	201	102	0.41	36:26	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	168	85.0	0.46	33:23	___
13C12-HxCDF 234	182	92.4	0.47	32:40	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	73.3	37.2	0.73	24:33	___
13C12-2378-TCDD	83.6	42.4	0.79	25:18	___
13C12-PeCDF 123	125	63.2	1.55	28:35	___
13C12-PeCDD 123	186	94.1	1.54	29:38	___
13C12-HxCDF 678	163	82.6	0.48	32:11	___
13C12-HxCDD 678	174	88.2	1.12	32:51	___
13C12-HpCDF 678	196	99.2	0.44	34:59	___
13C12-HpCDD 678	185	93.6	0.93	35:58	___
13C12-OCDD	363	92.1	0.88	39:24	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.81	25:07	___
13C12-HxCDD 789	1.27	33:09	___

Reviewed By: [signature] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

FILE NAME....: S915568
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.328 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-465-DAY 6
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-60
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	16.4				0.74	33:10	—
12378-PeCDD	114				1.65	38:36	—
123478-HxCDD	202				1.21	43:23	—
123678-HxCDD	122				1.06	43:31	—
123789-HxCDD	383				1.[illegible]	43:56	PR
1234678-HpCDD	1510				1.02	48:22	B
OCDD	5910				0.85	53:38	B
2378-TCDF	1030				0.75	32:23	—
12378-PeCDF	463				1.57	37:09	—
23478-PeCDF	920				1.57	38:07	—
123478-HxCDF	4970				1.11	42:12	PR
123678-HxCDF	1250				1.12	42:24	—
234678-HxCDF	2270				1.12	43:11	B,PR
123789-HxCDF	105				1.12	44:20	—
1234678-HpCDF	12170				0.91	46:52	—
1234789-HpCDF	940				0.92	49:01	—
OCDF	12180				0.87	53:52	—
TOTAL TCDD	209	11		236	0.75		—
TOTAL PeCDD	837	10			1.60		—
TOTAL HxCDD	1740	7			1.23		—
TOTAL HpCDD	3170	2			1.02		—
TOTAL TCDF	5780	16		5780	0.74		—
TOTAL PeCDF	12380	19		12380	1.55		—
TOTAL HxCDF	17890	12		17900	1.12		—
TOTAL HpCDF	20650	4			0.92		—

Reviewed By: [illegible] 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915568
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.328 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-465-DAY 6
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-60
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.7	55.4		33:10	___
13C12-PeCDF 234	164	84.5	1.47	38:06	___
13C12-HxCDF 478	214	111	0.49	42:13	___
13C12-HxCDD 478	206	106	1.21	43:22	___
13C12-HpCDF 789	135	70.0	0.43	49:00	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	152	78.3	0.49	44:19	___
13C12-HxCDF 234	183	94.4	0.48	43:10	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	93.3	48.2	0.75	32:21	___
13C12-2378-TCDD	132	68.0	0.79	33:09	___
13C12-PeCDF 123	150	77.3	1.42	37:08	___
13C12-PeCDD 123	134	69.2	1.54	38:35	___
13C12-HxCDF 678	180	92.7	0.47	42:22	___
13C12-HxCDD 678	174	89.7	1.20	43:30	___
13C12-HpCDF 678	193	99.7	0.44	46:51	___
13C12-HpCDD 678	179	92.2	1.02	48:21	___
13C12-OCDD	435	112	0.87	53:37	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:57	___
13C12-HxCDD 789	1.21	43:58	___

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915557
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.072 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-470-DAY 1
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-53
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	2.9				0.68	33:09	—
12378-PeCDD	14.0				1.58	38:35	—
123478-HxCDD	29.1				1.21	43:22	—
123678-HxCDD	35.5				1.26	43:30	—
123789-HxCDD	79.9				1.25	43:58	PR
1234678-HpCDD	644				1.01	48:21	B
OCDD	2490				0.84	53:37	B
2378-TCDF	268				0.71	32:23	—
12378-PeCDF	96.1				1.56	37:08	—
23478-PeCDF	264				1.60	38:06	—
123478-HxCDF	1300				1.10	42:11	PR
123678-HxCDF	392				1.10	42:22	—
234678-HxCDF	1180				1.11	43:10	B PR
123789-HxCDF	40.5				1.08	44:19	—
1234678-HpCDF	3300				0.89	46:50	—
1234789-HpCDF	942				0.89	49:00	—
OCDF	13140				0.86	53:51	—
TOTAL TCDD	36.7	12		40.6	0.76		—
TOTAL PeCDD	138	11			1.53		—
TOTAL HxCDD	543	7			1.23		—
TOTAL HpCDD	1300	2			1.01		—
TOTAL TCDF	1060	17		1060	0.69		—
TOTAL PeCDF	2830	19		2840	1.57		—
TOTAL HxCDF	5920	15			1.11		—
TOTAL HpCDF	8690	4			0.90		—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915557
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 10.072 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-470-DAY 1
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-53
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	10.9	55.1		33:09	___
13C12-PeCDF 234	163	82.3	1.50	38:04	___
13C12-HxCDF 478	188	94.8	0.50	42:[illegible]2	___
13C12-HxCDD 478	204	103	1.23	43:[illegible]	___
13C12-HpCDF 789	130	65.6	0.42	48:59	___

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	155	78.1	0.50	44:19	___
13C12-HxCDF 234	174	87.5	0.49	43:09	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	96.1	48.4	0.75	32:20	___
13C12-2378-TCDD	123	61.9	0.79	33:08	___
13C12-PeCDF 123	165	83.3	1.48	37:06	___
13C12-PeCDD 123	184	92.6	1.49	38:34	___
13C12-HxCDF 678	174	87.4	0.50	42:22	___
13C12-HxCDD 678	175	88.0	1.20	43:30	___
13C12-HpCDF 678	169	85.0	0.42	46:49	___
13C12-HpCDD 678	171	86.2	0.99	48:20	___
13C12-OCDD	364	91.7	0.89	53:36	___

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	32:56	___
13C12-HxCDD 789	1.20	43:57	___

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915571 CLIENT.....: RADIAN TLI SAMPLE ID.: 52-78-64
CONCAL.....: S915566 SAMPLE ID....: MO-475-DAY 2
ANALYST.....: NB ANALYSIS DATE: 12/11/91 PROJECT NUMBER: 19629B
SAMPLE SIZE..: 10.038 g SAMPLE MATRIX: ASH DATE RECEIVED.: 11/27/91
ICAL DATE....: 08/07/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE...: SPX2372K CLIENT PROJECT: MORRISTO
GC COLUMN....: DB-5

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.5				0.79	33:12	—
12378-PeCDD	6.7				1.65	38:37	—
123478-HxCDD	11.3				1.39	43:25	—
123678-HxCDD	13.0				1.08	43:33	—
123789-HxCDD	27.8				1.18	44:00	PR
1234678-HpCDD	219				1.10	48:23	B
OCDD	1070				0.81	53:38	B
2378-TCDF	91.3				0.73	32:24	—
12378-PeCDF	47.3				1.49	37:10	—
23478-PeCDF	104				1.63	38:08	—
123478-HxCDF	522				1.14	42:13	PR
123678-HxCDF	208				1.12	42:25	—
234678-HxCDF	463				1.11	43:12	B,PR
123789-HxCDF	16.7				1.19	44:22	—
1234678-HpCDF	1770				0.93	46:52	—
1234789-HpCDF	373				0.90	49:02	—
OCDF	3910				0.85	53:53	—
TOTAL TCDD	12.8	9		15.9	0.78		—
TOTAL PeCDD	58.5	10		60.9	1.55		—
TOTAL HxCDD	192	7			1.22		—
TOTAL HpCDD	466	2			1.07		—
TOTAL TCDF	424	15			0.74		—
TOTAL PeCDF	1170	15			1.58		—
TOTAL HxCDF	2590	12		2590	1.12		—
TOTAL HpCDF	4120	4			0.92		—

Reviewed By: SL 12/28/91 X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915571
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.038 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-475-DAY 2
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-64
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	14.1	71.0		33:12	—
13C12-PeCDF 234	153	76.7	1.50	38:07	—
13C12-HxCDF 478	194	97.5	0.48	42:14	—
13C12-HxCDD 478	211	106	1.21	43:24	—
13C12-HpCDF 789	114	57.4	0.41	49:01	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	160	80.4	0.49	44:20	—
13C12-HxCDF 234	178	89.4	0.48	43:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	111	55.9	0.76	32:22	—
13C12-2378-TCDD	159	79.9	0.78	33:10	—
13C12-PeCDF 123	128	64.5	1.48	37:09	—
13C12-PeCDD 123	147	73.9	1.53	38:36	—
13C12-HxCDF 678	156	78.3	0.49	42:24	—
13C12-HxCDD 678	176	88.4	1.18	43:31	—
13C12-HpCDF 678	123	61.9	0.44	46:51	—
13C12-HpCDD 678	138	69.3	1.02	48:22	—
13C12-OCDD	275	69.1	0.87	53:38	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.78	32:58	—
13C12-HxCDD 789	1.20	44:00	—

Reviewed By: SA 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b)

12/28/91

FILE NAME....: S915573
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.232 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MC-480-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-66
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	3.2				0.77	33:12	—
12378-PeCDD	13.8				1.61	38:37	—
123478-HxCDD	21.6				1.21	43:2	—
123678-HxCDD	13.2				1.20	43:3	—
123789-HxCDD	4.6				1.18	44:00	PR
1234678-HpCDD	395				1.07	48:23	B
OCDD	1220				0.83	53:39	B
2378-TCDF	221				0.73	32:24	—
12378-PeCDF	85.9				1.59	37:10	—
23478-PeCDF	192				1.61	38:08	—
123478-HxCDF	845				1.10	42:13	PR
123678-HxCDF	282				1.09	42:25	—
234678-HxCDF	793				1.10	43:13	B,PR
123789-HxCDF	29.5				1.15	44:22	—
1234678-HpCDF	2170				0.93	46:52	—
1234789-HpCDF	669				0.93	49:02	—
OCDF	6050				0.87	53:53	—
TOTAL TCDD	41.2	12		42.0	0.76		—
TOTAL PeCDD	115	8		138	1.63		—
TOTAL HxCDD	370	7			1.22		—
TOTAL HpCDD	795	2			1.03		—
TOTAL TCDF	948	15			0.73		—
TOTAL PeCDF	2060	17		2060	1.58		—
TOTAL HxCDF	3870	14		3870	1.12		—
TOTAL HpCDF	5780	4			0.93		—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME....: S915573
CONCAL.....: S915566
ANALYST.....: NB
SAMPLE SIZE..: 10.232 g
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372K
GC COLUMN....: DB-5

CLIENT.....: RADIAN
SAMPLE ID....: MO-480-DAY 3
ANALYSIS DATE: 12/11/91
SAMPLE MATRIX: ASH
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 52-78-66
PROJECT NUMBER: 19629B
DATE RECEIVED.: 11/27/91
DATE COLLECTED: / /
CLIENT PROJECT: MORRISTO

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	12.7	64.7		33:12	—
13C12-PeCDF 234	146	74.5	1.49	38:07	—
13C12-HxCDF 478	179	91.7	0.5[illegible]	42:15	—
13C12-HxCDD 478	193	98.8	1.24	43:24	—
13C12-HpCDF 789	116	59.4	0.44	49:01	—

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	150	76.7	0.49	44:20	—
13C12-HxCDF 234	162	83.0	0.50	43:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	115	58.7	0.74	32:22	—
13C12-2378-TCDD	148	75.8	0.78	33:10	—
13C12-PeCDF 123	148	75.7	1.50	37:09	—
13C12-PeCDD 123	138	70.4	1.54	38:36	—
13C12-HxCDF 678	163	83.3	0.49	42:24	—
13C12-HxCDD 678	164	83.7	1.15	43:31	—
13C12-HpCDF 678	128	65.7	0.41	46:51	—
13C12-HpCDD 678	138	70.6	1.01	48:22	—
13C12-OCDD	295	75.5	0.86	53:38	—

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.79	32:58	—
13C12-HxCDD 789	1.22	44:00	—

Reviewed By: SL 12/28/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378> ANALYSIS DATA

12/20/91

FILE NAME..... S915487
CONCAL.....: S915481
ANALYST.....: SA
SAMPLE SIZE..: 500.00 mL
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX2372S
GC COLUMN....: DB-5

CLIENT..... RADIAN
SAMPLE ID.... TLI WATER BLANK
ANALYSIS DATE: 12/05/91
SAMPLE MATRIX: WATER
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 196290
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				—
12378-PeCDD	ND		0.008				—
23478-HxCDD	ND		0.008				—
123678-HxCDD	ND		0.005				—
123789-HxCDD	ND		0.005				—
1234678-HpCDD	0.13				1.05	48:37	—
OCDD	0.64				0.85	53:56	—
2378-TCDF	EMPC			0.003			—
12378-PeCDF	ND		0.005				—
23478-PeCDF	ND		0.003				—
123478-HxCDF	ND		0.005				—
123678-HxCDF	ND		0.003				—
234678-HxCDF	EMPC			0.006			—
123789-HxCDF	ND		0.005				—
1234678-HpCDF	ND		0.003				—
1234789-HpCDF	ND		0.005				—
OCDF	ND		0.008				—
TOTAL TCDD	ND		0.005				—
TOTAL PeCDD	ND		0.008				—
TOTAL HxCDD	0.03	2		0.03	1.36		—
TOTAL HpCDD	0.21	2			1.04		—
TOTAL TCDF	EMPC			0.01			—
TOTAL PeCDF	ND		0.003				—
TOTAL HxCDF	EMPC			0.008			—
TOTAL HpCDF	EMPC			0.006			—

Reviewed By: AK 12/20/91

X237_RPT 4.00, LARS 4.10.00

TRIANGLE LABORATORIES, INC.
PCDD/PCDF 2378X ANALYSIS (a)

12/28/91

FILE NAME....: S915561
CONCAL.....: S915553
ANALYST.....: SA
SAMPLE SIZE..: 1.00
ICAL DATE....: 08/07/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.....: PADIAN
SAMPLE ID....: TLI M23 BLANK
ANALYSIS DATE: 12/10/91
SAMPLE MATRIX: M23
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: n/a
PROJECT NUMBER: 19629A
DATE RECEIVED.: / /
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.008				
12378-PeCDD	ND		0.005				
123478-HxCDD	ND		0.005				
123678-HxCDD	ND		0.003				
123789-HxCDD	ND		0.005				
1234678-HpCDD	0.03				1.11	48:21	
OCDD	0.14				0.82	53:36	
2378-TCDF	ND		0.005				
12378-PeCDF	ND		0.005				
23478-PeCDF	ND		0.003				
123478-HxCDF	ND		0.005				
123678-HxCDF	ND		0.003				
234678-HxCDF	0.006				1.27	43:10	
123789-HxCDF	ND		0.005				
1234678-HpCDF	0.004				0.92	46:49	
1234789-HpCDF	ND		0.005				
OCDF	0.009				0.91	53:48	
TOTAL TCDD	ND		0.008				
TOTAL PeCDD	ND		0.005				
TOTAL HxCDD	EMPC			0.01			
TOTAL HpCDD	0.05	2			1.10		
TOTAL TCDF	EMPC			0.008			
TOTAL PeCDF	ND		0.003				
TOTAL HxCDF	0.006	1			1.27		
TOTAL HpCDF	0.009	2			1.00		

Reviewed By: TV 12/28/91

X237_RPT 4.00, LARS 4.10.00

Table 2.

MORRISTOWN - Toxic Metals Trains - Back 1/2

Amount in the back half metals train in total ug.

SAM Number	Sample Description	Ag ICAP	Al ICAP	Ba ICAP	Be ICAP	Cd ICAP	Cr ICAP	Cu ICAP	Ni ICAP	Sb ICAP	Tl ICAP	As AAS GF	Pb AAS GF	Hg AAS-CV	Final Sample Volume (L	Initial Voume (L)	Initial Volume 0.050L
P1-11-010-01b	MO - 88	5.49	36.5	1.64	< 0.111	* 0.591	3.97	24.7	1.77	* 2.87	< 11.1	< 0.446	* 1.14	11.2	0.100	0.4880	0.4380
P1-11-010-02b	MO - 95	10.6	16.3	0.806	< 0.112	< 0.224	* 1.14	14.7	* 1.00	< 1.68	< 11.2	< 0.448	< 0.336	< 1.84	0.100	0.4692	0.4192
P1-11-010-03b	MO - 04	7.21	42.6	1.57	< 0.106	* 0.743	3.28	26.5	2.25	96.4	< 10.6	< 0.425	* 1.08	4403	0.100	0.8567	0.8067
P1-11-010-04b	MO - 11	* 2.12	34.0	2.98	* 0.511	1.67	4.02	23.2	3.41	11.9	< 10.9	< 0.435	* 0.752	2071	0.100	0.6164	0.5664
P1-11-010-05b	MO - 18	5.33	31.9	1.90	< 0.107	* 0.363	* 1.56	33.6	* 1.45	56.3	< 10.7	< 0.427	* 0.474	1287	0.100	0.7800	0.7300
P1-11-010-06b	MO - 25	< 0.636	26.3	1.55	< 0.106	* 0.212	* 2.50	23.5	2.40	< 1.59	< 10.6	< 0.424	< 0.318	1230	0.100	0.8811	0.8311
P1-11-010-07b	MO - 32	< 0.637	42.3	2.12	< 0.106	* 0.530	* 2.99	12.8	2.45	41.4	< 10.6	< 0.424	* 0.558	10614	0.100	0.8714	0.8214
P1-11-010-08b	MO - 39	* 2.38	26.8	1.95	< 0.106	* 0.487	* 1.02	19.8	* 1.00	< 1.59	< 10.6	< 0.424	* 0.557	8160	0.100	0.9007	0.8507
P1-11-010-09b	MO - 46	4.56	230	3.35	< 0.106	11.1	* 3.03	74.7	2.25	62.6	< 10.6	< 0.422	26.5	6778	0.100	0.9467	0.8967
P1-11-010-10b	MO - 53	* 0.924	23.7	1.07	< 0.106	* 0.340	* 0.892	11.0	* 1.09	< 1.59	< 10.6	< 0.425	* 0.384	858	0.100	0.8627	0.8127
P1-11-010-11b	MO - 60	* 1.18	53.7	3.54	< 0.106	* 0.423	8.26	21.0	6.54	71.5	< 10.6	< 0.423	* 1.08	6403	0.100	0.9019	0.8519
P1-11-010-12b	MO - 67	< 0.638	32.2	1.91	< 0.106	* 0.447	3.95	31.5	2.95	< 1.60	< 10.6	< 0.425	* 0.735	195	0.100	0.8384	0.7884
P1-11-010-13b	MO - 74	* 0.634	43.6	1.88	< 0.106	0.338	* 2.55	18.9	3.61	100	* 12.3	< 0.423	* 0.904	9087	0.100	0.9310	0.8810
P1-11-010-14b	MO - 81	< 0.638	23.4	2.30	< 0.106	* 0.276	5.46	21.6	3.33	< 1.60	< 10.6	< 0.425	* 0.385	634	0.100	0.8390	0.7890
P1-11-010-16b-M	Method Spike	12.1%	102%	90.9%	96.0%	99.0%	98.5%	94.6%	98.3%	92.6%	94.8%	93.4%	94.4%	91.0%			
P1-11-010-17b-M	Method Spike-Dup	19.2%	100%	90.7%	95.6%	99.3%	98.7%	94.3%	98.3%	89.2%	99.1%	96.4%	96.0%	91.0%			
P1-11-010-18b-B	Method Blank	* 2.29	< 3.73	< 0.107	< 0.107	< 0.213	< 0.640	< 0.427	< 0.320	< 1.60	< 10.7	< 0.427	< 0.320	< 3.13	0.100	0.7988	0.7488
P1-11-010-	LCS	102%	102%	98.3%	96.4%	104%	104%	98.1%	103%	110%	98.5%	98.9%	101%	96.0%			

* less than 5 times the detection limit.

CALCULATIONS:

Sample Results (ug/L) X Final Volume (L) X Initial Volume (L) / Digested Volume = Sample Results in Total ug.

Table 2.
Morristown Front 1/2 Metals
Amount in the front half metals train in total ug.

SAM Number	Sample Description	Ag ICAP	Al ICAP	Ba ICAP	Be ICAP	Cd ICAP	Cr ICAP	Cu ICAP	Ni ICAP	Sb ICAP	Tl ICAP	As AAS-GF	Pb AAS-GF	Hg AAS-CV	Final Sample
P1-11-010-01a	MO-85,86,87	* 4.48	3900	323	* 0.275	14.1	11.7	131	12.0	24.3	< 25.0	* 4.85	87.8	< 2.45	0.250
P1-11-010-02a	MO-92,93,94	* 5.83	166	5.35	< 0.250	* 0.725	* 2.63	15.4	* 1.85	* 12.6	< 25.0	< 1.00	< 0.750	< 2.45	0.250
P1-11-010-03a	MO-01,02,03	< 3.00	25500	5950	2.65	1040	260	10800	157	1165	< 50.0	21.9	8000	213	0.500
P1-11-010-04a	MO-08,09,10	* 4.05	193	8.58	< 0.250	* 1.90	* 3.25	23.8	2.58	* 13.5	< 25.0	< 1.00	6.85	< 2.45	0.250
P1-11-010-05a	MO-15,16,17	* 4.10	47850	5550	4.00	775	234	13700	263	1230	< 50.0	25.8	7500	55.5	0.500
P1-11-010-06a	MO-22,23,24	* 4.35	166	5.60	< 0.250	* 1.33	* 2.95	4.65	7.13	* 10.8	< 25.0	< 1.00	2.04	< 2.45	0.250
P1-11-010-07a	MO-29,30,31	28.4	72000	8850	3.20	1275	357	12900	225	885	< 50.0	32.7	7900	867	0.500
P1-11-010-08a	MO-36,37,38	* 4.73	336	27.5	< 0.250	4.35	* 5.53	25.5	1.65	* 11.0	< 25.0	< 1.00	22.5	< 2.45	0.250
P1-11-010-09a	MO-43,44,45	< 6.00	65450	10100	* 4.90	1520	496	22000	506	2760	< 100	48.9	12400	148	1.000
P1-11-010-10a	MO-50,51,52	* 5.45	154	6.95	< 0.250	* 1.38	2.20	8.20	< 0.750	* 10.6	< 25.0	< 1.00	5.10	< 2.45	0.250
P1-11-010-11a	MO-57,58,59	< 3.00	30150	6100	4.80	1165	399	18950	288	1325	< 50.0	* 9.70	13700	78.5	0.500
P1-11-010-12a	MO-64,65,66	* 4.75	167	8.15	< 0.250	1.43	* 1.85	6.68	< 0.750	* 9.90	< 25.0	< 1.00	5.30	< 2.45	0.250
P1-11-010-13a	MO-71,72,73	< 3.00	44350	6100	4.25	1565	398	18700	313	2500	< 50.0	19.7	12100	30.0	0.500
P1-11-010-14a	MO-778,79,80	* 5.78	142	5.35	< 0.250	* 1.13	* 1.60	* 4.85	< 0.750	* 8.78	< 25.0	< 1.00	* 3.28	< 2.45	0.250
P1-11-010-18A-B	Method Blank	* 3.98	< 8.75	* 0.350	< 0.250	< 0.500	< 1.50	< 1.00	* 1.45	< 3.75	< 25.0	< 1.00	< 0.750	< 2.45	0.250
P1-10-003-16A-M	Method Spike	36.4%	99.5%	86.7%	98.0%	112%	105%	91.5%	106%	98.8%	94.6%	105%	101%	103%	
P1-10-003-17A-M	Method Spike-dup	64.1%	114%	87.0%	100%	113%	107%	91.8%	110%	99.7%	94.1%	87.4%	94.8%	99.6%	
P1-10-003-25a-L	LCS	96.6%	90.5%	97.2%	91.6%	107%	101%	90.3%	102%	108%	90.6%	97.0%	103%	101%	

* less than 5 times the detection limit.

CALCULATIONS:

Sample Result (ug/L) X Final Volume (L) = Total ug

Reviewed by
[illegible]
1/8/92

MORRISTOWN - Ash

Samples are in ug/g.

SAM Number	Sample Description	Ag ICAP	AL** ICAP	Ba** ICAP	Be** ICAP	Cd ICAP	Cr** ICAP	Cu ICAP	Ni ICAP	Sb** ICAP	Tl** ICAP	As** ICAP	Pb ICAP	Hg AAS-CV	Final Volume(L)
P1-11-015-01c	MO - 441	< 1.20	185000	3140	* 0.440	21.8	49.2	8900	66.8	< 3.00	< 20.0	65.4	208	< 1.96	0.100
P1-11-015-02c	MO - 446	< 1.20	193800	4340	* 0.440	10.6	51.2	32200	148	< 3.00	< 20.0	84.8	296	< 1.96	0.100
P1-11-015-03c	MO - 451	< 1.20	192400	3760	* 0.420	11.4	53.6	54800	160	< 3.00	< 20.0	194	404	< 1.96	0.100
P1-11-015-04c	MO - 456	< 1.20	152400	6320	< 0.200	20.8	36.8	14260	71.6	< 3.00	< 20.0	54.8	476	< 1.96	0.100
P1-11-015-05c	MO - 461	< 1.20	79600	10040	* 0.480	8.52	57.2	17360	74.4	< 3.00	< 20.0	80.4	592	< 1.96	0.100
P1-11-015-06c	MO - 466	< 1.20	82200	6680	* 0.440	11.7	72.2	51000	476	< 3.00	< 20.0	90.8	430	< 1.96	0.100
P1-11-015-07c	MO - 471	< 1.20	15180	1508	< 0.200	108	20.8	1100	22.2	* 11.4	< 20.0	2.44	292	34.8	0.100
P1-11-015-08c	MO - 476	< 1.20	18440	1254	* 0.300	75.6	16.8	1232	27.4	* 4.34	< 20.0	2.22	162	10.1	0.100
P1-11-015-09c	MO - 481	< 1.20	11540	1100	* 0.220	84.4	15.1	802	19.5	* 3.56	< 20.0	2.06	99	40.8	0.100
P1-11-015-10c	MO - 486	< 1.20	12760	1106	* 0.220	98.0	17.8	1380	19.8	23.4	< 20.0	2.66	224	208	0.100
P1-11-015-11c	MO - 491	< 1.20	12840	1236	* 0.220	53.2	15.3	884	16.5	* 5.54	< 20.0	1.91	156	288	0.100
P1-11-015-12c	MO - 496	< 1.20	12600	1196	* 0.320	80.6	17.6	1010	18.8	19.3	< 20.0	2.96	159	444	0.100
P1-11-015-13c	MO - 501	< 1.20	43800	2400	* 0.400	37.8	20.2	1022	36.0	< 3.00	< 20.0	7.00	312	10.1	0.100
P1-11-015-14c	MO - 506	< 1.20	45600	2260	* 0.420	32.8	26.0	1082	40.2	< 3.00	< 20.0	7.36	306	10.6	0.100
P1-11-015-15c	MO - 511	< 1.20	18440	1576	* 0.300	46.2	18.8	700	26.2	< 3.00	< 20.0	2.80	102	16.7	0.100
P1-11-015-16c	MO - 516	< 1.20	53200	1940	* 0.360	26.8	23.2	1016	33.0	< 3.00	< 20.0	3.56	248	42.0	0.100
P1-11-015-17c	MO - 521	< 1.20	44000	2120	* 0.360	22.6	20.6	976	35.8	< 3.00	< 20.0	6.10	274	28.0	0.100
P1-11-015-18c	MO - 526	< 1.20	44400	3080	* 0.380	27.6	26.0	1296	46.2	< 3.00	< 20.0	4.00	234	24.0	0.100
P1-11-016-19c-S	Method Spike	0.825%	-155%	67.5%	82.0%	93.4%	80.4%	90.4%	92.2%	83.7%	38.7%	87.8%	84.6%	95.0%	
P1-11-016-20c-S	Method Spike dup	0.415%	70.0%	88.5%	83.5%	92.8%	80.4%	90.4%	92.0%	86.7%	40.5%	93.8%	90.4%	97.2%	
P1-11-016-21c-B	Method Blank	< 1.20	* 8.90	* 0.480	< 0.200	< 0.400	< 1.20	< 0.800	< 0.600	< 3.00	< 20.0	< 0.800	< 0.600	< 1.96	0.100
P1-11-016-	LCS	108%	101%	97.6%	95.4%	104%	102%	98.4%	103%	108%	98.2%	97.0%	105%	101%	

* less than five times the detection limit.

**Samples prepped using H2O2.

Note: Sample prepped with H2O2; P1-11-016-07c was spiked for Ag, Al, Ba, Be, Sb, and Tl.

Reviewed by [illegible]
1/5/12

Note: Samples prepped with HF; P1-11-016-18c was spiked for As, Cr, Cu, Ni, and Pb.
P1-11-016-01c was spiked for Cd.

MORRISTOWN - Lime Slurry and Make-Up Water

Lime slurry samples are in ug/g; Make-up Water samples are in total ug.

SAM Number	Sample Description	Ag ICAP	Al ICAP	Ba ICAP	Be ICAP	Ca ICAP	Cd ICAP	Cr ICAP	Cu ICAP	Ni ICAP	Sb ICAP	Tl ICAP	As ICAP	Pb ICAP	Hg AAS-CV	Final Volume(L)	Initial Weight(g)/Vol(L)	Digested Volume	% Solid
P1-11-016-01b	MO - 529	* 0.850	146	0.960	< 0.100	28300	< 0.200	< 0.600	2.40	* 0.340	< 1.50	< 10.0	< 0.400	< 0.300	< 0.392	0.100	1.00 g		
P1-11-016-02b	MO - 531	* 1.11	214	1.40	< 0.100	45100	< 0.200	< 0.600	2.11	* 0.450	< 1.50	< 10.0	< 0.400	< 0.300	< 0.392	0.100	1.00 g		
P1-11-016-03b	MO - 533	* 0.840	80.9	1.03	< 0.100	16600	< 0.200	< 0.600	< 0.400	< 0.300	< 1.50	< 10.0	< 0.400	< 0.300	< 0.392	0.100	1.00 g		
P1-11-016-04b	MO - 535	< 0.600	42.9	0.860	< 0.100	8780	< 0.200	< 0.600	< 0.400	* 0.310	< 1.50	< 10.0	< 0.400	< 0.300	< 1.960	0.100	1.00 g		
P1-11-016-05b	MO - 537	< 0.600	29.6	0.910	< 0.100	5720	< 0.200	< 0.600	< 0.400	< 0.300	< 1.50	< 10.0	< 0.400	< 0.300	< 1.960	0.100	1.00 g		
P1-11-016-06b	MO - 539	< 0.600	113	1.10	< 0.100	20300	< 0.200	< 0.600	< 0.400	* 0.320	< 1.50	< 10.0	< 0.400	< 0.300	< 1.960	0.100	1.00 g		
P1-11-016-07b	MO - 542	21.5	17.7	34.6	< 0.111		< 0.221	* 1.56	33.7	* 0.985	* 1.94	< 11.1	* 1.43	< 0.332	< 0.204	0.100	1.00 g		
P1-11-016-08b	MO - 546	* 0.928	4.41	33.4	< 0.110		< 0.221	< 0.663	25.3	< 0.331	< 1.66	< 11.0	* 1.18	< 0.331	< 0.207	0.100	0.5200 L	0.4700	1.00%
P1-11-016-09b	MO - 550	< 0.661	4.87	38.0	< 0.110		< 0.220	< 0.661	48.6	< 0.331	< 1.65	< 11.0	* 1.28	< 0.331	< 0.211	0.100	0.5268 L	0.4768	1.00%
P1-11-016-10b	MO - 554	< 0.661	5.98	38.5	< 0.110		< 0.220	< 0.661	72.1	< 0.330	< 1.65	< 11.0	* 1.99	< 0.330	< 0.214	0.100	0.5380 L	0.4880	1.01%
P1-11-016-11b	MO - 558	< 0.664	4.03	33.3	< 0.111		< 0.221	* 0.731	145	* 0.509	< 1.66	< 11.1	* 1.18	< 0.332	< 0.203	0.100	0.5450 L	0.4950	1.00%
P1-11-016-12b	MO - 562	< 0.662	4.07	38.7	< 0.110		< 0.221	* 0.717	89.9	* 0.408	< 1.65	< 11.0	* 1.14	< 0.331	< 0.211	0.100	0.5169 L	0.4669	1.00%
																	0.5376 L	0.4876	1.00%
P1-11-016-13a-S	Matrix Spike - 01b	47.0%	94.5%	90.4%	93.0%	-900%	93.8%	95.2%	90.3%	93.8%	99.0%	95.3%	95.2%	108%	109%				
P1-11-016-14a-S	Matrix Spike dup - 01b	68.8%	100%	87.8%	91.8%	350%	90.4%	91.3%	91.9%	92.8%	98.0%	94.3%	97.0%	104%	104%				
P1-11-016-16a-S	Method Spike	30.4%	98.8%	90.7%	94.4%		98.8%	97.9%	94.0%	97.0%	86.2%	99.4%	93.6%	101%	96.6%				
P1-11-016-17a-S	Method Spike dup	16.0%	99.4%	90.3%	94.6%		97.8%	97.2%	98.5%	97.4%	87.5%	101%	102%	102%	92.6%				
P1-11-016-15a-B	Method Blank	< 0.600	< 4.45	< 0.240	< 0.100		< 0.200	< 0.600	0.400	< 0.300	< 1.50	< 10.0	< 0.400	< 0.300	< 1.96	0.100	1.00 g		
P1-11-016-18a-B	Method Blank	< 1.25	< 12.1	< 0.499	< 0.208		< 0.416	< 1.25	< 0.83	< 0.624	< 1.50	< 10.0	< 0.832	< 0.624	< 0.392	0.100	1.00 L	0.4807	
P1-11-016-19a-L	LCS	100%	101%	96.8%	93.0%		100%	100%	98.9%	107%	105%	99.1%			96.4%				
P1-11-016-20a-L	LCS	100%	101%	97.1%	95.0%		102%	103%	97.8%	101%	109%	97.7%	98.9%	98.8%	97.4%				

* less than five times the detection limit.

** Calcium ran for lime slurry only.

Reviewed by [illegible]
1/8/12

CALCULATIONS: Lime Slurry: (P1-11-016-01b 06b)

[Sample result(ug/L) X Final Volume (L) / Sample Weight (g)] - Sample result in total ug/g.

Run # _____

Date 12/3/91

Client _____

Plant Morristown

Technician T Wood

Sample type Filter Metals

Sheet 1 of 2

Run #	Sample ID#	Sample Vol. (ml)	Blank Corr. (ml)	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
F3 IN	mo 55			0.6387	0.6405		
			✓	0.6387	0.6404		
	99114						
				0.6387	0.6404	~~[illegible]~~	[illegible]
F3 OUT	mo 72			0.6475	0.6476		
			✓	0.6475	0.6477		
	99129						
				0.6475	0.6476	0.0001	
1 IN	mo 01			0.6585	1.9839		
				0.6590	1.9842		
	Tm 1121					2	
				0.6588	1.9840	1.3252	
1 OUT	mo 08			0.6556	0.6561		
				0.6556	0.6560		
	Tm 1104						
				0.6556	0.6560	0.0004	
2 IN	mo 15	0.6339	0.6590	0.6339	1.9235		
		0.6342	0.6512	0.6342	1.9235		
						5	
	Tm 022	0.6340	0.6571	0.6340	1.9235	1.2895	
2 OUT	mo 22			0.6558	0.6575		
			✓	0.6559	0.6577		
	Tm 024						
				0.6558	0.6576	0.0018	
3 IN	mo 29			~~0.65~~	2.2030		
				0.5568	~~2.2034~~		
			✓	0.5563	2.2031		
	Tm 021			0.5566	2.2032	1.6466	
3 OUT	mo 36			0.5735	0.5980		
				0.5736	0.5982		
			✓				
	Tm 031			0.5736	0.5981	0.0245	

1181672R

Method 5 Analysis Data Sheet

Run # _____

Client _____

Date 12/3/91

Plant Morristown

Technician [illegible]

Sample type [illegible]

Sheet 2 of 2

Run #	Sample ID#	Sample Vol. (ml)	Blank Corr. (ml)	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
4 IN	MO43		✓	0.6495	2.8408		
				0.6470	2.8407		
	TM023						
				0.6492	2.8408	2.1915	
4 OUT	MO52		✓	0.6385	0.6405		
				0.6381	0.6400		
	TM028						
				0.6385	0.6406	0.0021	
5 IN	MO57		✓	0.6582	2.4357		
				0.6578	2.4356		
	TM 03						
				0.6580	2.4356	1.8556	
5 OUT	MO64		✓	0.6403	0.6430		
				0.6405	0.6433		
	TM 027						
				0.6404	0.6432	0.0028	
6 IN	MO 71		✓	0.6437	2.3502		
				0.6437	2.3505		
	TM 026						
				0.6438	2.3504	1.7066	
6 OUT	MO 78		✓	0.6385	0.6405		
				0.6386	0.6400		
	TM 030						
				0.6387	0.6402	0.0016	

1181672R

Method 5 Analysis Data Sheet

Client _____

Plant Morristown

Sample type ACETONE / METALS

Run # P1-11-010

Date 12/2/91

Technician T WOOD

Sheet 1 of 2

Run #	Sample ID#	Sample Vol. (ml)	Blank Corr. (ml)	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
FB	MO 80	175 mL		113.5628	113.5760		
	C1A			113.5628	113.5762		
	Beaker						
INLET	MO 250			113.5628	113.5761	0.0133	
FB	MO 93	160 mL		112.1844	112.1857		
	02A			112.1844	112.1856		
OUT	T11			112.1846	112.1856	0.0010	
1	MO 02	325 mL		111.9348	111.9357		
	C3A			111.9348	111.9355		
IN	MO 100			111.9348	111.9356	0.0008	
1	MO 09	250 mL		104.8747	104.8775		
	04A			104.8747	104.8777		
OUT	LL17			104.8747	104.8776	0.0029	
2	MO 23	410 mL		101.6577	108.9072		
	05A			101.6576	108.9075		
IN	MO 400			101.6576	108.9074	7.2498	
2	MO 16	125 mL		112.5573	112.5599		
	06A			112.5568	112.5597		
OUT	PO 98			112.5570	112.5598	0.0028	
3	MO 30	350 mL		101.5458	101.3045		
	07A			101.5460	101.3048		
IN	MO 150			101.5459	101.3046	0.7587	
3	MO 37	275 mL		104.3826	104.3815		
	C8A			104.3828	104.3814		
OUT	RZ5			104.3828	104.3814	0.0186	

1181672R

Method 5 Analysis Data Sheet

Run # P1-11-010

Client

Date 12/2/91

Plant Morristown

Technician TWOOD

Sample type ACETONE (Metals)

Sheet 2 of 2

Run #	Sample ID#	Sample Vol. (ml)	Blank Corr. (ml)	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
4 IN	MO44 09A	375mL		[illegible]	[illegible]		
				[illegible]	[illegible]		
	Tm 200			[illegible]	[illegible]	[illegible]	
4 OUT	MO51 10A	260mL		[illegible]	113.6966		
				[illegible]	113.6970		
	M10			[illegible]	113.6964	[illegible]	
5 IN	MO58 11A	325mL		[illegible]	114.7393		
				[illegible]	114.7389		
	PO90			[illegible]	114.7391	[illegible]	
5 OUT	MO65 12A	250mL		[illegible]	107.8690		
				[illegible]	[illegible]		
	MO200			[illegible]	[illegible]	[illegible]	
6 IN	MO72 13A	375		[illegible]	92.8653		
				[illegible]	92.8656		
	MO552			[illegible]	92.8654	[illegible]	
6 OUT	MO79 14A	250mL		[illegible]	104.1286		
				[illegible]	104.1288		
	MO300			[illegible]	104.1287	[illegible]	
LPB	MO100 15A	125mL		[illegible]	[illegible]		
				[illegible]	[illegible]		
	Tm 300			[illegible]	[illegible]	[illegible]	

1181672R

Method 5 Analysis Data Sheet

Morristown

8 **RADIAN** CORPORATION Project No. Book No. 25279 TITLE ACETONE (metals) FINAL WT.

Mettler DAL

From Page No.

ID #	RUN #	Vol	Beaker #	12/4/91	12/5/91	12/6/91
~~FB IN~~						
mo 86 04A	FB IN	175 mL	mo 250	113.5760	113.5710	113.5762 ✓
mo 93 02A	FB OUT	160 mL	T11	112.1857	112.1865	112.1856 ✓
mo D2 03A	1 IN	325 mL	mo 100	111.9456	~~111.938~~ 111.9357	111.9355 ✓
mo 09 04A	1 OUT	250 mL	LL17	104.8775	104.8801	104.8777 ✓
mo 23 05A	2 IN	410 mL	mo 400	108.9225	~~108.907~~ 108.9072	108.9075 ✓
mo 16 06A	2 OUT	425 mL	P098	112.5599	112.5597 ✓	
mo 30 07A	3 IN	350 mL	mo 150	101.3040	101.3045	101.3048 ✓
mo 37 08A	3 OUT	275 mL	RZ 5	104.3815	104.3814 ✓	
mo 44 09A	4 IN	375 mL	mo 200	111.6984	111.6853	111.69882 ✓
mo 51 10A	4 OUT	260 mL	m10	113.6960	113.6968	113.6970 ✓
mo 58 11A	5 IN	325 mL	P090	114.7513	114.7393	114.7389 ✓
mo 65 12A	5 OUT	250 mL	mo 200	107.8680	107.8690	107.8691 ✓
mo 72 13A	6 IN	375 mL	mo 550	92.8750	92.8653	92.8656 ✓
mo 79 14A	6 OUT	250 mL	mo 300	104.1286	104.1296	104.1288 ✓

To Pa

Witnessed & Understood by me, Date Invented by Date

Recorded by

0 **RADIAN** CORPORATION

Project No. _____
Book No. 25279 TITLE FOR morristown METALS TARE BEAKERS

rom Page No. __

	11/27/91	12/2/91	
TM200	110.1820	110.1817 ✓	
RZ3	102.1146	~~102.1097~~ 102.1115	
PO98	112.5573	112.5559	112.5568 ✓
TM300	111.0352	111.0271	
MID	113.6960	113.6964 ✓	
RZ5	104.3626	104.3629 ✓	
LL17	104.8747	104.8747 ✓	
PO90	113.4698	113.4695 ✓	
MO300	104.1260	104.1264 ✓	
MO550	91.7280	91.7284 ✓	
MO250	113.5628	113.5628 ✓	
T11	112.1847	112.1844 ✓	
MO200	107.8636	107.8633 ✓	
MO100	110.8512	110.8478	110.8478 ✓
MO150	100.5460	100.5458 ✓	
MO500	103.9812		
MO450	103.7665		
MO350	108.8829		
MO400	107.6596	107.6597 ✓	

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FILTERS

TITLE METALS FINAL MORRISTOWN

Project No.

Book No. 25279

RADIAN CORPORATION

From Page No.

RUN ID	ID	Location	Filter #	11/27/91	12/2/91	12/3/91
MT 4	50	OUT	TM028	0.6405	0.6406	
MO 4	mo43	IN	Tm023	2.8408	2.8409	
5	mo57	IN	Tm1103	2.4357	2.4356	
5	mo64	OUT	Tm027	0.6430	0.6433	
6	mo71	IN	Tm026	2.3502	2.3505	
6	mo78	OUT	Tm030	0.6405	0.6400	
1	mo01	IN	Tm1101	1.9839	1.9842	
1	mo08	OUT	Tm1104	0.6561	0.6560	
2	mo15	IN	Tm022	1.9149	1.9235	1.9235
2	mo22	OUT	Tm029	0.6575	0.6577	
3	mo29	IN	Tm021	2.2030	2.2034	
3	mo36	OUT	Tm031	0.5980	0.5982	
LPB	mo99	IN	Tm1105	0.6687	0.6688	
FB	mo85	IN	99114	0.6405	0.6404	
FB	mo92	OUT	99129	0.6476	0.6477	
RB	mo198		Tm040	0.5556	0.5555	

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Recorded by

TITLE metals filter Tare wt.

Project No.

Book No. 25279

RADIAN CORPORATION

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		11/5/91	11/6	11/7
Tm	01	0.6585	0.6590	
	02	0.6585	0.6587	
	03	0.6594	0.6582	0.6578
	04	0.6586	0.6556	0.6556
	05	0.6685	0.6685	
	06	~~0.653~~ 0.6486	0.6486	
	07	0.6646	0.6644	
	08	0.6574	0.6570	
	09	0.6600	0.6601	
	10	0.6529	0.6529	
	11	0.6634	0.6634	
	12	0.6580	0.6582	
	13	~~0.6244~~ 0.6467	0.6464	
	14	0.6508	0.6506	
	15	0.6422	~~0.6451~~ 0.6413 11/19	0.6413
	16	0.6552	0.6550	
	17	0.6323	0.6323	
	18	0.6360	0.6360	
	19	0.6468	0.6464	
Tm	20	0.6300	0.6298	
	21	0.6638	0.6639	
Fmc	22	0.6580	0.6570	0.6572
11/18	23	0.6527	0.6527	
5661	24	0.6690	0.6690	
Tm	25	0.6471	0.6461	0.6461
	~~26~~	11/18/91	11/21/91	11/21/91
	27	0.6406	0.6375	0.6375
~~Fmc~~ mother	28	0.6276	0.6274	
on	29	0.6506	0.6504	
	30	0.6534	0.6521	0.6523
	31	0.6527	0.6483	0.6502 0.6478
	32	0.6638	0.6581	~~0.6606~~ 0.6582
	33	0.6384	0.6379	
	34	0.6433	0.6425	0.6430
Tm	35	0.6505	0.6505	

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RH69 9/11/91

	9/11/91 800	9/12/91 RH 70 800	
TM 021	0.5568	0.5563	
TM 022	0.6339	0.6342	
TM 023	~~0.64~~ 0.6495	0.6490	
TM 024	0.6395	0.6395	9/13/91
TM 025	0.6528	0.6529	0.6527
TM 026	0.6439	0.6437	
TM 027	0.6403	0.6405	
TM 028	0.6385	0.6385	
TM 029	0.6558	0.6559	
TM 030	0.6388	0.6386	
~~TM 031~~			
~~TM 0~~			

	9/12/91 800	9/13/91
TM 031	0.5735	0.5736
TM 032	0.6220	0.6221
TM 033	0.6121	0.6120
TM 034	0.5780	0.5780
TM 035	0.5511	0.5510
TM 036	~~0.64~~ 0.6370	0.6370
TM 037	0.5758	0.5756
TM 038	0.5862	0.5863
TM 039	0.6300	0.6300
TM 040	0.5548	0.5547
TM 041	0.6368	0.6367
TM 042	0.6300	0.6296
TM 043	0.5812	0.5809
TM 044	0.5485	0.5486
TM 045	0.6360	0.6360

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Witnessed & Understood by me,	Date	Invented by	Date
Julie O'Hara	10/12/91	Recorded by	

8 **RADIAN** CORPORATION Project No._____ Book No. 25273 TITLE Metal filter TARe WT 991

From Page No.__

		RH 60 temp 76 9/13/91	RH64 9/14/91	RH 64 temp 77 9/15/91	RH 60 9/16/91
991	1	~~0.6611~~ 0.6572	0.6578	0.6572	0.6570 ✓
	2	0.6611	0.6612 ✓		
	3	0.6535	0.6532 ✓		
	4	0.6519	0.6520 ✓		
991	5	0.6567	0.6573 ✓	0.6568 ✓	
	6	0.6536	0.6531 ✓		
	7	0.6481	0.6480 ✓		
	8	0.6536	0.6536 ✓	~~0.653~~	
991	9	0.6519	0.6529	0.6521	0.6521 ✓
	10	0.6633	0.6634 ✓		
	11	0.6505	0.6505 ✓		
	12	0.6571	0.6572 ✓		
	13	0.6450	0.6450 ✓		
991	14	0.6387	0.6387 ✓		
	15	0.6485	0.6484 ✓		
	16	0.6519	0.6526	0.6519 ✓	0.6519 ✓
	17	~~0.6484~~ 0.6505	0.6520 ✓	0.6507 ✓	
991	18	0.6558	0.6559 ✓		
	19	0.6475	0.6476 ✓		
	20	0.6484	0.6482 ✓		
991	21	0.6511	0.6518	0.6518 ✓	
	22	0.6548	0.6540 ✓	0.6536 ✓	
	23	0.6500	0.6502 ✓		
991	24	0.6540	0.6537 ✓		
	25	0.6400	0.6400 ✓		
	26	0.6440	0.6436 ✓		
	27	0.6450	0.6446 ✓		
991	28	0.6450	0.6445 ✓		
	29	0.6475	0.6475 ✓		
991	30	0.6420	0.6420 ✓		

To Page No._____

Witnessed & Understood by me,	Date	Invented by	Date
Julie D Lopez	10/12/91	Recorded by	

RADIAN CORPORATION

CALCULATION SHEET

CALC. NO. _____

SIGNATURE _____ DATE _____ CHECKED _____ DATE _____

PROJECT _____ JOB NO. _____

SUBJECT Morristown MWI SHEET _____ OF _____ SHEETS

METALS		FILTER	PROBE RINSE	TOTAL	FILTER #	BEAKER #
FB	INLET	0.0017	0.0133	0.0150	99114	01A
FB	OUTLET	0.0001	0.0010	0.0011	99129	02A
1	INLET	1.3252	1.0878	2.4130	TM11-01	03A
1	OUTLET	0.0004	0.0029	0.0033	TM11-04	04A
2	INLET	1.2895	1.2478	2.5373	TM-022	05A
2	OUTLET	0.0018	0.0028	0.0046	TM-029	06A
3	INLET	1.6766	0.7587	2.4053	TM-021	07A
3	OUTLET	0.0245	0.0186	0.0431	TM-031	08A
4	INLET	2.1915	1.5164	3.7079	TM-023	09A
4	OUTLET	0.0021	0.0007	0.0028	TM-028	10A
5	INLET	1.8556	1.2694	3.1250	TM11-03	11A
5	OUTLET	0.0028	0.0055	0.0083	TM-027	12A
6	INLET	1.7066	1.1372	2.8438	TM-026	13A
6	OUTLET	0.0016	0.0025	0.0041	TM-030	14A

4-81-3361

MORRISTOWN - 101a Hg Trains
Samples are in total ug.

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01a	MO - 179,181	1.59	0.500	0.020
P1-11-012-02a	MO - 183,185	< 0.206	0.500	0.020
P1-11-012-03a	MO - 131,133	134	0.500	0.002
P1-11-012-04a	MO - 135,137	* 0.378	0.500	0.020
P1-11-012-05a	MO - 141,142	48.2	0.500	0.005
P1-11-012-06a	MO - 143,145	* 0.293	0.500	0.020
P1-11-012-07a	MO - 147,149	976	1.000	0.001
P1-11-012-08a	MO - 151,153	2.88	0.500	0.020
P1-11-012-09a	M) - 155,157	219	0.500	0.001
P1-11-012-10a	MO - 159,161	* 0.378	0.500	0.020
P1-11-012-11a	MO - 163,165	1645	0.500	0.001
P1-11-012-12a	MO - 167,169	< 0.206	0.500	0.020
P1-11-012-13a	MO - 171,173	132	0.500	0.001
P1-11-012-14a	MO - 175,177	* 0.206	0.500	0.020
P1-11-012-15a-S	Matrix Spike -	102%		
P1-11-012-16a-S	Matrix Spike dup -	97.9%		
P1-11-012-17a-B	Method Blank	< 0.361	0.536	0.0122
P1-11-012-	LCS	99.3%		
P1-11-012-	LCS	103%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
QDLopez
1/6/92

MORRISTOWN - 101a Hg Trains
Samples are in total ug.

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01a-1	MO - 179,181	1.16	0.250	0.020
P1-11-012-02a-1	MO - 183,185	< 0.285	0.250	0.020
P1-11-012-03a-1	MO - 131,133	13.4	0.250	0.010
P1-11-012-04a-1	MO - 135,137	* 1.12	0.250	0.020
P1-11-012-05a-1	MO - 141,142	3.08	0.250	0.020
P1-11-012-06a-1	MO - 143,145	* 0.408	0.250	0.020
P1-11-012-07a-1	MO - 147,149	57.0	0.250	0.002
P1-11-012-08a-1	MO - 151,153	1.1	0.250	0.020
P1-11-012-09a-1	M) - 155,157	11.7	0.250	0.005
P1-11-012-10a-1	MO - 159,161	* 0.188	0.250	0.020
P1-11-012-11a-1	MO - 163,165	46.7	0.250	0.005
P1-11-012-12a-1	MO - 167,169	< 0.629	0.250	0.020
P1-11-012-13a-1	MO - 171,173	11.2	0.250	0.005
P1-11-012-14a-1	MO - 175,177	* 0.320	0.250	0.020
P1-11-012-15a1-S	Matrix Spike -	97.0%		
P1-11-012-16a1-S	Matrix Spike dup -	100.0%		
P1-11-012-17a1-B	Method Blank	< 0.254	0.250	0.0148
P1-11-012-	LCS	106%		
P1-11-012-	LCS	92.5%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
Julio D Lopez
1/6/92

MORRISTOWN - 101a Hg Trains

Samples are in total ug.

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01a-2	MO - 179,181	< 0.123	0.250	0.020
P1-11-012-02a-2	MO - 183,185	< 0.123	0.250	0.020
P1-11-012-03a-2	MO - 131,133	2.03	0.250	0.020
P1-11-012-04a-2	MO - 135,137	* 0.159	0.250	0.020
P1-11-012-05a-2	MO - 141,142	0.703	0.250	0.020
P1-11-012-06a-2	MO - 143,145	< 2.41	0.250	0.001
P1-11-012-07a-2	MO - 147,149	29.2	0.250	0.005
P1-11-012-08a-2	MO - 151,153	< 0.120	0.250	0.020
P1-11-012-09a-2	M) - 155,157	2.73	0.250	0.020
P1-11-012-10a-2	MO - 159,161	< 0.120	0.250	0.020
P1-11-012-11a-2	MO - 163,165	7.30	0.250	0.010
P1-11-012-12a-2	MO - 167,169	* 0.159	0.250	0.020
P1-11-012-13a-2	MO - 171,173	1.25	0.250	0.020
P1-11-012-14a-2	MO - 175,177	< 0.120	0.250	0.020
P1-11-012-15a2-S	Matrix Spike - 05a	89.8%		
P1-11-012-16a2-S	Matrix Spike dup - 05a	94.9%		
P1-11-012-17a2-B	Method Blank	< 0.14	0.250	0.017
P1-11-012-	LCS	98.5%		
P1-11-012-	LCS	98.5%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
Julio D Lopez
1/6/92

MORRISTOWN - 101a Hg Trains

Samples are in total ug

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01b	MO - 180,182	* 0.826	0.545	0.020
P1-11-012-02b	MO - 184,186	3.98	0.480	0.020
P1-11-012-03b	MO - 132,134	2471	0.967	0.001
P1-11-012-04b	MO - 136,138	3452	0.978	0.001
P1-11-012-05b	MO - 139,140	1428	1.000	0.001
P1-11-012-06b	MO - 144,146	1635	1.036	0.001
P1-11-012-07b	MO - 148,150	8692	0.990	0.001
P1-11-012-08b	MO - 152,154	9340	1.000	0.001
P1-11-012-09b	M) - 156,158	1266	1.023	0.001
P1-11-012-10b	MO - 160,162	993	0.960	0.001
P1-11-012-11b	MO - 164,166	2980	1.000	0.001
P1-11-012-12b	MO - 168,170	326	0.850	0.001
P1-11-012-13b	MO - 172,174	6315	0.930	0.001
P1-11-012-14b	MO - 176,178	696	0.985	0.001
P1-11-012-15b-S	Matrix Spike -04b	103%		
P1-11-012-16b-S	Matrix Spike dup -04b	101%		
P1-11-012-17b-B	Method Blank	< 2.77	0.910	0.004
P1-11-012-	LCS	98.8%		
P1-11-012-	LCS	105%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
Julio D Lopez
1/6/92

MORRISTOWN - 101a Hg Trains (Radian Filter #1)

Samples are in total ug.

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01b-1	MO - 180,182	* 0.525	0.250	0.020
P1-11-012-02b-1	MO - 184,186	* 0.485	0.250	0.020
P1-11-012-03b-1	MO - 132,134	* 0.724	0.250	0.020
P1-11-012-04b-1	MO - 136,138	1.88	0.250	0.020
P1-11-012-05b-1	MO - 139,140	* 0.365	0.250	0.020
P1-11-012-06b-1	MO - 144,146	2.04	0.250	0.020
P1-11-012-07b-1	MO - 148,150	2.68	0.250	0.020
P1-11-012-08b-1	MO - 152,154	2.36	0.250	0.020
P1-11-012-09b-1	M) - 156,158	< 0.245	0.250	0.020
P1-11-012-10b-1	MO - 160,162	4.51	0.250	0.020
P1-11-012-11b-1	MO - 164,166	* 0.684	0.250	0.020
P1-11-012-12b-1	MO - 168,170	< 0.245	0.250	0.020
P1-11-012-13b-1	MO - 172,174	* 0.525	0.250	0.020
P1-11-012-14b-1	MO - 176,178	* 0.525	0.250	0.020
P1-11-012-15b1-S	Matrix Spike -10b-1	92.7%		
P1-11-012-16b1-S	Matrix Spike dup -10b-1	94.7%		
P1-11-012-17b1-B	Method Blank	< 0.245	0.250	0.020
P1-11-012-	LCS	98.0%		
P1-11-012-	LCS	102%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
Julie D Lopez
1/6/92

MORRISTOWN - 101a Hg Trains
Samples are in total ug.

SAM Number	Sample Description	Hg AAS-CV	Final Volume	Sample Volume (L)
P1-11-012-01b-2	MO - 180,182	< 0.188	0.250	0.020
P1-11-012-02b-2	MO - 184,186	< 0.188	0.250	0.020
P1-11-012-03b-2	MO - 132,134	* 0.320	0.250	0.020
P1-11-012-04b-2	MO - 136,138	* 0.231	0.250	0.020
P1-11-012-05b-2	MO - 139,140	* 0.320	0.250	0.020
P1-11-012-06b-2	MO - 144,146	< 0.188	0.250	0.020
P1-11-012-07b-2	MO - 148,150	4.63	0.250	0.020
P1-11-012-08b-2	MO - 152,154	0.674	0.250	0.020
P1-11-012-09b-2	M) - 156,158	< 0.123	0.250	0.020
P1-11-012-10b-2	MO - 160,162	< 0.123	0.250	0.020
P1-11-012-11b-2	MO - 164,166	0.766	0.250	0.020
P1-11-012-12b-2	MO - 168,170	< 0.123	0.250	0.020
P1-11-012-13b-2	MO - 172,174	1.36	0.250	0.020
P1-11-012-14b-2	MO - 176,178	< 0.123	0.250	0.020
P1-11-012-15b2-S	Matrix Spike -08b	83.5%		
P1-11-012-16b2-S	Matrix Spike dup -08b	92.1%		
P1-11-012-17b-B	Method Blank	< 0.123	0.250	0.020
P1-11-012-	LCS	101%		
P1-11-012-	LCS	96.0%		

*Less than five times the detection limits.

CALCULATION: Sample results(ng) x Final Volume(L) x 0.001 / Sample Volume used(L) = Total ug.

Reviewed by
Julio D Lopez
1/6/92

Table 2.
MORRISTOWN - KMNO4 Hg Impingers
Amount in the back half Hg train in total ug.

SAM Number	Sample Description	Hg AAS CV #1	Hg AAS CV #2	Hg AAS CV #3	Hg AAS CV #4	Hg Value Used	Initial Volume (L)	Comments
P1-11-010-01c	MO - 90	< 0.362	< 0.181			< 0.181	0.1847	
P1-11-010-02c	MO - 97	< 1.03	< 0.517			< 0.517	0.5273	
P1-11-010-03c	MO - 06	9.34	5.99	7.77		8.55	0.4131	#2 not used
P1-11-010-04c	MO - 13	22.0	* 1.75	24.8		23.4	0.5268	#2 not used
P1-11-010-05c	MO - 20	4.70	2.24	5.36		5.03	0.4430	#2 not used
P1-11-010-06c	MO - 27	* 3.49	* 0.830	* 2.96		* 3.23	0.4970	#2 not used
P1-11-010-07c	MO - 34	* 2.67	< 0.427	5.06	< 0.427	* 3.86	0.4362	#1 & 3 used
P1-11-010-08c	MO - 41	6.20	* 0.913	6.45		6.33	0.4245	#2 not used
P1-11-010-09c	MO - 48	163		166		165	0.4041	#1 & 3 used
P1-11-010-10c	MO - 55	* 3.71	* 0.906	4.26		* 3.98	0.4215	#2 not used
P1-11-010-11c	MO - 62	* 1.90	* 1.49	* 2.55		* 1.98	0.3641	all used
P1-11-010-12c	MO - 69	< 0.779	< 0.390		< 0.390	< 0.390	0.3976	#2 & 4 used
P1-11-010-13c	MO - 76	7.91	4.71	8.24	4.06	6.95	0.4058	all used
P1-11-010-14c	MO - 83	* 1.93	* 0.451	* 1.68	< 0.371	* 1.80	0.3790	#1 & 3 used
P1-11-010-16c-S	Matrix Spike - 01c	97.6%	103%					
P1-11-010-17c-S	Matrix Spike-Dup - 01c	96.8%	99.6%					
P1-11-010-18c-B	Method Blank	< 0.815	< 0.408	< 0.815	< 0.815	< 0.815	0.4161	#1 & 3 used
P1-11-010-	LCS	96.0%	100%	98.8%	101%			

* less than 5 times the detection limit.

CALCULATIONS:

Mercury:

Sample Result (ug/L) X Total Impinger Volume (L) = Total ug Hg

Reviewed by
[illegible]
1/15/92

Morristown - HCl Trains

Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	1 - 1	MO - 276	* 0.0854	6.94	0.0648	0.0667
	1 - 2	MO - 283	* 0.0602	1.02	* 0.0381	0.0596
	1 - 3	MO - 284	* 0.0499	11.0	0.0653	0.0578
	1 - 3(OH)	MO - 293	< 0.0178	< 0.00506	< 0.00564	0.0444
Outlet	1 - 1	MO - 278	* 0.0771	0.340	< 0.00710	0.0559
	1 - 2	MO - 287	* 0.0295	8.61	0.0493	0.0522
	1 - 3	MO - 280	< 0.0252	8.57	0.117	0.0630
	1 - 3(OH)	MO - 605	< 0.0180	< 0.00512	< 0.00570	0.0449
	Reagent Bk	MO - 437	< 0.0137	< 0.00391	< 0.00436	0.0343
	Reagent Bk	MO - 434	< 0.0125	< 0.00357	< 0.00398	0.0313
		Matrix Spike on MO-276	102%	105%	115%	
		Matrix Spike on MO-276 dup	100%	102%	118%	
		LCS	99.8%	94.5%	93.8%	
		LCS	101%	102%	97.4%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julie Lopez
1/8/92

Morristown - HCl Trains

Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	2 - 1	MO - 298	0.194	12.1	0.0726	0.0508
	2 - 2	MO - 307	* 0.107	10.1	0.235	0.0609
	2 - 3	MO - 316	* 0.0378	9.44	0.102	0.0552
	2 - 3(OH)	MO - 317	< 0.0148	< 0.00423	< 0.00471	0.0371
Outlet	2 - 1	MO - 302	< 0.0296	0.747	< 0.00940	0.0740
	2 - 2	MO - 311	< 0.0238	0.434	< 0.00757	0.0596
	2 - 3	MO - 320	< 0.0230	0.560	0.0638	0.0575
	2 - 3(OH)	MO - 321	< 0.0141	< 0.00402	< 0.00448	0.0353
	Reagent Bk	MO - 436	< 0.0136	< 0.00389	< 0.00433	0.0341
	Reagent Bk	MO - 435	< 0.0134	< 0.00382	< 0.00425	0.0335
		Matrix Spike on MO-307	93.6%	108%	115%	
		Matrix Spike on MO-307 dup	95.0%	105%	117%	
		LCS	103%	103%	102%	
		LCS	101%	96.9%	96.6%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julio D Lopez
1/8/92

Morristown - HCl Trains
Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	3 - 1	MO - 322	* 0.0434	49.5	1.96	0.0589
	3 - 2	MO - 333	< 0.0316	24.2	1.39	0.0790
	3 - 3	MO - 340	< 0.0237	57.9	1.14	0.0593
	3 - 3(OH)	MO - 341	< 0.0112	1.15	0.0504	0.0280
Outlet	3 - 1	MO - 326	< 0.0247	0.396	0.121	0.0617
	3 - 2	MO - 335	< 0.0276	0.371	0.125	0.0691
	3 - 3	MO - 344	< 0.0200	0.462	0.404	0.0499
	3 - 3(OH)	MO - 345	< 0.0178	< 0.00508	< 0.00566	0.0446
	Reagent Bk	MO - 426	< 0.0105	< 0.00300	< 0.00334	0.0263
	Reagent Bk	MO - 421	< 0.0114	< 0.00325	< 0.00362	0.0285
		Matrix Spike on MO-326	96.4%	86.7%	105%	
		Matrix Spike on MO-326 dup	97.2%	87.4%	105%	
		Method Blank	< 0.0202	< 0.00576	< 0.00642	0.0505
		LCS	102%	97.4%	96.1%	
		LCS	100%	94.0%	91.4%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julie Dlopez
1/8/92

Morristown - HCl Trains
Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	4 - 1	MO - 346	0.486	73.0	1.07	0.0543
	4 - 2	MO - 355	0.171	71.5	1.79	0.0616
	4 - 3	MO - 364	0.237	83.2	0.504	0.0394
	4 - 3(OH)	MO - 365	< 0.0127	0.287	0.0242	0.0318
Outlet	4 - 1	MO - 350	< 0.0255	0.543	0.131	0.0637
	4 - 2	MO - 359	< 0.0140	4.67	0.100	0.0351
	4 - 3	MO - 368	< 0.0160	1.28	0.0966	0.0399
	4 - 3(OH)	MO - 369	< 0.0128	< 0.00366	< 0.00408	0.0321
	Reg.Blank	MO - 418	< 0.0144	0.515	< 0.00457	0.0360
	Reg.Blank	MO - 429	< 0.0100	< 0.00285	< 0.00318	0.0250
		Matrix Spike on MO-350	94.4%	113%	108%	
		Matrix Spike on MO-350 dup	94.4%	112%	106%	
		LCS	99.2%	95.5%	93.2%	
		LCS	102%	98.0%	90.3%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julie D. Lopez
1/8/92

Morristown - HCl Trains
Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	5 - 1	MO - 370	0.151	53.7	1.72	0.0414
	5 - 2	MO - 379	0.175	46.3	1.34	0.0376
	5 - 3	MO - 388	0.253	67.8	0.393	0.0385
	5 - 2(OH)	MO - 381	< 0.00980	9.11	< 0.00311	0.0245
Outlet	5 - 1	MO - 374	< 0.0163	< 0.00464	< 0.00517	0.0407
	5 - 2	MO - 383	< 0.0157	< 0.00448	< 0.00499	0.0393
	5 - 3	MO - 392	< 0.0150	< 0.00426	< 0.00475	0.0374
	5 - 3(OH)	MO - 393	< 0.00832	< 0.00237	< 0.00264	0.0208
	Field Blk.	MO - 422	< 0.0140	< 0.00399	< 0.00445	0.0350
		Matrix Spike on MO-370	101%	102%	95.3%	
		Matrix Spike on MO-370 dup	100%	102%	98.4%	
		LCS	104%	98.0%	95.7%	
		LCS	98.2%	93.2%	92.0%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julie O Lopez
1/8/92

Morristown - HCl Trains
Samples are in total mg

Inlet/ Outlet	Run #	Sample Description	F IC	Cl IC	Br IC	Sample Volume (L)
Inlet	6 - 1	MO - 394	< 0.0104	58.8	< 0.00329	0.0259
	6 - 2	MO - 403	0.0786	39.8	< 0.00367	0.0289
	6 - 3	MO - 412	0.117	85.5	0.499	0.0326
	6 - 2(OH)	MO - 413	< 0.0100	5.80	< 0.00318	0.0250
Outlet	6 - 1	MO - 398	< 0.0141	< 0.00401	< 0.00447	0.0352
	6 - 2	MO - 407	< 0.0136	< 0.00386	< 0.00431	0.0339
	6 - 3	MO - 416	< 0.0157	< 0.00447	< 0.00498	0.0392
	6 - 3(OH)	MO - 417	< 0.0103	< 0.00294	< 0.00328	0.0258
		Matrix Spike on MO-413	102%	114%	86.8%	
		Matrix Spike on MO-413 dup	98.4%	106%	105%	
		Method Blank	< 0.0123	< 0.00351	< 0.00391	0.0308
		LCS	98.2%	90.9%	107%	
		LCS	104%	108%	104%	

CALCULATION: Sample Value (mg/L) X Sample Volume (L) = Sample Result in total mg.

Reviewed by
Julio D Lopez
1/8/92

1-2

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-3
Eluent = E11102 KB
Offset = 576

FS = 30
Pump Rate = 26
Chart Speed = 1cm/min
Injection Size = 3ml

Sample Description	Anion	Peak Height	Retention Time	Comments
Eluent	Any	—	—	
Std # 1	F⁻ Cl⁻ Br⁻	481 497 989	1.19 2.52 6.36	2.5 ppm 5.0 5.0 } 5.0 ml # 11106 JRS 15.0 ml eluent
Std # 2	F⁻ Cl⁻ Br⁻	1009 1073 178	1.18 2.46 6.16	5.0 10.0 ppm 10.0 } 10.0 ml # 11106 JRS 10.0 ml eluent
Std # 3	F⁻ Cl⁻ Br⁻	1562 1746 282	1.18 2.42 5.96	7.5 15.0 ppm 15.0 } 15.0 ml # 11106 JRS 5.0 ml eluent
Std # 4	F⁻ Cl⁻ Br⁻	2056 2369 357	1.16 2.42 5.98	10.0 20.0 ppm 20.0 } # 11106 JRS
QC # 11107 JRS	F⁻ Cl⁻ Br⁻	1012 1061 162	1.16 2.40 6.00	5.0 ppm 10.2 10.2
Std # 1	Br⁻	932	~~6.06~~ 6.21	5.0 ppm } 5.0 ml # 11110 JM 15.0 ml eluent
Std # 2	Br⁻	177	6.00	10.0 ppm } 10.0 ml # 11110 JM 10.0 ml eluent
Std # 3	Br⁻	269	6.05	15.0 ppm } 15.0 ml # 11110 JM 5.0 ml eluent
Std # 4	Br⁻	365	6.09	20.0 ppm } # 11110 JRS
QC # 11109 JRS	Br⁻	194	5.93	4.4 ppm
Mo-276	F⁻ Cl⁻ Br⁻	136 over ND	1.21 2.33 —	66.7 ml (I) c-1
Mo-276 (1:1)	F⁻ Cl⁻ Br⁻	92.2 over 8.03	1.21 2.60 6.17	
Mo-276 (1:10)	F⁻ Cl⁻ Br⁻	ND 1164 ND	— 2.44 —	
Mo-276 (1:10) SIA	F⁻ Cl⁻ Br⁻	765 1528 —	~~1.19~~ 1.16 ~~2.52~~ 2.43 —	

Reviewed by: Julio D Lopez
12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-3
Eluent = E11102 ICB
Offset = 576

FS = 30
Pump Rate = 26
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-276 (1:10) S/A-dup	F⁻ Cl⁻ Br⁻	752 1490 —	—	
MO-276 (1:1) S/A	Br⁻	161	6.08	
MO-276 (1:1) S/A-dup	Br⁻	165	5.99	
MO-283	F⁻ Cl⁻ Br⁻	87.6 ovr ND	1.18 2.47 —	55.6mL (I) B-1
MO-283 (1:1)	F⁻ Cl⁻ Br⁻	63.8 927 5.01	1.23 2.68 6.18	
MO-284	F⁻ Cl⁻ Br⁻	71.3 ovr Tr. ~~ND~~ 19.7	1.19 2.26 — 6.03	57.8mL (I) C-1
MO-284 (1:1)	F Cl Br⁻	48.8 ovr ND	1.24 2.56 —	
MO-284 (1:10)	F⁻ Cl⁻ Br⁻	21.6 2245 1.51	1.20 2.53 6.17	Tr*
MO-253	F⁻ Cl⁻ Br⁻	ND ND ND	— — —	44.4 (I) Hg-1
QC* 11107 Tr	F⁻ Cl⁻	1020 1058	1.18 2.87	
QC* 11109 Tr	Br⁻	195	6.19	

Reviewed by: Julio D Lopez
12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-3
Eluent = E11102 KB
Offset = 594

FS = 30
Pump Rate = 26
Chart Speed = 1cm/min
Injection Size = 3 mL

Sample Description	Anion	Peak Height	Retention Time	Comments
QC# 11107 JMS	F⁻ Cl⁻	1045 1120	1.19 2.48	
QC# 11109 JMS	Br⁻	182	6.16	No Good Pressure on IC to high
QC# 11109 JMS	Br⁻	188	6.16	
MO-278	F⁻ Cl⁻ Br⁻	249 615 ND	1.20 2.51 –	55.9 mL (O) a-1
MO-278 (1:1)	F⁻ Cl⁻ Br⁻	157 311 1.50	1.20 2.64 6.14	
MO-287	F⁻ Cl⁻ Br⁻	76.7 OVR ND	1.19 2.28 –	52.2 mL (O) b-1
MO-287 (1:1)	F⁻ Cl⁻ Br⁻	57.4 OVR 7.77	1.20 2.49 6.14	
MO-287 (1:10)	F⁻ Cl⁻ Br⁻	31.3 1928 1.37	1.18 2.45 6.13	
MO-280	F⁻ Cl⁻ Br⁻	4.99 OVR ND	1.19 2.31 –	63.0 mL (O) c-1
MO-280 (1:1)	F⁻ Cl⁻ Br	32.1 OVR 16.0	1.22 2.55 6.14	
MO-280 (1:10)	F⁻ Cl⁻ Br⁻	27.1 1554 2.36	1.23 2.54 6.21	
MO-605	F⁻ Cl⁻ Br⁻	ND ND ND	– – –	44.9 mL (O) hy-1
MO-437	F⁻ Cl⁻ Br⁻	ND ND ND	– – –	34.3 mL 0.1 N Hy. RB
MO-434	F⁻ Cl⁻ Br⁻	ND ND ND	– – –	36.3 mL 0.1 N H2SO4 RB
MO-298	F⁻ Cl⁻ Br⁻	763 OVR ND	1.19 2.22 –	50.8 (I) a-2

Reviewed by: [illegible] 12/20/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-3
Eluent = [illegible]
Offset = 5 14

FS = 30
Pump Rate = 26
Chart Speed = 1 cm/min
Injection Size = 3 mL

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-298 (1.1)	F Cl Br	415 [illegible] [illegible]	1.19 2.40 6.11	
MO-298 (1.10)	F Cl Br	112 [illegible] [illegible]	1.17 2.48 6.10	
MO-298 (1.20)	F Cl Br	[illegible] 1351 [illegible]	1.18 2.44 6.11	
GC# 11101 TR1	F Cl Br	1028 1155	1.17 2.43	
GC# 11109 TR	Br	201	5.96	

3-6

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = 75.3
Eluent = E 11102 KB
Offset =

FS = 30
Pump Rate = 28.4
Chart Speed = 1cm/min
Injection Size = 3ml

Sample Description	Anion	Peak Height	Retention Time	Comments
M. Blank	F- Cl- Br-	- - -	- - -	
QC# 11107 Jas	F- Cl-	1036 1172	1.18 2.44	
QC# 11109 Jas	Br-	209	5.84	
MO-307	F- Cl- Br-	251 ovr 76.6	1.10 2.04 5.45	60.9 ml (I) b-2
MO-307 (1:1)	F- Cl- Br-	143 ovr 26.0	1.13 2.30 5.69	
MO-307 (1:10)	F- Cl- Br-	49.3 1944 5.16	1.15 2.33 5.60	
MO-307 (1:1) S/A	F- Cl- Br-	785 ovr —	1.07 2.36 —	w/ Std#3 F-
MO-307 (1:1) S/A	F- Cl- Br-	797 ovr —	1.08 2.33	w/ Std#3 F-
MO-307 (1:10) S/A	Cl-	2006	2.19	w/ Std#3 Cl-
MO-307 (1:10) S/A	Cl-	1936	2.17	w/ Std#3 Cl-
MO-307 S/A	Br- JS	221	5.30	w/ Std#3 Br-
~~MO-307 S/A~~	~~Br- 12.29~~	~~229~~	~~5.28~~	~~w/ Std#3 Br-~~
MO-307 (1:1) S/A	Br	188	5.25	w/ 16.0 ppm Br-
MO-307 (1:1) S/A	Br-	187	5.27	w/ 16.0 ppm Br-
MO-316	F- Cl- Br-	102 ovr ND	1.07 1.96	55.2 ml (I) c-2

~~ND Good~~

Reviewed by: Julie D Lopez
12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS 3
Eluent = Eluent KB
Offset =

FS = 30
Pump Rate = 28.4
Chart Speed = 1cm/min
Injection Size = 3ml

Sample Description	Anion	Peak Height	Retention Time	Comments
MO 316 1:1	F Cl Br	55.4 OVF 15.5	1.09 2.14 5.27	
MO 316 1:10	F Cl Br	25.3 2005 2.36	1.07 2.25 5.30	
MO 317	F Cl Br	— ND — ND — ND	— — —	27.1ml (I)hy2c
MO-302	F Cl Br	ND 1117 ND	— 1.17 —	74.0ml (0)a-2.
MO-302 1:1	F Cl Br	ND 534 ND	— 2.29 —	
MO-311	F Cl Br	ND 765 ND	— 2.20 —	59.6ml (0)b-2
MO-311 1:1	F Cl Br	ND 363 ND	— 2.29	
QC*11107 Std	F Cl	921 1260	1.06 2.14	
QC*11109 Std	Br	212	5.20	

Day 4 - [illegible]

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-1
Eluent = E12101 TRS
Offset = 573

FS = 30
Pump Rate = 26
Chart Speed = 1 cm/min
Injection Size = 3 mL

Sample Description	Anion	Peak Height	Retention Time	Comments
Blank	Any	—	—	
QC# 11107 TRS	F⁻ Cl⁻	1024 1428	1.16 2.36	
QC# 11107 TRS	F⁻ Cl⁻	1022 1425	1.15 2.34	
Std #1	F⁻ Cl⁻	461 500 925	1.15 2.34 5.76	2.5 ppm, 5.0 ppm } 5.0 mL #11106 TRS, 15.0 mL eluent
Std #2	F⁻ Cl⁻	997 1137 192	1.15 2.33 5.69	5.0 ppm, 10.0 ppm } 10.0 mL #11106 TRS, 10.0 mL eluent
Std #3	F⁻ Cl⁻	1543 2013 297	1.15 2.34 5.66	7.5 ppm, 15.0 ppm } 15.0 mL #11106 TRS, 5.0 mL eluent
Std #4	F⁻ Cl⁻	2082 2586 420	1.15 2.35 5.68	10.0 ppm, 20.0 ppm } #11106 TRS
QC# 12102 TRS	F⁻ Cl⁻ Br⁻	1018 1186 191	1.19 2.44 6.04	
MO-320	F⁻ Cl⁻ Br⁻	NO 1165 11.4	– 2.44 5.73	57.5 mL (D) C-2
MO-321	F⁻ Cl⁻ Br⁻	NO NO NO	– – –	35.3 mL (D) C-hy
MO-436	F⁻ Cl⁻ Br⁻	NO NO NO	– – –	34.1 mL R.B. (06)
MO-435	F⁻ Cl⁻ Br⁻	NO NO NO	– – –	33.5 mL R.R. (SQ)
MO-322	F⁻ Cl⁻ Br⁻	77.9 OVR OVR	1.16 2.12 5.47	58.9 mL (I) a-3
MO-322 (1:1)	F⁻ Cl⁻ Br⁻	33.6 OVR 329	1.21 2.22 5.93	
MO-322 (1:5)	F⁻ Cl⁻ Br⁻	17.4 258 (OVR) 51.1	1.20 2.38 5.86	

Reviewed by Julio Olaez 12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS 1
Eluent = E12101 [illegible]
Offset = 573

FS = 30
Pump Rate = 26
Chart Speed = 1 cm / min
Injection Size = 3 mL

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-322 (1:10)	F⁻ Cl⁻ Br⁻	1.79 2596 (ovr) 34.1	1.18 2.36 6.02	
MO-322 (1:20)	F⁻ Cl⁻ Br⁻	7.34 2594 (ovr) 23.1	1.19 2.31 5.87	
MO-322 (1:40)	F⁻ Cl⁻ Br⁻	3.01 2594 (ovr) 10.9	1.19 2.42 6.02	
MO-~~333~~ 322 (1:80)	F⁻ Cl⁻ Br⁻	2.17 1275 5.45	1.18 2.40 6.06	~~79.0 mL (I) b-3~~ [illegible]
MO-333	F⁻ Cl⁻ Br⁻	ND ovr 394	– 2.14 5.61	79.0 mL (I) b-3
MO-333 (1:1)	F⁻ Cl⁻ Br⁻	ND ovr 169	– 2.31 5.74	
MO-333 (1:10)	F⁻ Cl⁻ Br⁻	8.41 ovr 14.1	1.17 2.36 6.06	
MO-333 (1:20)	F⁻ Cl⁻ Br⁻	5.02 [illegible] [illegible]	1.19 2.42 5.99	
MO-340	F⁻ Cl⁻ Br⁻	~~11.4~~ ND ~~ovr~~ ovr 3.33	~~1.22~~ – ~~2.44~~ 2.16 ~~6.00~~ 5.77	59.3 mL (I) c-3
MO-340 (1:5)	F⁻ Cl⁻ Br⁻	11.4 ovr 46.8	1.22 2.44 6.00	
MO-340 (1:20)	F⁻ Cl⁻ Br⁻	3.86 ovr 10.7	1.19 2.36 5.95	
MO-340 (1:40)	F⁻ Cl⁻ Br⁻	2.29 ovr 5.27	1.20 2.38 5.99	
MO-340 (1:80)	F⁻ Cl⁻ Br⁻	5.30 1513 3.88	1.18 2.40 5.87	
MO-341	F⁻ Cl⁻ Br⁻	ND ovr 25.6	– 2.13 5.73	28.0 mL (I) hy c-3
MO-341 (1:5)	F⁻ Cl⁻ Br⁻	ND 951 7.40	– 2.35 5.95	
QC#12102 [illegible]	F⁻ Cl⁻ Br⁻	1009 1192 190	1.17 2.40 5.88	

Orig 5 - [illegible]

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS 3
Eluent = E12101 JRS
Offset = 584

FS = 30
Pump Rate = 26
Chart Speed = 1 cm/min
Injection Size = 3 ml

Sample Description	Anion	Peak Height	Retention Time	Comments
QC* 12102 JRS	F Cl Br	1004 1144 180	1.16 2.44 FS ~~1.00~~ 6.13	
BLANK	F Cl Br	– – –	– – –	
MU-326	F Cl Br	NO 691 NO	– 2.48 –	61.7 ml (0) a-3
MU-326 (1:1)	F Cl Br	NO 332 8.61	– 2.61 6.07	
MU-326 (1:1) S/A	F Cl Br	441 791 107	1.17 2.55 6.02	w/ Std #2
MU-326 (1:1) S/Adm	F Cl Br	444 800 107	1.18 2.54 6.02	w/ Std #2
MU-335	F Cl Br	NO 542 NO	– 2.49 –	69.1 ml (0) b-3
MU-335 (1:1)	F Cl Br	NO 266 7.07	– 2.60 6.00	
MU-344	F Cl Br	NO 1055 ~~NO~~ 155	– 2.48 5.94	49.9 ml (0) c-3
MU-~~345~~ 344 (1:1) 12-24-91 JA	F Cl Br	NO 439 ~~100~~ 58.3	– 2.64 5.96	
MU-345	F Cl Br	NO NO NO	– – –	44.6 ml (0) by-c-3
MU-426	F Cl Br	NO NO NO	– – –	26.3 ml RB (Sq)
MU-~~426~~ 421 JA 12-24-91	F Cl Br	NO NO NO	– – –	26.3 ml ~~36.0 ml~~ RB (DK) JA 12-24-91
MU-346	F Cl Br	1856 OVF NO	1.15 2.67 –	54.3 ml (I) a-4
MU-346 (1:1)	F Cl Br	952 OVF 191	1.19 6.09	

Reviewed by
[signature]
12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = _____ FS = _____
Column = _____ Pump Rate = _____
Eluent = _____ Chart Speed = _____
Offset = _____ Injection Size = _____

Sample Description	Anion	Peak Height	Retention Time	Comments
MO 346 (1.80)	F Cl Br	29.1 2169 3.74	1.16 2.40 6.01	
MO 355	F Cl Br	519 OVR OVR	1.15 2.08 5.80	6/6 ml (1) b-4
MO-355 (1.5)	F Cl Br	131 OVR 108	1.19 2.43 6.08	
MO 355 (1.50)	F Cl Br	159 OVR 10.3	1.16 2.39 6.03	
MO-355 (1.100)	F Cl Br	7.64 1427 4.85	1.18 2.44 6.14	
QC#12102 Tr1	F Cl Br	991 1165 184	1.18 2.45 6.03	

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS 3
Eluent = E12102 JRS
Offset = 584

FS = 30
Pump Rate = 26
Chart Speed = 1cm/min
Injection Size = 3ml

Sample Description	Anion	Peak Height	Retention Time	Comments
QC# 12102 JRS	F Cl Br	1020 1210 178	1.17 2.44 6.11	5.0 ppm 10.2 ppm 10.2 ppm
MO-364	F Cl Br	1220 over ND	1.11 2.25 –	39.4 (I) c-4
MO-364 (1:5)	F Cl Br	257 over 41.4	1.19 2.34 6.31	
MO-364 (1:20)	F Cl Br	351 over 9.40	1.18 2.40 6.21	
MO 364 (1:80)	F Cl Br	193 over 614	1.15 2.42 6.23	
MO 364 - (1:160)	F Cl Br	10.5 1659 0.989	1.18 2.46 6.23	~~31.8ml (I) hg c-4~~ JS 12-5-11 [illegible]
MO-365	F Cl Br	ND 1062 4.16	1.02 2.33 6.18	31.8 (I) hg c-4 ~~63.7ml (O) a-4~~ JS 12-5-11 [illegible]
MO-350	F Cl Br	ND 868 ND	– 2.54 –	63.7ml (O) a-4
MO-350 (1:1)	F Cl Br	ND 383 9.67	– 2.64 6.11	
MO-350 (1:5) SLA	F Cl Br	429 923 111	1.18 2.61 6.16	
MO-350 (1:1) SLA dup	F Cl Br	429 917 109	1.21 2.59 6.07	
MO-359	F Cl Br	ND over ND	– 2.28 –	39.1ml (O) b-4
MO-359 (1:1)	F Cl Br	ND over 17.6	– 2.50 6.01	
MO-359 (1:20)	F Cl Br	3.14 726 2.12	1.20 2.43 6.05	
MO-368	F Cl Br	ND over ND	– 2.36 –	39.9ml (O) c-4

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS-3
Eluent = E120102 TM
Offset = 584

FS = 30
Pump Rate = 26
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-368 (1:1)	F⁻ Cl⁻ Br⁻	ND 2052 13.4	– 2.08 6.15	
MO-369	F⁻ Cl⁻ Br⁻	ND ND ND	– – –	32.1mL (0) hy C-4
MO-418 (RB)	F⁻ Cl⁻ Br⁻	ND 1834 ND	– 2.37 –	36.0mL (SO_4^-) R.B
MO-418 dup	F⁻ Cl⁻ Br⁻	ND 1808 ND	– 2.41 –	
MO-418 (1:1)	F⁻ Cl⁻ Br⁻	ND 729 ND	– 2.57 –	
MO-429	F⁻ Cl⁻ Br⁻	ND ND ND	– – –	25.0mL (04) R.B.
QC#12102 TM	F⁻ Cl⁻ Br⁻	983 1195 182	1.17 2.42 6.00	

Reviewed by:
[signature]
12/26/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = AS 1
Eluent = ~~CO3~~ E12103 [illegible]
Offset = 560

FS = 30
Pump Rate = 55
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
Eluent Blank	F Cl Br	– – –	– – –	
Std #1	F Cl Br	601 532 811	1.44 3.37 9.05	2.5 ppm 5.0 5.0 — 5 mL #12104 TDS; 15 mL eluent
Std #2	F Cl Br	1301 1210 1670	1.40 3.30 8.70	5.0 ppm 10.0 10.0 — 10 mL #12104 TDS; 10 mL eluent
Std #3	F Cl Br	1961 1609 255	1.42 3.32 8.76	7.5 ppm 15.0 15.0 — 15 mL #12104 TDS; 5.0 mL eluent.
Std #4	F Cl Br	2514 2552 337	1.41 3.30 8.73	10.0 ppm 20.0 20.0 — #12104 TDS
QC #12103 TDS	F Cl Br	1267 1119 121	1.43 3.36 8.91	5.0 ppm 10.0 10.0 — TV
Std #1	F Cl Br	571 494 762	1.40 3.30 8.86	
Std #2	F Cl Br	1200 1097 155	1.40 3.29 8.84	
Std #3	F Cl Br	1833 1775 236	1.40 3.30 8.77	
Std #4	F Cl Br	2429 2486 317	1.41 3.31 8.85	
QC #12103 TDS	F Cl Br	1244 1104 149	1.44 3.35 9.02	
MU-370 1:1	F Cl Br	403 OVF 362	1.43 3.13 9.05	1:4 mL (I/a-S
1:4	F Cl Br	244 OVF 162	1.40 3.28 8.81	
1:80	F Cl Br	220 1453 11.5	1.44 3.37 9.12	
S/2 1:80	F Cl Br	581 1518 79.6	1.42 3.31 8.91	

Retest

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = _____ FS = _____
Column = _____ Pump Rate = _____
Eluent = _____ Chart Speed = _____
Offset = _____ Injection Size = _____

Sample Description	Anion	Peak Height	Retention Time	Comments
S/A dup (1:80)	F⁻ Cl⁻ Br⁻	573 1576 82.3	1.44 3.36 8.97	
MU-379 1:1	F⁻ Cl⁻ Br⁻	531 ovr. 283	1.49 3.20 9.11	37.6ml (E) b-S
1:80	F⁻ Cl⁻ Br⁻	20.0 1852 5.07	1.51 3.56 9.61	
MU-388	F⁻ Cl⁻ Br⁻	1597 ovr 160	1.31 2.88 8.70	38.5 (E) c-S
1:160	F⁻ Cl⁻ Br⁻	16.3 1259 NO	1.34 3.17 -	
QC#12103 JAS	F⁻ Cl⁻ Br⁻	1224 1127 .58	1.38 3.24 8.58	

Reviewed by
Julio D. Lopez
12/20/91

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = 75-3
Eluent = [illegible]
Offset = 574

FS = 30
Pump Rate = 32
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
Std# 1	F Cl Br	[illegible] [illegible] [illegible]	0.90 2.14 5.78	[illegible]
Std# 2	F Cl Br	592 6[illegible] 8[illegible]4	0.91 2.15 5.77	[illegible]
Std# [illegible]	F Cl Br	1366 10[illegible] 129	0.92 2.15 5.73	[illegible]
Std# 4	F Cl Br	1810 13[illegible] 168	0.91 2.14 5.69	[illegible]
YC# 12103 [illegible]	F Cl Br	874 597 [illegible]	0.91 2.14 5.75	[illegible]
Mo [illegible]	F Cl Br	ND OVF ND	- 1.83 -	24.5mL (E) hy b-5
1.40	F Cl Br	ND 596 ND	- 2.02	
Mo 394	F Cl Br	ND ND ND	- - -	40.7mL (O) a-5
Mo 393	F Cl Br	ND ND ND	- - -	39.3mL (O) b-5
Mo-392	F Cl Br	ND ND ND	- - -	37.4mL (O) c-5
Mo 422	F Cl Br	ND ND ND	- - -	30.2mL (O) FB
Mo 393	F Cl Br	ND ND ND	- - -	20.8mL (O) hy c-5
Mo-394 (III)	F Cl Br	ND OVF ND	- 2.09 -	25.9mL (I) a-6
1.80	F Cl Br	~~[illegible]~~ 20.8 OVF ND	0.90 2.14 -	
1:160	F Cl Br	10.9 941 ND	0.90 2.03 -	

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = _____ FS = _____
Column = _____ Pump Rate = _____
Eluent = _____ Chart Speed = _____
Offset = _____ Injection Size = _____

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-403 (1.1)	F Cl Br	2.3 OVF ND	1.02 2.11 —	23.9 mL [illegible]
1.160	F Cl Br	ND 54[illegible] ND	0.91 2.13 —	
QC# 12103 [illegible]	F Cl Br	932 5[illegible] [illegible]	0.91 2.12 5.60	

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = 4S 3
Eluent = [illegible]
Offset = 5.16

FS = 30
Pump Rate = 3L
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
QC#12103 Jan	F Cl Br	921 [illegible] [illegible]	0.91 2.16 5.45	50 [illegible] [illegible] TV
MW-412	F Cl Br	ND [illegible] ND	[illegible] 2.13 -	32.6mL (I) c-6
1.1	F Cl Br	276 [illegible] [illegible]	[illegible] [illegible] 5.33	
1.[illegible]	F Cl Br	[illegible] [illegible] ND	[illegible] 2.16 -	
1.160	F Cl Br	[illegible] 1163 [illegible] ND	0.84 2.15 [illegible]	
MW 413	F Cl Br	ND ~~ND~~ ND	[illegible] -	25.0mL (I) [illegible] c-6
1.1	F Cl Br	ND ~~ND~~ ND	[illegible]	
1.20	F Cl Br	ND 757 ND	- 2.13 -	
MW-3[illegible]	F Cl Br	ND ND ND	- - -	35.2mL (O) a-6
MW 4[illegible]	F Cl Br	ND ND ND	- - -	33.[illegible]mL (O) b 6
MW-416	F Cl Br	ND ND ND	- - -	38.2mL (O) c-6
MW-417	F Cl Br	ND ND ND	~~[illegible]~~ JT ~~[illegible]~~ JT 12/19/91 ~~[illegible]~~ JT [illegible]	25.8mL (O) [illegible] c-6
MW-413 1.20 5/4	F Cl Br	432 [illegible] 36.5	0.92 2.16 5.16	w/ Std. #2
MW-413 1.[illegible] 5/4 dup	F Cl Br	419 754 44.[illegible]	~~0.92~~ 0.91 JT ~~[illegible]~~ 2.17 [illegible] 5.86	
M. Blank	F Cl Br	ND ND ND	- - -	
QC#12103 Jan	F Cl Br	910 [illegible] [illegible]	0.93 2.15 5.24	[illegible]

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = _____ FS = _____
Column = _____ Pump Rate = _____
Eluent = _____ Chart Speed = _____
Offset = _____ Injection Size = _____

Sample Description	Anion	Peak Height	Retention Time	Comments
MO-388 (1:160)	F⁻ Cl⁻ Br⁻	15.2 12.12 ND	1.48 3.52 —	
MO-389	F⁻ Cl⁻ Br⁻	[illegible] [illegible] [illegible]	— [illegible] [illegible]	11.3ml (I) by C-5
MO-389 (1:80)	F⁻ Cl⁻ Br⁻	[illegible] [illegible] ND	— 3.12 —	
MO-389 (1:80)	F⁻ Cl⁻ Br⁻	ND [illegible] ND	— [illegible] —	
~~QC# 12103 TRS~~	~~F⁻ Cl⁻ Br⁻~~	~~[illegible]~~ ~~[illegible]~~ ~~[illegible]~~	~~1.54 3.05 9.77~~	~~50 ppm~~ 11.0 mL rate 100 [illegible] changed - [illegible] 10.0 [illegible]
QC# 12103 TRS	F⁻ Cl⁻ Br⁻	[illegible] [illegible] [illegible]	~~[illegible]~~ ~~[illegible]~~ 1.24 ~~[illegible]~~ ~~[illegible]~~ 2.75 [illegible] 6 [illegible] [illegible]	

ION CHROMATOGRAPHY ANALYSIS

INSTRUMENT CONDITIONS:

System = 1
Column = 2 & 3
Eluent = E12105 KB
Offset = 568

FS = 30
Pump Rate = 30
Chart Speed = 1cm/min
Injection Size = 3mL

Sample Description	Anion	Peak Height	Retention Time	Comments
Eluent	Any	—	—	
QC# 12108 ICB	Br^-	122	6.08	TV = 10.0 ppm
MO 307	Br^-	138	5.55	
1:1	Br^-	13.1	5.93	
S/A	Br^-	122	5.91	TV = 5.46 ppm
S/A dup	Br^-	12[illegible]	5.88	TV = 5.46 ppm
QC# 12108 ICB	Br^-	127	5.92	TV = 10.0 ppm

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 11.26.91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F⁻

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	481	481 ✓
5.0 ppm	1009	1009 ✓
7.5 ppm	1562	1562 ✓
10.0 ppm	2056	2056 ✓

#11106 TAS

corr.= 0.9958 ✓

slope= 211

[y']= 42.5 ✓

MDL = 0.40 ppm ✓

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
								True	Recovery
QC# 11107 TAS	-	1012				1012 ✓	4.99 ppm ✓	5.0 ppm	99.8% ✓
MD - 276	-	136 (1:1)	92.2 (1:10)	ND		92.2 ✓	0.634 ppm ✓	X2 ✓	1.28 ppm ✓
- 283	-	96 (1:1)	63.8			63.8 ✓	0.504 ppm ✓	X2 ✓	1.01 ppm ✓
- 284	-	71.3 (1:1)	48.8			48.8 ✓	0.432 ppm ✓	X2 ✓	0.864 ppm ✓
- 293	-	ND				ND ✓	<MDL ✓	-	<0.40 ppm ✓
								True	Recovery
QC# 11107 TAS	-	1020				1020 ✓	5.03 ppm ✓	5.00 ppm	101% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
Mo 276/15 ppm/1:1	1:10	765				765 ✓	3.82 ppm ✓	3.75 ppm ✓	102% ✓
" /11 ppm/1:1	1:10	752				752 ✓	3.76 ppm ✓	3.75 ppm ✓	100% ✓

ION CHROMATOGRAPH

PROJECT TITLE: [illegible] DATE: [illegible] ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: [illegible]

ELEMENT: [illegible]

Standards	Readings (Peak Height)					Mean Peak Height
2.5 ppm						431
5.0 ppm						[illegible]
10 ppm						[illegible]
100 ppm						[illegible]

corr.= [illegible]

slope= [illegible]

[y']= [illegible]

MDL = [illegible] ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC* 11161 [illegible]		1041				1041	5.15 ppm	5.0 ppm	103.6
MO-418	—	[illegible]	151			[illegible]	1.38 ppm	—	1.38 ppm
MO-[illegible]		[illegible]	[illegible]	313		[illegible]	0.565 ppm	—	0.565 ppm
MO-[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	—	[illegible]
MO-[illegible]		ND				ND		—	
MO 431	—	ND				ND		—	
MO 434	—	ND				ND		—	
MO [illegible]	—	162	165	[illegible]	[illegible]	163	3.82 ppm	—	3.82 ppm
QC* 11161 [illegible]		[illegible]				[illegible]	[illegible]	[illegible]	[illegible] / 101.6

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-2-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F-

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	481	
5.0 ppm	1009	
7.5 ppm	1562	
10.0 ppm	2056	

Curve run 11/26/91

corr.= 0.9998

slope= 211

[y']= 42.5

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC# 11107 TM	-	1036	1036	5.11 ppm	5.00 ppm	102%
MO-307	-	251 (1:1) 143 (1:10) 49.3	143	0.877	X2	1.76 ppm
MO-316	(-)	102 (1:1) 55.4 (1:2) 25.3	102	0.684	-	0.684 ppm
MO-317	(-)	ND	ND	<MDL	-	<0.40 ppm
MO-302	(-)	ND (1:1) ND	ND	<MDL	-	<0.40 ppm
MO-311	(-)	ND (1:1) ND	ND	<MDL	-	<0.40 ppm
					True	% Recovery
QC# 11107 TM	-	981	981	4.85 ppm	5.00 ppm	97.0%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-307/7.5 ppm/1:1	-	785	785	3.72 ppm	4.17 ppm	93.6%
/7.5 ppm/1:1	-	797	797	3.78 ppm	4.17 ppm	95.0%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-3-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	461	461 ✓
5.0 ppm	997	997 ✓
7.5 ppm	1543	1543 ✓
10.0 ppm	2082	2082 ✓

corr.= 0.99999 ✓

slope= 216 ✓

[y']= 81.5 ✓

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC# 12102 Jns	-	1018	1018 ✓	5.08 ppm ✓	True 5.00 ppm	% Recovery 102% ✓
MO-320	JJ 12-3-91 ND -	ND	ND ✓	<MDL ✓	-	<0.40 ppm ✓
MO-321	-	ND	ND ✓	↓	-	↓
MO-436	-	ND	ND ✓	↓	-	↓
MO-435	-	ND	ND ✓	↓	-	↓
MO-322	(-)	77.9 (1:1) 33.6 (1:5) 12.4 (1:10) 7.79 (1:20) 7.34 (1:40) 3.01 (1:80) 2.19	77.9 ✓	0.737 ppm ✓	-	0.737 ppm ✓
MO-333	(-)	ND (1:1) ND (1:10) 8.41 (1:20) 5.02	~~8.41~~ ND	~~0.416~~ ppm <MDL	~~x10~~	~~0.416~~ ppm <0.4
MO-340	(-)	ND (1:5) 11.4 (1:20) 3.86 (1:40) 2.29	ND ✓	<MDL	-	<0.40 ppm
~~MO-341~~ JJ 12-3-91	-	(1:80) 5.30			-	<0.40 ppm
MO-341	(-)	ND (1:5) ND	ND ✓	<MDL		
					True	% Recovery
QC# 12102 Jns	-	1009	1009 ✓	5.04 ppm ✓	5.0 ppm	101% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-4-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F-

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	Curve Run 12/3/91	461
5.0 ppm		997
7.5 ppm		1543
10.0 ppm		2082

corr.= 0.99999

slope= 216

[y']= 81.5

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor True	Final Concentration % Recovery
QC# 12102 JRS	-	1004	1004 ✓	5.02 ppm ✓	5.00 ppm	100% ✓
M. Blank	-	ND	ND ✓	<MDL	-	<0.40 ppm
MO-326	-	ND (1:1)	ND ✓		-	
MO-335	-	ND (1:1)	ND ✓		-	
MO-344	-	ND (1:1)	ND ✓		-	
MO-345	-	ND	ND ✓		-	
MO-426	-	ND	ND ✓		-	
MO-421	-	ND	ND ✓		-	
MO-346	(-)	1856 (1:1) 992 (1:80) 29.1	1856 ✓	8.95 ppm ✓	-	8.95 ppm ✓
MO-355	(-)	519 (1:5) 131 (1:50) 15.9 (1:100) 7.64	519 ✓	2.78 ppm ✓	-	2.78 ppm ✓
QC# 12102 JRS	-	991	991 ✓	4.96 ppm	True 5.00 ppm	99.2%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-326/5 ppm/1:1	1:1	441	441 ✓	2.41 ppm ✓	2.50 ppm	96.4% ✓
" "	1:1	444	444 ✓	2.43 ppm ✓	2.50 ppm	97.2% ✓

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12 5 91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm		461
5.0 ppm		991
7.5 ppm		1543
10.0 ppm		2082

corr.= 0.99999

slope= 216

[y']= 81.5

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC#12102 TAJ	–	1020	1020	5.09 ppm	True 5.0 ppm	% Recovery 102%
MO-364	–	1220 (1:5) 257 (1:20) 851 (1:50) 1093 (1:100) 105	1220	6.02 ppm	–	6.02 ppm
MO-365	–	ND	ND	<MDL	–	<0.40 ppm
MO-350	–	ND (1:1) ND	ND	↓		↓
MO-359	–	ND (1:1) ND (1:20) 3.14	3.14	<MDL	(DIL)	<0.40 ppm
MO-368	–	ND (1:1) ND	ND	<MDL	–	↓
MO-369	–	ND	ND	↓	–	↓
MO-418	–	ND (1:1) ND (dup-ND)	ND	↓	–	↓
MO-429	–	ND	ND	↓	–	↓
QC#12102 TAJ	–	983	983	4.92 ppm	True 5.0 ppm	% Recovery 98.4%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO 350/5.0 ppm/1:1	1:1	429	429	2.36 ppm	2.50 ppm	94.4%
/5.0 ppm/1:1	1:1	109 429	429 109	2.39 ppm	2.50 ppm	94.4%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-13 91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	571	571
5.0	1200	1200
7.5	1833	1833
10.0	2449	2449

corr.= 0.9999

slope= 251

[y']= 53.5

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC#12103 TAS	-	1244	1244	5.18 ppm	5.0 ppm	104%
mo 370	1:1	403 (1:1) 244 (1:80) 29.0	403	1.82 ppm	x2	3.64 ppm
mo 379	1:1	531 (1:80) 20.0	531	2.33 ppm	x2	4.66 ppm
mo 388	-	1597 (1:160) 16.3	1597	6.58 ppm	—	6.58 ppm
					True	% Recovery
QC#12103 TAS		1224	1224	5.10 ppm	5.0 ppm	102%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
mo 370/5 ppm/1:1	1:80	581	581	2.53 ppm	2.50 ppm	101%
" /5 ppm/1:1	1:80	573	573	2.50 ppm	2.50 ppm	100%

ION CHROMATOGRAPH

PROJECT TITLE: [illegible] DATE: 12-14-11 ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: [illegible]

ELEMENT: [illegible]

Standards	Readings (Peak Height)					Mean Peak Height
[illegible] ppm	426					426
5.0 ppm	512					512
1.5 ppm	1266					1266
[illegible] ppm	1810					1810

corr.= [illegible]

slope= [illegible]

[y']= [illegible]

MDL = 0.40 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC* 12103 TM	-	814				814	4.51 ppm	Tm 50 ppm	2 Rinses 18.24
Mo 381	-	ND (1.00) 10				ND	<0.40 ppm	-	<0.40 ppm
Mo 374	-	ND				ND		-	
Mo 383	-	ND				ND		-	
Mo 382	-	ND				ND		-	
Mo 422	-	ND				ND		-	
Mo 373	-	ND				ND		-	
Mo 364	1:1	ND 1.0 20.0 (1.00) 144				[illegible]	4.5 ppm	[illegible]	25.8 ppm
Mo 403	(1:1)	213 (1.00) 56.1				13	1.21 ppm	22	2.72 ppm
								Tm	2 Rinses
QC* 12103 [illegible]	-	132				132	5.23 ppm	5 ppm	105%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-19-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: F

Standards	Readings (Peak Height)	Mean Peak Height
2.5 ppm	Curve Ion 12/18/91	420
5.0		892
7.5		1366
10.0		1810

corr.= 0.9999 ✓
slope= 186 ✓
[y']= 39.0 ✓

MDL = 0.40 ppm ✓

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC#12103 Jas	-	927	927 ✓	5.20 ppm ✓	True 5.0 ppm	% Recovery 104% ✓
MO-412	-	ND (1:1) 296 (1:80) 22.4 (1:160) 12.5	296 ✓	1.80 ppm ✓	x2 ✓	3.60 ppm ✓
MO-413	(-)	ND (1:1) ND (1:20) ND	ND ✓	<MDL ✓	-	<0.40 ppm ✓
MO-398	(-)	ND	ND ✓			
MO-407	(-)	ND	ND ✓			
MO-416	(-)	ND	ND ✓			
MO-417	(-)	ND	ND ✓			
M. Blank	(-)	ND	ND ✓	<MDL ✓	-	<0.40 ppm ✓
					True	% Recovery
QC#12103 Jas	-	910	910 ✓	5.11 ppm ✓	5.0 ppm	102% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-413/5 ppm/1:1	1:20	432	432 ✓	2.54 ppm ✓	2.50 ppm ✓	~~101%~~ 102%
[illegible]	1:20	419	419 ✓	2.46 ppm ✓	2.50 ppm ✓	98.4% ✓

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 11-26-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl-

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	497					497 ✓
10.0 ppm	1073					1073 ✓
15.0 ppm	1346					1346 ✓
20.0 ppm	2367					2367 ✓

corr.= 0.9996 ✓

slope= 126

[y']= 151 ✓

MDL = 0.114 ppm ✓

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor True	Final Concentration % Recovery
QC#11107 Val	-	104				1061 ✓	9.64 ppm ✓	10.2 ppm	94.5% ✓
MO-276	-	over (1:1)	over (1:10)	1164		1164 ✓	10.4 ppm ✓	x10 ✓	104 ppm ✓
-283	-	over (1:1)	927			927 ✓	8.59 ppm ✓	x2 ✓	17.2 ppm
-284	-	over (1:1)	over (1:10)	2245 ✓		2245 ✓	19.0 ppm ✓	x10 ✓	190 ppm ✓
-293	-	ND				ND ✓	<MDL ✓	- ✓	<0.114 ppm ✓
								True	% Recov
QC#11107 Val	-	1098				1098 ✓	9.93 ppm ✓	10.2 ppm	97.4% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO 276/15ppm/1:1	1:10	1528				1528 ✓	13.3 ppm ✓	12.7 ppm ✓	105% ✓
	1:1	1490				1490 ✓	13.0 ppm	12.7 ppm ✓	102% ✓

Reviewed by JDLopez

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 11 21 91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: CC

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	Curve Tan 11/26/91	417
10.0 ppm		1013
15.0 ppm		1746
20.0 ppm		2369

corr.= 0.9996

slope= 126

[y']= 151

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC#11101 VAS	-	1120	1120	10.1 ppm	True 10.2 ppm	% Recovery 99.0%
MO-218	-	615 (1:1) 311	615	6.09 ppm	-	6.09 ppm
MO-281	-	ovr (1:1) ovr (1:10) 1928	1928	16.5 ppm	x10	165 ppm
MO-280	-	ovr (1:1) ovr (1:10) 1554	1554	13.6 ppm	x10	136 ppm
MO-605	-	ND	ND	<MDL	-	<0.114 ppm
MO 437		ND	ND	↓	-	↓
MO 438		ND	ND		-	
MO 298	-	ovr (1:1) ovr (1:10) ovr (1:10) 1351	1351	11.9 ppm	x10	236 ppm
QC#11101 VAS	-	1155	1155	10.4 ppm	True 10.2 ppm	% Recovery 102%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-2-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl^-

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	497	
10.0 ppm	1073	
15.0 ppm	1746	
20.0 ppm	2369	

Slope [illegible] on 11/26/91

corr.= 0.9996 ✓
slope= 126 ✓
[y']= 151 ✓

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	2 Recovery
QC# 11107 [illegible]	-	1172	1172 ✓	10.5 ppm ✓	10.2 ppm	103% ✓
MO-307	-	OVR (1:1) OVR (1:10) 1944	1944 ✓	16.6 ppm ✓	x10 ✓	166 ppm ✓
MO-316	-	OVR (1:1) OVR (1:10) 2005	2005 ✓	17.1 ppm ✓	x10 ✓	171 ppm ✓
MO-317	-	ND	ND ✓	<MDL ✓	- ✓	<0.114 ppm ✓
MO-302	(-)	[illegible] 534 1117 (1:1) 534	1117 ✓	10.1 ppm ✓	- ✓	10.1 ppm ✓
MO-311	(-)	[illegible] 765 (1:1) 363	765 ✓	7.28 ppm ✓	- ✓	7.28 ppm ✓
					True	2 Recovery
QC# 11107 [illegible]	-	1260	1260 ✓	11.2 ppm ✓	10.2 ppm	110% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-307/15 ppm/1:1	1:10 2006		2006 ✓	17.1 ppm ✓	15.8 ppm ✓	108% ✓
[illegible]	1936		1936 ✓	16.6 ppm ✓	15.8 ppm ✓	105% ✓

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-3-91 ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Ce^-

Standards	Readings (Peak Height)	Mean Peak Height
50 ppm	500	500
100 ppm	1131	1131
150 ppm	2013	2013
200 ppm	2586	2586

corr.= 0.9969

slope= 143

[y']= 224

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC# 12102 [illegible]	-	1186	1186	9.86 ppm	True 10.2 ppm	% Recovery 96.9%
MO-320	-	1165	1165	9.74 ppm	-	9.74 ppm
MO-321	-	ND	ND	<MDL	-	<0.114 ppm
MO-436	-	ND	ND	↓	-	↓
MO-431	-	ND	ND		-	
MO-322	-	over (1:1) over (1:5) over (1:10) over (1:20) over (1:50) over (1:80) 1215	1215	10.5 ppm	x 80	840 ppm
MO-333	-	over (1:1) over (1:10) over (1:20) 1963	1963	15.3 ppm	x 20	306 ppm
MO-340	-	over (1:5) over (1:20) over (1:40) over (1:80)	1513	12.2 ppm	x 80	976 ppm
MO-341	-	over (1:5) 951	951	8.24 ppm	x 5	41.2 ppm
					True	% Recovery
QC# 12102 [illegible]	-	1192	1192	9.93 ppm	10.2 ppm	97.4%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12.4.91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm		500
10.0 ppm		1131
15.0 ppm		2013
20.0 ppm		2586

corr.= 0.9969

slope= 143

[y']= 224

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC# 12102 TMS	-	1144	1144	9.59 ppm	10.2 ppm	94.0%
M. Black	-	ND	ND	<MDL	-	<0.114 ppm
MO-326	-	691 (1:1) 332	691	6.42 ppm	-	6.42 ppm
MO-335	-	542 (1:1) 266	542	5.37 ppm	-	5.37 ppm
MO-344	-	1095 (1:1) 439	1095	9.25 ppm	-	9.25 ppm
MO-345	-	ND	ND	<MDL	-	<0.114 ppm
MO-426	-	ND	ND	↓	-	↓
MO-421	-	ND	ND	↓	-	↓
MO-346	-	over (1:1) over (1:20) 2169	2169	16.8 ppm	x80	544 ppm
MO-353	-	over (1:5) over (1:20) over (1:100) 1427	1427	11.6 ppm	x100	1160 ppm
					True	% Recovery
QC# 12102 TMS	-	1165	1165	9.24 ppm	10.1 ppm	95.5%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-326/10ppm/1:1	1:1	791	791	7.12 ppm	8.21 ppm	86.7%
[illegible]	1:1	800	800	7.18 ppm	8.21 ppm	87.4%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12 5 91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm		500
10.0 ppm		1131
15.0 ppm		2013
20.0 ppm		2586

corr.= 0.9969

slope= 143

[y']= 224

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC#12102 [illegible]	-	1210	1210	10.0 ppm	True 10.2 ppm	% Recovery 98.0%
MO 364	-	over (1:1) over (1:20) over (1:80) over (1:160) 1651	1651	13.2 ppm	x160	2112 ppm
MO 365	-	1062	1062	9.02 ppm	-	9.02 ppm
MO 350	-	598 (1:1) 383	385 ~~[illegible]~~	4.26 ppm	x2	852 ppm
MO 359	-	~~[illegible]~~ over (1:1) over (1:20) 126	~~[illegible]~~ 126	6.66 ppm	x10	133 ppm
MO 368	-	over (1:1) 2052	2052	16.0 ppm	x2	32.0 ppm
MO 369	-	ND	ND	<MDL	-	<0.114 ppm
MO-418	-	1834 (dup 1800) = Avg 1821 (1:1) 729	1821	14.3 ppm	-	14.3 ppm
MO-429	-	ND	ND	<MDL	-	<0.114 ppm
QC# 12102 [illegible]	-	1195	1195	9.95 ppm	True 10.2 ppm	% Recovery 97.5%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO 350/10ppm/1:1	1:1	923	923	8.04	1.13 ppm	113%
/10 /1:1	1:1	911	911	8.0[illegible]	1.13 ppm	112%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-13-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl^-

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	494	494
10.0 ppm	1097	1097
15.0 ppm	1775	1775
20.0 ppm	2486	2486

corr.= 0.9993

slope= 133

[y']= 200

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC#12103 VAS	-	1104	1104	9.80 ppm	10.0 ppm	98.0%
MO-370	1:1	0.5 (1.8 0.6) (1.8) 1955	1955	[illegible] ppm	[illegible]	1296 ppm
MO-379	1:1	0.5 (1.80) 1852	1852	[illegible] ppm	[illegible]	[illegible] ppm
MO-388	-	0.5 (1.60) 1259	1259	11.0 ppm	[illegible]	1760 ppm
					True	% Recovery
QC#12107 TAS	-	1127	1127	9.98 ppm	10.0 ppm	99.8%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-370/10ppm/1:1	1.80	1578	1578	13.4 ppm	13.1 ppm	102%
↓ /10ppm/1:1	1.80	1576	1576	13.3 ppm	13.1 ppm	102%

ION CHROMATOGRAPH

PROJECT TITLE: [illegible] DATE: [illegible] ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	306					306
10.0 ppm	622					622
15.0 ppm	1000					1000
20.0 ppm	1349					1349

corr.= [illegible]

slope= [illegible]

[y']= 635

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
[illegible]	-	541				541	[illegible]	100 ppm	1321 ✓
MO-381	-	0.11	1.20	5.16		5.16	[illegible] ppm ✓	2400	311 ppm ✓
MO-314	0	ND				ND	<0.114		<0.114 ppm ✓
MO-333	0	ND				ND			
MO-321	0	ND				ND			
MO-422	0	ND				ND			
MO-363	0	ND				ND			
MO-304	0.1	0.05	0.10	0.16	541	541	[illegible] ppm	2100	[illegible] ppm
MO 403	0.1	0.11	0.10	541		541	5.41 ppm	2100	1318 ppm ✓
[illegible]		541				541	[illegible] ppm	[illegible]	[illegible]
								[illegible] ppm	[illegible] ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-19-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Cl

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	300	300
10.0	622	622
15.0	1020	1020
20.0	1349	1349

Curve Tan 12/18/91

corr.= 0.9992 ✓
slope= 70.9
[y']= 63.5

MDL = 0.114 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC # 12103 JRS	–	706	706 ✓	10.8 ppm ✓	True 10.0	2 Recovery 108% ✓
MO-412	–	over (1:1) over (1:80) over (1:160) 1103	~~1103~~ 1103 ✓	16.4 ppm ✓	X160 ✓	2624 ppm ✓
MO-413	–	over (1:1) over (1:20) 757	757 ✓	11.6 ppm ✓	X20 ✓	232 ppm ✓
MO-358	⊖	ND	ND ✓	<MDL ✓	–	<0.114 ppm ✓
MO-407	⊖	ND	✓			
MO-416	⊖	ND	✓			
MO-417	⊖	ND	✓			
M. Blank	⊖	ND	ND ✓	<MDL ✓	–	<0.114 ppm ✓
QC # 12103 JRS	–	710	710	10.9 ppm ✓	True 10.0	109% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-413 / 10 ppm / 1:1	1:20	806	806 ✓	12.3 ppm ✓	10.8 ppm	114% ✓
+ / 10 ppm / 1:1	1:20	754	754 ✓	11.5 ppm ✓	10.8 ppm	106% ✓

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 11-26-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	93.2					93.2 ✓
10.0 ppm	177					177 ✓
15.0 ppm	~~369~~ JL	269				269 ✓
20.0 ppm	~~363~~ JDL	365				JDL ~~363~~ 365 ✓

#11110 TM

JDL 12/27/91

corr.= ~~0.9996~~ 0.9995

slope= ~~18.0~~ 18.1

[y']= ~~0.20~~ 0.800

MDL = 0.127 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
								True	2 Recovery
QC# 11109 TM	–	194				194 ✓	10.7 ppm	11.4 ppm	93.82 ✓
MO-276	–	ND (1:1)	8.03 (1:10)	ND		8.03 ✓	~~0.434~~ JDL 0.486 ppm	X2 ✓	~~0.868~~ JDL ppm 0.972 ppm
-283	–	ND (1:1)	5.01			5.01 ✓	~~0.26~~ 0.320	X2 ✓	~~0.534~~ ppm 0.640
-284	(–)	19.7 (1:1)	ND			19.7 ✓	1.08 1.13	– ✓	~~1.08~~ ppm 1.13
-293	–	ND				ND ✓	<MDL	– ✓	<0.127 ppm
								True	2 Recovery
QC# 11109 TM	–	195				195 ✓	10.8 ppm	11.4 ppm	94.72 ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-276/15 ppm/1:1	1:1	161				161 ✓	8.92 ppm	7.77 ppm	~~1162~~ 115 %
/15 ppm/1:1	1:1	165				165 ✓	9.14 ↓	7.74 ↓	1182

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: [illegible] ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: [illegible]

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	932	932
10.0 ppm	177	177
15.0 ppm	269	269
20.0 ppm	363	363

corr.= 0.9996

slope= 18.0

[y']= 0.20

MDL = 0.127 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC# 11109 [illegible]		Red pressure high ~~1.2~~ 188	188	18.4 ppm	Low 11.4 ppm	L Recovery 91.2%
MO 278		ND (1.1) 1.90	~~1.90~~ ND	<MDL	~~x2~~	<0.127 ppm
MO 281		ND (1.1) 1.77 (1.10) 1.37	1.77	~~1.42~~ 0.420 ppm	x2	0.840 ppm
MO 280	–	ND (1.1) 1.60 (1.10) 2.36	1.60	0.[illegible] ppm	x2	1.75 ppm
MO 605	–	ND	ND	<MDL		<0.127 ppm
MO 437	–	ND	ND	↓	–	↓
MO 434		ND	ND			
MO 298		ND (1.1) 1.22 (1.10) 2.0 (1.10) 0.672	1.22	8.666 ppm	x2	1.33 ppm
QC# 11109 [illegible]	–	201	201	11.1 ppm	True 11.4 ppm	L Recovery 92.4%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-2-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br⁻

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	932					
10.0 ppm	177					
15.0 ppm	269					
20.0 ppm	363					

corr.= 0.9996

slope= 180

[y']= 0.20

MDL = 0.127 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
								True	% Recovery
[illegible]		20%				20%	11.6 ppm	11.4 ppm	102%
MO-307	-	76.6 (1:1)	26.0 (1:10)	5.16		26.0	1.43 ppm	X2	2.86 ppm
MO-316	-	ND (1:1)	15.9 (1:10)	2.26		15.9	0.871 ppm	X2	1.74 ppm
MO-317	-	ND				ND	<0.127	-	<0.127 ppm
MO-302	-	ND (1:1)	ND			ND	<0.127	-	<0.127 ppm
MO-311	-	ND (1:1)	ND			ND	<0.127	-	<0.127 ppm
								True	% Recovery
QC# 11109 Fy	-	212				212	11.7 ppm	11.4 ppm	103%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO 307/16.0 ppm/1:1	18:1	186				188	10.4 ppm	8.72 ppm	119%
/16.0 ppm/1:1	1:1	187				187	10.4 ppm	8.72 ppm	119%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12 3 91 ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: [illegible]

ELEMENT: Pr

Standards	Readings (Peak Height)	Mean Peak Height
		92.5
5.0 ppm	92.5	192
10.0 ppm	192	297
15.0 ppm	297	400
20.0 ppm	400	

corr.= 0.9999

slope= 20.6

[y']= 11.5

MDL = 0.127

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC # 12102 JM	-	191	191	9.85 ppm	10.2 ppm	96.6%
MO-320	-	11.4	11.4	1.11 ppm	-	1.11 ppm
MO-321	-	ND	ND	<MDL	-	<0.127 ppm
MO-436	-	ND	ND	↓	-	↓
MO-435	-	ND	ND	↓	-	↓
MO-322	-	0.05 (1:1) 329 (1:5) 51.1 (1:10) 341 (1:20) 23.1 (1:40) 10.9 (1:80) 5.45	329	16.6 ppm	x2	33.2 ppm
MO-333	-	394 (1:1) 169 (1:10) 14.1 (1:20) 6.58	169	8.78 ppm	x2	17.6 ppm
MO-340	-	385 (1:5) 46.8 (1:20) 10.7 (1:40) 5.27	385	19.3 ppm	-	19.3 ppm
MO-341	-	256 (1:5) 7.40	256	1.80 ppm	-	1.80 ppm
					True	% Recovery
QC # ~~1200~~ 12102 JM	-	190	190	9.80	10.2 ppm	96.1%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-4-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	Steve Ray	92.5
10.0 ppm		152
15.0 ppm		297
20.0 ppm	12/3/91	400

corr.= 0.9999 ✓

slope= 20.6

[y']= 11.5

MDL = 0.127

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC# 12102 Tm	-	180	180 ✓	9.32 ppm ✓	10.2 ppm ✓	91.4% ✓
M. Blank	⊖	ND	ND ✓	<MDL ✓	-	<0.127 ppm ✓
MO-326	-	ND (1:1) 8.61	8.61 ✓	0.978 ppm ✓	x2 ✓	1.96 ppm ✓
MO-335	-	ND (1:1) 7.07	7.07 ✓	0.904 ppm ✓	x2 ✓	1.81 ppm ✓
MO-344	-	155 (1:1) 58.3	155 ✓	8.10 ppm ✓	- ✓	8.10 ppm ✓
MO-345	⊖	ND	ND ✓	<MDL ✓	- ✓	<0.127 ppm ✓
MO-426	⊖	ND	ND ✓	↓	- ✓	↓
MO-421	⊖	ND	ND ✓	↓	- ✓	↓
MO-346	-	ND (1:1) 191 (1:80) 3.74	191 ✓	9.85 ppm ✓	x2 ✓	19.7 ppm ✓
MO-355	-	ovr (1:5) 108 (1:50) 10.3 (1:100) 4.85	108 ✓	5.82 ppm ✓	x5 ✓	29.1 ppm ✓
					True	% Recovery
QC# 12102 Tm	-	184	184 ✓	9.51 ppm ✓	10.2 ppm ✓	93.2% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-326/10ppm/1:1	1:1	107	107 ✓	5.77 ppm ✓	5.49 ppm ✓	105% ✓
	1:1	107	107 ✓	5.77 ppm ✓	5.49 ppm ✓	105% ✓

Reviewed by [illegible]

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-5-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br-

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm		92.5
10.0 ppm		192
15.0 ppm		297
20.0 ppm		400

corr.= 0.9999

slope= 20.6

[y']= 11.5

MDL = 0.127 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
					True	% Recovery
QC# 12102 Tr	-	178	178	9.22 ppm	10.2 ppm	90.3%
MO-364	-	ND (1:1) 41.4 (1:2) 9.10 (1:8) 1.14 (1:16) 0.[illegible]	41.4	2.57 ppm	x5	12.8 ppm
MO-365	-	4.16 (1:1) [illegible]	4.16	0.762 ppm	-	0.762 ppm
MO-350	-	ND (1:1) 9.61	9.61	1.03 ppm	x2	2.06 ppm
MO-359	-	ND (1:1) 17.6 (1:2) 2.12	17.6	1.42 ppm	x2	2.84 ppm
MO-368	-	ND (1:1) 13.4	13.4	1.21 ppm	x2	2.42 ppm
MO-369	-	ND	ND	<MDL	-	<0.127 ppm
MO-418	-	ND (dup ND) (1:1) ND	ND	↓	-	↓
MO-429	-	ND	ND		-	
					True	% Recovery
QC# 12102 Tr	-	182	182	9.42	10.2 ppm	92.4%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO 350 / 10 ppm / 1:1	1:1	111	111	5.96 ppm	5.52 ppm	108%
[illegible] / 1:1	1:1	109	109	5.36 ppm	5.52 ppm	106%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-13-91 ANALYST: Southerland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br⁻

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	76.0					76.0 ✓
10.0	155					155 ✓
15.0	236					236 ✓
20.0	319					319 ✓

corr.= 0.9999 ✓

slope= 162 ✓

[y']= 6.00 ✓

MDL = 0.127 ppm ✓

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
								True	% Recovery
DC#12103 Jas	–	149				149 ✓	9.57 ppm ✓	10.0 ppm	95.7% ✓
MO-370	1:1	362	(1:4) 162	(1:50) 4.5		~~362~~ 162	~~22.7~~ 10.4 ppm ✓	x4 ✓	41.6 ppm ✓
MO-379	(1:1)	283	(1:80) 5.04			283 ✓	17.8 ppm ✓	x2 ✓	35.6 ppm ✓
MO-388	(–)	160	(1:160) NO			160 ✓	10.2 ppm ✓	– ✓	10.2 ppm
								True	% Recovery
DC#12103 Jas	–	158				158 ✓	10.1 ppm ✓	10.0 ppm	101% ✓

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-370/10 ppm/1:1	1:80	79.6				79.6 ✓	5.28 ppm ✓	5.54 ppm ✓	95.3% ✓
" /10 ppm/1:1	1:80	82.3				82.3 ✓	5.45 ppm ✓	5.54 ppm ✓	98.4% ✓

ION CHROMATOGRAPH

PROJECT TITLE: [illegible] DATE: [illegible] ANALYST: [illegible]

INSTRUMENT: DIONEX 16

METHOD: [illegible]

ELEMENT: [illegible]

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	426					426
10.0 ppm	824					824
15.0 ppm	127					127
20.0 ppm	168					168

corr.= [illegible]

slope= [illegible]

[y']= 0.200

MDL = [illegible] ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
[illegible]		126				126	[illegible]	[illegible]	[illegible]
[illegible]		ND ([illegible]) ND				ND	[illegible]		[illegible]
[illegible]		ND				ND			
[illegible]		ND				ND			
[illegible]		ND				ND			
[illegible]		ND				ND			
[illegible]		ND				ND			
[illegible]		ND ([illegible]) ND ([illegible]) ND				ND			
[illegible]		ND ([illegible]) ND				ND			
[illegible]									
[illegible]		[illegible]				[illegible]	[illegible]	[illegible]	[illegible]

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 12-14-91 ANALYST: Jack Kaplan

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br

Standards	Readings (Peak Height)	Mean Peak Height
5.0 ppm	42.6	42.6
10.0	82.4	82.4
15.0	129	129
20.0	168	168

corr.= 0.9994

slope= 8.46

[y']= 0.200

MDL = 0.121 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)	Mean Pk. Height	Concentration	Dilution Factor	Final Concentration
QC #12103 [illegible]		81.1	81.1	[illegible]	[illegible]	[illegible]
MO 412	-	ND (1:1) 64.3 (1:2) ND (1:4)	64.3	1.63 ppm	x2	[illegible]
MO 413	-	ND (1:1) ND (1:2) ND	ND	<MDL		<0.121 ppm
MO-398	-	ND	ND			
MO-407	-	ND	ND			
MO-416	-	ND	ND			
MO-417	-	ND	ND			
M. Blank	-	ND	ND	<MDL	-	<0.121 ppm
					True	% Recovery
QC #12103 [illegible]	-	90.0	90.0	10.7 ppm	10.0 ppm	107%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)	Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)	Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO-412/10 ppm/1:1	1:20	36.5	36.5	4.34 ppm	5.0 ppm	86.5%
" 10 ppm/1:1	1:20	44.2	44.2	5.25 ppm	5.0 ppm	105%

ION CHROMATOGRAPH

PROJECT TITLE: Morristown DATE: 1-2-92 ANALYST: Sutherland

INSTRUMENT: DIONEX 16

METHOD: IC

ELEMENT: Br^-

Standards	Readings (Peak Height)					Mean Peak Height
5.0 ppm	60.4					60.4
10.0	124	Curve run				124
15.0	160	12/30/91				160
20.0	260					260

corr. = 0.9998

slope = 13.3

[y'] = 2.6

MDL = 0.127 ppm

Samples (SAM #)	Dilution	Readings (Pk. Height)				Mean Pk. Height	Concentration	Dilution Factor True	Final Concentration % Recovery
QC# 121088KB	-	122				122	9.15 ppm	10.0 ppm	92.5%
MO. 307	-	33.8 (1:1)	18.1			18.1	1.33 ppm	N/A	3.36 ppm
								True	% Recovery
QC# 121688KB	-	127				127	10.1 ppm	10.0 ppm	101%

Duplicates (Sam#/ID)	Dilution	Readings (Peak Height)				Mean Pk. Height	Duplicate Concentration	Sample Conc.	Percent Recovery

Spikes (Sam#/Std/Ratio)	Dilution	Readings (Concentration)				Mean Pk. Height	Spike Concentration	True Value	Percent Recovery
MO. 307 / 1 ppm / 1:1	1:1	122				122	1.75	5.46 ppm	115%
↓ / 1 ppm / 1:1	1:1	124				124	1.90	5.46 ppm	117%

TITLE [illegible] Book No. 26080 **RADIAN** CORPORATION

From Page No.

CD 1-23-92

pH BENCH SHEET

PROJECT/WORKORDER = P1-11-015

TEMPERATURE = 25°C

EFFICIENCY =

STANDARD	pH
STANDARD CAL 10.00	10.003
7.00	7.022
4.00	4.001

QC	pH	TRUE	% RECOVERY

SAM #	pH
P1-11-015 19a	9.895
mo 641 20a	9.497
mo 642 21a	10.370
mo 643 22a	9.620
mo-645 23a	10.108
? 24a	10.200

Samples prepared: 10g sample added to 20.0mL DI water. Stir one hour. Read pH.

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by [illegible]	1-23-92

TITLE Morristown 9SH Samples Carbon Test Book No. 26310 RAD CORPO

From Page No.

Known Cal	Reading
.359%	.359%
.897%	.895%
3.32%	3.34%
6.13%	6.14%

DATE 1/22/92

ID #	Run # Day	Lot	Grams of Sample	Carbon Amount
MO 439 1b	1	BA	5.002	7.01
444 2b	2	BA	4.995	1.62
449 3b	3	BA	5.003	2.38
454 4b	4	BA	5.008	1.04
459 5b	5	BA	5.000	3.83
464 6b	6	BA	5.000	1.52
469 7b	1	BH	5.005	2.21
474 8b	2	BH	5.009	1.22
479 9b	3	BH	5.012	3.88
484 10b	4	BH	4.999	3.89
489 11b	5	BH	4.995	2.22
494 12b	6	BH	4.997	3.67
499 13b	1	Spray Dryer	4.999	1.72
504 14b	2	Spray Dryer	5.009	1.57
509 15b	3	Spray Dryer	4.995	3.68
514 16b	4	Spray Dryer	4.998	3.18
519 17b	5	Spray Dryer	5.000	2.92
MO 524 18b	6	Spray Dryer	5.000	2.67

Witnessed & Understood by me. | Date | Invented by | Date

Recorded by

Morristown Memorial Hospital
Ash Weight Summary

TOTAL ASH REMOVED (Lbs.)

Date	Bottom	Spraydryer	Baghouse	
11/18/91	325	17	185	
11/19/91	256	15	122	
11/20/91	404	98	215	(a)
11/21/91	213	13	99	
11/22/91	241	10	292	
11/23/91	248	8	156	

a. Filter cake was removed during run on 11/20/91. Total ash dropped was 859 lbs in 1.5 hours. The 215 lbs shown in the table does not include any of the ash from cake removal.

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: Morristown Hosp
Sample Type: PSD

Run #: 1
Date: 11 20 91
Technician: TW & BW
Sheet ___ of ___

Filter Set JO

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO-235				0.62655		
					0.62652		
	Inlet Run 1						
				0.62111	0.62654	0.00543	
1					0.78272		
					0.78272		
				0.78178	0.78272	0.00094	
2					0.76765		
					0.76765		
				0.76621	0.76765	0.00144	
3					0.74883		
					0.74885		
				0.74612	0.74884	0.00272	
4					0.72950		
					0.72952		
				0.72675	0.72951	0.00276	
5					0.65400		
					0.65404		
				0.65165	0.65402	0.00237	
6					0.69468		
					0.69470		
				0.69246	0.69469	0.00223	
7					0.61184		
					0.61182		
				0.61053	0.61183	0.00130	
8					0.76421		
					0.76421		
				0.76206	0.76421	0.00215	
9					0.91088		
					0.91089		
				0.90079	0.91089	0.01010	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: DSD

Run #: 2
Date: 11 | 21 | 91
Technician: TU + BUN
Sheet ____ of ____

FILTER SET JC

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
Ø	MO-239				0.92580		
					0.92570		
	INLET RUN 2			0.91148	0.92570	0.01422	
1					0.85626		
					0.85627		
				0.85544	0.85627	0.00083	
2					0.76182		
					0.76182		
				0.76072	0.76182	0.00110	
3					0.77853		
					0.77854		
				0.77638	0.77854	0.00216	
4					0.65477		
					0.65475		
				0.65283	0.65476	0.00193	
5					0.68184		
					0.68180		
				0.67992	0.68182	0.00190	
6					0.60917		
					0.60916		
				0.60770	0.60917	0.00147	
7					0.62515		
					0.62515		
				0.62430	0.62515	0.00085	
8					0.60168		
					0.60168		
				0.60099	0.60168	0.00069	
9					0.66800		
					0.66800		
				0.65911	0.66800	0.00889	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: DSA

Run #: 3
Date: 11/22/91
Technician: TW + BLW
Sheet ____ of ____

FILTER SET PO

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
Ø	MO-243	-			0.87875		
					0.87874		
	INLET RUN 3			0.86523	0.87875	0.01352	
1					0.62119		
					0.62115		
				0.62083	0.62117	0.00034	
2					0.76079		
					0.76082		
				0.76035	0.76081	0.00046	
3					0.61826		
					0.61823		
				0.61700	0.61825	0.00125	
4					0.60532		
					0.60530		
				0.60361			
				~~0.60631~~	0.60531	0.00170	
5					0.78655		
					0.78654		
				0.78510	0.78655	0.00145	
6					0.75610		
					0.75608		
				0.75491	0.75609	0.00118	
7					0.61383		
					0.61383		
				0.61309	0.61383	0.00074	
8					0.59110		
					0.59110		
				0.58960	0.59110	0.00150	
9					0.68319		
					0.68320		
				0.67461	0.68320	0.00859	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: Morristown Hosp
Sample Type: PSD

Run #: 4
Date: 11/23/91
Technician: TW & Bun
Sheet ____ of ____

Filter Set A0

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	Mo-247				0.85064		
					0.85065		
	Inlet Run 4			0.83984	0.85065	0.01081	
1					1.06670		
					1.06668		
				1.06588	1.06669	0.00081	
2					0.60916		
					0.60919		
				0.60854	0.60918	0.00064	
3					0.83116		
					0.83113		
				0.82940	0.83115	0.00175	
4					1.02343		
					1.02346		
				1.02191	1.02345	0.00154	
5					0.97170		
					0.97168		
				0.97009	0.97169	0.00160	
6					1.06765		
					1.06767		
				1.06620	1.06766	0.00146	
7					0.87326		
					0.87326		
				0.87277	0.87326	0.00049	
8					0.75702		
					0.75702		
				0.75670	0.75702	0.00032	
9					1.06979		
					1.06982		
				1.06398	1.06981	0.00583	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: PSD

Run #: FB
Date: 11/23/91
Technician: JW & BWN
Sheet ____ of ____

FILTER SET JA

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO - 255				0.80860		
					0.80860		
	INLET FB			0.80843	0.80860	0.00017	
1					1.04679		
					1.04675		
				1.04663	1.04677	0.00014	
2					0.76803		
					0.76800		
				0.76777	0.76802	0.00025	
3					0.85410		
					0.85408		
				0.85396	0.85409	0.00013	
4					1.08069		
					1.08072		
				1.08046	1.08071	0.00025	
5					1.14528		
					1.14525		
				1.14512	1.14527	0.00015	
6					0.99300		
					0.99300		
				0.99277	0.99300	0.00023	
7					0.61042		
					0.61038		
				0.61031	0.61040	0.00009	
8					1.01697		
					1.01694		
				1.01693	1.01696	0.00003	
9					0.88744		
					0.88740		
				0.88721	0.88742	0.00021	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: Morristown Hosp
Sample Type: PSD

Run #: 1
Date: 11/20/91
Technician: TU & Bun
Sheet ___ of ___

Filter Set JO

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO-235				0.62655		
					0.62652		
	Inlet Rod			0.62111	0.62654	0.00543	
1					0.78272		
					0.78272		
				0.78178	0.78272	0.00094	
2					0.76765		
					0.76765		
				0.76621	0.76765	0.00144	
3					0.74883		
					0.74885		
				0.74612	0.74884	0.00272	
4					0.72950		
					0.72952		
				0.72675	0.72951	0.00276	
5					0.65400		
					0.65404		
				0.65165	0.65402	0.00237	
6					0.69468		
					0.69470		
				0.69246	0.69469	0.00223	
7					0.61184		
					0.61182		
				0.61053	0.61183	0.00130	
8					0.76421		
					0.76421		
				0.76206	0.76421	0.00215	
9					0.91088		
					0.91089		
				0.90079	0.91089	0.01010	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: PSD

Run #: 2
Date: 11/21/91
Technician: JW + BUN
Sheet ____ of ____

FILTER SET JC

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
¢	MO-239				0.92580		
					0.92570		
	INLET Row 2			0.91148	0.92570	0.01422	
1					0.85626		
					0.85627		
				0.85544	0.85627	0.00083	
2					0.76182		
					0.76182		
				0.76072	0.76182	0.00110	
3					0.77853		
					0.77854		
				0.77638	0.77854	0.00216	
4					0.65477		
					0.65475		
				0.65283	0.65476	0.00193	
5					0.68184		
					0.68180		
				0.67992	0.68182	0.00190	
6					0.60917		
					0.60916		
				0.60770	0.60917	0.00147	
7					0.62515		
					0.62515		
				0.62430	0.62515	0.00085	
8					0.60168		
					0.60168		
				0.60099	0.60168	0.00069	
9					0.66800		
					0.66800		
				0.65911	0.66800	0.00889	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: PSD

FILTER SET PO

Run #: 3
Date: 11/22/91
Technician: TW & BW
Sheet ____ of ____

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO-243				0.87875		
					0.87874		
	INLET RUN 3			0.86523	0.87875	0.01352	
1					0.62119		
					0.62115		
				0.62083	0.62117	0.00034	
2					0.76079		
					0.76082		
				0.76035	0.76081	0.00046	
3					0.61826		
					0.61823		
				0.61700	0.61825	0.00125	
4					0.60532		
					0.60530		
				0.60361			
				~~0.60631~~	0.60531	0.00170	
5					0.78655		
					0.78654		
				0.78510	0.78655	0.00145	
6					0.75610		
					0.75608		
				0.75491	0.75609	0.00118	
7					0.61383		
					0.61383		
				0.61309	0.61383	0.00074	
8					0.59110		
					0.59110		
				0.58960	0.59110	0.00150	
9					0.68319		
					0.68320		
				0.67461	0.68320	0.00859	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: PSD

Run #: 4
Date: 11/23/91
Technician: TW & RWN
Sheet ___ of ___

FILTER SET AO

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO-247				0.85064		
					0.85065		
	INLET RUN 4			0.83984	0.85065	0.01081	
1					1.06670		
					1.06668		
				1.06588	1.06669	0.00081	
2					0.60916		
					0.60919		
				0.60854	0.60918	0.00064	
3					0.83116		
					0.83113		
				0.82940	0.83115	0.00175	
4					1.02343		
					1.02346		
				1.02191	1.02345	0.00154	
5					0.97170		
					0.97168		
				0.97009	0.97169	0.00160	
6					1.06765		
					1.06767		
				1.06620	1.06766	0.00146	
7					0.87326		
					0.87326		
				0.87277	0.87326	0.00049	
8					0.75702		
					0.75702		
				0.75670	0.75702	0.00032	
9					1.06979		
					1.06982		
				1.06398	1.06981	0.00583	

RADIAN CORPORATION

METHOD 5 ANALYSIS DATA SHEET

Client: EPA
Plant: MORRISTOWN HOSP
Sample Type: PSD

Run #: FB
Date: 11/23/91
Technician: JW & BLN
Sheet ____ of ____

FILTER SET JA

Run #	Sample ID#	Sample Vol. ml	Blank Corr. ml	Tare Weight (g)	Final Weight (g)	Sample Weight (g)	Comments
0	MO - 255				0.80860		
					0.80860		
	INLET FB			0.80843	0.80860	0.00017	
1					1.04679		
					1.04675		
				1.04663	1.04677	0.00014	
2					0.76803		
					0.76800		
				0.76777	0.76802	0.00025	
3					0.85410		
					0.85408		
				0.85396	0.85409	0.00013	
4					1.08069		
					1.08072		
				1.08046	1.08071	0.00025	
5					1.14528		
					1.14525		
				1.14512	1.14527	0.00015	
6					0.99300		
					0.99300		
				0.99277	0.99300	0.00023	
7					0.61042		
					0.61038		
				0.61031	0.61040	0.00009	
8					1.01697		
					1.01694		
				1.01693	1.01696	0.00003	
9					0.88744		
					0.88740		
				0.88721	0.88742	0.00021	

From Page No.

		11/6	11/7
AO	0	0.83984	0.83983
	1	1.06588	1.06588
	2	0.60853	0.60854
	3	0.82939	0.82940
	4	1.02190	1.02191
	5	0.97009	0.97009
	6	1.06619	1.06621
	7	0.87276	0.87277
	8	0.75670	0.75670
AO	9	1.06390	1.06395
Q	0	0.68488	0.68488
	1	0.61900	0.61900
	2	0.58460	0.58461
	3	0.82544	0.82544
	4	0.59580	0.59581
	5	0.62392	0.62390
	6	0.58999	0.58.999
	7	0.62070	0.62072
	8	0.61573	0.61574
Q	9	0.66560	0.66560
KO	0	0.89283	0.89282
	1	0.62595	0.62594
	2	0.61638	0.61638
	3	0.61720	0.61721
	4	0.59433	0.59436
	5	0.60667	0.60667
	6	0.57637	0.57638
	7	0.62888	0.62888
	8	0.58477	0.58478
KO	9	0.66825	0.66827

To Pag

Witnessed & Understood by me.	Date	Invented by	Date
		Recorded by	

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From Page No. ___

		11/5/91	46
JO	0	0.62111	0.62111
JO	1	0.78178	0.78178
JO	2	0.76620	0.76621
	3	0.74613	0.74611
	4	0.72676	0.72674
	5	0.65165	0.65165
	6	0.69245	0.69246
	7	0.61053	0.61052
	8	0.76207	0.76205
JO	9	0.90078	0.90079
CO	0	0.73604	0.73604
	1	0.62135	0.62134
	2	0.95500	0.95500
	3	1.04754	1.04752
	4	0.65304	0.65302
	5	0.60407	0.60407
	6	0.99240	0.99242
	7	0.80340	0.80340
	8	0.91574	0.91572
CO	9	0.73160	0.73160
DD	0	0.44183	0.44182
	1	0.58492	0.58492
	2	0.63636	0.63637
	3	0.59304	0.59304
	4	0.65050	0.65051
	5	0.60050	0.60050
	6	0.60850	0.60850
	7	0.63255	0.63254
	8	0.60480	0.60480
DD	9	0.68148	0.68147

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

E PSD Filter TARe WT

Project No.

Book No. 25279 **RADIAN** CORPORATION

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m Page No.

		H 5/91	11/6
JA	Ø	0.80843	0.80843
	1	1.04663	1.04663
	2	0.76777	0.76777
	3	0.85396	0.85395
	4	1.08045	1.08046
	5	1.14512	1.14512
	6	0.99277	0.99277
	7	0.61031	0.61031
	8	1.01694	1.01692
JA	9	0.88720	0.88721
JC	Ø	0.91147	0.91148
	1	0.85544	0.85544
	2	0.76073	0.76071
	3	0.77638	0.77638
	4	0.65283	0.65283
	5	0.67992	0.67991
	6	0.60770	0.60770
	7	0.62430	0.62430
	8	0.60099	0.60099
JC	9	0.65912	0.65910
PO	Ø	0.86523	0.86523
	1	0.62083	0.62083
	2	0.76035	0.76034
	3	0.61700	0.61700
	4	0.60360	0.60362
	5	0.78510	0.78509
	6	0.75490	0.75491
	7	0.61309	0.61309
	8	0.58960	0.58960
	9	0.67460	0.67461

To Page No.

Witnessed & Understood by me.	Date	Invented by	Date
		Recorded by	

From Page No. _____ ~~MO 255~~ MO 255 RUN AB INLET

		12/4/91	12/5/91	12/10/91
JA	0	0.80860	0.80860 ✓	
JA	1	1.04687	1.04679	1.04675 ✓
	2	0.76825	0.76803	0.76800 ✓
	3	0.85434	0.85410	0.85408 ✓
	4	1.08069	1.08072 ✓	
	5	1.14528	1.14525 ✓	
	6	0.99344	0.99300	0.99300 ✓
	7	0.61042	0.61038 ✓	
	8	1.01697	1.01694 ✓	
JA	9	0.88744	0.88740 ✓	

MO 243 RUN 3 INLET

				12/10/91	12/13/91
PO	0	0.87948	0.87924	0.87875	0.87874 ✓
	1	0.62119	0.62115 ✓		
	2	0.76088	0.76079	0.76082 ✓	
	3	0.61826	0.61823 ✓		
	4	0.60553	0.60532	0.60530 ✓	
	5	0.78688	0.78662	0.78655	0.78654 ✓
	6	0.75619	0.75610	0.75608 ✓	
	7	0.61383	0.61383 ✓		
	8	0.59124	0.59110	0.59110 ✓	
PO	9	0.68354	0.68300	0.68319	0.68320 ✓

MO 239 RUN 2 INLET

JC	0	0.92584	0.92590	0.92570 ✓
	1	0.85626	0.85627 ✓	
	2	0.76182	0.76182 ✓	
	3	0.77853	0.77854 ✓	
JC	4	0.65477	0.65475 ✓	
	5	0.68184	0.68180 ✓	
JC	6	0.60917	0.60916 ✓	
	7	0.62515	0.62515 ✓	
	8	0.60168	0.60168 ✓	
JC	9	0.66776	0.66800	0.66800 ✓
		12/4/91	12/5/91	12/10/91

To Page N

Witnessed & Understood by me.	Date	Invented by	Date
		Recorded by	

TITLE PSD FINAL WT. MORRISTOWN

Project No.

Book No. 25273

RADI CORPORA

From Page No.

MO 247 RUN 4 INLET

		12/4/91	12/5/91	12/10/91
AO	~~0~~			
	0	0.85064	0.85065	
	1 ~~2~~	1.06670	1.06668	
	2 ~~3~~	0.60916	0.60919	
	3 ~~4~~	0.83116	0.83113	
	4 ~~5~~	1.02343	1.02346	
	5 ~~6~~	0.97170	0.97168	
	6 ~~7~~	1.06897	1.06765	1.06767
	7 ~~8~~	0.87326	0.87326	
AO	8 ~~9~~	0.75702	0.75702	
	9	1.06979	1.06982	

MO 235 RUN 1 INLET 12/10/91

JO	~~0~~	0.62655	0.62652
	1	0.78272	0.78272
	2	0.76765	0.76765
	3	0.74883	0.74885
	4	0.72950	0.72952
	5	0.65460	0.65464
	6	0.69468	0.69470
	7	0.61184	0.61182
	8	0.76421	0.76421
	9	0.91088	0.91089

12/4/91 12/10/91

To P

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-01	MORRISTOWN	11/12/91	INLET	METALS	FILTER	1	[illegible]		BWN/JDL	[illegible]
MO-02	MORRISTOWN		INLET	METALS	ACETONE PR	1	[illegible]	[illegible]	BWN/JDL	
MO-03	MORRISTOWN		INLET	METALS	NITRIC PR	1	[illegible]	[illegible]	BWN/JDL	
MO-04	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	1	[illegible]	[illegible]	BWN/JDL	[redacted]
[redacted]										
MO-06	MORRISTOWN	11/8/91	INLET	METALS	PERMANGANATE	1	3[illegible]	[illegible]	BWN/JDL	[redacted]
[redacted]										
MO-08	MORRISTOWN	11/8/91	OUTLET	METALS	FILTER	1	[illegible]		BWN/JDL	[illegible]
MO-09	MORRISTOWN		OUTLET	METALS	ACETONE PR	1	[illegible]	[illegible]	BWN/JDL	
MO-10	MORRISTOWN		OUTLET	METALS	NITRIC PR	1	[illegible]	[illegible]	BWN/JDL	
MO-11	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	1	[illegible]	[illegible]	BWN/JDL	[redacted]
[redacted]										
MO-13	MORRISTOWN	11/8/91	OUTLET	METALS	PERMANGANATE	1	[illegible]	[illegible]	BWN/JDL	[redacted]
[redacted]										
MO-15	MORRISTOWN	11/8/91	INLET	METALS	FILTER	2	0.6342	–	BWN/JDL	TM 022
MO-16	MORRISTOWN		INLET	METALS	ACETONE PR	2	353.8	264.6	BWN/JDL	
MO-17	MORRISTOWN		INLET	METALS	NITRIC PR	2	560.0	263.9	BWN/JDL	
MO-18	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	2	1172.4	380.8	BWN/JDL	[redacted]
[redacted]										
MO-20	MORRISTOWN	11/8/91	INLET	METALS	PERMANGANATE	2	866.8	381.5	BWN/JDL	[redacted]
[redacted]										
MO-22	MORRISTOWN	11/8/91	OUTLET	METALS	FILTER	2	0.6559		BWN/JDL	TM 029
MO-23	MORRISTOWN		OUTLET	METALS	ACETONE PR	2	589.3	264.1	BWN/JDL	
MO-24	MORRISTOWN		OUTLET	METALS	NITRIC PR	2	415.1	264.0	BWN/JDL	
MO-26	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	2	870.8	379.2	BWN/JDL	[redacted]
[redacted]										
MO-27	MORRISTOWN	11/8/91	OUTLET	METALS	PERMANGANATE	2	822.4	381.3	BWN/JDL	[redacted]
[redacted]										
MO-29	MORRISTOWN	11/20/91	INLET	METALS	FILTER	3	0.5563		BWN/JDL	
MO-30	MORRISTOWN		INLET	METALS	ACETONE PR	3	264.1	495.1	BWN/JDL	
MO-31	MORRISTOWN		INLET	METALS	NITRIC PR	3	263.2	408.9	BWN/JDL	
MO-32	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	3	380.5	1257.9	BWN/JDL	[redacted]
[redacted]										
MO-34	MORRISTOWN	11/20/91	INLET	METALS	PERMANGANATE	3	380.7	816.9	BWN/JDL	[redacted]
[redacted]										
MO-36	MORRISTOWN	11/20/91	OUTLET	METALS	FILTER	3	0.5736		BWN/JDL	
MO-37	MORRISTOWN		OUTLET	METALS	ACETONE PR	3	263.7	419.5	BWN/JDL	
MO-38	MORRISTOWN		OUTLET	METALS	NITRIC PR	3	263.4	492.3	BWN/JDL	
MO-39	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	3	381.9	1282.6	BWN/JDL	[redacted]
[redacted]										
MO-41	MORRISTOWN	11/20/91	OUTLET	METALS	PERMANGANATE	3	379.6	804.1	BWN/JDL	[redacted]
[redacted]										

AMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample ID	Client	Date	Location	Type of Train	Fraction	Run #	Tare Wt	Final Wt	Sampler	Comments
MO-43	MORRISTOWN	11/21/91	INLET	METALS	FILTER	4	0.6490		BWN/JDL	* TM023
MO-44	MORRISTOWN		INLET	METALS	ACETONE PR	4	263.1	559.0	BWN/JDL	
MO-45	MORRISTOWN		INLET	METALS	NITRIC PR	4	263.4	419.4	BWN/JDL	
MO-46	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	4	391.9	1338.6	BWN/JDL	[redacted]
[redacted]										
MO-48	MORRISTOWN	11/21/91	INLET	METALS	PERMANGANATE	4	391.8	795.9	BWN/JDL	[redacted]
[redacted]										
MO-50	MORRISTOWN	11/21/91	OUTLET	METALS	FILTER	4	0.6385		BWN/JDL	* TM028
MO-51	MORRISTOWN		OUTLET	METALS	ACETONE PR	4	263.5	446.4	BWN/JDL	
MO-52	MORRISTOWN		OUTLET	METALS	NITRIC PR	4	262.8	453.8	BWN/JDL	
MO-53	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	4	389.8	1252.5	BWN/JDL	[redacted]
[redacted]										
MO-55	MORRISTOWN	11/21/91	OUTLET	METALS	PERMANGANATE	4	390.2	811.7	BWN/JDL	[redacted]
[redacted]										
MO-57	MORRISTOWN	11/22/91	INLET	METALS	FILTER	5	0.6578		BWN/JDL	TM 1103
MO-58	MORRISTOWN		INLET	METALS	ACETONE PR	5	273.1	497.2	BWN/JDL	
MO-59	MORRISTOWN		INLET	METALS	NITRIC PR	5	272.6	349.2	BWN/JDL	
MO-60	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	5	381.0	1282.9	BWN/JDL	[redacted]
[redacted]										
MO-62	MORRISTOWN	11/22/91	INLET	METALS	PERMANGANATE	5	379.6	743.7	BWN/JDL	[redacted]
[redacted]										
MO-64	MORRISTOWN	11/22/91	OUTLET	METALS	FILTER	5	0.6405		BWN/JDL	TM027
MO-65	MORRISTOWN		OUTLET	METALS	ACETONE PR	5	274.2	456.3	BWN/JDL	
MO-66	MORRISTOWN		OUTLET	METALS	NITRIC PR	5	273.8	451.5	BWN/JDL	
MO-67	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	5	381.7	1220.1	BWN/JDL	[redacted]
[redacted]										
MO-69	MORRISTOWN	11/22/91	OUTLET	METALS	PERMANGANATE	5	380.9	778.5	BWN/JDL	[redacted]
[redacted]										
MO-71	MORRISTOWN	11/23/91	INLET	METALS	FILTER	6	0.6437		BWN/JDL	TM026
MO-72	MORRISTOWN		INLET	METALS	ACETONE PR	6	273.3	583.0	BWN/JDL	
MO-73	MORRISTOWN		INLET	METALS	NITRIC PR	6	273.5	501.5	BWN/JDL	
MO-74	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	6	380.4	1317.1	BWN/JDL	[redacted]
[redacted]										
MO-76	MORRISTOWN	11/23/91	INLET	METALS	PERMANGANATE	6	387.4	793.2	BWN/JDL	[redacted]
MO-77	MORRISTOWN		INLET	METALS	PERMANGANATE	6			BWN/JDL	
MO-78	MORRISTOWN	11/23/91	OUTLET	METALS	FILTER	6	0.6386		BWN/JDL	TM030
MO-79	MORRISTOWN		OUTLET	METALS	ACETONE PR	6	272.5	435.6	BWN/JDL	
MO-80	MORRISTOWN		OUTLET	METALS	NITRIC PR	6	263.7	464.6	BWN/JDL	
MO-81	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	6	381.4	1223.9	BWN/JDL	[redacted]
[redacted]										
MO-83	MORRISTOWN	11/23/91	OUTLET	METALS	PERMANGANATE	6	388.1	768.1	BWN/JDL	[redacted]

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample #	Facility	Date	Location	Type of Test	Method	Feed Line	Feed Wt.	Final Wt.	Analyst	Comments
[redacted]										
MO-85	MORRISTOWN	11/22/91	INLET	METALS	FILTER	FB	0.6587		BWN/JDL	#99114
MO-86	MORRISTOWN		INLET	METALS	ACETONE PR	FB	273.3	398.9	BWN/JDL	
MO-87	MORRISTOWN		INLET	METALS	NITRIC PR	FB	273.8	351.6	BWN/JDL	
MO-88	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	FB	387.6	875.6	BWN/JDL	[redacted]
[redacted]										
MO-90	MORRISTOWN	11/22/91	INLET	METALS	PERMANGANATE	FB	388.0	572.7	BWN/JDL	[redacted]
[redacted]										
MO-92	MORRISTOWN	11/22/91	OUTLET	METALS	FILTER	FB	0.6475		BWN/JDL	#99129
MO-93	MORRISTOWN		OUTLET	METALS	ACETONE PR	FB	272.5	378.3	BWN/JDL	
MO-94	MORRISTOWN		OUTLET	METALS	NITRIC PR	FB	272.4	420.4	BWN/JDL	
MO-95	MORRISTOWN		OUTLET	METALS	NITRIC/PEROXIDE	FB	287.4	756.6	BWN/JDL	[redacted]
[redacted]										
MO-97	MORRISTOWN	11/22/91	OUTLET	METALS	PERMANGANATE	FB	287.6	814.9	BWN/JDL	[redacted]
[redacted]										
MO-99	MORRISTOWN	11/23/91	INLET	METALS	FILTER	LPB	0.6685 g		BWN/JDL	
MO-100	MORRISTOWN		INLET	METALS	ACETONE PR	LPB	261.5 g	521.1 g	BWN/JDL	
MO-101	MORRISTOWN		INLET	METALS	NITRIC PR	LPB	262.7 g	346.4 g	BWN/JDL	
MO-102	MORRISTOWN		INLET	METALS	NITRIC/PEROXIDE	LPB	304.4 g	517.5 g	BWN/JDL	[redacted]
[redacted]										
MO-104	MORRISTOWN	11/23/91	INLET	METALS	PERMANGANATE	LPB	304.6 g	618.4 g	BWN/JDL	[redacted]
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
MO-113	MORRISTOWN	11/18/91		METALS	NITRIC/PEROXIDE	RB DAY 1	262.1 g	384.4 g	BWN/JDL	
MO-114	MORRISTOWN	11/19/91		METALS	NITRIC/PEROXIDE	RB DAY 2			BWN/JDL	
MO-115	MORRISTOWN	11/20/91		METALS	NITRIC/PEROXIDE	RB DAY 3	212.1	121.1	BWN/JDL	
MO-116	MORRISTOWN	11/21/91		METALS	NITRIC/PEROXIDE	RB DAY 4	807.4 g	263.8 g	BWN/JDL	
[redacted]										Not taken, sample used up to make FB's. Plans to make a new batch of reagent would not be representative of what was made the FB for that day. (Wright 11/22/91)
MO-118	MORRISTOWN	11/23/91		METALS	NITRIC/PEROXIDE	RB DAY 6	274.6	706.4	BWN/JDL	
MO-119	MORRISTOWN	11/18/91		METALS	PERMANGANATE	RB DAY 1	260.0	530.0	BWN/JDL	
MO-120	MORRISTOWN	11/19/91		METALS	PERMANGANATE	RB DAY 2			BWN/JDL	
MO-121	MORRISTOWN	11/20/91		METALS	PERMANGANATE	RB DAY 3	213.1 g	536.5	BWN/JDL	
MO-122	MORRISTOWN	11/21/91		METALS	PERMANGANATE	RB DAY 4	262.2 g	601.4 g	BWN/JDL	
[redacted]										
MO-124	MORRISTOWN	11/23/91		METALS	PERMANGANATE	RB DAY 6	177.9	101.1	BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MO-125	MORRISTOWN	11/21/91		METALS	DI H20	RB 1	[illegible]	[illegible]		
MO-126	MORRISTOWN	11/21/91		METALS	DI H20	RB 2	565.0g	262.5g	BWN/JDL	
MO-127	MORRISTOWN	11/21/91		METALS	HNO3 0.1N	RB 1	[illegible]	[illegible]	BWN/JDL	
MO-128	MORRISTOWN	11/21/91		METALS	HNO3 0.1N	RB 2	262.6g	473.1g	BWN/JDL	
MO-129	MORRISTOWN	11/21/91		METALS	ACETONE	RB 1	262.1	315.1	BWN/JDL	
MO-130	MORRISTOWN	11/21/91		METALS	ACETONE	RB 2	262.1g	409.8g	BWN/JDL	
MO-131	MORRISTOWN	11/21/91	INLET	MERCURY	FILTER[redacted]	1	[illegible]	[illegible]	BWN/JDL	
MO-132	MORRISTOWN		INLET	MERCURY	IMPINGER	1	363.1g	1331.5	BWN/JDL	
MO-133	MORRISTOWN		INLET	MERCURY	PR [redacted] RINSE	1	262.8g	[illegible]	BWN/JDL	
MO-134	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	1	164.3g	[illegible]	BWN/JDL	
MO-135	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	1	263.[illegible]	[illegible]	BWN/JDL	
MO-136	MORRISTOWN		OUTLET	MERCURY	IMPINGER	1	391.2	1314.2	BWN/JDL	
MO-137	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	1	262.3g	[illegible]	BWN/JDL	
MO-138	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	1	164.3g	282.3	BWN/JDL	
MO-139	MORRISTOWN	11/19/91	INLET	MERCURY	HCl FILTER[redacted]	2	283.9	165.4	BWN/JDL	
MO-140	MORRISTOWN		INLET	MERCURY	IMPINGER	2	1330.6	379.9	BWN/JDL	
MO-141	MORRISTOWN		INLET	MERCURY	PR [redacted] RINSE	2	262.7	[illegible]	BWN/JDL	
MO-142	MORRISTOWN		INLET	MERCURY	F HCL IMP. RINSE	2	460.7	263.6	BWN/JDL	
MO-143	MORRISTOWN		OUTLET	MERCURY	PR FILTER[redacted]	2	357.0	165.3	BWN/JDL	
MO-144	MORRISTOWN		OUTLET	MERCURY	IMPINGER	2	1349.8	381.2	BWN/JDL	
MO-145	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE F	2	492.7	263.3	BWN/JDL	
MO-146	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	2	379.6	263.9	BWN/JDL	
MO-147	MORRISTOWN	[illegible]	INLET	MERCURY	FILTER[redacted]	3	263.3	639.5	BWN/JDL	
MO-148	MORRISTOWN		INLET	MERCURY	IMPINGER	3	381.8	1560.9	BWN/JDL	
MO-149	MORRISTOWN		INLET	MERCURY	PR [redacted]	3	263.6	754.5	BWN/JDL	
MO-150	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	3	164.3	221.9	BWN/JDL	
MO-151	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	3	263.9	547.1	BWN/JDL	
MO-152	MORRISTOWN		OUTLET	MERCURY	IMPINGER	3	380.5	1305.4	BWN/JDL	
MO-153	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	3	263.6	536.2	BWN/JDL	
MO-154	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	3	164.4	281.4	BWN/JDL	
MO-155	MORRISTOWN	11/21/91	INLET	MERCURY	FILTER[redacted]	4	262.9	445.5	BWN/JDL	
MO-156	MORRISTOWN		INLET	MERCURY	IMPINGER	4	392.2	1383.6	BWN/JDL	
MO-157	MORRISTOWN		INLET	MERCURY	PR [redacted] RINSE	4	478.1	262.7	BWN/JDL	
MO-158	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	4	163.8	259.7	BWN/JDL	
MO-159	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	4	263.7	530.8	BWN/JDL	
MO-160	MORRISTOWN		OUTLET	MERCURY	IMPINGER	4	381.3	1289.6	BWN/JDL	
MO-161	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	4	262.9	437.9	BWN/JDL	
MO-162	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	4	164.9	251.7	BWN/JDL	
MO-163	MORRISTOWN	11/22/91	INLET	MERCURY	FILTER[redacted]	5	272.8	439.0	BWN/JDL	
MO-164	MORRISTOWN		INLET	MERCURY	IMPINGER	5	381.0	1366.8	BWN/JDL	
MO-165	MORRISTOWN		INLET	MERCURY	[redacted] RINSE PR	5	274.1	731.0	BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample ID	Site Name	Date	Location	Type of Train	Fraction	Run #	Tare Wt	Final Wt	Sampler	Comments
MO-166	MORRISTOWN	11/22/91	INLET	MERCURY	HCL IMP. RINSE	5	164.4	233.0	BWN/JDL	
MO-167	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	5	274.0	581.3	BWN/JDL	
MO-168	MORRISTOWN		OUTLET	MERCURY	IMPINGER	5	379.2	1174.7	BWN/JDL	
MO-169	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	5	274.4	639.1	BWN/JDL	
MO-170	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	5	164.0	274.4	BWN/JDL	
MO-171	MORRISTOWN	11/23/91	INLET	MERCURY	FILTER[redacted]	6	264.2	469.9	BWN/JDL	
MO-172	MORRISTOWN		INLET	MERCURY	IMPINGER	6	388.9	1231.0	BWN/JDL	
MO-173	MORRISTOWN		INLET	MERCURY	PR [redacted] RINSE	6	262.4	467.3	BWN/JDL	
MO-174	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	6	164.2	321.8	BWN/JDL	
MO-175	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	6	263.8	548.1	BWN/JDL	
MO-176	MORRISTOWN		OUTLET	MERCURY	IMPINGER	6	~~164.2~~	~~3m~~	BWN/JDL	387.9 / 1299.6
MO-177	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	6	263.8	514.3	BWN/JDL	
MO-178	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	6	164.2	321.8	BWN/JDL	
MO-179	MORRISTOWN	11/22/91	INLET	MERCURY	FILTER[redacted]	FB	273.1	423.4	BWN/JDL	
MO-180	MORRISTOWN		INLET	MERCURY	IMPINGER	FB	386.7	904.0	BWN/JDL	
MO-181	MORRISTOWN		INLET	MERCURY	PR [redacted] RINSE	FB	272.2	478.0	BWN/JDL	
MO-182	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	FB	163.9	272.4	BWN/JDL	
MO-183	MORRISTOWN		OUTLET	MERCURY	FILTER[redacted]	FB	271.9	414.9	BWN/JDL	
MO-184	MORRISTOWN		OUTLET	MERCURY	IMPINGER	FB	387.3	589.0	BWN/JDL	
MO-185	MORRISTOWN		OUTLET	MERCURY	PR [redacted] RINSE	FB	272.7	527.1	BWN/JDL	
MO-186	MORRISTOWN		OUTLET	MERCURY	HCL IMP. RINSE	FB	164.1	244.6	BWN/JDL	
MO-187	MORRISTOWN	11/18/91	INLET	MERCURY	FILTER[redacted]	LPB	[illegible]	[illegible]	BWN/JDL	
MO-188	MORRISTOWN		INLET	MERCURY	IMPINGER	LPB	[illegible]	[illegible]	BWN/JDL	
MO-189	MORRISTOWN		INLET	MERCURY	PR [redacted]	LPB	[illegible]	[illegible]	BWN/JDL	
MO-190	MORRISTOWN		INLET	MERCURY	HCL IMP. RINSE	LPB			BWN/JDL	
[redacted]										
[redacted]										
[redacted]										
[redacted]										
MO-195	MORRISTOWN	11/19/91		MERCURY	8N HCL	RB	[illegible]	[illegible]	BWN/JDL	
MO-196	MORRISTOWN	11/21/91		MERCURY	8N HCL	RB	262.8g	410.2g	BWN/JDL	
MO-197	MORRISTOWN	11/[illegible]/91		MERCURY	FILTER	RB	[illegible]	[illegible]	BWN/JDL	
MO-198	MORRISTOWN	[illegible]		METALS	FILTER	RB			BWN/JDL	
MO-199	MORRISTOWN	[illegible]	INLET	CDD/CDF	ACETONE/TOLUENE	1	[illegible]	[illegible]	BWN/JDL	
MO-200	MORRISTOWN		INLET	CDD/CDF	FILTER	1			BWN/JDL	
MO-201	MORRISTOWN	[illegible]	OUTLET	CDD/CDF	ACETONE/TOLUENE	1	[illegible]	[illegible]	BWN/JDL	
MO-202	MORRISTOWN		OUTLET	CDD/CDF	FILTER	1			BWN/JDL	
MO-203	MORRISTOWN	[illegible]	INLET	CDD/CDF	ACETONE/TOLUENE	2	808.3	[illegible]	BWN/JDL	
MO-204	MORRISTOWN		INLET	CDD/CDF	FILTER	2			BWN/JDL	
MO-205	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	2	751.1	881.5	BWN/JDL	
MO-206	MORRISTOWN		OUTLET	CDD/CDF	FILTER	2			BWN/JDL	

AMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample #	Site Name	Date	Location	Type of Filter	Medium	Run #	Tare Wt	Final Wt	Sampler	Comments
MO-207	MORRISTOWN	[illegible]	INLET	CDD/CDF	ACETONE/TOLUENE	3	380.5	894.2	BWN/JDL	
MO-208	MORRISTOWN		INLET	CDD/CDF	FILTER	3			BWN/JDL	
MO-209	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	3	380.2	856.1	BWN/JDL	
MO-210	MORRISTOWN		OUTLET	CDD/CDF	FILTER	3			BWN/JDL	
MO-211	MORRISTOWN	11/21/91	INLET	CDD/CDF	ACETONE/TOLUENE	4	380.7	891.4	BWN/JDL	
MO-212	MORRISTOWN		INLET	CDD/CDF	FILTER	4			BWN/JDL	
MO-213	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	4	387.0	671.5	BWN/JDL	
MO-214	MORRISTOWN		OUTLET	CDD/CDF	FILTER	4			BWN/JDL	
MO-215	MORRISTOWN	11/22/91	INLET	CDD/CDF	ACETONE/TOLUENE	5	388.3	871.2	BWN/JDL	
MO-216	MORRISTOWN		INLET	CDD/CDF	FILTER	5			BWN/JDL	
MO-217	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	5	380.9	752.5	BWN/JDL	
MO-218	MORRISTOWN		OUTLET	CDD/CDF	FILTER	5			BWN/JDL	
MO-219	MORRISTOWN	11/23/91	INLET	CDD/CDF	ACETONE/TOLUENE	6	388.1	897.3	BWN/JDL	
MO-220	MORRISTOWN		INLET	CDD/CDF	FILTER	6			BWN/JDL	
MO-221	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	6	387.1	773.3	BWN/JDL	
MO-222	MORRISTOWN		OUTLET	CDD/CDF	FILTER	6			BWN/JDL	
MO-223	MORRISTOWN	11/[illegible]/91	INLET	CDD/CDF	ACETONE/TOLUENE	FB	387.1	645.3	BWN/JDL	
MO-224	MORRISTOWN		INLET	CDD/CDF	FILTER	FB			BWN/JDL	
MO-225	MORRISTOWN		OUTLET	CDD/CDF	ACETONE/TOLUENE	FB	387.2	589.1	BWN/JDL	
MO-226	MORRISTOWN		OUTLET	CDD/CDF	FILTER	FB			BWN/JDL	
MO-227	MORRISTOWN	11/[illegible]/91	INLET	CDD/CDF	ACETONE/TOLUENE	LPB	[illegible]	[illegible]	BWN/JDL	
MO-228	MORRISTOWN		INLET	CDD/CDF	FILTER	LPB			BWN/JDL	
~~MO-229~~	~~MORRISTOWN~~		~~OUTLET~~	~~CDD/CDF~~	~~ACETONE/TOLUENE~~	~~LPB~~			~~BWN/JDL~~	
~~MO-230~~	~~MORRISTOWN~~		~~OUTLET~~	~~CDD/CDF~~	~~FILTER~~	~~LPB~~			~~BWN/JDL~~	
MO-231	MORRISTOWN	11/18/91		CDD/CDF	ACETONE	RB 1	[illegible]	[illegible]	BWN/JDL	
MO-232	MORRISTOWN	11/21/91		CDD/CDF	ACETONE	RB 2	262.2g	313.7g	BWN/JDL	
MO-233	MORRISTOWN	11/19/91		CDD/CDF	TOLUENE	RB 1	[illegible]	[illegible]	BWN/JDL	
MO-234	MORRISTOWN	11/21/91		CDD/CDF	TOLUENE	RB 2	262.6g	386.9g	BWN/JDL	
MO-235	MORRISTOWN	11/20/91	INLET	PSD	SET OF 10 FILTERS	1			BWN/JDL	
~~MO-236~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~ACETONE RINSE~~	~~1~~			~~BWN/JDL~~	
~~MO-237~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~M-Cl2 RINSE~~	~~1~~			~~BWN/JDL~~	
~~MO-238~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~WATER~~	~~1~~			~~BWN/JDL~~	
MO-239	MORRISTOWN	11/21/91	INLET	PSD	SET OF 10 FILTERS	2			BWN/JDL	
~~MO-240~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~ACETONE RINSE~~	~~2~~			~~BWN/JDL~~	
~~MO-241~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~M-Cl2 RINSE~~	~~2~~			~~BWN/JDL~~	
~~MO-242~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~WATER~~	~~2~~			~~BWN/JDL~~	
MO-243	MORRISTOWN	11/22/91	INLET	PSD	SET OF 10 FILTERS	3			BWN/JDL	
~~MO-244~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~ACETONE RINSE~~	~~3~~			~~BWN/JDL~~	
~~MO-245~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~M-Cl2 RINSE~~	~~3~~			~~BWN/JDL~~	
~~MO-246~~	~~MORRISTOWN~~		~~INLET~~	~~PSD~~	~~WATER~~	~~3~~			~~BWN/JDL~~	
MO-247	MORRISTOWN	11/23/91	INLET	PSD	SET OF 10 FILTERS	FB 4			BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample ID	Facility	Date	Location	Type of Stack	Fraction	Run #	Tare Wt	Final Wt	Sampler	Comments
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										
MO-255	MORRISTOWN	11/18/91		PSD	[redacted] *	RB 1			BWN/JDL	* Set of 10 filters
MO-257	MORRISTOWN	11/21/91		PSD	ACETONE RINSE	RB 2			BWN/JDL	
MO-258	MORRISTOWN	11/18/91		PSD	MeCl2 RINSE	RB 1			BWN/JDL	
MO-259	MORRISTOWN	11/21/91		PSD	MeCl2 RINSE	RB 2			BWN/JDL	
MO-260	MORRISTOWN	11/18/91		PSD	WATER	RB 1			BWN/JDL	
MO-261	MORRISTOWN	11/21/91		PSD	WATER	RB 2			BWN/JDL	
MO-262	MORRISTOWN	11/19/91	INLET	SPORE	PROBE/IMPINGERS	1			BWN/JDL	1 OF 2
MO-263	MORRISTOWN	↓	INLET	SPORE	PROBE/IMPINGERS	1			BWN/JDL	2 OF 2
MO-264	MORRISTOWN	11/19/91	INLET	SPORE	PROBE/IMPINGERS	2	[illegible]	[illegible]	BWN/JDL	1 OF 3
MO-265	MORRISTOWN	↓	INLET	SPORE	PROBE/IMPINGERS	2	[illegible]	[illegible]	BWN/JDL	2 OF 3
MO-266	MORRISTOWN	[illegible]	INLET	SPORE	PROBE/IMPINGERS	3			BWN/JDL	1 OF 2
MO-267	MORRISTOWN	↓	INLET	SPORE	PROBE/IMPINGERS	3			BWN/JDL	2 OF 2
MO-268	MORRISTOWN	11/21/91	INLET	SPORE	PROBE/IMPINGERS	FB			BWN/JDL	1 OF 2
MO-269	MORRISTOWN	↓	INLET	SPORE	PROBE/IMPINGERS	FB			BWN/JDL	2 OF 2
MO-270	MORRISTOWN	[illegible]	INLET	SPORE	PROBE/IMPINGERS	LPB			BWN/JDL	1 OF 2
MO-271	MORRISTOWN	↓	INLET	SPORE	PROBE/IMPINGERS	LPB			BWN/JDL	2 OF 2
MO-272	MORRISTOWN	↓		SPORE	BUFFER SOLUTION	RB 1			BWN/JDL	
[redacted]										
[redacted]										
[redacted]										
MO-276	MORRISTOWN	11/15/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B A	1/1	[illegible]	[illegible]	BWN/JDL	
MO-277	MORRISTOWN		INLET	HCl/HBr/HF	0.1N HYDROXIDE A	1/1	[illegible]	[illegible]	BWN/JDL	
MO-278	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	1/1	[illegible]	[illegible]	BWN/JDL	
[redacted]										
MO-280	MORRISTOWN	11/15/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	1/1 1/3	[illegible]	[illegible]	BWN/JDL	
MO-281	MORRISTOWN	11/15/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	1/1	[illegible]	[illegible]	BWN/JDL	
[redacted]										
MO-283	MORRISTOWN	11/15/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B	1/2	[illegible]	[illegible]	BWN/JDL	
MO-284	MORRISTOWN	11/15/91	INLET	HCl/HBr/HF	0.1 N SULFURIC C	1/2 1/3	[illegible]	[illegible]	BWN/JDL	
MO-285	MORRISTOWN	11/15/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	1/2	[illegible]	[illegible]	BWN/JDL	
[redacted]										
MO-287	MORRISTOWN	11/15/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	1/2	[illegible]	[illegible]	BWN/JDL	
[redacted]										

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

Sample ID	Facility Name	Date	Location	Type of Media	Fraction	Filter #	Pre Wt.	Post Wt.	Analyst	Comments
MO-289 H	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	1/2	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~1/2~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~1/2~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~1/2~~			~~BWN/JDL~~	
MO-293	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	1/3	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~1/3~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~1/3~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~1/3~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1N HYDROXIDE B~~	~~1/3~~			~~BWN/JDL~~	
MO-298	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1 N SULFURIC A	2/1	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~2/1~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~2/1~~			~~BWN/JDL~~	
MO-301 H	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	2/1	[illegible]	[illegible]	BWN/JDL	
MO-302	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	2/1	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~2/1~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~2/1~~			~~BWN/JDL~~	
MO-306 H	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	2/1	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~2/2~~			~~BWN/JDL~~	
MO-307	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1 N SULFURIC B	2/2	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~2/2~~			~~BWN/JDL~~	
MO-308 H	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	2/2	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~2/2~~			~~BWN/JDL~~	
MO-311	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	2/2	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~2/2~~			~~BWN/JDL~~	
MO-313 H	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	2/2	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~2/3~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~2/3~~			~~BWN/JDL~~	
MO-316	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1 N SULFURIC C	2/3	70.7	15.5	BWN/JDL	
MO-317	MORRISTOWN	↓	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	2/3	52.7	15.8	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC A~~	~~2/3~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~2/3~~			~~BWN/JDL~~	
MO-320	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	2/3	73.5	16.0	BWN/JDL	
MO-321	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE C	2/3	51.2	15.9	BWN/JDL	
MO-322	MORRISTOWN	11/20/91	INLET	HCl/HBr/HF	0.1 N SULFURIC A	3/1	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~3/1~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~INLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~3/1~~			~~BWN/JDL~~	
MO-325 H	MORRISTOWN	[illegible]	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	3/1	[illegible]	[illegible]	BWN/JDL	
MO-326	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	3/1	[illegible]	[illegible]	BWN/JDL	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC B~~	~~3/1~~			~~BWN/JDL~~	
~~[illegible]~~	~~MORRISTOWN~~		~~OUTLET~~	~~HCl/HBr/HF~~	~~0.1 N SULFURIC C~~	~~3/1~~			~~BWN/JDL~~	
MO-329 H	MORRISTOWN	[illegible]	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	3/1	[illegible]	[illegible]	BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-331	MORRISTOWN	11/20/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B	3/2	—		BWN/JDL	
MO-333 H	MORRISTOWN	11/20/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	3/2	17.4	96.4	BWN/JDL	
MO-335	MORRISTOWN	11/20/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	3/2	15.6	84.7	BWN/JDL	
MO-337 H	MORRISTOWN	11/20/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	3/2	16.0	52.8	BWN/JDL	
MO-340	MORRISTOWN	11/20/91	INLET	HCl/HBr/HF	0.1 N SULFURIC C	3/3	15.6	74.9	BWN/JDL	
MO-341	MORRISTOWN	↓	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	3/3	15.9	43.9	BWN/JDL	
MO-344	MORRISTOWN	11/20/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	3/3	17.3	61.2	BWN/JDL	
MO-345	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE C	3/3	17.4	62.0	BWN/JDL	
MO-346	MORRISTOWN	11/21/91	INLET	HCl/HBr/HF	0.1 N SULFURIC A	4/1	15.9	70.2	BWN/JDL	
MO-349 H	MORRISTOWN	11/21/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	4/1	27.8	58.2	BWN/JDL	
MO-350	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	4/1	15.5	79.2	BWN/JDL	
MO-353 H	MORRISTOWN	11/21/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	4/1	27.9	65.8	BWN/JDL	
MO-355	MORRISTOWN	11/21/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B	4/2	15.8	77.4	BWN/JDL	
MO-357 H	MORRISTOWN	11/21/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	4/2	[illegible]	[illegible]	BWN/JDL	Tare: 28.2g Final = 61.3g
MO-359	MORRISTOWN	11/21/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	4/2	27.5	66.6	BWN/JDL	
MO-361 H	MORRISTOWN	11/21/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	4/2	27.9	61.1	BWN/JDL	
MO-364	MORRISTOWN	11/21/91	INLET	HCl/HBr/HF	0.1 N SULFURIC C	4/3	27.6	67.0	BWN/JDL	
MO-365	MORRISTOWN	↓	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	4/3	27.7	59.5	BWN/JDL	
MO-368	MORRISTOWN	11/21/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	4/3	28.3	68.2	BWN/JDL	
MO-369	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE C	4/3	28.0	60.1	BWN/JDL	

Added to wrong bottle Inlet 3/2 (sulfuric & hydroxide in one bottle) 11/20/91

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
✓Mo-370	MoTown	11/22/91	Inlet	HCl/HBr/HF	0.1N Sulfuric A	5/1	28.1	69.5	BWN/JDL	
[redacted]										
✓MO-373 H	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	5/1	27.9	50.5	BWN/JDL	
✓MO-374	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	5/1	28.0	68.7	BWN/JDL	
[redacted]										
✓MO-377 H	MORRISTOWN	11/22/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	5/1	28.1	55.2	BWN/JDL	
[redacted]										
✓MO-379	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B	5/2	27.4	65.2	BWN/JDL	
✓MO-381 H	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	5/2	27.7	52.2	BWN/JDL	
[redacted]										
✓MO-383	MORRISTOWN	11/22/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	5/2	27.6	66.9	BWN/JDL	
✓MO-385 H	MORRISTOWN	11/22/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	5/2	27.7	53.0	BWN/JDL	
[redacted]										
✓MO-388	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1 N SULFURIC C	5/3	28.0	66.5	BWN/JDL	
✓MO-389	MORRISTOWN	↓	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	5/3	28.0	39.3	BWN/JDL	
[redacted]										
✓MO-392	MORRISTOWN	11/22/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	5/3	27.8	65.2	BWN/JDL	
✓MO-393	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE C	5/3	28.0	48.8	BWN/JDL	
✓MO-394	MORRISTOWN	11/23/91	INLET	HCl/HBr/HF	0.1 N SULFURIC A	6/1	28.0	53.9	BWN/JDL	
[redacted]										
✓MO-397 H	MORRISTOWN	11/23/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	6/1	27.6	91.0	BWN/JDL	
✓MO-398	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	6/1	27.8	103.0	BWN/JDL	
[redacted]										
✓MO-401 H	MORRISTOWN	11/23/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	6/1	27.3	49.6	BWN/JDL	
✓MO-403	MORRISTOWN	11/23/91	INLET	HCl/HBr/HF	0.1 N SULFURIC B	6/2	27.9	56.8	BWN/JDL	
✓MO-405 H	MORRISTOWN	11/23/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE B	6/2	28.0	48.9	BWN/JDL	
✓MO-407	MORRISTOWN	11/23/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC B	6/2	28.0	61.9	BWN/JDL	
✓MO-409 H	MORRISTOWN	11/23/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE B	6/2	28.2	52.0	BWN/JDL	
[redacted]										

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-412	MORRISTOWN	11/23/91	INLET	HCl/HBr/HF	0.1 N SULFURIC C	6/3	29.0	60.6	BWN/JDL	
MO-413	MORRISTOWN	↓	INLET	HCl/HBr/HF	0.1N HYDROXIDE C	6/3	27.9	52.9	BWN/JDL	
[redacted]										
MO-416	MORRISTOWN	11/23/91	OUTLET	HCl/HBr/HF	0.1 N SULFURIC C	6/3	28.1	67.3	BWN/JDL	
MO-417	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE C	6/3	28.3	54.1	BWN/JDL	
MO-418	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1 N SULFURIC A	FB	28.0	64.0	BWN/JDL	
[redacted]										
MO-421	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE A	FB	28.3	56.8	BWN/JDL	
MO-422	MORRISTOWN	↓	OUTLET	HCl/HBr/HF	0.1 N SULFURIC A	FB	28.1	58.3	BWN/JDL	
[redacted]										
MO-425	MORRISTOWN	11/22/91	OUTLET	HCl/HBr/HF	0.1N HYDROXIDE A	FB	27.5	59.7	BWN/JDL	
MO-426 LL	MORRISTOWN	11/22/91	INLET	HCl/HBr/HF	0.1 N SULFURIC A	LPB	17.4	43.1	BWN/JDL	
[redacted]										
MO-429 LL	MORRISTOWN	11/18/91	INLET	HCl/HBr/HF	0.1N HYDROXIDE	LPB	17.4	42.4	BWN/JDL	
[redacted]										
MO-434	MORRISTOWN	11/18/91		HCl/HBr/HF	0.1 N SULFURIC	RB	15.6	46.9	BWN/JDL	
MO-435	MORRISTOWN	11/21/91		HCl/HBr/HF	0.1 N SULFURIC	RB	27.8	66.3	BWN/JDL	
MO-436	MORRISTOWN	11/18/91		HCl/HBr/HF	0.1N HYDROXIDE	RB	15.6	49.9	BWN/JDL	
MO-437	MORRISTOWN	11/21/91		HCl/HBr/HF	0.1N HYDROXIDE	RB	~~[illegible]~~ 27.8 JDL	~~[illegible]~~ 64.3 JDL	BWN/JDL	
MO-438	MORRISTOWN	11/18/91	BOTTOM ASH		ARCHIVE	DAY 1			BWN/JDL	
MO-439	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 1			BWN/JDL	
MO-440	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 1			BWN/JDL	
MO-441	MORRISTOWN		BOTTOM ASH		METALS	DAY 1			BWN/JDL	
MO-442	MORRISTOWN	↓	BOTTOM ASH		SPORES	DAY 1			BWN/JDL	
MO-443	MORRISTOWN	11/19/91	BOTTOM ASH		ARCHIVE	DAY 2			BWN/JDL	
MO-444	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 2			BWN/JDL	
MO-445	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 2			BWN/JDL	
MO-446	MORRISTOWN		BOTTOM ASH		METALS	DAY 2			BWN/JDL	
MO-447	MORRISTOWN	↓	BOTTOM ASH		SPORES	DAY 2			BWN/JDL	
MO-448	MORRISTOWN	11/20/91	BOTTOM ASH		ARCHIVE	DAY 3			BWN/JDL	
MO-449	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 3			BWN/JDL	
MO-450	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 3			BWN/JDL	
MO-451	MORRISTOWN		BOTTOM ASH		METALS	DAY 3			BWN/JDL	
MO-452	MORRISTOWN	↓	BOTTOM ASH		SPORES	DAY 3			BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-453	MORRISTOWN	11-21-91	BOTTOM ASH		ARCHIVE	DAY 4	381.8	969.5	BWN/JDL	
MO-454	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 4	380.2	1078.7	BWN/JDL	
MO-455	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 4	381.2	901.2	BWN/JDL	
MO-456	MORRISTOWN		BOTTOM ASH		METALS	DAY 4	311.6	1032.7	BWN/JDL	
MO-457	MORRISTOWN		BOTTOM ASH		SPORES	DAY 4			BWN/JDL	
MO-458	MORRISTOWN	11/22/91	BOTTOM ASH		ARCHIVE	DAY 5			BWN/JDL	
MO-459	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 5			BWN/JDL	
MO-460	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 5			BWN/JDL	
MO-461	MORRISTOWN		BOTTOM ASH		METALS	DAY 5			BWN/JDL	
MO-462	MORRISTOWN		BOTTOM ASH		SPORES	DAY 5			BWN/JDL	
MO-463	MORRISTOWN	11/23/91	BOTTOM ASH		ARCHIVE	DAY 6			BWN/JDL	
MO-464	MORRISTOWN		BOTTOM ASH		CARB., LOI	DAY 6			BWN/JDL	
MO-465	MORRISTOWN		BOTTOM ASH		CDD/CDF	DAY 6			BWN/JDL	
MO-466	MORRISTOWN		BOTTOM ASH		METALS	DAY 6			BWN/JDL	
MO-467	MORRISTOWN		BOTTOM ASH		SPORES	DAY 6			BWN/JDL	
MO-468	MORRISTOWN	11/18/91	BAGHOUSE		ARCHIVE	DAY 1			BWN/JDL	
MO-469	MORRISTOWN		BAGHOUSE		CARB., LOI	DAY 1			BWN/JDL	
MO-470	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 1			BWN/JDL	
MO-471	MORRISTOWN		BAGHOUSE		METALS	DAY 1			BWN/JDL	
MO-472	MORRISTOWN		BAGHOUSE		SPORES	DAY 1			BWN/JDL	
MO-473	MORRISTOWN	11/19/91	BAGHOUSE		ARCHIVE	DAY 2	390.4 g	711.0 g	BWN/JDL	
MO-474	MORRISTOWN		BAGHOUSE		CARB., LOI	DAY 2	390.1 g	1153 g	BWN/JDL	
MO-475	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 2	391.2 g	710.3 g	BWN/JDL	
MO-476	MORRISTOWN		BAGHOUSE		METALS	DAY 2	311.0 g	713.1 g	BWN/JDL	
MO-477	MORRISTOWN		BAGHOUSE		SPORES	DAY 2	390.5 g	1181.1 g	BWN/JDL	
MO-478	MORRISTOWN	11/20/91	BAGHOUSE		ARCHIVE	DAY 3			BWN/JDL	
MO-479	MORRISTOWN		BAGHOUSE		CARB., LOI	DAY 3			BWN/JDL	
MO-480	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 3			BWN/JDL	
MO-481	MORRISTOWN		BAGHOUSE		METALS	DAY 3			BWN/JDL	
MO-482	MORRISTOWN		BAGHOUSE		SPORES	DAY 3			BWN/JDL	
MO-483	MORRISTOWN	11/21/91	BAGHOUSE		ARCHIVE	DAY 4			BWN/JDL	
MO-484	MORRISTOWN		BAGHOUSE		CARB., LOI	DAY 4			BWN/JDL	
MO-485	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 4			BWN/JDL	
MO-486	MORRISTOWN		BAGHOUSE		METALS	DAY 4			BWN/JDL	
MO-487	MORRISTOWN		BAGHOUSE		SPORES	DAY 4			BWN/JDL	
MO-488	MORRISTOWN	11/22/91	BAGHOUSE		ARCHIVE	DAY 5	393.3	757.4	BWN/JDL	
MO-489	MORRISTOWN		BAGHOUSE		CARB., LOI	DAY 5	392.9	768.2	BWN/JDL	
MO-490	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 5	392.7	769.4	BWN/JDL	
MO-491	MORRISTOWN		BAGHOUSE		METALS	DAY 5	392.9	746.1	BWN/JDL	
MO-492	MORRISTOWN		BAGHOUSE		SPORES	DAY 5			BWN/JDL	
MO-493	MORRISTOWN	11/23/91	BAGHOUSE		ARCHIVE	DAY 6			BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-494	MORRISTOWN	11/23/91	BAGHOUSE		CARB., LOI	DAY 6			BWN/JDL	
MO-495	MORRISTOWN		BAGHOUSE		CDD/CDF	DAY 6			BWN/JDL	
MO-496	MORRISTOWN		BAGHOUSE		METALS	DAY 6			BWN/JDL	
[redacted]										
MO-498	MORRISTOWN	11/18/91	SPRAYDRYE		ARCHIVE	DAY 1			BWN/JDL	
MO-499	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 1			BWN/JDL	
MO-500	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 1			BWN/JDL	
MO-501	MORRISTOWN		SPRAYDRYE		METALS	DAY 1			BWN/JDL	
MO-502	MORRISTOWN		SPRAYDRYE		SPORES	DAY 1			BWN/JDL	
MO-503	MORRISTOWN	11/19/91	SPRAYDRYE		ARCHIVE	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-504	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-505	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-506	MORRISTOWN		SPRAYDRYE		METALS	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-507	MORRISTOWN		SPRAYDRYE		SPORES	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-508	MORRISTOWN	[illegible]	SPRAYDRYE		ARCHIVE	DAY 3			BWN/JDL	
MO-509	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 3			BWN/JDL	
MO-510	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 3			BWN/JDL	
MO-511	MORRISTOWN		SPRAYDRYE		METALS	DAY 3			BWN/JDL	
MO-512	MORRISTOWN		SPRAYDRYE		SPORES	DAY 3			BWN/JDL	
MO-513	MORRISTOWN	11/21/91	SPRAYDRYE		ARCHIVE	DAY 4			BWN/JDL	
MO-514	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 4			BWN/JDL	
MO-515	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 4			BWN/JDL	
MO-516	MORRISTOWN		SPRAYDRYE		METALS	DAY 4			BWN/JDL	
[redacted]										
MO-518	MORRISTOWN	11/22/91	SPRAYDRYE		ARCHIVE	DAY 5	393.6	1056.7	BWN/JDL	
MO-519	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 5	392.4	1042.7	BWN/JDL	
MO-520	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 5	395.8	1016.9	BWN/JDL	
MO-521	MORRISTOWN		SPRAYDRYE		METALS	DAY 5	395.2	1056.3	BWN/JDL	
[redacted]										
MO-523	MORRISTOWN	11/23/91	SPRAYDRYE		ARCHIVE	DAY 6			BWN/JDL	
MO-524	MORRISTOWN		SPRAYDRYE		CARB.,LOI,MOD LOI	DAY 6			BWN/JDL	
MO-525	MORRISTOWN		SPRAYDRYE		CDD/CDF	DAY 6			BWN/JDL	
MO-526	MORRISTOWN		SPRAYDRYE		METALS	DAY 6			BWN/JDL	
[redacted]										
MO-528	MORRISTOWN	11/16/91	LIME SLUR		ARCHIVE	DAY 1			BWN/JDL	
MO-529	MORRISTOWN		LIME SLUR		METALS,SOLID,LIME	DAY 1			BWN/JDL	
MO-530	MORRISTOWN	11/19/91	LIME SLUR		ARCHIVE	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-531	MORRISTOWN		LIME SLUR		METALS,SOLID,LIME	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-532	MORRISTOWN	11/21/91	LIME SLUR		ARCHIVE	DAY 3			BWN/JDL	
MO-533	MORRISTOWN		LIME SLUR		METALS,SOLID,LIME	DAY 3			BWN/JDL	
MO-534	MORRISTOWN	11/21/91	LIME SLUR		ARCHIVE	DAY 4			BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MO-535	MORRISTOWN	11/21/91	LIME SLUR		METALS,SOLID,LIME	DAY 4			BWN/JDL	
MO-536	MORRISTOWN	11/22/91	LIME SLUR		ARCHIVE	DAY 5	272.9	387.1	BWN/JDL	
MO-537	MORRISTOWN	↓	LIME SLUR		METALS,SOLID,LIME	DAY 5	247.2	813.9	BWN/JDL	
MO-538	MORRISTOWN	11/23/91	LIME SLUR		ARCHIVE	DAY 6	873.6	812.0	BWN/JDL	263.5 / 820.6
MO-539	MORRISTOWN	↓	LIME SLUR		METALS,SOLID,LIME	DAY 6	273.5	801.8	BWN/JDL	262.5 / 815.3
MO-540	MORRISTOWN	11/18/91	MAKEUP H2O		ARCHIVE	DAY 1	273.3	790.2	BWN/JDL	
MO-541	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 1	273.4	803.3	BWN/JDL	
MO-542	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 1			BWN/JDL	
MO-543	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 1			BWN/JDL	
MO-544	MORRISTOWN	11/19/91	MAKEUP H2O		ARCHIVE	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-545	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-546	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-547	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 2	[illegible]	[illegible]	BWN/JDL	
MO-548	MORRISTOWN	11/20/91	MAKEUP H2O		ARCHIVE	DAY 3			BWN/JDL	
MO-549	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 3			BWN/JDL	
MO-550	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 3			BWN/JDL	
MO-551	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 3			BWN/JDL	
MO-552	MORRISTOWN	11/21/91	MAKEUP H2O		ARCHIVE	DAY 4			BWN/JDL	
MO-553	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 4			BWN/JDL	
MO-554	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 4			BWN/JDL	
MO-555	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 4			BWN/JDL	
MO-556	MORRISTOWN	11/22/91	MAKEUP H2O		ARCHIVE	DAY 5	273.6	812.0	BWN/JDL	
MO-557	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 5	273.5	801.8	BWN/JDL	
MO-558	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 5	273.3	790.2	BWN/JDL	
MO-559	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 5	273.4	803.3	BWN/JDL	
MO-560	MORRISTOWN	11/23/91	MAKEUP H2O		ARCHIVE	DAY 6	263.0	807.8	BWN/JDL	
MO-561	MORRISTOWN	↓	MAKEUP H2O		SOLIDS, CHLORINE	DAY 6	664.0	792.4	BWN/JDL	
MO-562	MORRISTOWN	↓	MAKEUP H2O		METALS	DAY 6	764.3	801.9	BWN/JDL	
MO-563	MORRISTOWN	↓	MAKEUP H2O		CDD/CDF	DAY 6	264.2	793.0	BWN/JDL	
MO-564	MORRISTOWN	11/18/91	BOTTOM ASH		SPORE	BLANK			BWN/JDL	
MO-565	MORRISTOWN	↓	BAGHOUSE		SPORE	BLANK			BWN/JDL	
MO-566	MORRISTOWN	↓	SPRAYDRYE		SPORE	BLANK			BWN/JDL	
MO-567	MORRISTOWN	11/[illegible]/91			SPORE PIPE	PIPE #11			BWN/JDL	
MO-568	MORRISTOWN	↓			SPORE PIPE	PIPE #12			BWN/JDL	
MO-569	MORRISTOWN	↓			SPORE PIPE	PIPE #13			BWN/JDL	
MO-570	MORRISTOWN	↓			SPORE PIPE	PIPE #14			BWN/JDL	
MO-571	MORRISTOWN	↓			SPORE PIPE	PIPE #15			BWN/JDL	
MO-572	MORRISTOWN	↓			SPORE PIPE	PIPE #16			BWN/JDL	
MO-573	MORRISTOWN	↓			SPORE PIPE	PIPE #17			BWN/JDL	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MO-575	MORRISTOWN	↓			SPORE PIPE	PIPE #19			BWN/JDL	

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

MO-576	MORRISTOWN	11/19/91			SPORE PIPE	PIPE #21			BWN/JDL	
MO-585	MORRISTOWN	11/20/91			SPORE PIPE	PIPE #31			BWN/JDL	
MO-586	MORRISTOWN				SPORE PIPE	PIPE #32			BWN/JDL	
MO-589	MORRISTOWN	11/20/91			SPORE PIPE	PIPE #35			BWN/JDL	
MO-590	MORRISTOWN				SPORE PIPE	PIPE #36			BWN/JDL	
MO-592	MORRISTOWN	11/20/91			SPORE PIPE	PIPE #38			BWN/JDL	
MO-594	MORRISTOWN	11/18/91			SPORE PIPE	PIPE #71			BWN/JDL	
MO-595	MORRISTOWN	~~11/19/91~~	11/20/91		SPORE PIPE	PIPE #72			BWN/JDL	
MO-601	MORRISTOWN	11/19/91	Inlet	COD/COF	XAD	LPB			BWN/JDL	
MO-602	MORRISTOWN								BWN/JDL	
MO-603	MORRISTOWN								BWN/JDL	
MO-604	MORRISTOWN					RB			BWN/JDL	
MO-605	MORRISTOWN					1/3			BWN/JDL	
MO-606	MORRISTOWN	11/19/91	Inlet	COD/COF	XAD	2			BWN/JDL	
MO-607	MORRISTOWN								BWN/JDL	
MO-608	MORRISTOWN		Inlet				262.8	103.0	BWN/JDL	
MO-609	MORRISTOWN		Outlet				257.3	105.2	BWN/JDL	
MO-610	MORRISTOWN		Inlet			2			BWN/JDL	3 of 3
MO-611	MORRISTOWN	11/20/91	Inlet			3			BWN/JDL	
MO-612	MORRISTOWN		Outlet						BWN/JDL	
MO-613	MORRISTOWN		Inlet	Mercury	HNO3 Rinse PB		262.9	351.1	BWN/JDL	
MO-614	MORRISTOWN		Outlet				263.5	406.8	BWN/JDL	
MO-615	MORRISTOWN	11/20/91				2/1			BWN/JDL	
MO-616	MORRISTOWN	11/19/91				2			BWN/JDL	

Spore pipe #81 & 82 taken 11/21/91 for Ambient blanks

SAMPLE LOG FOR EPA-EMB - MORRISTOWN MEMORIAL HOSPITAL'S MEDICAL WASTE INCINERATOR

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MO-617	MORRISTOWN	11/21/91	Inlet	CDD/CDF	XAD	4			BWN/JDL	Teflon both
MO-618	MORRISTOWN		Outlet						BWN/JDL	
MO-619	MORRISTOWN		Inlet	Mercury	HNO3 PR		263.0	338.3	BWN/JDL	
MO-620	MORRISTOWN		Outlet				263.3	344.7	BWN/JDL	
MO-621	MORRISTOWN	11/18/91			SPORE PIPE INSUL	PIPE 16			BWN/JDL	
MO-622	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 13			BWN/JDL	
MO-623	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 10			BWN/JDL	
MO-624	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 11			BWN/JDL	
MO-625	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 14			BWN/JDL	
MO-626	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 17			BWN/JDL	
MO-627	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 19			BWN/JDL	
MO-628	MORRISTOWN	11/18/91			SPORE PIPE INSULATION	PIPE 21			BWN/JDL	
MO-629	MORRISTOWN	11/19/91				PIPE 21			BWN/JDL	PIPE LOST
MO-630	MORRISTOWN	11/19/91				2X			BWN/JDL	PIPE LOST
MO-631	MORRISTOWN	11/19/91				2X			BWN/JDL	
MO-632	MORRISTOWN	11/20/91				36			BWN/JDL	
MO-633	MORRISTOWN	11/20/91				72			BWN/JDL	Stopped top teflon bottom
MO-634	MORRISTOWN	11/22/91	Inlet	CDD/CDF	XAD	5			BWN/JDL	Pumpfilm both
MO-635	MORRISTOWN	11/22/91	~~Inlet~~ Out				273.8	333.0	BWN/JDL	
MO-636	MORRISTOWN		Inlet	Mercury	HNO3 PR		272.5	682.2	BWN/JDL	
MO-637	MORRISTOWN		Outlet			FB	273.2	342.5	BWN/JDL	
MO-638	MORRISTOWN		Inlet	Mercury		FB	273.8	362.2	BWN/JDL	
MO-639	MORRISTOWN		Outlet	Mercury					BWN/JDL	Stopped both
MO-640	MORRISTOWN		Inlet	CDD/CDF	XAD				BWN/JDL	Teflon both
MO-641	MORRISTOWN		Outlet						BWN/JDL	
MO-642	MORRISTOWN	~~11/20/91~~	11/20/91	Bottom Ash	pH	JDW 3			BWN/JDL	
MO-643	MORRISTOWN	~~11/21/91~~	11/21/91			5 4			BWN/JDL	
MO-644	MORRISTOWN	11/22/91				5			BWN/JDL	
MO-645	MORRISTOWN	11/23/91				6			BWN/JDL	Teflon both
MO-646	MORRISTOWN	11/23/91	Inlet	CDD/CDF	XAD	6			BWN/JDL	
MO-647	MORRISTOWN		Outlet						BWN/JDL	
MO-648	MORRISTOWN		Inlet	Mercury	HNO3 PR				BWN/JDL	
MO-649	MORRISTOWN		Outlet						BWN/JDL	
MO-650	MORRISTOWN	11/23/91			Wet Spore	~~RB~~	Control		BWN/JDL	
MO-651	MORRISTOWN	11/23/91			Baghouse Ash	Archive			BWN/JDL	
MO-652	MORRISTOWN								BWN/JDL	
MO-653	MORRISTOWN								BWN/JDL	
MO-654	MORRISTOWN								BWN/JDL	
MO-655	MORRISTOWN								BWN/JDL	
MO-656	MORRISTOWN								BWN/JDL	
MO-660	MORRISTOWN								BWN/JDL	
MO-661	MORRISTOWN								BWN/JDL	
MO-662	MORRISTOWN									

Meter Box Calibration

Post Test- Morristown MWI

Date 12/6/91 Cal Meter # 6830284 Pbar 29.87

Box # 8 Cal Meter Yd 0.9967 Vaccum 5 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
1.8	-1.6	Final	6.043	66.517	72	72	85	67	5	0.9925	2.10
		Init.	2.573	63.032	70	70	83	67			
		Total	3.470	3.485	Avg.	71.0	Avg.	75.5			
1	-1	Final	9.243	69.775	72	72	92	73	6	0.9920	1.96
		Init.	6.043	66.517	72	72	92	70			
		Total	3.200	3.258	Avg.	72.0	Avg.	81.8			
3	-2.3	Final	14.608	75.234	74	74	107	79	6	1.0013	2.06
		Init.	9.243	69.775	73	73	107	77			
		Total	5.365	5.459	Avg.	73.5	Avg.	92.5			
									Average	0.9953	2.04

Meter Box Calibration

Post Test- Morristown MWI

Date 12/6/91 Cal Meter # 6830284 Pbar 29.87

Box # 18 Cal Meter Yd 0.9967 Vaccum 7 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
1.1	-0.06	Final	88.283	26.230	75	75	81	69	15.5	0.9886	1.74
		Init.	79.037	16.804	72	72	96	78			
		Total	9.246	9.426	Avg.	73.5	Avg.	81.0			
1.1	-0.06	Final	100.680	39.230	72	72	96	78	21	0.9829	1.73
		Init.	88.283	26.230	73	73	105	90			
		Total	12.397	13.000	Avg.	72.5	Avg.	92.3			
1.1	-0.06	Final	106.125	45.028	73	73	105	90	9.25	0.9802	1.72
		Init.	100.680	39.230	72	72	108	94			
		Total	5.445	5.798	Avg.	72.5	Avg.	99.3			
									Average	0.9839	1.73

Meter Box Calibration

Post Test- Morristown MWI

Date 12/3/91 Cal Meter # 6830284 Pbar 29.88

Box # A-35 Cal Meter Yd 0.9967 Vaccum 12 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
2	-0.14	Final	14.053	102.520	68	68	121	92	10	1.0047	2.05
		Init.	6.890	94.901	72	72	130	102			
		Total	7.163	7.619	Avg.	70.0	Avg.	111.3			
2	-0.14	Final	21.267	110.295	72	72	130	102	10	1.0051	2.00
		Init.	14.053	102.520	72	72	142	111			
		Total	7.214	7.775	Avg.	72.0	Avg.	121.3			
2	-0.07	Final	35.914	126.334	72	72	142	111	20.5	1.0063	2.01
		Init.	21.267	110.295	74	74	149	127			
		Total	14.647	16.039	Avg.	73.0	Avg.	132.3			
									Average	1.0053	2.02

Meter Box Calibration

Post Test- Morristown MWI

Date 12/3/91 Cal Meter # 6830284 Pbar 29.65

Box # A-36 Cal Meter Yd 0.9967 Vaccum 11 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
0.74	-0.05	Final	45.341	98.060	74	74	85	77	12	0.9935	1.89
		Init.	39.707	92.300	72	72	93	82			
		Total	5.634	5.760	Avg.	73.0	Avg.	84.3			
0.74	-0.05	Final	66.249	20.014	73	73	99	92	11.5	0.9823	1.86
		Init.	60.876	14.323	73	73	102	97			
		Total	5.373	5.691	Avg.	73.0	Avg.	97.5			
0.74	-0.05	Final	60.876	114.323	73	73	99	92	11.5	0.9993	1.81
		Init.	55.405	108.653	78	78	102	97			
		Total	5.471	5.670	Avg.	75.5	Avg.	97.5			
									Average	0.9917	1.85

Meter Box Calibration

Post Test- Morristown MWI

Date 12/3/91 Cal Meter # 6830284 Pbar 29.88

Box # N-32 Cal Meter Yd 0.9967 Vaccum 5 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
1.3	-0.1	Final	27.570	80.650	71	71	74	74	12.5	1.0040	2.10
		Init.	20.185	73.303	71	75	78	74			
		Total	7.385	7.347	Avg.	72.0	Avg.	75.0			
1.3	-0.1	Final	35.822	88.877	71	71	78	74	14	1.0085	2.09
		Init.	27.570	80.650	70	70	80	76			
		Total	8.252	8.227	Avg.	70.5	Avg.	77.0			
1.3	-0.1	Final	46.850	99.932	70	70	80	76	18.75	1.0048	2.10
		Init.	35.822	88.877	72	72	81	77			
		Total	11.028	11.055	Avg.	71.0	Avg.	78.5			
									Average	1.0058	2.10

Meter Box Calibration

Post Test- Morristown MWI

Date 12/3/91 Cal Meter # 6830284 Pbar 29.88

Box # N-33 Cal Meter Yd 0.9967 Vaccum 11 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
1.1	-0.07	Final	90.876	12.670	72	72	78	77	14.25	0.9965	2.03
		Init.	83.003	4.737	72	72	79	76			
		Total	7.873	7.933	Avg.	72.0	Avg.	77.5			
1.1	-0.07	Final	97.623	19.488	72	72	79	76	12.25	0.9946	2.04
		Init.	90.876	12.670	73	73	82	77			
		Total	6.747	6.818	Avg.	72.5	Avg.	78.5			
1.1	-0.07	Final	104.054	26.003	73	73	82	77	11.75	0.9934	2.06
		Init.	97.623	19.488	73	73	82	78			
		Total	6.431	6.515	Avg.	73.0	Avg.	79.8			
									Average	0.9948	2.04

Meter Box Calibration

Post Test- Morristown MWI

Date 12/3/91 Cal Meter # 6830284 Pbar 29.65

Box # N-34 Cal Meter Yd 0.9967 Vaccum 5 " Hg

Orifice Setting	Cal. Meter Pressure	Gas Volume Cal. Meter		Gas Volume Meter Box	Cal. Temp In	Cal. Temp Out	Meter Temp In	Meter Temp Out	Time	Yd	Delta H@
1.8	-0.12	Final	64.401	96.897	74	74	80	77	7.75	1.0151	1.85
		Init.	58.644	91.205	70	70	80	76			
		Total	5.757	5.692	Avg.	72.0	Avg.	78.3			
1.8	-0.12	Final	70.898	103.358	70	70	80	76	8.75	1.0116	1.84
		Init.	64.401	96.897	72	72	82	76			
		Total	6.497	6.461	Avg.	71.0	Avg.	78.5			
1.8	-0.12	Final	77.019	9.476	72	72	82	76	8.25	1.0088	1.84
		Init.	70.898	3.358	69	69	82	77			
		Total	6.121	6.118	Avg.	70.5	Avg.	79.3			
									Average	1.0118	1.84

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	0.1N H_2SO_4	Mallinckrodt	2876KEPR	---	43.6	12000	0.1N	DI H_2O	Volumetric Flask
	0.1N NaOH				48g	↓	0.1N	↓	↓
	0.1N HNO_3	Mallinckrodt	2704KENR	---	85.6mL	↓	0.1N	↓	↓

BALANCE CALIBRATION

Actual Weights	Reading

Did not have balance wts (bolts & washers)

RECORDED BY: Julio D. Lopez

DATE: ~~11/19/91~~ JDL 11/17/91

Pre Test Day

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]
Toluene Baxter - B18860
Acetone Baxter BB165 [illegible]

BALANCE CALIBRATION

Actual Weights	Reading	
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
	PT1200	B6100

RECORDED BY: [illegible]
DATE: 11/18/91

DAY 1

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	Acidic $KMnO_4$	Mallinckrodt	7068 KETJ	—	160.0g	4000	4%	H_2SO_4 - 10%	PT1200
	ABS · H_2O_2	↓	5240 KEPC	4/92	333 mL	1000	10%	HNO_3 - 5%	1000mL Vol. Flask

H_2SO_4 - Mallinckrodt - 2876 KEPX
HNO_3 - Mallinckrodt 2704 KENR
Toluene Baker BA8160
Acetone - Baker BB165[illegible]

BALANCE CALIBRATION

Actual Weights		Reading	
#1	w/o bolt	32.0g	31.9g
#1-8	↓	267.4g	267.5g
#1-16	w/bolt	702.3g	702.7g
#1-24	↓	991.1g	991.5g
		PT1200	BL100

RECORDED BY: Julio D. Lopez
DATE: 11/19/91

DAY 2.

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION Vendor	Lot #	Expiration Date	grams used	Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
	Acidic MnO_4	Mallinckrodt	7068 KETJ	—	~~160.0~~ 120.0	~~4000~~ 3000	4% w/v	10% H_2SO_4	PT1200
	ABS H_2O_2	↓	5240 KEPC	9/92	333 mL	1000	10% v/v	5% HNO_3	Vol. Flask

H_2SO_4 - Mallinckrodt - 2876 KEPX
HNO_3 - ↓ - 2704 KENR
Toluene Baxter BA860
Acetone ↓ BB165 [illegible]

BALANCE CALIBRATION

Actual Weights		Reading	
#1	w/o bolt	32.0g	32.0g
#1-8	w ↓	267.4g	267.6g
#1-16	w/bolt	734.7g	739.5g
#1-24	↓	991.1g	991.8g
		PT1200	B6100

RECORDED BY: [signature]
DATE: 11/20/91

1 DAY 3

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	Acidic $KMnO_4$	Mallinckrodt	7068 KEJT	–	~~160~~ 120.0	3000 mL	4% w/v	10% H_2SO_4	PT1200
	ABS	↓	5240 KEPC	9/92	333 mL	1000 mL	10% v/v	5% HNO_3	Volumetric Flask

BALANCE CALIBRATION

Actual Weights

#1	w/o bolt
#1-8	↓
#1-16	w/ bolt
#1-24	↓

Reading

32.0g	32.1g
267.4g	267.7g
734.8g	735.4g
991.0g	991.8g
PT1200	B6100

H_2SO_4 - Mallinckrodt - 2876 KEPX
HNO_3 - ↓ - 2704 KENR
Toluene Baker - BA860
Acetone ↓ - BB165 [illegible]

RECORDED BY: [illegible]
DATE: 11/21/91

DAY 1

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	Acidic $KMnO_4$	Mallinckrodt	7069 KZJJ	–	160.0	4000	4% w/v	10% H_2SO_4	PT1200
	ABS - H_2O_2	↓	5240 KEPC	9/92	333.0	1000	10% v/v	5% HNO_3	Vol Flask

H_2SO_4 - Mallinckrodt - 2876 KEPX
HNO_3 - ↓ - 2704 KENR
Toluene - Baker - BA8160
Acetone - ↓ - BB165 or BA947

BALANCE CALIBRATION

Actual Weights		Reading	
1	w/o bolt	32.0g	32.0g
1-8	↓	267.5g	267.6g
1-16	w/bolt	735.0g	735.4g
1-24	↓	991.4g	991.9g
		PT1200	B6100

RECORDED BY: [illegible]
DATE: 11/22/91

STANDARDS PREPARATION

Standard # (with analysts initials)	Element(s)	STOCK SOLUTION				Final volume (mL)	Final Concen-tration	Matrix (with acid lot numbers)	Transfer Implement(s) or Balance #
		Vendor	Lot #	Expiration Date	grams used				
	Acidic $KMnO_4$	Mallinckrodt	7068 KETJ	—	1600.0	4000	4% w/v	10% H_2SO_4	PT1200
	ABS H_2O_2	↓	6240 KEPC	9/92	333.0	1000	10% v/v	5% HNO_3	Vol Flask

BALANCE CALIBRATION

Actual Weights		Reading	
1	w/o bolt	32.0g	32.0g
1-8	↓	267.5g	267.5g
1-16	w/ bolt	73.50g	135.3g
1-24	↓	991.5g	991.8g
		PT1200	B6100

H_2SO_4 - Mallinckrodt - 2876 KEPX
HNO_3 - ↓ - 2704 KENR
Toluene - Baker - BA 8600
Acetone - ↓ - BA 947

RECORDED BY: [illegible]
DATE: 11/23/91

Day 6

DEFINITION OF TERMS

SYMBOL	DEFINITIONS	UNITS
As	AREA OF STACK	in.^2
Cp	PITOT COEFFICIENT	--
Ca	CONCENTRATION OF PARTICULATE	grains/ft^3
Dn	DIAMETER OF SAMPLING NOZZLE	in.
ER	EMISSION RATE OF PARTICULATE	lb/hr
Kp	PITOT TUBE COEFFICIENT	--
MFd	MOLE FRACTION OF DRY STACK GAS	--
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	lb/lb-mole
MWw	MOLECULAR WEIGHT OF WET STACK GAS	lb/lb-mole
	MOISTURE COLLECTED IN IMPINGERS	grams
P(std)	STANDARD PRESSURE (29.92 in. Hg)	in. Hg
Pb	BAROMETRIC PRESSURE	in. Hg
Pmg(avg)	AVERAGE GAUGE METER PRESSURE	in. Hg
Ps	ABSOLUTE STACK PRESSURE	in. Hg
	PARTICULATE CATCH	grams
Qsd	AVERAGE STACK DRY VOLUMETRIC FLOW RATE	dry ft^3/min.
%CO2	PERCENT CO2 IN STACK GAS	--
%N2	PERCENT N2 IN STACK GAS	--
%O2	PERCENT O2 IN STACK GAS	--
%V	PERCENT MOISTURE IN STACK	--
%XS	PERCENT EXCESS AIR	--
	TOTAL SAMPLING TIME	min.
T(std)	STANDARD TEMPERATURE (68 F)	F
Tm(avg)	AVERAGE TEMPERATURE OF THE METER	F
Ts(avg)	AVERAGE TEMPERATURE OF THE STACK	F
Vm	TOTAL METERED VOLUME	ft^3
Vm(std)	STANDARD METERED VOLUME	dry standard ft^3
Vw(gas)	VOLUME OF WATER IN STACK GAS	standard ft^3
Vs	VELOCITY OF STACK GAS	ft/min
Y	TEST METER CALIBRATION COEFFICIENT	--

SAMPLE CALCULATIONS

COMPANY : BORGESS MEDICAL CENTER
PLANT SITE : KALAMAZOO, MI
SAMPLING LOCATION : BAGHOUSE OUTLET
DATE : 09/07/91

EXAMPLE #1: PM/Metals , RUN 02

STANDARD CONDITIONS: 68 F, 29.92 in Hg

INPUT PARAMETERS:

As	=	551.55 sq.in.	Ps	=	29.48 in. Hg	PM COLLECT.	=	0.0102	grams
Cp	=	0.84	%CO2	=	4.69	AVG SQRT DEL.P	=	0.2546	IN H2O
Dn	=	0.313 in.	%N2	=	80.26	MOISTURE	=	211.60	grams
Kp	=	84.59	%O2	=	15.05	COLLECTED			
P(std)	=	29.92 in. Hg	T(std)	=	68.00 F	SAMPL TIME	=	240	min.
Pb	=	29.52 in. Hg	Tm(avg)	=	110.09 F	Ts(avg)	=	294.42	F
Pmg(avg)	=	0.45 in. H2O	Vm	=	91.40 ft^3	Y	=	1.0108	

1) Volume of dry gas sampled at standard conditions:

Pm = Pmg/13.6 + Pb
Pm = 29.5530

$$Vm(std) = \frac{Y * Vm * (T(std) + 460) * Pm}{P(std) * (Tm(avg) + 460)}$$

Vm(std) = (1.011 * 91.40 * (68 + 460) * 29.55) / (29.92 * (110.09 + 460))

Vm(std) = 84.52 dscf

2) Volume of water vapor at standard conditions:

Vw(gas) = 0.04707 ft3/g * (moisture collected)

Vw(gas) = (0.04707 * 211.60)

Vw(gas) = 9.95 scf

3) Percent moisture in stack:

$$\%V = \frac{100 * Vw(gas)}{Vm(std) + Vw(gas)}$$

%V = (100 *9.95) / (84.52 + 9.95)

%V = 10.53

4) Mole fraction of dry stack gas:

$$MFd = \frac{100 - \%V}{100}$$

MFd = (100 - 10.53) / 100

MFd = 0.895

5) Average molecular weight of dry stack gas:

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

MWd = (0.44 * 4.69) + (0.32 * 15.05) + (0.28 * 80.26)

MWd = 29.35 lb/lb-mole

6) Average molecular weight of wet stack gas:

MWw = MWd * MFd + 18.0 * (1.0 - MFd)

MWw = 29.35 * 0.895 + 18.0 * (1.0 - 0.895)

MWw = 28.16 lb/lb-mole

7) Stack velocity (feet/min) at stack conditions:

Vs = Kp*Cp*[SQRT(dP)]avg*(SQRT[(Ts)avg])*[SQRT(1/Ps*MWw)]*60

Vs = 84.59 * 0.84 * 0.25 * SQRT[(294.42 +460) / (29.48 * 28.16)]

Vs = 17.24665 fps
1034.799 fpm

8) Average stack dry volumetric flow rate:

$$Qsd = \frac{Vs * As * MFd * (T(std)+460) * Ps}{144 \text{ sq.in./cu.ft.} * (Ts(avg) + 460) * P(std)}$$

Qsd = 17.25 * 551.55 * 0.895 * (68.0 + 460) * 29.48 / (144 * (294.42 + 460) * 29.92)

Qsd = 2444.95 dscfm
69.24236 dscmm

9) Isokinetic sampling rate (%):

$$\%I = \frac{1039.5746 * Vm(std) * (Ts(avg) + 460)}{Vs * \text{samp. time} * Ps * MFd * (Dn)^2}$$

%I = (1039.5746 * 84.52 * (294.42 + 460)) / (1034.80 * 240 * 29.48 * 0.895 * (0.313)^2)

%I = 103.24

10) Excess air (%):

$$\%XS = \frac{100 * \%O2}{(0.264 * \%N2) - \%O2}$$

%XS = (100 * 15.05) / ((0.264 * 80.26) - 15.05)

%XS = 244.53

11) Concentration of particulate:

Ca = (particulate catch) / Vm(std) / 453.59 * 7000

Ca = 0.0102 / 84.52 / 453.59 * 7000

Ca = 0.00186 grains/dscf

12) Particulate Emissions Rate:

ER = (concentration) * (Qsd) * 60 / 7000

ER = 0.0019 * 2444.95 * 60 / 7000

ER = 0.039 lb/hr

PROJECT PARTICIPANTS

Environmental Protection Agency

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

Standards of Performance for New Stationary Sources; Appendix A—Addition of Methods for Measurement of Polychlorinated Dibenzo-p-Dioxins, Polychlorinated Dibenzofurans, and Hydrogen Chloride Emissions From Stationary Sources

[AD-FRL-3694-2]

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The purpose of this proposed rule is to add Method 23, "Determination of Polychlorinated Dibenzo-p-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) from Stationary Sources," and Method 26, "Determination of Hydrogen Chloride Emissions from Stationary Sources" to Appendix A of CFR part 60. These methods are being proposed to determine compliance with subparts Ca and Ea of part 60.

A public hearing will be held, if requested, to provide interested persons an opportunity for oral presentation of data, views, or arguments concerning the proposed rule.

DATES: *Comments.* Comments must be received on or before March 5, 1990.

Public Hearing. If anyone contacts EPA requesting to speak at a public hearing by January 10, 1990, a public hearing will be held February 7, 1990, beginning at 10 a.m. Persons interested in attending the hearing should call the contact mentioned under **ADDRESSES** to verify that a hearing will be held.

Request to Speak at Hearing. Persons wishing to present oral testimony must contact EPA by January 10, 1990.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Air Docket (LE-131), Attention: Docket Number A-89-11, U.S. Environmental Protection Agency, room M-1500, 1st Floor, Waterside Mall, 401 M Street SW., Washington, DC 20460.

Public Hearing. If anyone contacts EPA requesting a public hearing, it will be held at EPA's Emission Measurement Laboratory Building, Research Triangle Park, North Carolina. Persons interested in attending the hearing or wishing to present oral testimony should notify Gary McAlister, Emission Measurement Branch (MD-19), Technical Support Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541-1062.

Docket. Docket No. A-89-11, containing materials relevant to this rulemaking, is available for public inspection and copying between 8 a.m. and 3:30 p.m., Monday through Friday, at EPA's Air Docket, room M-1500, 1st Floor, Waterside Mall, 401 M Street SW., Washington, DC 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Gary McAlister or Roger Shigehara, Emission Measurement Branch (MD-19), Technical Support Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-1062.

SUPPLEMENTARY INFORMATION:

I. The Rulemaking

Under subparts Ca and Ea, the EPA is proposing to regulate emissions from municipal waste combustors (MWCs) which will include setting emission limits for polychlorinated dibenzo-p-dioxins (PCDDs, CDDs, or dioxins), polychlorinated dibenzo furans (PCDFs, CDFs, or furans), and hydrochloric acid (HCl). There are presently no methods published in 40 CFR part 60, appendix A, to measure any of these pollutants. This action would propose one method to measure the PCDDs and PCDFs and another method to measure the HCl.

Summary of Reference Methods

Method 23 is used to measure the emission of PCDDs and PCDFs from MWCs. A sample is withdrawn isokinetically from the stack through a probe, a filter, and a trap packed with a solid adsorbent. The PCDDs and PCDFs are collected in the probe, on the filter, and on the solid adsorbent. The PCDDs and PCDFs are extracted from the particulate matter and the adsorbent with a hot organic solvent. The extracted PCDDs and PCDFs are separated by capillary gas chromatography and then each isomer is identified and measured with mass spectrometry (GC/MS). The total PCDDs and PCDFs are the sum of the individual isomers. Toxicity factors are not used in the calculation.

Method 26 is used to measure the emission of HCl from MWCs. A sample is withdrawn at a constant rate from the stack through a probe and impingers filled with a dilute acid. The HCl is collected in the impinger solution. The chloride ion is separated by ion chromatography and measured by a conductivity detector.

Background

In 1983, the American Society of Mechanical Engineers (ASME) recognized that the testing for PCDDs and PCDFs needed to be standardized. In February of 1984, the ASME convened a committee of government representatives, testing consultants, equipment manufacturers, and incinerator operators to write a standard procedure for PCDDs and PCDFs. This eventually distributed as a draft ASME protocol in December of 1984. The procedure that we are proposing was derived from this draft ASME protocol. We are proposing significant changes in the quality assurance requirements and the solvents used to recover the sample. Because more labeled compounds are available, the proposed method will require additional labeled internal standards and surrogate compounds which will provide better representation of the entire range of PCDDs and PCDFs. Under the proposal the filter and solid adsorbent would be extracted in the laboratory with toluene to assure a high PCDD and PCDF recovery efficiency. Additionally the proposed sample recovery solvents used for rinsing the sample train glassware in the field would be acetone followed by methylene chloride with a final quality assurance rinse using toluene. EPA will continue to review the toluene field rinse quality assurance results and continue to evaluate the desirability of replacing methylene chloride with toluene for field rinsing sample glassware.

II. Administrative Requirements

A. Public Hearing

A public hearing will be held, if requested, to discuss the proposed test methods in accordance with section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations should contact EPA at the address given in the **ADDRESSES** section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement with EPA before, during, or within 30 days after the hearing. Written statements should be addressed to the Air Docket address given in the **ADDRESSES** section of this preamble.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Air Docket in Washington, DC (see **ADDRESSES** section of this preamble).

B. Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by EPA in the development of this proposed

rulemaking. The principal purposes of the docket are: (1) To allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process and (2) to serve as the record in case of judicial review (except for interagency review materials) [section 307(d)(7)(A)].

C. Office of Management and Budget Review

Executive Order 12291 Review. Under Executive Order 12291, EPA must judge whether a regulation is "major" and, therefore, subject to the requirement of a regulatory impact analysis. The proposal of these test methods is not major because it will not have an annual effect on the economy of $100 million or more; it will not result in a major increase in costs or prices; and there will be no significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S.-based enterprises to compete with foreign-based enterprises in domestic or export markets. Any burden resulting from the use of these methods is considered in the burden estimate for the regulation requiring the use of these methods.

D. Regulatory Flexibility Act Compliance

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this attached rule, if promulgated, will not have an economic impact on small entities because no additional costs will be incurred from this action.

This proposal does not contain any information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.*

List of Subjects in 40 CFR Part 60

Air pollution control, Municipal waste combustors, MWCs, Polychlorinated dibenzo-p-dioxins, Polychlorinated dibenzofurans, Hydrogen chloride.

Dated: November 30, 1989.

William K. Reilly,

Administrator.

The EPA proposes to amend title 40, part 60 of the Code of Federal Regulations as follows:

1. The authority citation for part 60 continues to read as follows:

Authority: 42 U.S.C. 7401, 7411, 7414, 7416, 7601.

2. Appendix A is amended by adding Methods 23 and 26 to read as follows:

Appendix A—Reference Methods

* * * * *

Method 23—Determination of Polychlorinated Dibenzo-p-Dioxins Polychlorinated Dibenzofurans From Stationary Sources

1. Applicability and Principle

1.1 Applicability. This method is applicable to the determination of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) from stationary sources.

1.2 Principle. A sample is withdrawn from the gas stream isokinetically and collected in the sample probe, on a glass fiber filter, and on a packed column of adsorbent material. The PCDDs and PCDFs are extracted from the sample, separated by high resolution gas chromatography, and measured by high resolution mass spectrometry.

2. Apparatus

2.1 Sampling. A schematic of the sampling train used in this method is shown in Figure 23-1. The train is identical to that described in Section 2.1 of Method 5 of this appendix with the following additions:

2.1.1 Nozzle. The nozzle shall be made of nickel, nickel plated stainless steel, quartz, or borosilicate glass.

BILLING CODE 6560-50-M

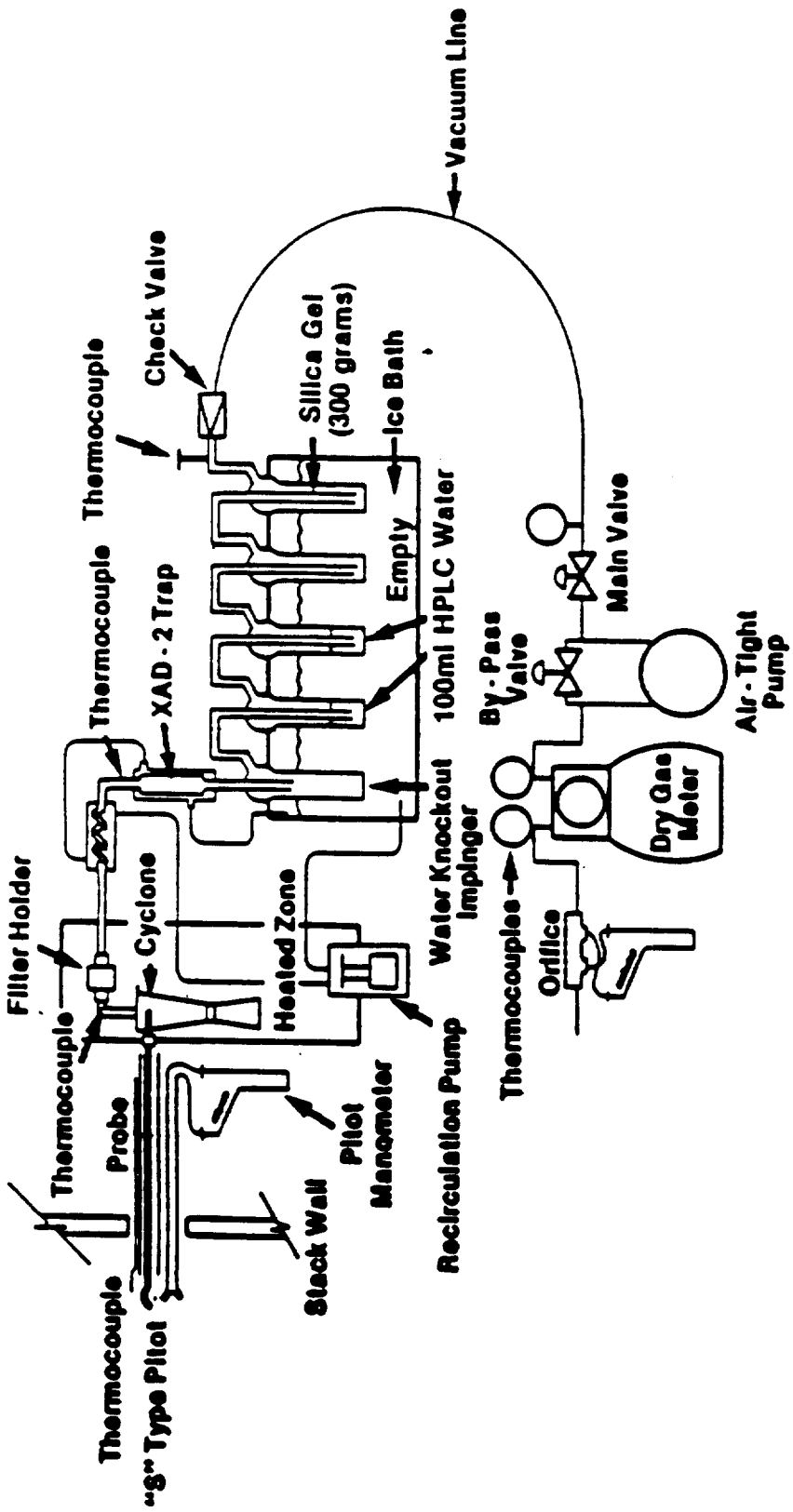

Figure 1. CDD/CDF Sampling Train Configuration

BILLING CODE 6560-50-C

2.1.2 Sample Transfer Lines. The sample transfer lines, if needed, shall be heat traced, heavy walled TFE (½ in. OD with ⅛ in wall) with connecting fittings that are capable of forming leak-free, vacuum-tight connections without using sealing greases. The line shall be as short as possible and must be maintained at 120 °C.

2.1.1 Filter Support. Teflon or Teflon coated wire.

2.1.2 Adsorbent Module. Glass container to hold the solid adsorbent. A schematic diagram is shown in Figure 23–2. Other physical configurations of the resin trap/condenser assembly are acceptable. The connecting fittings shall form leak-free, vacuum tight seals. No sealant greases shall be used in the sampling train. A coarse glass frit is included to retain the adsorbent.

2.1.3 Condenser. Glass, coil type with compatible fittings. A schematic diagram is shown in Figure 23–2.

2.1.4 Water Bath. Thermostatically controlled to maintain the gas temperature exiting the condenser at <20 °C (68 °F).

2.2 Sample Recovery.

2.2.1 Fitting Caps. Ground glass, Teflon or aluminum foil to cap off the sample exposed sections of the train.

2.2.2 Wash Bottle. Teflon, 500-ml.

2.2.3 Probe Liner and Probe-Nozzle Brushes. Inert bristle brushes with precleaned stainless steel or Teflon handles. The probe brush shall have extensions of stainless steel or Teflon, at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

2.2.4 Filter Storage Container. Sealed filter holder, wide-mouth amber glass jar with Teflon-lined cap, or aluminum foil.

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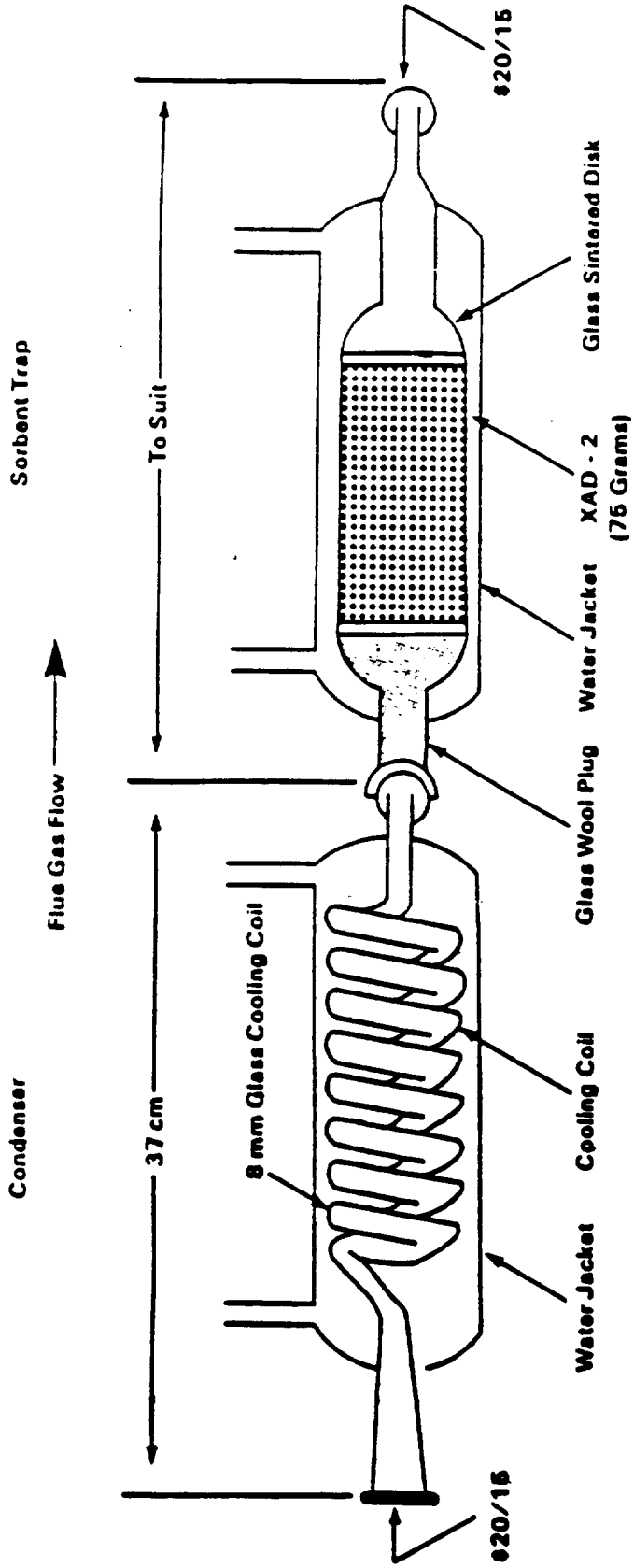

FIGURE 2. CONDENSER AND SORBENT TRAP FOR COLLECTION OF GASEOUS PCDDs AND PCDFs

BILLING CODE 6560-50-C

2.2.5 Balance. Triple beam.

2.2.6 Aluminum Foil. Heavy duty, hexane-rinsed.

2.2.7 Metal Storage Container. Air tight container to store silica gel.

2.2.8 Graduated Cylinder. Glass, 250-ml with 2-ml graduation.

2.2.9 Glass Sample Storage Container. Amber glass bottle for sample glassware washes, 500- or 1000-ml, with leak free Teflon-lined caps.

2.3 Analysis.

2.3.1 Sample Container. 125- and 250-ml flint glass bottles with Teflon-lined caps.

2.3.2 Test Tube. Glass.

2.3.3 Soxhlet Extraction Apparatus. Capable of holding 43 × 123 mm extraction thimbles.

2.3.4 Pasteur Pipettes. For preparing liquid chromatographic columns.

2.3.5 Reacti-vials. Amber glass, 2-ml, silanized prior to use.

2.3.6 Rotary Evaporator. Buchi/Brinkman RF-121 or equivalent.

2.3.7 Nitrogen Evaporative Concentrator. N-Evap Analytical Evaporator Model III or equivalent.

2.3.8 Separatory Funnels. Glass, 2-liter.

2.3.9 Gas Chromatograph. Consisting of the following components:

2.3.9.1 Oven. Capable of maintaining the separation column at the proper operating temperature ±1°C and performing programmed increases in temperature at rates of at least 3°C/min.

2.3.9.2 Temperature Gauge. To monitor column oven, detector, and exhaust temperatures ±1°C.

2.3.9.3 Flow System. Gas metering system to measure sample, fuel, combustion gas, and carrier gas flows.

2.3.9.4 Capillary Columns. A fused silica column, 60 m × 25 mm inside diameter (ID), coated with DB-5 and a fused silica column, 30 m × 25 mm ID coated with SP-2331.

2.3.10 Mass Spectrometer. Capable of routine operation at a resolution of 1:10000 with a stability of ±5 ppm.

2.3.11 Data System. Compatible with the mass spectrometer and capable of monitoring at least five groups of 25 ions.

2.3.12 Analytical Balance. To measure within 0.1 mg.

3. Reagents

3.1 Sampling.

3.1.1 Filters. Glass fiber filters, without organic binder, exhibiting at least 99.95 percent efficiency (<0.05 percent penetration) on 0.3-micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Standard Method D2986-71 (Reapproved 1978) (incorporated by reference—see § 60.17).

3.1.1.1 Precleaning. All filters shall be cleaned before their initial use. Place a glass extraction thimble and 1 g of silica gel and a plug of glass wool into a Soxhlet apparatus, charge the apparatus with toluene, and reflux for a minimum of three hours. Remove the toluene and discard it, but retain the silica gel. Place no more than 50 filters in the thimble onto the bed of silica gel and top with the cleaned glass wool. Charge the Soxhlet with toluene and reflux for 16 hours. After extraction, allow the Soxhlet to cool, remove the toluene extract, and retain it for analysis. Remove the filters and dry them under a clean N_2 stream. Store the filters tightly wrapped in cleaned aluminum foil.

3.1.1.2 Quality Control Check. Analyze the toluene extract from Section 3.1.1.1 as described in Sections 5.2 and 5.3. If any TCDD or TCDF is present at a concentration above the minimum detectable level, repeat the cleaning procedure and reanalyze the extract until no TCDD or TCDF is detectable.

3.1.2 Adsorbent Resin. Amberlite XAD-2 resin. Thoroughly cleaned before initial use.

3.1.2.1 Cleaning Procedure. This procedure may be carried out in a giant Soxhlet extractor. An all-glass filter thimble containing an extra-coarse frit is used for extraction of XAD-2. The frit is recessed 10-15 mm above a crenellated ring at the bottom of the thimble to facilitate drainage. The resin must be carefully retained in the extractor cup with a glass wool plug and a stainless steel ring because it floats on methylene chloride. This process involves sequential extraction in the following order.

Solvent	Procedure
Water	Initial rinse: Place resin in a beaker, rinse once with water, and discard. Fill with water a second time, let stand overnight, and discard.
Water	Extract with water for 8 hours.
Methanol	Extract for 22 hours.
Methylene chloride	Extract for 22 hours.
Methylene chloride (fresh).	Extract for 22 hours.

3.1.2.2 Drying.

3.1.2.2.1 Drying Column. Pyrex pipe, 10.2 cm ID by 0.6 m long, with suitable retainers as shown in Figure 23-3.

3.1.2.2.2 Procedure. The adsorbent must be dried with clean inert gas. Liquid nitrogen from a standard commercial liquid nitrogen cylinder has proven to be a reliable source of large volumes of gas free from organic contaminants. Connect the liquid nitrogen cylinder to the column by a length of cleaned copper tubing, 0.95 cm ID, coiled to pass through a heat source. A convenient heat source is a water bath heated from a steam line. The final nitrogen temperature should only be warm to the touch and not over 40 °C. Continue flowing nitrogen through the adsorbent until all the residual solvent is removed. The rate of flow should be high enough to gently agitate the particles but not high enough to cause the particles to fracture.

3.1.2.3 Quality Control Check. The adsorbent must be checked for residual methylene chloride as well as TCDDs and TCDFs.

3.1.2.3.1 Methylene Chloride Residue.

3.1.2.3.1.1 Extraction. Weigh a 1.0 g sample of dried resin into a small vial, add 3 ml of toluene, cap the vial, and shake it well.

3.1.2.3.1.2 Analysis. Inject a 5µl sample of the extract into a gas chromatograph operated under the following conditions:

Column: 6 ft x ⅛ in stainless steel containing 10% OV-101 on 100/120 Supelcoport.

Carrier Gas: Helium at a rate of 30 ml/min.

Detector: Flame ionization detector operated at a sensitivity of 4×10^{-11} A/mV.

Injection Port Temperature: 250 °C.

Detector Temperature: 305 °C.

Oven Temperature: 30 °C for 4 min; programmed to rise at 40 °C until it reaches 250 °C; return to 30 °C after 1000 seconds.

Compare the results of the analysis to the results from the reference solution. Prepare the reference solution by injecting 2.5 µl of methylene chloride into 100 ml of toluene. This corresponds to 100 µg of methylene chloride per g of adsorbent. The maximum acceptable concentration is 1000 µg/g of adsorbent. If the adsorbent exceeds this level, drying must be continued until the excess methylene chloride is removed.

3.1.2.3.2 TCDDs and TCDFs. Extract the sample as described in Section 5.1.1. Analyze the extract as described in §§ 5.2 and 5.3. If any of the TCDDs or TCDFs are present at concentrations above the MDL, the adsorbent must be recleaned by repeating the last step of the cleaning procedure. The MDL can be calculated as ⅓ of the theoretical minimum quantifiable level (TMQL). The TMQL is calculated in § 9.8.

3.1.2.4 Storage. The adsorbent must be used within four weeks of cleaning. After cleaning, it may be stored in a wide mouth amber glass container with a Teflon-lined cap or placed in one of the glass adsorbent modules tightly sealed with Teflon film and elastic bands.

3.1.3 Glass Wool. Cleaned by sequential immersion in three aliquots of hexane, dried in a 110 °C oven, and stored in a hexane-washed glass jar with a Teflon-lined screw cap.

3.1.4 Water. Deionized distilled and stored in a hexane-rinsed glass container with a Teflon-lined screw cap.

3.1.5 Chromic Acid Cleaning Solution. Dissolve 20 g of sodium dichromate in 15 ml of water, and then carefully add 400 ml of concentrated sulfuric acid.

3.2 Sample Recovery.

3.2.2 Acetone. Pesticide quality.

3.2.2 Methylene Chloride. Pesticide quality.

3.2.3 Toluene. Pesticide quality.

3.3 Analysis.

3.3.1 Potassium Hydroxide. Reagent grade.

3.3.2 Sodium Sulfate. Granulated, reagent grade. Purify prior to use by rinsing with methylene chloride and oven drying. Store the cleaned material in a glass container with a Teflon-lined screw cap.

3.3.3 Sulfuric Acid. Reagent grade.

3.3.4 Sodium Hydroxide. 1.0 N. Weigh 40 g of sodium hydroxide into a 1-liter volumetric flask. Dilute to 1 liter with water.

3.3.5 Hexane. Pesticide grade.

3.3.6 Methylene Chloride. Pesticide Grade.

3.3.7 Benzene. Pesticide Grade.

3.3.8 Ethyl Acetate.

3.3.9 Methanol. Pesticide Grade.

3.3.10 Toluene. Pesticide Grade.

3.3.11 Isooctane. Pesticide Grade.

3.3.12 Cyclohexane. Pesticide Grade.

3.3.13 Basic Alumina. Activity grade 1. 100–200 mesh. Prior to use, activate the alumina by heating for 16 hours at 130 °C before use. Store in a desiccator.

3.3.14 Silica Gel. Bio-Sil A, 100–200 mesh. Prior to use, activate the silica gel by heating for at least 30 minutes at 180 °C. After cooling rinse the silica gel sequentially with methanol and methylene chloride. Heat the rinsed silica gel at 50 °C for 10 minutes, then increase the temperature gradually to 180 °C over 25 minutes and maintain it at this temperature for 90 minutes. Cool at room temperature and store in a glass container with a Teflon-lined screw cap.

3.3.15 Silica Gel Impregnated with Sulfuric Acid. Combine 100 g of silica gel with 44 g of concentrated sulfuric acid in a screw capped glass bottle and agitate thoroughly. Disperse the solids with a stirring rod until a uniform mixture is obtained. Store the mixture in a glass container with a Teflon-lined screw cap.

3.3.16 Silica Gel Impregnated with Sodium Hydroxide. Combine 39 g of 1 N sodium hydroxide with 100 g of silica gel in a screw capped glass bottle and agitate thoroughly. Disperse solids with a stirring rod until a uniform mixture is obtained. Store the mixture in glass container with a Teflon-lined screw cap.

3.3.17 Carbon/Celite. Combine 10.7 g of AX-21 carbon with 124 g of Celite 545 in a 250-ml glass bottle with a Teflon-lined screw cap. Agitate the mixture thoroughly until a uniform mixture is obtained. Store in the glass container.

3.3.18 Nitrogen. Ultra high purity.

3.3.19 Hydrogen. Ultra high purity.

3.3.20 Internal Standard Solution. Prepare a stock standard solution containing the isotopically labelled PCDDs and PCDFs at the concentrations shown in Table 1 under the heading "Internal Standards" in 10 ml of isooctane.

3.3.21 Surrogate Standard Solution. Prepare a stock standard solution containing the isotopically labelled PCDDs and PCDFs at the concentrations shown in Table 1 under the heading "Surrogate Standards" in 10 ml of isooctane.

3.3.22 Recovery Standard Solution. Prepare a stock standard solution containing the isotopically labelled PCDDs and PCDFs at the concentrations shown in Table 1 under the heading "Recovery Standards" in 10 ml of isooctane.

4. Procedure

4.1 Sampling. The complexity of this method is such that, in order to obtain reliable results, testers should be trained and experienced with the test procedures.

4.1.1 Pretest Preparation.

4.1.1.1 Cleaning Glassware. All glass components of the train upstream of and including the adsorbent module shall be cleaned as described in section 2A of the Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples. Special care shall be devoted to the removal of residual silicone grease sealants on ground glass connections of used glassware. Any residue shall be removed by soaking the glassware for several hours in a chromic acid cleaning solution prior to cleaning as described above.

4.1.1.2 Adsorbent Trap. The traps must be loaded in a clean area to avoid contamination. They should not be loaded in the field. Fill a trap with 20 to 30 g of XAD-2. Follow the XAD-2 with glass wool and tightly cap both ends of the trap.

4.1.1.3 Sample Train. It is suggested that all components be maintained according to the procedure described in APTD-0576.

4.1.1.4 Silica Gel. Weigh several 200 to 300 g portions of silica gel in an air tight container to the nearest 0.5 g. Record the total weight of the silica gel plus container, on each container. As an alternative, the silica gel may be weighed directly in its impinger or sampling holder just prior to sampling.

4.1.1.5 Filter. Check each filter against light for irregularities and flaws or pinhole leaks. Pack the filters flat in a clean glass container or wrapped in aluminum foil.

4.1.2 Preliminary Determinations. Same as section 4.1.2 of Method 5.

4.1.3 Preparation of Collection Train.

4.1.3.1 During preparation and assembly of the sampling train, keep all train openings where contamination can enter sealed until just prior to assembly or until sampling is about to begin.

Note: Do not use sealant grease in assembling the train.

4.1.3.2 Place approximately 100 ml of water in each of the first two impingers, leave the third impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the fourth impinger.

4.1.3.3 Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

4.1.3.4 Assemble the train as shown in Figure 23-1.

4.1.3.5 Turn on the adsorbent module and condenser coil recirculating pump and begin monitoring the adsorbent module gas entry temperature. Ensure proper sorbent temperature gas entry temperature before proceeding and before sampling is initiated. It is extremely important that the XAD-2 adsorbent resin temperature never exceed 50.C because thermal decomposition will occur. During testing, the XAD-2 temperature must not exceed 20 °C for efficient capture of the TCDDs and TCDFs.

4.1.4 Leak-Check Procedure. Same as Method 5, § 4.1.4.

4.1.5 Sample Train Operation. Same as Method 5, § 4.1.5.

4.2 Sample Recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Seal the nozzle end of the sampling probe with Teflon tape or aluminum foil.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe. Remove the probe from the train and close off both ends with aluminum foil. Seal off the inlet to the train with Teflon tape, a ground glass cap, or aluminum foil.

Transfer the probe and impinger assembly to the cleanup area. This area shall be clean and enclosed so that the chances of losing or contaminating the sample are minimized. Smoking which could contaminate the sample shall not be allowed in the cleanup area.

Inspect the train prior to and during disassembly and note any abnormal conditions, e.g., broken filters, colored impinger liquid, etc. Treat the samples as follows:

4.2.1 Container No. 1. Either seal the filter holder or carefully remove the filter from the filter holder and place it in its identified container. Use a pair of cleaned tweezers to handle the filter. If it is necessary to fold the filter, do so such that the particulate cake is inside the fold. Carefully transfer to the container any particulate matter and/or filter fibers which adhere to the filter holder gasket, by using a dry inert bristle brush and/or a sharp-edged blade. Seal the container.

4.2.2 Absorbent Module. Remove the module from the train, tightly cap both ends, label it, cover with aluminum foil, and store it on ice for transport to the laboratory.

4.2.3 Cyclone Catch. If the optional cyclone is used, quantitatively recover the particulate into a glass container and cap.

4.2.4 Container No. 2. Quantitatively recover material deposited in the nozzle, probe transfer lines, the front half of the filter holder, and the cyclone, if used, first by brushing while rinsing three times each with acetone and then by rinsing the probe three times with methylene chloride. Collect all the rinses in Container No. 2.

Rinse the back half of the filter holder, the connecting line between the filter and the condenser, and the condenser, if using a separate condenser and absorbent trap, sequentially, three times each, with acetone and methylene chloride. Collect all the rinses in Container No. 2 and mark the level of the liquid on the container.

4.2.5 Container No. 3. Repeat the rinsing described in section 4.2.4 using toluene as the rinse solvent. Collect the rinses in Container No. 3 and mark the level of the liquid on the container.

4.2.6 Impinger Water. Measure the liquid in the first three impingers to within ±1 ml by using a graduated cylinder or by weighing it to within ±0.5 by using a balance. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight. 4.2.7 Silica Gel. Note the color of the indicating silica gel to determine if it has been completely spent and make a mention of its condition. Transfer the silica gel from the fourth impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling. A rubber policeman may be used as an aid in removing the silica gel from the impinger.

5. Analysis

5.1 Sample Extraction.

5.1.1 Container No. 1. Place a glass extraction thimble and 1 g of silica gel and a plug of glass wool into the Soxhlet apparatus.

charge the apparatus with toluene, and reflux for a minimum of 3 hours. Remove the toluene and discard it, but retain the silica gel. Suspend the adsorbent module directly over the extraction thimble described in section 5.1.1. The glass frit of the module should be in the up position. The thimble is contained in a clean beaker, which will serve to catch the solvent rinses. Using a Teflon squeeze bottle, flush the XAD-2 into the thimble onto the bed of cleaned silica gel. Thoroughly rinse the glass module with toluene into the beaker containing the thimble. Add the XAD-2 glass wool plug to the thimble, add the contents of container No. 1, and add the concentrate from Section 5.1.2. For low level samples, add 20 ul of the internal standard solution (section 3.3.20), for high level samples, add 100 ul of the solution. Low level samples are those samples that contain less than 200 pg of any TCDD of TCDF. Cover the XAD-2 in the thimble with the cleaned glass wool plug to prevent the resin from floating into the solvent reservoir of the extractor. If the resin is wet, effective extraction can be accomplished by loosely packing the resin in the thimble. The thimble is placed in the extractor, and the toluene contained in the beaker is added to the solvent reservoir. Additional toluene is added to make the reservoir approximately two—thirds full. Add Teflon boiling chips and assemble the apparatus. Adjust the heat source to cause the extractor to cycle 5-6 times per hour. Extract the resin for 16 hours. After extraction, allow the Soxhlet to cool. Transfer the toluene extract and three 10-ml rinses to the rotary evaporator. Concentrate the extract to approximately 8 ml. Use nitrogen evaporation to further reduce the sample to about 1 ml. Split the sample in half. Store one half and analyze the other according to the procedures in sections 5.2 and 5.3.

5.1.2 Container No. 1. Transfer the contents directly to the glass thimble of the extractor and extract them simultaneously with the XAD-2 resin.

5.1.3 Container No. 2. Concentrate the sample to a volume of about 1-5 ml using the rotary evaporator apparatus, at a temperature of less than 37 °C. Rinse the sample container three times with small portions of methylene chloride and add these to the concentrated solution and concentrate further to near dryness. This residue contains particulate matter removed in the rinse of the train probe and nozzle. Add the concentrate to the filter and the XAD-2 resin in the Soxhlet apparatus as described in section 5.1.1.

5.1.4 Container No. 3. Concentrate the sample to a volume of about 1-5 ml using the rotary evaporator apparatus, at a temperature of less than 37°C. Rinse the sample container three times with small portions of toluene and add these to the concentrated solution and concentrate further to near dryness. Analyze the extract according to the procedures in sections 5.2 and 5.3.

5.2 Sample Cleanup and Fractionation.

5.2.1 Silica Gel Column. Pack one end of a glass column, 20 mm x 230 mm, with glass wool. Add in sequence, 1 g silica gel, 2 g of sodium hydroxide impregnated silica gel, 1 g silica gel, 4 g of acid-modified silica gel, and 1 g of silica gel. Wash the column with 30 ml of hexane and discard it. Add the sample extract, dissolved in 5 ml of hexane to the column with two additional 5-ml rinses. Elute the column with an additional 90 ml of hexane and retain the entire eluate. Concentrate this solution to a volume of about 1 ml using the nitrogen evaporative concentrator (section 2.3.7).

5.2.2 Basic Alumina Column. Shorten a 25-ml disposable Pasteur pipette to about 16 ml. Pack the lower section with glass wool and 12 g of basic alumina. Transfer the concentrated extract from the silica gel column to the top of the basic alumina column and elute the column sequentially with 120 ml of 0.5 percent methylene chloride in hexane followed by 120 ml of 35 percent methylene chloride in hexane. Discard the first 120 ml of eluate. Collect the second 120 ml of eluate and concentrate it to about 0.5 ml using the nitrogen evaporative concentrator.

5.2.3 AX-21 Carbon/Celite 545 Column. Remove the bottom 0.5 inch from the tip of a 9-ml disposable Pasteur pipette. Insert a filter paper disk in the top of the pipette 2.5 cm from the constriction. Add sufficient carbon/celite mixture to form a 2 cm column. Top with a glass wool plug. Rinse the column in sequence with 2 ml of 50 percent benzene in ethyl acetate, 1 ml of 50 percent methylene chloride in cyclohexane and 2 ml of hexane. Discard these eluates. Transfer the concentrate in 1 ml of hexane from the basic alumina column to the carbon/celite column along with 1 ml of hexane rinse. Elute the column sequentially with 2 ml of 50 percent methylene chloride in hexane and 2 ml of 50 percent benzene in ethyl acetate and discard these eluates. Invert the column and elute in the reverse direction with 4 ml of toluene. Collect this eluate. Concentrate the eluate in a rotary evaporator at 50 °C to about 1 ml. Transfer the concentrate to a Reacti-vial using a toluene rinse and concentrate to a volume of 200 µl using a stream of N_2. Store extracts in a freezer, shielded from light, prior to analysis.

5.3 Analysis. Analyze the sample using a gas chromatograph coupled to a mass spectrometer (GC/MS) using the instrumental parameters in sections 5.3.1 and 5.3.2. A 1 to 5 µl aliquot of the extract is injected into the GC. Sample extracts are first analyzed using the DB-5 capillary column to determine the concentration of each isomer of PCDDs and PCDFs (tetra-through octa-). If tetra-chlorinated dibenzofurans are detected in this analysis, then another aliquot of the sample is analyzed in a separate run, using the SP 2331 column to measure the 2,3,7,8 tetra-chlorodibenzofuran isomer.

5.3.1 Gas Chromatograph Operating Conditions.

5.3.1.1 Injector. Configured for capillary column, splitless, 250 °C.

5.3.1.2 Carrier Gas. Helium, 1-2 ml/min.

5.3.1.3 Oven. Initially at 150 °C. Raise ballistically to 180 °C and then at 3 °C/min up to 300 °C.

5.3.2 High Resolution Mass Spectrometer.

5.3.2.1 Resolution. 8000-10000 m/e.

5.3.2.2 Ionization Mode. Electron impact, 70 eV.

5.3.2.3 Source Temperature 250 °C.

5.3.2.4 Monitoring Mode. Selected ion monitoring. A list of the various ions to be monitored is summarized in Table 4.

5.3.2.5 Identification Criteria. The following identification criteria shall be used for the characterization of polychlorinated dibenzodioxins and dibenzofurans.

1. The integrated ion-abundance ratio (M+/M+2 or M+2/M+4) shall be within 15 percent of the theoretical value. The acceptable ion-abundance ratio ranges for the identification of chlorine-containing compounds are given in Table 5.

2. The retention time for the analytes must be within 3 seconds of the corresponding ^{13}C-labeled internal standard, surrogate or alternate standard.

3. The monitored ions shown in Table 4 for a given analyte shall reach their maximum within 2 seconds of each other.

4. The identification of specific isomers that do not have corresponding ^{13}C-labeled standards is done by comparison of the relative retention time (RRT) of the analyte to the nearest internal standard retention time with reference (i.e., within 0.005 RRT units) to the comparable RRTs found in the continuing calibration.

5. The signal to noise for all monitored ions must be greater than 2.5.

6. The confirmation of 2,3,7,8-TCDD and 2,3,7,8-TCDF shall satisfy all of the above identification criteria.

7. For the identification of PCDFs, no signal may be found in the corresponding PCDPE channels.

5.3.2.6 Quantification. The peak areas for the two ions monitored for each analyte are summed to yield the total response for each analyte. Each internal standard is used to quantify the indigenous PCDDs or PCDFs in its homologous series. For example the $^{13}C_{12}$-1,2,3,4-tetra chlorinated dibenzodioxin is used to calculate the concentrations of all other tetra chlorinated isomers. Recoveries of the tetra- and penta- internal standards are calculated using the $^{13}C_{12}$-1,2,3,4-TCDD. Recoveries of the hexa- through octa- internal standards are calculated using $^{13}C_{12}$-1,2,3,7,8,9-HxCDD. Recoveries of the surrogate standards are calculated using the corresponding homolog from the internal standard.

6. Calibration

Same as Method 5 with the following additions.

6.1 GC/MS System.

6.1.1 Initial Calibration. Calibrate the GC/MS system using the set of five standards shown in Table 2 for low level samples or Table 3 for high level samples. The relative standard deviation for the mean response factor from each of the unlabeled analytes (Table 2) and of the internal, surrogate, and alternate standards shall be less than or equal to the values in Table 6. The signal to noise ratio for the GC signal present in every selected ion current profile shall be greater than or equal to 2.5. The ion abundance ratios shall be within the control limits in Table 5.

6.1.2 Daily Performance Check.

6.1.2.1 Calibration Check. Inject one µl of solution number 4 from Table 2 or solution number 3 from Table 3. Calculate the relative

response factors (RRF's) for each compound and compare each of them to the corresponding mean RRF obtained during the initial calibration. The analyzer performance is acceptable if the measured RRF's for the labeled and unlabeled compounds for the daily run are within the limits of the mean values shown in Table 6. In addition the ion-abundance ratios shall be within the allowable control limits shown in Table 8.

6.1.2.2 Column Separation Check. Inject a solution of a mixture of PCDDs and PCDFs that documents resolution between 2,3,7,8-TCDD and other TCDD isomers. Resolution is defined as a valley between peaks that is less than 25% of the lower of the two peaks.

7. Quality Control

7.1 Sampling Train Collection Efficiency Check. Add 100 µl of the surrogate standards in Table 1 to the adsorbent cartridge of each train before each test.

7.2 Internal Standard Percent Recoveries. Recoveries of the internal standards must be between 40 to 130% for the tetrathrough hexachlorinated compounds while the range is 25 to 130% for the higher hepta- and octachlorinated homologues. If the internal standards do not meet the recovery requirements, the data will still be acceptable provided that the signal is equal to or greater than ten times the noise level.

7.3 Surrogate Recoveries. The surrogate recoveries are measured relative to the internal standards and are a measure of collection efficiency. All recoveries shall be between 70 and 130%. Poor recoveries for all the surrogates may be an indication of breakthrough in the sampling train. If the recovery of all standards is below 70%, the sampling runs must be repeated. As an alternative the sampling runs do not have to be repeated if the final results are divided by the fraction of surrogate recovery. Poor recoveries of isolated surrogate compounds should not be grounds for rejecting an entire set of samples.

7.4 Toluene Quality Assurance Rinse. Report the results of the toluene quality assurance rinse separately from the total sample catch. Do not add it to the total sample.

8. Quality Assurance

8.1 Applicability. When the method is used to analyze samples to demonstrate compliance with a source emission regulation, an audit sample must be analyzed.

8.2 Audit Procedure. The audit sample contains tetra through octa isomers of PCDD and PCDF. Concurrently, analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for the compliance samples and the EPA audit sample. If this condition is met, auditing of subsequent compliance analyses for any enforcement agency within seven days is not required.

8.3 Audit Sample Availability. The audit sample may be obtained by writing:

Source Test Audit Coordinator (MD-77B), Quality Assurance Division, Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711

or by calling the Source Test Audit Coordinator (STAC) at (919) 541-7834. The request for the audit sample must be made at least 30 days prior to the scheduled compliance sample analysis.

8.4 Audit Results. Calculate the audit sample concentration according to the calculation procedure described in the audit instructions included with the audit sample. Fill in the audit sample concentration and the analyst's name on the audit response form included with the audit instructions. Send one copy to the EPA regional office or the appropriate enforcement agency. The STAC will return the EPA response to the laboratory being audited. Include this EPA response with the results of the compliance samples in appropriate reports to the EPA regional office or the appropriate enforcement agency. Include this information with subsequent analyses for any enforcement agency during the seven-day period.

9. Calculations

Same as Method 5, section 6 with the following additions.

9.1 Nomenclature.

A_{ni} = Integrated ion current of the two ions characteristic of compound i in the calibration standard.

A^*_{si} = Integrated ion current of the two ions characteristic of the internal standard i in the calibration standard.

A^*_{ssi} = Integrated ion current of the two ions characteristic of surrogate compound i in the calibration standard.

A_i = Integrated ion current of the two ions characteristic of compound i in the sample.

A^*_i = Integrated ion current of the two ions characteristic of internal standard i in the sample.

A_{rr} = Integrated ion current of the two ions characteristic of the recovery standard.

A_{si} = Integrated ion current of the two ions characteristic of surrogate compound i in the sample.

C_v = Concentration of the compound of interest in the most dilute calibration solution, pg/µl.

m_{ni} = Mass of compound i in the calibration standard injected into the analyzer, pg.

m^*_{si} = Mass of labeled compound i in the calibration standard injected into the analyzer, pg.

m^*_i = Mass of internal standard i added to the sample, pg.

m_{rr} = Mass of recovery standard in the calibration standard injected into the analyzer, pg.

m_{si} = Mass of surrogate compound i in the calibration standard.

RRF_i = Relative response factor.

RRF_{rr} = Recovery standard response factor.

V = Final extract volume, µl.

9.2 Relative Response Factor.

$$RRF = 1/n \sum^{n} A_{ni}\, m^*_{si} / (A^*_{si}\, m_{ni}) \qquad \text{Eq. 23-1}$$

9.3 Concentration of the PCDDs and PCDFs.

$$C_i = m^*_i\, A_i / (A^*_i\, RRF_i\, V_{sample}) \qquad \text{Eq. 23-2}$$

9.4 Recovery Standard Response Factor.

$$RRF_{rr} = A^*_{si}\, m_{rr} / (A_{rr}\, m^*_{si}) \qquad \text{Eq. 23-3}$$

9.5 Recovery of Internal Standards [R^*].

$$R^* = (A^*_i\, m_{ni} / A_{ni}\, RF_i\, m^*_i) \times 100\% \qquad \text{Eq. 23-4}$$

9.6 Surrogate Compound Response Factor.

$$RRF_s = A^*_{si}\, m_{si} / (A_{ssi}\, m^*_{si}) \qquad \text{Eq. 23-5}$$

9.7 Recovery of Surrogate Compounds [R_s].

$$R_s = (A_{si}\, m^*_i / A^*_i\, RRF_i\, m_{si}) \times 100\% \qquad \text{Eq. 23-6}$$

9.8 Theoretical Minimum Quantifiable Level (TMQL).

$$TMQL = C_v\, V / R^* \qquad \text{Eq. 23-7}$$

9. Bibliography

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3. Thomasen, J.R. (ed.). Analysis of Pesticide Residues in Human and Environmental Samples. U.S. Environmental Protection Agency. Research Triangle Park, NC. 1974.

4. Triangle Laboratories. Case Study: Analysis of Samples for the Presence of Tetra Through Octachloro-p-Dibenzodioxins and Dibenzofurans. Research Triangle Park, NC. 1988. 26 p.

5. U.S. Environmental Protection Agency. Method 8280—The Analysis of Polychlorinated Dibenzo-p-dioxin and Polychlorinated Dibenzofurans. In: Test Methods for Evaluating Solid Waste. Washington, DC. SW-846. September, 1986. 54 p.

TABLE 1.—COMPOSITION OF THE SAMPLE FORTIFICATION AND RECOVERY STANDARDS SOLUTIONS

Analyte	Concentration (pg/µl)
Internal standards:	
$^{13}C_{12}$-2,3,7,8-TCDD	100
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100
$^{13}C_{12}$-2,3,7,8-TCDF	100
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100
Surrogate Standards:	
$^{37}Cl_4$-2,3,7,8-TCDD	100
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100
Recovery standards:	
$^{13}C_{12}$-1,2,3,4-TCDD	500
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	500

TABLE 2.—COMPOSITION OF THE INITIAL CALIBRATION SOLUTIONS (LOW)

Compound	Concentrations (pg/µL)—Solution No.—				
	1	2	3	4	5
Unlabeled analytes:					
2,3,7,8-TCDD	0.5	1	5	50	100
2,3,7,8-TCDF	0.5	1	5	50	100
1,2,3,7,8-PeCDD	2.5	5	25	250	500
1,2,3,7,8-PeCDF	2.5	5	25	250	500
2,3,4,7,8-PeCDF	2.5	5	25	250	500
1,2,3,4,7,8-HxCDD	2.5	5	25	250	500
1,2,3,6,7,8-HxCDD	2.5	5	25	250	500
1,2,3,7,8,9-HxCDD	2.5	5	25	250	500
1,2,3,4,7,8-HxCDF	2.5	5	25	250	500
1,2,3,6,7,8-HxCDF	2.5	5	25	250	500
1,2,3,7,8,9-HxCDF	2.5	5	25	250	500
2,3,4,6,7,8-HxCDF	2.5	5	25	250	500
1,2,3,4,6,7,8-HpCDD	2.5	5	25	250	500
1,2,3,4,6,7,8-HpCDF	2.5	5	25	250	500
1,2,3,4,7,8,9-HpCDF	2.5	5	25	250	500
OCDD	2.5	5	25	250	500
OCDF	5	10	50	500	1000
Internal standards:	5	10	50	500	1000
$^{13}C_{12}$-2,3,7,8-TCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	100	100	100	100
$^{13}C_{12}$-OCDD	200	200	200	200	200
$^{13}C_{12}$-2,3,7,8-TCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	100	100	100	100
Surrogate standards:					
$^{37}Cl_4$-2,3,7,8-TCDD	0.5	1	5	50	100
$^{13}C_{12}$-2,3,4,7,8-PeCDF	2.5	5	25	250	500
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	2.5	5	25	250	500
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	2.5	5	25	250	500
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	2.5	5	25	250	500
Alternate standard:					
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	2.5	5	25	250	500
Recovery standards:					
$^{13}C_{12}$-1,2,3,4-TCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	100	100	100	100	100

TABLE 3.—COMPOSITION OF THE INITIAL CALIBRATION SOLUTIONS (HIGH)

Compound	Concentrations (pg/µL)—Solution No.—				
	1	2	3	4	5
Unlabeled analytes:					
2,3,7,8-TCDD	5	50	100	500	1000
2,3,7,8-TCDF	5	50	100	500	1000
1,2,3,7,8-PeCDD	25	250	500	2500	5000
1,2,3,7,8-PeCDF	25	250	500	2500	5000
2,3,4,7,8-PeCDF	25	250	500	2500	5000
1,2,3,4,7,8-HxCDD	25	250	500	2500	5000
1,2,3,6,7,8-HxCDD	25	250	500	2500	5000
1,2,3,7,8,9-HxCDD	25	250	500	2500	5000
1,2,3,4,7,8-HxCDF	25	250	500	2500	5000
1,2,3,6,7,8-HxCDF	25	250	500	2500	5000
1,2,3,7,8,9-HxCDF	25	250	500	2500	5000
2,3,4,6,7,8-HxCDF	25	250	500	2500	5000
1,2,3,4,6,7,8-HpCDD	25	250	500	2500	5000
1,2,3,4,6,7,8-HpCDF	25	250	500	2500	5000
1,2,3,4,7,8,9-HpCDF	25	250	500	2500	5000
OCDD	50	500	1000	5000	10000

TABLE 3.—COMPOSITION OF THE INITIAL CALIBRATION SOLUTIONS (HIGH)—Continued

Compound	Concentrations (pg/µL)—Solution No.—				
	1	2	3	4	5
CCDF	50	500	1000	5000	10000
Internal standards:					
$^{13}C_{12}$-2,3,7,8-TCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	100	100	100	100
$^{13}C_{12}$-OCDD	200	200	200	200	200
$^{13}C_{12}$-2,3,7,8-TCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	100	100	100	100
Surrogate standards:					
$^{37}Cl_4$-2,3,7,8-TCDD	5	50	100	500	1000
$^{13}C_{12}$-2,3,4,7,8-PeCDF	25	250	500	2500	5000
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	25	250	500	2500	5000
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	25	250	500	2500	5000
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	25	250	500	2500	5000
Alternate standard:					
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	5	50	100	500	1000
Recovery standards:					
$^{13}C_{12}$-1,2,3,4-TCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	100	100	100	100	100

TABLE 4.—ELEMENTAL COMPOSITIONS AND EXACT MASSES OF THE IONS MONITORED BY HIGH RESOLUTION MASS SPECTROMETRY FOR PCDDS AND PCDFS

Descriptor No.	Accurate mass	Ion type	Elemental composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl^{37}Cl_3O$	TCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDD
	327.8847	M	$C_{12}H_4{}^{37}Cl_4O_2$	TCDD (S)
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)
	333.9339	M+2	$^{13}C_{12}H_4{}^{35}Cl^{37}Cl_3O_2$	TCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE
	354.9792	LOCK	C_6F_{11}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PECDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF (S)
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)
	403.7974	M+2	$C_{12}H_3{}^{35}Cl_5{}^{37}ClO$	HpCPDE
	354.9792	LOCK	C_6F_{11}	PFK
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)
	389.8157	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDD (S)
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE
	430.9729	LOCK	C_6F_{11}	PFK
4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	409.7789	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	417.8253	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF (S)
	423.7766	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCPDE
	430.9729	LOCK	C_6F_{11}	PFK
5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	469.7779	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)

TABLE 4.—ELEMENTAL COMPOSITIONS AND EXACT MASSES OF THE IONS MONITORED BY HIGH RESOLUTION MASS SPECTROMETRY FOR PCDDS AND PCDFS—Continued

Descriptor No.	Accurate mass	Ion type	Elemental composition	Analyte
	513.6775	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_3O_2$	OCDPE
	442.9728	LOCK	$C_{18}F_{17}$	PFK

(a) The following nuclidic masses were used: H = 1.007825 C = 12.000000 ^{13}C = 13.003355 F = 18.9984 O = 15.994915 ^{35}Cl = 34.968853 ^{37}Cl = 36.965903 S = Labeled Standard

TABLE 5.—ACCEPTABLE RANGES FOR ION-ABUNDANCE RATIOS OF PCDDS AND PCDFS

Number of chlorine atoms	Ion type	Theoretical ratio	Control limits	
			Lower	Upper
4	M/M+2	0.77	0.65	0.89
5	M+2/M+4	1.55	1.32	1.78
6	M+2/M+4	1.24	1.05	1.43
6[1]	M/M+2	0.51	0.43	0.59
7[2]	M/M+2	0.44	0.37	0.51
7	M+2/M+4	1.04	0.88	1.20
8	M+2/M+4	0.89	0.76	1.02

[1] Used only for ^{13}C-HxCDF.
[2] Used only for ^{13}C-HpCDF.

TABLE 6.—MINIMUM REQUIREMENTS FOR INITIAL AND DAILY CALIBRATION RESPONSE FACTORS

Compound	Relative Response Factors	
	Initial calibration RSD	Daily calibration percentage difference
Unlabeled Analytes:		
2,3,7,8-TCDD	25	25
2,3,7,8-TCDF	25	25
1,2,3,7,8-PeCDD	25	25
1,2,3,7,8-PeCDF	25	25
2,3,4,7,8-PeCDF	25	25
1,2,4,5,7,8-HxCDD	25	25
1,2,3,6,7,8-HxCDD	25	25
1,2,3,7,8,9-HxCDD	25	25
1,2,3,4,7,8-HxCDF	25	25
1,2,3,6,7,8-HxCDF	25	25
1,2,3,7,8,9-HxCDF	25	25
2,3,4,6,7,8-HxCDF	25	25
1,2,3,4,6,7,8-HpCDD	25	25
1,2,3,4,6,7,8-HpCDF	25	25
OCDD	25	25
OCDF	30	30
Internal standards:		
^{13}C$_{12}$-2,3,7,8-TCDD	25	25
^{13}C$_{12}$-1,2,3,7,8-PeCDD	25	25
^{13}C$_{12}$-1,2,3,6,7,8-HxCDD	25	25
^{13}C$_{12}$-1,2,3,4,6,7,8-HpCDD	30	30
^{13}C$_{12}$-OCDD	30	30
^{13}C$_{12}$-2,3,7,8-TCDF	30	30
^{13}C$_{12}$-1,2,3,7,8-PeCDF	30	30
^{13}C$_{12}$-1,2,3,6,7,8-HxCDF	30	30
^{13}C$_{12}$-1,2,3,4,6,7,8-HpCDF	30	30
Surrogate standards:		
^{37}Cl$_4$-2,3,7,8-TCDD	25	25
^{13}C$_{12}$-2,3,4,7,8-PeCDF	25	25
^{13}C$_{12}$-1,2,3,4,7,8-HxCDD	25	25
^{13}C$_{12}$-1,2,3,4,7,8-HxCDF	25	25

TABLE 6.—MINIMUM REQUIREMENTS FOR INITIAL AND DAILY CALIBRATION RESPONSE FACTORS—Continued

Compound	Relative Response Factors	
	Initial calibration RSD	Daily calibration percentage difference
^{13}C$_{12}$-1,2,3,4,7,8,9-HpCDF	25	25
Alternate Standard:		
^{13}C$_{12}$-1,2,3,7,8,9-HxCDF	25	25

* * * * *

Method 26—Determination of Hydrogen Chloride Emissions From Stationary Sources

1. Applicability, Principle, Interferences, Precision, Bias, and Stability

1.1 Applicability. This method is applicable for determining hydrogen chloride (HCl) emissions from stationary sources.

1.2 Principle. An integrated sample is extracted from the stack and passed through dilute sulfuric acid. In the dilute acid, the HCl gas is dissolved and forms chloride (Cl^-) ions. The Cl^- is analyzed by ion chromatography (IC).

1.3 Interferences. Volatile materials which produce chloride ions upon dissolution during sampling are obvious interferences. Another likely interferent is diatomic chlorine (Cl_2) gas which reacts to form HCl and hypochlorous acid (HOCl) upon dissolving in water. However, Cl_2 gas exhibits a low solubility in water and the use of acidic, rather than neutral or basic collection solutions, greatly reduces the chance of dissolving any chlorine present. This method does not experience a significant bias when sampling a 400 ppm HCl gas stream containing 50 ppm Cl_2. Sampling a 220 ppm HCl gas stream containing 180 ppm Cl_2 results in a positive bias of 3.4 percent in the HCl measurement.

1.4 Precision and Bias. The within-laboratory relative standard deviations are 6.2 and 3.2 percent at HCl concentrations of 3.9 and 15.3 ppm, respectively. The method does not exhibit a bias to Cl_2 when sampling at concentrations less than 50 ppm.

1.5 Stability. The collected samples can be stored for up to 4 weeks before analysis.

1.6 Detection Limit. The analytical detection limit of the method is 0.1 µg/ml.

2. Apparatus

2.1 Sampling. The sampling train is shown in Figure 26-1, and component parts are discussed below.

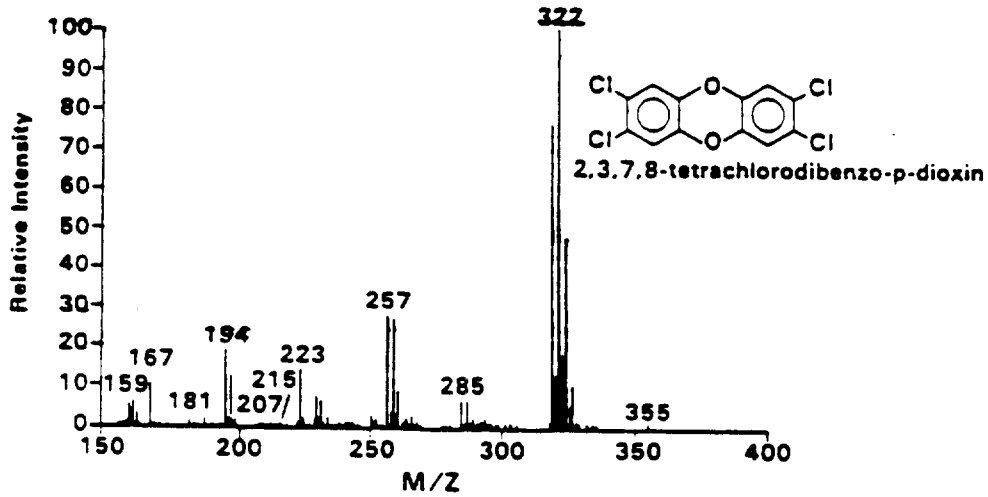
2.1.1 Probe. Borosilicate glass, approximately ⅜-in. (9-mm) I.D. with a heating system to prevent moisture condensation. A ⅜-in. I.D. Teflon elbow should be attached to the inlet of the probe and a 1-in. (25-mm) length of ⅜-in. I.D. Teflon tubing should be attached to the open end of the elbow to permit the opening of the probe to be turned away from the gas stream. This reduces the amount of particulate entering the train. This probe configuration should be used when the concentration of particulate matter in the emissions is high. When high concentrations are not present, the Teflon elbow is not necessary, and the probe inlet may be perpendicular to the gas stream. A glass wool plug should *not* be used to remove particulate matter since a negative bias in the data could result. Instead, a Teflon filter (see § 2.1.5) should be installed at the inlet (for

TRIANGLE LABORATORIES, INC.

POLYCHLORINATED DIBENZODIOXINS AND DIBENZOFURANS

DATA USER MANUAL

Triangle Laboratories
Analytical Methodology,
Data Quality Objectives,
Deliverables,
Data Package Assembly Description
&
Examples of Calculations



METHODOLOGY FOR THE DETERMINATION OF METALS EMISSIONS IN EXHAUST GASES FROM INCINERATION PROCESSES

1. Applicability and Principle

1.1 Applicability. This method is applicable for the determination of arsenic (As), beryllium (Be), cadmium (Cd), total chromium (Cr), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn) emissions from municipal waste incinerators and similar combustion processes. These elements are referred to hereafter as the primary metals. This method may also be used for the determination of antimony (Sb), barium (Ba), copper (Cu), manganese (Mn), phosphorus (P), selenium (Se), silver (Ag), and thallium (Tl) emissions from these sources. These elements are referred to hereafter as the secondary metals.

In addition, the method may be used to determine particulate emissions by following the additional procedures described. Modifications to the sample recovery and analysis procedures described in this protocol for the purpose of determining particulate emissions may potentially impact the front half mercury determination.*

1.2 Principle. The stack sample is withdrawn isokinetically from the source, with particulate emissions collected in the probe and on a heated filter and gaseous emissions collected in a series of chilled impingers containing a solution of dilute nitric acid in hydrogen peroxide in two impingers, and acidic potassium permanganate solution in two (or one) impingers. Sampling train components are recovered and digested in separate front and back half fractions. Materials collected in the sampling train are digested with acid solutions to dissolve inorganics and to remove organic constituents that may create analytical interferences. Acid digestion is performed using conventional Parr® Bomb or microwave digestion techniques. The

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*Field tests to date have shown that of the total amount of mercury measured by the method, only 0 to <2% was measured in the front half. Therefore, it is tentatively concluded, based on the above data, that particulate emissions may be measured by this train, without significantly altering the mercury results.

nitric acid and hydrogen peroxide impinger solution, the acidic potassium permanganate impinger solution, and the probe rinse and digested filter solutions are analyzed for mercury by cold vapor atomic absorption spectroscopy (CVAAS). Except for the permanganate solution, the remainder of the sampling train fractions are analyzed for As, Be, Cd, Cr, Pb, Ni, and Zn (and Sb, Ba, Cu, Mn, P, Se, Ag, and Tl, if desired) by inductively coupled argon plasma emission spectroscopy (ICAP) or atomic absorption spectroscopy (AAS). Graphite furnace atomic absorption spectroscopy (GFAAS) is used for analysis of As, Cd, and Pb (and Sb, Se, and Tl, when measured) if these elements require greater analytical sensitivity than can be obtained by ICAP. Additionally, if desired, the tester may use AAS for analyses of all target metals if the resulting in-stack method detection limits (combined sampling and analytical detection limits) meet the data quality objectives of the testing program. For convenience, aliquots of each digested sample fraction can be combined proportionally for a single analytical determination. The efficiency of the analytical procedure is quantified by the analysis of spiked quality control samples containing each of the target metals including actual sample matrix effects checks.

2. Range, Sensitivity, Precision, and Interferences

2.1 Range. For the analyses described in this methodology and for similar analyses, the ICAP response is linear over several orders of magnitude. Samples containing metal concentrations in the nanograms per milliliter (ng/ml) to micrograms per milliliter (ug/ml) range in the analytical finish solution can be analyzed using this technique. Samples containing greater than approximately 50 ug/ml of arsenic, chromium, or lead should be diluted to that level or lower for final analysis. Samples containing greater than approximately 20 ug/ml of cadmium should be diluted to that level before analysis.

2.2 Analytical Sensitivity. ICAP analytical detection limits for the primary [and secondary] metals in the sample solutions (based on SW-846, Method 6010) are approximately as follows: As (53 ng/ml), Be (0.3 ng/ml), Cd (4 ng/ml), Cr (7 ng/ml), Pb (42 ng/ml), Ni (15 ng/ml), Zn (2 ng/ml) [Sb (32 ng/ml), Ba (2 ng/ml), Cu (6 ng/ml), P (75 ng/ml), Mn (2 ng/ml), Se (75 ng/ml), Ag (7 ng/ml), Ti (40 ng/ml)]. The actual method detection limits are sample dependent and may vary as the sample matrix may affect the limits. The

analytical detection limits for the primary [and secondary] metals in sample solutions analyzed by direct aspiration AAS (based on SW-846, Method 7000) are approximately as follows: As (2 ng/ml), Be (5 ng/ml), Cd (5 ng/ml), Cr (50 ng/ml), Pb (100 ng/ml), Ni (40 ng/ml), Zn (5 ng/ml) [Sb (200 ng/ml), Ba (100 ng/ml), Cu (20 ng/ml), Mn (10 ng/ml), Se (2 ng/ml), Ag (10 ng/ml), Tl (100 ng/ml)]. The detection limit for mercury by CVAAS is approximately 0.2 ng/ml. The use of GFAAS can give added sensitivity compared to the use of direct aspiration AAS for the following primary and secondary metals: As (1 ng/ml), Be (0.2 ng/ml), Cd (0.1 ng/ml), Cr (1 ng/ml), Pb (1 ng/ml), Sb (3 ng/ml), Se (2 ng/ml), and Tl (1 ng/ml).

Using (1) the procedures described in this method, (2) the analytical detection limits described in the previous paragraph, (3) a volume of 300 ml for the front half and 150 ml for the back half samples, and (4) a stack gas sample volume of 1.25 m^3, the corresponding in-stack method detection limits are presented in Table A-1 and calculated as shown:

$$\frac{A \times B}{C} = D$$

where: A = analytical detection limit, ug/ml.
B = volume of sample prior to aliquot for analysis, ml.
C = stack sample volume, dscm (dsm^3).
D = in-stack detection limit, ug/m^3.

Values in Table A-1 are calculated for the front and back half and/or the total train.

To ensure optimum sensitivity in obtaining the measurements, the concentrations of target metals in the solutions are suggested to be at least ten times the analytical detection limits. Under certain conditions, and with greater care in the analytical procedure, this concentration can be as low as approximately three times the analytical detection limit. In all cases, repetitive analyses, method of standard additions (MSA), serial dilution, or matrix spike addition should be used to establish the quality of the data.

Actual in-stack method detection limits will be determined based on actual source sampling parameters and analytical results as described above. If required, the method in-stack detection limits can be made more sensitive than those shown in Table A-1 for a specific test by using one or more of the following options:

TABLE A-1. IN-STACK METHOD DETECTION LIMITS (ug/m^3)
FOR TRAIN FRACTIONS USING ICAP AND AAS

Metal	Front Half Fraction 1 Probe and Filter	Back Half$_1$ Fraction 2 Impingers 1-3	Back Half$_2$ Fraction 3 Impingers 4-5	Total Train
		Primary Metals		
Arsenic	12.7 (0.3)*	6.4 (0.1)*		19.1 (0.4)*
Beryllium	0.07 (0.05)*	0.04 (0.03)*		0.11 (0.08)*
Cadmium	1.0 (0.02)*	0.5 (0.01)*		1.5 (0.03)*
Chromium	1.7 (0.2)*	0.8 (0.1)*		2.5 (0.3)*
Lead	10.1 (0.2)*	5.0 (0.1)*		15.1 (0.3)*
Mercury	0.05**	0.03**	0.03**	0.11**
Nickel	3.6	1.8		5.4
Zinc	0.5	0.3		0.8
		Secondary Metals		
Antimony	7.7 (0.7)*	3.8 (0.4)*		11.5 (1.1)*
Barium	0.5	0.3		0.8
Copper	1.4	0.7		2.1
Manganese	0.5 (0.2)*	0.2 (0.1)*		0.7 (0.3)*
Phosphorus	18	9		27
Selenium	18 (0.5)*	9 (0.3)*		27 (0.8)*
Silver	1.7	0.9		2.6
Thallium	9.6 (0.2)*	4.8 (0.1)*		14.4 (0.3)*

( )* Detection limit when analyzed by GFAAS.
** Detection limit when analyzed by CVAAS.
Actual method in-stack detection limits will be determined based on actual source sampling parameters and analytical results as described earlier in this section.

- A normal 1-hour sampling run collects a stack gas sampling volume of about 1.25 m^3. If the sampling time is increased and 5 m^3 are collected, the in-stack method detection limits would be one fourth of the values shown in Table A-1 (this means that with this change, the method is four times more sensitive than normal).
- The in-stack detection limits assume that all of the sample is digested (with exception of the aliquot for mercury) and the final liquid volumes for analysis are 300 ml for the front half and 150 ml for the back half sample. If the front half volume is reduced from 300 ml to 30 ml, the front half in-stack detection limits would be one tenth of the values shown above (ten times more sensitive). If the back half volume is reduced from 150 ml to 25 ml, the in-stack detection limits

would be one sixth of the above values. Matrix effects checks are necessary on analyses of samples and typically are of greater significance for samples that have been concentrated to less than the normal sample volume. A volume less than 25 ml may not allow resolubilization of the residue and may increase interference by other compounds.

- When both of the above two improvements are used on one sample at the same time, the resultant improvements are multiplicative. For example, where stack gas volume is increased by a factor of five and the total liquid sample digested volume of both the front and back halves is reduced by factor of six, the in-stack method detection limit is reduced by a factor of thirty (the method is thirty times more sensitive).
- Conversely, reducing stack gas sample volume and increasing sample liquid volume will increase limits. The front half and back half samples (Fractions 1 and 2) can be combined prior to analysis. The resultant liquid volume (excluding Fraction 3, which must be analyzed separately) is recorded. Combining the sample as described does not allow determination (whether front or back half) of where in the train the sample was captured. The in-stack method detection limit then becomes a single value for all target metals except mercury, for which the contribution of Fraction 3 must be considered.
- The above discussion assumes no blank correction. Blank corrections are discussed later in this method.

2.3 Precision. The precisions (relative standard deviations) for each of the primary and secondary metals detected in a method development test at a sewage sludge incinerator, are as follows: As (13.5%), Cd (11.5%), Cr (11.2%), Pb (11.6%), Zn (11.8%), Sb (12.7%), Ba (20.6%), Cu (11.5%), P (14.6%), Se (15.3%), and Tl (12.3%). The precision for nickel was 7.7% for another test conducted at a source simulator. Beryllium, manganese and silver were not detected in the tests; however, based on the analytical sensitivity of the ICAP for these metals, it is assumed that their precisions should be similar to those for the other metals, when detected at similar levels.

2.4 Interferences. Iron can be a spectral interference during the analysis of arsenic, chromium, and cadmium by ICAP. Aluminum can be a spectral interference during the analysis of arsenic and lead by ICAP. Generally, these interferences can be reduced by diluting the sample, but this increases the

in-stack method detection limit. Refer to EPA Method 6010 (SW-846) for details on potential interferences for this method. For all GFAAS analyses, matrix modifiers should be used to limit interferences, and standards should be matrix matched.

3. Apparatus

3.1 Sampling Train. A schematic of the sampling train is shown in Figure A-1. It is similar to the Method 5 train. The sampling train consists of the following components.

3.1.1 Probe Nozzle (Probe Tip) and Borosilicate or Quartz Glass Probe Liner. Same as Method 5, Sections 2.1.1 and 2.1.2. Glass nozzles are requiredunless an alternate probe tip prevents the possibility of contamination or interference of the sample with its materials of construction. If a probe tip other than glass is used, no correction of the stack sample test results can be made because of the effect on the results by the probe tip.

3.1.2 Pitot Tube and Differential Pressure Gauge. Same as Method 2, Sections 2.1 and 2.2, respectively.

3.1.3 Filter Holder. Glass, same as Method 5, Section 2.1.5, except that a Teflon filter support must be used to replace the glass frit.

3.1.4 Filter Heating System. Same as Method 5, Section 2.1.6.

3.1.5 Condenser. The following system shall be used for the condensation and collection of gaseous metals and for determining the moisture content of the stack gas. The condensing system should consist of four to six impingers connected in series with leak-free ground glass fittings or other leak-free, non-contaminating fittings. The first impinger is optional and is recommended as a water knockout trap for use during test conditions which require such a trap. The impingers to be used in the metals train are now described. When the first impinger is used as a water knockout, it shall be appropriately-sized for an expected large moisture catch and constructed generally as described for the first impinger in Method 5, Paragraph 2.1.7. The second impinger (or the first HNO_3/H_2O_2 impinger) shall also be as described for the first impinger in Method 5. The third impinger (or the impinger used as the second HNO_3/H_2O_2 impinger) shall be the same as the Greenburg Smith impinger with the standard tip described as the second impinger in Method 5, Paragraph 2.1.7. All other impingers used in the metals train are the same as the second impinger (the first HNO_3/H_2O_2 impinger) previously described in this paragraph. In summary,

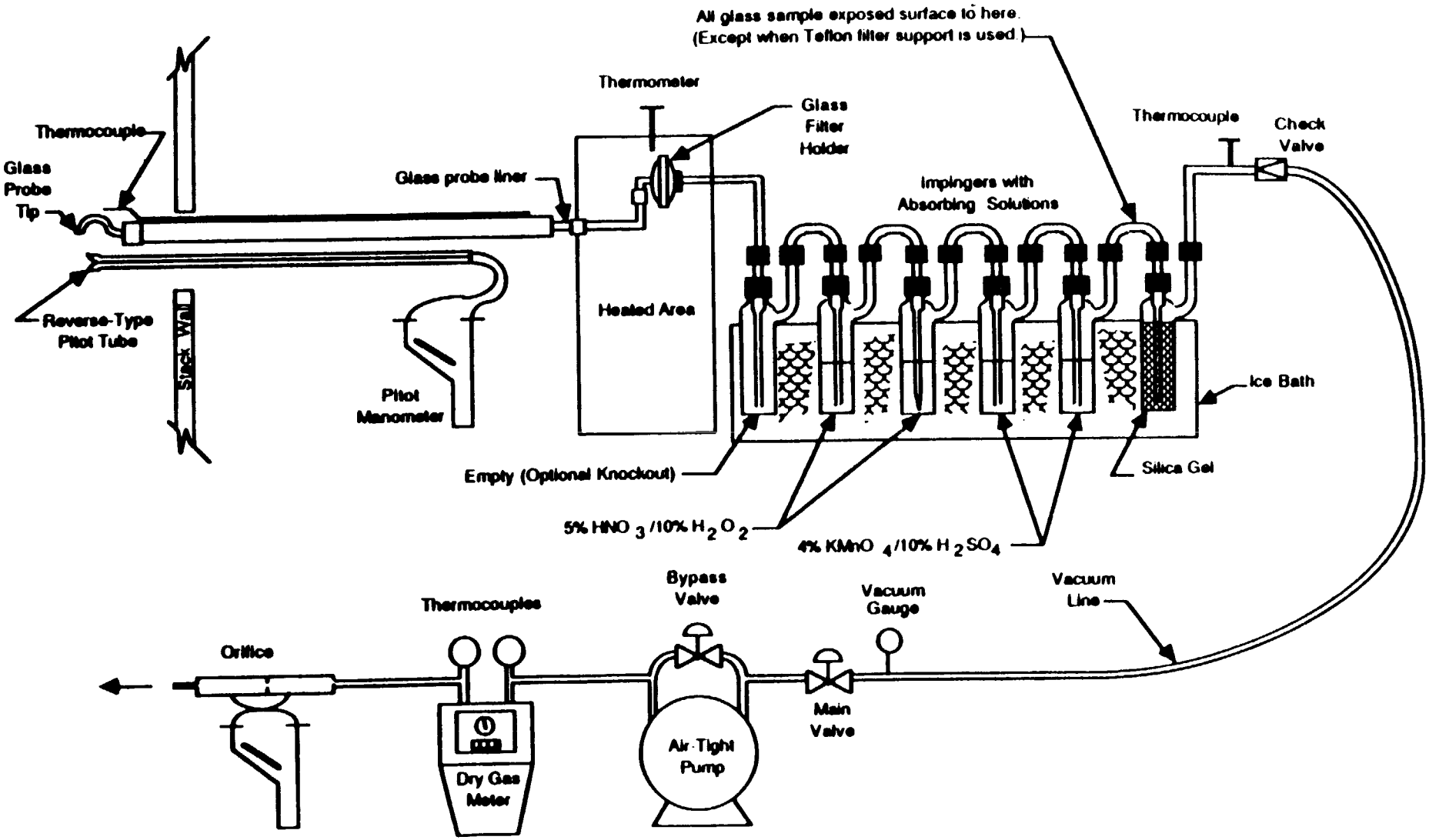


Figure A-1. Schematic of multiple metals sampling train.

the first impinger should be empty, the second and third shall contain known quantities of a nitric acid/hydrogen peroxide solution (Section 4.2.1), the fourth (and fifth, if required) shall contain a known quantity of acidic potassium permanganate solution (Section 4.2.2), and the last impinger shall contain a known quantity of silica gel or equivalent desiccant. A thermometer capable of measuring to within 1°C (2°F) shall be placed at the outlet of the last impinger. When the water knockout impinger is not needed, it is removed from the train and the other impingers remain the same. If mercury analysis is not needed, the potassium permanganate impingers are removed.

3.1.6 Metering System, Barometer, and Gas Density Determination Equipment. Same as Method 5, Sections 2.1.8 through 2.1.10, respectively.

3.1.7 Teflon Tape. For capping openings and sealing connections on the sampling train.

3.2 Sample Recovery. Same as Method 5, Sections 2.2.1 through 2.2.8 (Nonmetallic Probe-Liner and Probe-Nozzle Brushes, Wash Bottles, Sample Storage Containers, Petri Dishes, Glass Graduated Cylinder, Plastic Storage Containers, Funnel and Rubber Policeman, and Glass Funnel), respectively, with the following exceptions and additions:

3.2.1 Nonmetallic Probe-Liner and Probe-Nozzle Brushes. For quantitative recovery of materials collected in the front half of the sampling train. Description of acceptable all-Teflon component brushes to be included in EPA's Emission Measurement Technical Information Center (EMTIC) files.

3.2.2 Sample Storage Containers. Glass bottles with Teflon-lined caps, 1000- and 500-ml, shall be used for $KMnO_4$-containing samples and blanks. Polyethylene bottles may be used for other sample types.

3.2.3 Graduated Cylinder. Glass or equivalent.

3.2.4 Funnel. Glass or equivalent.

3.2.5 Labels. For identification of samples.

3.2.6 Polypropylene Tweezers and/or Plastic Gloves. For recovery of the filter from the sampling train filter holder.

3.3 Sample Preparation and Analysis. For the analysis, the following equipment is needed:

3.3.1 Volumetric Flasks, 100 ml, 250 ml, and 1000 ml. For preparation of standards and sample dilution.

3.3.2 Graduated Cylinders. For preparation of reagents.

3.3.3 Parr® Bombs or Microwave Pressure Relief Vessels with Capping

Station (CEM Corporation model or equivalent).

3.3.4 Beakers and Watchglasses. 250-ml beakers for sample digestion with watchglasses to cover the tops.

3.3.5 Ring Stands and Clamps. For securing equipment such as filtration apparatus.

3.3.6 Filter Funnels. For holding filter paper.

3.3.7 Whatman 541 Filter Paper (or equivalent). For filtration of digested samples.

3.3.8 Disposable Pasteur Pipets and Bulbs.

3.3.9 Volumetric Pipets.

3.3.10 Analytical Balance. Accurate to within 0.1 mg.

3.3.11 Microwave or Conventional Oven. For heating samples at fixed power levels or temperatures.

3.3.12 Hot Plates.

3.3.13 Atomic Absorption Spectrometer (AAS). Equipped with a background corrector.

3.3.13.1 Graphite Furnace Attachment. With As, Cd, and Pb (and Sb, Se, and Tl, if measured) hollow cathode lamps (HCLs) or electrodeless discharge lamps (EDLs). Same as EPA Methods 7060 (As), 7131 (Cd), 7421 (Pb), 7041 (Sb), 7740 (Se), and 7841 (Tl).

3.3.13.2 Cold Vapor Mercury Attachment. With a mercury HCL or EDL. The equipment needed for the cold vapor mercury attachment includes an air recirculation pump, a quartz cell, an aerator apparatus, and a heat lamp or desiccator tube. The heat lamp should be capable of raising the ambient temperature at the quartz cell by 10°C such that no condensation forms on the wall of the quartz cell. Same as EPA Method 7470.

3.3.14 Inductively Coupled Argon Plasma Spectrometer. With either a direct or sequential reader and an alumina torch. Same as EPA Method 6010.

4. Reagents

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

4.1 Sampling. The reagents used in sampling are as follows:

4.1.1 Filters. The filters shall contain less than 1.3 ug/in.^{2} of each of

the metals to be measured. Analytical results provided by filter manufacturers are acceptable. However, if no such results are available, filter blanks must be analyzed for each target metal prior to emission testing. Quartz fiber or glass fiber filters without organic binders shall be used. The filters should exhibit at least 99.95 percent efficiency (<0.05 percent penetration) on 0.3 micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Standard Method D2986-71 (incorporated by reference). For particulate determination in sources containing SO_2 or SO_3, the filter material must be of a type that is unreactive to SO_2 or SO_3, as described in EPA Method 5. Quartz fiber filters meeting these requirements are recommended.

4.1.2 Water. To conform to ASTM Specification D1193.77, Type II (incorporated by reference). Analyze the water for all target metals prior to field use. All target metals should be less than 1 ng/ml.

4.1.3 Nitric Acid. Concentrated. Baker Instra-analyzed or equivalent.

4.1.4 Hydrochloric Acid. Concentrated. Baker Instra-analyzed or equivalent.

4.1.5 Hydrogen Peroxide, 30 Percent (V/V).

4.1.6 Potassium Permanganate.

4.1.7 Sulfuric Acid. Concentrated.

4.1.8 Silica Gel and Crushed Ice. Same as Method 5, Sections 3.1.2 and 3.1.4, respectively.

4.2 Pretest Preparation for Sampling Reagents.

4.2.1 Nitric Acid (HNO_3)/Hydrogen Peroxide (H_2O_2) Absorbing Solution, 5 Percent HNO_3/10 Percent H_2O_2. Add 50 ml of concentrated HNO_3 and 333 ml of 30 percent H_2O_2 to a 1000-ml volumetric flask or graduated cylinder containing approximately 500 ml of water. Dilute to volume with water. The reagent shall contain less than 2 ng/ml of each target metal.

4.2.2 Acidic Potassium Permanganate ($KMnO_4$) Absorbing Solution, 4 Percent $KMnO_4$ (W/V). Prepare fresh daily. Dissolve 40 g of $KMnO_4$ in sufficient 10 percent H_2SO_4 to make 1 liter. Prepare and store in glass bottles to prevent degradation. The reagent shall contain less than 2 ng/ml of Hg.

<u>Precaution:</u> To prevent autocatalytic decomposition of the permanganate solution, filter the solution through Whatman 541 filter paper. Also, due to reaction of the potassium permanganate with the acid, there may be pressure buildup in the sample storage bottle; these bottles should not be fully filled

and should be vented both to relieve excess pressure and prevent explosion due to pressure buildup. Venting is highly recommended, but should not allow contamination of the sample; a No. 70-72 hole drilled in the container cap and Teflon liner has been used.

4.2.3 Nitric Acid, 0.1 N. Add 6.3 ml of concentrated HNO_3 (70 percent) to a graduated cylinder containing approximately 900 ml of water. Dilute to 1000 ml with water. Mix well. The reagent shall contain less than 2 ng/ml of each target metal.

4.2.4 Hydrochloric Acid (HCl), 8 N. Add 690 ml of concentrated HCl to a graduated cylinder containing 250 ml of water. Dilute to 1000 ml with water. Mix well. The reagent shall contain less than 2 ng/ml of Hg.

4.3 Glassware Cleaning Reagents.

4.3.1 Nitric Acid, Concentrated. Fisher ACS grade or equivalent.

4.3.2 Water. To conform to ASTM Specifications D1193-77, Type II.

4.3.3 Nitric Acid, 10 Percent (V/V). Add 500 ml of concentrated HNO_3 to a graduated cylinder containing approximately 4000 ml of water. Dilute to 5000 ml with water.

4.4 Sample Digestion and Analysis Reagents.

4.4.1 Hydrochloric Acid, Concentrated.

4.4.2 Hydrofluoric Acid, Concentrated.

4.4.3 Nitric Acid, Concentrated. Baker Instra-analyzed or equivalent.

4.4.4 Nitric Acid, 10 Percent (V/V). Add 100 ml of concentrated HNO_3 to 800 ml of water. Dilute to 1000 ml with water. Mix well. Reagent shall contain less than 2 ng/ml of each target metal.

4.4.5 Nitric Acid, 5 Percent (V/V). Add 50 ml of concentrated HNO_3 to 800 ml of water. Dilute to 1000 ml with water. Reagent shall contain less than 2 ng/ml of each target metal.

4.4.6 Water. To conform to ASTM Specifications D1193-77, Type II.

4.4.7 Hydroxylamine Hydrochloride and Sodium Chloride Solution. See EPA Method 7470 for preparation.

4.4.8 Stannous Chloride.

4.4.9 Potassium Permanganate, 5 Percent (W/V).

4.4.10 Sulfuric Acid, Concentrated.

4.4.11 Nitric Acid, 50 Percent (V/V).

4.4.12 Potassium Persulfate, 5 Percent (W/V).

4.4.13 Nickel Nitrate, $Ni(NO_3)_2 \cdot 6H_2O$.

4.4.14 Lanthanum Oxide, La_2O_3.

4.4.15 AAS Grade As Standard, 1000 ug/ml.

4.4.16 AAS Grade Be Standard, 1000 ug/ml.

4.4.17 AAS Grade Cd Standard, 1000 ug/ml.

4.4.18 AAS Grade Cr Standard, 1000 ug/ml.

4.4.19 AAS Grade Pb Standard, 1000 ug/ml.

4.4.20 AAS Grade Hg Standard, 1000 ug/ml.

4.4.21 AAS Grade Ni Standard, 1000 ug/ml.

4.4.22 AAS Grade Zn Standard, 1000 ug/ml.

4.4.23 AAS Grade Al Standard, 1000 ug/ml.

4.4.24 AAS Grade Fe Standard, 1000 ug/ml.

4.4.25 AAS Grade Sb Standard, 1000 ug/ml. Optional.

4.4.26 AAS Grade Ba Standard, 1000 ug/ml. Optional.

4.4.27 AAS Grade Cu Standard, 1000 ug/ml. Optional.

4.4.28 AAS Grade Mn Standard, 1000 ug/ml. Optional.

4.4.29 AAS Grade P Standard, 1000 ug/ml. Optional.

4.4.30 AAS Grade Se Standard, 1000 ug/ml. Optional.

4.4.31 AAS Grade Ag Standard, 1000 ug/ml. Optional.

4.4.32 AAS Grade Tl Standard, 1000 ug/ml. Optional.

4.4.33 The metals standards may also be made from solid chemicals as described in EPA Method 200.7. EPA Method 7470 or Standard Methods for the Analysis of Water and Wastewater. 15th Edition, Method 303F should be referred to for additional information on mercury standards.

4.4.34 Mercury Standards and Quality Control Samples. Prepare fresh weekly a 10 ug/ml intermediate mercury standard by adding 5 ml of 1000 ug/ml mercury stock solution to a 500-ml volumetric flask; dilute to 500 ml by first adding 20 ml of 15 percent HNO_3 and then adding water. Prepare a working mercury standard solution fresh daily: add 5 ml of the 10 ug/ml intermediate standard to a 250 ml volumetric flask and dilute to 250 ml with 5 ml of 4 percent $KMnO_4$, 5 ml of 15 percent HNO_3, and then water. At least six separate aliquots of the working mercury standard solution should be used to prepare the standard curve. These aliquots should contain 0.0, 1.0, 2.0, 3.0, 4.0, and 5.0 ml of the working standard solution. Quality control samples should be prepared by making a separate 10 ug/ml standard and diluting until in the range of the calibration.

4.4.35 ICAP Standards and Quality Control Samples. Calibration standards

for ICAP analysis can be combined into four different mixed standard solutions as shown below.

MIXED STANDARD SOLUTIONS FOR ICAP ANALYSIS

Solution	Elements (secondary metals in parantheses)
I	As, Be, Cd, Pb, Zn (Mn, Se)
II	Fe (Ba, Cu)
III	Al, Cr, Ni
IV	(Sb, P, Ag, Tl)

Prepare these standards by combining and diluting the appropriate volumes of the 1000 ug/ml solutions with 5 percent nitric acid. A minimum of one standard and a blank can be used to form each calibration curve. However, a separate quality control sample spiked with known amounts of the target metals in quantities in the midrange of the calibration curve should be prepared. Suggested standard levels are 50 ug/ml for Al, 25 ug/ml for Cr and Pb, 15 ug/ml for Fe, and 10 ug/ml for the remaining elements. Standards containing less than 1 ug/ml of metal should be prepared daily. Standards containing greater than 1 ug/ml of metal should be stable for a minimum of 1 to 2 weeks.

4.4.36 Graphite Furnace AAS Standards for Arsenic, Cadmium, and Lead (and Antimony, Selenium, and Thallium). Prepare a 10 ug/ml standard by adding 1 ml of 1000 ug/ml standard to a 100-ml volumetric flask. Dilute to 100 ml with 10 percent nitric acid. For graphite furnace AAS, the standards must be matrix matched; e.g., if the samples contain 6 percent nitric acid and 4 percent hydrofluoric acid, the standards should also be made up with 6 percent nitric acid and 4 percent hydrofluoric acid. Prepare a 100 ng/ml standard by adding 1 ml of the 10 ug/ml standard to a 100-ml volumetric flask and dilute to 100 ml with the appropriate matrix solution. Other standards should be prepared by dilution of the 100 ng/ml standards. At least five standards should be used to make up the standard curve. Suggested levels are 0, 10, 50, 75, and 100 ng/ml. Quality control samples should be prepared by making a separate 10 ug/ml standard and diluting until it is in the range of the samples. Standards containing less than 1 ug/ml of metal should be prepared daily. Standards containing greater than 1 ug/ml of metal should be stable for a minimum of 1 to 2 weeks.

4.4.37 Matrix Modifiers.

4.4.37.1 Nickel Nitrate, 1 Percent (V/V). Dissolve 4.956 g of $Ni(NO_3)_2 \cdot 6H_2O$ in approximately 50 ml of water in a 100-ml volumetric flask.

Dilute to 100 ml with water.

4.4.37.2 Nickel Nitrate, One-tenth Percent (V/V). Dilute 10 ml of 1 percent nickel nitrate solution to 100 ml with water. Inject an equal amount of sample and this modifier into the graphite furnace during AAS analysis for As.

4.4.37.3 Lanthanum. Dissolve 0.5864 g of La_2O_3 in 10 ml of concentrated HNO_3 and dilute to 100 ml with water. Inject an equal amount of sample and this modifier into the graphite furnace during AAS analysis for Pb.

5. Procedure

5.1 Sampling. The complexity of this method is such that, to obtain reliable results, testers should be trained and experienced with the test procedures.

5.1.1 Pretest Preparation. Follow the same general procedure given in Method 5, Section 4.1.1, except that, unless particulate emissions are to be determined, the filter need not be desiccated or weighed. All sampling train glassware should first be rinsed with hot tap water and then washed in hot soapy water. Next, glassware should be rinsed three times with tap water, followed by three additional rinses with water. All glassware should then be soaked in a 10 percent (V/V) nitric acid solution for a minimum of 4 hours, rinsed three times with water, rinsed a final time with acetone, and allowed to air dry. All glassware openings where contamination can occur should be covered until the sampling train is assembled, prior to sampling.

5.1.2 Preliminary Determinations. Same as Method 5, Section 4.1.2.

5.1.3 Preparation of Sampling Train. Follow the same general procedures given in Method 5, Section 4.1.3, except place 100 ml of the nitric acid/hydrogen peroxide solution (Section 4.2.1) in the two HNO_3/H_2O_2 impingers (normally the second and third impingers), place 100 ml of the acidic potassium permanganate solution (Section 4.2.2) in the fourth and fifth impinger, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the last impinger. Alternatively, the silica gel may be weighed directly in the impinger just prior to train assembly.

Several options are available to the tester based on the sampling conditions. The use of an empty first impinger can be eliminated if the moisture to be collected in the impingers is calculated or determined to be less than 150 ml. The tester shall include two impingers containing the acidic potassium permanganate solution for the first test run, unless past testing experience at the same or similar sources has shown that only one is

necessary. The last permanganate impinger may be discarded if both permanganate impingers have retained their original deep purple permanganate color. A maximum of 200 ml in each permanganate impinger (and a maximum of three permanganate impingers) may be used, if necessary, to maintain the desired color in the last permanganate impinger.

Retain for reagent blanks, 100 ml of the nitric acid/hydrogen peroxide solution and 100 ml of the acidic potassium permanganate solution. These solutions should be labeled and treated as described in Section 7. Set up the sampling train as shown in Figure A-1. If necessary to ensure leak-free sampling train connections, Teflon tape should be used instead of silicone grease to prevent contamination.

Precaution: Extreme care should be taken to prevent contamination within the train. Prevent the mercury collection reagent (acidic potassium permanganate) from contacting any glassware of the train which is washed and analyzed for Mn. Prevent hydrogen peroxide from mixing with the acidic potassium permanganate.

5.1.4 Leak-Check Procedures. Follow the leak-check procedures given in Method 5, Section 4.1.4.1 (Pretest Leak-Check), Section 4.1.4.2 (Leak-Checks During the Sample Run), and Section 4.1.4.3 (Post-Test Leak-Checks).

5.1.5 Sampling Train Operation. Follow the procedures given in Method 5, Section 4.1.5. For each run, record the data required on a data sheet such as the one shown in Figure 5-2 of Method 5.

5.1.6 Calculation of Percent Isokinetic. Same as Method 5, Section 4.1.6.

5.2 Sample Recovery. Begin cleanup procedures as soon as the probe is removed from the stack at the end of a sampling period.

The probe should be allowed to cool prior to sample recovery. When it can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a rinsed, non-contaminating cap over the probe nozzle to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling. This normally causes a vacuum to form in the filter holder, thus causing the undesired result of drawing liquid from the impingers into the filter.

Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet. Be careful not to lose any condensate that might be present. Cap the filter inlet where the probe was fastened. Remove the umbilical cord from the last impinger and cap the

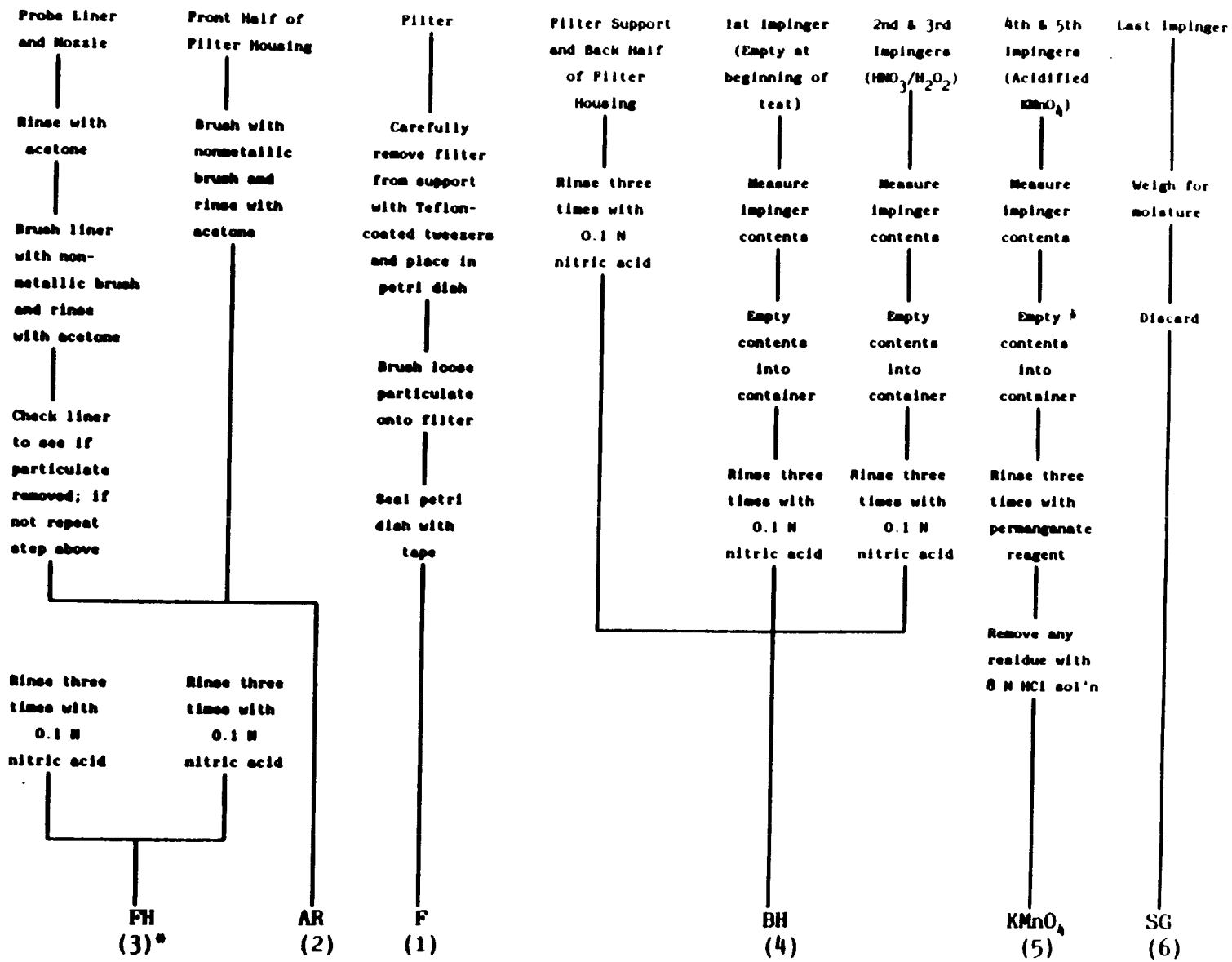
impinger. Cap off the filter holder outlet and impinger inlet. Use non-contaminating caps, whether ground-glass stoppers, plastic caps, serum caps, or Teflon tape to close these openings.

Alternatively, the train can be disassembled before the probe and filter holder/oven are completely cooled, if this procedure is followed: Initially disconnect the filter holder outlet/impinger inlet and loosely cap the open ends. Then disconnect the probe from the filter holder or cyclone inlet and loosely cap the open ends. Cap the probe tip and remove the umbilical cord as previously described.

Transfer the probe and filter-impinger assembly to a cleanup area that is clean and protected from the wind and other potential causes of contamination or loss of sample. Inspect the train before and during disassembly and note any abnormal conditions. The sample is recovered and treated as follows (see schematic in Figure A-2). Assure that all items necessary for recovery of the sample do not contaminate it.

5.2.1 Container No. 1 (Filter). Carefully remove the filter from the filter holder and place it in its identified petri dish container. Acid-washed polypropylene or Teflon coated tweezers or clean, disposable surgical gloves rinsed with water should be used to handle the filters. If it is necessary to fold the filter, make certain the particulate cake is inside the fold. Carefully transfer the filter and any particulate matter or filter fibers that adhere to the filter holder gasket to the petri dish by using a dry (acid-cleaned) nylon bristle brush. Do not use any metal-containing materials when recovering this train. Seal the labeled petri dish.

5.2.2 Container No. 2 (Acetone Rinse). Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover particulate matter and any condensate from the probe nozzle, probe fitting, probe liner, and front half of the filter holder by washing these components with 100 ml of acetone and placing the wash in a glass container. Note: The use of exactly 100 ml is necessary for the subsequent blank correction procedures. Distilled water may be used instead of acetone when approved by the Administrator and shall be used when specified by the Administrator; in these cases, save a water blank and follow the Administrator's directions on analysis. Perform the acetone rinses as follows: Carefully remove the probe nozzle and clean the inside surface by rinsing with acetone from a wash bottle and brushing with a nonmetallic brush. Brush until



* Number in parantheses indicates container number.

Figure A-2. Sample recovery scheme.

the acetone rinse shows no visible particles, after which make a final rinse of the inside surface with acetone.

Brush and rinse the inside parts of the Swagelok fitting with acetone in a similar way until no visible particles remain.

Rinse the probe liner with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces will be wetted with acetone. Allow the acetone to drain from the lower end into the sample container. A funnel may be used to aid in transferring liquid washings to the container. Follow the acetone rinse with a nonmetallic probe brush. Hold the probe in an inclined position, squirt acetone into the upper end as the probe brush is being pushed with a twisting action through the probe; hold a samplecontainer underneath the lower end of the probe, and catch any acetone and particulate matter which is brushed through the probe three times or more until no visible particulate matter is carried out with the acetone or until none remains in the probe liner on visual inspection. Rinse the brush with acetone, and quantitatively collect these washings in the sample container. After the brushing, make a final acetone rinse of the probe as described above.

It is recommended that two people clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

Clean the inside of the front half of the filter holder by rubbing surfaces with a nonmetallic nylon bristle brush and rinsing with aceton Rinse each surface three times or more if needed to remove visible particulate. Make a final rinse of the brush and filter holder. After all acetone washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that acetone will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container clearly to identify its contents.

5.2.3 Container No. 3 (Probe Rinse). Rinse the probe liner, probe nozzle, and front half of the filter holder thoroughly with 100 ml of 0.1 N nitric acid and place the wash into a sample storage container. Note: The use of exactly 100 ml is necessary for the subsequent blank correction procedures. Perform the rinses as described in Method 12, Section 5.2.2. Record the volume of the combined rinse. Mark the height of the fluid level on the outside of the storage container and use this mark to determine if leakage occurs during

transport. Seal the container and clearly label the contents. Finally, rinse the nozzle, probe liner, and front half of the filter holder with water followed by acetone and discard these rinses.

5.2.4 Container No. 4 (Impingers 1 through 3, Contents and Rinses). Due to the large quantity of liquid involved, the tester may place the impinger solutions in more than one container. Measure the liquid in the first three impingers volumetrically to within 0.5 ml using a graduated cylinder. Record the volume of liquid present. This information is required to calculate the moisture content of the sampled flue gas. Clean each of the first three impingers, the filter support, the back half of the filter housing, and connecting glassware by thoroughly rinsing with 100 ml of 0.1 N nitric acid as described in Method 12, Section 5.2.4. Note: The use of exactly 100 ml of 0.1 N nitric acid rinse is necessary for the subsequent blank correction procedures. Combine the rinses and impinger solutions, measure and record the volume. Calculate the 0.1 N nitric acid rinse volume by difference. Mark the height of the fluid level on the outside of the container to determine if leakage occurs during transport. Seal the container and clearly label the contents.

5.2.5 Container No. 5 (Acidified Potassium Permanganate Solution and Rinses, Impingers No. 4 & 5). Pour all the liquid from the permanganate impingers (fourth and fifth, if two permanganate impingers are used) into a graduated cylinder and measure the volume to within 0.5 ml. This information is required to calculate the moisture content of the sampled flue gas. Using 100 ml total of the acidified potassium permanganate solution, rinse the permanganate impinger(s) and connecting glass pieces a minimum of three times. Combine the rinses with the permanganate impinger solution. Finally, rinse the permanganate impinger(s) and connecting glassware with 50 ml of 8 N HCl to remove any residue. Note: The use of exactly 100 ml and 50 ml for the two rinses is necessary for the subsequent blank correction procedures. Place the combined rinses and impinger contents in a labeled glass storage bottle. Mark the height of the fluid level on the outside of the bottle to determine if leakage occurs during transport. See the following note and the Precaution in Paragraph 4.2.2 and properly seal the bottle and clearly label the contents.

Note: Due to the potential reaction of the potassium permanganate with the acid, there may be pressure buildup in the sample storage bottles. These bottles should not be filled full and should be vented to relieve excess

pressure. Venting is highly recommended. A No. 70-72 hole drilled in the container cap and Teflon liner has been found to allow adequate venting without loss of sample.

5.2.6 Container No. 6 (Silica Gel). Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. Transfer the silica gel from its impinger to its original container and seal. The tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. The small amount of particles that may adhere to the impinger wall need not be removed. Do not use water or other liquids to transfer the silica gel since weight gained in the silica gel impinger is used for moisture calculations. Alternatively, if a balance is available in the field, record the weight of the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g.

5.2.7 Container No. 7 (Acetone Blank). Once during each field test, place 100 ml of the acetone used in the sample recovery process into a labeled container for use in the front half field reagent blank. Seal the container.

5.2.8 Container No. 8 (0.1 N Nitric Acid Blank). Once during each field test, place 200 ml of the 0.1 N nitric acid solution used in the sample recovery process into a labeled container for use in the front half and back half field reagent blanks. Seal the container.

5.2.9 Container No. 9 (5% Nitric Acid/10% Hydrogen Peroxide Blank). Once during each field test, place 200 ml of the 5% nitric acid/10% hydrogen peroxide solution used as the nitric acid impinger reagent into a labeled container for use in the back half field reagent blank. Seal the container.

5.2.10 Container No. 10 (Acidified Potassium Permanganate Blank). Once during each field test, place 300 ml of the acidified potassium permanganate solution used as the impinger solution and in the sample recovery process into a labeled container for use in the back half field reagent blank for mercury analysis. Seal the container.

Note: This container should be vented, as described in Section 5.2.4, to relieve excess pressure.

5.2.11 Container No. 11 (8 N HCl Blank). Once during each field test, place 50 ml of the 8 N hydrochloric acid used to rinse the acidified potassium permanganate impingers into a labeled container for use in the back half reagent blank for mercury.

5.2.12 Container No. 12 (Filter Blank). Once during each field test,

place an unused filter from the same lot as the sampling filters in a labeled petri dish. Seal the petri dish. This will be used in the front half field reagent blank.

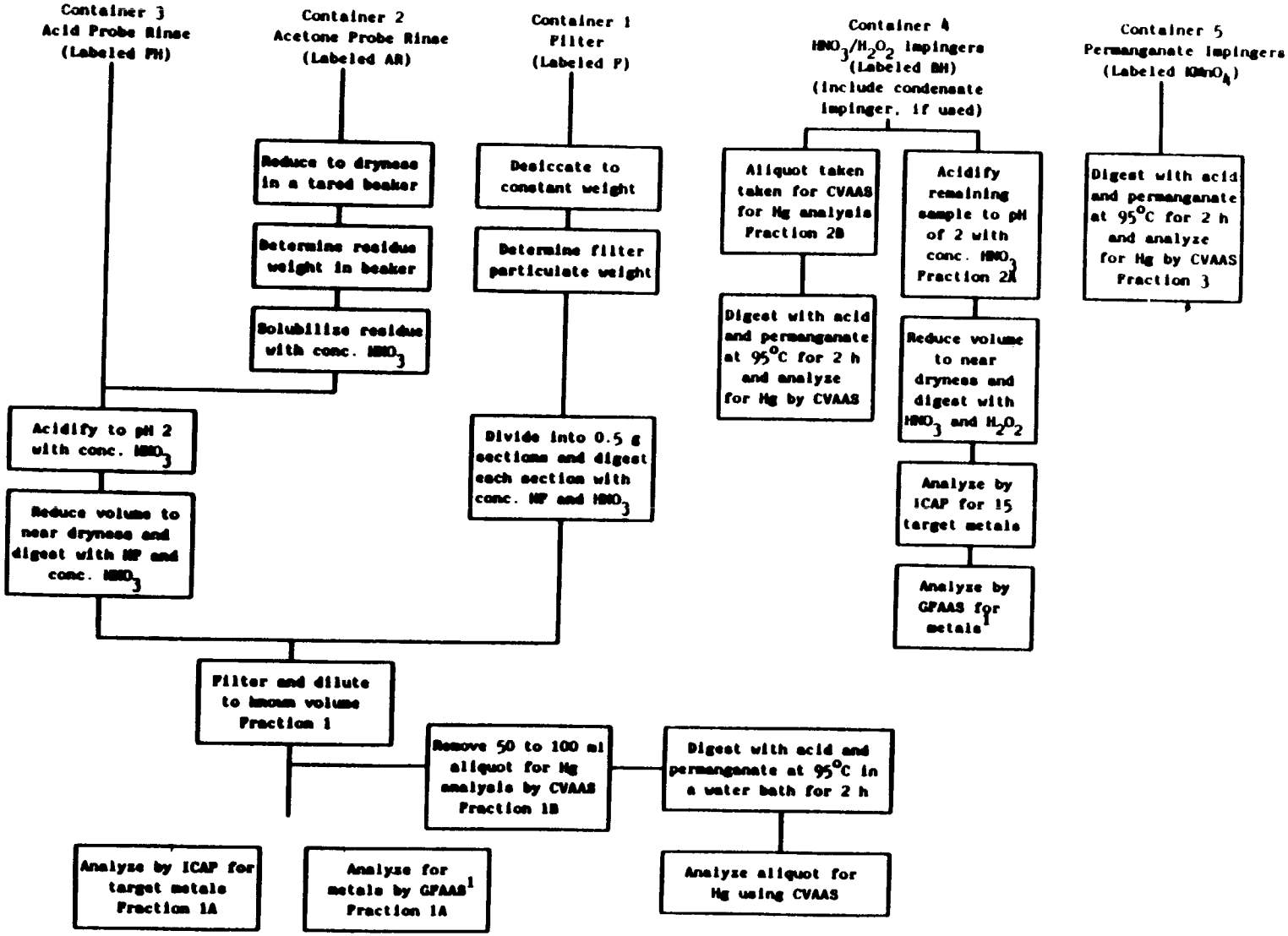
5.3 Sample Preparation. Note the level of the liquid in each of the containers and determine if any sample was lost during shipment. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. A diagram illustrating sample preparation and analysis procedures for each of the sample train components is shown in Figure A-3.

5.3.1 Container No. 1 (Filter). If particulate emissions are being determined, then desiccate the filter and filter catch without heat and weigh to a constant weight as described in Section 4.3 of Method 5. For analysis of metals, divide the filter with its filter catch into portions containing approximately 0.5 g each and place into the analyst's choice of either individual microwave pressure relief vessels or Parr® Bombs. Add 6 ml of concentrated nitric acid and 4 ml of concentrated hydrofluoric acid to each vessel. For microwave heating, microwave the sample vessels for approximately 12-15 minutes in intervals of 1 to 2 minutes at 600 Watts. For conventional heating, heat the Parr Bombs at 140°C (285°F) for 6 hours. Then cool the samples to room temperature and combine with the acid digested probe rinse as required in Section 5.3.3, below.

Notes: 1. Suggested microwave heating times are approximate and are dependent upon the number of samples being digested. Twelve to 15 minute heating times have been found to be acceptable for simultaneous digestion of up to 12 individual samples. Sufficient heating is evidenced by sorbent reflux within the vessel.

2. If the sampling train uses an optional cyclone, the cyclone catch should be prepared and digested using the same procedures described for the filters and combined with the digested filter samples.

5.3.2 Container No. 2 (Acetone Rinse). Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Measure the liquid in this container either volumetrically to ±1 ml or gravimetrically to ±0.5 g. Transfer the contents to an acid-cleaned tared 250-ml beaker and evaporate to dryness at ambient Figure



[1]Analysis by AAS for metals found at less than 2 ug/ml in digestate solution, if desired. Or analyze for each metal by AAS, if desired

Figure A-3. Sample preparation and analysis scheme.

temperature and pressure. (If particulate emissions are being determined, desiccate for 24 hours without heat, weigh to a constant weight according to the procedures described in Section 4.3 of Method 5, and report the results to the nearest 0.1 mg.) Resolubilize the residue with concentrated nitric acid and combine tne resultant sample including all liquid and any particulate matter with Container No. 3 prior to beginning the following Section 5.3.3.

5.3.3 Container No. 3 (Probe Rinse). The pH of this sample shall be 2 or lower. If the pH is higher, the sample should be acidified with concentrated nitric acid to pH 2. The sample should be rinsed into a beaker with water and the beaker should be covered with a ribbed watchglass. The sample volume should be reduced to approximately 50 ml by heating on a hot plate at a temperature just below boiling. Inspect the sample for visible particulate matter, and depending on the results of the inspection, perform one of the following. If no particulate matter is observed, combine the sample directly with the acid digested portions of the filter prepared previously in Section 5.3.1. If particulate matter is observed, digest the sample in microwave vessels or Parr® Bombs following the procedures described in Section 5.3.1; then combine the resultant sample directly with the acid digested portions of the filter prepared previously in Section 5.3.1. The resultant combined sample is referred to as Fraction 1. Filter the combined solution of the acid digested filter and probe rinse samples using Whatman 541 filter paper. Dilute to 300 ml (or the appropriate volume for the expected metals concentration) with water. Measure and record the combined volume of the Fraction 1 solution to within 0.1 ml. Quantitatively remove a 50-ml aliquot and label as Fraction 1B. Label the remaining 250-ml portion as Fraction 1A. Fraction 1A is used for ICAP or AAS analysis. Fraction 1B is used for the determination of front half mercury.

5.3.4 Container No. 4 (Impingers 1-3). Measure and record the total volume of this sample (Fraction 2) to within 0.5 ml. Remove a 50-ml aliquot for mercury analysis and label as Fraction 2B. Label the remaining portion of Container No. 4 as Fraction 2A. The Fraction 2B aliquot should be prepared and analyzed as described in Section 5.4.3. Fraction 2A shall be pH 2 or lower. If necessary, use concentrated nitric acid to lower Fraction 2A to pH 2. The sample should be rinsed into a beaker with water and the beaker should be covered with a ribbed watchglass. The sample volume should be reduced to approximately 20 ml by heating on a hot plate at a temperature just below boiling. Then follow either of the digestion procedures described in Sections

5.3.4.1 and 5.3.4.2, below.

5.3.4.1 Conventional Digestion Procedure. Add 30 ml of 50 percent nitric acid and heat for 30 minutes on a hot plate to just below boiling. Add 10 ml of 3 percent hydrogen peroxide and heat for 10 more minutes. Add 50 ml of hot water and heat the sample for an additional 20 minutes. Cool, filter the sample, and dilute to 150 ml (or the appropriate volume for the expected metals concentrations) with water.

5.3.4.2 Microwave Digestion Procedure. Add 10 ml of 50 percent nitric acid and heat for 6 minutes in intervals of 1 to 2 minutes at 600 Watts. Allow the sample to cool. Add 10 ml of 3 percent hydrogen peroxide and heat for 2 more minutes. Add 50 ml of hot water and heat for an additional 5 minutes. Cool, filter the sample, and dilute to 150 ml (or the appropriate volume for the expected metals concentrations) with water.

Note: All microwave heating times given are approximate and are dependent upon the number of samples being digested at a time. Heating times as given above have been found acceptable for simultaneous digestion of up to 12 individual samples. Sufficient heating is evidenced by solvent reflux within the vessel.

5.3.5 Container No. 5 (Impingers 4 & 5). Measure and record the total volume of this sample to within 0.5 ml. This sample is referred to as Fraction 3. Follow the analysis procedures described in Section 5.4.3.

5.3.6 Container No. 6 (Silica Gel). Weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g using a balance. (This step may be conducted in the field.)

5.4 Sample Analysis. For each sampling train, five individual samples are generated for analysis. A schematic identifying each sample and the prescribed sample preparation and analysis scheme is shown in Figure A-3. The first two samples, labeled Fractions 1A and 1B, consist of the digested samples from the front half of the train. Fraction 1A is for ICAP or AAS analysis as described in Sections 5.4.1 and/or 5.4.2. Fraction 1B is for determination of front half mercury as described in Section 5.4.3.

The back half of the train was used to prepare the third through fifth samples. The third and fourth samples, labeled Fractions 2A and 2B, contain the digested samples from the H_2O and HNO_3/H_2O_2 Impingers 1 through 3. Fraction 2A is for ICAP or AAS analysis. Fraction 2B will be analyzed for mercury.

The fifth sample, labeled Fraction 3, consists of the impinger contents and

rinses from the permanganate Impingers 4 and 5. This sample is analyzed for mercury as described in Section 5.4.3. The total back half mercury catch is determined from the sum of Fraction 2B and Fraction 3.

5.4.1 ICAP Analysis. Fraction 1A and Fraction 2A are analyzed by ICAP using EPA Method 200.7 (40 CFR 136, Appendix C). Calibrate the ICAP, and set up an analysis program as described in Method 200.7. The quality control procedures described in Section 7.3.1 of this method shall be followed. Recommended wavelengths for use in the analysis of the primary, secondary, and interferring metals are listed below.

Element	Wavelength (nm)
Arsenic	193.696
Beryllium	313.042
Cadmium	226.502
Chromium	267.716
Lead	220.353
Nickel	231.604
Zinc	213.856
Antimony	206.833
Barium	455.403
Copper	324.754
Manganese	257.610
Selenium	196.026
Silver	328.068
Thallium	190.864
Aluminum	308.215
Iron	259.940

The wavelengths listed are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference.

Initially, analyze all samples for the target metals plus iron and aluminum. If iron and aluminum are present in the sample, the sample may have to be diluted so that each of these elements is at a concentration of less than 50 ppm to reduce their spectral interferences on arsenic and lead.

Note: When analyzing samples in a hydrofluoric acid matrix, an alumina torch should be used; since all front half samples will contain hydrofluoric acid, use an alumina torch.

5.4.2 AAS by Direct Aspiration and/or Graphite Furnace. If analysis of metals in Fraction 1A and Fraction 2A using graphite furnace or direct aspiration AAS is desired, Table A-2 snould be used to determine which techniques and methods should be applied for each target metal. Table A-2 should also be consulted to determine possible interferences and techniques to be followed for their minimization. Calibrate the instrument according to Section 6.3 and follow the quality control procedures specified in Section 7.3.2.

5.4.3 Cold Vapor AAS Mercury Analysis. Fraction 1B, Fraction 2B, and Fraction 3 should be analyzed for mercury using cold vapor atomic absorption spectroscopy following the method outlined in EPA Method 7470 or in Standard Methods for Water and Wastewater Analysis, 15th Edition, Method 303F. Set up the calibration curve as described in Section 7.3 of Method 303F. Add approximately 5 ml of each sample to BOD bottles. Record the amount of sample added. The amount used is dependent upon the expected levels of mercury. Dilute to approximately 120 ml with mercury-free water. Add approximately 15 ml of 5 percent potassium permanganate solution to the Fraction 2B and Fraction 3 samples. Add 5 percent potassium permanganate solution to the Fraction 1B sample as needed to produce a purple solution lasting at least 15 minutes. A minimum of 25 ml is suggested. Add 5 ml of 50 percent nitric acid, 5 ml of concentrated sulfuric acid, and 9 ml of 5 percent potassium persulfate to each sample and each standard. Digest the solution in the capped BOD bottle at 95°C (205°F) in a convection oven or water bath for 2 hours. Cool. Add 5 ml of hydroxylamine hydrochloride solution and mix the sample. Then add 7 ml of stannous chloride to each sample and analyze immediately.

6. Calibration

Maintain a laboratory log of all calibrations.

6.1 Sampling Train Calibration. Calibrate the sampling train components according to the indicated sections of Method 5: Probe Nozzle (Section 5.1); Pitot Tube (Section 5.2); Metering System (Section 5.3); Probe Heater (Section 5.4); Temperature Gauges (Section 5.5); Leak-Check of the Metering System (Section 5.6); and Barometer (Section 5.7).

6.2 Inductively Coupled Argon Plasma Spectrometer Calibration. Prepare standards as outlined in Section 4.4. Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures using the

TABLE A-2. APPLICABLE TECHNIQUES, METHODS, AND MINIMIZATION OF INTEFERENCE FOR AAS ANALYSIS

Metal	Technique	Method No.	Wavelength (nm)	Interference	
				Cause	Minimization
Sb	Aspiration	7040	217.6	1000 mg/ml Pb Ni, Cu, or acid	Use secondary wavelenght of 231.1 nm. Match sample & standards acid concentration or use nitrous oxide/acetylene flame
Sb	Furnace	7041	217.6	High Pb	Secondary wavelength or Zeeman correction
As	Furnace	7060	193.7	Arsenic volati - zation Aluminium	Spiked samples & add nickel nitrate solution to digestates prior to analyses Use Zeeman background correction
Ba	Aspiration	7080	553.6	Calcium Barium ionization	High hollow cathode current & narrow band set 2 mL of KCl per 100 mL of sample
Be	Aspiration	7090	234.9	500 ppm Al High Mg & Si	Add 0.1% flouride Use method of standard additions
Be	Furnace	7091	234.9	Be in optical path	Optimize parameters to miminize effects
Cd	Aspiration	7130	228.8	Absorption & light scattering	Background correction is required
Cd	Furnace	7131	228.8	As above Excess chloride Pipet tips	As above Ammonium phosphate used as a matrix modifier Use cadmium-free tips
Cr	Aspiration	7190	357.9	Alkali metal Absorption & scatt	KCl ionization suppressant in sample & stand Consult manufacturer's literature
Cr	Furnace	7191	357.9	200 mg/L calcium & phosphate	All calcium nitrate for a know constant effect and to eliminate effect of phosphate

(continued)

TABLE A-2 (CONTINUED)

Metal	Technique	Method No.	Wavelength (nm)	Interference Cause	Interference Minimization
Cu	Aspiration	7210	324.7	Absorpt & scatter	Consult manufacturer's manual
Fe	Aspiration	7380	248.3	Contamination	Great care taken to avoid contamination
Pb	Aspiration	7420	283.3	217.0 nm alternat	Background correction required
Pb	Furnace	7421	283.3	Poor recoveries	Matrix modifier, add 10 uL of phosphorus acid to 1-mL of prepared sample in sampler cup
Mn	Aspiration	7460	279.5	403.1 nm alternat	Background correction required
Ni	Aspiration	7520	232.0	352.4 nm alternat Fe, Co, & Cr Nonlinear respons	Background correction required Matrix matching or a nitrous-oxide/acety flame Sample dilution or use 352.4 nm line
Se	Furnace	7740	196.0	Volitality Adsorpt & scatter	Spike samples & reference materials & add nickel nitrate to minimize volatilization Background correction is required & Zeeman background correction can be useful
Ag	Aspiration	7760	328.1	Absorpt & scatter AgCl insoluble Viscosity	Background correction is required Avoid hydrochloric acid unless silver is in solution as a chloride complex Sample & standards monitored for apiration rate
Ti	Aspiration	7840	276.8		Background correction is required Hydrochloric acid should not be used
Tl	Furnace	7841	276.8	Hydrochloric acid or chloride	Background correction is required Verify that losses are not occuring for volitization by spiked samples or standad addt Palladium is a suitable matrix modifier
Zn	Aspiration	7950	213.9	High Si, Cu & P Contamination	Strontium removes Cu and phosphate Care should be taken to avid contamination

above standards. The instrument calibration should be checked once per hour. If the instrument does not reproduce the concentrations of the standard within 10 percent, the complete calibration procedures should be performed.

6.3 Atomic Absorption Spectrometer - Direct Aspiration, Graphite Furnace and Cold Vapor Mercury Analyses. Prepare the standards as outlined in Section 4.4. Calibrate the spectrometer using these prepared standards. Calibration procedures are also outlined in the EPA methods referred to in Table A-2 and in Standard Methods for Water and Wastewater, 15th Edition, Method 303F (for mercury). Each standard curve should be run in duplicate and the mean values used to calculate the calibration line. The instrument should be recalibrated approximately once every 10 to 12 samples.

7. Quality Control

7.1 Sampling. Field Reagent Blanks. The blank samples in Container Numbers 7 through 12 produced previously in Sections 5.2.7 through 5.2.11, respectively, shall be processed, digested, and analyzed as follows. Digest and process Container No. 12 contents per Section 5.3.1, Container No. 7 per Section 5.3.2, and half of Container No. 8 per Section 5.3.3. This produces Fraction Blank 1A and Fraction Blank 1B from Fraction Blank 1. Combine the remaining half of Container No. 8 with the contents of Container No. 9 and digest and process the resultant volume per Section 5.3.4. This produces Fraction Blank 2A and Fraction Blank 2B from Fraction Blank 2. Container No. 10 and Container No. 11 contents are Fraction Blank 3. Analyze Fraction Blank 1A and Fraction Blank 2A per Section 5.4.1 and/or 5.4.2. Analyze Fraction Blank 1B, Fraction Blank 2B, and Fraction Blank 3 per Section 5.4.3. The analysis of Fraction Blank 1A produces the front half reagent blank correction values for the metals except mercury; the analysis of Fraction Blank 1B produces the front half reagent blank correct value for mercury. The analysis of Fraction Blank 2A produces the back half reagent blank correction values for the metals except mercury, while separate analysis of Fraction Blanks 2B and 3 produce the back half reagent blank correction value for mercury.

7.2 An attempt may be made to determine if the laboratory reagents used in Section 5.3 caused contamination. They should be analyzed by the procedures in Section 5.4. The Administrator will determine whether or not the laboratory blank reagent values can be used in the calculation of the stationary source test results.

7.3 Quality Control Samples. The following quality control samples should be analyzed.

7.3.1 ICAP Analysis. Follow the quality control shown in Section 8 of Method 6010. For the purposes of a three run test series, these requirements have been modified to include the following: two instrument check standard runs, two calibration blank runs, one interference check sample at the beginning of the analysis (must be within 25% or analyze by standard addition), one quality control sample to check the accuracy of the calibration standards (must be within 25% of calibration), and one duplicate analysis (must be within 5% of average or repeat all analysis).

7.3.2 Direct Aspiration and/or Graphite Furnace AAS Analysis for Arsenic, Beryllium, Cadmium, Chromium, Lead, Mercury, Nickel, and Zinc (and Antimony, Barium, Copper, Manganese, Phosphorus, Selenium, Silver, and Thallium, if measured). All samples should be analyzed in duplicate. Perform a matrix spike on one front half sample and one back half sample or one combined sample. If recoveries of less than 75 percent or greater than 125 percent are obtained for the matrix spike, analyze each sample by the method of additions. A quality control sample should be analyzed to check the accuracy of the calibration standards. The results must be within 10% or the calibration repeated.

7.3.3 Cold Vapor AAS Analysis for Mercury. All samples should be analyzed in duplicate. A quality control sample should be analyzed to check the accuracy of the calibration standards (within 10% or repeat calibration). Perform a matrix spike on one sample from the nitric impinger portion (must be within 25% or samples must be analyzed by the method of standard additions). Additional information on quality control can be obtained from EPA Method 7470 or in Standard Methods for Water and Wastewater, 15th Edition, Method 303F.

8. Calculations

8.1 Dry Gas Volume. Using the data from this test, calculate $V_{m(std)}$, the dry gas sample volume at standard conditions as outlined in Section 6.3 of Method 5.

8.2 Volume of Water Vapor and Moisture Content. Using the data obtained from this test, calculate the volume of water vapor $V_{w(std)}$ and the moisture content B_{ws} of the stack gas. Use Equations 5-2 and 5-3 of Method 5.

8.3 Stack Gas Velocity. Using the data from this test and Equation 2-9 of Method 2, calculate the average stack gas velocity.

8.4 Metals (Except Mercury) in Source Sample.

8.4.1 Fraction 1A, Front Half, Metals (except Hg). Calculate the amount of each metal collected in Fraction 1 of the sampling train using the following equation:

$$M_{fh} = C_a \; F_d \; V_{soln.1} \qquad \text{Eq. 1*}$$

where:

M_{fh} = total mass of each metal (except Hg) collected in the front half of the sampling train (Fraction 1), ug.
C_a = concentration of metal in sample Fraction 1A as read from the standard curve (ug/ml).
F_d = dilution factor (F_d = the inverse of the fractional portion of the concentrated sample in the solution actually used in the instrument to produce the reading C_a. For example, when the dilution of Fraction 1A is from 2 to 10 ml, F_d = 5).
$V_{soln.1}$ = total volume of digested sample solution (Fraction 1), ml.

8.4.2 Fraction 2A, Back Half, Metals (except Hg). Calculate the amount of each metal collected in Fraction 2 of the sampling train using the following equation.

$$M_{bh} = C_a \; F_a \; V_a \qquad \text{Eq. 2*}$$

where:

M_{bh} = total mass of each metal (except Hg) collected in the back half of the sampling train (Fraction 2), ug.
C_a = concentration of metal in sample Fraction 2A, as read from the standard curve (ug/ml).
F_a = aliquot factor, volume of Fraction 2 divided by volume of aliquot Fraction 2A.
V_a = volume of digested sample analyzed (concentrated Fraction 2A), ml.

8.4.3 Total Train, Metals (except Hg). Calculate the total amount of each of the quantified metals collected in the sampling train as follows:

$$M_t = (M_{fh} - M_{fhb}) + (M_{bh} - M_{bhb}) \qquad \text{Eq. 3*}$$

*If Fractions 1A and 2A are combined, proportional aliquots must be used. Appropriate changes must be made in Equations 1-3 to reflect this approach.

where:

M_t = total mass of each metal (separately stated for each metal) collected in the sampling train, ug.
M_{fhb} = blank correction value for mass of metal detected in front half field reagent blank, ug.
M_{bhb} = blank correction value for mass of metal detected in back half field reagent blank, ug.

Note: If the measured blank value for the front half (m_{fhb}) is in the range 0.0 to A ug [where A ug equals the value determined by multiplying 1.4 ug per square inch (1.4 ug/in.^{2}) times the actual area in square inches (in.^{2}) of the filter used in the emission sample], m_{fhb} may be used to correct the emission sample value (m_{fh}); if m_{fhb} exceeds A ug, the greater of the two following values (either I. or II.) may be used:

I. A ug, or

II. the lesser of (a) m_{fhb}, or (b) 5 percent of m_{fh}.

If the measured blank value for the back half (m_{bhb}) is in the range 0.0 to 1 ug, m_{bhb} may be used to correct the emission sample value (m_{bh}); if m_{bhb} exceeds 1 ug, the greater of the two following values may be used: 1 ug or 5 percent of m_{bh}.

8.5 Mercury in Source Sample.

8.5.1 Fraction 1B, Front Half, Hg. Calculate the amount of mercury collected in the front half, Fraction 1, of the sampling train using the following equation:

$$Hg_{fh} = \frac{Q_{fh}}{V_{f1B}} \times V_{soln,1} \qquad \text{Eq. 4}$$

where:

Hg_{fh} = total mass of mercury collected in the front half of the sampling train (Fraction 1), ug.
Q_{fh} = quantity of mercury in analyzed sample, ug.
$V_{soln,1}$ = total volume of digested sample solution (Fraction 1), ml.
V_{f1B} = volume of Fraction 1B analyzed, ml. See the following Note.

Note: V_{f1B} is the actual amount of Fraction 1B analyzed. For example, if 1 ml of Fraction 1B were diluted to 100 ml to bring it into the proper analytical range, and 1 ml of the 100-ml dilution was analyzed, V_{f1B} would be 0.01.

8.5.2 Fraction 2B and Fraction 3, Back Half, Hg. Calculate the amount of mercury collected in Fractions 2 and 3 using Equations 5 and 6, respectively.

Calculate the total amount of mercury collected in the back half of the sampling train using Equation 7.

$$Hg_{bh2} = \frac{Q_{bh2}}{V_{f1B}} \times V_{soln.2} \qquad \text{Eq. 5}$$

where:

Hg_{bh2} = total mass of mercury collected in Fraction 2, ug.
Q_{bh2} = quantity of mercury in analyzed sample, ug.
V_{f2B} = volume of Fraction 2B analyzed, ml (see Note in Section 8.5.1).
$V_{soln.2}$ = total volume of Fraction 2, ml.

$$Hg_{bh3} = \frac{Q_{bh3}}{V_{f2B}} \times V_{soln.3} \qquad \text{Eq. 6}$$

where:

Hg_{bh3} = total mass of mercury collected in Fraction 3, ug.
Q_{bh3} = quantity of mercury in analyzed sample, ug.
V_{f3} = volume of Fraction 3 analyzed, ml (see Note in Section 8.5.1).
$V_{soln.3}$ = total volume of Fraction 3, ml.

$$Hg_{bh} = Hg_{bh2} + Hg_{bh3} \qquad \text{Eq. 7}$$

where:

Hg_{bh} = total mass of mercury collected in the back half of the sampling train, ug.

8.5.3 Total Train Mercury Catch. Calculate the total amount of mercury collected in the sampling train using Equation 8.

$$M_t = (Hg_{fh} - Hg_{fhb}) + (Hg_{bh} - Hg_{bhb}) \qquad \text{Eq. 8}$$

where:

M_t = total mass of mercury collected in the sampling train, ug.
Hg_{fhb} = blank correction value for mass of mercury detected in front half field reagent blank, ug.

Hg_{bhb} = blank correction value for mass of mercury detected in back half field reagent blank, ug.

Note: If the total of the measured blank values ($Hg_{fhb} + Hg_{bhb}$) is in the range of 0 to 3 ug, then the total may be used to correct the emission sample value ($Hg_{fh} + Hg_{bh}$); if it exceeds 3 ug, the greater of the following two values may be used: 3 ug or 5 percent of the emission sample value ($Hg_{fh} + Hg_{bh}$).

8.6 Metal Concentration of Stack Gas. Calculate the concentrations of arsenic, beryllium, cadmium, total chromium, lead, mercury, nickel, and zinc (and antimony, barium, copper, manganese, phosphorus, selenium, silver, and thallium, if measured) in the stack gas (dry basis, adjusted to standard conditions) as follows:

$$C_s = K_4 \ (M_t / V_{m(std)}) \qquad \text{Eq.9}$$

where:

C_s = concentration of each metal in the stack gas, mg/dscm.
K_4 = 10^{-3} mg/ug.
M_t = total mass of each metal collected in the sampling train, ug.
$V_{m(std)}$ = volume of gas sample as measured by the dry gas meter, corrected to dry standard conditions, dscm.

8.7 Isokinetic Variation and Acceptable Results. Same as Method 5, Sections 6.11 and 6.12, respectively.

9. Bibliography

9.1 Method 303F in Standard Methods for the Examination of Water Wastewater, 15th Edition, 1980. Available from the American Public Health Association, 1015 18th Street N.W., Washington, D.C. 20036.

9.2 EPA Methods 6010, 7000, 7041, 7060, 7131, 7421, 7470, 7740, and 7841, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Third Edition. September 1988. Office of Solid Waste and Emergency Response, U. S. Environmental Protection Agency, Washington, D.C. 20460.

9.3 EPA Method 200.7, Code of Federal Regulations, Title 40, Part 136, Appendix C. July 1, 1987.

9.4 EPA Methods 1 through 5, Code of Federal Regulations, Title 40, Part 60, Appendix A, July 1, 1987.

METHOD 101A—Determination of Particulate and Gaseous Mercury Emissions From Sewage Sludge Incinerators

Introduction

This method is similar to Method 101, except acidic potassium permanganate solution is used instead of acidic iodine monochloride for collection.

1. *Applicability and Principle*

1.1 Applicability. This method applies to the determination of particulate and gaseous mercury (Hg) emissions from sewage sludge incinerators and other sources as specified in the regulations.

1.2 Principle. Particulate and gaseous Hg emissions are withdrawn isokinetically from the source and collected in acidic potassium permanganate ($KMnO_4$) solution. The Hg collected (in the mercuric form) is reduced to elemental Hg, which is then aerated from the solution into an optical cell and measured by atomic absorption spectrophotometry.

2. *Range and Sensitivity*

2.1 Range. After initial dilution, the range of this method is 20 to 800 ng Hg/ml. The upper limit can be extended by further dilution of the sample.

2.2 Sensitivity. The sensitivity of the method depends on the recorder/spectrophotometer combination selected.

3. *Interfering Agents*

3.1 Sampling. Excessive oxidizable organic matter in the stack gas prematurely depletes the $KMnO_4$ solution and thereby prevents further collection of Hg.

3.2 Analysis. Condensation of water vapor on the optical cell windows causes a positive interference.

4. *Precision*

Based on eight paired-train tests, the within-laboratory standard deviation was estimated to be 4.8 μg Hg/ml in the concentration range of 50 to 130 μg Hg/m³.

5. *Apparatus*

5.1 Sampling Train and Sample Recovery. Same as Method 101, Sections 5.1 and 5.2, respectively, except for the following variations:

5.1.1 Probe Liner. Same as Method 101, Section 5.1.2, except that if a filter is used ahead of the impingers, the tester must use the probe heating system to minimize the condensation of gaseous Hg.

5.1.2 Filter Holder (Optional). Borosilicate glass with a rigid stainless-steel wire-screen filter support (do not use glass frit supports) and a silicone rubber or Teflon gasket, designed to provide a positive seal against leakage from outside or around the filter. The filter holder must be equipped with a filter heating system capable of maintaining a temperature around the filter holder of 120 ± 14° C (248 ± 25° F) during sampling to minimize both water and gaseous Hg condensation. The tester may use a filter in cases where the stream contains large quantities of particulate matter.

[5.1.2 corrected by 53 FR 36972, September 23, 1988]

5.2 Analysis. The apparatus needed for analysis is the same as Method 101, Sections 5.3 and 5.4, except as follows:

5.2.1 Volumetric Pipets, Class A: 1-, 2-, 3-, 4-, 5-, 10-, and 20-ml.

5.2.2 Graduated Cylinder, 25-ml.

5.2.3 Steam Bath.

6. *Reagents*

Use ACS reagent-grade chemicals or equivalent, unless otherwise specified.

6.1 Sampling and Recovery. The reagents used in sampling and recovery are as follows:

6.1.1 Water. Deionized distilled, meeting ASTM Specifications for Type I Reagent Water—ASTM Test Method D1193-77 (incorporated by reference—see § 61.18). If high concentrations of organic matter are not expected to be present, the analyst may eliminate the $KMnO_4$ test for oxidizable organic matter. Use this water in all dilutions and solution preparations.

6.1.2 Nitric Acid (HNO_3), 50 Percent (V/V). Mix equal volumes of concentrated HNO_3 and deionized distilled water, being careful to slowly add the acid to the water.

6.1.3 Silica Gel. Indicating type, 6- to 16-mesh. If previously used, dry at 175° C (350° F) for 2 hr. The tester may use new silica gel as received.

6.1.4 Filter (Optional). Glass fiber filter, without organic binder, exhibiting at least 99.95 percent efficiency on 0.3 μm dioctyl phthalate smoke particles. The tester may use the filter in cases where the gas stream contains large quantities of particulate matter, but he should analyze blank filters for Hg content.

6.1.5 Sulfuric Acid (H_2SO_4), 10 Percent (V/V). Add and mix 100 ml of concentrated H_2SO_4 with 900 ml of deionized distilled water.

6.1.6 Absorbing Solution. 4 Percent $KMnO_4$ (W/V). Prepare fresh daily. Dissolve 40 g of $KMnO_4$ in sufficient 10 percent H_2SO_4 to make 1 liter. Prepare and store in glass bottles to prevent degradation.

6.2 Analysis. The reagents needed for analysis are listed below:

6.2.1 Tin (II) Solution. Prepare fresh daily and keep sealed when not being used. Completely dissolve 20 g of tin (II) chloride [or 25 g of tin (II) sulfate] crystals (Baker Analyzed reagent grade or any other brand that will give a clear solution) in 25 ml of concentrated HCl. Dilute to 250 ml with deionized distilled water. Do not substitute HNO_3, H_2SO_4, or other strong acids for the HCl.

6.2.2 Sodium Chloride—Hydroxylamine Solution. Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate (or 12 g of hydroxylamine hydrochloride) in deionized distilled water and dilute to 100 ml.

6.2.3 Hydrochloric Acid (HCl), 8 N. Dilute 67 ml of concentrated HCl to 100 ml with deionized distilled water (slowly add the HCl to the water).

6.2.4 Nitric Acid, 15 Percent (V/V). Dilute 15 ml of concentrated HNO_3 to 100 ml with deionized distilled water.

6.2.5 Mercury Stock Solution, 1 mg Hg/ml. Prepare and store all mercury standard solutions in borosilicate glass containers. Completely dissolve 0.1354 g of mercury (II) chloride in 75 ml of deionized distilled water. Add 100 ml of concentrated HNO_3, and adjust the volume to exactly 100 ml with deionized distilled water. Mix thoroughly. This solution is stable for at least 1 month.

6.2.6 Intermediate Mercury Standard Solution, 10 μg Hg/ml. Prepare fresh weekly. Pipet 5.0 ml of the mercury stock solution (Section 6.2.5) into a 500-ml volumetric flask and add 20 ml of 15 percent HNO_3 solution. Adjust the volume to exactly 500 ml with deionized distilled water. Thoroughly mix the solution.

6.2.7 Working Mercury Standard Solution, 200 ng Hg/ml. Prepare fresh daily. Pipet 5.0 ml from the Intermediate Mercury Standard Solution (Section 6.2.6) into a 250-ml volumetric flask. Add 5 ml of 4 percent $KMnO_4$ absorbing solution and 5 ml of 15 percent HNO_3. Adjust the volume to exactly 250 ml with deionized distilled water. Mix thoroughly.

6.2.8 Potassium Permanganate, 5 Percent (W/V). Dissolve 5 g of $KMnO_4$ in deionized distilled water and dilute to 100 ml.

6.2.9 Filter. Whatman No. 40 or equivalent.

7. *Procedure*

7.1 Sampling. The sampling procedure is the same as Method 101, except for changes due to the use of $KMnO_4$ instead of ICl absorbing solution and the possible use of a filter. These changes are as follows:

7.1.1 Preliminary Determinations. The preliminary determinations are the same as those given in Method 101, Section 7.1.2, except for the absorbing solution depletion sign. In this method, high oxidizable organic content may make it impossible to sample for the desired minimum time. This problem is indicated by the complete bleaching of the purple color of the $KMnO_4$ solution. In these cases, the tester may divide the sample run into two or more subruns to insure that the absorbing solution would not be depleted. In cases where an excess of water condensation is encountered, collect two runs to make one sample.

7.1.2 Preparation of Sampling Train. The preparation of the sampling train is the same as that given in Method 101, Section 7.1.3, except for the cleaning of the glassware [probe, filter holder (if used), impingers, and connectors] and the charging of the first three impingers. In this method, clean all the glass components by rinsing with 50 percent HNO_3, tap water, 8 N HCl, tap water, and finally deionized distilled water. Then place 50 ml of 4 percent $KMnO_4$ in the first impinger and 100 ml in each of the second and third impingers.

If a filter is used, use a pair of tweezers to place the filter in the filter holder. Be sure to center the filter and place the gasket in proper position to prevent the sample gas stream from by-passing the filter. Check the filter for tears after assembly is completed. Be sure also to set the filter heating system at the desired operating temperature after the sampling train has been assembled.

7.1.3 Sampling Train Operation. In addition to the procedure given in Method 101, Section 7.1.5, maintain a temperature

around the filter (if applicable) of 120° ± 14° C (248° ± 25° F).

7.2 Sample Recovery. Begin proper clean-up procedure as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When it can be safely handled, wipe off any external particulate matter near the tip of the probe nozzle and place a cap over it. Do not cap off the probe tip tightly while the sampling train is cooling because the resultant vacuum would draw liquid out from the impingers.

Before moving the sample train to the cleanup site, remove the probe from the train, wipe off the silicone grease, and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Wipe off the silicone grease from the impinger. Use either ground-glass stoppers, plastic caps, or serum caps to close these openings.

Transfer the probe, impinger assembly, and (if applicable) filter assembly to a cleanup area that is clean, protected from the wind, and free of Hg contamination. The ambient air in laboratories located in the immediate vicinity of Hg-using facilities is not normally free of Hg contamination.

Inspect the train before and during assembly, and note any abnormal conditions. Treat the sample as follows:

7.2.1 Container No. 1 (Impinger, Probe, and Filter Holder). Use a graduated cylinder: measure the liquid in the first three impingers to within ±1 ml. Record the volume of liquid present (e.g., see Figure 5-3 of Method 5 in Part 60 of 40 CFR). This information is needed to calculate the moisture content of the effluent gas. (Use only graduated cylinder and glass storage bottles that have been precleaned as in Section 7.1.2.) Place the contents of the first three impingers into a 1000-ml glass sample bottle.

(NOTE: If a filter is used, remove the filter from its holder, as outlined under "Container No. 3" below.)

Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover the Hg (and any condensate) from the probe nozzle, probe fitting, probe liner and front half of the filter holder (if applicable) as follows: Rinse these components with a total of 250 to 400 ml of fresh 4 percent $KMnO_4$ solution; add all washings to the 1000-ml glass sample bottle; remove any residual brown deposits on the glassware using the minimum amount of 8 N HCl required; and add this HCl rinse to this sample container.

After all washings have been collected in the sample container, tighten the lid on the container to prevent leakage during shipment to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Label the container to clearly identify its contents.

7.2.2 Container No. 2 (Silica Gel). Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. Transfer the silica gel from its impinger to its original container and seal. The tester may use as aids a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g; record this weight.

7.2.3 Container No. 3 (Filter). If a filter was used, carefully remove it from the filter holder, place it in a 100-ml glass sample bottle, and add 20 to 40 ml of 4 percent $KMnO_4$. If it is necessary to fold the filter, be sure that the particulate cake is inside the fold. Carefully transfer to the 150-ml sample bottle any particulate matter and filter fibers that adhere to the filter holder gasket by using a dry Nylon bristle brush and a sharp-edged blade. Seal the container. Label the container to clearly identify its contents. Mark the height of the fluid level to determine whether leakage occurs during transport.

7.2.4 Container No. 4 (Filter Blank). If a filter was used, treat an unused filter from the same filter lot used for sampling in the same manner as Container No. 3.

7.2.5 Container No. 5 (Absorbing Solution Blank). For a blank, place 500 ml of 4 percent $KMnO_4$ absorbing solution in a 1000-ml sample bottle. Seal the container.

7.3 Sample preparation. Check liquid level in each container to see if liquid was lost during transport. If a noticeable amount of leakage occurred, either void the sample or use methods subject to the approval of the Administrator to account for the losses. Then follow the procedures below.

7.3.1 Containers No. 3 and No. 4 (Filter and Filter Blank). If a filter was used, place the contents, including the filter, of Containers No. 3 and No. 4 in separate 250-ml beakers and heat the beakers on a steam bath until most of the liquid has evaporated. Do not take to dryness. Add 20 ml of concentrated HNO_3 to the beakers, cover them with a glass, and heat on a hot plate at 70° C for 2 hours. Remove from the hot plate and filter the solution through Whatman No. 40 filter paper. Save the filtrate for Hg analysis. Discard the filter.

7.3.2 Container No. 1 (Impingers, Probe, and Filter Holder). Filter the contents of Container No. 1 through Whatman 40 filter paper to remove the brown MnO_2 precipitate. Wash the filter with 50 ml of 4 percent $KMnO_4$ absorbing solution and add this wash to the filtrate. Discard the filter. Combine the filtrates from Containers No. 1 and No. 3 (if applicable), and dilute to a known volume with deionized distilled water. Mix thoroughly.

7.3.3 Container No. 5 (Absorbing Solution Blank). Treat this container as described in Section 7.3.2. Combine this filtrate with the filtrate with Container No. 4 and dilute to a known volume with deionized distilled water. Mix thoroughly.

7.4 Analysis. Calibrate the spectrophotometer and recorder and prepare the calibration curve as described in Sections 8.1 to 8.2. Then repeat the procedure used to establish the calibration curve with appropriately sized aliquots (1 to 10 ml) of the samples (from Sections 7.3.2 and 7.3.3) until two consecutive peak heights agree within ±3 percent of their average value. If the 10-ml sample is below the detectable limit, use a larger aliquot (up to 20 ml), but decrease the volume of water added to the aeration cell accordingly to prevent the solution volume from exceeding the capacity of the aeration bottle. If the peak maximum of a 1.0-ml aliquot is off scale, further dilute the original sample to bring the Hg concentration into the calibration range of the spectrophotometer. If the Hg content of the absorbing solution and filter blank is below the working range of the analytical method, use zero for the blank.

Run a blank and standard at least after every five samples to check the spectrophotometer calibration; recalibrate as necessary.

It is also recommended that at least one sample from each stack test be checked by the Method of Standard Additions to confirm that matrix effects have not interfered in the analysis.

[7.4 corrected by 53 FR 36972, September 23, 1988]

8. *Calibration and Standards*

The calibration and standards are the same as Method 101, Section 8, except for the following variations:

8.1 Optical Cell Heating System Calibration. Same as Method 101, Section 8.2, except use a 25-ml graduated cylinder to add 25 ml of deionized distilled water to the bottle section of the aeration cell.

8.2 Spectrophotometer and Recorder Calibration. The mercury response may be measured by either peak height or peak area. (NOTE: The temperature of the solution affects the rate at which elemental Hg is released from a solution and, consequently, it affects the shape of the absorption curve (area) and the point of maximum absorbance (peak height). To obtain reproducible results, all solutions must be brought to room temperature before use.) Set the spectrophotometer wave length at 253.7 nm and make certain the optical cell is at the minimum temperature that will prevent water condensation.

Then set the recorder scale as follows: Using a 25-ml graduated cylinder, add 25 ml of deionized distilled water to the aeration cell bottle and pipet 5.0 ml of the working mercury standard solution into the aeration cell. (NOTE: Always add the Hg-containing solution to the aeration cell after the 25 ml of deionized distilled water.) Place a Teflon-coated stirring bar in the bottle. Add 5 ml of the 4 percent $KMnO_4$ absorbing solution followed by 5 ml of 15 percent HNO_3 and 5 ml of 5 percent $KMnO_4$ to the aeration bottle and mix well. Now, attach the bottle section to the bubbler section of the aeration cell and make certain that (1) the aeration cell exit arm stopcock (Figure 101-3 of Method 101) is closed (so that Hg will not prematurely enter the optical cell when the reducing agent is being added) and (2) there is no

[Appendix B, Method 101A]

flow through the bubbler. Add 5 ml of sodium chloride hydroxylamine in 1-ml increments until the solution is colorless. Now add 5 ml of tin (II) solution to the aeration bottle through the side arm, and immediately stopper the side arm. Stir the solution for 15 seconds, turn on the recorder, open the aeration cell exit arm stopcock, and immediately initiate aeration with continued stirring. Determine the maximum absorbance of the standard and set this value to read 90 percent of the recorder full scale.

[8.2 amended by 49 FR 35769, September 12, 1984]

9. *Calculations*—9.1 *Dry Gas Volume, Volume of Water Vapor and Moisture Content, Stack Gas Velocity, Isokinetic Variation and Acceptable Results, and Determination of Compliance.* Same as Method 101, Sections 9.1, 9.2, 9.3, 9.6, and 9.7, respectively, except use data obtained from this test.

9.2 *Total Mercury.* For each source sample, correct the average maximum absorbance of the two consecutive samples whose peak heights agreed within ±3 percent of their average for the contribution of the field blank. Then calculate the total Hg content in μg in each sample. Correct for any dilutions made to bring the sample into the working range of the spectrophotometer.

9.3 *Mercury Emission Rate.* Calculate the Hg emission rate R in g/day for continuous operations using Equation 101A-1. For cyclic operations, use only the time per day each stack is in operation. The total Hg emission rate from a source will be the summation of results from all stacks.

$$R = K \frac{m_{Hg} v_s A_s (86{,}400 \times 10^{-6})}{(V_{m(std)} - V_{w(std)})(T_s/P_s)}$$

Eq. 101A-1

Where:

m_{Hg} = Total Hg content in each sample, μg.
v_s = Average stack gas velocity, m/sec (fps).
A_s = Stack cross-sectional area, m^2 (ft^2).
86,400 = Conversion factor, sec/day.
10^{-6} = Conversion factor, g/μg.
$V_{m(std)}$ = Dry gas sample volume at standard conditions, corrected for leakage (if any), m^3 (ft^3).
$V_{w(std)}$ = Volume of water vapor at standard conditions, m^3 (ft^3).
T_s = Absolute average stack gas temperature, °K (°R).
P_s = Absolute stack gas pressure, mm Hg (in. Hg).
K = 0.3858 °K/mm Hg for metric units.
= 17.64 °R/in. Hg for English units.

10. *Bibliography.* 1. Same as Method 101, Section 10.

2. Mitchell, W. J., M. R. Midgett, J. C. Suggs, and D. Albrinck.
Test Methods to Determine the Mercury Emissions from Sludge Incineration Plants.
U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Publication No. EPA-600/4-79-058. September 1979.

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METHOD 26 - DETERMINATION OF HYDROGEN CHLORIDE EMISSIONS FROM STATIONARY SOURCES

1. Applicability, Principle, Interferences, Precision, Bias, and Stability

1.1 Applicability. This method is applicable for determining hydrogen chloride (HCl) emissions from stationary sources.

1.2 Principle. An integrated sample is extracted from the stack and passed through dilute sulfuric acid. In the dilute acid, the HCl gas is dissolved and forms chloride (Cl^-) ions. The Cl^- is analyzed by ion chromatography (IC).

1.3 Interferences. Volatile materials which produce chloride ions upon dissolution during sampling are obvious interferences. Another possible interferent is diatomic chlorine (Cl_2) gas which reacts to form HCl and hypochlorous acid (HOCl) upon dissolving in water. However, Cl_2 gas exhibits a low solubility in water and the use of acidic, rather than neutral or basic collection solutions, greatly reduces the chance of dissolving any chlorine present.

1.4 Precision and Bias. The within-laboratory relative standard deviations are 6.2 and 3.2 percent at HCl concentrations of 3.9 and 15.3 ppm, respectively. The method does not exhibit a bias to Cl_2 when sampling at concentrations less than 50 ppm.

1.5 Stability. The collected samples can be stored for up to 4 weeks before analysis.

1.6 Detection Limit. The analytical detection limit of the method is 0.1 μg/ml.

2. Apparatus

2.1 Sampling. The sampling train is shown in Figure 26-1, and component parts are discussed below.

2.1.1 Probe. Borosilicate glass, approximately 3/8-in. (9-mm) I.D. with a heating system to prevent moisture condensation. A Teflon-glass filter in a mat configuration should be installed to remove particulate matter from the gas stream (see Section 2.1.5). A glass wool plug should not be used to remove particulate matter since a negative bias in the data could result.

2.1.2 Three-way Stopcock. A borosilicate-glass three-way stopcock with a heating system to prevent moisture condensation. The heated stopcock should connect to the outlet of the heated filter and the inlet of the first impinger. The heating system should be capable of preventing condensation up to the inlet of the first impinger. Silicone grease may be used, if necessary, to prevent leakage.

2.1.3 Impingers. Four 30-ml midget impingers with leak-free glass connectors. Silicone grease may be used, if necessary, to prevent leakage. For sampling at high moisture sources or for sampling times greater than one hour, a midget impinger with a shortened stem (such that the gas sample does not bubble through the collected condensate) should be used in front of the first impinger.

2.1.4 Drying Tube or Impinger. Tube or impinger, of Mae West design, filled with 6- to 16-mesh indicating type silica gel, or equivalent, to dry the gas sample and to protect the dry gas meter and pump. If the silica gel has been used previously, dry at 175°C (350°F) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

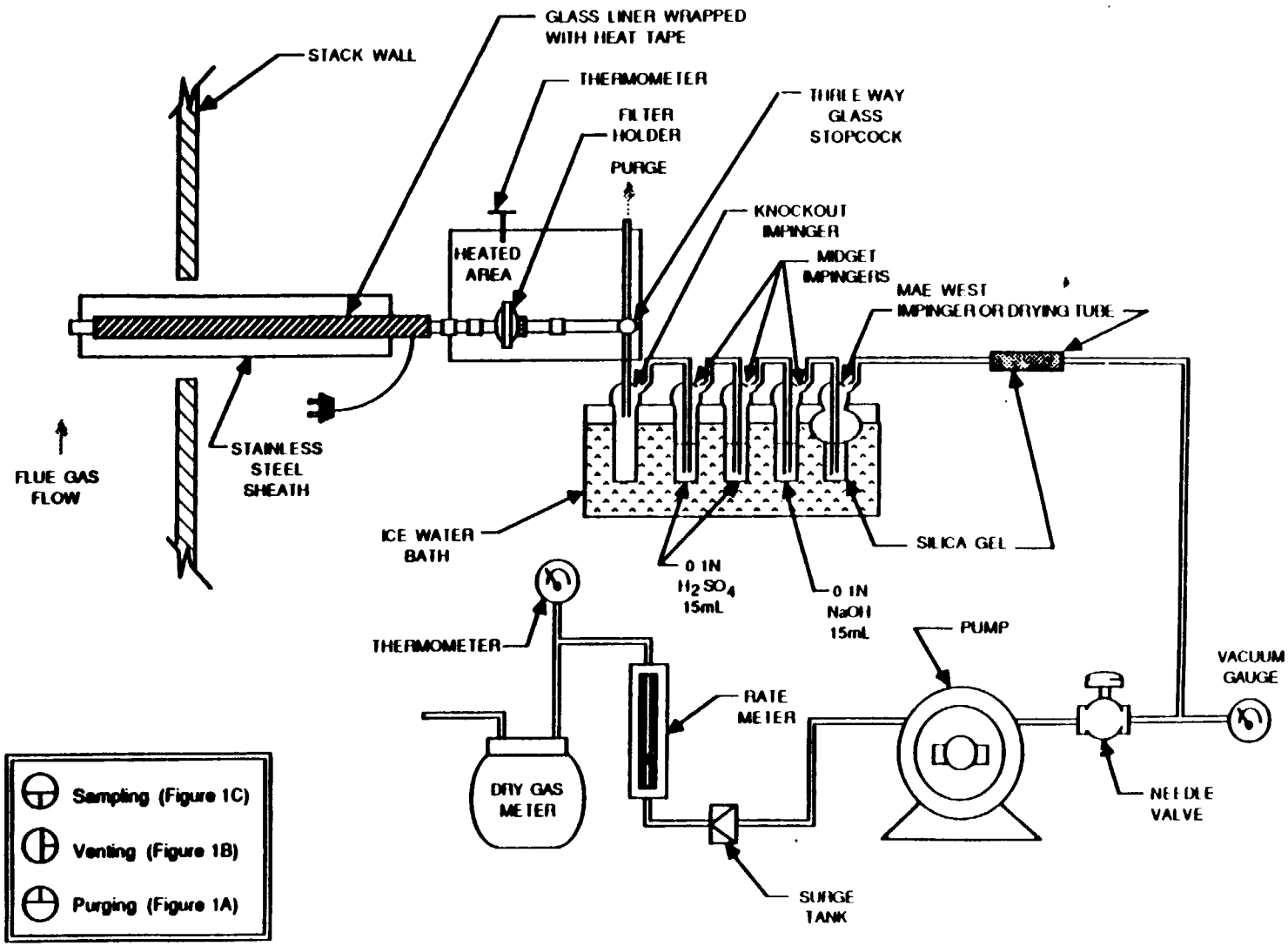

Figure 26-1. Sampling train.

2.1.5 Filter. A 25-mm (or other size) Teflon-glass mat, Pallflex TX40HI75 (Pallflex Inc., 125 Kennedy Drive, Putnam, CT 06260). This filter is in a mat configuration to prevent fine particulate matter from entering the sampling train. Its composition is 75% Teflon/25% borosilicate glass. Other filters may be used, but they must be in a mat (as opposed to a laminate) configuration and contain at least 75% Teflon.

2.1.6 Filter Holder and Support. The filter holder should be made of Teflon or quartz. The filter support shall be made of Teflon. All Teflon filter holders and supports are available from Savillex Corp., 5325 Hwy 101, Minnetonka, MN 55345.

2.1.7 Sample Line. Leak-free, with compatible fittings to connect the last impinger to the needle valve.

2.1.8 Rate Meter. Rotameter, or equivalent, capable of measuring flow rate to within 2 percent of the selected flow rate of 2 liters/min.

2.1.9 Purge Pump, Purge Line, Drying Tube, Needle Valve, and Rate Meter. Pump capable of purging the sampling probe at 2 liters/min, with drying tube, filled with silica gel or equivalent, to protect pump, and a rate meter capable of measuring 0 to 5 liters/min.

2.1.10 Stopcock Grease, Valve, Pump, Volume Meter, Barometer, and Vacuum Gauge. Same as in Method 6, Sections 2.1.4, 2.1.7, 2.1.8, 2.1.10, 2.1.11, and 2.1.12.

2.1.11 Temperature Measuring Devices. Temperature measuring device to monitor the temperature of the probe and a thermometer or other temperature measuring device to monitor the temperature of the sampling system from the outlet of the probe to the inlet of the first impinger.

2.1.12 Ice Water Bath. To minimize loss of absorbing solution.

2.2 Sample Recovery.

2.2.1 Wash Bottles. Polyethylene or glass, 500-ml or larger, two.

2.2.2 Storage Bottles. 100-ml glass, with Teflon-lined lids, to store impinger samples (two per sampling run).

2.3 Sample Preparation and Analysis. The materials required for volumetric dilution and chromatographic analysis of samples are described below.

2.3.1 Volumetric Flasks. Class A, 100-ml size.

2.3.2 Volumetric Pipets. Class A, assortment. To dilute samples into the calibration range of the instrument.

2.3.3 Ion Chromatograph. Suppressed or non-suppressed, with a conductivity detector and electronic integrator operating in the peak area mode. Other detectors, strip chart recorders, and peak height measurements may be used.

3. Reagents

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society (ACS reagent grade). When such specifications are not available, the best available grade shall be used.

3.1 Sampling.

3.1.1 Water. Deionized, distilled water that conforms to ASTM Specification D 1193-77, Type 3.

3.1.2 Absorbing Solution, 0.1 N Sulfuric Acid (H_2SO_4). To prepare 100 ml of the absorbing solution for the front impinger pair, slowly add 0.28 ml of concentrated H_2SO_4 to about 90 ml of water while stirring, and adjust the

final volume to 100 ml using additional water. Shake well to mix the solution.

3.1.3 Chlorine Scrubber Solution, 0.1 N Sodium Hydroxide (NaOH). To prepare 100 ml of the scrubber solution for the fourth impinger, dissolve 0.40 g of solid NaOH in about 90 ml of water, and adjust the final solution volume to 100 ml using additional water. Shake well to mix the solution.

3.2 Sample Preparation and Analysis.

3.2.1 Water. Same as in Section 3.1.1.

3.2.2 Blank Solution. A separate blank solution of the absorbing reagent should be prepared for analysis with the field samples. Dilute 30 ml of absorbing solution to 100 ml with water in a separate volumetric flask.

3.2.3 Sodium Chloride (NaCl) Stock Standard Solution. Solutions containing a nominal certified concentration of 1000 mg/l are commercially available as convenient stock solutions from which working standards can be made by appropriate volumetric dilution. Alternately, concentrated stock solutions may be produce. from reagent grade NaCl. The NaCl should be dried at 110°C for 2 or more hours and cooled to room temperature in a desiccator immediately before weighing. Accurately weigh 1.6 to 1.7 g of the dried NaCl to within 0.1 mg, dissolve in water, and dilute to 1 liter. The exact Cl^- concentration can be calculated using Eq. 26-1.

$$\mu g\ Cl^-/ml = g\ of\ NaCl \times 10^3 \times 35.45/58.44 \qquad \text{Eq. 26-1}$$

Refrigerate the stock standard solution and store no longer than one month.

3.2.4 Chromatographic Eluent. Effective eluents for non-suppressed IC using a resin- or silica-based weak ion exchange column are a 4 mM potassium hydrogen phthalate solution, adjusted to pH 4.0 using a saturated sodium borate solution, and a 4 mM 4-hydroxy benzoate solution, adjusted to pH 8.6

using 1 N NaOH. An effective eluent for suppressed ion chromatography is a solution containing 3 mM sodium bicarbonate and 2.4 mM sodium carbonate. Other dilute solutions buffered to a similar pH and containing no interfering ions may be used. When using suppressed ion chromatography, if the "water dip" resulting from sample injection interferes with the chloride peak, use a 2 mM NaOH/2.4 mM sodium bicarbonate eluent.

4. Procedure

4.1 Sampling.

4.1.1 Preparation of Collection Train. Prepare the sampling train as follows: Pour 15 ml of the absorbing solution into each of the first two impingers, and add 15 ml of scrubber solution to the fourth impinger. Connect the impingers in series with the knockout impinger first, followed by the two impingers containing absorbing solution and the impinger containing the scrubber solution. Place a fresh charge of silica gel, or equivalent, in the drying tube or Mae West impinger.

4.1.2 Adjust the probe temperature and the temperature of the filter and the stopcock, i.e., the heated area in Figure 26-1 to a temperature sufficient to prevent water condensation. This temperature should be at least 20°C above the source temperature, but not greater than 120°C. The temperature should be monitored throughout a sampling run to ensure that the desired temperature is maintained.

4.1.3 Leak-Check Procedure. A leak-check prior to the sampling run is optional; however, a leak-check after the sampling run is mandatory. The leak-check procedure is as follows: Temporarily attach a suitable (e.g., 0-40 cc/min) rotameter to the outlet of the dry gas meter and place a vacuum gauge at or near the probe inlet. Plug the probe inlet, pull a vacuum of at

least 250 mm Hg (10 in. Hg), and note the flow rate as indicated by the rotameter. A leakage rate not in excess of 2 percent of the average sampling rate is acceptable. (NOTE: Carefully release the probe inlet plug before turning off the pump.) It is suggested (not mandatory) that the pump be leak-checked separately, either prior to or after the sampling run. If done prior to the sampling run, the pump leak-check shall precede the leak-check of the sampling train described immediately above; if done after the sampling run, the pump leak-check shall follow the train leak-check. To leak-check the pump, proceed as follows: Disconnect the drying tube from the probe-impinger assembly. Place a vacuum gauge at the inlet to either the drying tube or pump, pull a vacuum of 250 mm (10 in.) Hg, plug or pinch off the outlet of the flow meter, and then turn off the pump. The vacuum should remain stable for at least 30 sec. Other leak-check procedures may be used, subject to the apporval of the Administrator, U.S. Environmental Protection Agency.

4.1.4 Purge Procedure. Immediately before sampling, connect the purge line to the stopcock, and turn the stopcock to permit the purge pump to purge the probe (see Figure 1A of Figure 26-1). Turn on the purge pump, and adjust the purge rate to 2 liters/min. Purge for at least 5 minutes before sampling.

4.1.5 Sample Collection. Turn on the sampling pump, pull a slight vacuum of approximately 25 mm Hg (1 in. Hg) on the impinger train, and turn the stopcock to permit stack gas to be pulled through the impinger train (see Figure 1C of Figure 26-1). Adjust the sampling rate to 2 liters/min, as indicated by the rate meter, and maintain this rate to within 10 percent during the entire sampling run. Take readings of the dry gas meter volume and temperature, rate meter, and vacuum gauge at least once every five minutes during the run. A sampling time of one hour is recommended. Shorter sampling

times may introduce a significant negative bias in the HCl concentration. At the conclusion of the sampling run, remove the train from the stack, cool, and perform a leak-check as described in Section 4.1.2.

4.2 Sample Recovery. Disconnect the impingers after sampling. Quantitatively transfer the contents of the first three impingers (the knockout impinger and the two absorbing solution impingers) to a leak-free storage bottle. Add the water rinses of each of these impingers and connecting glassware to the storage bottle. The contents of the scrubber impinger and connecting glassware rinses may be discarded. The sample bottle should be sealed, shaken to mix, and labeled. The fluid level should be marked so that if any sample is lost during transport, a correction proportional to the lost volume can be applied.

4.3 Sample Preparation for Analysis. Check the liquid level in each sample, and determine if any sample was lost during shipment. If a noticeable amount of leakage has occurred, the volume lost can be determined from the difference between the initial and final solution levels, and this value can be used to correct the analytical results. Quantitatively transfer the sample solution to a 100-ml volumetric flask, and dilute the solution to 100 ml with water.

4.4 Sample Analysis.

4.4.1 The IC conditions will depend upon analytical column type and whether suppressed or non-suppressed IC is used. An example chromatogram from a non-suppressed system using a 150-mm Hamilton PRP-X100 anion column, a 2 ml/min flow rate of a4 mM 4-hydroxy benzoate solution adjusted to a pH of 8.6 using 1 N NaOH, a 50 µl sample loop, and a conductivity detector set on 1.0 µS full scale is shown in Figure 26-2.

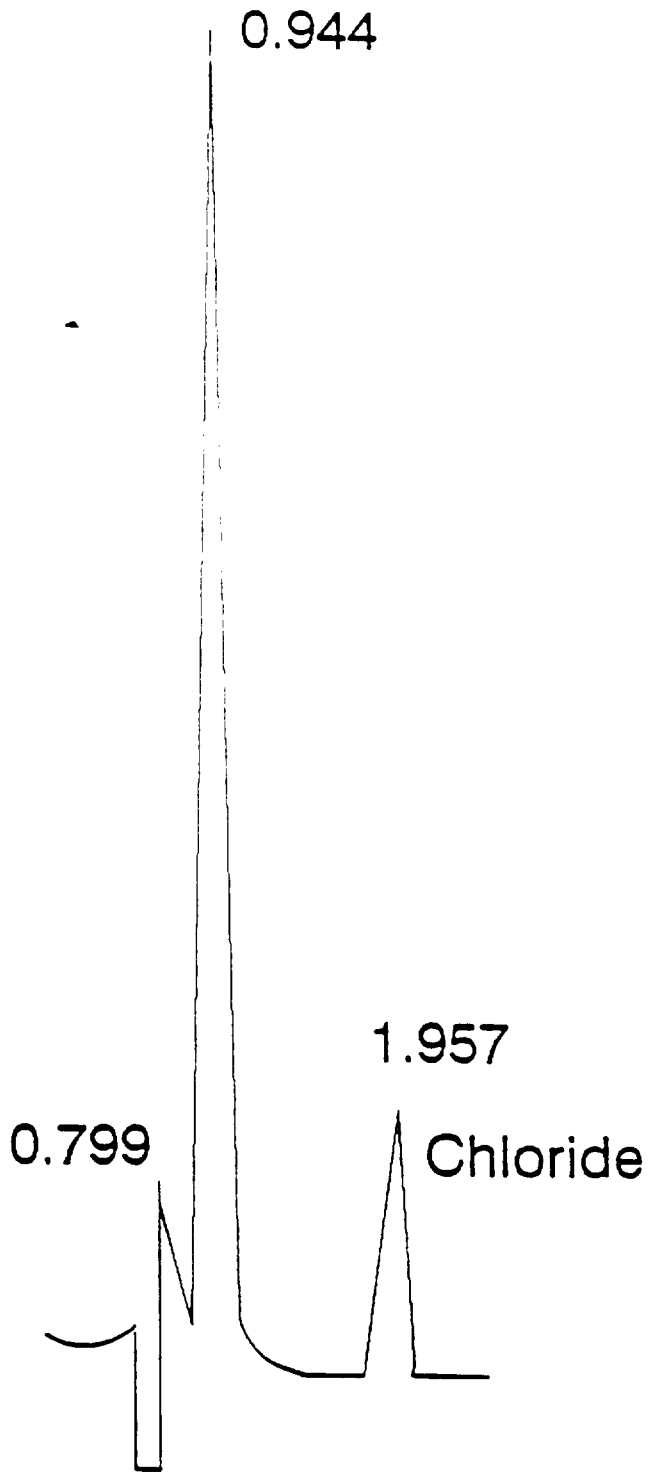

Figure 26-2. Example Chromatogram

4.4.2 Before sample analysis, establish a stable baseline. Next, inject a sample of water, and determine if any Cl^- appears in the chromatogram. If Cl^- is present, repeat the load/injection procedure until no Cl^- is present. At this point, the instrument is ready for use.

4.4.3 First, inject the calibration standards covering an appropriate concentration range, starting with the lowest concentration standard. Next, inject in duplicate, a QC sample followed by a water blank and the field samples. Finally, repeat the injection of calibration standards to allow compensation for any drift in the instrument during analysis of the field samples. Measure the Cl^- peak areas or heights of the samples. Use the average response from the duplicate injections to determine the field sample concentrations using a linear calibration curve generated from the standards.

4.5 Audit Analysis. There is currently no validated audit sample for this method. It is recommended to analyze a QC sample along with the field samples as described above.

5. Calibration

5.1 Dry Gas Metering System, Thermometers, Rate Meter, and Barometer. Same as in Method 6, Sections 5.1, 5.2, 5.3, and 5.4.

5.2 Calibration Curve for Ion Chromatograph. To prepare calibration standards, dilute given volumes (1.0 ml or greater) of the stock standard solution, with 0.1 N H_2SO_4 (Section 3.1.2) to convenient volumes. Prepare at least four standards that are within the linear range of the instrument and which cover the expected concentration range of the field samples. Analyze the standards as instructed in Section 4.4.3, beginning with the lowest concentration standard. Determine the peak areas or heights, and plot

individual values versus Cl^- concentration in $\mu g/ml$. Draw a smooth curve through the points. Use linear regression to calculate a formula describing the resulting linear curve.

6. Quality Assurance

6.1 Applicability. When the method is used to analyze samples to demonstrate compliance with a source emission regulation, a set of two audit samples must be analyzed.

6.2 Audit Procedure. The audit samples are chloride solutions. Concurrently analyze the two audit samples and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for compliance samples and the EPA audit samples. If this condition is met, auditing of subsequent compliance analyses for the same enforcement agency within 30 days is not required. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of different enforcement agencies, unless prior arrangements are made with both enforcement agencies.

6.3 Audit Sample Availability. The audit samples may be obtained by writing or calling the EPA regional Office or the appropriate enforcement agency. The request for the audit samples must be made at least 30 days prior to the scheduled compliance sample analyses.

6.4 Audit Results. Calculate the concentrations in mg/dscm using the specified sample volume in the audit instructions. **NOTE:** Indication of acceptable results may be obtained immediately by reporting the audit results in mg/dscm and compliance results in total μg HCl/sample to the responsible enforcement agency. Include the results of both audit samples, their

identification numbers, and the analyst's name with the results of the compliance determination samples in appropriate reports to the EPA regional office or the appropriate enforcement agency. Include this information with subsequent analyses for the same enforcement agency during the 30-day period.

The concentrations of the audit samples obtained by the analyst shall agree within 10 percent of the actual concentrations. If the 10 percemt specification is not met, reanalyze the compliance samples and audit samples, and include initial and reanalysis values in the test report. Failure to meet the 10 percemt specification may require retests until the audit problems are resolved. However, if the audit results do not affect the compliance or noncompliance status of the affected facility, the administrator may waive the reanalysis requirement, further audits, or retests and accept the results of the compliance test. While steps are being taken to resolve audit analysis problems, the Administrator may also choose to use the data to determine the compliance or noncompliance status of the affected facility.

7. Calculations

Retain at least one extra decimal figure beyond those contained in the available data in intermediate calculations, and round off only the final answer appropriately.

7.1 Sample Volume, Dry Basis, Corrected to Standard Conditions. Calculate the sample volume using Eq. 6-1 of Method 6.

7.2 Total μg HCl Per Sample.

$$m = (S-B)(100)(36.46)/(35.45) = (102.8)(S-B) \qquad \text{Eq. 26-2}$$

Where:

m = Mass of HCl in sample, μg.

S = Concentration of sample, μg Cl^-/ml.

B = Concentration of blank, μg Cl^-/ml.

100 = Volume of filtered and diluted sample, ml.

36.46 = Molecular weight of HCl, $\mu g/\mu g$-mole.

35.45 = Atomic weight of Cl, $\mu g/\mu g$-mole.

7.3 Concentration of HCl in the Flue Gas.

$$C = K\ m/V_{m(std)} \qquad \text{Eq. 26-3}$$

Where:

C = Concentration of HCl, dry basis, mg/dscm.

K = 10^{-3} mg/μg.

m = Mass of HCl in sample, μg.

$Vm_{(std)}$ = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm.

8. Bibliography

1. Steinsberger, S. C. and J. H. Margeson, "Laboratory and Field Evaluation of a Methodology for Determination of Hydrogen Chloride Emissions from Municipal and Hazardous Waste Incinerators," U.S. Environmental Protection Agency, Office of Research and Development, Report No. 600/3-89/064, April 1989. Available from the National Technical Information Service, Springfield, VA 22161 as PB89220586/AS.

2. State of California, Air Resources Board, Method 421, "Determination of Hydrochloric Acid Emissions from Stationary Sources," March 18, 1987.

3. Cheney, J.L. and C.R. Fortune. Improvements in the Methodology for Measuring Hydrochloric Acid in Combustion Source Emissions. J. Environ. Sci. Health. A19(3): 337-350. 1984.

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MICROBIAL SURVIVABILITY TEST FOR MEDICAL WASTE INCINERATOR EMISSIONS

1. Applicability and Principle

1.1 Applicability. This test method measures the survivability of a specific indicator organism through the normal medical waste incinerator operation cycle. Microbial spores are the most resistant type of organism to thermal inactivation and are therefore utilized as the surrogate organism to ensure that all microorganisms will be rendered non-viable. This procedure is designed to recover, identify, and quantify the indicator organism and is not intended to recover other microorganisms collected by the sampling train.

1.2 Principle. With the incinerator operating under recommended conditions, it is charged with wastes spiked with known amounts of *Bacillus stearothermophilus* spores. Emission samples are collected isokinetically in a buffered solution in impingers. The recovered samples are aliquoted. One sample of each aliquot will not be heat-treated. The samples are cultured. Colonies of *B. stearothermophilus* are identified and quantified.

2. Apparatus

Note: Mention of trade names or specific product in this method does not constitute endorsement by the Environmental Protection Agency.

2.1 Sterilization. Autoclave capable of steam sterilization at conditions of 121°C for 15 minutes at 15 psi. Specific apparatus and reagents that contact the recovered sample shall be sterilized under these conditions by autoclaving or other equivalent method.

2.2 Sampling. The sampling train is shown in Figure 1 and is composed of the following component parts.

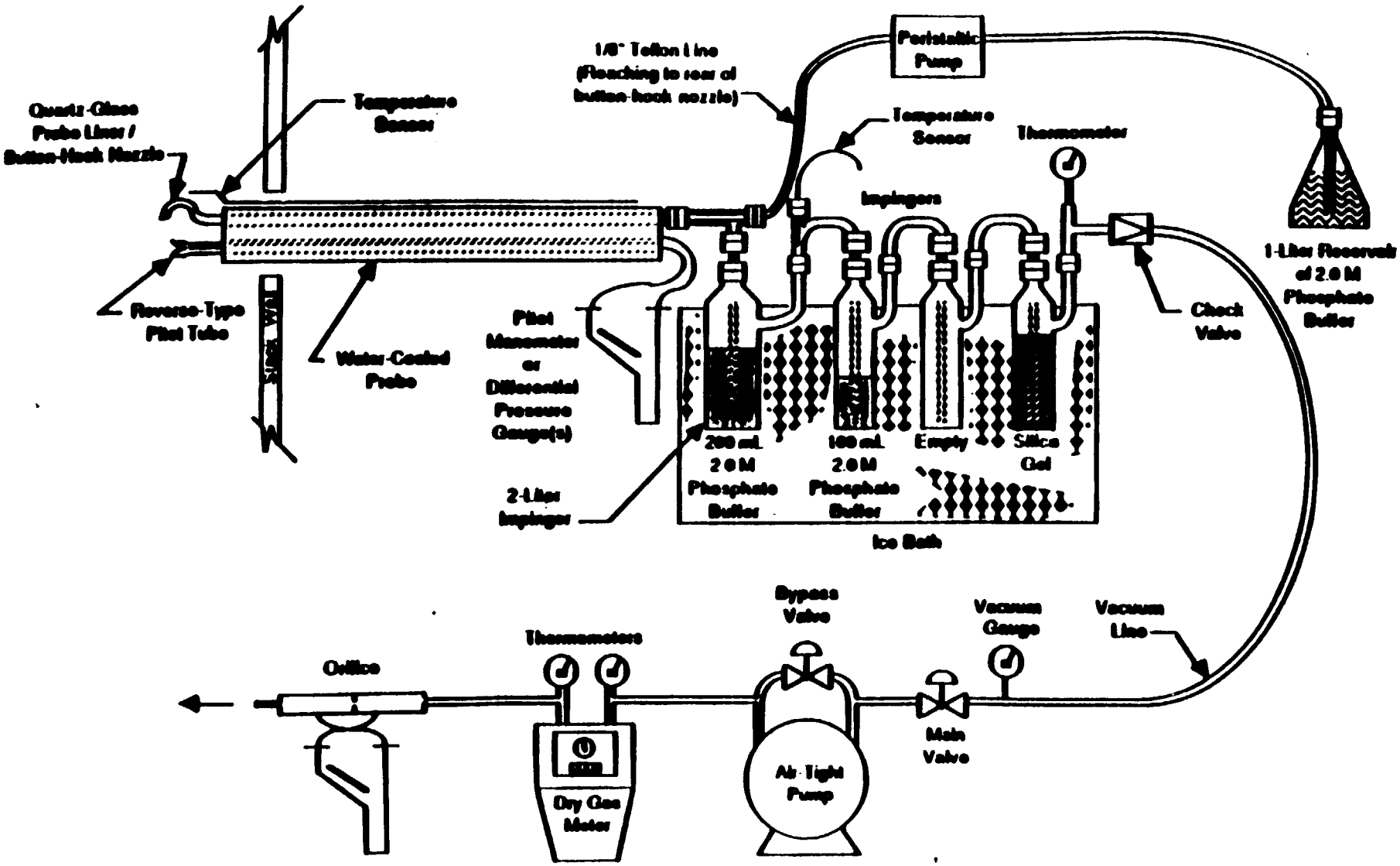


Figure 1. Sampling Train for Microbial Emissions

2.2.1 Probe Nozzle/Liner. One piece, quartz glass with button-hook design nozzle having a sharp, tapered leading edge. The angle of taper shall be ≤30° and the taper shall be on the outside to preserve a constant internal diameter. The nozzle shall be sized based on the range of velocity heads in the duct (EPA Method 2) so that nozzle size need not be changed to maintain isokinetic sampling rates (see Section 4.1.3.1). The nozzle shall be calibrated according to the procedures outlined in Section 5. Select a suitable liner length (and water-cooled probe) such that all traverse points can be sampled.

2.2.2 Water-cooled Probe. Metal sheath incorporating a circulating water system capable of delivering at least 5.7 liters/min (1.5 gal/min) of tap or ice water to cool the length of the quartz probe liner. It should also have provisions for supporting the S-type pitot tube and thermocouple probe.

2.2.3 Pitot Tube. Same as in Method 5, Section 2.1.3, except refer to Figure 1 in this method.

2.2.4 Differential Pressure Gauges. Same as in Method 5, Section 2.1.4.

2.2.5 Impingers. Four impingers of the Greenburg-Smith design connected in series with leak-free ground glass fittings or any similar leak-free non-contaminating fittings. The first impinger shall have sufficient capacity to contain the total volume of buffer originally charged to this impinger, the moisture catch, and the buffer introduced into the probe. The stem tips of the first, third, and fourth impingers shall be modified by replacing the standard tips with 1.3-cm (0.5-in.) ID glass tubing extended to about 1.3 cm from the bottom of the flask. A temperature sensor shall be inserted into the first impinger and a thermometer or temperature sensor shall be placed at the outlet of the fourth impinger for monitoring the gas stream temperatures at

these locations; both shall be capable of measuring temperature to within 1°C (2°F). Alternatively, functionally equivalent systems are acceptable.

2.2.6 Probe Gas Buffering System. Sterile tubing, pumping system, and sterile buffer reservoir to introduce sterile 2.0 M phosphate buffer, pH ~7, into the quartz-glass probe liner in a spray pattern adjacent to the rear of the button-hook nozzle during sampling. Teflon tubing 32-mm (1/8-in.) OD crimped at the end and punched with needle-sized holes has been shown to be suitable. The pumping system should be capable of delivering buffer to the probe at a rate of approximately 15 to 20 ml/min. An acceptable configuration is illustrated in Figure 1.

2.2.7 Metering System. Same as in Method 5, Section 2.1.8.

2.2.8 Barometer. Same as in Method 5, Section 2.1.9.

2.2.9 Gas Density Determination Equipment. Same as in Section 2.1.10 of Method 5.

2.3 Sample Recovery.

2.3.1 Probe Brush. Nylon bristle brush with stainless steel, plastic, or Teflon handle. The probe brush shall have extensions (at least as long as the probe) of similar material. The brush shall be properly sized and shaped to brush out the probe liner and nozzle with the probe gas buffering system installed.

2.3.2 Wash Bottles (sterile). Two glass, polyethylene, or Teflon wash bottles are recommended.

2.3.3 Sample Storage Containers (sterile). Glass containers with leak-free caps, 2-liter.

2.4 Analysis.

2.4.1 Incubator. Air convection type, capable of aerobic incubation at 55 to 65°C.

2.4.2 Incubation Tubes (sterile). Heat-proof tubes or bottles.

2.4.3 Water Bath. Capable of maintaining a temperature of 80°C.

2.4.4 Petri Dishes (sterile).

2.4.5 Filter Units (sterile). Nalgene[R] 0.2-μm cellulose nitrate membrane analytical filter units or equivalent.

3. Reagents

3.1 Sampling.

3.1.1 Water. All water used shall be sterile deionized water.

3.1.2 Collection and Probe Gas Buffering Reagent (sterile). Buffered phosphate solution (2.0 M), approximate Ph 7. Prepare by dissolving 174.2 g dibasic potassium phosphate (K_2HPO_4) and 136.1 g monobasic potassium phosphate (KH_2PO_4) in water and diluting to 1 liter. Approximately 2 liters are required for each test run.

3.1.3 Crushed Ice.

3.1.4 Silica Gel. Same as in Method 5, Section 3.1.2.

3.1.5 Stopcock Grease. Heat-stable silicone grease. This is not necessary if screw-on connectors with Teflon sleeves or similar, inert, fittings are used.

3.1.6 Indicator Microorganisms. Bacillus stearothermophilus spores. The theoretical spore charge to the incinerator when mixed with wastes should be at least 10^{12} spores total per sampling run. With advance notice, liquid cultures at this level can be produced by the Fermentation Facility, Department of Biochemistry, University of Alabama at Birmingham, UAB Station, Birmingham, Alabama, 35294 (Telephone No. 205-934-5561). For spiking purposes, cultures will be inoculated into or onto materials normally found in the medical waste stream.

3.2 Analysis. The analytical reagents recommended have been demonstrated to be suitable for culturing and enumerating the indicator spores. Other reagents may also be used if demonstrated to be suitable.

3.2.1 Water. All water used shall be sterile deionized water.

3.2.2 Trypticase Soy Agar Growth Medium. Prepare by mixing 15.0 g pancreatic digest of casein, 5.0 g papaic digest of soy meal, 5.0 g NaCl, and 15.0 g agar with 1 liter of water. Boil to dissolve the agar. Sterilize at 121°C for 15 minutes. This recipe will prepare 100 petri dishes.

3.2.3 1 N Sodium Hydroxide (NaOH). Add 40 g of NaOH to a 1-liter volumetric flask containing water and dilute to volume with water while mixing.

3.2.4 Balance. To measure within 0.5 g.

4. Procedure

4.1 Sampling.

4.1.1 Pretest Preparation. It is suggested that sampling equipment be calibrated and maintained according to the procedures described in Section 3.4 of EPA's Quality Assurance Handbook, Volume III (Citation 4). Clean and hydrogen peroxode/alcohol-disinfect the nozzle/probe liner, first three impingers, all connections, and the nozzle/probe liner brush as follows: Soak in 1.0 N HNO_3 for at least one hour, wash with a laboratory detergent, rinse three times with tap water and three times with deionized water, and finally, rinse with 90 percent ethanol. During storage between cleaning and assembly, plug all component inlets and outlets with similarly-prepared cork or rubber stoppers, or cover with Parafilm^R. Store the probe brush in a clean plastic bag.

4.1.2 Preparation of Collection Train. Assemble the train as in Figure 1, using applicable sections of Citation 4 as a guide. Aseptically add

200 ml and 100 ml of collecting reagent to the first and second impingers, respectively. Transfer approximately 200 to 300 g of silica gel to the fourth impinger. If the stack gas moisture is to be determined using this train, weigh all four impingers to the nearest 0.5 g. Mark the probe with heat-resistant tape or by other means to denote the proper distance into the stack or duct for each sampling point. Place crushed ice around the impingers.

4.1.3 Preliminary Determinations. Same as in Method 5, Section 4.1.2, with the addition that the total sampling time shall be such that the pH of the first impinger will remain above five.

4.1.4 Leakcheck Procedures.

4.1.4.1 Pretest Leakcheck. This pretest leakcheck is recommended, but not required. Plug the inlet to the first impinger using a sterile plug, and pull a 380-mm Hg (15-in. Hg) vacuum. (A lower vacuum may be used, provided that it is not exceeded during the test.) Then connect the probe to the train and leak check at about 25-mm Hg (1-in. Hg) vacuum. Alternatively, the probe may be leak checked with the rest of the sampling train, in one step, at 380mm Hg (15-in. Hg) vacuum. Leakage rates in excess of 4 percent of the average sampling rate or 0.00057 m^3/min (0.02 cfm), whichever is less, are unacceptable. The leakcheck procedures described in Citation 4 may also be helpful.

4.1.4.2 Leakchecks During Sample Run. If during the sampling run, a component (e.g., impinger) change becomes necessary, a leakcheck as described shall be conducted immediately before the change is made. Leakchecks after component changes are optional.

4.1.4.3 Post-test Leakcheck. A leakcheck is mandatory at the conclusion of each sampling run. The leakcheck shall be done in accordance with the procedures outlined in Section 4.1.4.1, except that it shall be conducted at a

vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is acceptable, no correction need be applied to the total volume of dry gas metered. If, however, an unacceptable leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume as shown in Section 6.3 of Method 5, or void the sampling run.

4.1.5 Sampling Train Operation.

4.1.5.1 During the sampling run, maintain an isokinetic sampling rate (within 10 percent of true isokinetic unless otherwise specified by the Administrator). Nomographs and programmable calculators are available, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations. For each run, record the data on a data sheet such as the one shown in Figure 5-2 of Method 5. If this train is to be used to determine the moisture content of the sample gas, determine and record the starting volume of the buffer in the probe gas buffering system reservoir. If used, level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse. Clean the ports prior to the test run to minimize the chance of sampling deposited material. When the stack is under significant negative pressure, take care to close the coarse adjust valve before inserting the probe into the stack to prevent collection solution from backing into the probe. If necessary, the pump may be turned on with the coarse adjust valve closed.

4.1.5.2 Ensure that the temperatures of the primary (and secondary, if applicable) combustion chamber, as well as the stack have reached the requirements specified in the applicable regulations. Begin sampling just before the spiked wastes are added to the incinerator.

4.1.5.3 Before inserting the probe into the duct and beginning sampling, remove the nozzle cap, verify that the pitot tube and probe are properly positioned (the probe at a slight angle to allow buffer and condensed moisture to drain into the first impinger), and start the circulating water and probe gas buffering systems. Insert the probe into the duct and position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Block off the openings around the probe and port to prevent unrepresentative dilution of the gas stream. Begin sampling by immediately starting the pump and adjusting the flow to isokinetic conditions. Traverse the duct cross-section, as required by Method 1, being careful not to contact the duct walls with the probe nozzle when sampling near the walls or when removing or inserting the probe through the port; this minimizes the chance of extracting deposited material. During the test run, add more ice around the impingers and, if necessary, salt to maintain temperatures of less than 50°C (120°F) in the first impinger and 20°C (68°F) at the silica gel impinger outlet. Also, if a manometer is used, periodically check its level and zero.

4.1.5.4 At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, and turn off the pump and probe gas buffering system. If this train is to be used to determine the moisture content of the sample gas, determine and record the final volume of the buffer in the probe gas buffering system reservoir. Record the final dry gas meter reading and conduct a post-test leakcheck as outlined in Section 4.1.4.3. Also, leak check the pitot lines as described in Method 2, Section 3.1; the lines must pass this leakcheck in order to validate the velocity head data.

4.1.6 Calculation of Percent Isokinetic. Same as in Section 4.1.6 of Method 5.

4.2 Sample Recovery. Sample recovery procedures are summarized in Figure 2. Allow the probe to cool, ensuring that no foreign contamination enters the nozzle during the process. When the probe has cooled, turn off the water circulating system and wipe off any external matter near the tip of the probe nozzle. Disconnect the probe from the impinger assembly leaving the buffer delivery system inside the probe liner. Using a wash bottle containing sterile buffer solution and the probe brush, wash the interior of the probe liner, and collect the washings in the sample bottle. Remove the umbilical cord from the last impinger. If using this train to determine the moisture content of the sample gas, weigh each of the four impingers to the nearest 0.5 g. Aseptically transfer the contents of the first three impingers to the sample recovery bottle with sterile buffer rinsings. Check the pH of the sample solution using pH paper, and if necessary, adjust to pH 6.0 to 7.5 with 1 N NaOH. Mark the level of liquid in the sample recovery bottle to check for leakage later. For shipment to the laboratory, pack the bottle in ice and maintain at or below 4°C. Ensure that the sample bottle is sufficiently sealed to prevent contamination from melted ice.

4.3 Sample Preparation and Analysis. The procedures for sample preparation and analysis are summarized in Figure 3.

4.3.1 Sample Solution Aliquots. Note the level of liquid in the sample container and confirm on the analysis sheet whether leakage occurred during transport. Mix the sample solution well and divide into the following aliquots using sterile pipets and/or glassware: three 10-ml aliquots, three 100-ml aliquots, and three equal volume aliquots of the remaining solution. Using sterile water, rinse pipets or other glassware used to transfer the sample solutions into the containers.

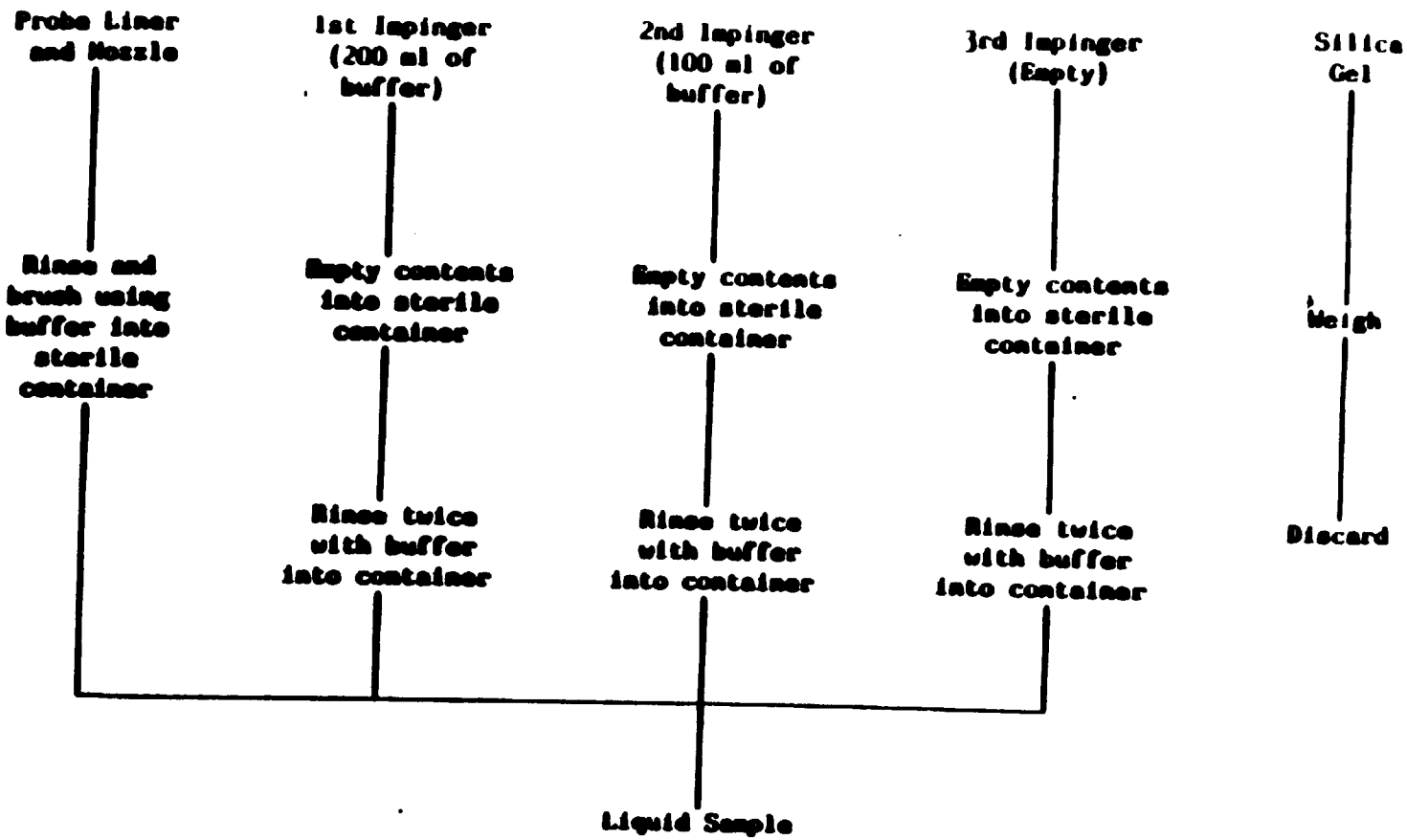
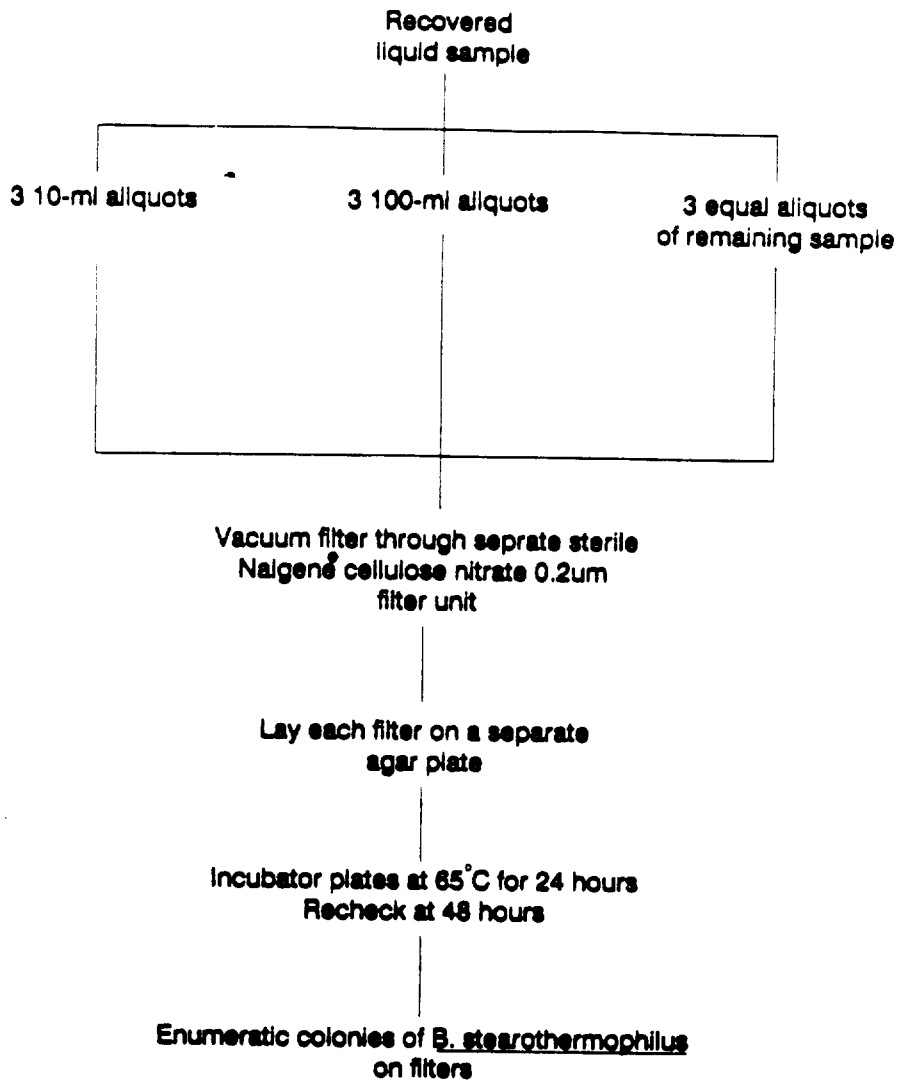


Figure 2. Sample Recovery Scheme for Microbial Testing


Recovered
liquid sample
3 10-ml aliquots
3 100-ml aliquots
3 equal aliquots
of remaining sample
Vacuum filter through seprate sterile
Nalgene cellulose nitrate 0.2um
filter unit
Lay each filter on a separate
agar plate
Incubator plates at 65°C for 24 hours
Recheck at 48 hours
Enumeratic colonies of B. stearothermophilus
on filters

4.3.2 Culture Incubation. Pour molten trypticase soy agar into petri dishes. Allow the agar to harden. Using separate filter units, filter each sample aliquot. Rinse each incubation tube with sterile water and pass this rinse through the filter as well. Using sterile tweezers, remove the filters from each unit and place face up on separate agar plates. Aerobically incubate the plates in an air convection incubator at 65°C for 18 to 24 hours.

4.3.4 Quantification. Remove plates from incubator, identify and enumerate the bacterial colonies.

4.3.5 Identification of Indicator Microorganisms. Confirm that the colonies are B. stearothermophilus by testing representative colonies from the plates. A variety of tests, including gram staining and biochemical tests will be used as necessary to correctly identify the colonies.

4.4 Quality Control Procedures.

4.4.1 Meter Orifice Check. The procedures in Sections 4.4.1 and 4.4.2 of Method 5 are recommended, but are optional.

4.4.2 Indicator Microorganisms. Aliquots of the spore suspension used to spike the waste shall be filtered, cultured, and quantified simultaneously with the samples to establish the actual spike quantity.

5. Calibrations

Maintain a laboratory log of all calibrations. Calibrate the probe nozzle, pitot tube, metering system, and barometer as described in Method 5, Sections 5.1, 5.2, 5.3, and 5.7.

6. Calculations

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used as long as they give equivalent results.

6.1 Nomenclature.

A = Cross-sectional area of stack, m^2 (ft^2).

A_n = Cross-sectional area of nozzle, m^2 (ft^2).

B_{ws} = Water vapor in the gas stream, proportion by volume.

C = Concentration of B. stearothermophilus in stack gas, dry basis, corrected to standard conditions, viable spores/dsm^3 (viable spores/dscf).

DE = Destruction efficiency, percent.

I = Percent of isokinetic sampling.

M_w = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

N = Number of viable indicator microorganisms in sample.

P_{bar} = Barometric pressure at the sampling site, mm Hg (in. Hg).

P_s = Absolute stack gas pressure, mm Hg (in. Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

Q_{sd} = Dry volumetric flue gas flow rate at standard conditions, dscm/min (dscf/min).

R = Ideal gas constant, 0.06236 (mm Hg)(m^3)/(°K)(g-mole) [21.85 (in. Hg)(ft^3)/(°R)(lb-mole)].

S_a = Average number of spore colonies counted for three replicate aliquots.

S_e = Number of viable spiked spores exiting stack.

S_s = Number of viable spores spiked in the waste feed.

T_m = Absolute average dry gas meter temperature (see Figure 5-2 of Method 5), °K (°R).

T_s = Absolute average stack gas temperature (see Figure 5-2 of Method 5), °K (°R).

T_{std} = Standard absolute temperature, 293°K (528°R).

V_a = Volume of sample aliquot filtered.

V_g = Volume of gas exiting stack during test period, dsm^3 (dscf).

V_{lc} = Total volume of liquid collected in impingers and silica gel (difference between total weight of impingers before and after sampling divided by 1 g/ml), ml.

V_{lf} = Final volume of liquid sample, ml.

V_m = Volume of gas sample as measured by dry gas meter, dm^3 (dcf).

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dsm^3 (dscf).

V_{pb} = Volume of buffer introduced into the probe, ml.

$V_{w(std)}$ = Volume of water vapor in the gas sample, corrected to standard conditions, sm^3 (scf).

v_s = Stack gas velocity, calculated by Equation 2-9 of Method 2, using data obtained from this method, m/sec (ft/sec).

Y = Dry gas meter calibration factor.

ΔH = Average pressure differential across the orifice meter (see Figure 5-2 of Method 5), mm H_2O (in. H_2O).

ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).

θ = Total sampling time, min.

13.6 = Specific gravity of mercury.

60 = Sec/min.

100 = Conversion to percent.

460 = Correction to absolute temperature.

6.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop. See data sheet (Figure 5-2 of Method 5).

6.3 Dry Gas Volume. Correct the sample volume measured by the dry gas meter to standard conditions (20°C, 760 mm Hg or 68°F, 29.92 in. Hg) by using Equation 1.

$$V_{m(std)} = V_m Y (T_{std}/T_m) [(P_{bar} + (\Delta H/13.6)]/P_{std}$$
$$= K_1 V_m Y [P_{bar} + (\Delta H/13.6)]/T_m \qquad \text{Eq. 1}$$

where:

K_1 = 0.3858 °K/mm Hg for metric units,

= 17.64 °R/in. Hg for English units.

NOTE: Equation 1 can be used as written unless leakage is observed during any of the mandatory leakchecks.

6.4 Volume of Water Vapor.

$$V_{w(std)} = V_{lc}(\rho_w/M_w)(RT_{std}/P_{std}) = K_2 V_{lc} \qquad \text{Eq. 2}$$

where:

K_2 = 0.001333 m^3/ml for metric units,

= 0.04707 ft^3/ml for English units.

Note: V_{lc} is equal to the final weight of the impingers minus the initial weight of the charged impingers and the buffer introduced into the probe (V_{pb}).

6.5 Moisture Content. Same as in Method 5, Section 6.5.

6.6 Number of Indicator Microorganisms Collected. If possible, use the set of replicate sample values that yields between 20 and 200 counts per plate for conducting these calculations.

$$N = S_a V_{lf}/V_a \qquad \text{Eq. 3}$$

6.7 Concentration of Indicator Organisms Collected.

$$C = N/V_{m(std)} \qquad \text{Eq. 4}$$

6.8 Flue Gas Flow Rate at Standard Conditions.

$$Q_{sd} = 60\ (1-B_{ws})\ v_s\ A\ (T_{std}/T_s)\ (P_s/P_{std})$$ Eq. 5

6.9 Volume of Gas Exiting Stack During Test Period.

$$V_g = Q_{sd}\theta$$ Eq. 6

6.10 Number of Viable Spores Exiting Stack During Test Period.

$$S_e = C\ V_g$$ Eq. 7

6.11 Destruction Efficiency of Incinerator for Indicator Spores.

$$DE = [1 - (S_e/S_s)]\ 100$$ Eq. 8

6.12 Isokinetic Variation. Same as in Method 5, Section 6.11.

6.12.3 Acceptable Results. Same as in Method 5, Section 6.12.

7. Bibliography

1. Same as in Bibliography of Method 5.

2. American Society for Microbiology. Manual of Methods for General Bacteriology. Washington, D.C., 1981. 524 p.

3. Buchannan, R.E. and N.E. Gibbons. Bergey's Manual of Determinative Bacteriology. Baltimore, MD. The Williams and Wilkins Company. 1974. 1268 p.

4. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. U.S. Environmental Protection Agency, Office of Research and Development. Research Triangle Park, NC, 27711. EPA-600/4-77-027b. August 1977.

MICROBIAL SURVIVABILITY TEST FOR MEDICAL WASTE INCINERATOR ASH

1. Applicability and Principle

1.1 Applicability. Two test methods will be performed to determine the survivability of microorganisms in the ash during the normal operation of the medical waste incinerator. The quantification of surviving indicator organisms is utilized as an indication of the effectiveness of incineration as a medical waste treatment technology. This test procedure is intended to recover, identify and quantify the indicator organisms used to determine the efficiency of the incinerator. *Bacillus stearothermophilus*, a spore forming bacterium, is used because this type of organism is typically the most resistant to thermal inactivation, thereby ensuring that more fragile organisms will be destroyed. The following procedures were developed to recover only the indicator organism.

1.2. Principle. With the incinerator operating under recommended conditions, the waste stream is charged with known quantities of *Bacillus stearothermophilus* spores in items normally found in the medical waste stream and in the insulated pipes. The samples are added to the incinerator with typical medical wastes and are recovered at the end of the burn cycle when ashes are batch-removed. The destruction efficiency of the incinerator is determined by establishing the survivability of the indicator microorganism.

2. Apparatus

Note: Mention of trade names or specific product in this method does not constitute endorsement by the U.S. Environmental Protection Agency.

2.1 Sterilization. Autoclave capable of steam sterilization conditions of 121°C for 15 minutes at 15 psi. Specific apparatus and reagents that

contact the recovered sample shall be sterilized under these conditions by autoclaving or other equivalent method.

2.2 Sampling. The direct ash samples are collected from the ash after cooling. A thief sampler is used for collection. The sample is collected into sterile containers and stored at 4°C prior to transportation to the laboratory. The pipe sample is shown in Figure 1 and is composed of the following components:

2.2.1 Outer Container. Steel pipe having a two-inch diameter and 6 in. long with end caps to contain the sample. (Note: Since components are commonly available in English units, only English units are specified). The ends of the pipe shall be threaded to attach the metal caps. Etch or stamp each tube for identification.

2.2.2 Inner Container. 2-in. length of 3/8-stainless-steel tubing with stainless-steel Swagelok caps. Other leak-free stainless-steel fittings may be used as alternatives.

2.2.3 Insulation. Vermiculite, or other thermal insulating material. The insulation shall be such that the inner container is maintained in the center portion of the outer container to protect it from thermal shock.

2.3 Sample Recovery.

2.3.1 Gloves. Of sufficient quality to protect the tester from microorganisms that may be present in the ash.

2.3.2 Sample Retrieval Instruments. Shovel, tongs, thiefs or other instruments for removing an incinerator ash sample and the pipe sample from the ash dump.

2.3.3 Sample Storage Containers. Pipe Samples are placed inside plastic bags. Direct ash samples are placed in sterile containers then in plastic bags. All samples are stored at 4°C until transport to the laboratory.

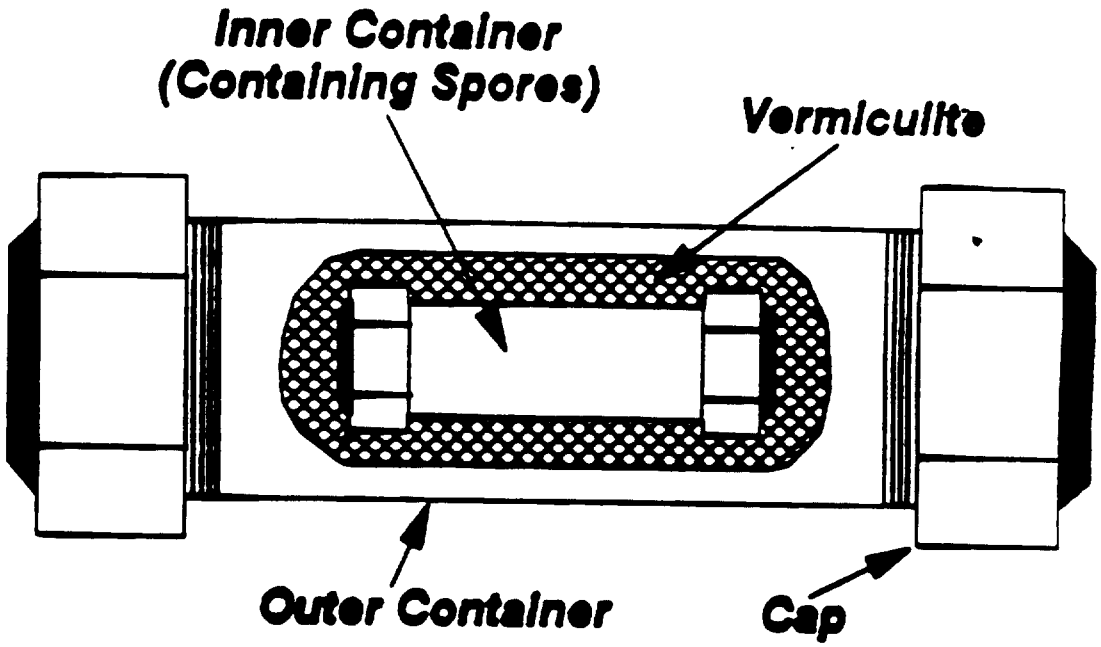


Figure 1. Pipe Sample Assembly

2.4 Analysis.

2.4.1 Incubator. Air convection type, capable of aerobic incubation at 55 to 65°C.

2.4.2 Incubation Tubes (Sterile). Heat-proof tubes or bottles.

2.4.3 Water Bath. Capable of maintaining a temperature of 80°C.

2.4.4 Petri Dishes (Sterile).

2.4.5 Filter Units (Sterile). Nalgene[R] 0.2-µm cellulose nitrate membrane analytical filter units or equivalent.

3. Reagents

3.1 Sampling and Sample Recovery.

3.1.1 Crushed Ice. For sample storage in the field.

3.1.2 Indicator Microorganisms. *Bacillus stearothermophilus* spores. Each pipe should contain approximately 1×10^6 dry spores and approximately 1×10^{12} spores per day are being added to the actual waste stream. Dry spores of this quantity may be obtained from ATCC, 12301 Parklawn Drive, Rockville, MD 20857. (Telephone No. 800-638-6597).

B.stearothermophilus is also added to the waste stream at approximately 1×10^{12} spores per day. Direct ash samples will be taken each day to determine actual spore survivability or the incinerator destruction efficiency.

3.2 Analysis. The analytical reagents will vary according to the culture and identification procedure used. The reagents described are required for the example tests listed in this method. Other reagents suitable for appropriate alternative tests are acceptable.

3.2.1 Water. All water used shall be sterile deionized.

3.2.2 Spore Reagent (Sterile). Buffered phosphate solution (2.0 M) prepared by dissolving 174.2 g dibasic potassium phosphate (K_2HPO_4) and

136.1 g monobasic potassium phosphate (KH_2PO_4) in water and diluting to 1 liter.

3.2.3 Trypticase Soy Agar Growth Medium. Prepare by mixing 15.0 g pancreatic digest of casein, 5.0 g papaic digest of soy meal, 5.0 g NaCl, and 15.0 g agar with 1 liter of water. Boil to dissolve the agar. Sterilize at 121°C for 15 minutes. This recipe will prepare 10 petri dishes.

4. Procedure

4.1 Sampling.

4.1.1 Sample Preparation.

4.1.1.1 Clean the inner pipe and caps before use. Remove the cap from the spore vial and breakup the spore cake using a clean instrument. Secure one end cap to the inner container. Carefully transfer the crushed cake of 1×10^6 spores into the inner sample container, and seal the other end cap. All sampling instruments (i.e. sampling thief) used to take the actual sample are sterilized. Sterile sample containers for the ash samples are obtained.

4.1.1.2 Secure one end cap to the outer container, and add enough vermiculite to allow the inner container to be positioned in the approximate middle and center of the outer tube. Add additional vermiculite, gently tapping the outer container to effect settling, until full. Secure the other end cap. The spore inoculation techniques are discussed in Appendix A.3 will be used for inoculation of waste items for direct ash sampling. A total of 1×10^{12} spores are added to the waste stream per sampling day.

4.1.2 Incinerator Spike. The incinerator spike will vary according to loading practice. For semi-continuous loading operations, add a set of three samples to the incinerator at the beginning, middle, and end of a normal day's loading period (9 total samples per daily burn). Disperse each sample per set in different sections of the wastes to be charged. For single-charge batch

operations, place all 9 samples on the incinerator bed before any wastes are charged. Divide the bed into a grid of 9 equal areas. Place a sample in the approximate center of each grid. Load the wastes charge in a manner that will not disturb the sample arrangement.

4.2 Sample Recovery. The sample recovery will vary according to incinerator ash-removal practice. Recover the samples during ash removal following the cool-down period for batch removal operations or as they emerge in the ash bin for continuous cleanout operations. NOTE: For units having water-quenched ash bins, care should taken to remove the samples quickly from the bin to prevent contamination. Remove excess debris from the recovered samples, place in a plastic bag, and pack in ice to maintain at or below 4°C. Ensure that the samples are protected from contamination from melted ice.

4.3 Analysis.

4.3.1 Sample Preparation of Analysis. The samples should be deliveverd to the laboartory within 96 hours. A pH is performed on the direct ash samples at the time of recovery. Upon delivery to the laboratory the pipe sample is opened, the outer container and vermiculite are discarded after the inner container is recovered. The inner container should be cleaned sufficiently to prevent cross-contamination when opening the sample. The contents of the inner pipe container is then transferred aseptically into sterile test tubes. The inside of the container is rinsed with sterile water and this is placed in the test tube.

Ash samples must be thoroughly mixed to ensure homogeneity. Approximately one gram of ash is then added to 3-100 ml aliquots of sterile water. A six log serial dilution of each aliquot will then be prepared.

4.3.2 Culture Development. Pour molten trypticase soy agar into 10 petri dishes and allow the agar to harden. Using a separate cellulose nitrate

filter, for each serial dilution, filter each concentration from each ash suspension. Using sterile tweezers, remove the filters from each unit and place face up on separate agar plates. Aerobically incubate the plates in an air convection incubator at 65°C for 18 to 24 hours.

4.3.4 Identification of Indicator Microorganisms. A variety of tests may be used to identify B. stearothermophilus. As a minimum, techniques to establish that the microorganisms found are gram-positive, rod-shaped, spore-producers should be used. This may be performed using stain/morphological/biochemical tests or by strip/card testing units for determining biochemical profile.

4.4 Quality Control Procedures.

4.4.1 Indicator Organisms. Spores from a vial not subjected to the incinerator test shall be dissolved in spore reagent, appropriately aliquoted to yield a final plate count of between 20 and 200 colonies, developed, and enumerated simultaneously with the samples as a control to aid in establishing colony identity.

5. Calculation

5.1 Microbial Survivability of Indicator Spores.

$$MS = [1 - (S_r/S_s)]\ 100 \qquad \text{Eq. 1}$$

where:

MS = Microbial Survivability, percent (to 6 sig. figures).

S_r = Number of spore colonies counted in the analysis.

S_s = Number of spores in original spike vial.

100 = Conversion to percent.

6. Bibliography

1. American Society for Microbiology. Manual of Methods for General Bacteriology. Washington, D.C. 1981. 524 p.

2. Buchannan, R.E. and N.E. Gibbons. Bergey's Manual of Determinative Bacteriology. Baltimore, MD. The Williams and Wilkins Company. 1974. 1268 p.

EPA MEDICAL WASTE INCINERATION TESTS
PROPOSED ASH SAMPLING PROTOCOL
Revision 2 - 8/7/90

I. PRE-SAMPLING PREPARATION

A. Sifter (see Figure 1)

1. Scrub the sifter with soapy water and clean with a disinfectant such as Virex 128. Allow the sifter to air dry in a clean, dry area.

2. Disinfect with a 3 percent hydrogen peroxide solution, allow to air-dry in a clean, dry area.

3. Cover the can with clean plastic and seal the lid until use.

B. Other

1. Where possible, use disposable items that have been disinfected for sampling. Examples of disposable items are disposable gloves, garments, etc. Use new bottles to store samples.

II. ASH SAMPLING PROCEDURE

A. Open the incinerator door.

B. Remove shovel from the storage container and allow to air dry in a clean, dry area.

C. Remove ash from the chamber with a shovel and deposit it into the top of the sifter.

D. Gently sift the ash until fines fall into the bottom of the sifter.

E. Remove the sifter basket and deposit course material into a tared trash can.

F. Repeat Steps C through E until the desired amount of ash is removed. The amount of the ash that is removed will be determined by the hospital's normal ash removal procedures.

G. When the ash has been extracted, weigh and record the amount of course material removed.

H. Place the lid tightly on the sifter.

I. Roll the sifter for a minimum of one minute to uniformly mix ash fines.

J. Remove the lid after the ash has settled.

K. Remove sampling thief (grain sampler, three feet long with ½ inch slots) from storage container and allow to air dry in a clean, dry place.

L. Take samples using sampler. Collect four samples into 950 ml bottles by repeatedly inserting sampler into random locations in the ash bed within the sifter drum. Seal the bottles, wipe each

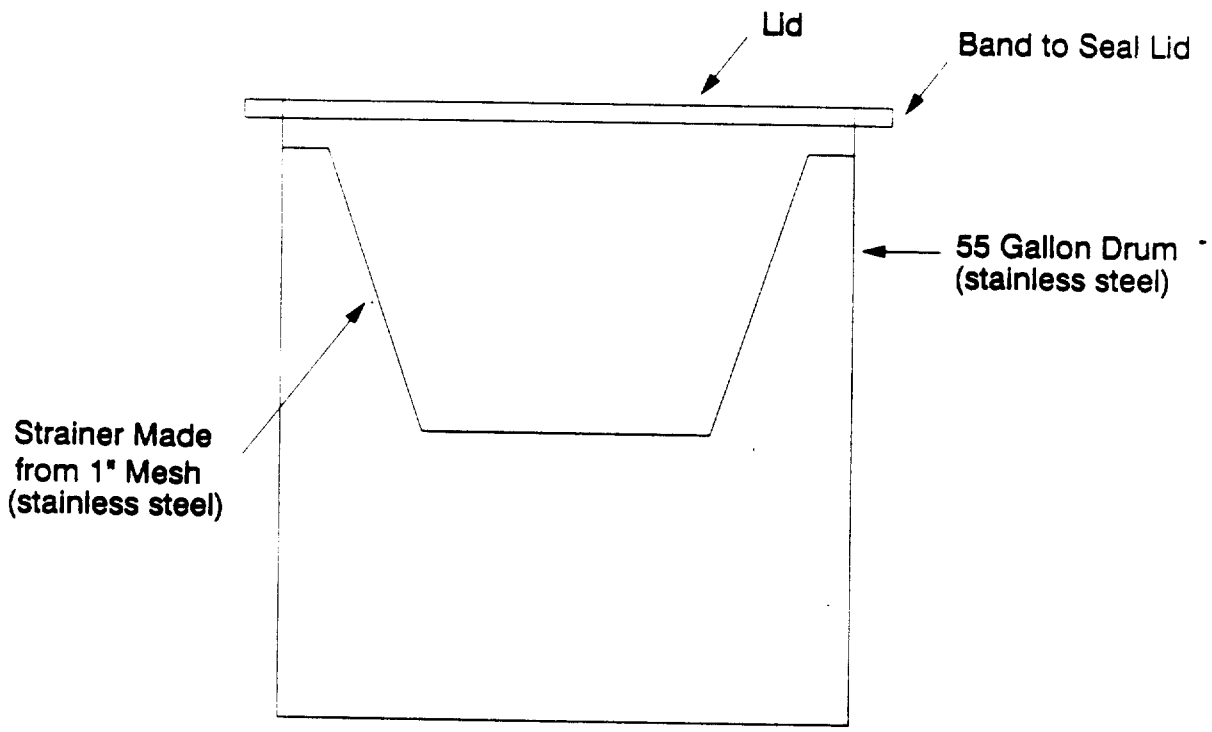


Figure 1. Incinerator Ash Sampling Sifter

with disinfectant and label the bottles immediately. Store labeled bottles in a refrigerator (microbial samples only).

M. The four samples will be sent for analysis as follows:

1. 950 ml for dioxin analysis.

2. 950 ml for metals/carbon/loss on ignition (LOI) analysis.

3. 950 ml for spore enumeration analysis.

4. 950 ml for archive purposes.

III. POST SAMPLING PREPARATION

A. Clean and prepare the utensils for next use. Store them in containers filled with 3 percent hydrogen peroxide solution.

B. Clean and disinfect the sifter for the next use.

Determination Of Condensible Emissions From Stationary Sources

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability. This method applies to the determination of condensible particulate matter (CPM) emissions from stationary sources. It is intended to represent condensible matter as material that condenses after passing through an in-stack filter (**Note:** The filter catch can be analyzed according to Method 17 procedures). This method may be used in conjunction with Method 201 or 201A if the probes are glass lined. This method may also be modified to measure material that condenses at other temperatures by specifying the filter temperature.

1.2 Principle. The CPM is collected in the impinger portion of a Method 17 (Appendix A, 40 CFR Part 60) type sampling train. The impinger contents are immediately purged after the run with nitrogen (N_2) to remove dissolved sulfur dioxide (SO_2) gases from the impinger contents. The impinger solution is then extracted with methylene chloride ($MeCl_2$). The organic and aqueous fractions are then taken to dryness and the residues weighed. The total of both fractions represents the CPM.

2. PRECISION AND INTERFERENCE

2.1 Precision. The precisions based on method development tests at a wood waste burner and two coal-fired boilers are 13.0 ± 2.1 mg/m^3, 3.5 ± 1.1 mg/m^3, and 39.5 ± 9.0 mg/m^3, respectively.

2.2 Interference. Ammonia (e.g., in sources that use ammonia injection as a control technique) interferes by reacting with the hydrogen chloride (HCl) in the gas stream to form ammonium chloride (NH_4Cl) which would be measured as CPM. The sample may be analyzed for chloride and the equivalent amount of NH_4Cl can be subtracted from the CPM weight.

3. APPARATUS

3.1 Sampling Train. Same as in Method 17, Section 2.1, with the following exceptions noted below (see Figure 1). **Note:** Mention of trade names or specific products does not constitute endorsement by EPA.

3.1.1 The probe extension shall be glass-lined.

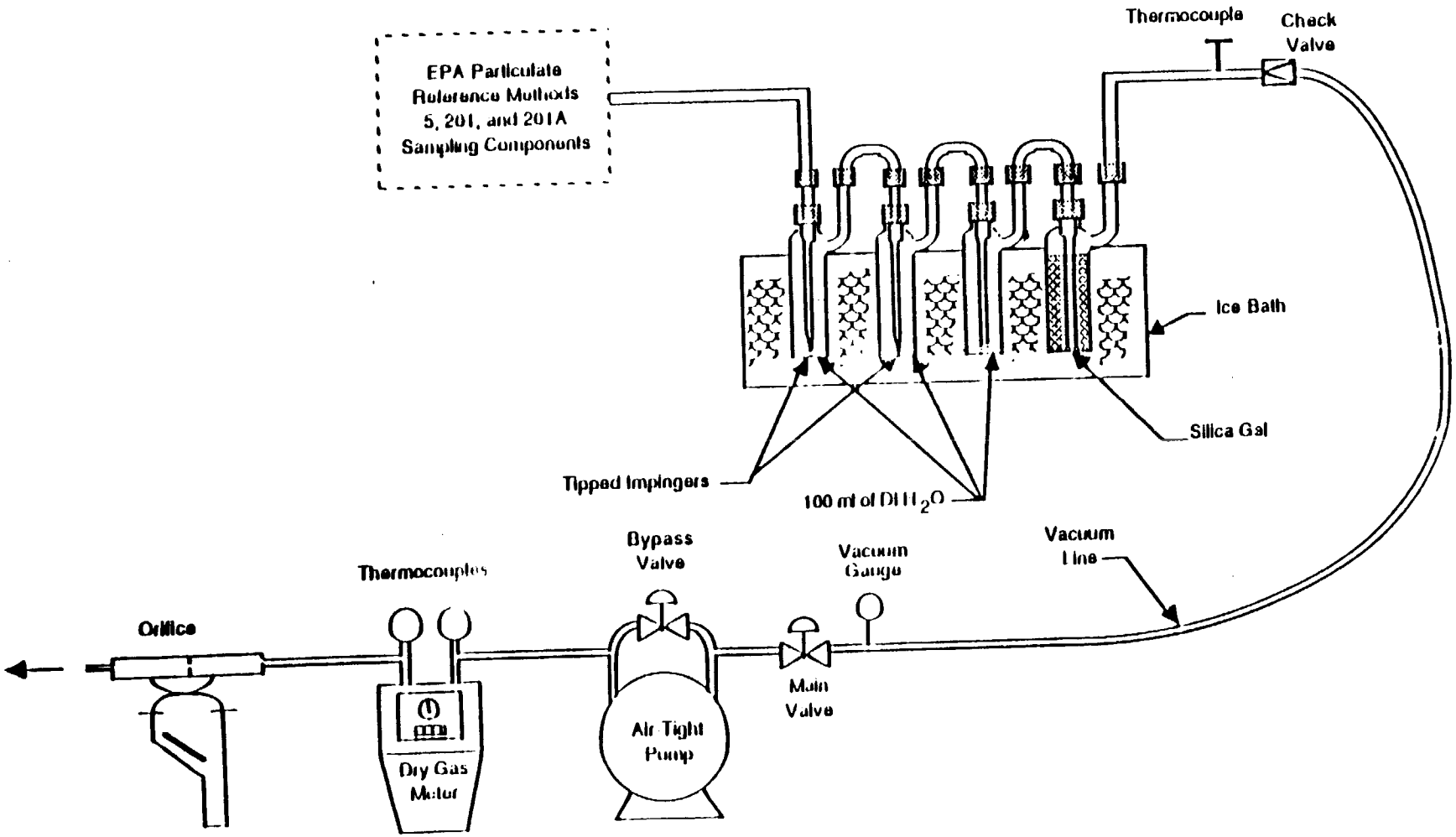


Figure 1. Schematic of condensible particulate sampling train.

3.1.2 A Teflon filter support shall be used.

3.1.3 Both the first and second impingers shall be of the Greenburg-Smith design with the standard tip.

3.1.4 All sampling train glassware shall be cleaned prior to the test with soap and tap water, water, and rinsed using tap water, water, acetone, and finally, $MeCl_2$. It is important to remove completely all silicone grease from areas that will be exposed to the $MeCl_2$ during sample recovery.

3.2 **Sample Recovery.** Same as in Method 5, Section 2.2, with the following additions:

3.2.1 **N_2 Purge Line.** Inert tubing and fittings capable of delivering 0 to 28 liters/min of N_2 gas to the impinger train from a standard gas cylinder (see Figure 2). Standard 0.95 cm (3/8-inch) plastic tubing and compression fittings in conjunction with an adjustable pressure regulator and needle valve may be used.

3.2.2 **Rotameter.** Capable of measuring gas flow at 20 liters/min.

3.3 **Analysis.** The following equipment is necessary in addition to that listed in Method 5, Section 2.3:

3.3.1 **Separatory Funnel.** Glass, 1-liter.

3.3.2 **Weighing Tins.** 350-ml.

3.3.3 **Drying Equipment.** Hot plate and oven with temperature control.

~~3.3.4 **Burette.** 5-ml size with 0.01-ml graduations.~~

3.3.5 **Pipets.** 5-ml.

3.3.6 **Ion Chromatograph.** Same as in Method 5F, Section 2.1.6.

4. REAGENTS

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

4.1 Sampling. Same as in Method 5, Section 3.1, with the addition of deionized distilled water to conform to the American Society for Testing and Materials Specification D 1193-74, Type II.

4.2 Sample Recovery. Same as in Method 5, Section 3.2, with the following additions:

4.2.1 N_2 Gas. N_2 gas at delivery pressures high enough to provide a flow of 20 liters/min for 1 hour through the sampling train.

4.2.2 Methylene Chloride.

4.2.3 Water. Same as in Section 4.1.

4.3 Analysis. Same as in Method 5, Section 3.3, with the following additions:

4.3.1 Methylene Chloride.

4.3.2 Ammonium Hydroxide. Concentrated (14.8 M) NH_4OH.

4.3.3 Water. Same as in Section 4.1.

4.3.4 Phenolphthalein. The pH indicator solution, ~~1.0~~ .05 percent in ~~60~~ 50 percent alcohol.

5. PROCEDURE

5.1 Sampling. Same as in Method 5, Section 4.1, with the following exceptions:

5.1.1 Place 100 ml of water in the first three impingers.

5.1.2 The use of silicone grease in train assembly is not recommended. Teflon tape or similar means may be used to provide leak-free connections between glassware.

5.2 Sample Recovery. Same as in Method 17, Section 4.2 with the addition of a post-test N_2 purge and specific changes in handling of individual samples as described below.

5.2.1 Post-test N_2 Purge for Sources Emitting SO_2. (Note: This step is recommended, but is optional. When no or little SO_2 is present in the gas stream, i.e., the pH of the impinger solution is greater than 4.5, purging has been found to be unnecessary.) As soon as possible after the post-test leak check, detach the probe and filter from the impinger train. Leave the ice in the impinger box to prevent removal of moisture during the purge. If necessary, add more ice during the purge to maintain the gas temperature below 20°C. With no flow of gas through the clean purge line and fittings, attach it to the input of the impinger train (see Figure 2). To avoid over- or under-pressurizing the impinger array, slowly commence the N_2 gas flow through the line while simultaneously opening the meter box pump valve(s). Adjust the pump bypass and N_2 delivery rates to obtain the following conditions: (1) 20 liters/min or $\Delta H_@$ and (2) an overflow rate through the rotameter of less than 2 liters/min. Condition (2) guarantees that the N_2 delivery system

is operating at greater than ambient pressure and prevents that possibility of passing ambient air (rather than N_2) through the impingers. Continue the purge under these conditions for 1 hour, checking the rotameter and ΔH value(s) periodically. After 1 hour, simultaneously turn off the delivery and pumping systems.

5.2.2 Sample Handling.

5.2.2.1 Container Nos. 1, 2, and 3. If filter catch is to be determined, as detailed in Method 5, Section 4.2.

5.2.2.2 Container No. 4 (Impinger Contents). Measure the liquid in the first three impingers to within 1 ml using a clean graduated cylinder or by weighing it to within 0.5 g using a balance. Record the volume or weight of liquid present to be used to calculate the moisture content of the effluent gas. Quantitatively transfer this liquid into a clean sample bottle (glass or plastic); rinse each impinger and the connecting glassware, including probe extension, twice with water, recover the rinse water and add it to the same sample bottle. Mark the liquid level on the bottle.

5.2.2.3 Container No. 5 ($MeCl_2$ Rinse). Follow the water rinses of each impinger and the connecting glassware, including the probe extension with two rinses of $MeCl_2$; save the rinse products in a clean, glass sample jar. Mark the liquid level on the jar.

5.2.2.4 Container No. 6 (Water Blank). Once during each field test, place 500 ml of water in a separate sample container.

5.2.2.5 Container No. 7 ($MeCl_2$ Blank). Once during each field test, place in a separate glass sample jar a volume of $MeCl_2$ approximately equivalent to the volume used to conduct the $MeCl_2$ rinse of the impingers.

5.2.2.6 Container No. 8 (Acetone Blank). As described in Method 5, Section 4.2.

5.3 Analysis. Record the data required on a sheet such as the one shown in Figure 3. Handle each sample container as follows:

5.3.1 Container Nos. 1, 2, and 3. If filter catch is analyzed, as detailed in Method 5, Section 4.3.

5.3.2 Container Nos. 4 and 5. Note the level of liquid in the containers and confirm on the analytical data sheet whether leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Measure the liquid in Container No. 4 either volumetrically to ± 1 ml or gravimetrically to ± 0.5 g. Remove a 5-ml aliquot and set aside for later ion chromatographic (IC) analysis of sulfates.

(Note: Do not use this aliquot to determine chlorides since the HCl will be evaporated during the first drying step; Section 8.2 details a procedure for this analysis.)

5.3.2.1 Extraction. Separate the organic fraction of the sample by adding the contents of Container No. 5 ($MeCl_2$) to the contents of Container No. 4 in a 1000-ml separatory funnel. After mixing, allow the aqueous and organic phases to fully separate, and drain off most of the organic/$MeCl_2$ phase. Then add 75 ml of $MeCl_2$ to the funnel, mix well, and drain off the lower organic phase. Repeat with another 75 ml of $MeCl_2$. This extraction should yield about 250 ml of organic extract. Each time, leave a small amount of the organic/$MeCl_2$ phase in the separatory funnel ensuring that no water is collected in the organic phase. Place the organic extract in a tared 350-ml weighing tin.

5.3.2.2 Organic Fraction Weight Determination (Organic Phase from Container Nos. 4 and 5). Evaporate the organic extract at room temperature and pressure in a laboratory hood. Following evaporation, desiccate the organic fraction for 24 hours in a desiccator containing anhydrous calcium sulfate. Weigh to a constant weight and report the results to the nearest 0.1 mg.

5.3.2.3 Inorganic Fraction Weight Determination. Using a hot plate, or equivalent, evaporate the aqueous phase to approximately 50 ml; then evaporate to dryness in a 105°C oven. Redissolve the residue in 100 ml of water. Add five drops of phenolphthalein to this solution, then add concentrated (14.8 M) NH_4OH until the sample turns pink. Any excess NH_4OH will be evaporated during the drying step. Evaporate the sample to dryness in a 105°C oven, desiccate the sample for 24 hours, weigh to a constant weight, and record the results to the nearest 0.1 mg. (Note: The addition of NH_4OH is recommended, but is optional when no or little SO_2 is present in the gas stream, i.e., when the pH of the impinger solution is greater than 4.5, the addition of NH_4OH is not necessary.)

5.3.2.4 Analysis of Sulfate by IC to Determine Ammonium Ion (NH_4^+) Retained in the Sample. (Note: If NH_4OH is not added, omit this step.) Determine the amount of sulfate in the aliquot taken from Container No. 4 earlier as described in Method 5F (Appendix A, 40 CFR Part 60). Based on the IC $SO_4^=$ analysis of the aliquot, calculate the correction factor to delete the NH_4^+ retained in the sample and to add the combined water removed by the acid-base reaction (see Section 7.2).

5.3.3 Analysis of Water and $MeCl_2$ Blanks (Container Nos. 6 and 7). Analyze these sample blanks as described above in Sections 5.3.2.3 and 5.3.2.2, respectively. The sum of the values for the water blank and the $MeCl_2$ blank must be less than 2 mg or 5 percent of the mass of the CPM ($m_o + m_r$), whichever is greater. If the sum of the actual blank values is greater, then subtract 2 mg or 5 percent of the mass of the CPM, whichever is greater.

5.3.4 Analysis of Acetone Blank (Container No. 8). Same as in Method 5, Section 4.3.

6. CALIBRATION

Same as in Method 5, Section 5, except calibrate the IC according to the procedures in Method 5F, Section 5.

7. CALCULATIONS

Same as in Method 5, Section 6, with the following additions:

7.1 Nomenclature. Same as in Method 5, Section 6.1 with the following additions.

c_{cpm} = Concentration of the CPM in the stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).

C_{SO4} = Concentration of $SO_4^=$ in the sample, mg/ml.

m_b = Sum of the mass of the water and $MeCl_2$ blanks, mg.

m_c = Mass of the NH_4^- added to sample to form ammonium sulfate, mg.

m_i = Mass of inorganic CPM matter, mg.

m_o = Mass of organic CPM, mg.

m_r = Mass of dried sample from inorganic fraction, mg.

m_{rc} = Mass of dried sample from inorganic fraction corrected for volume of aliquot taken for IC analysis, mg.

V_b = Volume of aliquot taken for IC analysis, ml.

V_{ic} = Volume of impinger contents sample, ml.

7.2 Correction for NH_4^- and H_2O. Calculate the correction factor to delete the NH_4^- retained in the sample and to add the combined water removed by the acid-base reaction based on the IC $SO_4^=$.

$$m_c = K\ C_{SO4}\ V_{ic} \qquad \text{Eq. 1}$$

where:

K = 0.020502

7.3 Mass of Inorganic CPM.

$$m_{rc} = m_r \left[\frac{V_{ic}}{V_{ic} - V_b} \right] - m_b + m_c \qquad \text{Eq. 2}$$

7.4 Concentration of CPM.

$$c_{cpm} = \frac{m_o + m_i}{V_{m\ stc}} \qquad \text{Eq. 3}$$

8. ALTERNATIVE PROCEDURES

8.1 Determination of NH_4^- Retained in Sample by Titration.

8.1.1 An alternative procedure to determine the amount of NH_4^- added to the inorganic fraction by titration may be used. After dissolving the inorganic residue in 100 ml of water, titrate the solution with 0.1 N NH_4OH to a pH of 7.0, as indicated by a pH meter. The 0.1 N NH_4OH is made as follows: Add 7 ml of concentrated (14.8 M) NH_4OH to 1 liter of water. Standardize against standardized 0.1 N H_2SO_4 and calculate the exact normality using a procedure parallel to that described in Section 5.5 of Method 6 (Appendix A, 40 CFR Part 60). Alternatively, purchase 0.1 N NH_4OH that has been standardized against a National Institute of Standards and Technology reference material.

8.1.2 Calculate the concentration of $SO_4^=$ in the sample using the following equation.

$$C_{SO4} = \frac{48.03\ V_t\ N}{100} \qquad \text{Eq. 4}$$

where:

N = Normality of the NH_4OH, mg/ml.

V_t = Volume of NH_4OH titrant, ml.

48.03 = mg/meq.

100 = Volume of solution, ml.

8.1.3 Calculate the CPM as described in Section 7.

8.2 Analysis of Chlorides by IC. At the conclusion of the final weighing as described in Section 5.3.2.3, redissolve the inorganic fraction in 100 ml of water. Analyze an aliquot of the redissolved sample for chlorides by IC using techniques similar to those described in Method 5F for sulfates. Previous drying of the sample should have removed all HCl. Therefore, the remaining chlorides measured by IC can be assumed to be NH_4Cl, and this weight can be subtracted from the weight determined for CPM.

8.3 **Air Purge to Remove SO_2 from Impinger Contents.** As an alternative to the post-test N_2 purge described in Section 5.2.1, the tester may opt to conduct the post-test purge with air at 20 liter/min. **Note:** The of an air purge is not as effective as a N_2 purge.

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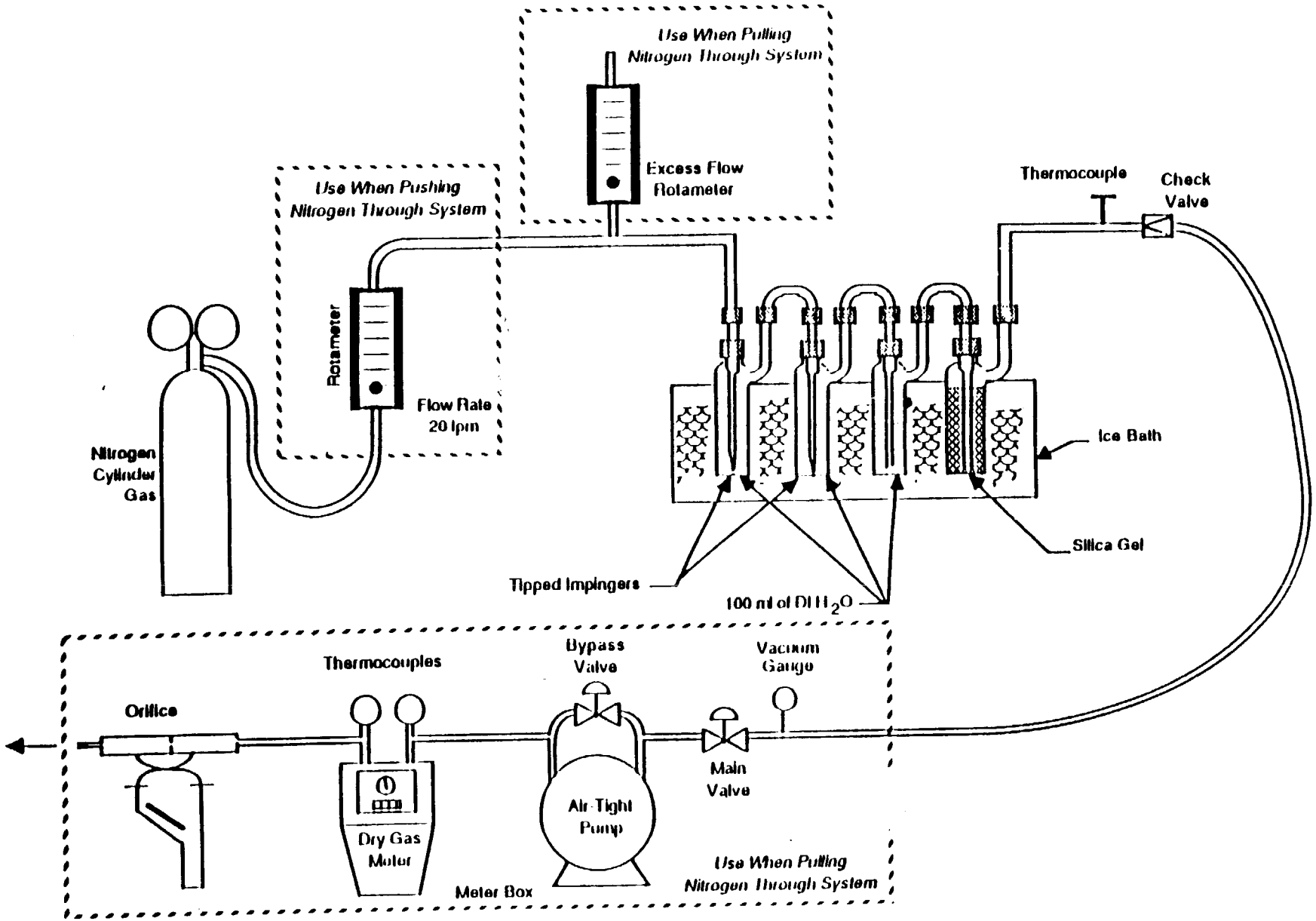

Figure 2. Schematic of post-test nitrogen purge system.

Moisture Determination

Volume or weight of liquid in impingers _____ ml or g
Weight of moisture in silica gel _____ g

Sample Preparation (Container No. 4)

Amount of liquid lost during transport _____ ml
Final volume _____ ml
pH of sample prior to analysis _____
Addition of NH_4OH required? _____
Sample extracted 2X with 75 ml $MeCl_2$? _____

For Titration of Sulfate

Normality of NH_4OH _____ N
Volume of sample titrated _____ ml
Volume of titrant _____ ml

Sample Analysis

Container number	Weight of Condensible Particulate, mg		
	Final Weight	Tare Weight	Weight Gain
4 (Inorganic) 4 & 5 (Organic)			
		Total	_____
		Less Blank	_____
		Weight of Condensible Particulate	_____

Figure 3. Analytical data sheet.