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Air

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Hot Mix Asphalt Plants
Truck Loading and Silo Filling
Instrumental Methods Testing

Asphalt Plant C
Los Angeles, California

Office of Air Quality
Clean Air
OAQPS
Planning and Standards

Hot Mix Asphalt Plants
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Final Report

For U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emissions, Monitoring, and Analysis Division
Emission Measurement Center (MD-19)
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Preface

This report was prepared by Midwest Research Institute (MRI) for the U.S. Environmental Protection Agency (EPA) under EMC Contract No. 68-D-98-027, Work Assignment Number 3-02. A draft of this report was prepared previously under WA 2-04. Mr. Michael Toney is the EPA Work Assignment Manager. The MRI Work Assignment Leader is Mr. Scott Klamm and Mr. John Hosenfeld is the Program Manager of MRI's contract with EMC.

This report presents the results from an emissions test using FTIR spectroscopy and FID at a hot mix asphalt plant.

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Glossary

ASTM—American Society for Testing and Materials
CEMS—Continuous Emissions Monitoring System
CO—Carbon Monoxide
CTS—Calibration Transfer Standard
EMAD—Emissions Measurement and Analysis Division
EMC—Emissions Measurement Center
ESP—Electrostatic Precipitator
FID—Flame Ionization Detector
FTIR—Fourier Transform Infrared Spectroscopy
HAP—Hazardous Air Pollutant
MRI—Midwest Research Institute
NO—Nitric Oxide
NO_2—Nitrogen Dioxide
N_2O—Nitrous Oxide
NO_x—Nitrogen Oxides (generally comprised of the chemical species NO, NO_2 and N_2O)
PES—Pacific Environmental Services
PTE—Permanent Total Enclosure
RAP—Recycled Asphalt
RTFOT—Rolling Thin Film Oven Test
SED—Silo Emissions Duct
SF_6—Sulfur Hexafluoride
SMTG—Source Measurement Technology Group
SO_2—Sulfur Dioxide
TED—Tunnel Emissions Duct
THC—Total Hydrocarbons
VOST—Volatile Organic Sampling Train

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Overview

Test results are summarized in Table ES-1, and show both average concentrations and emission factors for the Plant C test program. Three types of samples were collected as part of this test program. Production emissions were collected from the process dryer stack (two test runs), silo filling emissions were measured at the Silo Emissions Duct (SED, three test runs, collected simultaneous with the loadout testing), and loadout emissions testing was conducted at the tunnel exhaust duct (TED, three test runs). A fourth, background, emissions test was also performed at the TED location to measure emissions due to truck traffic alone. Note that no emission factor can be calculated for the background test, since no truck loading was underway at the time.

The data in Table ES-1 are broken into two primary categories. First, all concentrations and emission factors are reported on an "as measured" basis. These values are derived directly from the instrument readings, flow measurements, and truck loading data collected while on-site. Second, tracer gas testing at the TED location allowed a determination of capture efficiency to be made. The average capture efficiency for all three runs was 61% (determined by the 90% lower confidence limit approach), and was 45% for the background run. Table ES-1 includes the capture efficiency corrected TED concentrations and emission factors.

With the exception of Total Hydrocarbon (THC, by Method 25A) data, all concentrations reported in the table were determined by direct (extractive) Fourier Transform Infrared Spectroscopy (FTIR, by Method 320). Many additional compounds, particularly SO_2 and NO_x, were analyzed for, but were not detected, and are therefore not included in the main summary table. A Tenax sample concentration technique (with FTIR analysis) was also used for this test program, but did not reveal the presence of any additional analytes. The Tenax sample concentration results, although qualitative, thus suggest that the extractive FTIR detection limits reported in Appendix C may be high by a factor of as much as 30-40.

Table OV-1. Summary of Results—Average Concentrations and Emission Factors

	As measured							Capture Efficiency Corrected[5]		
	Dryer stack production		SED production		TED production		TED background	TED production		TED background
	ppm	lb/ton	ppm	lb/ton	ppm	lb/ton	ppm	ppm	lb/ton	ppm
Propane	2.05	7.14×10^{-4}	ND	−	ND	−	ND	ND	−	ND
Methane	55.4	8.00×10^{-3}	6.43	2.44×10^{-5}	3.20	1.64×10^{-4}	3.00	5.29	2.66×10^{-4}	6.67
CO	62.6	1.44×10^{-2}	80.0	4.33×10^{-4}	5.73	5.20×10^{-4}	3.50	9.54	8.44×10^{-4}	7.78
Hydrocarbon Mixture A[1]	ND	−	104	1.83×10^{-3}	0.0100	3.75×10^{-6}	ND	0.0154	5.74×10^{-6}	ND
Hydrocarbon Mixture B[1]	ND	−	202	4.20×10^{-3}	3.03	8.36×10^{-4}	ND	5.02	1.36×10^{-3}	ND
Ethylene	ND	−	8.24	3.95×10^{-5}	0.0833	6.35×10^{-6}	ND	0.144	1.07×10^{-5}	ND
Formaldehyde	ND	−	7.33	5.24×10^{-5}	0.00800	5.20×10^{-7}	ND	0.148	9.57×10^{-7}	ND
Isooctane	ND	−	5.63	1.48×10^{-4}	ND	−	ND	ND	−	ND
THC[2]	19.0	7.34×10^{-3}	5.26	5.29×10^{-3}	7.50	1.14×10^{-3}	1.20/0.830[3]/1.60[4]	12.4	1.85×10^{-3}	2.67/1.84[3]/3.56[4]

ND = Not detected.

1 Together, "hydrocarbon mixture A" and hydrocarbon mixture B" represent the best least-squares spectral fit for a nonaromatic hydrocarbon mixture. Mixture A was quantitated using reference spectra for toluene, and Mixture B was quantitated using reference spectra for hexane.
2 Method 25A, determined as ppm propane.
3 Value taken from first half of background test (Run 4).
4 Value taken from second half of background test (Run 4).
5 Using 90% lower confidence limit capture efficiencies for each run (Run 1 = 64%, Run 2 = 65%, Run 3 = 54%, Run = 45%).

Section 1. Introduction

1.1 Background

The United States Environmental Protection Agency (EPA) is investigating hot mix asphalt plants to identify and quantify particulate matter and organic hazardous air pollutants (HAPs) emitted from asphalt cement load-out operations. EPA issued a work assignment to Midwest Research Institute (MRI) to conduct an air emissions test program to collect data in support of the investigation. The testing program was conducted through EPA Contract No. 68-W6-0048, Work Assignment No. 2-08, and results are presented in this report.

The test facility (referred to as "Plant C") was selected as the host facility for this project, primarily because load-out emissions are controlled by a silo exhaust system and a load-out tunnel. The plant has a production capacity of 650 tons per hour (TPH).

The primary objective of the project was to characterize air emissions of organic HAPs from asphalt cement load-out operations and operation of the hot mix dryer. Testing was performed to characterize emissions from the storage silos, the load-out tunnel, and the hot mix dryer. Section 1.2, below, summarizes the specific measurements collected during the various tests.

In addition to MRI's testing, manual samples were collected simultaneously by Pacific Environmental Services, Inc. (PES) in order to address all needs of the work request. Work performed by PES was under a separate work assignment and discussion of this additional testing is outside the scope of this report.

1.2 Project Summary

The site selected for performing the emissions tests performs all truck loading operations inside a tunnel approximately 183 ft in length with open doorways at both ends. During loading, emissions are captured by activating a double-slotted capture hood located at each individual silo. Thus, the tunnel, ventilation system, and capture hoods work together to form a near-total enclosure for determination of mass emissions for the loading operations.

The selected test site, however, did not meet all of the criteria for a permanent total enclosure (PTE) as defined by EPA Method 204, "Criteria for Verification of a Permanent or Temporary Total Enclosure," *Federal Register*, Vol. 62, No. 115, June 16, 1997. Specifically, the chosen test site did not meet all the criteria for building geometry, or average face velocity across the two doorways. A building which does not meet criteria for PTE is required to undergo capture efficiency testing in order to demonstrate effectiveness of the air handling system. Preliminary capture efficiency tests were conducted at the site during the week of May 11-15, 1998, and capture efficiency tests were also performed in conjunction with the tests described in this report.

Three ventilation system tests and a capture efficiency test on the load-out system (alone) were performed to determine emissions at the facility. The three ventilation systems are referred to as the load-out system, the silo storage system, and the hot mix dryer system. Two or three test runs were performed to test each ventilation system, as summarized below:

- The Load-out system was tested for HAPs, CO, SO_2, and NO_x, using extractive Fourier Transform Infrared Spectroscopy (FTIR) (EPA Method 320) and FTIR with sample concentration; and for total hydrocarbons (THC) using a flame ionization detector (FID) (Method 25A). Three test runs were performed during normal load-out operations. A fourth test run was also performed with trucks traversing the load-out area while no loading was occurring in order to determine background emissions contributed by diesel truck exhaust.

- The Silo storage system was tested for HAPs, CO, SO_2, and NO_x, using extractive FTIR (EPA Method 320) and FTIR with sample concentration; and for total hydrocarbons (THC) using a flame ionization detector (FID) (Method 25A). This storage system was tested intermittently with the load-out system whenever silo loading operations occurred, and was not included in the background test.

- The Hot mix dryer system was tested for HAPs, CO, SO_2, and NO_x, using extractive FTIR (EPA Method 320) and FTIR with sample concentration; and for total hydrocarbons (THC) using a flame ionization detector (FID) (Method 25A). Two test runs were performed.

- Capture efficiency tests of the load-out system were also performed simultaneously with the load-out system and silo storage system tests. Tracer gas was released from a manifold in the load-out bay, was collected by the ventilation system, and air concentrations were measured, allowing capture efficiency to be calculated.

The load-out and silo storage ventilation systems combine into one common duct which passes through an electrostatic precipitator and is exhausted to air. Testing for the load-out system was performed at a port located between Silos 1 and 2, which is upstream of the combined common duct. Similarly, the silo storage testing was performed from an extension at the top of Silo 2, which is also located upstream of the combined common duct.

1.3 Project Personnel

This EPA project is administered by the Emission Measurement Center (EMC). The test request was initiated by the Emission Factor and Inventory Group (EFIG) of the Emission Standards Division (ESD), both from the Office of Air Quality Planning and Standards (OAQPS). Key project personnel are listed below in Table 1-1.

Table 1-1. Project Personnel

Organization	Name and title	Phone number
U.S. EPA EMC	Michael Toney, Work Assignment Manager	(919) 541-5247 (919) 541-1039 (fax)
Asphalt Plant C	Richard Burnett, Manager Corporate Operations	(909) 736-7600
Asphalt Plant C	Pat McClure, Plant Operator	(949) 786-1290
Midwest Research Institute 425 Volker Boulevard Kansas City, MO 64110	Scott Klamm, Work Assignment Leader	(816) 753-7600, ext. 1228 (816) 531-0315 (fax)
Midwest Research Institute 425 Volker Boulevard Kansas City, MO 64110	John Hosenfeld, Program Manager	(816) 753-7600, ext. 1336 (816) 531-0315 (fax)

Section 2.
Process Description and Test Locations

2.1 Process Description

This plant was selected for the emissions testing due to its high production rate and enclosure/ventilation of the storage silos and load-out bay.

The Plant C facility has a rated production capacity of 650 tons per hour (tph). Daily production varies from approximately 2,000 tons per day (tpd) to 6,000 tpd depending on demand. The plant produces five different categories of asphalt cement, 3/8 in, 1/2 in, 3/4 in, fines, and recycled asphalt (RAP). These categories indicate the average size and type of aggregate in the mix. In RAP, small amounts of recycled asphalt are added to the mix. The plant also adds small amounts of rubber to some products as a crack inhibitor.

The plant uses two different kinds of liquid asphalt, AR-4000 and AR-8000. AR-4000 is a softer asphalt with a higher volatile content and is used approximately 90% of the time. The percent by weight of liquid asphalt in the mix varies from 4.8% to 6.0% depending on the size of the aggregate (the smaller the aggregate, the higher the liquid asphalt content).

A schematic of the process is provided in Figure 2-1.

2.1.1 Aggregate Processing Operations

In this continuous process, cold aggregate is introduced to the rotary drum dryer. The dryer dries the cold aggregate and then mixes the heated and dried aggregate with the liquid asphalt cement. As the drum rotates, the aggregates move toward the other end of the drum. Asphalt cement and recycled asphalt pavement (RAP) are typically introduced either midway down the drum or at the end of the drum in a lower temperature zone. A ventilation system exhausts the gases and condensed particulate from the rotary drum dryer through a baghouse and exhaust stack.

2.1.2 Load-Out Operations

Five 200-ton heated silos sit on top of a load-out tunnel. The silos serve as a holding station between production and the loading of the asphalt cement into transport trucks. The asphalt cement in storage can have a temperature up to 160EC (320EF). The load-out tunnel is approximately 183 ft long. During a full load-out schedule, trucks enter the tunnel approximately every 3 min. Single bed trucks hold approximately 21 tons of asphalt cement. Dual bed trucks (i.e., a truck and trailer) hold approximately 25 tons. The temperature of the asphalt cement as it drops from the silo into the truck is approximately 300EF.

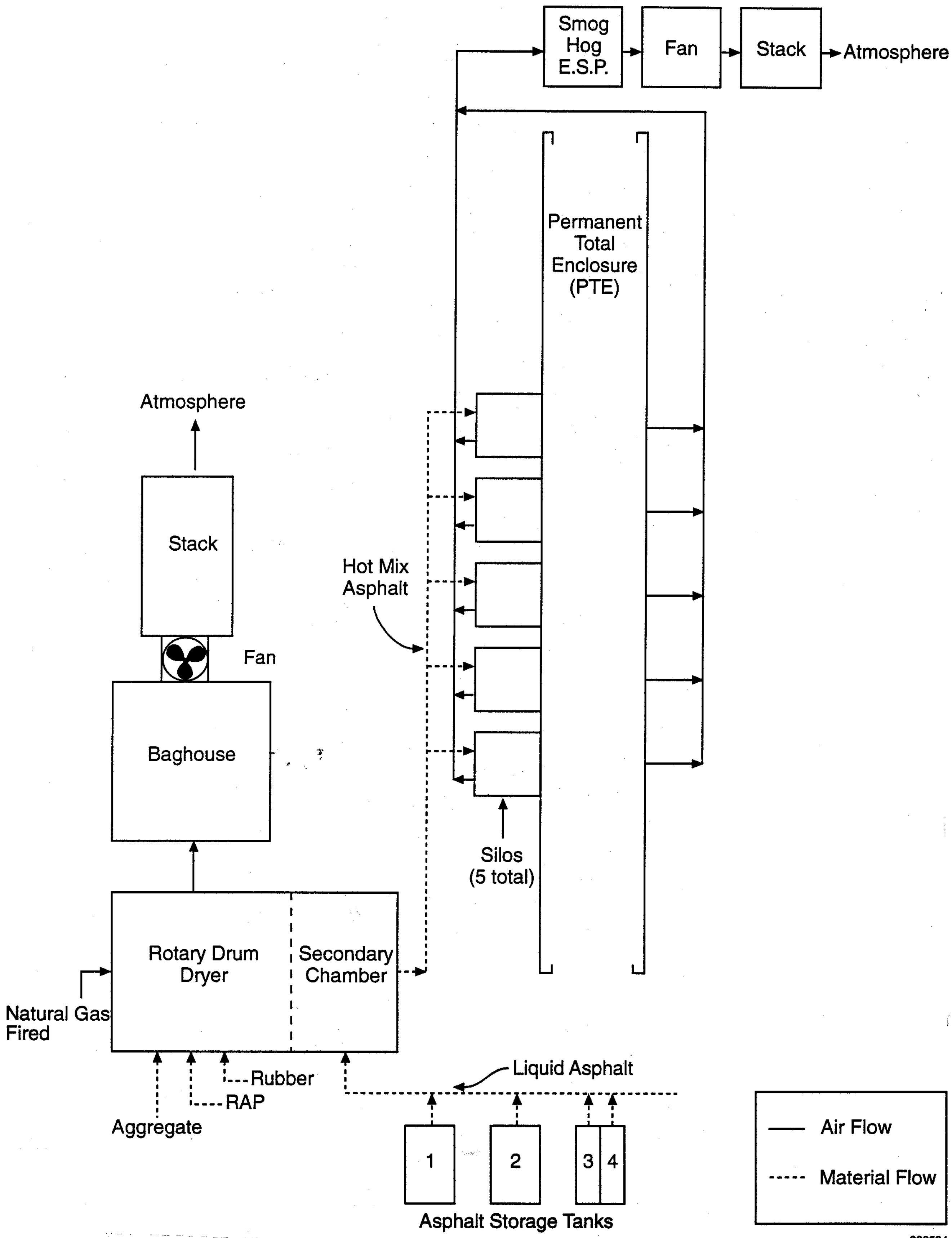


Figure 2-1. Process Flow Schematic

The truck is positioned under the silo containing the desired aggregate where it is loaded into the truck bed. During loading, emissions are captured by activating a double-slotted capture hood located at each silo. With the truck positioned under the silo, one free-standing slot will be at the forward edge and one at the aft edge of the truck bed. No more than one silo can operate at a given time and only the capture hood associated with that silo is activated to capture the emissions. It typically takes 15 to 30 seconds to load a truck. However, the activated capture hood continues operating until the next truck enters and another silo/capture hood is activated. One capture hood is always active, even when no loading is occurring. Constant flow is maintained by the fan setting, thus, a constant airflow is always exhausted from the load-out tunnel to the emission abatement system.

2.2 Test Locations

Figures 2-2 and 2-3 show the load-out and silo storage combined ventilation system from the top and side, respectively. Finished product from the aggregate process is conveyed into the five heated silos located above the truck load-out bay. A header captures emissions from the storage silos and where it is ducted to the load-out bay emission abatement system.

2.2.1 Outlet Duct, Storage Silo No. 2 Vent System

Sampling Location No. 1 was positioned at the outlet duct of storage silo No. 2 prior to connection to the common silo storage ventilation system. Since no isokinetic sampling was performed by MRI at this location, sample collection was taken at a single point.

2.2.2 Outlet of the Load-Out Bay Ventilation System

Sampling Location No. 2 was positioned between Silos 1 and 2 along the common header to the Smog Hog. This was a 36-in diameter round duct with a horizontal gas flow. Since no isokinetic sampling was performed by MRI at this location, sample collection was taken at a single point. This location is upstream of Silo 1, so no emissions data from Silo 1 load-out were gathered during this test program.

2.2.3 Hot Mix Drying Exhaust System

Figure 2-4 shows the hot mix process drying exhaust system. This was a 54 in x 36 in rectangle duct with six 5-in ports. Since no isokinetic sampling was performed by MRI at this location, sample collection was taken at a single point, but the entire duct was traversed by MRI in order to collect the appropriate measurements of gas temperature, flow rate, moisture, CO_2, and O_2.

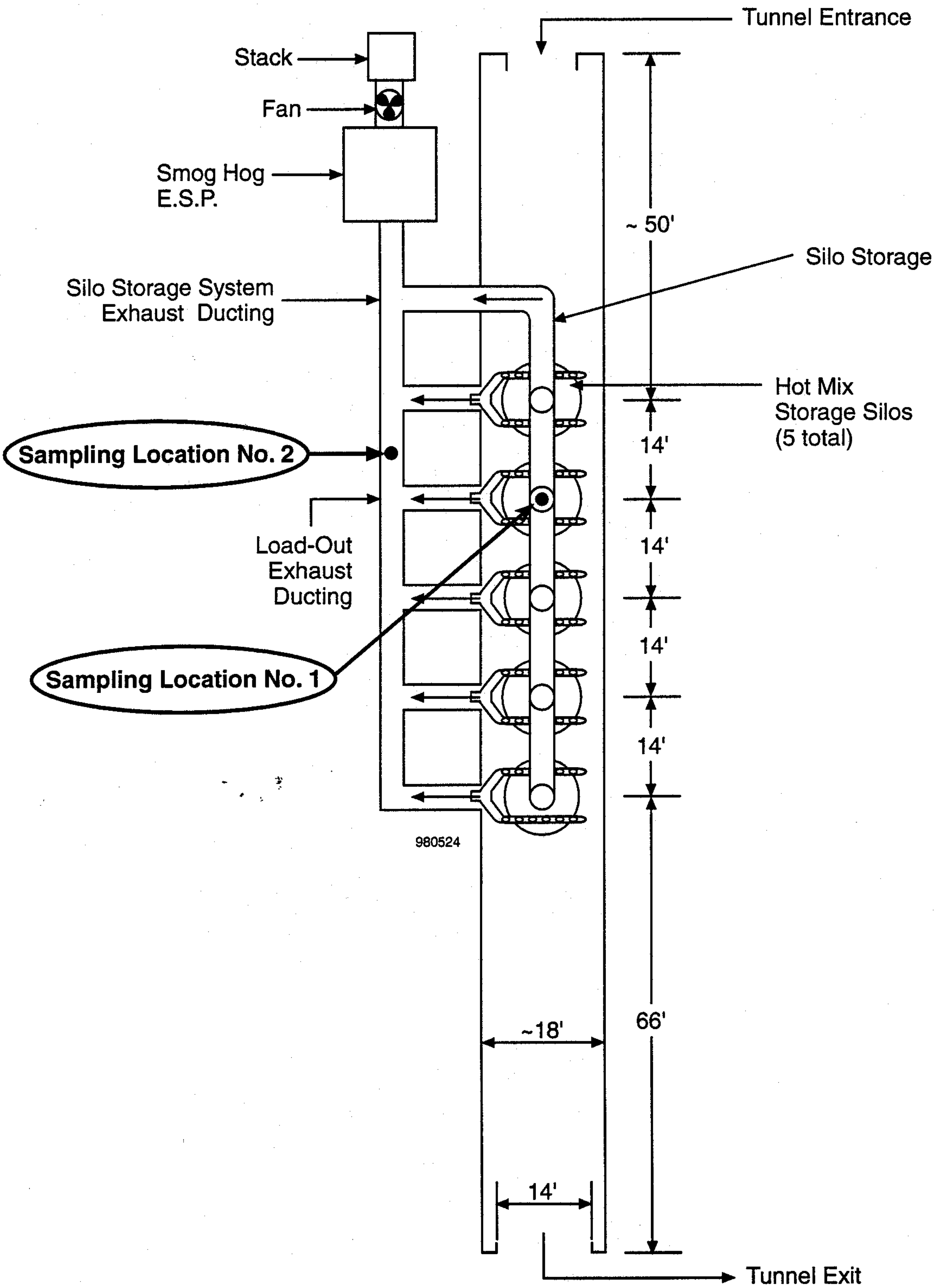


Figure 2-2. Load-Out Station, Top View

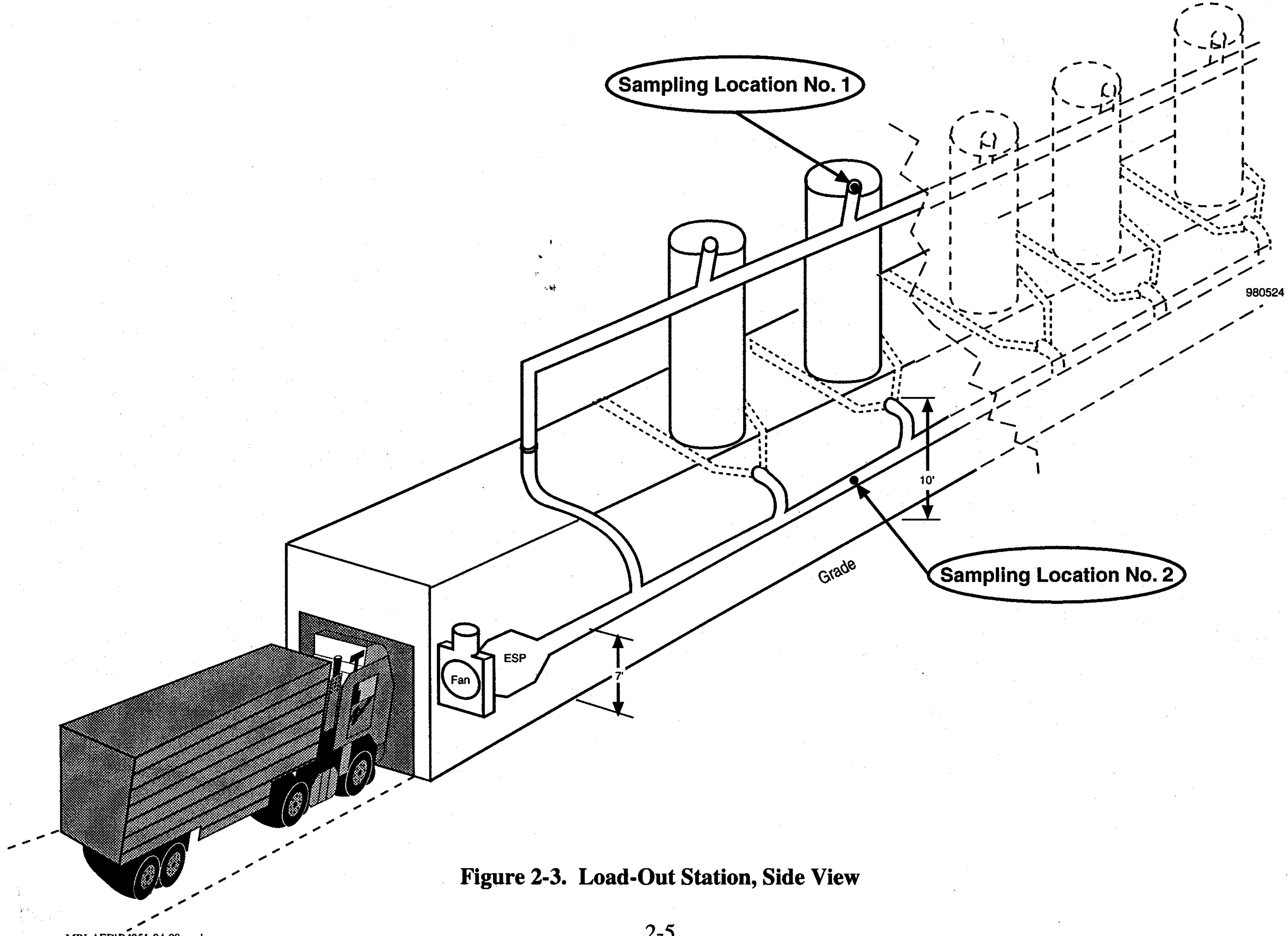


Figure 2-3. Load-Out Station, Side View

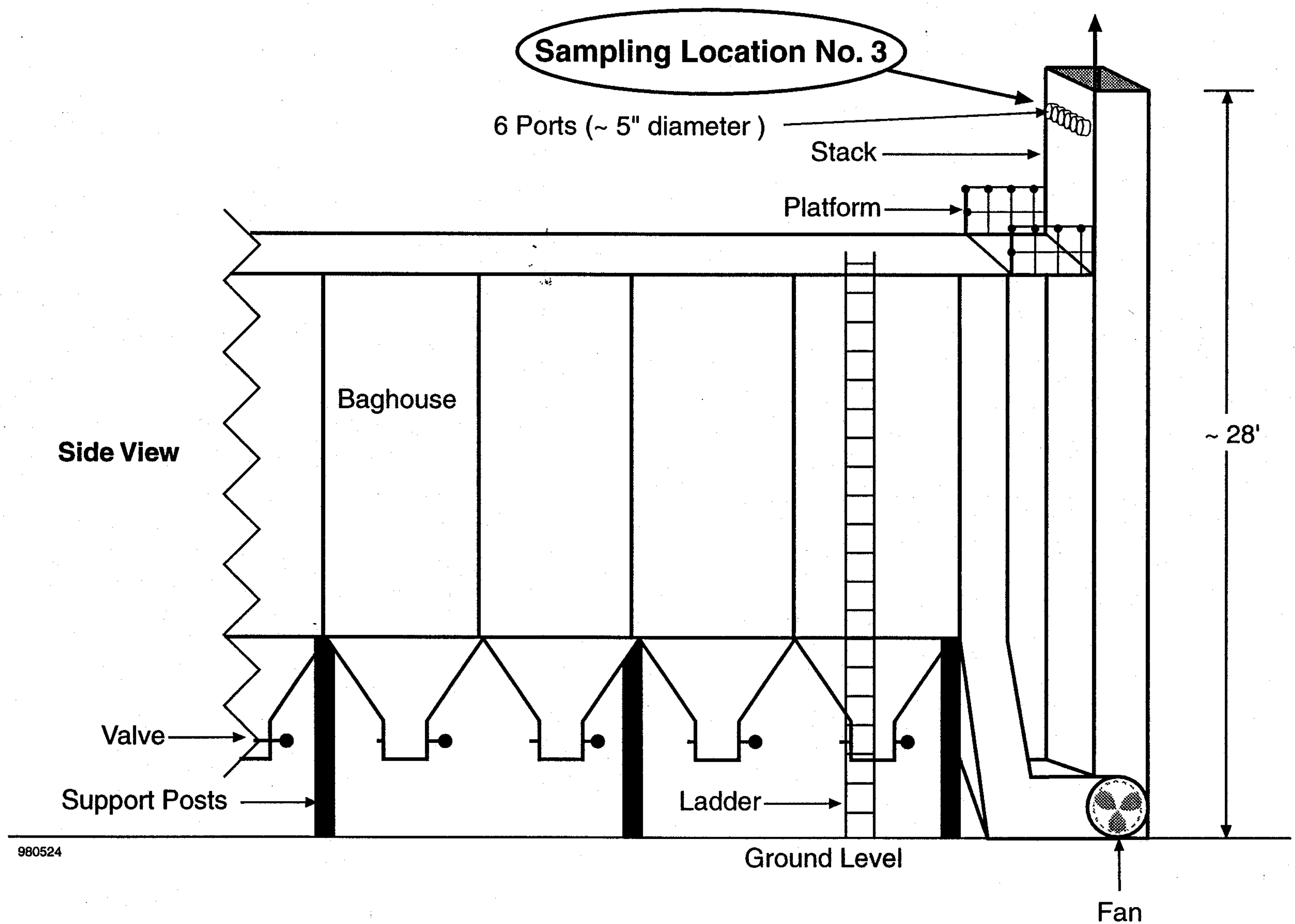


Figure 2-4. Hot Mix Drying Exhaust System

Section 3.
Test Results

Three ventilation systems were tested to determine emissions at the facility: load-out, silo storage, and hot mix dryer. Two test runs were performed on the hot mix dryer, while three test runs were performed at the load-out and silo storage systems. A fourth, background, test run at the load-out system was also performed to characterize emissions from the truck exhausts. Testing at these systems is discussed below.

3.1 Objectives and Test Matrix

Objectives for the testing program were as follows:

- Perform three tests of the silo storage system for HAPs, CO, SO_2, and NO_x using extractive FTIR (EPA Method 320) and FTIR with sample concentration; and for THC using Method 25A.
- Perform three tests of the load-out system for HAPs, CO, SO_2, and NO_x using extractive FTIR (Method 320) and FTIR with sample concentration; and for THC using Method 25A. Also perform a fourth, background test to determine emissions contributed by the truck diesel exhaust alone.
- Determine capture efficiency of the load-out system simultaneously with the load-out emissions testing.
- Perform three tests of the hot mix dryer system (process stack) for HAPs, CO, SO_2, and NO_x using extractive FTIR (EPA Method 320) and FTIR with sample concentration; and for THC using Method 25A.

An additional, minor objective of the test program was to characterize emissions from intermittent loading (4 x 5.5-ton drops) relative to normal loading (1 x 22-ton drops) by THC (Method 25A).

Due to process problems, only two tests of the hot mix dryer system (process stack) were performed. For the load-out testing, three test runs and a background run were performed. Three tests of the silo storage system were also completed, as well as the intermittent loading test. Table 3-1 summarizes the matrix completed by the field activities, and Sections 3.1.1 to 3.1.3 briefly describe the test activities.

Three different types of measurements were performed with the FTIR system. First, an extractive sampling system was used to transport sample gas from the sampling location

Table 3-1. Summary of Sampling and Analysis Parameters

No. of test runs	Test Condition	Sample	Sampling port location	Sample frequency for each run	Sampling method	Analytical parameters	Analytical method
3	Load-Out	Load-out duct emissions	No. 2	4-hr continuous extractive sampling	Extractive FTIR Method 320	CO, SO_2, NO_x, HAPs	FTIR Spectral analysis
				4-hr composite per run	Adsorbent trap	HAPs	Desorption/FTIR spectral analysis
				Continuous during 4-hr run	Method 25A	THC	FID
		Load-out duct capture efficiency	No. 2	4-hr continuous extractive sampling	Extractive FTIR Method 320	SF_6	FTIR spectral analysis
		Storage silo duct	No. 1	Intermittent sampling, coincident with silo loading operations	Extractive FTIR Method 320	CO, SO_2, NO_x, HAPs	FTIR Spectral analysis
				Estimated 2-hr composite per run	Adsorbent trap	HAPs	Desorption/FTIR spectral analysis
				Continuous during run	Method 25A	THC	FID
		Incremental load-out emissions, 4x5.5-ton vs 1x22-ton	No. 2	Continuous, as time and plant conditions allow	Method 25A	THC	FID
1	Background (No load-out operations)	Load-out duct emissions	No. 2	4-hr continuous extractive sampling	Extractive FTIR Method 320	CO, SO_2, NO_x, HAPs	FTIR Spectral analysis
				4-hr composite per run	Adsorbent trap	HAPs	Desorption/FTIR spectral analysis
				Continuous during 4-hr run	Method 25A	THC	FID
		Load-out duct capture efficiency	No. 2	4-hr continuous extractive sampling	Extractive FTIR Method 320	SF_6	FTIR spectral analysis
2	Hot Mix Process Operations	Hot mix drying stack	No. 3	3-hr continuous extractive sampling	Extractive FTIR Method 320	CO, SO_2, NO_X, HAPs	FTIR Spectral analysis

Table 3-1 (Continued)

No. of test runs	Test Condition	Sample	Sampling port location	Sample frequency for each run	Sampling method	Analytical parameters	Analytical method
				3-hr composite per run	Adsorbent trap	HAPs	Desorption/FTIR spectral analysis
				Continuous during 3-hr run	Method 25A	THC	FID
				Once per run	Methods 1 and 2	Velocity Temperature	Pitot tube Thermocouple
				3-hr composite	Method 3	O_2, CO_2	Orsat
				3-hr composite	Method 4	Stack H_2O	Gravimetric

directly to the FTIR gas cell where the spectra were recorded. This is referred to as “extractive” or “direct” sampling. Second, in the “sample concentration” procedure, a manual sampling train was used to collect a measured volume of gas onto a tube packed with Tenax sorbent. Contents of the tube were then heated and desorbed into the gas cell where the spectrum was recorded. Third, in the capture efficiency study, a metered volume of sulfur hexafluoride (SF_6) gas was released into the loadout tunnel while extractive measurements were being conducted. The SF_6 measured by the FTIR system was assumed to be equivalent to the SF_6 taken up by the loadout tunnel ducts. These procedures are all described more fully in Section 4.

3.1.1 Hot Mix Dryer (Process Stack) Testing

The hot mix dryer system was tested for HAPs, CO, SO_2, NO_x, and other compounds for which there are reference spectra using extractive FTIR and sample concentration with FTIR analysis. In addition to FTIR spectroscopy, monitoring for THC using FID per Method 25A was performed. Two 3-hr runs of testing during normal process operations were performed.

During the dryer testing, MRI monitored the process and baghouse operating conditions. Parameters were logged manually or obtained from plant logs, where applicable. Manual readings were logged every 15 min. Some of the parameters monitored were:

- Feed rate of aggregates
- Feed rate of liquid asphalt
- Liquid asphalt temperature
- Mix temperature
- Natural gas usage rates
- Baghouse pressure drop

Several operational problems were encountered during the dryer stack testing which contributed to process instability and generation of inconsistent emissions data. First, high moisture was present in the aggregate feeds due to heavy rainfall in the region (post El Niño conditions). Also contributing to high moisture were large amounts of soil/humus material in the RAP, which was considered to be of poor quality. This additional moisture created difficult production conditions in which the stack emissions varied significantly towards the end of each run. Time plots presented later in this report (Section 3.3.1) clearly show these trends.

Appendix A contains summaries of the process operating data collected during the testing. Appendix B contains raw data from the manual methods operated during the process stack testing.

3.1.2 Tunnel Emissions Duct (TED) Testing

Emissions from the load-out system were tested simultaneously with the silo emissions duct (SED) using extractive FTIR, sample concentration with FTIR analysis, and THC analysis. Each test period was approximately 4 to 5 hours in length, and also corresponded to time periods of manual sample collection by PES.

Concurrent with FTIR testing of the load-out emissions discussed above, capture efficiency testing at this location was also performed. Simultaneous with sampling at this location, tracer gas (SF_6) was released at whichever silo was currently active (Nos. 2 through 5). Thus, four separate gas release manifolds were placed within the load-out tunnel, one along the wall near each of the silos (Nos. 2 through 5). As the capture hood for any one of the silos was activated, an MRI operator also activated tracer gas flow to that particular release manifold. Tracer gas was released at a constant rate (measured by a mass flowmeter). Each manifold dispersed tracer gas evenly from six nozzles spaced along its length (Figure 3-1). For each set of six nozzles, two nozzles were directed generally upwards at 45E, two were directed generally downward at 45E, and two were directed horizontally. Sample spectra were collected by extractive FTIR, where concentrations were determined and converted to mass emissions over time. These were compared to the measured tracer gas emission rate, allowing duct capture efficiency to be calculated. Results are presented later in Section 3.3.3.

A stable, nonflammable gas (sulfur hexafluoride, or SF_6) was used as the tracer gas. Approximately 4 lpm of 2% sulfur hexafluoride was released, resulting in an air concentration of around 0.10 to 0.20 ppm, a concentration level easily detected (approximately 0.05-0.10 absorbance units) by extractive FTIR with an approximately 10-m pathlength.

THC monitoring was also conducted to perform a comparison test of emissions generated from incremental loading versus total loading. The facility normally operates using total loading, with a 22-ton loadout being dropped all at one time. Using incremental loading, a 22-ton loadout was instead dropped as four 5.5-ton loads, one after the other. Response of the THC served as a measure of total emissions. This test was performed separately from other load-out testing and provided rough information on expected emission levels for an upcoming test at a batch mix facility (Plant D). Intermittent loadout test results are reported later in Section 3.3.2.

3.1.3 Silo Emissions Duct (SED) Testing

Testing at the silo location was performed concurrently with the load-out system testing during periods in which loading of silo No. 2 occurred. Thus, the silo storage testing was divided into several periods of 15 to 160 min each throughout a 4-hr load-out emissions test run. Three test runs were performed at a rate of one run per day.

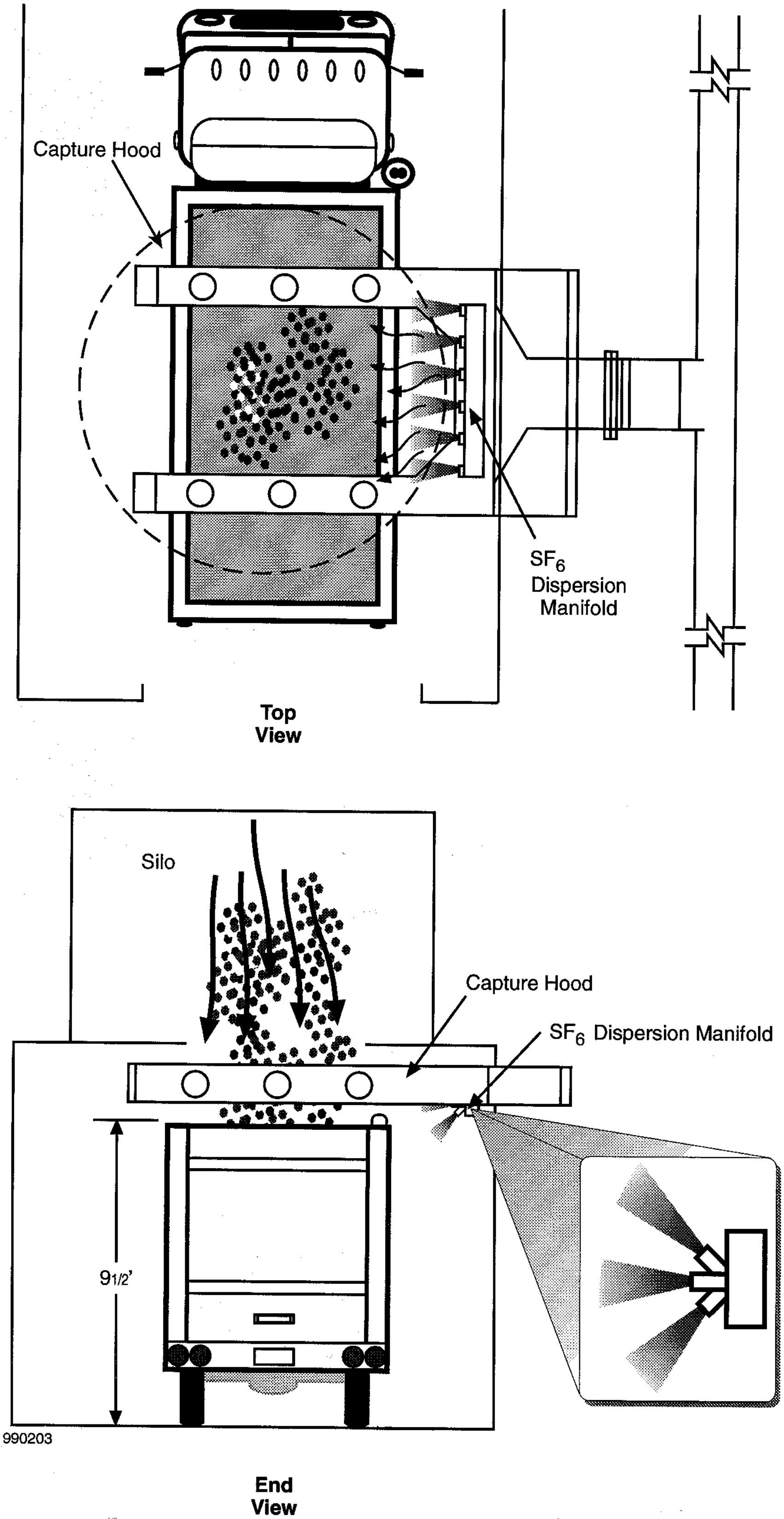


Figure 3-1. Capture System with Tracer Gas Placement

3.2 Field Test Changes and Problems

1. Due to process problems on July 20, a test run of the process stack (hot mix dryer) could not be performed. Two tests of the process stack were performed, one each on July 21 and July 22.

2. Due to process problems on July 21, the test of the process stack (hot mix dryer) was shortened from the planned 4-hr to 3-hr. The second test of the hot mix dryer (July 22) was thus also reduced to a 3-hr test to provide consistency between the two data sets.

3. Failure of the load-out damper on Silo No. 2 on July 23 created conditions which prevented the collection of representative samples. Testing for that day was aborted and facility maintenance was performed. No analysis of the partially collected samples was performed.

4. High moisture created sampling difficulties during Run 3 at the SED for the extractive FTIR. As a precautionary measure, the FTIR sample collection was changed from continuous to grab sampling during the indicated time periods. Thus, the reported data is from three grab samples collected over a 20-minute time period, and is therefore less informative about the overall process than data from Runs 1 and 2.

3.3 Summary of Test Results

Table 3-2 summarizes the run times for each of the test methods. Table 3-3 summarizes the measured air flow rates and gas composition data for the test program.

As a general note, the extractive FTIR method provides the most direct analyte measurements and proved to be the most useful technique for identification and quantitation of analytes. Because the sample is untreated, the gas was composed primarily of moisture and CO_2, both of which are spectral interferences. These interferences limited the measurements of many compounds to the low-ppm concentration range. No additional target analytes were detected in the sample concentration spectra, which indicates that the quantitation limits were actually lower. The Method 25A results were consistent with the direct FTIR results. Complete extractive FTIR results tables are presented in Appendix C, sample concentration FTIR results are presented in Appendix D, and THC data are presented in Appendix E. Orientation limits for ND (not-detected) compounds are contained in Appendix C.

Table 3-2. Summary of Test Run Times

	Dryer stack Run 1	Dryer stack Run 2	Loadout/silo emissions ducts Run 1	Loadout/silo emissions ducts Run 2	Loadout/silo emissions ducts Run 3	Loadout/silo emissions ducts (background) Run 4
Date	7/21/98	7/22/98	7/24/98	7/25/98	7/27/98	7/26/98
Inclusive run time	0930-1421	0902-1246	0720-1258	0710-1126	0705-1200	0923-1347
THC times	1120-1209 1218-1238 1249-1302 1305-1318 1320-1332 1338-1420	0935-1056 1104-1237	0720-0805 (SED) 0814-0917 (TED) 0936-1030 (SED) 1036-1257 (TED)	0710-1118 (TED) 0845-0925 (SED)	0710-1200 (TED) 0720-0737 (SED) 0750-0930 (SED) 1010-1200 (SED)	0925-1125 1148-1345
FTIR times	1137-1232 1240-1420	0937-1110 1129-1235	0725-0805 (SED) 0805-0915 (TED) 0921-0935 (TED) 0935-1030 (SED) 1057-1258 (TED)	0711-0844 (TED) 0844-0927 (SED) 0927-1112 (TED)	0705-0933 (TED) 0955-1040 (TED) 1051-1112 (SED)[1] 1115-1200 (TED)	0923-1126 1150-1347
Tenax sampling times	1121-1421	0935-1236	0720-1257 (TED) 0720-0801 (SED) 0858-0913 (SED) 0921-1030 (SED)	0710-1126 (TED)[2] 0715-0808 (SED) 0844-0958 (SED)	0710-1152 (TED)[2] 0710-0951 (SED)	0925-1125 (TED) 1145-1345 (TED)
Velocity traverse	0930-0950	0902-0916 1229-1246	NA	NA	NA	NA
Moisture train	1122-1420	0936-1234	NA	NA	NA	NA

[1] Batch or grab sampling
[2] Duplicate sample also collected
NA = Not applicable

Table 3-3. Source Gas Composition and Flow Summary

	Dryer stack Run 1	Dryer stack Run 2	Loadout/silo emissions ducts Run 1	Loadout/silo emissions ducts Run 2	Loadout/silo emissions ducts Run 3	Loadout/silo emissions ducts (background) Run 4
Date	7/21/98	7/22/98	7/24/98	7/25/98	7/27/98	7/26/98
Dryer Stack						
Oxygen, %	9.2	4.0	–	–	–	–
Carbon dioxide, %	6.0	12.2	–	–	–	–
Moisture content, %	25.4	31.9	–	–	–	–
Volumetric flow rate,						
dscfm	18,758	19,441[1]	–	–	–	–
wscfm	25,145	28,548[1]	–	–	–	–
Tunnel Emissions Duct (TED)						
Oxygen, %	–	–	20.9	20.9	20.9	20.9
Carbon dioxide, %	–	–	0.0	0.0	0.0	0.0
Moisture content,[2] %	–	–	3.6	3.0	2.7	3.4
Volumetric flow rate,[2]						
dscfm	–	–	10,227	9,933	9,743	10,665
wscfm	–	–	10,609	10,240	10,013	11,040
acfm	–	–	11,261	10,922	10,832	11,886
Silo Emission Duct (SED)						
Oxygen, %	–	–	20.9	20.9	20.9	–
Carbon dioxide, %	–	–	0.0	0.0	0.0	–
Moisture content,[3] %	–	–	12.8	22.5	59.4	–
Volumetric flow rate,[3]						
dscfm	–	–	503	445	230	–
wscfm	–	–	577	574	56	–

[1] Average of two velocity traverses at beginning and end of test.
[2] Average of two trains (PES data for Method 315 and Method 0010).
[3] Data from single train operating during time period of FTIR sampling (PES data from Method 0010, trains S-MM5-1, S-MM5-2, and S-MM5-3, respectively).

3.3.1 Gaseous HAP Emission Results

Process Stack Results

Table 3-4 summarizes the gaseous HAPs identified by extractive FTIR in the process dryer stack emissions. Figures 3-2 and 3-3 show time plots of the data, and indicate most of emissions occurred later in the test run, when process stability became difficult to maintain.

SED Results

Table 3-5 summarizes the gaseous HAPs identified by extractive FTIR in the SED during the loadout testing. Time plots of the individual species are presented in Appendix C, and the FTIR results were consistent with the THC analyzer results.

TED Results

Table 3-6 summarizes the gaseous HAPs identified by extractive FTIR in the TED during the loadout testing. As with the SED HAP data, above, time plots of the individual species are presented in Appendix C, and the FTIR results were consistent with the THC analyzer results.

Note that the SED emissions, both the measured concentrations and the volumetric flowrates, were much more variable than the TED emissions.

Sample Concentration Results

The results from the sample concentration spectra were consistent with the load-out quantitation limits calculated from the direct-FTIR spectra (Appendix C). The sample concentration results indicate that the actual quantitation limits were lower than those reported in Appendix C, because none of the analytes was detected in the sample concentration spectra.

Preliminary measurements performed by PES during the site visit indicated that toluene, meta- and para-xylenes might be present at concentrations between 60 and 75 ppb (as measured by VOST). The preliminary results provided the justification for performing sample concentration FTIR during the main field test. The sample concentration flow rates and total collection volumes were calculated to provide the sensitivity to measure the target analytes at those concentrations (i.e., concentration factor of approximately 50).

The sample concentration spectra were qualitatively similar to the direct-FTIR spectra and toluene and the xylenes were not detected. The minimum sample concentration quantitation limits were estimated to be about 50 ppb. Analysis of these spectra was complicated by the presence of the non-aromatic hydrocarbon mixture that was measured in the direct FTIR samples. This hydrocarbon mixture was particularly high in the sample concentration spectra of the silo emissions.

The non-aromatic hydrocarbon mixture in the TED sample concentration spectra was measured as “hydrocarbon mixture B” (quantitated using hexane reference spectra) and the results were compared to the direct-FTIR measurements. After correcting for the sample concentration factor, the average measured mixture B concentration was 1.9 ppm in the front-trap samples. This compares to an average mixture B concentration of 3 ppm measured in the direct-FTIR samples. One would expect the sample concentration result to be lower because some sample won’t be recovered from the adsorbent material.

Table 3-4. Dryer Stack Emissions Summary

Compound emissions	Run 1	Run 2
Date	7/21/98	7/22/98
Flowrate (wscfm)	25,145	28,548
Propane (ppm, average)	4.1	ND
Propane (ppm, min/max)	ND/75.1	! / !
Emission rate (g/hr)	320	–
Emission rate (lb/hr)	0.71	–
Methane (ppm, average)	42.5	68.3
Methane (ppm, min/max)	ND/268	ND/268
Emission rate (g/hr)	1207	2202
Emission rate (lb/hr)	2.66	4.85
CO (ppm, average)	103	22.1
CO (ppm, min/max)	ND/355	ND/318
Emission rate (g/hr)	5118	1247
Emission rate (lb/hr)	11.3	2.75
SO_2 (ppm)	ND	ND
Emission rate (g/hr)	!	!
Emission rate (lb/hr)	!	!
NO_x (includes NO, NO_2, and N_2O, ppm)	ND	ND
Emission rate (g/hr)	!	!
Emission rate (lb/hr)	!	!

wscfm = wet standard cubic feet per minute
ND = Not detected above practical quantitation limit

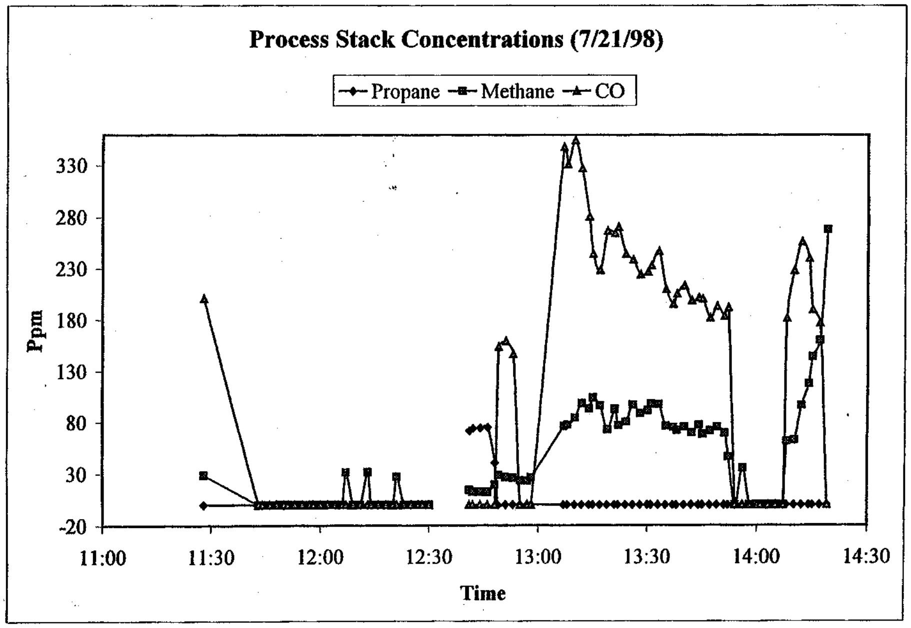


Figure 3-2. Process Stack Concentration (7/21/98)

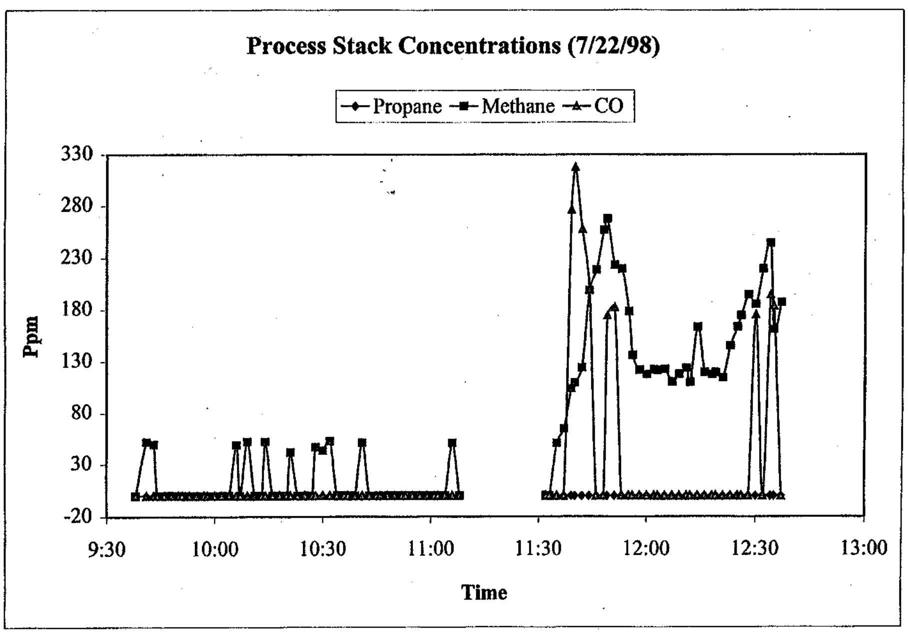


Figure 3-3. Process Stack Concentrations (7/22/98)

Table 3-5. SED Emissions Summary

Compound emissions	Run 1	Run 2	Run 3[a]
Date	7/24/98	7/25/98	7/27/98
Flowrate (dscfm)	577	574	567
Production rate (tons/hr)[b]	398	278	550
Asphalt temp. at loadout (EF)[c]	321	316	291
RTFOT Results (%)[d]	-0.362	-0.322	-0.284
Methane (ppm, average)	17	2.3	ND
Methane (ppm, min/max)	ND/37	ND/17	! / !
Emission rate (g/hr)	11.1	1.5	–
Emission rate (lb/hr)	0.024	0.0033	–
Emission factor (lb/ton)	6.1×10^{-5}	1.2×10^{-6}	–
CO (ppm, average)	82	16	142
CO (ppm, min/max)	61/108	ND/105	ND/426
Emission rate (g/hr)	93	18	159
Emission rate (lb/hr)	0.21	0.040	0.35
Emission factor (lb/ton)	5.2×10^{-4}	1.4×10^{-4}	6.4×10^{-4}
Hydrocarbon Mixture A[e] (ppm, average)	130	7.5	174
Hydrocarbon Mixture A[e](ppm, min/max)	54/236	ND/98	ND/522
Emission rate (g/hr)	488	28	641
Emission rate (lb/hr)	1.07	0.062	1.41
Emission factor (lb/ton)	2.7×10^{-3}	2.2×10^{-4}	2.6×10^{-3}
Hydrocarbon Mixture B[e] (ppm, average)	221	215	170
Hydrocarbon Mixture B[e] (ppm, min/max)	104/371	3.2/337	126/233
Emission rate (g/hr)	776	751	586
Emission rate (lb/hr)	1.71	1.65	1.29
Emission factor (lb/ton)	4.3×10^{-3}	5.9×10^{-3}	2.3×10^{-3}
Ethylene (ppm, average)	3.5	0.23	21
Ethylene (ppm, min/max)	1.4/4.7	ND/3.3	ND/63
Emission rate (g/hr)	4.0	0.26	23.5
Emission rate (lb/hr)	0.0088	0.00057	0.052
Emission factor (lb/ton)	2.2×10^{-5}	2.1×10^{-6}	9.4×10^{-5}
Formaldehyde (ppm, average)	19	3.0	ND
Formaldehyde (ppm, min/max)	ND/38	ND/32	! / !
Emission rate (g/hr)	23	3.6	–
Emission rate (lb/hr)	0.051	0.0080	–
Emission rate (lb/ton)	1.3×10^{-4}	2.9×10^{-5}	–
Isooctane (ppm, average)	16	0.89	ND
Isooctane (ppm, min/max)	9.8/30	ND/7.9	! / !
Emission rate (g/hr)	74	4.1	–
Emission rate (lb/hr)	0.16	0.0091	–
Emission factor (lb/ton)	4.1×10^{-4}	3.3×10^{-5}	

[a] Due to sampling difficulties, grab or "batch" sampling procedure used. Emissions data is considered qualitative due to reduced sampling frequency.
[b] Determined during time periods in which SED emissions monitoring by FTIR occurred.
[c] Average value obtained from PES.
[d] Average value obtained from PES as per ASTM method D2872-88.
[e] Together, "hydrocarbon mixture A" and "hydrocarbon mixture B" represent the best least-squares spectral fit for a nonaromatic hydrocarbon mixture. Mixture A was quantitated using reference spectra for toluene, and Mixture B was quantitated using reference spectra for hexane.

ND = Not detected above practical quantitation limit.

Table 3-6. TED Emissions Summary

Compound emissions	Run 1	Run 2	Run 3	Run 4
Date	7/24/98	7/25/98	7/27/98	7/26/98
Flowrate (dscfm)	10,609	10,240	10,013	11,040
Loadout rate (tons/hr)[a]	478	391	723	–
Asphalt temp. at loadout (EF)[b]	321	316	291	–
RTFOT Results (%)[c]	!0.362	-0.322	-0.284	–
Methane (ppm, average)	3.2	3.1	3.3	3.0
Methane (ppm, min/max)	2.8/3.5	2.6/3.4	2.8/4.2	2.7/3.2
Emission rate (g/hr)	38.3	35.8	37.3	37.4
Emission rate (lb/hr)	0.084	0.079	0.082	0.082
Emission factor (lb/ton)	1.8×10^{-4}	2.0×10^{-4}	1.1×10^{-4}	–
CO (ppm, average)	2.3	8.2	6.7	3.5
CO (ppm, min/max)	ND/14	ND/17	ND/18	ND/7.6
Emission rate (g/hr)	48	166	133	76
Emission rate (lb/hr)	0.11	0.365	0.29	0.17
Emission factor (lb/ton)	2.2×10^{-4}	9.3×10^{-4}	4.0×10^{-4}	–
Hydrocarbon Mixture A[d] (ppm, average)	ND	0.030	ND	ND
Hydrocarbon Mixture A[d] (ppm, min/max)	! / !	ND/3.2	! / !	! / !
Emission rate (g/hr)	–	2.0	–	–
Emission rate (lb/hr)	–	0.0044	–	–
Emission factor (lb/ton)	–	1.1×10^{-5}	–	–
Hydrocarbon Mixture B[d] (ppm, average)	3.2	2.8	3.1	ND
Hydrocarbon Mixture B[d] (ppm, min/max)	0.9/6.5	0.7/6.2	ND/6.4	! / !
Emission rate (g/hr)	207	174	189	–
Emission rate (lb/hr)	0.45	0.38	0.42	–
Emission factor (lb/ton)	9.5×10^{-4}	9.8×10^{-4}	5.8×10^{-4}	–
Ethylene (ppm, average)	0.11	ND	0.14	ND
Ethylene (ppm, min/max)	ND/0.7	! / !	ND/0.8	! / !
Emission rate (g/hr)	2.3	–	2.8	–
Emission rate (lb/hr)	0.0051	–	0.0061	–
Emission factor (lb/ton)	1.1×10^{-5}	–	8.4×10^{-6}	–
Formaldehyde (ppm, average)	ND	ND	0.024	ND
Formaldehyde (ppm, min/max)	! / !	! / !	ND/1.6	! / !
Emission rate (g/hr)	–	–	0.51	–
Emission rate (lb/hr)	–	–	0.0011	–
Emission factor (lb/ton)	–	–	1.5×10^{-6}	–

[a] Determined during time periods in which TED emissions monitoring by FTIR occurred.
[b] Average value obtained from PES.
[c] Average value obtained from PES as per ASTM method D2872-88.
[d] Together, "hydrocarbon mixture A" and "hydrocarbon mixture B" represent the best least-squares spectral fit for a nonaromatic hydrocarbon mixture. Mixture A was quantitated using reference spectra for toluene, and Mixture B was quantitated using reference spectra for hexane.

ND = Not detected above practical quantitation limit.

Tenax samples from the process stack SED were concentrated at a factor of approximately 30-40, and could not quantitatively measure the non-aromatic hydrocarbon fraction, since the relatively high concentrations encountered saturated the sorbent material. It was evident from other regions of these spectra that additional analytes were not present, and quantitation limits for these compounds are presented in Appendix C.

Toluene-d_8 was spiked into some of the Tenax samples as a surrogate to evaluate the sample percent recovery. The toluene-d_8 was not detected in the spiked samples. Spectral bands of toluene-d_8 are shifted to lower frequencies with respect to the toluene spectrum. While this provides a potential advantage in discriminating between the spiked and unspiked components, the lower frequency regions were more difficult to analyze for the deuterated species. This was primarily because the spiked samples still contained significant amounts of CO_2 and moisture, which interfered with the toluene-d_8 analysis. For this technique to become more quantitative, further development of deuterated species spiking procedures and/or more effective procedures for removal of moisture and CO_2, either spectrally or from the traps themselves, should be undertaken.

3.3.2 Total Hydrocarbon Emission Results

Table 3-7 summarizes the THC data for the test program. For the loadout (TED) testing, average THC emissions were fairly consistent at 7.1 to 7.7 ppm. The emission rate due to loadout operations was thus calculated to be 0.52 to 0.54 lb/hr. Baseline (Run 4) emissions were clearly present, but were much lower than the loadout emissions, and averaged 0.8 ppm (0.057 lb/hr) for the first half of the run, and 1.6 ppm (0.11 lb/hr) for the second half of the run.

Emissions at the SED were much more variable than those observed at the TED, due to greater variation in both the measured THC concentrations and the gas flowrates. Average THC concentrations ranged from 531 to 590 ppm for the test series, amounting to roughly 1.8 to 2.3 lb/hr. Note that the SED location, silo loading operations only occur during a fraction of the work day.

In addition to the TED and SED testing, two tests were performed on the process dryer stack. Average THC emissions were approximately 19 ppm for both of these tests, amounting to about 3.3 to 3.7 lb/hr.

In addition to the process dryer stack, TED and SED testing, a comparison of "intermittent loadout" emissions was performed. This test was performed to provide rough information on expected emission levels for an upcoming test at a batch mix facility (Plant D). Using only the THC analyzer for measuring emissions, a series of asphalt loadout drops were performed under controlled conditions. In Case 1, a typical 22-ton loadout was performed as four 5.5-ton drops, spaced at approximately 30-sec intervals. For Case 2, the 22-ton drop was performed all at once. Six drops of each type were performed.

Table 3-7. THC Emissions Summary

	Dryer Stack						
	Run 1	Run 2	Run 1	Run 2	Run 3	Run 4 (1st half)	Run 4 (2nd half)
Concentration (ppm as propane)							
Minimum	5.1	2.8	–	–	–	–	–
Maximum	63.5	84.4	–	–	–	–	–
Average	19.2	18.7	–	–	–	–	–
Emission rate (lb/hr)	3.3	3.7	–	–	–	–	–
Production rate (tons/hr)	494	457					
Emission factor (lb/ton)	6.7×10^{-3}	8.0×10^{-3}					
Tunnel Emissions Duct (TED)							
Concentration (ppm as propane)							
Minimum	–	–	0.0	0.0	1.7	0.6	1.2
Maximum	–	–	26.0	33.0	17.1	1.1	1.8
Average	–	–	7.1	7.7	7.7	0.83	1.6
Emission rate (lb/hr)	–	–	0.52	0.54	0.53	0.057	0.11
Loadout rate (tons/hr)[b]	–	–	453	400	573	–	–
Emission Factor (lb/ton)	–	–	1.1×10^{-3}	1.3×10^{-3}	9.2×10^{-4}	–	–
Silo Emission Duct (SED)							
Concentration (ppm as propane)							
Minimum	–	–	56.1	28.9	34.9	–	–
Maximum	–	–	790	656	1000[a]	–	–
Average	–	–	531	456	590	–	–
Emission rate (lb/hr)	–	–	2.1	1.8	2.3	–	–
Production rate (tons/hr)[c]	–	–	398	278	550	–	–
Emission factor (lb/ton)	–	–	5.3×10^{-3}	6.4×10^{-3}	4.2×10^{-3}	–	–
Asphalt Conditions							
Asphalt temp at loadout (EF)[d]	–	–	321	316	291	–	–
RTFOT Results (%)[e]	–	–	!0.362	!0.322	!0.284	–	–

[a] Maximum reading of instrument.
[b] Determined during time periods in which TED emissions monitoring by THC occurred.
[c] Determined during time periods in which SED emissions monitoring by THC occurred.
[d] Average value obtained from PES.
[e] Average value obtained from PES as per ASTM method D2872-88.

Figure 3-4 shows THC emissions results from Case 1 and Case 2 loadout methods. The THC integration time was set to 10-sec intervals to provide better resolution, and areas under each peak were integrated as shown in the figure.

The two data sets are summarized in Table 3-8, and were examined to determine if there was a significant difference between the means of each set. A Student's t-test was performed as shown in the table.

The difference in means is 361 ppm-sec, or 32.3%. These two means were compared using the Student two-sample t-test. First, the equality of variances in the two groups was tested via an F-test. The calculated F-value was 1.93 with (5,5) degrees of freedom. This value is not statistically significantly different from one (p-value of 0.49). Thus, the two variances can be assumed to be equal at the 95% confidence level.

The t-value was then calculated as 1.59 with 10 degrees of freedom (6+6-2). The significance level associated with this t-value is 0.14. Therefore, although there is a 361 ppm-sec difference in the mean values for Case 1 and Case 2, 361 ppm-sec is not statistically different from zero at the 95% confidence level.

Table 3-8. Intermittant Loadout Summary and Statisical Analysis

	Case 1 (4 x 5.5 ton)	Case 2 (1 x 22 ton)
Observations (ppm-sec)	1,564	1,243
	2,304	917
	1,243	1,729
	1,524	935
	1,189	936
	1,040	934
Average (Mean)	1,477	1,116
Differences in Averages (ppm-sec)	361	
Standard Deviation	452	326
Variance	204,304	106,276
Number of Observations	6	6

Minute-by-minute summaries and time plots of the THC data are contained in Appendix E. All THC data were calculated on a ppm as propane basis.

It should be noted that while 30-sec intervals between drops were used for this equipment, the intervals between drops at the Plant D test were approximately 60-sec. The Case 1 data resulting from drops at 60-sec intervals may be different than are presented in Table 3-8. As a result, the statistical analysis would also be different.

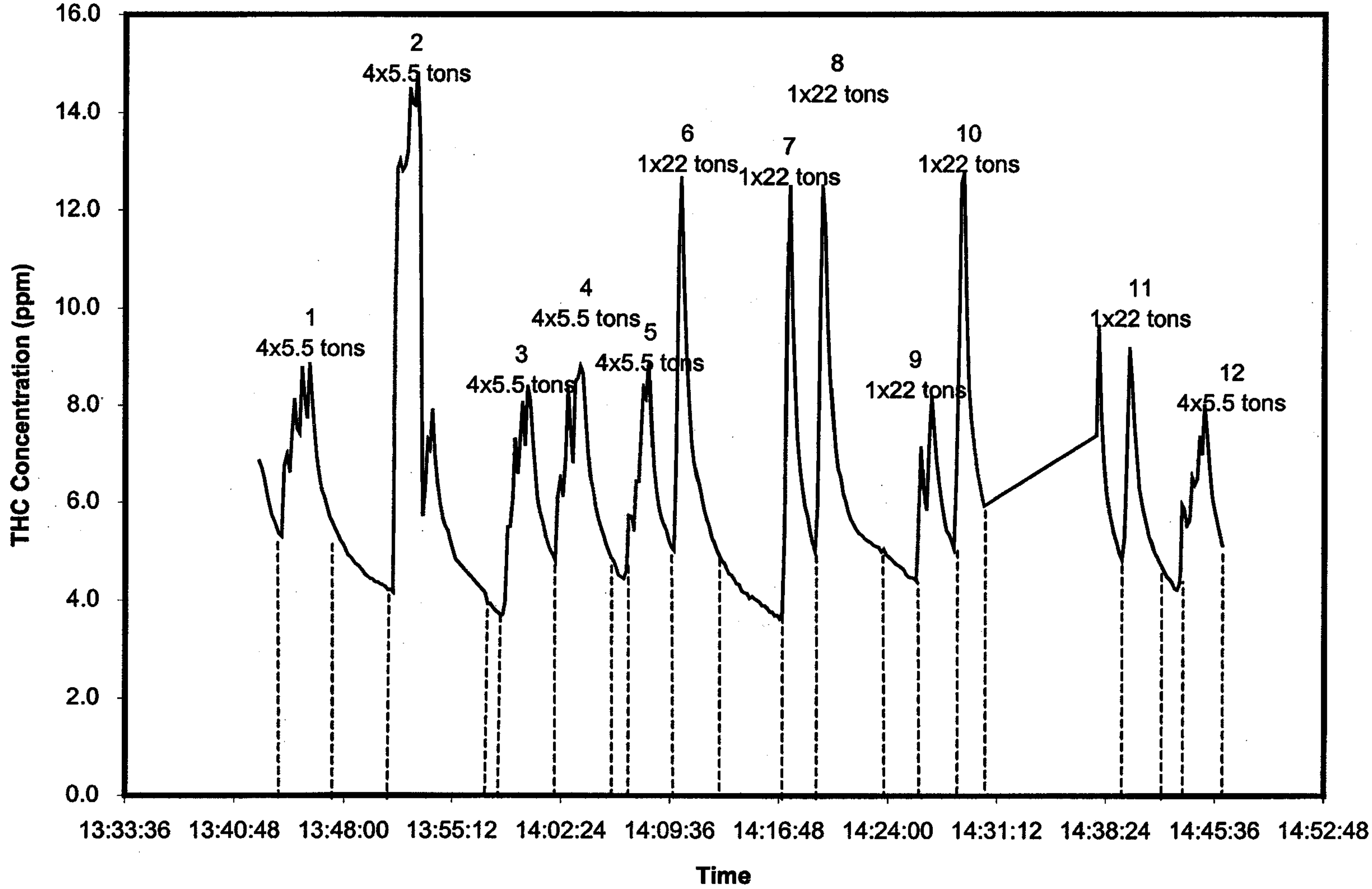


Figure 3-4. THC Concentrations During Intermittent Loadout Testing

3.3.3 Tracer Gas Capture Efficiency Test Results

Tracer gas capture efficiency was calculated using the lower confidence limit (LCL) approach contained in the EPA guidance document EMC GD-036.[1] Using this approach, the LCL was determined at the 90% confidence limit, and capture data from each test run was broken into 7 to 10 approximately equal time intervals of greater than 20 min each. The exact number of individual time intervals for each run was dependent upon the raw data and timing of SF_6 data collection within the run. Similarly, not every individual time interval was the exact same length, and actual time intervals varied from 21 to 27 min in length, depending upon the data available for each run. Table 3-9 summarizes this information and the LCL capture efficiency calculations.

As shown in Table 3-9, the 90%-LCL for the test series ranged from 54% to 65% for the three loadout test runs. The reported tracer gas capture efficiencies are believed to be underestimates of the actual emission capture efficiency. The tracer gas injection angles, location, and direction imposed a more severe challenge to the capture system than the emissions produced during loadout operations. The baseline test (Run 4) showed the poorest 90%-LCL capture efficiency (45%) and may be partially explained by the noticeably higher winds during the test. Of even greater importance, only two trucks were operating during the baseline test, creating large time intervals in which winds into the tunnel doorway were not blocked by awaiting truck traffic.

Appendix F contains a full summary of the SF_6 capture data and time plots of the measured SF_6 concentrations with the corresponding asphalt loadout. SF_6 gas release data is summarized in Appendix G. Loadout raw data is contained in Appendix H.

Table 3-9. SF_6 Capture Efficiency Calculations

Test conditions	Run 1	Run 2	Run 3	Run 4
Test date	7/24/98	7/25/98	7/27/98	7/26/98
Nominal test times (24-hr)	805-808	713-844	715-932	931-1345
	830-916	931-1112	1003-1044	
	925-932		1117-1135	
	1100-1257		1137-1152	
			1154-1200	
Elapsed time (min)	173	192	217	254
Silos operating	Silos 2,3,4 & 5	Silos 2,3,4 & 5	Silos 2,4 & 5	Silo 2
Loadout during capture tests (tons/hr)	478	391	723	NA
Loadout during all testing (tons/hr)	453	400	573	NA
SF_6 Release Rates				
	Run 1	Run 2	Run 3	Run 4
Average release rate (LPM)	4.07	4.04	4.01	4.11
Gas SF_6 concentration	0.0199	0.0199	0.0200	0.0200
Mass release rate (g/min)	0.490	0.487	0.486	0.498
Capture Efficiency[a] (%)				
Interval No.[b]	Run 1	Run 2	Run 3	Run 4
No. 1	93.0	78.5	79.8	55.9
No. 2	90.1	81.2	77.6	51.1
No. 3	82.1	82.3	65.1	65.6
No. 4	67.3	71.0	79.4	82.9
No. 5	64.4	53.7	53.0	55.2
No. 6	49.4	65.0	49.9	68.8
No. 7	63.1	73.9	46.1	38.1
No. 8	!	59.4	55.6	51.3
No. 9	!	!	50.1	23.4
No. 10	!	!	47.4	32.8
Average capture efficiency	72.8	70.6	60.4	52.5
Std. Deviation	16.0	10.5	13.8	17.7
n	7	8	10	10
t (0.90 LCL)	1.440	1.415	1.383	1.383
Capture Efficiency @ 90% LCL	**64**	**65**	**54**	**45**

[a] Complete calculation spreadsheets are contained in Appendix F.

[b] Exact times for each interval are in Appendix F.

3.4 Line Calibration Checks

The calibration standard mixture of 105 ppm toluene and 3.83 ppm SF_6 was measured directly by filling the FTIR cell from the cylinder and recording the spectrum of the gas standard. Then at least once each test day the same calibration mixture was injected into the sample line directly upstream of the first particulate filter at the end of the sample probe. The gas standard was allowed to flood the line from the probe to the FTIR cell. The cell was filled and the spectrum of the line spike was recorded. The line-spike spectra were analyzed using the spectrum of the direct measurement to calculate the recovered concentrations. The calculated concentrations in each of the line-spike spectra were compared to the 100 % recovery concentrations. The results are shown in Table 3-10.

Table 3-10. Calibration Standard Line Check Results

	Toluene		SF_6	
File Name	(ppm)	% Recovery	(ppm)	% Recovery
SP0727B	102.0	97.1%	2.72	97.2%
SP0727A	103.0	98.1%	3.70	96.7%
SP0726A	104.0	99.0%	3.79	98.8%
SP0722A[a]	99.5	94.7%	3.67	95.9%
SP0721A	101.7	96.8%	3.75	97.8%

[a] The calculated recovery for “sp0722a” was slightly below 95% because this sample contained a significant amount of moisture compared to the direct measurement or the other line measurements. This indicates “sp0722a” was slightly diluted by air compared to the other measurements. If the line had been purged longer with the gas standard, this measurement would also have been within 95%. The SF_6 recovery for “sp0722a” fell within 95%, but the SF_6 measurement also shows the slight dilution from air.

Section 4.
Sampling and Analytical Methods

Midwest Research Institute operated a sampling system (Figure 4-1) that transports sample gas through heated Teflon® lines. The sample stream passed through a gas manifold that distributed sample to the FTIR instrumentation and the total hydrocarbon analyzers (THC CEMS). Concentrated samples for FTIR analysis were collected separately, using a sampling train at each sampling location.

Sampling procedures followed the test plan and are further described in the FTIR Draft EPA Method 320[2] for hazardous air pollutants (HAPs), the EPA Protocol[3] for extractive FTIR testing at industrial point sources, and EPA Method 25A. The objectives of the field test were to use the FTIR method to measure emissions from the processes, screen for HAPs in the EPA FTIR reference spectrum library, conduct analyte spiking for quality assurance, and analyze the spectra for compounds not in the EPA library. The manual emissions measurements were performed by PES, who provided the manual data to MRI for the load-out and silo tests. MRI collected manual emission data for the process stack tests.

4.1 Sampling System Description

4.1.1 Extractive System

Sample was extracted through a single port using a 0.5-in diameter stainless steel probe (Figure 4-1). Sample was transported through heated Teflon® line using a KNF Neuberger heated head sample pump (Model No. 35 ST.11I). A Balston particulate filter (holder Model Number 30-25, filter element Model Number 100-25-BH, 99% removal efficiency at 0.1 mm) was connected in-line at the outlet of the sample probe. The sample line was heat wrapped and insulated.

The sample pump outlet was connected to the sample manifold where the sample stream passed through a secondary Balston particulate filter immediately after entering the manifold box. The manifold was constructed of stainless steel 3/8-in tubing and contains 4-way valves and heated rotameters (0 to 20 LPM) to allow the operator to control sample flow to the FTIR cell and the THC CEMS. A heated 1/4-in diameter 20-ft long Teflon jumper line connected the manifold to the inlet of the FTIR gas cell and to the THC CEMS. All sampling system components were maintained above the duct temperature (200EF for the load-out testing, 300EF for the process stack).

The manifold consists of a secondary particulate filter, control valves, rotameters, back pressure regulators and gauges, and a mass flow controller. The manifold can control

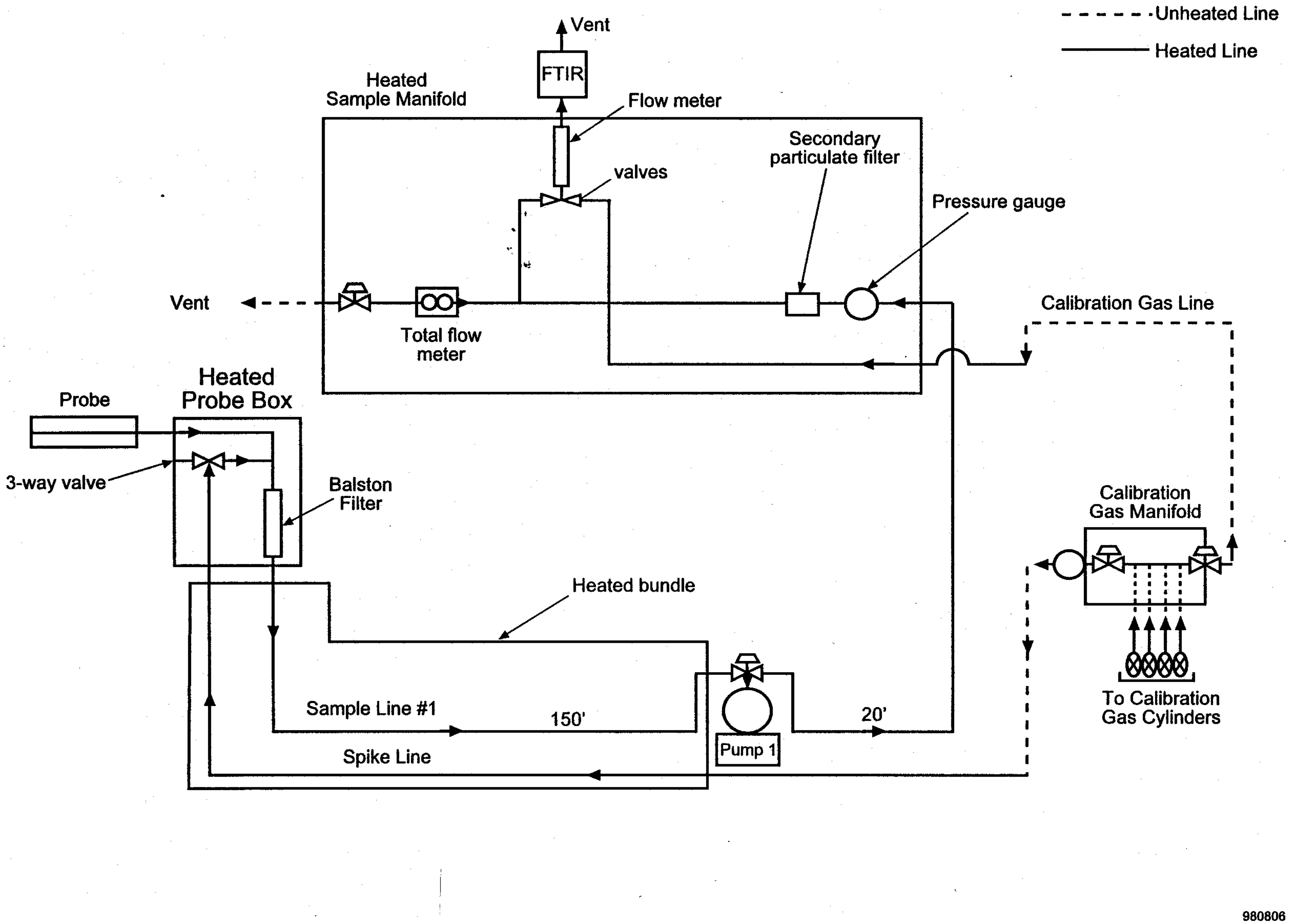


Figure 4-1. Extractive Sampling System

two sample gas stream inputs, eight calibration gases, and has outputs for three analyzers. Also included on the cart is a computer work station and controls for the spike valves and mass flow controller.

MRI used a KVB/Analect model RFX-40 FTIR spectrometer equipped with a liquid nitrogen cooled mercury cadmium telluride (MCT) detector. Samples were contained in an Infrared Analysis (model D-22H) variable path gas cell equipped with treated ZnSe windows. The cell was equipped with temperature controllers and was fitted with a digital pressure gauge. The FTIR gas cell was maintained at 250EF (120EC). The interior cell walls were coated with Teflon to minimize potential analyte losses.

The cell pathlength was set by adjusting an objective mirror to control the number of IR beam passes through the cell. The number of beam passes was measured by shining a He/Ne laser through the optical path and observing the number of laser spots on the field mirror. The pathlength in meters was determined by comparing Calibration Transfer Standard (CTS) EPA reference spectra to the CTS spectra recorded in the field, and was measured to be 9.9 meters. This path length was used in all of the analyses.

All data were collected at a resolution of 1.0 cm. One hundred scans were co-added for each spectrum (200 for background spectra). Each spectrum required about 2 min to record.

4.1.2 Sample Concentration

Using procedures contained in Appendix I, a measured volume of sample gas was collected using an absorbent tube filled with 10 g of Tenax sorbent material. The sampling train was a modified VOST train and used both a primary and backup trap for all tests. Prior to testing, the primary trap for each train was spiked with a measured volume of d_8-toluene in nitrogen (compressed gas). One sample concentration train was set up and run simultaneously with other methods (PES manual methods) at each test location.

Prior to sampling, each train was checked for contamination by collecting a measured volume of dry nitrogen through the sampling train. This tube was then desorbed in the same way as all of the sample tubes. One contamination check was run for each sampling train.

Field raw data sheets for the sample concentration technique are contained in Appendix I.

4.2 Sampling Procedures

Most of the FTIR measurements were performed using the continuous sampling procedure described below. Spectra of all calibrations, background measurements and some samples were recorded using the batch sampling procedure. All of the Method 25A measurements were performed as indicated in the method.

Batch Sampling—This procedure is described in Section 8.7.1 in EPA Method 320. With this technique, sample gas continuously flows from the probe, through the sample line, through the manifold, and out a manifold vent. A 4-way valve on the manifold is turned to direct a portion of the gas stream to fill the evacuated FTIR cell to ambient pressure. The manifold total flow meter before the vent is monitored to ensure that a positive flow is always directed out the vent during sampling. The cell is pressurized to slightly over 1 atmosphere before the inlet is closed. The cell outlet vent valve is opened to allow the sample to equilibrate at 1 atmosphere and then closed. The spectrum of the static sample is then recorded before the cell is evacuated to prepare for the next sample.

Continuous Sampling—Sample gas is flowed continuously from the probe through the sample line, through the manifold, and to the FTIR cell at ambient pressure. After the cell is filled as in the batch sampling procedure, the cell inlet and outlet valves are kept open to allow gas to pass through the cell. Spectra of the flowing sample is collected continuously by co-addition of 50 to 100 scans (approximately 1-min time period). The sampling and measurement times are expected to be longer than the 30-sec truck loading events. The observed emissions peaks may appear lower and to occur over a longer interval than the actual emissions from each 30-sec event. However, the integrated area under a plot of the observed emissions vs. time should give an accurate representation of the total emissions. Sample flow rate through the cell will be monitored and recorded so that a determination of cell purge time can also be made. Performance Specification 15 gives more detail on sampling rate and its effect on continuous measurements.

Sample Concentration—After the sample tubes were collected, they were placed on ice (up to several hours) until they could be analyzed. The sample tube was dried with a nitrogen purge connected to the tube inlet. The dried tube was placed in a tubular heating jacket and the tube outlet was connected to the FTIR cell inlet. The tube inlet was connected to a nitrogen cylinder. The tube was gradually heated to 220EC (under low flow) before the inlet and outlet valves were opened to allow nitrogen at 1 LPM to carry desorbed gases into the cell. Once the cell reached 1 atmosphere, the valves were closed and a spectrum of the contained sample was recorded.

4.3 FTIR Analytical Procedures

Analytical procedures in the EPA FTIR Protocol were followed for this test. Analytical programs were prepared prior to the field test for use in estimating some concentrations on site (i.e., SF_6 concentration). After the data collection was completed the spectra were analyzed using a computer program that employed a linear least squares fit routine (Rho Squared, Durham, NC).[4,5] The program operated in the Midac Grams/32® software package (Version 4.11, Level II, Galactic, Inc.). The input data (reference spectra and analytical regions) for the computer program are identified in Tables 4-1 and 4-2.

Initially, the spectra were evaluated to select suitable reference spectra as input for the computer program. Next an analysis was run on all of the sample spectra using the reference spectra listed in Tables 4-1 and 4-2. Undetected compounds were removed from the analysis and the spectra were analyzed again using reference spectra only for the detected compounds. The complete results from this second analytical run are summarized in tables in Appendices C and D (for the direct and sample concentration results, respectively).

The same program that performed the analysis calculated the residual spectra (the difference between the observed and least squares fit absorbance values). Residual spectra were calculated for each analytical region and for each sample spectrum. All of the residuals were stored electronically and are included with the electronic copy of the sample data provided with this report. The computer program calculated the standard 1sigma uncertainty for each analytical result, but some of the reported uncertainties for the detected compounds are equivalent to 2*sigma.

The concentrations were corrected for differences in absorption path length and temperature between the reference and sample spectra using the equation below.

$$C_{corr} = \left(\frac{Lr}{Ls}\right)\left(\frac{Ts}{Tr}\right)\left(\frac{Pr}{Ps}\right) C_{calc} \qquad (1)$$

where:
C_{corr} = concentration, corrected for path length and temperature
C_{calc} = uncorrected sample concentration
L_r = cell path length(s) (meters) used in recording the reference spectrum
L_s = cell path length (meters) used in recording the Sample spectra
T_r = absolute temperature(s) (Kelvin) of gas cell used in recording the reference spectra
T_s = absolute temperature (Kelvin) of the sample gas when confined in the FTIR gas cell
P_r = pressure of the reference spectrum sample
P_s = pressure of the sample gas in the FTIR cell

The sample path length was estimated by measuring the number of laser passes through the infrared gas cell. These measurements were recorded in the data records. The actual sample path length, L_s, was calculated by comparing the sample calibration transfer standard CTS spectra to CTS spectra in the EPA FTIR reference spectrum library. Reference CTS spectra from the EPA reference library, were used as input for an automated analysis of the CTS spectra recorded at the test site.

Table 4-1. Program Input for FTIR Analysis (Loadout and Silo Samples)

Compound Name	File name	Region No.	ISC *	Reference Meters	Reference T (K)
Water	194jsub	1,2,3	100*		
	194gsub		35.8*		
	194hsub		61.3*		
Carbon monoxide	co20829a	1	167.1	22	394
Sulfur dioxide	198c1bsi	2	90.3	22	394
Carbon dioxide	193b4a_b	1,2,3	415*		
Formaldehyde	087c1anb	3	100.0	11.25	373
Benzene	015a4ara	3	496.6	3	298
Methane	196c1bsd	3	80.1	22	394
Carbonyl Sulfide	030a4ase	2	19.5	3	298
Toluene	153a4arc	3	103.0	3	298
Methyl chloride	107a4asa	3	501.4	3	298
Methyl chloroform	108a4asc	2	98.8	3	298
1,1-Dichloroethane	086b4asa	2	499.1	2.25	373
1,3-Butadiene	023a4asc	2	98.4	3	298
Propane	prophan	3	39.3	3	298
Chlorobenzene	037a4arc	2	502.9	3	298
Cumene	046a4asc	3	96.3	3	298
Ethyl benzene	077a4arb	3	515.5	3	298
Hexane	095a4asd	3	101.6	3	298
Methylene chloride	117a4asa	2	498.5	3	298
Propionaldehyde	140b4anc	3	99.4	2.25	373
Styrene	147a4asb	2	550.7	3	298
1,1,2,2-Tetrachloroethane	150b4asb	2	493.0	2.25	373
p-Xylene	173a4asa	2	488.2	3	298
o-Xylene	171a4asa	3	497.5	3	298
m-Xylene	172a4arh	2	497.8	3	298
Isooctane	165a4asc	3	101.4	3	298
Ethylene	C0726b	2	99.9	9.9	397
SF_6	Sf0722a	2	0.205	9.9	397

Region No.	Upper cm^{-1}	Lower cm^{-1}
1	2,142.0	2,002.1
2	1,275.0	722.6
3	3,160.8	2,650.1

* Indicates an arbitrary concentration was used for the interferant.

Table 4-2. Program Input for FTIR Analysis (Process Stack and Tenax Samples)

Compound Name	File name	Region No.	ISC *	Reference	
				Meters	T (K)
Water	194jsub	1,2,3	100*		
Carbon monoxide	co20829a	1	167.1	22	394
Sulfur dioxide	198c1bsi	2	90.3	22	394
Carbon dioxide	193c1bsc	1,2,3	415*		
Formaldehyde	087c1anb	3	100.0	11.25	373
Benzene	015a4ara	3	496.6	3	298
Methane	196c1bsb	3	80.1	22	394
Carbonyl Sulfide	030a4ase	2	19.5	3	298
Toluene	153a4arc	3	103.0	3	298
Methyl chloride	107a4asa	3	501.4	3	298
Methyl chloroform	108a4asc	2	98.8	3	298
1,1-Dichloroethane	086b4asa	2	499.1	2.25	373
1,3-Butadiene	023a4asc	2	98.4	3	298
Propane	prophan	3	39.3	3	298
Cumene	046a4asc	3	96.3	3	298
Ethyl benzene	077a4arb	3	515.5	3	298
Hexane	095a4asd	3	101.6	3	298
Methylene chloride	117a4asa	2	498.5	3	298
Propionaldehyde	140b4anc	3	99.4	2.25	373
Styrene	147a4asb	2	550.7	3	298
1,1,2,2-Tetrachloroethane	150b4asb	2	493.0	2.25	373
p-Xylene	173a4asa	2	488.2	3	298
o-Xylene	171a4asa	3	497.5	3	298
m-Xylene	172a4arh	2	497.8	3	298
Isooctane	165a4asc	3	101.4	3	298
Ethylene	C0726b	2	99.9	9.9	397
SF_6	Sf0722a	2	0.205	9.9	397
Ammonia	174c1asc	2	10.0	20	388

Region No.	Upper cm^{-1}	Lower cm^{-1}
1	2,201	1952.3
2	1,331.8	750.5
3	3,160.3	2,450

* Indicates an arbitrary concentration was used for the interferant.

4.3.1 Computer Program Input

Tables 4-1 and 4-2 present a summary of the reference spectra input for the computer program used to analyze the sample spectra. Table 4-3 summarizes the program input used to analyze the CTS spectra recorded at the field test. The CTS spectra were analyzed as an independent determination of the cell path length. To analyze the CTS spectra, MRI used 0.25 cm^{-1} spectra "cts0814b" and "cts0814c." These reference CTS spectra were recorded on the same dates as the toluene reference spectra used in the analyses. These spectra were de-resolved in the same way as the toluene reference spectra using Section K.2.2 of the EPA FTIR protocol. The program analyzed the main two ethylene bands centered near 2,989 and 949 cm^{-1}. Table 4-4 summarizes the results of the CTS analysis. The cell path length from this analysis was used as L_s in equation (1).

4.3.2 EPA Reference Spectra

HAP spectra used in the MRI analysis were taken from the EPA reference spectrum library (http://134.67.104.12/html/emtic/ftir2.htm). The original sample and background interferograms were truncated to the first 16,384 data points. The truncated interferograms were Fourier transformed using Norton-Beer medium apodization and no zero filling. The transformation parameters were chosen to agree with those used to collect the sample absorbance spectra. The new 1.0 cm^{-1} toluene single beam spectra were combined with their de-resolved single beam background spectra and converted to absorbance.

4.3.3 Estimated Uncertainties of Non-Detects

The analytical program quantified each of the principal sample components. Then each standard spectrum was mathematically scaled and subtracted from the sample spectrum. The resulting residual spectra were analyzed to estimate quantitation limits for undetected HAPs. These quantitation limits, expressed as uncertainties in the non-detects (zero concentrations) are included in Appendix C.

4.3.4 FTIR System

A KVB/Analect Diamond RFX-40 spectrometer was used to record all of the data in this field test. The gas cell is a heated variable path (D-22H) gas cell from Infrared Analysis, Inc. The path length of the cell was set at 20 laser passes and was measured to be 9.9 meters using the CTS reference and sample spectra. The interior cell walls have been treated with a Teflon® coating to minimize potential analyte losses. An MCT liquid nitrogen detector was used. The spectra were recorded at a nominal resolution of 1.0 cm^{-1}.

Table 4-3. Program Input for Analysis of CTS Spectra

Compound name	File name	ASC	ISC	% Difference
Ethylene*	cts0814b.spc	1.007	1.014	0.7349
Ethylene	cts0814c.spc	1.007	0.999	0.7350

* This spectrum was used in the analysis of the Irvine CTS spectra. Analytical Regions for CTS analysis were 842.5 cm^{-1}-1107 cm^{-1} and 2984.36 cm^{-1}-2992.38 cm^{-1}.

Table 4-4. Path Length Determinations From the Analysis of Hot (397 K) CTS Spectra

CTS spectra (99.9 ppm Ethylene)	Path length results		
	Meters	Delta [a]	% Delta
C0721B	10.3	−0.36	−3.6%
C0721C	9.9	−0.05	−0.6%
C0721D	10.1	−0.20	−2.0%
C0721E	9.9	0.03	0.3%
C0722A	9.8	0.08	0.9%
C0722B	9.9	0.04	0.4%
C0723A	9.8	0.12	1.2%
C0723B	9.8	0.11	1.2%
C0723C	9.9	−0.03	−0.3%
C0724A	9.8	0.05	0.5%
C0724B	10.0	−0.08	−0.8%
C0725A	9.8	0.12	1.2%
C0725B	9.8	0.06	0.6%
C0725C	10.0	−0.10	−1.0%
C0726A	9.9	−0.01	−0.1%
C0726B	9.9	−0.01	−0.1%
C0727A	9.8	0.07	0.7%
C0727B	9.9	0.04	0.4%
C0727C	9.8	0.05	0.5%
C0727D	9.9	0.04	0.5%
Average Path Length (M)	9.9		
Standard Deviation	0.12		

[a] The difference between the calculated and average values.

4.4 Total Hydrocarbon Sampling Procedures

THC sampling was conducted simultaneously with the FTIR sampling at each of the test locations. The same sampling system used for the FTIR sampling was used for the THC sampling. Sample gas was directed to the analyzer through a separate set of rotameters and control valves on the manifold. A brief description of each system component follows.

- THC Analyzer—The THC concentration was measured using a flame ionization detector (FID). MRI used a J.U.M. Model VE-7 analyzer. The THC analyzer was operated on the zero to 100 ppm range throughout the test period (0-1000 ppm for SED). The fuel for the FID is 40 percent hydrogen and 60 percent helium mixture.

- Data Acquisition System—MRI used LABTECH notebook (Windows version), which is an integrated system that provides data acquisition, monitoring and control. The system normally writes data to a disk in the background while performing foreground tasks or displaying data in real time. The averaging period set for this test was one minute.
- Calibration Gases—Calibration gases were prepared from an EPA Protocol 1 cylinder of propane (5278 ppm propane in nitrogen) using an Environics Model 2020 gas dilution system that complies with the requirements of EPA Method 205. High, medium, and low standard gases were generated to perform analyzer calibration checks. The raw data are recorded in ppm as propane but are converted to an as carbon basis for reporting.

Section 5.
QA/QC Summary

5.1 Sampling and Test Conditions

Before the test, sample lines were checked for leaks and were cleaned by purging with moist air (250EF). Following this, the lines were checked for contamination using dry nitrogen. This is done by heating the sampling lines to 250EF and purging with dry nitrogen. The FTIR cell was filled with some of the purging nitrogen, and the spectrum of this sample was collected. This single beam spectrum was converted to absorbance using a spectral background of pure nitrogen (99.9 percent) taken directly from a cylinder. The lines were checked again on-site before sampling, after each change of location, and after spiking.

During sampling, spectra of at least 10 different samples were collected during each hour. Each spectrum was assigned a unique file name and written to the hard disk and a backup disk under that file name. Each interferogram was also saved under a file name that identifies it with its corresponding absorbance spectrum. All background spectra and calibration spectra were also stored on disks with their corresponding interferograms.

Notes on each calibration and sample spectrum were recorded on hard copy data sheets. Below are listed some sampling and instrument parameters that were documented in these records.

Sampling Conditions:

- Line temperature
- Process conditions
- Sample flow rate
- Ambient pressure
- Time of sample collection

Instrument Configuration:

- Cell volume (for continuous measurements)
- Cell temperature
- Cell path length
- Instrument resolution
- Number of scans co-added
- Length of time to measure spectrum
- Time spectrum was collected
- Time and conditions of recorded background spectrum
- Apodization

Hard copy records were also kept of all flue gas measurements, such as sample flow, temperature, moisture, and diluent data. Equipment calibration data and gas certifications are presented in Appendix J.

Effluent was allowed to flow through the entire sampling system for at least 5 minutes before a sampling run started or after changing to a different test location. FTIR spectra were continuously monitored to ensure that there was no deviation in the spectral baseline greater than ± 5 percent (! 0.02 # absorbance # +0.02). When this condition occurred, sampling was interrupted and a new background spectrum was collected. The run was then resumed until completed or until it was necessary to collect another background spectrum.

Results of the analyte spiking were presented earlier in Section 3.4 and met all QA/QC criteria, except where noted due to the presence of ambient air. These checks served to demonstrate sample line integrity during the field testing.

Results from the CTS spectra were presented earlier in Section 4.3.4 and met all QA/QC criteria. These checks served to demonstrate instrument stability and optical conditions during the field testing.

5.2 FTIR Spectra

For a detailed description of QA/QC procedures relating to data collection and analysis, refer to the "Protocol for Applying FTIR Spectrometry in Emission Testing."

A spectrum of the CTS was recorded at the beginning and end of each test day. A leak check of the FTIR cell was also performed according to the procedures in References 1 and 2. The CTS gas was 100 ppm ethylene in nitrogen. The CTS spectrum provided a check on the operating conditions of the FTIR instrumentation, e.g., spectral resolution and cell path length. Ambient pressure was recorded whenever a CTS spectrum was collected. The CTS spectra were compared to CTS spectra in the EPA library. This comparison is used to quantify differences between the library spectra and the field spectra so library spectra of HAPs can be used in the quantitative analysis.

Two copies of all interferograms, processed backgrounds, sample spectra, and the CTS were stored on separate computer disks. Additional copies of sample and CTS absorbance spectra were also stored for data analysis. Sample absorbance spectra can be regenerated from the raw interferograms, if necessary.

The compact disk enclosed with this report contains one complete copy of all of the FTIR data recorded at the field test. The data are organized into directories, whose titles identify the contents. The continuous data are in directories identified by the date on which the spectra were recorded. Additional subdirectories "AIF" and "ASF" identify interferograms and absorbance spectra, respectively. All of the sample data are in the Analect instruments software format. The directories "refs" and "residuals" contain de-resolved reference spectra that were used in the analyses and the residual spectra, respectively. There are three residual spectra for each sample spectrum, one for each analytical region. The information on the enclosed disk with the data records in Appendix A meets the reporting requirements of the EPA FTIR Protocol and Method 320.

To measure HAPs detected in the gas stream MRI used spectra from the EPA library, when available.

5.3 Method 25A

5.3.1 Initial Checks

Before starting the first run, the following system checks were performed:

1. Zero and Span check of the analyzer
2. Analyzer linearity check at intermediate levels
3. Response time check of the system

Calibration criteria for Method 25A is ± 5 % of calibration gas value.

5.3.2 Daily Checks

The following checks were made for each test run:

1. Zero/Span calibration and linearity checks before each test run
2. Final Zero and span calibration check of the analyzer at the end of each test run

The difference between initial and final zero and span checks agreed within ± 3 % of the instrument span.

Section 6.
References

1. "Revised Capture Efficiency Guidance for Control of Volatile Organic Compound Emissions," EMC GD-036, Prepared by EPA/OAQPS/EMC, February 7, 1995.

2. Test Method 320 *"Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy,"* Proposed in *Federal Register*, March 11, 1998.

3. *"Protocol For The Use of FTIR Spectrometry to Perform Extractive Emissions Testing at Industrial Sources,"* Revised, EPA Contract No. 68-D2-0165, Work Assignment 3-12, September, 1996.

4. *"An Examination of a Least Squares Fit FTIR Spectral Analysis Method,"* G. M. Plummer and W. K. Reagen, **Air and Waste Management Association**, Paper Number 96-WA65.03, 1996.

5. *"Computer-Assisted Quantitative Infrared Spectroscopy,"* Gregory L. McClure (ed.), **ASTM Special Publication 934** (ASTM), 1987.

Appendix A

Process Data

Process Data Spreadsheet

MRI Project No. 4701-08-03-04

Client/Source: EPA/Plant C (Hot Mix Asphalt Plant)

Run No. 1

Date: 7/21/98

Data Recorded By: Pam Murowchick

Time	Natural Gas Rate (ACFM)			Aggregate Feed Rate (TPH)	Liquid Asphalt Feed Rate (TPH)	Mix Rate (TPH)	Liquid Asphalt Temp. (F)	Burner Turndown Position (%)	Mix Temp. (F)	Cyclone Entrance Temp. (F)	Dryer Pressure (in Hg)	Baghouse Exit Temp. (F)	Baghouse Pressure Drop (in Hg)	Exhaust Fans Amperage (amps)		Comments
1119	1160	@	76.3	436.38	23.08	459.46	355.24	34.5	330.87	286	0.29	248	0	77	81	Mix 2 (3/4 inch) Started testing at 1120.
1130	1100	@	76.1	490.69	25.09	516.59	354.88	28.8	309.46	271	0.31	256	0	75	80	
1145	1140	@	76.7	491.86	25.99	517.85	354.89	28.8	312.66	274	0.30	260	0	75	78	
1154	1180	@	76.9	492.44	26.04	518.47	353.24	30.0	315.82	273	0.29	261	0	75	78	Switched to Mix 4 (1/2 inch).
1200	1200	@	77.1	505.36	28.08	533.44	353.24	30.0	313.01	268	0.31	261	0	75	79	
1215	1200	@	77.3	500.48	27.91	528.40	354.18	30.0	302.86	268	0.29	257	0	75	80	
1230	1190	@	77.4	508.51	28.37	536.88	354.87	30.0	313.40	280	0.30	264	0	75	78	
1245	1100	@	77.6	510.60	28.52	539.13	355.05	30.0	310.80	264	0.31	258	0	75	78	
1257	1180	@	77.7	503.73	28.17	531.90	307.32	29.5	304.16	266	0.28	256	0	75	79	Switched to Mix 2 (3/4 inch).
1306	1030	@	77.8	465.88	24.74	490.62	313.00	24.0	314.14	254	0.31	254	0	75	75	Started to ramp down to 400 TPH production.
1315	947	@	78.0	438.60	23.22	461.82	318.18	21.5	307.64	243	0.28	246	0	75	75	
1330	988	@	78.3	463.55	23.29	463.55	324.24	22.5	302.00	241	0.28	237	0	75	75	
1345	1070	@	77.9	438.18	23.16	461.34	329.13	23.4	306.63	243	0.31	237	0	75	78	
1355	1150	@	77.4	436.68	23.09	459.76	328.68	28.3	305.62	251	0.30	240	0	75	75	Switched to Mix 4 (1/2 inch).
1400	1150	@	77.1	448.94	25.01	473.95	329.50	28.3	310.11	254	0.32	242	0	75	79	
1413	841	@	78.0	390.64	21.99	412.63	332.53	18.0	319.81	224	0.32	235	0	72	75	Switched to Mix 2 (3/4 inch).
1421																Plant down due to burner out.
Avg.	1102	@	77.35	470.16	25.36	494.11	338.64	27.4	311.187	260	0.30	251	0	75	78	

Process Data Spreadsheet

MRI Project No. 4701-08-03-04

Client/Source: EPA/Plant C (Hot Mix Asphalt Plant)

Run No. 2

Date: 7/22/98

Data Recorded By: Pam Murowchick

Time	Natural Gas Rate (ACFM)			Aggregate Feed Rate (TPH)	Liquid Asphalt Feed Rate (TPH)	Mix Rate (TPH)	Liquid Asphalt Temp. (F)	Burner Turndown Position (%)	Mix Temp. (F)	Cyclone Entrance Temp. (F)	Dryer Pressure (in Hg)	Baghouse Exit Temp. (F)	Baghouse Pressure Drop (in Hg)	Exhaust Fans Amperage (amps)		Comments
931	1170	@	73.1	478.20	26.69	504.89	347.63	34.0	306.86	281	0.31	268	0	79	82	Mix 4 (1/2 inch) Started testing at 935.
946	1290	@	73.3	479.05	26.76	505.81	344.53	34.0	304.08	283	0.31	269	0	80	81	
1001	1160	@	73.6	478.04	26.68	504.72	346.12	34.0	300.89	285	0.32	271	0	80	82	
1013	1100	@	73.4	476.50	26.57	503.07	344.45	28.0	300.55	266	0.30	261	0	78	79	Switched to Mix 2 (3/4 inch).
1031	1160	@	73.9	465.71	24.62	490.33	343.38	28.0	293.55	263	0.30	254	0	76	80	
1046	1290	@	73.9	477.01	26.60	503.61	344.15	33.1	303.98	268	0.28	258	0	79	82	Switched to Mix 4 (1/2 inch).
1101	1160	@	74.1	476.84	26.60	503.44	345.06	33.1	302.96	268	0.31	258	0	78	81	
1114	1240	@	74.3	479.16	26.72	505.88	345.06	33.1	301.19	267	0.30	258	0	78	80	
1131	1160	@	75.2	479.83	26.72	506.60	342.70	33.1	299.46	267	0.30	259	0	78	82	
1146	711	@	75.7	357.62	18.85	376.47	341.06	12.0	306.95	214	0.31	235	0	72	72	Switched to Mix 2 (3/4 inch). Started to ramp down to 325 TPH production.
1201	789	@	76.2	327.88	17.34	345.22	340.68	15.0	295.30	213	0.31	216	0	75	75	
1216	890	@	76.3	324.71	17.12	341.84	341.88	15.0	314.52	213	0.31	213	0	74	75	
1231	819	@	77.0	325.96	17.22	343.18	340.73	15.7	307.53	211	0.32	211	0	75	75	
Avg.	1072	@	74.6	432.81	23.73	456.54	343.65	26.8	302.91	254	0.31	249	0	77	79	

Process Data Spreadsheet

Sheet_1_of_1_

Pacific Environmental Services — Run No. 2

Client/Source: EPA/Plant C (Hot Mix Asphalt Plant) — Date: 7/25/98

Data Recorded By: JHL

Time	Natural Gas Rate (ACFM)	Aggregate Feed Rate (TPH)	Recycle (RAP) Feed Rate (TPH)	% RAP in mix	Rubber Feed Rate (TPH)	Liquid Asphalt Feed Rate (TPH)	Liquid Asphalt Type	Mix Rate (TPH)	Product Code	Liquid Asphalt Temp. (F)	Burner Pos. (%)	Mix Temp. (F)	Cyclone Entrance Temp. (F)	Dryer Pressure (in Hg)	Baghouse Exit Temp. (F)	Baghouse Pressure Drop (in Hg)	Exhaust Fans Amperage (amps) fan 1 / fan 2
6:12 AM	700	69	18.9	20.4	0	4.4	4000	92.7	4C	319.4	11	326.6	210	0.33	205	0	75/75
6:30 AM	0	178.8	79.8	29.3	0	13.4	4000	272	2	321.1	15.1	315.7	178	1.84	191	0	88/92
7:10 AM	745	181.3	82.7	29.8	0	13.7	4000	277.7	2C	321.7	14	312.1	228	0.28	203	0	75/78
7:40 AM	834	183.2	82.7	29.6	0	13.8	4000	279.7	2C	321.7	17.6	326.1	237	0.27	213	0	75/80
8:11 AM	950	261.2	110.7	28.2	0	20.4	4000	392.3	4C	325.6	21.4	338	281	0.31	255	0	74/79
8:41 AM	927	241.6	88.9	25.5	0	18.1	4000	348.6	4C	326.2	`19	336.9	251	0.31	242	0	73/79
9:11 AM	710	182.4	81.7	29.4	0	13.7	4000	277.8	2C	324.8	12	324.2	221	0.32	219	0	74/75
9:41 AM	710	182.7	80.9	29.2	0	13.7	4000	277.3	2C	325.2	11	317.6	209	0.28	209	0	72/76
10:11 AM	733	177.2	78.6	29.2	0	13.2	4000	269	2C	325.6	11.6	323.8	218	0.29	210	0	73/75
10:41 AM	741	196.4	87.2	29.2	0	14.7	4000	298.3	2C	327.5	13	327.6	228	0.29	219	0	71/74
11:10 AM	854	185.5	82.1	29.2	0	13.8	4000	281.4	2C	328	10.5	307.8	208	0.28	208	0	71/73
11:34 AM	Plant shut down - lack of customers																
12:02 PM	789	0.41	0.2	31.7	0	0.03	4000	0.63	2C	329.8	29.1	216.2	206	0.23	194	0	71/74
12:40 PM	812	207.7	82.5	27.1	0	14	4000	304.2	2C	330	15	336.6	232	0.29	219	0	71/72
1:13 PM	880	255.86	112.2	29.0	0	19.1	4000	387.1	2C	331.2	21	329.8	260	0.29	242	0	72/75
1:42 PM	899	292.7	113.2	26.5	0	21	4000	426.9	2C	332	20	324.8	252	0.27	251	0	72/75

Process Data Spreadsheet

Pacific Environmental Services

Client/Source: EPA/Plant C (Hot Mix Asphalt Plant)

Run No. 1
Date: 7/24/98
Data Recorded By: JHL

Time	Natural Gas Rate (ACFM)	Aggregate Feed Rate (TPH)	Recycle (RAP) Feed Rate (TPH)	% RAP in mix	Rubber Feed Rate (TPH)	Liquid Asphalt Feed Rate (TPH)	Liquid Asphalt Type	Mix Rate (TPH)	Product Code	Liquid Asphalt Temp. (F)	Burner Pos. (%)	Mix Temp. (F)	Cyclone Entrance Temp. (F)	Dryer Pressure (in Hg)	Baghouse Exit Temp. (F)	Baghouse Pressure Drop (in Hg)	Exhaust Fans Amperage (amps) fan 1 / fan 2
6:34 AM	784	184.6	80.27	28.8	0	14	4000	278.9	2C	329.3	12.5	340	210	0.29	209	0	75/79
7:00 AM	841	295.1	0	0	0	15.6	4000	310.7	2	329.3	16	330	217	0.27	206	0	75/80
7:29 AM	1320	458.2	0	0	0	24.2	4000	482.4	2	331.8	37.3	319	332	0.31	280	0	81/88
8:00 AM	941	409.3	0	0	0	21.2	4000	430.5	2	332.2	21	324	268	0.33	283	0	75/79
8:30 AM	1040	383.5	0	0	0	21	4000	404.5	4	332	27	323	280	0.28	262	0	80/80
9:00 AM	915	328.9	0	0	0	18	4000	346.9	4	331.6	22	315	262	0.27	245	0	75/77
9:37 AM	878	322	0	0	0	16.7	4000	338.7	2	330.7	15	316	220	0.31	220	0	75/80
10:07 AM	847	322.6	0	0	0	16.7	4000	339.3	2	330.5	17	325	227	0.31	219	0	73/80
10:41 AM	974	328.6	0	0	0	18	4000	346.6	4	333.2	19.5	324	228	0.31	220	0	80/80
11:07 AM	899	319	0	0	0	16.6	4000	335.5	2	327.6	17.5	325	229	0.3	221	0	76/80
11:37 AM	945	320.2	0	0	0	16.6	4000	336.8	2	326.5	17.5	330	230	0.32	222	0	75/80
12:07 PM	913	319.9	0	0	0	16.6	4000	336.5	2	326.3	17.5	331	229	0.31	223	0	75/78
12:37 PM	920	320.4	0	0	0	16.6	4000	337	2	328.3	17.5	331	228	0.31	221	0	73/78
1:07 PM	858	320.2	0	0	0	16.6	4000	336.8	2	330.2	17.5	333	228	0.27	223	0	73/75

Process Data Spreadsheet

Sheet_1_of_1_

Pacific Environmental Services

Run No. 3

Client/Source: EPA/Plant C (Hot Mix Asphalt Plant)

Date: 7/27/98

Data Recorded By: JHL

Time	Natural Gas Rate (ACFM)	Aggregate Feed Rate (TPH)	Recycle (RAP) Feed Rate (TPH)	% RAP in mix	Rubber Feed Rate (TPH)	Liquid Asphalt Feed Rate (TPH)	Liquid Asphalt Type	Mix Rate (TPH)	Product Code	Liquid Asphalt Temp. (F)	Burner Pos. (%)	Mix Temp. (F)	Cyclone Entrance Temp. (F)	Dryer Pressure (in Hg)	Baghouse Exit Temp. (F)	Baghouse Pressure Drop (in Hg)	Exhaust Fans Amperage (amps) fan 1 / fan 2
6:30 AM	1190	0.9	0	0.0	0	3.6	4000	1.36	2C	319.3	24.9	316.1	271	0.33	231	0	78/81
6:59 AM	1190	342.8	140.3	27.6	0	24.6	4000	507.7	2C	321.9	31.3	324.7	341	0.28	306	0	78/81
7:36 AM	978	349.4	145.7	28.0	0	25.6	4000	520.7	2C	327.6	27	325.5	325	0.3	319	0	75/80
7:55 AM	1280	476.9	0	0.0	0	24.6	4000	501.5	2C	332.9	37	307.4	341	0.25	298	0	78/82
8:33 AM	1400	348.4	130.6	25.9	0	24.8	4000	503.8	2C	339.9	35.1	325.4	368	0.33	332	0	75/81
8:57 AM	1330	366.84	150.9	27.7	0	26.8	4000	544.6	2C	342.5	36	329.4	354	0.22	329	0	78/83
9:27 AM	1530	386.3	162	28.1	0	28.4	4000	576.6	2C	346.3	40.1	317.6	365	0.25	336	0	80/90
9:57 AM	1470	367.8	154.9	28.2	0	27.1	4000	549.8	2C	346.5	40	337.2	372	0.22	343	0	80/88
10:27 AM	1330	366.2	152.8	28.0	0	26.9	4000	545.9	2C	346.9	40	338.5	373	0.27	344	0	80/87
10:57 AM	1190	385.6	144.5	25.9	0	27.5	4000	557.5	2C	349	40	331.1	370	0.27	345	0	80/88
11:27 AM	1430	387.1	157.9	27.5	0	28.2	4000	573.2	2C	348.9	40	324.2	373	0.29	347	0	79/85
11:57 AM	1420	556	37.9	6.1	0	30.6	4000	624.4	2C	352.5	39.5	309.6	357	0.34	331	0	80/89
12:27 PM	1360	366.9	152.9	28.0	0	27	4000	546.9	2C	352.5	33	307.5	388	0.4	356	0	80/88
12:57 PM	1210	356.7	161.7	29.7	0	26.9	4000	545.2	2C	360.9	38.4	318.6	370	0.22	343	0	78/80
1:27 PM	1300	356.4	158.5	29.3	0	26.7	4000	541.5	2C	358	26.5	313	318	0.52	305	0	79/83
1:57 PM	1120	457.1	60	11.0	0	26.7	4000	543.3	2C	363.4	33.4	331.6	289	0.3	323	0	80/85
2:27 PM	881	374.7	0	0.0	0	19.5	4000	394.2	2	362.5	17.6	326.5	230	0.25	253	0	72/77

Comments: Rap was put on hold at 7:49 AM and continued at 8:05 AM

Plant was shut down at 3:20 AM due to energy conservation. Night shift was canceled.

Appendix B

Process Stack Testing Raw Data Sheets

40 CFR 60, APPENDIX A, METHOD 2* - GAS STREAM VELOCITY AND VOLUMETRIC FLOW RATE
DATA ENTRY AND SUMMARY OF RESULTS

MRI Project No. 4701.08.03.04
Client: USEPA - EMC
Sampling Location: 3

Run No. 1
Date: 07/21/98

Type S Pitot Tube No. PT-003
Pitot Tube Coefficient (Cp): 0.84
Thermocouple No. PT-36
Temperature Meter No. Y-0783
Barometer No. Y-2101
Elevation Change** from Barometer Location to Sampling Location: 20 feet
Cross Sectional Area of the Duct at Sampling Location: 13.8450 ft²
Carbon Dioxide Concentration By Volume, Dry Basis: 6.0 %
Oxygen Concentration By Volume, Dry Basis: 9.2 %
Gas Mol. Weight, Dry Basis (Md): 29.459 lb/lb-mole

FIRST TRAVERSE - START OF RUN

Start Time: 0930 Stop Time: 0950

Barometric Pressure at Barometer Location: 29.37 in. Hg
Barometric Pressure at Sampling Location: 29.35 in. Hg
Velocity Head at Centroid: 0.400 in. w.c.
Total Pressure at Centroid: 0.180 in. w.c.
Static Pressure: -0.102 in. w.c.
Absolute Pressure in Duct (Ps): 29.34 in. Hg
Water Vapor Concentration By Volume: 25.42 %
Gas Mol. Weight, Wet Basis (Ms): 26.550 lb/lb-mole

Traverse Point Number	Velocity Head, (delta-p), inches w.c.	Gas Stream Temp., (ts), °F	Velocity, (vs), ft/sec	Rotation Angle α
1-1	0.120	259	23.89	21
1-2	0.760	259	60.13	15
1-3	0.450	259	46.27	13
1-4	0.530	259	50.21	7
2-1	0.090	259	20.69	18
2-2	0.450	259	46.27	12
2-3	0.490	259	48.28	8
2-4	0.590	259	52.98	5
3-1	0.190	258	30.04	17
3-2	0.400	258	43.59	10
3-3	0.430	258	45.20	8
3-4	0.540	258	50.65	6
4-1	0.370	257	41.90	16
4-2	0.560	257	51.54	12
4-3	0.400	257	43.56	9
4-4	0.280	257	36.45	7
5-1	0.220	256	32.28	15
5-2	0.380	256	42.43	10
5-3	0.320	256	38.94	5
5-4	0.320	256	38.94	5
6-1	0.090	253	20.61	12
6-2	0.470	253	47.09	8
6-3	0.520	253	49.53	6
6-4	0.430	253	45.04	5

Average Rotation Angle: 10.4 °
Average Velocity: 41.94 ft/sec
Volumetric Flow Rate: 34,837 acfm
Volumetric Flow Rate: 25,152 scfm
Volumetric Flow Rate: 18,758 dscfm
Volumetric Flow Rate: 531 dry std. m³/min.

SECOND TRAVERSE - END OF RUN

Start Time: Stop Time:

Barometric Pressure at Barometer Location: in. Hg
Barometric Pressure at Sampling Location: in. Hg
Velocity Head at Centroid: in. w.c.
Total Pressure at Centroid: in. w.c.
Static Pressure: in. w.c.
Absolute Pressure in Duct (Ps): in. Hg
Water Vapor Concentration By Volume: %
Gas Mol. Weight, Wet Basis (Ms): lb/lb-mole

Traverse Point Number	Velocity Head, (delta-p), inches w.c.	Gas Stream Temp., (ts), °F	Velocity, (vs), ft/sec
1-1			
1-2			
1-3			
1-4			
2-1			
2-2			
2-3			
2-4			
3-1			
3-2			
3-3			
3-4			
4-1			
4-2			
4-3			
4-4			
5-1			
5-2			
5-3			
5-4			
6-1			
6-2			
6-3			
6-4			

Average Velocity: ft/sec
Volumetric Flow Rate: acfm
Volumetric Flow Rate: scfm
Volumetric Flow Rate: dscfm
Volumetric Flow Rate: dry std. m³/min.

RESULTS FOR RUN

Average Volumetric Flow Rate: NA dry std. ft³/hr.
Average Volumetric Flow Rate: NA dry std. m³/hr.

Deviation of the flow rate (acfm) after the run from the one before the run: NA %

COMMENTS: Second traverse not conducted due to process change before traverse could be run.

* 40 CFR 60, Appendix A, Method 3 is used for the determination of dry molecular weight, and the Alternative Method is used to determine moisture (water vapor) content.

** Positive values for locations above the barometer and negative values for locations below the barometer are entered here. (Computations reverse the signs to yield correct results.)

40 CFR 60, APPENDIX A, METHOD 2* - GAS STREAM VELOCITY AND VOLUMETRIC FLOW RATE
DATA ENTRY AND SUMMARY OF RESULTS

MRI Project No. 4701.08.03.04
Client: USEPA - EMC
Sampling Location: 3

Run No. 2
Date: 07/22/98

Type S Pitot Tube No. PT-003 Temperature Meter No. Y-0783 Barometer No. Y-2101
Pitot Tube Coefficient (Cp): 0.84 Elevation Change** from Barometer Location to Sampling Location: 20 feet
Thermocouple No. PT-36 Cross Sectional Area of the Duct at Sampling Location: 13.8450 ft³
Carbon Dioxide Concentration By Volume, Dry Basis: 4.0 % Gas Mol. Weight, Dry Basis (Md): 29.257 lb/lb-mole
Oxygen Concentration By Volume, Dry Basis: 12.2 %

FIRST TRAVERSE - START OF RUN

Start Time: 0902 Stop Time: 0916

Barometric Pressure at Barometer Location: 29.33 in. Hg
Barometric Pressure at Sampling Location: 29.31 in. Hg
Velocity Head at Centroid: 0.600 in. w.c.
Total Pressure at Centroid: 0.300 in. w.c.
Static Pressure: -0.123 in. w.c.
Absolute Pressure in Duct (Ps): 29.30 in. Hg
Water Vapor Concentration By Volume: 31.87 %
Gas Mol. Weight, Wet Basis (Ms): 25.674 lb/lb-mole

Traverse Point Number	Velocity Head, (delta-p), inches w.c.	Gas Stream Temp., (ts), °F	Velocity, (vs), ft/sec	Rotation Angle α
1-1	0.130	264	25.39	
1-2	0.510	264	50.30	
1-3	0.720	264	59.76	
1-4	1.020	264	71.13	
2-1	0.400	267	44.64	
2-2	0.400	267	44.64	
2-3	0.550	267	52.34	
2-4	0.690	267	58.63	
3-1	0.390	267	44.08	
3-2	0.530	267	51.38	
3-3	0.590	267	54.21	
3-4	0.820	267	63.91	
4-1	0.700	267	59.05	
4-2	0.790	267	62.73	
4-3	0.570	267	53.29	
4-4	0.780	267	62.33	
5-1	0.680	267	58.20	
5-2	0.940	267	68.43	
5-3	0.860	267	65.45	
5-4	0.820	267	63.91	
6-1	0.800	267	63.13	
6-2	0.900	267	66.96	
6-3	1.050	267	72.32	
6-4	0.920	267	67.70	

Average Rotation Angle: NR
Average Velocity: 57.66 ft/sec
Volumetric Flow Rate: 47,901 acfm
Volumetric Flow Rate: 34,083 scfm
Volumetric Flow Rate: 23,221 dscfm
Volumetric Flow Rate: 658 dry std. m³/min.

SECOND TRAVERSE - END OF RUN

Start Time: 1229 Stop Time: 1246

Barometric Pressure at Barometer Location: 29.33 in. Hg
Barometric Pressure at Sampling Location: 29.31 in. Hg
Velocity Head at Centroid: 0.150 in. w.c.
Total Pressure at Centroid: 0.006 in. w.c.
Static Pressure: -0.100 in. w.c.
Absolute Pressure in Duct (Ps): 29.30 in. Hg
Water Vapor Concentration By Volume: 31.87 %
Gas Mol. Weight, Wet Basis (Ms): 25.674 lb/lb-mole

Traverse Point Number	Velocity Head, (delta-p), inches w.c.	Gas Stream Temp., (ts), °F	Velocity, (vs), ft/sec
1-1	0.330	201	38.66
1-2	0.340	201	39.24
1-3	0.330	201	38.66
1-4	0.320	201	38.07
2-1	0.200	202	30.12
2-2	0.320	202	38.10
2-3	0.270	202	34.99
2-4	0.230	202	32.30
3-1	0.190	203	29.38
3-2	0.240	203	33.02
3-3	0.180	203	28.59
3-4	0.170	203	27.79
4-1	0.340	204	39.33
4-2	0.350	204	39.90
4-3	0.130	204	24.32
4-4	0.130	204	24.32
5-1	0.360	210	40.65
5-2	0.470	210	46.45
5-3	0.440	210	44.94
5-4	0.400	210	42.85
6-1	0.200	208	30.25
6-2	0.200	208	30.25
6-3	0.550	208	50.17
6-4	0.220	208	31.73

Average Velocity: 35.59 ft/sec
Volumetric Flow Rate: 29,562 acfm
Volumetric Flow Rate: 22,988 scfm
Volumetric Flow Rate: 15,661 dscfm
Volumetric Flow Rate: 443 dry std. m³/min.

RESULTS FOR RUN

Average Volumetric Flow Rate: 1,166,462 dry std. ft³/hr.
Average Volumetric Flow Rate: 33,031 dry std. m³/hr.

Deviation of the flow rate (acfm) after the run from the one before the run: -38.3 %

COMMENTS: For the second traverse, points were measured through ports 5 and 6 before word was received to stop sampling. Points at ports 1 through 4 were measured shortly after word was received to stop. The moisture and gas molecular weight values used for the second traverse are not representative. No data could be collected.

* 40 CFR 60, Appendix A, Method 3 is used for the determination of dry molecular weight, and the Alternative Method is used to determine moisture (water vapor) content.

** Positive values for locations above the barometer and negative values for locations below the barometer are entered here. (Computations reverse the signs to yield correct results.)

40 *CFR* 60, APPENDIX A, METHOD 2* -
GAS STREAM VELOCITY AND VOLUMETRIC FLOW RATE FIELD DATA SHEET

MRI Project No. 4701.08.03.04
Client: USEPA-EMC
Sampling Location: 3
Operator(s): J. Surman, D. Neal, B. Edwards
Type S Pitot Tube No. PT-003
Pitot Tube Coefficient (C_p): 0.84

Run No. 1
Date: 07-21-98

Temperature Meter No. Y-0783
Thermocouple No. TP ~~PT~~-36 EE SWR 8-14-98
Barometer No. Y-2101
Elevation Change** from Barometer Location to Sampling Location: +20 feet
Cross Sectional Area of Duct at Sampling Location: 13.945 ft³
Carbon Dioxide Concentration By Volume, Dry Basis: 6.0 %
Oxygen Concentration By Volume, Dry Basis: 9.2 %

FIRST TRAVERSE - START OF RUN

Start Time: 0930 Stop Time: 0950
Barometric Pressure (P_{bar}) at Barometer Location: 29.37 in. Hg
Velocity Head (Δp) at Centroid of Duct: 0.40 in. H_2O
Total Pressure (P) at Centroid of Duct: +0.18 in. H_2O

Leak Checks - Initial: No Leak Final: No Leak

Traverse Point Number	Velocity Head, (Δp), in. H_2O	Gas Stream Temp. (t_s), °F	Rotation Angle, α
1-1	0.12	259	21
1-2	0.76	259	15
1-3	0.45	259	13
1-4	0.53	259	7
2-1	0.09	259	18
2-2	0.45	259	12
2-3	0.49	259	8
2-4	0.59	259	5
3-1	0.19	258	17
3-2	0.40	258	10
3-3	0.43	258	8
3-4	0.54	258	6
4-1	0.37	257	16
4-2	0.56	257	12
4-3	0.40	257	9
4-4	0.28	257	7
5-1	0.22	256	15
5-2	0.38	256	10
5-3	0.32	256	5
5-4	0.32	256	5
6-1	0.09	253	12
6-2	0.47	253	8
6-3	0.52	253	6
6-4	0.43	253	5

SECOND TRAVERSE - END OF RUN

Start Time: ______ Stop Time: ______
P_{bar}: ______ in. Hg
Δp: ______ in. H_2O
P: ______ in. H_2O

Initial: ______ Final: ______

Traverse Point Number	Velocity Head, (Δp), in. H_2O	Gas Stream Temp. (t_s), °F

* 40 *CFR* 60, Appendix A, Method 3 is used for the determination of dry gas molecular weight, and the Alternative Method is used for the determination of moisture content.
** Enter positive values for locations above barometer and negative values for locations below barometer.

Comments:

40 *CFR* 60, APPENDIX A, METHOD 2* -
GAS STREAM VELOCITY AND VOLUMETRIC FLOW RATE FIELD DATA SHEET

MRI Project No. 4701.08.03.04
Client: USEPA-EMC
Sampling Location: 3
Operator(s): J. Surman, D. Nell, B. Edwards
Type S Pitot Tube No. PT-003
Pitot Tube Coefficient (C_p): 0.84

Run No. 2
Date: 07-22-98
Temperature Meter No. Y-0783
Thermocouple No. ~~PT-36~~ TP-36 EE 8-14-98
Barometer No. Y-2101
Elevation Change** from Barometer Location to Sampling Location: +20 feet
Cross Sectional Area of Duct at Sampling Location: 13.845 ft^3
Carbon Dioxide Concentration By Volume, Dry Basis: 4.0 %
Oxygen Concentration By Volume, Dry Basis: 12.2 %

FIRST TRAVERSE - START OF RUN

Start Time: 0902 Stop Time: 0916
Barometric Pressure (P_{bar}) at Barometer Location: 29.33 in. Hg
Velocity Head (Δp) at Centroid of Duct: 0.60 in. H_2O
Total Pressure (P) at Centroid of Duct: 0.30 in. H_2O

Leak Checks - Initial: No Leak Final: No Leak

Traverse Point Number	Velocity Head, (Δp), in. H_2O	Gas Stream Temp. (t_s), °F	Rotation Angle, α
1-1	~~0.24~~ 0.13	264	
1-2	0.51	264	
1-3	0.72	264	
1-4	1.02	264	
2-1	0.40	267	
2-2	0.40	267	
2-3	0.55	267	
2-4	0.69	267	
3-1	0.39	267	
3-2	0.53	267	
3-3	0.59	267	
3-4	0.82	267	
4-1	0.70	267	
4-2	0.79	267	
4-3	0.57	267	
4-4	0.78	267	
5-1	0.68	267	
5-2	0.94	267	
5-3	0.86	267	
5-4	0.82	267	
6-1	0.80	267	
6-2	0.90	267	
6-3	1.05	267	
6-4	0.92	267	

SECOND TRAVERSE - END OF RUN

Start Time: 1229 Stop Time: 1246
P_{bar}: NR in. Hg
Δp: ~~NR~~ 0.15 in. H_2O
P: ~~NR~~ 0.00 in. H_2O

Initial: No Leak Final: No Leak

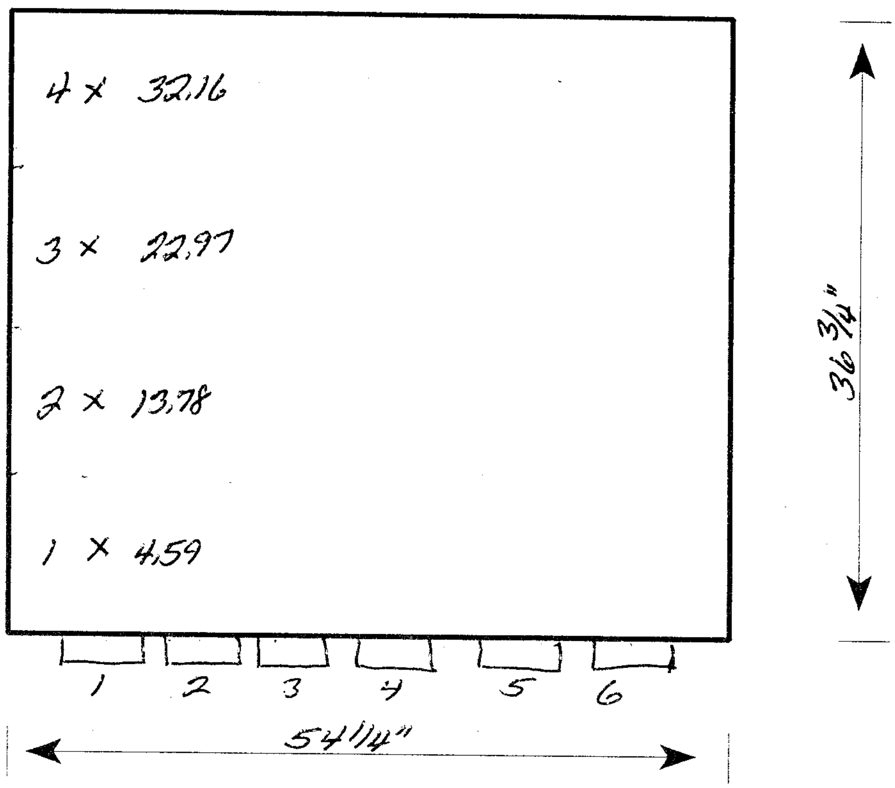
Traverse Point Number	Velocity Head, (Δp), in. H_2O	Gas Stream Temp. (t_s), °F
1-1	0.33	201
1-2	0.34	201
1-3	0.33	201
1-4	0.32	201
2-1	0.20	202
2-2	0.31	202
2-3	0.27	202
2-4	0.23	202
3-1	0.19	203
3-2	0.24	203
3-3	0.18	203
3-3	0.17	203
4-1	0.34	204
4-2	0.35	204
4-3	0.13	204
4-4	0.13	204
5-1	0.36	210
5-2	0.47	210
5-3	0.44	210
5-4	0.40	210
6-1	0.20	208
6-2	0.20	208
6-3	0.55	208
6-4	0.22	208

* 40 *CFR* 60, Appendix A, Method 3 is used for the determination of dry gas molecular weight, and the Alternative Method is used for the determination of moisture content.
** Enter positive values for locations above barometer and negative values for locations below barometer.

Comments: Second traverse - Ports 1-4 done after 1235 (time told to shutdown)

TRAVERSE POINT LOCATION FOR RECTANGULAR DUCTS

MRI Project No. 4701.08.03.04
Client: USEPA-EMC
Sampling Location: 3
Date: 07-20-98
For Run Numbers: All



Compass Direction ➤ Northeast

Flow is toward away from observer and is upward downward horizontal

Inside of far wall to outside of port (Distance A): 41 inches
Inside of near wall to outside of port (Distance B): 4.25 inches
Traverse distance (A - B): 36.75 inches
Internal duct dimension normal to traverses: 54.25 inches
Number of test ports: 6
Distance between port centers: 9 inches
Distance of nearest flow disturbance upstream from ports: 177 inches
Distance of nearest flow disturbance downstream from ports: 92 inches
Number of test points per traverse (i.e., per port): 4
Distance between test points on a traverse: 9.1875 inches
Dimensions obtained by/from: direct measurement
Data recorded by: J. Surman

COMMENTS:

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4701-08-03-04 RUN NO. 1

SAMPLE NO. ______ DATE 7-21-98

PLANT SAMPLING LOCATION DRYER STACK

ANALYSIS TIME (24hr-CLOCK) 1626

SAMPLE TYPE (BAG, GRAB) ______

OPERATOR D. NEAL

ORSAT LEAK CHECK BEFORE ANALYSIS:

BURETTE Pass CHANGE IN 4 MIN.

PIPETTES Pass CHANGE IN 4 MIN.

ORSAT LEAK CHECK AFTER ANALYSIS:

BURETTE Pass CHANGE IN 4 MIN.

PIPETTES Pass CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 6.0 2 6.0 3 6.0	6.0	1 6.0 2 6.0 3 6.0	6.0	1 6.0 2 6.0 3 6.0	6.0	6.0
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 15.2 2 15.2 3 15.2	9.2	1 15.2 2 15.2 3 15.2	9.2	1 15.2 2 15.2 3 15.2	9.2	9.2

91-16 SEV SURMAN wksht 052191

Acceptance Criteria

CO_2	> 4%	.3% by Volume	O_2	≥ 15%	.2% by Volume
	≤ 4%	.2% by Volume		< 15%	.3% by Volume

Comments:

OXYGEN AND CARBON DIOXIDE BY ORSAT

PROJECT NO. 4701-08-03-04 RUN NO. Run 2
SAMPLE NO. ____ DATE 7-22-95
PLANT SAMPLING LOCATION Burner Outlet Stack
ANALYSIS TIME (24hr-CLOCK) 1327
SAMPLE TYPE (BAG, GRAB) BAG
OPERATOR Gulick

ORSAT LEAK CHECK BEFORE ANALYSIS:
BURETTE 0 CHANGE IN 4 MIN.
PIPETTES 0 CHANGE IN 4 MIN.
ORSAT LEAK CHECK AFTER ANALYSIS:
BURETTE 0 CHANGE IN 4 MIN.
PIPETTES 0 CHANGE IN 4 MIN.

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	1 4.0 2 4.0 3 4.0	4.0	1 4.0 2 4.0 3 4.0	4.0	1 4.0 2 4.0 3 4.0	4.0	4.0
O_2 (NET IS SECOND READING MINUS ACTUAL CO_2 READING)	1 16.2 2 16.2 3 16.2	12.2	1 16.2 2 16.0 3 16.2	~~16~~ 12.1	1 ~~14.0~~ 16.2 2 16.2 3 16.2	12.2	12.2

91-16 SEV SURMAN wksht 052191

Acceptance Criteria

CO_2 > 4% .3% by Volume
≤ 4% .2% by Volume

O_2 ≥ 15% .2% by Volume
< 15% .3% by Volume

Comments:

MOISTURE (ALTERNATIVE METHOD) FIELD DATA CALCULATIONS
DATA ENTRY AND SUMMARY OF RESULTS

MRI Project No. 4701.08.03.04
Client: USEPA - EMC
Sampling Location: 3

Run No. 1
Date: 07/21/98

Metering Console No. VOST 2
Dry Gas Meter Factor (Y): 0.983
Impinger Set No. A
Gas Stream Temperature: 256 °F
Gas Stream Static Pressure: -0.10 in. w.c.
Barometric Pressure: 29.35 in. Hg
Gas Stream Volumetric Flow Rate: 18,758 dscfm

Initial Impingers Weight: 550.90 grams

Clock Time, 24-hr	Dry Gas Meter Volume, Liters	Average Dry Gas Meter Temp., °F	Dry Gas Meter Pressure, in. w.c.	Gas Stream Temp., °F	Constant Sampling Rate Variation	Vapor Pressure Of Water, in. Hg	Percent Water Vapor (Saturated), v/v
1122	0.000						
1132	6.250	42.0	0.00		1.12%		
1142	12.580	42.0	0.00		2.42%		
1152	18.800	41.0	0.00		0.64%		
1202	24.080	42.0	0.00		-14.57%		
1212	30.320	42.0	0.00		0.96%		
1222	36.570	45.0	0.00		1.12%		
1232	42.790	47.0	0.00		0.64%		
1242	49.060	47.0	0.00		1.45%		
1252	55.320	47.0	0.00		1.29%		
1302	61.600	46.0	0.00		1.61%		
1312	67.850	44.0	0.00		1.12%		
1322	74.120	43.0	0.00		1.45%		
1332	80.360	45.0	0.00		0.96%		
1342	86.620	44.0	0.00		1.29%		
1352	92.870	43.0	0.00		1.12%		
1402	99.140	43.0	0.00		1.45%		
1412	105.400	42.0	0.00		1.29%		
1422	111.250	41.0	0.00		-5.35%		

Final Impingers Weight: 579.60 grams

Sample Volume and Conditions and Moisture Results

Gas Sample Volume:	3.929	dcf
	0.1113	dcm
Gas Sample Volume at Standard Conditions:	3.971	dscf
	0.1125	dscm
Average Absolute Sampled Gas Temperature:	503.34	°R
	279.63	°K
Average Absolute Sampled Gas Pressure:	29.35	in. Hg
	745.49	mm Hg
Condensate Collected:	28.70	grams
Moisture (Water Vapor):	**25.42**	**% v/v**

MOISTURL.WK4 03/02/95 (rev. MOIST3_1.WK4 07/29/98 03:52 PM)

MOISTURE (ALTERNATIVE METHOD) FIELD DATA CALCULATIONS
DATA ENTRY AND SUMMARY OF RESULTS

MRI Project No. 4701.08.03.04
Client: USEPA - EMC
Sampling Location: 3

Run No. 2
Date: 07/22/98

Metering Console No. VOST 2
Dry Gas Meter Factor (Y): 0.983
Impinger Set No. A
Gas Stream Temperature: 267 °F
Gas Stream Static Pressure: -0.12 in. w.c.
Barometric Pressure: 29.31 in. Hg
Gas Stream Volumetric Flow Rate: 23,221 dscfm

Initial Impingers Weight: 550.50 grams

Clock Time, 24-hr	Dry Gas Meter Volume, Liters	Average Dry Gas Meter Temp., °F	Dry Gas Meter Pressure, in. w.c.	Gas Stream Temp., °F	Constant Sampling Rate Variation	Vapor Pressure Of Water, in. Hg	Percent Water Vapor (Saturated), v/v
0936	0.000						
0946	6.980	28.0	0.00		-0.07%		
0956	14.010	29.0	0.00		0.64%		
1006	20.960	30.0	0.00		-0.50%		
1016	28.060	33.0	0.00		1.65%		
1026	35.110	35.0	0.00		0.93%		
1036	42.060	36.0	0.00		-0.50%		
1046	48.990	37.0	0.00		-0.79%		
1056	55.970	37.0	0.00		-0.07%		
1106	63.010	37.0	0.00		0.79%		
1116	70.050	38.0	0.00		0.79%		
1126	77.010	38.0	0.00		-0.36%		
1136	84.030	40.0	0.00		0.50%		
1146	91.050	40.0	0.00		0.50%		
1156	98.010	40.0	0.00		-0.36%		
1206	105.050	40.0	0.00		0.79%		
1216	112.070	39.0	0.00		0.50%		
1226	119.010	40.0	0.00		-0.64%		
1234	124.333	40.0	0.00		-3.79%		

Final Impingers Weight: 595.10 grams

Sample Volume and Conditions and Moisture Results

Gas Sample Volume:	4.391	dcf
	0.1243	dcm
Gas Sample Volume at Standard Conditions:	4.496	dscf
	0.1273	dscm
Average Absolute Sampled Gas Temperature:	496.17	°R
	275.65	°K
Average Absolute Sampled Gas Pressure:	29.31	in. Hg
	744.47	mm Hg
Condensate Collected:	44.60	grams
Moisture (Water Vapor):	**31.87**	**% v/v**

MOISTURL.WK4 03/02/95 (rev. MOIST3_2.WK4 07/29/98 04:08 PM)

ALTERNATIVE METHOD - MOISTURE TRAIN FIELD DATA SHEET

MRI Project No. 4701.08.03.04
Client: USEPA-EMC

Sampling Location: 3
Run No. 1
Date: ~~02~~ 07-21-98
Operator(s): J. Surman

Metering Console No. VOST 2
Dry Gas Meter Factor (Y): 0.983
Impinger Set No. A
Gas Stream Temperature: 257 °F
Gas Stream Static Pressure: -0.102 in. w.c.
Barometric Pressure: 29.35 in. Hg
Gas Stream Volumetric Flow Rate: 535 dscfm

Initial Impingers Wt.: 550.9 grams
Silica gel: 100 % blue

Initial Leak Check: 0 cc/min @ 15 in. Hg vacuum

Clock Time, 24-Hr	Dry Gas Meter Volume, Liters	Dry Gas Meter Temperature*, °F	Dry Gas Meter Pressure, in. w.c.	Flow Rate Meter Setting	Impinger Outlet Temperature, °F	Pump Vacuum, in. Hg	Gas Stream Temperature, °F
1122	0.000						
1132	6.25	42	0	70	68	2	
1142	12.58	42	0	70	67	2	
1152	18.80	41	0	70	67	2	
1202	24.08	42	0	70	68	2	
1212	30.32	42	0	70	68	2	
1222	36.57	45	0	70	59	2	
1232	42.79	47	0	70	60	2	
1242	49.06	47	0	70	61	2	
1252	55.32	47	0	70	61	2	
1302	61.60	46	0	70	63	2	
1312	67.85	44	0	70	60	2	
1322	74.12	43	0	70	62	2	
1332	80.36	45	0	70	62	2	
1342	86.62	44	0	70	63	2	
1352	92.87	43	0	70	63	2	
1402	99.14	43	0	70	62	2	
1412	105.40	42	0	70	62	2	
~~1422~~ 1420:30	111.250	41	0	70	63	2	

* For dry gas meters having two thermocouples, the average temperature is entered.

Final Leak Check: 0 cc/min @ 12 in. Hg vacuum

Final Impingers Wt.: 579.6 grams Silica gel: 90 % blue

Comments: Shut down ~~14~~ 1420:30 Plant down

ALTERNATIVE METHOD - MOISTURE TRAIN FIELD DATA SHEET

MRI Project No. 4701.08.03.04
Client: USEPA-EMC

Sampling Location: 3
Run No. 2
Date: 07-22-98
Operator(s): J. Surman

Metering Console No. VOST 2
Dry Gas Meter Factor (Y): 0.983
Impinger Set No. A
Gas Stream Temperature: ________ °F
Gas Stream Static Pressure: ________ in. w.c.
Barometric Pressure: 29.31 in. Hg
Gas Stream Volumetric Flow Rate: ________ dscfm

Initial Impingers Wt.: 550.5 grams
Silica gel: 100 % blue

Initial Leak Check: 0 cc/min @ 15 in. Hg vacuum

Clock Time, 24-Hr	Dry Gas Meter Volume, Liters	Dry Gas Meter Temperature*, °F	Dry Gas Meter Pressure, in. w.c.	Flow Rate Meter Setting	Impinger Outlet Temperature, °F	Pump Vacuum, in. Hg	Gas Stream Temperature, °F
0936	0.000						
0946	6.98	28	0	70	67	2	
0956	14.01	29	0	70	67	2	
1006	20.96	30	0	70	67	2	
1016	28.06	33	0	70	67	2	
1026	35.11	35	0	70	67	2	
1036	42.06	36	0	70	66	2	
1046	48.99	37	0	70	65	2	
1056	55.97	37	0	70	65	2	
1106	63.01	37	0	70	65	2	
1116	70.05	38	0	70	65	2	
1126	77.01	38	0	70	66	2	
1136	84.03	40	0	70	66	2	
1146	91.05	40	0	70	67	2	
1156	98.01	40	0	70	66	2	
1206	105.05	40	0	70	67	2	
1216	112.07	39	0	70	67	2	
1226	119.01	40	0	70	67	2	
1236	124.333	40	0	70	67	2	
	Shut down at 1234						

* For dry gas meters having two thermocouples, the average temperature is entered.

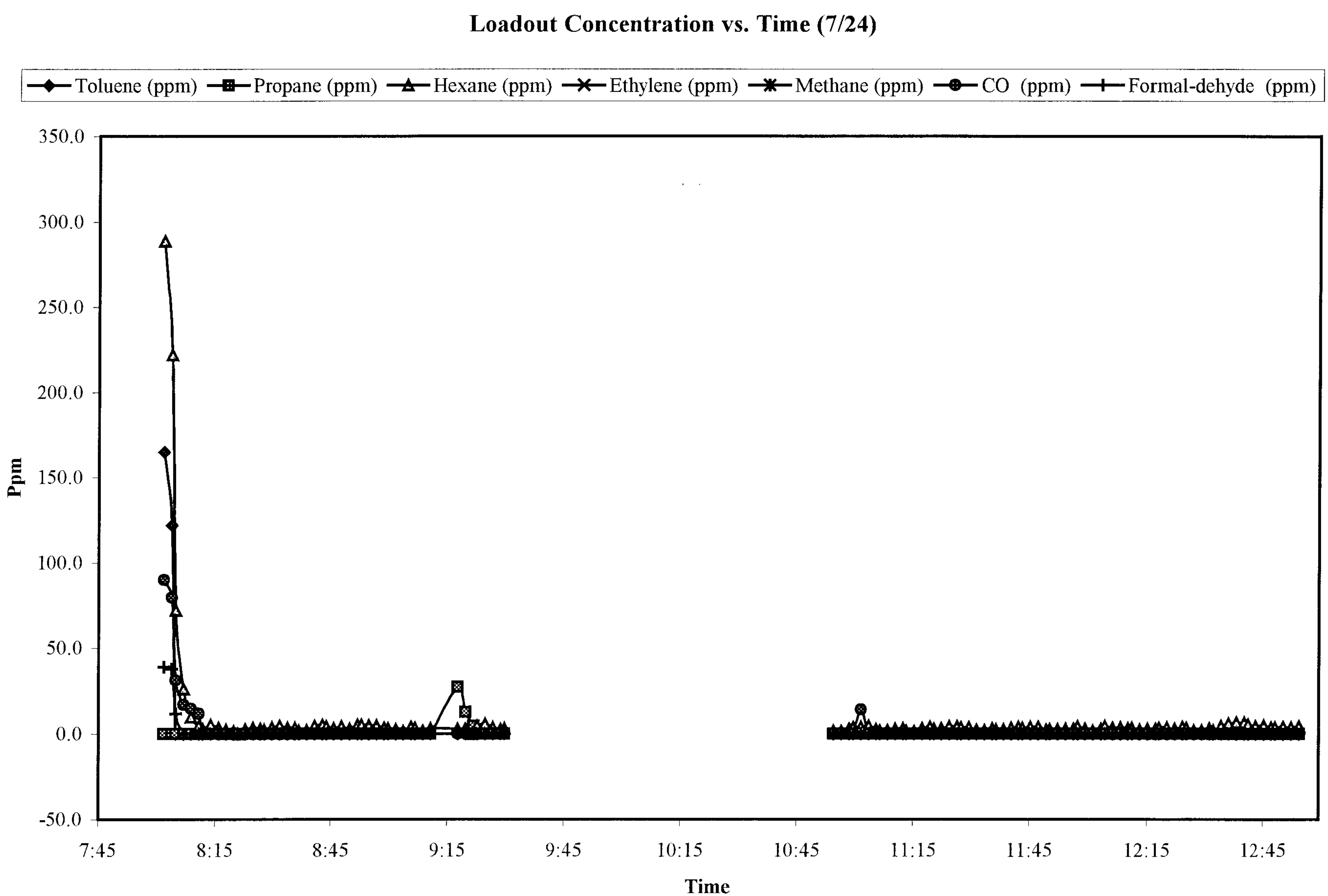
Final Leak Check: 0 cc/min @ 12 in. Hg vacuum

Final Impingers Wt.: 595.1 grams Silica gel: 85 % blue

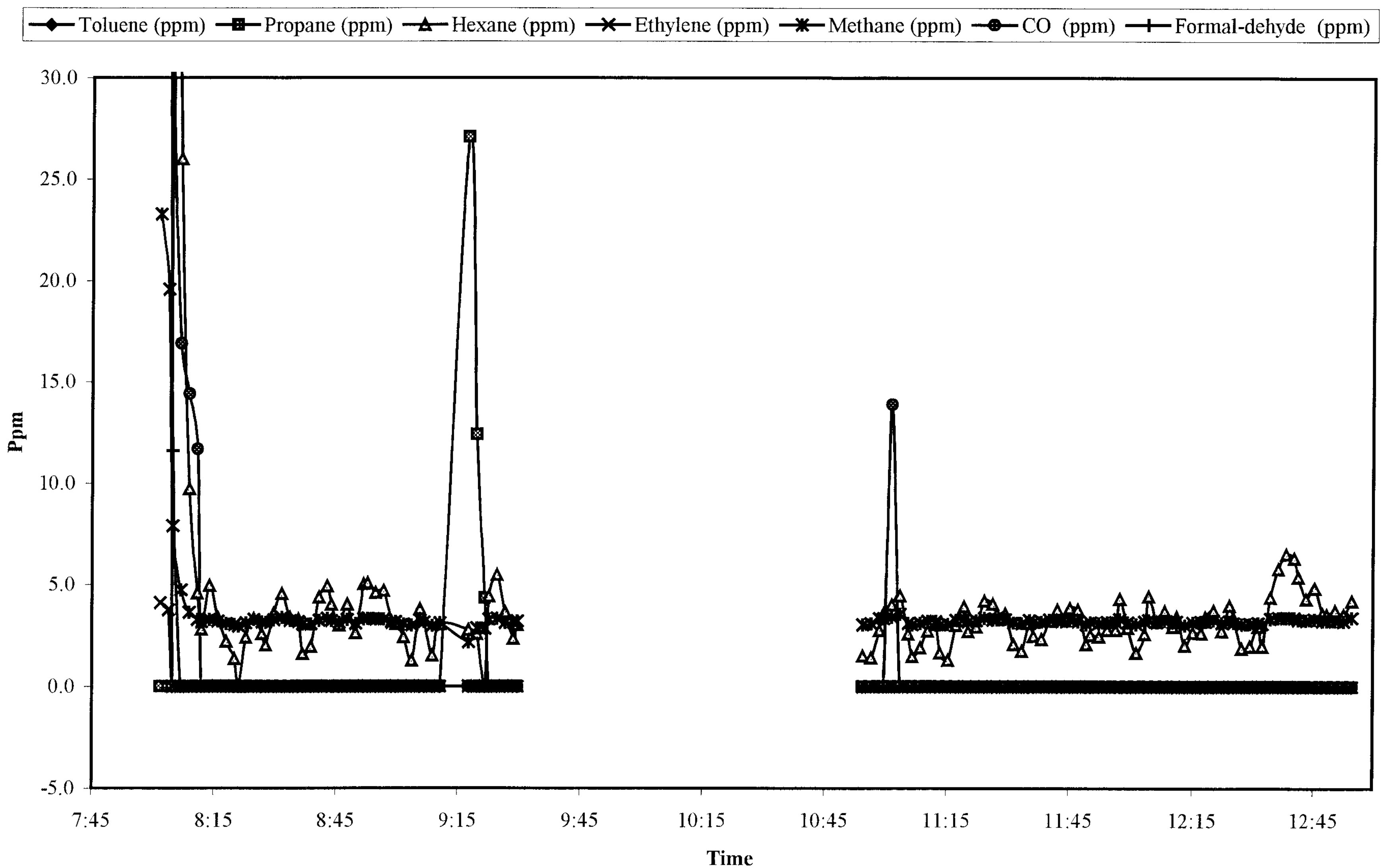
Comments:

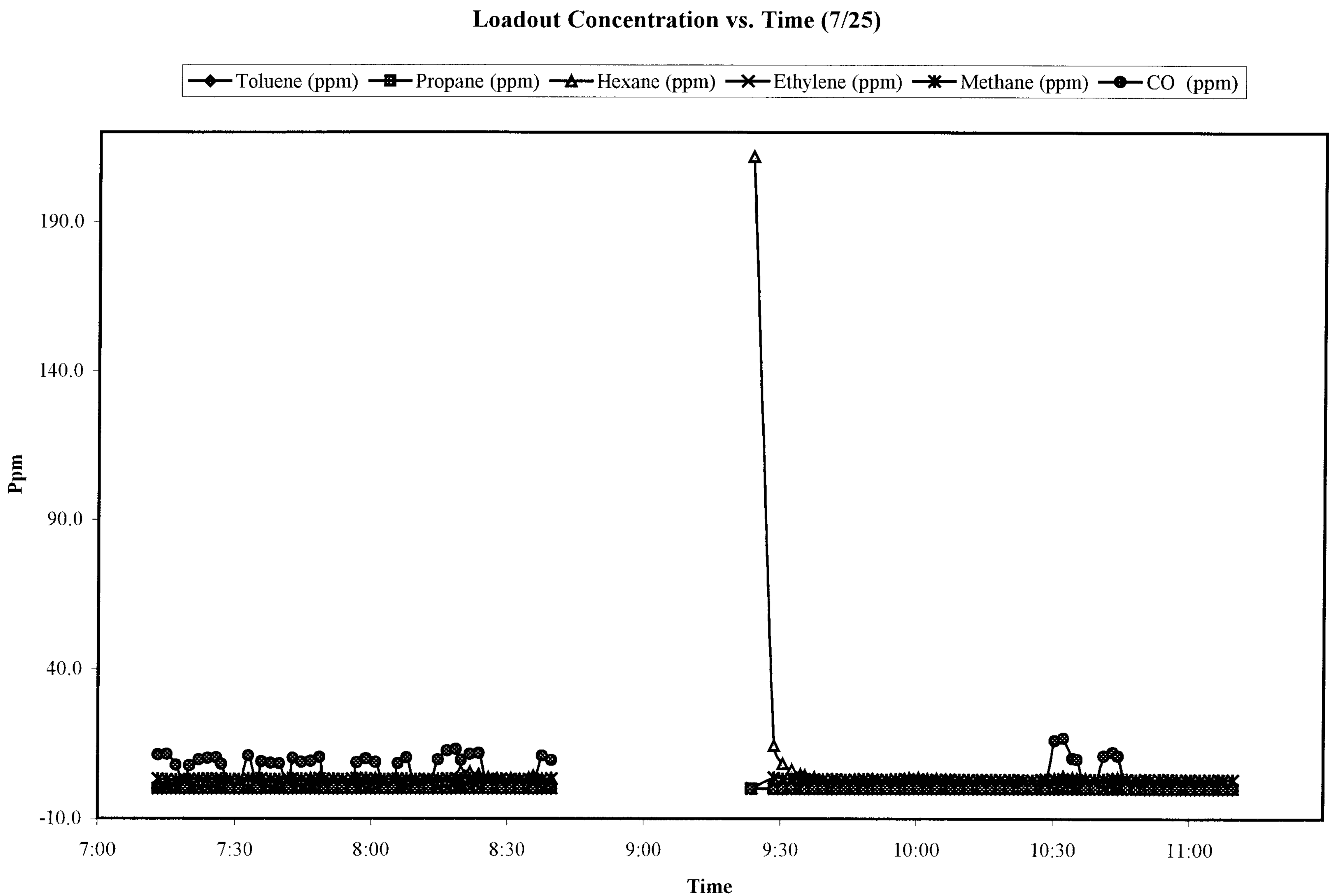
Appendix C

Direct (Extractive) FTIR Results

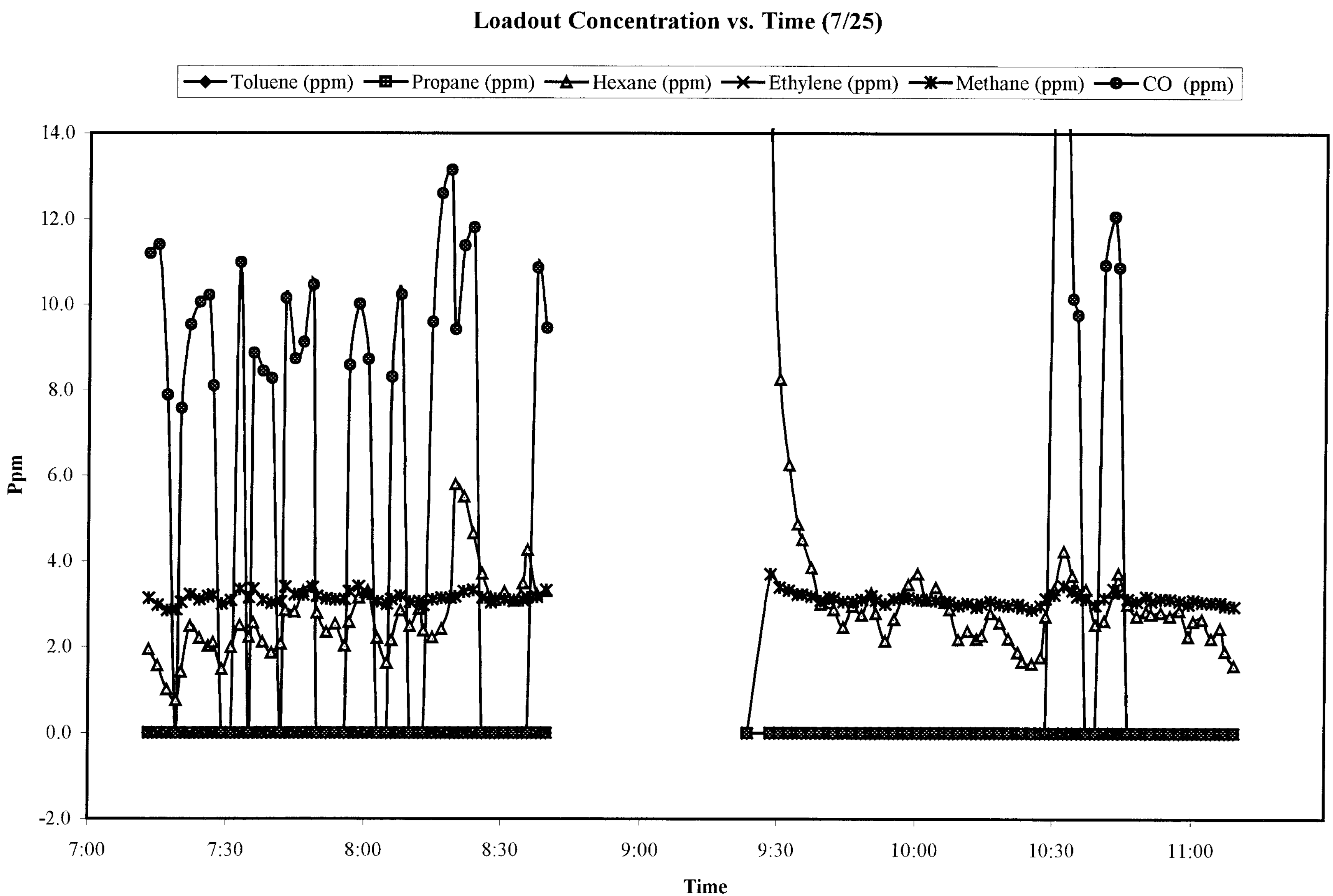

Loadout Concentration vs. Time (7/24)
Toluene (ppm)
Propane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
Formal-dehyde (ppm)
Ppm
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
7:45
8:15
8:45
9:15
9:45
10:15
10:45
11:15
11:45
12:15
12:45
Time

Loadout Concentration vs. Time (7/24)



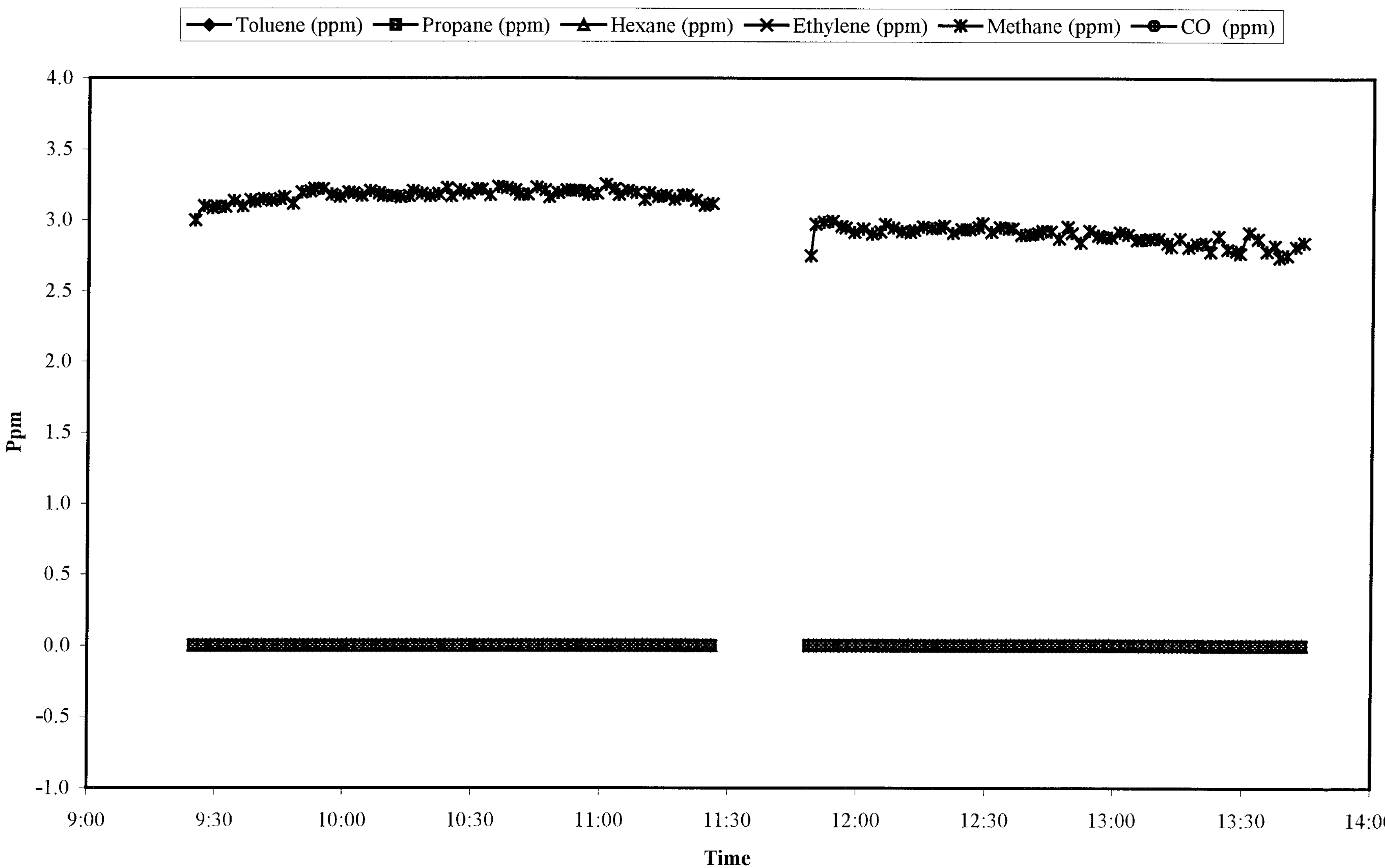


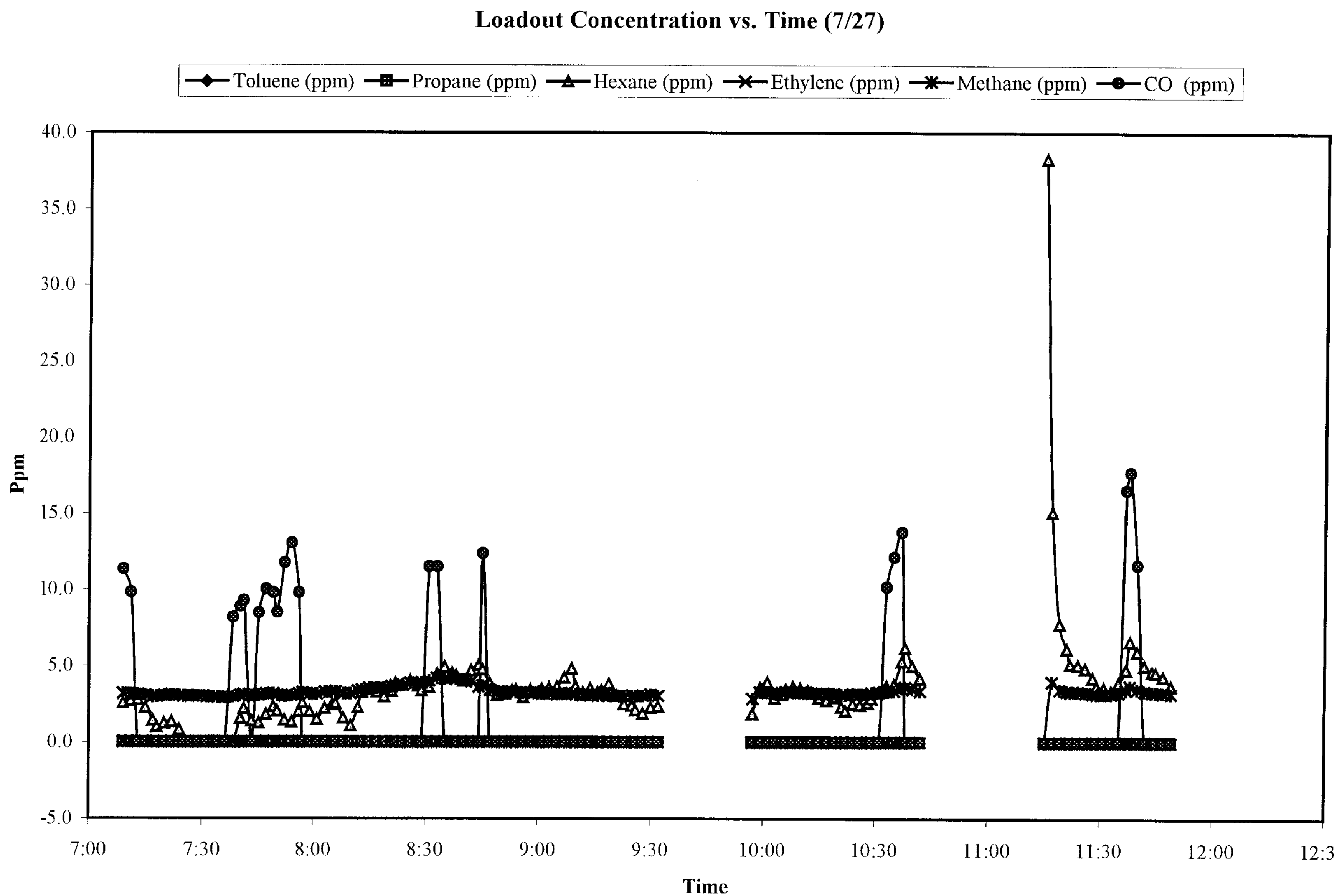
Loadout Concentration vs. Time (7/25)
Toluene (ppm)
Propane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
Ppm
190.0
140.0
90.0
40.0
-10.0
7:00
7:30
8:00
8:30
9:00
9:30
10:00
10:30
11:00
Time



Loadout Concentration vs. Time (7/25)
Toluene (ppm)
Propane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
Ppm
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
7:00
7:30
8:00
8:30
9:00
9:30
10:00
10:30
11:00
Time

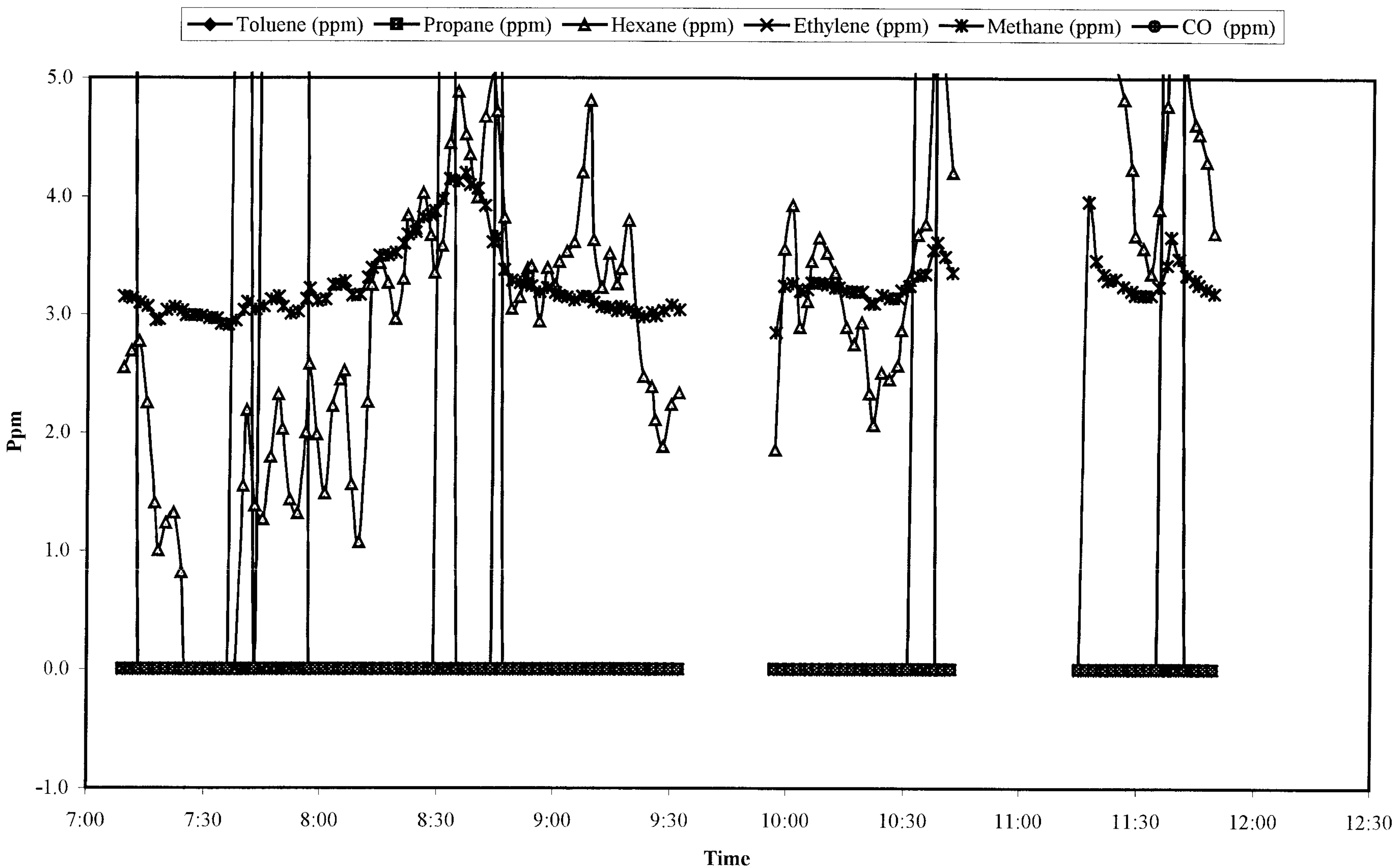
Loadout Concentration vs. Time (7/26)

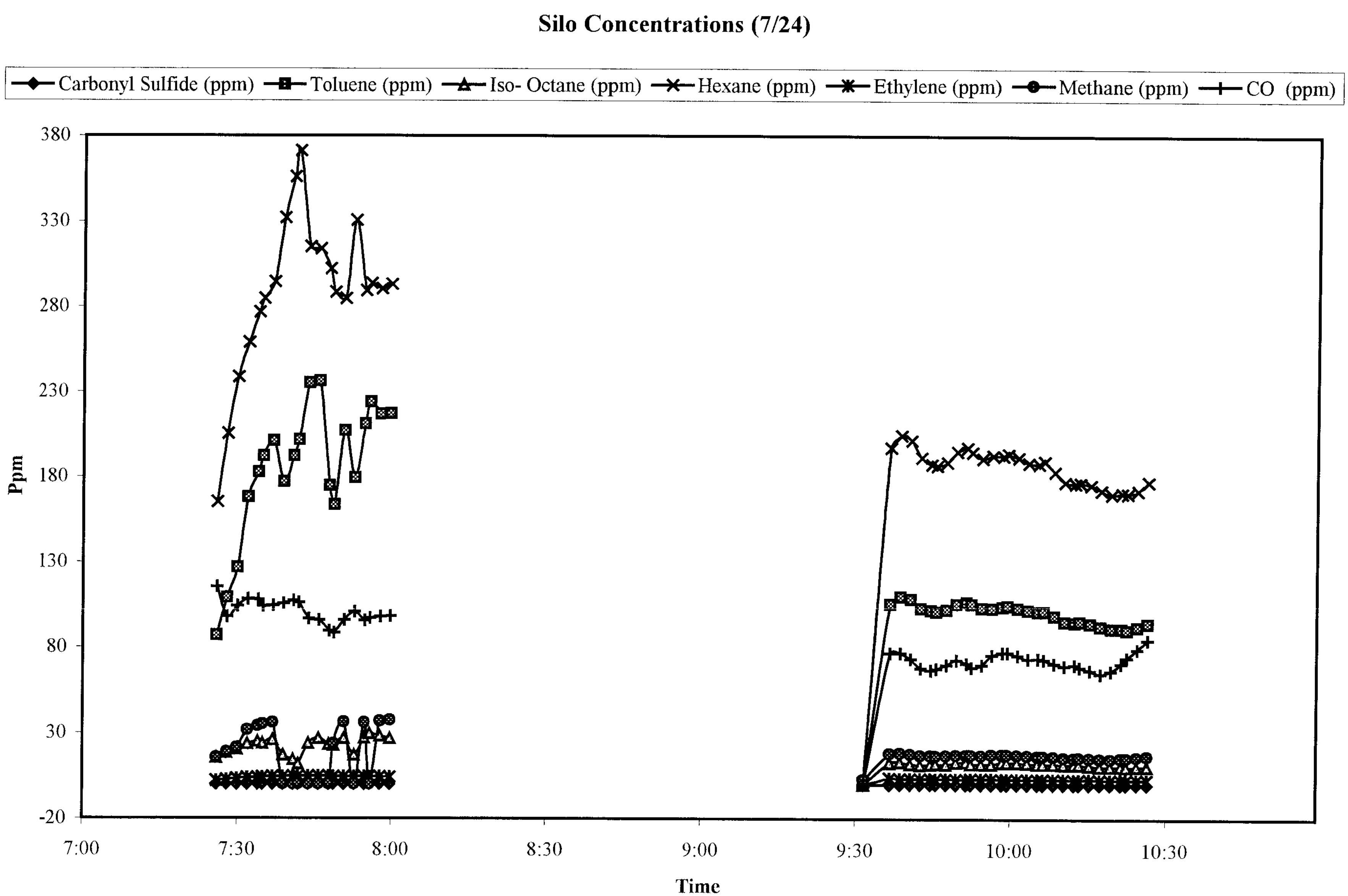




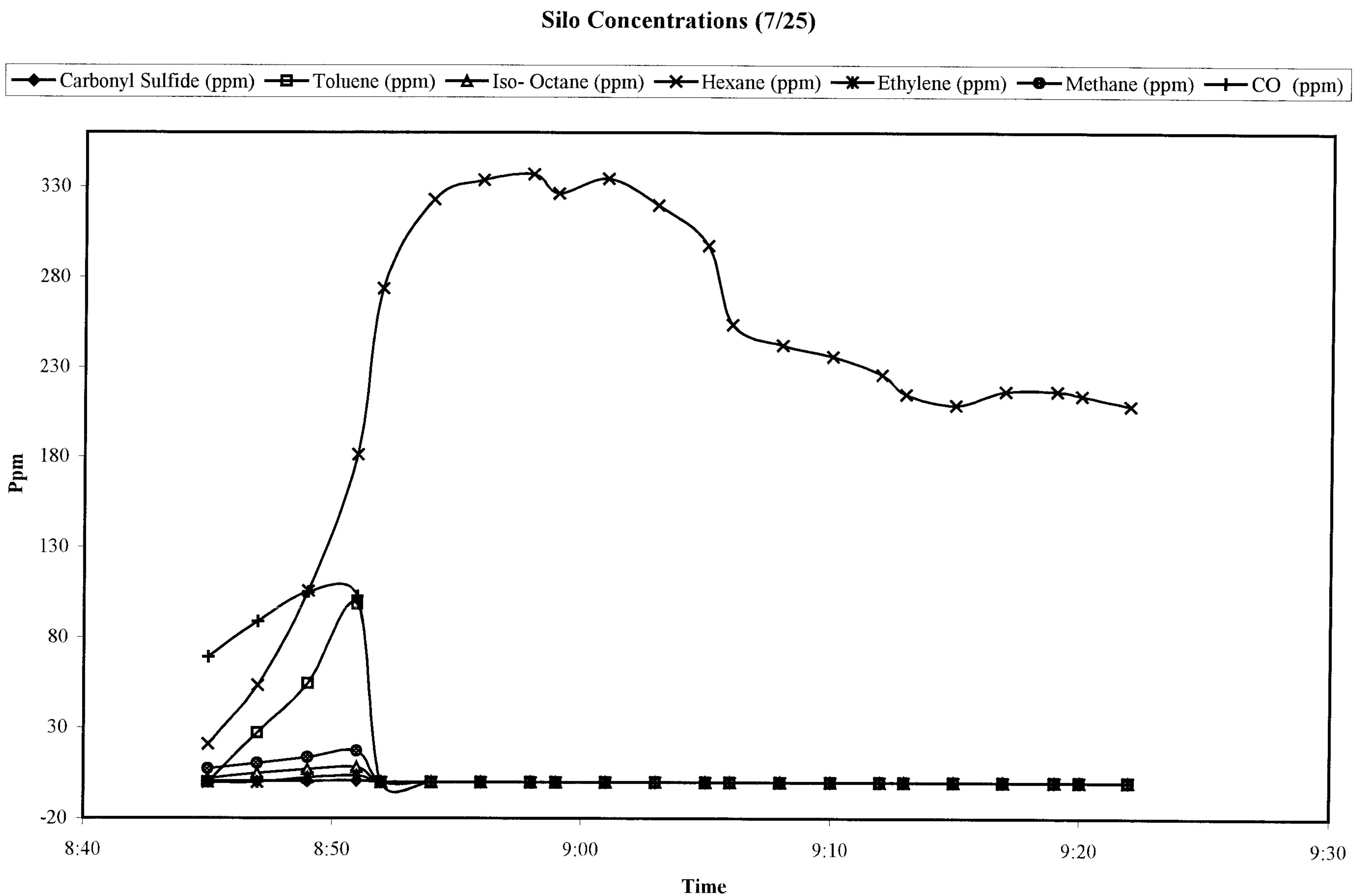
Loadout Concentration vs. Time (7/27)
Toluene (ppm)
Propane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
Ppm
7:00
7:30
8:00
8:30
9:00
9:30
10:00
10:30
11:00
11:30
12:00
12:30
Time

Loadout Concentration vs. Time (7/27)





Silo Concentrations (7/24)
Carbonyl Sulfide (ppm)
Toluene (ppm)
Iso- Octane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
380
330
280
230
180
130
80
30
-20
Ppm
7:00
7:30
8:00
8:30
9:00
9:30
10:00
10:30
Time



Silo Concentrations (7/25)
Carbonyl Sulfide (ppm)
Toluene (ppm)
Iso- Octane (ppm)
Hexane (ppm)
Ethylene (ppm)
Methane (ppm)
CO (ppm)
Ppm
330
280
230
180
130
80
30
-20
8:40
8:50
9:00
9:10
9:20
9:30
Time

Results: 1 /11/99 16 :19
Fit file: procstk.fit

File Name	Date	Time	Propane	Uncer-tainty	Methane	Uncer-tainty	CO	Uncer-tainty
File Name	Date	Corrected	prop/upper/pp	2*sigma	196/upper/ppm	2*sigma	CO/Mid/pp	2*sigma
17210008	7/21/98	11:28	0.0	5.2	28.7	3.8	201.2	37.7
17210009	7/21/98	11:43	0.0	56.1	0.0	42.7	0.0	185.3
17210010	7/21/98	11:44	0.0	52.3	0.0	39.9	0.0	173.0
17210011	7/21/98	11:46	0.0	56.2	0.0	42.8	0.0	185.8
17210012	7/21/98	11:48	0.0	47.5	0.0	36.2	0.0	173.8
17210013	7/21/98	11:50	0.0	52.2	0.0	39.8	0.0	178.7
17210014	7/21/98	11:51	0.0	56.1	0.0	42.7	0.0	183.6
17210015	7/21/98	11:53	0.0	37.8	0.0	28.8	0.0	182.9
17210016	7/21/98	11:55	0.0	42.6	0.0	32.5	0.0	178.2
17210017	7/21/98	11:57	0.0	29.0	0.0	22.1	0.0	168.1
17210018	7/21/98	11:58	0.0	51.8	0.0	39.4	0.0	169.7
17210019	7/21/98	12:00	0.0	52.2	0.0	39.8	0.0	171.1
17210020	7/21/98	12:02	0.0	52.0	0.0	39.6	0.0	176.9
17210021	7/21/98	12:04	0.0	44.2	0.0	33.7	0.0	179.0
17210022	7/21/98	12:06	0.0	44.2	0.0	33.7	0.0	179.1
17210023	7/21/98	12:07	0.0	37.9	31.1	26.8	0.0	171.6
17210024	7/21/98	12:09	0.0	56.6	0.0	43.1	0.0	181.9
17210025	7/21/98	12:11	0.0	52.2	0.0	39.8	0.0	187.6
17210026	7/21/98	12:13	0.0	38.2	31.3	27.0	0.0	165.8
17210027	7/21/98	12:14	0.0	51.8	0.0	39.4	0.0	164.3
17210028	7/21/98	12:16	0.0	51.7	0.0	39.4	0.0	164.9
17210029	7/21/98	12:18	0.0	55.8	0.0	42.5	0.0	174.6
17210030	7/21/98	12:20	0.0	51.8	0.0	39.4	0.0	164.3
17210031	7/21/98	12:21	0.0	30.5	26.9	21.6	0.0	163.8
17210032	7/21/98	12:23	0.0	43.4	0.0	33.1	0.0	164.7
17210033	7/21/98	12:25	0.0	36.9	0.0	28.1	0.0	164.7
17210034	7/21/98	12:27	0.0	51.8	0.0	39.4	0.0	164.1
17210035	7/21/98	12:28	0.0	51.8	0.0	39.5	0.0	164.8
17210036	7/21/98	12:30	0.0	36.9	0.0	28.1	0.0	162.5
17210037	7/21/98	12:41	71.5	1.8	14.3	5.9	0.0	97.5
17210038	7/21/98	12:42	73.9	1.5	12.3	5.1	0.0	98.0
17210039	7/21/98	12:44	74.5	1.5	12.3	5.1	0.0	97.9
17210040	7/21/98	12:46	75.1	1.5	12.2	5.1	0.0	97.9
17210041	7/21/98	12:48	40.6	2.0	19.1	6.7	0.0	124.1
17210042	7/21/98	12:49	0.0	12.8	28.2	9.1	153.4	129.9
17210043	7/21/98	12:51	0.0	11.7	26.5	8.3	159.0	133.2
17210044	7/21/98	12:53	0.0	11.5	25.9	8.2	146.3	133.8
17210045	7/21/98	12:55	0.0	12.5	23.2	8.8	0.0	131.5
17210046	7/21/98	12:57	0.0	10.9	23.0	7.7	0.0	136.3

File Name	Date	Time	Propane	Uncer-tainty	Methane	Uncer-tainty	CO	Uncer-tainty
17210047	7/21/98	12:58	0.0	14.3	26.1	10.1	0.0	126.4
17210048	7/21/98	13:07	0.0	51.9	75.9	36.7	348.1	176.0
17210049	7/21/98	13:08	0.0	42.6	77.1	30.2	331.0	168.5
17210050	7/21/98	13:10	0.0	38.1	84.2	27.0	354.8	167.4
17210051	7/21/98	13:12	0.0	36.8	98.3	26.0	327.0	163.4
17210052	7/21/98	13:14	0.0	42.9	93.3	30.4	280.9	166.8
17210053	7/21/98	13:15	0.0	36.8	103.5	26.0	244.5	170.4
17210054	7/21/98	13:17	0.0	39.7	96.0	28.1	228.4	166.0
17210055	7/21/98	13:19	0.0	58.8	72.9	41.6	267.0	172.5
17210056	7/21/98	13:21	0.0	37.3	92.5	26.3	264.7	169.7
17210057	7/21/98	13:22	0.0	55.5	76.8	39.3	270.6	177.5
17210058	7/21/98	13:24	0.0	51.5	80.3	36.4	244.2	176.9
17210059	7/21/98	13:26	0.0	37.0	96.7	26.2	238.7	168.6
17210060	7/21/98	13:28	0.0	51.3	88.5	36.3	224.3	164.3
17210061	7/21/98	13:30	0.0	46.5	91.2	32.9	226.6	164.7
17210062	7/21/98	13:31	0.0	51.5	97.7	36.4	233.0	167.2
17210063	7/21/98	13:33	0.0	51.3	97.3	36.3	246.9	164.8
17210064	7/21/98	13:35	0.0	51.4	76.2	36.4	209.7	183.6
17210065	7/21/98	13:37	0.0	41.9	75.1	29.7	195.2	167.1
17210066	7/21/98	13:38	0.0	51.3	72.2	36.3	205.3	167.4
17210067	7/21/98	13:40	0.0	51.4	75.3	36.3	213.3	170.5
17210068	7/21/98	13:42	0.0	51.8	69.8	36.6	198.8	183.3
17210069	7/21/98	13:44	0.0	41.7	77.3	29.5	201.6	168.4
17210070	7/21/98	13:45	0.0	51.4	68.4	36.4	200.4	175.8
17210071	7/21/98	13:47	0.0	51.4	71.8	36.3	181.8	170.7
17210072	7/21/98	13:49	0.0	51.5	75.2	36.5	193.3	178.3
17210073	7/21/98	13:51	0.0	51.4	69.3	36.4	183.7	169.2
17210074	7/21/98	13:52	0.0	46.6	46.6	33.0	191.9	168.4
17210075	7/21/98	13:54	0.0	51.4	0.0	39.1	0.0	167.9
17210076	7/21/98	13:56	0.0	37.5	35.5	26.6	0.0	167.9
17210077	7/21/98	13:58	0.0	55.2	0.0	42.0	0.0	176.5
17210078	7/21/98	14:00	0.0	51.4	0.0	39.1	0.0	168.0
17210079	7/21/98	14:01	0.0	55.3	0.0	42.1	0.0	172.6
17210080	7/21/98	14:03	0.0	51.4	0.0	39.1	0.0	164.4
17210081	7/21/98	14:05	0.0	52.6	0.0	40.0	0.0	177.2
17210082	7/21/98	14:07	0.0	49.1	0.0	37.4	0.0	164.0
17210083	7/21/98	14:08	0.0	37.3	61.6	26.4	181.4	166.4
17210084	7/21/98	14:10	0.0	55.4	62.5	39.3	228.5	175.0
17210085	7/21/98	14:12	0.0	51.4	96.3	36.4	256.1	183.1
17210086	7/21/98	14:14	0.0	55.3	117.4	39.1	240.0	182.2
17210087	7/21/98	14:15	0.0	51.6	144.1	36.5	189.6	172.2
17210088	7/21/98	14:17	0.0	36.7	160.0	25.9	176.8	161.4
17210089	7/21/98	14:19	0.0	61.1	268.0	43.2	0.0	178.9
		Average -->	4.1	41.9	42.5	30.9	102.9	163.1

File Name	Date	Time	Propane	Uncer-tainty	Methane	Uncer-tainty	CO	Uncer-tainty
17220002	7/22/98	9:38	0.0	48.1	0.0	36.6	0.0	164.3
17220003	7/22/98	9:41	0.0	60.2	51.8	42.9	0.0	175.8
17220004	7/22/98	9:43	0.0	60.1	49.5	42.9	0.0	174.2
17220005	7/22/98	9:44	0.0	65.5	0.0	49.9	0.0	180.8
17220006	7/22/98	9:46	0.0	62.9	0.0	47.9	0.0	173.8
17220007	7/22/98	9:48	0.0	65.6	0.0	49.9	0.0	179.6
17220008	7/22/98	9:50	0.0	65.8	0.0	50.1	0.0	177.5
17220009	7/22/98	9:51	0.0	65.9	0.0	50.2	0.0	180.4
17220010	7/22/98	9:53	0.0	65.3	0.0	49.7	0.0	182.6
17220011	7/22/98	9:55	0.0	65.6	0.0	50.0	0.0	181.2
17220012	7/22/98	9:57	0.0	65.5	0.0	49.9	0.0	180.9
17220013	7/22/98	9:58	0.0	65.8	0.0	50.1	0.0	177.8
17220014	7/22/98	10:00	0.0	65.7	0.0	50.0	0.0	181.1
17220015	7/22/98	10:02	0.0	62.9	0.0	47.9	0.0	174.5
17220016	7/22/98	10:04	0.0	65.7	0.0	50.0	0.0	180.9
17220017	7/22/98	10:06	0.0	60.1	48.7	43.0	0.0	175.3
17220018	7/22/98	10:07	0.0	66.5	0.0	50.6	0.0	174.2
17220019	7/22/98	10:09	0.0	60.6	52.2	43.3	0.0	168.9
17220020	7/22/98	10:11	0.0	74.8	0.0	57.0	0.0	180.5
17220021	7/22/98	10:13	0.0	64.8	0.0	46.3	0.0	174.9
17220022	7/22/98	10:14	0.0	62.8	52.1	44.8	0.0	170.2
17220023	7/22/98	10:16	0.0	66.0	0.0	47.1	0.0	181.6
17220024	7/22/98	10:18	0.0	64.7	0.0	46.1	0.0	178.8
17220025	7/22/98	10:20	0.0	66.0	0.0	47.1	0.0	177.0
17220026	7/22/98	10:21	0.0	57.5	41.7	41.0	0.0	160.0
17220027	7/22/98	10:23	0.0	65.9	0.0	47.1	0.0	176.7
17220028	7/22/98	10:25	0.0	64.7	0.0	46.2	0.0	177.6
17220029	7/22/98	10:27	0.0	65.7	0.0	50.0	0.0	181.5
17220030	7/22/98	10:28	0.0	63.0	46.7	45.0	0.0	175.4
17220031	7/22/98	10:30	0.0	57.7	43.4	41.2	0.0	177.8
17220032	7/22/98	10:32	0.0	62.7	52.7	44.7	0.0	177.0
17220033	7/22/98	10:34	0.0	54.3	0.0	41.4	0.0	161.0
17220034	7/22/98	10:36	0.0	54.4	0.0	41.4	0.0	164.0
17220035	7/22/98	10:37	0.0	54.6	0.0	41.5	0.0	164.4
17220036	7/22/98	10:39	0.0	66.4	0.0	50.5	0.0	178.9
17220037	7/22/98	10:41	0.0	60.3	51.2	43.1	0.0	171.1
17220038	7/22/98	10:43	0.0	76.6	0.0	58.3	0.0	177.3
17220039	7/22/98	10:45	0.0	65.9	0.0	50.2	0.0	179.0
17220040	7/22/98	10:46	0.0	65.9	0.0	50.2	0.0	184.6
17220041	7/22/98	10:48	0.0	66.0	0.0	50.2	0.0	178.4
17220042	7/22/98	10:50	0.0	66.1	0.0	50.3	0.0	180.1
17220043	7/22/98	10:52	0.0	75.1	0.0	57.2	0.0	179.0
17220044	7/22/98	10:53	0.0	65.9	0.0	50.2	0.0	178.5
17220045	7/22/98	10:55	0.0	66.7	0.0	50.8	0.0	174.3
17220046	7/22/98	10:57	0.0	57.7	0.0	44.0	0.0	172.8
17220047	7/22/98	10:59	0.0	66.3	0.0	50.5	0.0	176.8
17220048	7/22/98	11:01	0.0	66.1	0.0	50.3	0.0	184.0

File Name	Date	Time	Propane	Uncer-tainty	Methane	Uncer-tainty	CO	Uncer-tainty
17220049	7/22/98	11:02	0.0	73.7	0.0	56.1	0.0	178.8
17220050	7/22/98	11:04	0.0	75.5	0.0	57.5	0.0	183.6
17220051	7/22/98	11:06	0.0	60.5	50.6	43.2	0.0	170.8
17220052	7/22/98	11:08	0.0	54.4	0.0	41.5	0.0	162.9
17220053	7/22/98	11:32	0.0	54.8	0.0	41.8	0.0	173.6
17220054	7/22/98	11:33	0.0	54.6	0.0	41.6	0.0	162.9
17220055	7/22/98	11:35	0.0	57.7	50.7	41.1	0.0	174.3
17220056	7/22/98	11:37	0.0	64.6	64.9	46.0	0.0	172.2
17220057	7/22/98	11:39	0.0	62.8	104.2	44.7	276.8	172.2
17220058	7/22/98	11:40	0.0	60.5	109.9	43.1	317.9	174.0
17220059	7/22/98	11:42	0.0	60.4	124.2	43.0	258.5	162.6
17220060	7/22/98	11:44	0.0	64.8	199.1	46.2	200.2	178.4
17220061	7/22/98	11:46	0.0	60.3	219.1	42.9	0.0	168.2
17220062	7/22/98	11:48	0.0	50.1	257.7	35.5	0.0	171.1
17220063	7/22/98	11:49	0.0	64.9	268.2	46.2	174.6	165.4
17220064	7/22/98	11:51	0.0	50.3	223.5	35.7	182.6	170.7
17220065	7/22/98	11:53	0.0	65.3	219.8	46.5	0.0	176.9
17220066	7/22/98	11:55	0.0	61.4	178.6	43.7	0.0	164.3
17220067	7/22/98	11:56	0.0	50.2	136.0	35.7	0.0	169.3
17220068	7/22/98	11:58	0.0	49.7	122.0	35.3	0.0	169.6
17220069	7/22/98	12:00	0.0	53.4	117.6	38.0	0.0	168.4
17220070	7/22/98	12:02	0.0	45.0	122.3	32.0	0.0	171.8
17220071	7/22/98	12:03	0.0	44.8	121.6	31.8	0.0	178.0
17220072	7/22/98	12:05	0.0	57.3	122.8	40.8	0.0	163.8
17220073	7/22/98	12:07	0.0	45.2	110.6	32.1	0.0	171.1
17220074	7/22/98	12:09	0.0	45.0	118.1	31.9	0.0	179.9
17220075	7/22/98	12:11	0.0	45.1	123.7	32.0	0.0	183.2
17220076	7/22/98	12:12	0.0	53.3	110.3	37.9	0.0	167.2
17220077	7/22/98	12:14	0.0	62.4	163.3	44.5	0.0	176.1
17220078	7/22/98	12:16	0.0	56.7	119.9	40.3	0.0	165.8
17220079	7/22/98	12:18	0.0	55.1	117.8	39.2	0.0	166.6
17220080	7/22/98	12:19	0.0	56.7	119.7	40.3	0.0	165.6
17220081	7/22/98	12:21	0.0	53.3	114.7	37.9	0.0	168.1
17220082	7/22/98	12:23	0.0	60.8	145.3	43.3	0.0	175.6
17220083	7/22/98	12:25	0.0	59.9	163.5	42.7	0.0	165.9
17220084	7/22/98	12:26	0.0	51.1	174.8	36.2	0.0	170.4
17220085	7/22/98	12:28	0.0	46.7	194.8	33.1	0.0	171.3
17220086	7/22/98	12:30	0.0	60.1	185.7	42.7	175.5	167.1
17220087	7/22/98	12:32	0.0	65.4	219.8	46.6	0.0	182.3
17220088	7/22/98	12:34	0.0	64.9	244.8	46.2	195.1	166.8
17220089	7/22/98	12:35	0.0	57.3	161.1	40.8	184.2	165.7
17220090	7/22/98	12:37	0.0	62.7	187.3	44.6	0.0	166.4
17220091	7/22/98	14:31	0.0	0.1	0.0	0.1	0.0	0.2
Average -->			0.0	60.7	68.3	44.5	22.1	173.7

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17240030	7/24/98	8:12	0.0	5.7	0.0	1.1	2.8	0.2	0.0	0.3	3.1	0.6	0.0	0.8	8.0	4.5
17240031	7/24/98	8:14	0.0	6.2	0.0	1.2	5.0	0.2	0.0	0.4	3.3	0.6	0.0	0.9	5.4	4.8
17240032	7/24/98	8:16	0.0	5.9	0.0	1.1	3.4	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	4.9
17240033	7/24/98	8:18	0.0	5.6	0.0	1.0	2.2	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.3	4.4
17240034	7/24/98	8:20	0.0	5.3	0.0	1.0	1.3	0.2	0.0	0.3	3.0	0.5	0.0	0.8	0.0	4.6
17240035	7/24/98	8:21	0.0	5.3	0.0	1.0	0.9	0.2	0.0	0.3	3.0	0.5	0.0	0.7	0.0	4.5
17240036	7/24/98	8:23	0.0	5.6	0.0	1.0	2.4	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.8
17240037	7/24/98	8:25	0.0	5.8	0.0	1.1	3.3	0.2	0.0	0.3	3.3	0.6	0.0	0.8	7.5	4.6
17240038	7/24/98	8:27	0.0	5.5	0.0	1.0	2.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.3	4.5
17240039	7/24/98	8:28	0.0	5.4	0.0	1.0	2.0	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.1	4.4
17240040	7/24/98	8:30	0.0	5.8	0.0	1.1	3.6	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	4.9
17240041	7/24/98	8:32	0.0	5.9	0.0	1.1	4.5	0.2	0.0	0.4	3.4	0.6	0.0	0.8	7.4	4.7
17240042	7/24/98	8:34	0.0	5.7	0.0	1.1	3.4	0.2	0.0	0.4	3.2	0.6	0.0	0.8	5.2	4.6
17240043	7/24/98	8:36	0.0	5.7	0.0	1.1	3.3	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	4.9
17240044	7/24/98	8:37	0.0	5.5	0.0	1.0	1.6	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.7
17240045	7/24/98	8:39	0.0	5.6	0.0	1.0	1.9	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.8
17240046	7/24/98	8:41	0.0	6.1	0.0	1.1	4.4	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.1
17240047	7/24/98	8:43	0.0	6.1	0.0	1.1	4.9	0.2	0.0	0.4	3.3	0.6	0.0	0.9	6.3	4.8
17240048	7/24/98	8:44	0.0	6.0	0.0	1.1	4.0	0.2	0.0	0.4	3.2	0.6	0.0	0.8	5.7	4.8
17240049	7/24/98	8:46	0.0	5.8	0.0	1.1	3.0	0.2	0.0	0.4	3.1	0.6	0.0	0.8	7.4	4.7
17240050	7/24/98	8:48	0.0	5.9	0.0	1.1	4.0	0.2	0.0	0.4	3.3	0.6	0.0	0.8	6.3	4.7
17240051	7/24/98	8:50	0.0	5.6	0.0	1.0	2.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.8
17240052	7/24/98	8:52	0.0	6.5	0.0	1.2	5.0	0.2	0.0	0.4	3.3	0.7	0.0	0.9	0.0	5.4
17240053	7/24/98	8:53	0.0	6.4	0.0	1.2	5.1	0.2	0.0	0.4	3.3	0.7	0.0	0.9	7.3	5.0
17240054	7/24/98	8:55	0.0	6.1	0.0	1.1	4.6	0.2	0.0	0.4	3.3	0.6	0.0	0.9	5.8	4.8
17240055	7/24/98	8:57	0.0	6.1	0.0	1.1	4.7	0.2	0.0	0.4	3.3	0.6	0.0	0.9	6.3	4.8
17240056	7/24/98	8:59	0.0	5.8	0.0	1.1	3.2	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	4.9
17240057	7/24/98	9:00	0.0	5.8	0.0	1.1	3.1	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	5.0
17240058	7/24/98	9:02	0.0	5.6	0.0	1.0	2.4	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.8
17240059	7/24/98	9:04	0.0	5.4	0.0	1.0	1.3	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.7
17240060	7/24/98	9:06	0.0	6.0	0.0	1.1	3.8	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	5.1

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17240060	7/24/98	9:06	0.0	6.0	0.0	1.1	3.8	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	5.1
17240061	7/24/98	9:07	0.0	5.8	0.0	1.1	3.3	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	4.9
17240062	7/24/98	9:09	0.0	5.5	0.0	1.0	1.5	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.8
17240063	7/24/98	9:11	0.0	5.9	0.0	1.1	3.0	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.0
17240067	7/24/98	9:18	0.0	3.6	data unavailable		2.9	0.3	0.0	0.2	2.2	0.4	0.0	0.5	3.8	3.2
17240068	7/24/98	9:20	0.0	4.5	due to		2.6	0.3	0.0	0.3	2.8	0.5	0.0	0.6	7.8	3.9
17240069	7/24/98	9:22	0.0	5.3	THC spiking		2.1	0.3	0.0	0.3	3.0	0.5	0.0	0.7	9.5	4.4
17240070	7/24/98	9:23	0.0	6.1	0.0	0.6	4.0	0.4	0.0	0.4	3.3	0.6	0.0	0.9	8.2	4.8
17240071	7/24/98	9:25	0.0	6.7	0.0	0.7	5.5	0.2	0.0	0.4	3.3	0.7	0.0	0.9	5.5	5.2
17240072	7/24/98	9:27	0.0	6.2	0.0	1.2	3.6	0.2	0.0	0.4	3.1	0.6	0.0	0.9	0.0	5.2
17240073	7/24/98	9:29	0.0	5.9	0.0	1.1	2.3	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240074	7/24/98	9:30	0.0	6.1	0.0	1.1	3.0	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240120	7/24/98	10:55	0.0	5.7	0.0	1.1	1.5	0.2	0.7	0.4	3.0	0.6	0.0	0.8	0.0	4.9
17240121	7/24/98	10:57	0.0	5.6	0.0	1.1	1.4	0.2	0.7	0.4	3.1	0.6	0.0	0.8	0.0	4.9
17240122	7/24/98	10:59	0.0	5.9	0.0	1.1	2.8	0.2	0.0	0.4	3.3	0.6	0.0	0.8	7.8	4.7
17240123	7/24/98	11:00	0.0	6.2	0.0	1.2	3.6	0.2	0.7	0.4	3.3	0.6	0.0	0.9	7.0	4.9
17240124	7/24/98	11:02	0.0	6.1	0.0	1.1	4.0	0.2	0.0	0.4	3.4	0.6	0.0	0.9	13.9	4.9
17240125	7/24/98	11:04	0.0	6.2	0.0	1.2	4.4	0.2	0.0	0.4	3.5	0.6	0.0	0.9	10.5	4.9
17240126	7/24/98	11:06	0.0	5.7	0.0	1.1	2.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.9
17240127	7/24/98	11:07	0.0	5.6	0.0	1.0	1.5	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.8
17240128	7/24/98	11:09	0.0	5.7	0.0	1.1	1.9	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.9
17240129	7/24/98	11:11	0.0	6.0	0.0	1.1	2.7	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	5.1
17240130	7/24/98	11:13	0.0	6.1	0.0	1.1	3.0	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240131	7/24/98	11:14	0.0	5.7	0.0	1.1	1.6	0.2	0.0	0.4	3.0	0.6	0.0	0.8	0.0	4.9
17240132	7/24/98	11:16	0.0	5.7	0.0	1.1	1.3	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.9
17240133	7/24/98	11:18	0.0	6.1	0.0	1.1	3.0	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.4	4.9
17240134	7/24/98	11:20	0.0	6.4	0.0	1.2	3.9	0.2	0.0	0.4	3.3	0.7	0.0	0.9	0.0	5.4
17240135	7/24/98	11:21	0.0	6.1	0.0	1.1	2.7	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240136	7/24/98	11:23	0.0	6.1	0.0	1.2	2.9	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240137	7/24/98	11:25	0.0	6.4	0.0	1.2	4.2	0.2	0.0	0.4	3.4	0.7	0.0	0.9	0.0	5.3

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17240138	7/24/98	11:27	0.0	6.3	0.0	1.2	4.1	0.2	0.0	0.4	3.3	0.6	0.0	0.9	0.0	5.3
17240139	7/24/98	11:28	0.0	6.3	0.0	1.2	3.6	0.2	0.0	0.4	3.3	0.6	0.0	0.9	0.0	5.3
17240140	7/24/98	11:30	0.0	6.3	0.0	1.2	3.6	0.2	0.0	0.4	3.3	0.6	0.0	0.9	6.1	5.0
17240141	7/24/98	11:32	0.0	5.8	0.0	1.1	2.1	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.0
17240142	7/24/98	11:34	0.0	5.9	0.0	1.1	1.7	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240143	7/24/98	11:36	0.0	6.3	0.0	1.2	3.1	0.2	0.0	0.4	3.3	0.6	0.0	0.9	0.0	5.3
17240144	7/24/98	11:37	0.0	6.0	0.0	1.1	2.5	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240145	7/24/98	11:39	0.0	6.1	0.0	1.1	2.3	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240146	7/24/98	11:41	0.0	6.5	0.0	1.2	3.2	0.2	0.0	0.4	3.3	0.7	0.0	0.9	0.0	5.4
17240147	7/24/98	11:43	0.0	6.3	0.0	1.2	3.8	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.3
17240148	7/24/98	11:44	0.0	6.2	0.0	1.2	3.3	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.3
17240149	7/24/98	11:46	0.0	6.3	0.0	1.2	3.8	0.2	0.0	0.4	3.2	0.6	0.0	0.9	6.1	5.0
17240150	7/24/98	11:48	0.0	6.2	0.0	1.2	3.8	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.9	4.9
17240151	7/24/98	11:50	0.0	5.8	0.0	1.1	2.1	0.2	0.0	0.4	3.0	0.6	0.0	0.8	0.0	5.0
17240152	7/24/98	11:51	0.0	6.1	0.0	1.1	2.5	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.1
17240153	7/24/98	11:53	0.0	5.9	0.0	1.1	2.4	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240154	7/24/98	11:55	0.0	6.1	0.0	1.1	2.8	0.2	0.0	0.4	3.1	0.6	0.0	0.9	0.0	5.1
17240155	7/24/98	11:57	0.0	6.1	0.0	1.1	2.8	0.2	0.0	0.4	3.1	0.6	0.0	0.9	0.0	5.2
17240156	7/24/98	11:58	0.0	6.4	0.0	1.2	4.3	0.2	0.0	0.4	3.3	0.7	0.0	0.9	0.0	5.4
17240157	7/24/98	12:00	0.0	5.9	0.0	1.1	2.9	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240158	7/24/98	12:02	0.0	5.7	0.0	1.1	1.6	0.2	0.0	0.4	3.0	0.6	0.0	0.8	0.0	4.9
17240159	7/24/98	12:04	0.0	6.1	0.0	1.1	2.6	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240160	7/24/98	12:05	0.0	6.6	0.0	1.2	4.4	0.2	0.6	0.4	3.2	0.7	0.0	0.9	0.0	5.5
17240161	7/24/98	12:07	0.0	6.1	0.0	1.1	3.2	0.2	0.0	0.4	3.1	0.6	0.0	0.9	0.0	5.2
17240162	7/24/98	12:09	0.0	6.4	0.0	1.2	3.7	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.7	5.0
17240163	7/24/98	12:11	0.0	6.0	0.0	1.1	2.9	0.2	0.0	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240164	7/24/98	12:12	0.0	6.1	0.0	1.1	3.4	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240165	7/24/98	12:14	0.0	5.7	0.0	1.1	2.0	0.2	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.9
17240166	7/24/98	12:16	0.0	6.1	0.0	1.1	2.6	0.2	0.7	0.4	3.1	0.6	0.0	0.9	0.0	5.1
17240167	7/24/98	12:18	0.0	6.0	0.0	1.1	2.6	0.2	0.0	0.4	3.2	0.6	0.0	0.8	0.0	5.1
17240168	7/24/98	12:19	0.0	6.1	0.0	1.1	3.4	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.2

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17240169	7/24/98	12:21	0.0	6.2	0.0	1.2	3.7	0.2	0.7	0.4	3.2	0.6	0.0	0.9	0.0	5.2
17240170	7/24/98	12:23	0.0	5.9	0.0	1.1	2.7	0.2	0.7	0.4	3.1	0.6	0.0	0.8	0.0	5.0
17240171	7/24/98	12:25	0.0	6.3	0.0	1.2	4.0	0.2	0.0	0.4	3.2	0.6	0.0	0.9	0.0	5.3
17240172	7/24/98	12:26	0.0	6.0	0.0	1.1	3.4	0.2	0.7	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240173	7/24/98	12:28	0.0	5.7	0.0	1.1	1.9	0.2	0.7	0.4	3.1	0.6	0.0	0.8	0.0	4.9
17240174	7/24/98	12:30	0.0	5.9	0.0	1.1	2.0	0.2	0.6	0.4	3.1	0.6	0.0	0.8	0.0	5.0
17240175	7/24/98	12:32	0.0	6.0	0.0	1.1	2.9	0.2	0.6	0.4	3.1	0.6	0.0	0.8	0.0	5.1
17240176	7/24/98	12:33	0.0	5.8	0.0	1.1	2.0	0.2	0.7	0.4	3.1	0.6	0.0	0.8	0.0	5.0
17240177	7/24/98	12:35	0.0	6.9	0.0	1.3	4.4	0.2	0.7	0.4	3.3	0.7	0.0	1.0	8.0	5.3
17240178	7/24/98	12:37	0.0	6.9	0.0	1.3	5.8	0.2	0.7	0.4	3.4	0.7	0.0	1.0	6.7	5.3
17240179	7/24/98	12:39	0.0	7.0	0.0	1.3	6.5	0.2	0.7	0.4	3.4	0.7	0.0	1.0	0.0	5.7
17240180	7/24/98	12:41	0.0	6.7	0.0	1.3	6.3	0.2	0.7	0.4	3.4	0.7	0.0	0.9	0.0	5.5
17240181	7/24/98	12:42	0.0	6.3	0.0	1.2	5.4	0.2	0.7	0.4	3.3	0.6	0.0	0.9	0.0	5.2
17240182	7/24/98	12:44	0.0	6.1	0.0	1.1	4.3	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.4	4.8
17240183	7/24/98	12:46	0.0	6.2	0.0	1.2	4.8	0.2	0.0	0.4	3.3	0.6	0.0	0.9	6.6	4.9
17240184	7/24/98	12:48	0.0	6.0	0.0	1.1	3.6	0.2	0.7	0.4	3.2	0.6	0.0	0.8	6.7	4.7
17240185	7/24/98	12:49	0.0	5.9	0.0	1.1	3.5	0.2	0.0	0.4	3.2	0.6	0.0	0.8	8.5	4.7
17240186	7/24/98	12:51	0.0	6.1	0.0	1.1	3.7	0.2	0.0	0.4	3.2	0.6	0.0	0.9	7.6	4.8
17240187	7/24/98	12:53	0.0	6.1	0.0	1.1	3.5	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.5	4.8
17240188	7/24/98	12:55	0.0	6.3	0.0	1.2	4.2	0.2	0.7	0.4	3.4	0.6	0.0	0.9	5.4	4.9
		Average --->	0.0	6.0	0.0	1.1	3.2	0.2	0.1	0.4	3.2	0.6	0.0	0.8	2.3	5.0

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17250001	7/25/98	10:12	7:12	0.0	3.4	0.0	0.6	1.4	0.1	0.0	0.2	2.6	0.4	0.0	0.5	8.5	2.9
17250002	7/25/98	10:13	7:13	0.0	3.9	0.0	0.7	1.9	0.1	0.0	0.2	3.1	0.4	0.0	0.6	11.7	3.2
17250003	7/25/98	10:15	7:15	0.0	3.9	0.0	0.7	1.6	0.1	0.0	0.2	3.0	0.4	0.0	0.5	11.9	3.1
17250004	7/25/98	10:17	7:17	0.0	3.8	0.0	0.7	1.0	0.1	0.0	0.2	2.8	0.4	0.0	0.5	8.3	3.1
17250005	7/25/98	10:19	7:19	0.0	3.9	0.0	0.7	0.7	0.1	0.0	0.2	2.9	0.4	0.0	0.5	6.0	3.1
17250006	7/25/98	10:20	7:20	0.0	4.0	0.0	0.8	1.4	0.1	0.0	0.2	3.0	0.4	0.0	0.6	8.1	3.2
17250007	7/25/98	10:22	7:22	0.0	4.4	0.0	0.8	2.5	0.1	0.0	0.3	3.2	0.5	0.0	0.6	10.0	3.4
17250008	7/25/98	10:24	7:24	0.0	4.4	0.0	0.8	2.2	0.1	0.0	0.3	3.1	0.5	0.0	0.6	10.6	3.4
17250009	7/25/98	10:26	7:26	0.0	4.3	0.0	0.8	2.0	0.1	0.0	0.3	3.2	0.5	0.0	0.6	10.7	3.3
17250010	7/25/98	10:27	7:27	0.0	4.3	0.0	0.8	2.1	0.1	0.0	0.3	3.2	0.5	0.0	0.6	8.6	3.3
17250011	7/25/98	10:29	7:29	0.0	4.1	0.0	0.8	1.5	0.1	0.0	0.3	3.0	0.5	0.0	0.6	6.2	3.3
17250012	7/25/98	10:31	7:31	0.0	4.4	0.0	0.8	2.0	0.1	0.0	0.3	3.1	0.5	0.0	0.6	7.9	3.4
17250013	7/25/98	10:33	7:33	0.0	4.5	0.0	0.8	2.5	0.1	0.0	0.3	3.3	0.5	0.0	0.6	11.5	3.4
17250014	7/25/98	10:35	7:35	0.0	4.3	0.0	0.8	2.2	0.1	0.0	0.3	3.1	0.5	0.0	0.6	7.7	3.3
17250015	7/25/98	10:36	7:36	0.0	4.4	0.0	0.8	2.6	0.1	0.0	0.3	3.4	0.5	0.0	0.6	9.4	3.4
17250016	7/25/98	10:38	7:38	0.0	4.3	0.0	0.8	2.1	0.1	0.0	0.3	3.1	0.5	0.0	0.6	9.0	3.4
17250017	7/25/98	10:40	7:40	0.0	4.4	0.0	0.8	1.9	0.1	0.0	0.3	3.0	0.5	0.0	0.6	8.8	3.4
17250018	7/25/98	10:42	7:42	0.0	4.5	0.0	0.8	2.1	0.1	0.0	0.3	3.1	0.5	0.0	0.6	7.9	3.5
17250019	7/25/98	10:43	7:43	0.0	4.6	0.0	0.9	2.8	0.2	0.0	0.3	3.4	0.5	0.0	0.6	10.7	3.6
17250020	7/25/98	10:45	7:45	0.0	4.6	0.0	0.9	2.8	0.2	0.0	0.3	3.2	0.5	0.0	0.7	9.3	3.6
17250021	7/25/98	10:47	7:47	0.0	4.8	0.0	0.9	3.3	0.2	0.0	0.3	3.2	0.5	0.0	0.7	9.7	3.6
17250022	7/25/98	10:49	7:49	0.0	4.7	0.0	0.9	3.4	0.2	0.0	0.3	3.4	0.5	0.0	0.7	11.0	3.6
17250023	7/25/98	10:50	7:50	0.0	4.5	0.0	0.8	2.8	0.1	0.0	0.3	3.2	0.5	0.0	0.6	8.0	3.5
17250024	7/25/98	10:52	7:52	0.0	4.5	0.0	0.8	2.3	0.1	0.0	0.3	3.1	0.5	0.0	0.6	8.0	3.5
17250025	7/25/98	10:54	7:54	0.0	4.6	0.0	0.9	2.5	0.1	0.0	0.3	3.1	0.5	0.0	0.6	8.2	3.5
17250026	7/25/98	10:56	7:56	0.0	4.4	0.0	0.8	2.0	0.1	0.0	0.3	3.1	0.5	0.0	0.6	7.8	3.5
17250027	7/25/98	10:57	7:57	0.0	4.6	0.0	0.9	2.6	0.2	0.0	0.3	3.3	0.5	0.0	0.7	9.1	3.6
17250028	7/25/98	10:59	7:59	0.0	4.8	0.0	0.9	3.1	0.2	0.0	0.3	3.4	0.5	0.0	0.7	10.6	3.7
17250029	7/25/98	11:01	8:01	0.0	4.8	0.0	0.9	3.3	0.2	0.0	0.3	3.2	0.5	0.0	0.7	9.3	3.7
17250030	7/25/98	11:03	8:03	0.0	4.5	0.0	0.8	2.2	0.1	0.0	0.3	3.1	0.5	0.0	0.6	6.5	3.5
17250031	7/25/98	11:05	8:05	0.0	4.4	0.0	0.8	1.6	0.1	0.0	0.3	3.0	0.5	0.0	0.6	6.0	3.5
17250032	7/25/98	11:06	8:06	0.0	4.7	0.0	0.9	2.2	0.2	0.0	0.3	3.1	0.5	0.0	0.7	8.8	3.6
17250033	7/25/98	11:08	8:08	0.0	4.9	0.0	0.9	2.8	0.2	0.0	0.3	3.2	0.5	0.0	0.7	10.8	3.7

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17250033	7/25/98	11:08	8:08	0.0	4.9	0.0	0.9	2.8	0.2	0.0	0.3	3.2	0.5	0.0	0.7	10.8	3.7
17250034	7/25/98	11:10	8:10	0.0	4.7	0.0	0.9	2.5	0.2	0.0	0.3	3.0	0.5	0.0	0.7	7.9	3.6
17250035	7/25/98	11:12	8:12	0.0	5.0	0.0	0.9	2.9	0.2	0.0	0.3	3.1	0.5	0.0	0.7	7.6	3.8
17250036	7/25/98	11:13	8:13	0.0	4.6	0.0	0.9	2.4	0.2	0.0	0.3	3.0	0.5	0.0	0.7	7.1	3.6
17250037	7/25/98	11:15	8:15	0.0	4.7	0.0	0.9	2.2	0.2	0.0	0.3	3.1	0.5	0.0	0.7	10.1	3.7
17250038	7/25/98	11:17	8:17	0.0	4.7	0.0	0.9	2.4	0.2	0.0	0.3	3.1	0.5	0.0	0.7	12.6	3.7
17250039	7/25/98	11:19	8:19	0.0	5.0	0.0	0.9	3.2	0.2	0.0	0.3	3.1	0.5	0.0	0.7	13.7	3.9
17250040	7/25/98	11:20	8:20	3.2	1.3	0.0	0.9	5.7	0.2	0.0	0.3	3.1	0.6	0.0	0.7	9.9	3.9
17250041	7/25/98	11:22	8:22	0.0	5.1	0.0	0.9	5.5	0.2	0.0	0.3	3.3	0.6	0.0	0.7	11.9	3.9
17250042	7/25/98	11:24	8:24	0.0	5.3	0.0	1.0	4.6	0.2	0.0	0.3	3.3	0.6	0.0	0.8	12.3	4.0
17250043	7/25/98	11:26	8:26	0.0	5.2	0.0	1.0	3.7	0.2	0.0	0.3	3.1	0.6	0.0	0.7	8.7	4.0
17250044	7/25/98	11:28	8:28	0.0	4.9	0.0	0.9	3.1	0.2	0.0	0.3	3.0	0.5	0.0	0.7	6.1	3.8
17250045	7/25/98	11:29	8:29	0.0	5.1	0.0	1.0	3.1	0.2	0.0	0.3	3.1	0.5	0.0	0.7	6.8	3.9
17250046	7/25/98	11:31	8:31	0.0	5.2	0.0	1.0	3.3	0.2	0.0	0.3	3.1	0.6	0.0	0.7	7.3	3.9
17250047	7/25/98	11:33	8:33	0.0	5.0	0.0	0.9	3.1	0.2	0.0	0.3	3.1	0.5	0.0	0.7	6.8	3.8
17250048	7/25/98	11:35	8:35	0.0	5.3	0.0	1.0	3.5	0.2	0.0	0.3	3.1	0.6	0.0	0.7	7.1	4.0
17250049	7/25/98	11:36	8:36	0.0	5.7	0.0	1.1	4.3	0.2	0.0	0.3	3.1	0.6	0.0	0.8	9.3	4.2
17250050	7/25/98	11:38	8:38	0.0	5.2	0.0	1.0	3.2	0.2	0.0	0.3	3.2	0.6	0.0	0.7	11.4	4.0
17250051	7/25/98	11:40	8:40	0.0	5.1	0.0	1.0	3.3	0.2	0.0	0.3	3.3	0.5	0.0	0.7	10.0	3.9
17250076	7/25/98	12:24	9:24	0.0	144.4	0.0	27.0	211.9	4.7	0.0	6.7	0.0	15.2	0.0	20.4	0.0	109.1
17250077	7/25/98	12:29	9:29	9.6	2.6	0.0	2.0	14.0	0.3	0.7	0.5	3.8	1.1	4.4	1.5	7.1	6.9
17250078	7/25/98	12:31	9:31	5.5	1.9	0.0	1.4	8.1	0.2	0.0	0.4	3.3	0.8	0.0	1.1	5.3	5.1
17250079	7/25/98	12:33	9:33	0.0	6.5	0.0	1.2	6.2	0.2	0.0	0.4	3.3	0.7	0.0	0.9	9.0	4.7
17250080	7/25/98	12:35	9:35	0.0	5.8	0.0	1.1	4.9	0.2	0.0	0.3	3.2	0.6	0.0	0.8	6.6	4.3
17250081	7/25/98	12:36	9:36	0.0	5.6	0.0	1.0	4.5	0.2	0.0	0.3	3.2	0.6	0.0	0.8	7.3	4.2
17250082	7/25/98	12:38	9:38	0.0	5.3	0.0	1.0	3.8	0.2	0.0	0.3	3.2	0.6	0.0	0.7	7.1	4.0
17250083	7/25/98	12:40	9:40	0.0	5.1	0.0	1.0	3.0	0.2	0.0	0.3	3.1	0.5	0.0	0.7	7.0	3.9
17250084	7/25/98	12:42	9:42	0.0	5.2	0.0	1.0	3.0	0.2	0.0	0.3	3.2	0.6	0.0	0.7	7.4	4.0
17250085	7/25/98	12:43	9:43	0.0	5.1	0.0	1.0	2.9	0.2	0.0	0.3	3.1	0.5	0.0	0.7	6.5	4.0
17250086	7/25/98	12:45	9:45	0.0	5.1	0.0	1.0	2.5	0.2	0.0	0.3	3.1	0.5	0.0	0.7	7.0	4.0
17250087	7/25/98	12:47	9:47	0.0	5.2	0.0	1.0	3.0	0.2	0.0	0.3	3.0	0.6	0.0	0.7	7.7	4.0
17250088	7/25/98	12:49	9:49	0.0	5.2	0.0	1.0	2.7	0.2	0.0	0.3	3.1	0.5	0.0	0.7	6.9	4.0
17250089	7/25/98	12:51	9:51	0.0	5.4	0.0	1.0	3.3	0.2	0.0	0.3	3.2	0.6	0.0	0.8	7.7	4.1

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17250090	7/25/98	12:52	9:52	0.0	5.1	0.0	1.0	2.8	0.2	0.0	0.3	3.1	0.5	0.0	0.7	6.6	4.0
17250091	7/25/98	12:54	9:54	0.0	5.0	0.0	0.9	2.1	0.2	0.0	0.3	3.0	0.5	0.0	0.7	6.9	3.9
17250092	7/25/98	12:56	9:56	0.0	5.4	0.0	1.0	2.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	8.2	4.1
17250093	7/25/98	12:58	9:58	0.0	5.6	0.0	1.0	3.2	0.2	0.0	0.3	3.1	0.6	0.0	0.8	8.8	4.2
17250094	7/25/98	12:59	9:59	0.0	5.5	0.0	1.0	3.5	0.2	0.0	0.3	3.1	0.6	0.0	0.8	8.1	4.2
17250095	7/25/98	13:01	10:01	0.0	5.4	0.0	1.0	3.7	0.2	0.0	0.3	3.1	0.6	0.0	0.8	7.1	4.1
17250096	7/25/98	13:03	10:03	0.0	5.3	0.0	1.0	3.1	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.7	4.1
17250097	7/25/98	13:05	10:05	0.0	5.4	0.0	1.0	3.4	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.6	4.1
17250098	7/25/98	13:07	10:07	0.0	5.4	0.0	1.0	3.0	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.8	4.1
17250099	7/25/98	13:08	10:08	0.0	5.2	0.0	1.0	2.9	0.2	0.0	0.3	3.0	0.6	0.0	0.7	5.7	4.0
17250100	7/25/98	13:10	10:10	0.0	5.0	0.0	0.9	2.2	0.2	0.0	0.3	3.0	0.5	0.0	0.7	0.0	4.0
17250101	7/25/98	13:12	10:12	0.0	5.3	0.0	1.0	2.4	0.2	0.0	0.3	3.0	0.6	0.0	0.8	6.2	4.1
17250102	7/25/98	13:14	10:14	0.0	5.1	0.0	0.9	2.2	0.2	0.0	0.3	2.9	0.5	0.0	0.7	8.1	3.9
17250103	7/25/98	13:15	10:15	0.0	5.3	0.0	1.0	2.3	0.2	0.0	0.3	3.0	0.6	0.0	0.7	9.1	4.1
17250104	7/25/98	13:17	10:17	0.0	5.3	0.0	1.0	2.8	0.2	0.0	0.3	3.0	0.6	0.0	0.7	8.8	4.1
17250105	7/25/98	13:19	10:19	0.0	5.1	0.0	0.9	2.6	0.2	0.0	0.3	3.0	0.5	0.0	0.7	7.2	4.0
17250106	7/25/98	13:21	10:21	0.0	5.0	0.0	0.9	2.2	0.2	0.0	0.3	3.0	0.5	0.0	0.7	6.1	3.9
17250107	7/25/98	13:23	10:23	0.0	5.0	0.0	0.9	1.9	0.2	0.0	0.3	3.0	0.5	0.0	0.7	5.8	3.9
17250108	7/25/98	13:24	10:24	0.0	4.9	0.0	0.9	1.7	0.2	0.0	0.3	2.9	0.5	0.0	0.7	5.7	3.9
17250109	7/25/98	13:26	10:26	0.0	4.9	0.0	0.9	1.6	0.2	0.0	0.3	2.9	0.5	0.0	0.7	5.6	3.9
17250110	7/25/98	13:28	10:28	0.0	5.1	0.0	0.9	1.8	0.2	0.0	0.3	3.0	0.5	0.0	0.7	6.5	3.9
17250111	7/25/98	13:29	10:29	0.0	5.4	0.0	1.0	2.7	0.2	0.0	0.3	3.1	0.6	0.0	0.8	9.1	4.2
17250112	7/25/98	13:31	10:31	0.0	5.4	0.0	1.0	3.3	0.2	0.0	0.3	3.2	0.6	0.0	0.8	16.0	4.1
17250113	7/25/98	13:33	10:33	0.0	5.6	0.0	1.0	4.2	0.2	0.0	0.3	3.4	0.6	0.0	0.8	16.9	4.2
17250114	7/25/98	13:35	10:35	0.0	5.3	0.0	1.0	3.7	0.2	0.0	0.3	3.3	0.6	0.0	0.8	10.1	4.1
17250115	7/25/98	13:36	10:36	0.0	5.3	0.0	1.0	3.3	0.2	0.0	0.3	3.2	0.6	0.0	0.7	10.3	4.1
17250116	7/25/98	13:38	10:38	0.0	5.2	0.0	1.0	3.3	0.2	0.0	0.3	3.1	0.6	0.0	0.7	9.2	4.1
17250117	7/25/98	13:40	10:40	0.0	5.0	0.0	0.9	2.5	0.2	0.0	0.3	3.0	0.5	0.0	0.7	6.5	4.0
17250118	7/25/98	13:42	10:42	0.0	5.1	0.0	1.0	2.6	0.2	0.0	0.3	3.1	0.5	0.0	0.7	10.9	4.0
17250119	7/25/98	13:44	10:44	0.0	5.2	0.0	1.0	3.3	0.2	0.0	0.3	3.3	0.6	0.0	0.7	12.1	4.1
17250120	7/25/98	13:45	10:45	0.0	5.3	0.0	1.0	3.7	0.2	0.0	0.3	3.3	0.6	0.0	0.7	10.9	4.1
17250121	7/25/98	13:47	10:47	0.0	5.2	0.0	1.0	3.0	0.2	0.0	0.3	3.1	0.5	0.0	0.7	8.2	4.0
17250122	7/25/98	13:49	10:49	0.0	5.2	0.0	1.0	2.7	0.2	0.0	0.3	3.1	0.5	0.0	0.7	7.3	4.1
17250123	7/25/98	13:51	10:51	0.0	5.5	0.0	1.0	2.8	0.2	0.0	0.3	3.2	0.6	0.0	0.8	7.8	4.2

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17250124	7/25/98	13:52	10:52	0.0	5.3	0.0	1.0	2.8	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.7	4.1
17250125	7/25/98	13:54	10:54	0.0	5.4	0.0	1.0	2.8	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.4	4.1
17250126	7/25/98	13:56	10:56	0.0	5.4	0.0	1.0	2.7	0.2	0.0	0.3	3.1	0.6	0.0	0.8	7.1	4.2
17250127	7/25/98	13:58	10:58	0.0	5.3	0.0	1.0	2.9	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.9	4.1
17250128	7/25/98	14:00	11:00	0.0	5.1	0.0	1.0	2.2	0.2	0.0	0.3	3.0	0.5	0.0	0.7	5.3	4.0
17250129	7/25/98	14:01	11:01	0.0	5.5	0.0	1.0	2.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	7.5	4.2
17250130	7/25/98	14:03	11:03	0.0	5.3	0.0	1.0	2.6	0.2	0.0	0.3	3.0	0.6	0.0	0.7	6.1	4.1
17250131	7/25/98	14:05	11:05	0.0	5.2	0.0	1.0	2.2	0.2	0.0	0.3	3.0	0.6	0.0	0.7	5.5	4.1
17250132	7/25/98	14:07	11:07	0.0	5.3	0.0	1.0	2.4	0.2	0.0	0.3	3.0	0.6	0.0	0.7	5.9	4.1
17250133	7/25/98	14:08	11:08	0.0	5.1	0.0	1.0	1.9	0.2	0.0	0.3	3.0	0.5	0.0	0.7	0.0	4.2
17250134	7/25/98	14:10	11:10	0.0	5.2	0.0	1.0	1.6	0.2	0.0	0.3	2.9	0.5	0.0	0.7	0.0	4.2
			Average --->	0.0	4.9	0.0	0.9	2.8	0.2	0.0	0.3	3.1	0.5	0.0	0.7	8.2	3.8

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17260001	7/26/98	12:23	9:23	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.7	0.5	0.0	0.7	0.0	4.3
17260002	7/26/98	12:25	9:25	0.0	5.8	0.0	1.1	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	0.0	4.7
17260003	7/26/98	12:27	9:27	0.0	6.1	0.0	1.1	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	0.0	4.8
17260004	7/26/98	12:29	9:29	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	0.0	4.9
17260005	7/26/98	12:30	9:30	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	0.0	4.9
17260006	7/26/98	12:32	9:32	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	0.0	4.9
17260007	7/26/98	12:34	9:34	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	5.0
17260008	7/26/98	12:36	9:36	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	4.9
17260009	7/26/98	12:38	9:38	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	4.9
17260010	7/26/98	12:39	9:39	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	4.9
17260011	7/26/98	12:41	9:41	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	4.9
17260012	7/26/98	12:43	9:43	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	5.0
17260013	7/26/98	12:45	9:45	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	5.0
17260014	7/26/98	12:46	9:46	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260015	7/26/98	12:48	9:48	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.7	0.0	0.9	0.0	4.9
17260016	7/26/98	12:50	9:50	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260017	7/26/98	12:52	9:52	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260018	7/26/98	12:53	9:53	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260019	7/26/98	12:55	9:55	0.0	6.6	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	5.0
17260020	7/26/98	12:57	9:57	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260021	7/26/98	12:59	9:59	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260022	7/26/98	13:01	10:01	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260023	7/26/98	13:02	10:02	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260024	7/26/98	13:04	10:04	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260025	7/26/98	13:06	10:06	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.9
17260026	7/26/98	13:08	10:08	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.8
17260027	7/26/98	13:09	10:09	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.8
17260028	7/26/98	13:11	10:11	0.0	6.5	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.8
17260029	7/26/98	13:13	10:13	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.8
17260030	7/26/98	13:15	10:15	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.4	4.6
17260031	7/26/98	13:16	10:16	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.8
17260032	7/26/98	13:18	10:18	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260033	7/26/98	13:20	10:20	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260034	7/26/98	13:22	10:22	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260035	7/26/98	13:24	10:24	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17260035	7/26/98	13:24	10:24	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260036	7/26/98	13:25	10:25	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260037	7/26/98	13:27	10:27	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260038	7/26/98	13:29	10:29	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260039	7/26/98	13:31	10:31	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260040	7/26/98	13:32	10:32	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.4	4.5
17260041	7/26/98	13:34	10:34	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.6	4.5
17260042	7/26/98	13:36	10:36	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260043	7/26/98	13:38	10:38	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.3	4.5
17260044	7/26/98	13:40	10:40	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	6.1	4.5
17260045	7/26/98	13:41	10:41	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.4	4.5
17260046	7/26/98	13:43	10:43	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.7
17260047	7/26/98	13:45	10:45	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.6
17260048	7/26/98	13:47	10:47	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	0.0	4.6
17260049	7/26/98	13:48	10:48	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.4	4.4
17260050	7/26/98	13:50	10:50	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	7.6	4.4
17260051	7/26/98	13:52	10:52	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	7.6	4.4
17260052	7/26/98	13:54	10:54	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	6.6	4.5
17260053	7/26/98	13:56	10:56	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	7.2	4.4
17260054	7/26/98	13:57	10:57	0.0	6.4	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	6.6	4.5
17260055	7/26/98	13:59	10:59	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	6.6	4.4
17260056	7/26/98	14:01	11:01	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.3	0.7	0.0	0.9	6.4	4.4
17260057	7/26/98	14:03	11:03	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.8	4.4
17260058	7/26/98	14:04	11:04	0.0	6.3	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.7	0.0	0.9	5.7	4.4
17260059	7/26/98	14:06	11:06	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	5.4	4.3
17260060	7/26/98	14:08	11:08	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	5.1	4.3
17260061	7/26/98	14:10	11:10	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	0.0	4.5
17260062	7/26/98	14:11	11:11	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	0.0	4.5
17260063	7/26/98	14:13	11:13	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	0.0	4.4
17260064	7/26/98	14:15	11:15	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	0.0	4.4
17260065	7/26/98	14:17	11:17	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	5.4	4.3
17260066	7/26/98	14:19	11:19	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	6.6	4.3
17260067	7/26/98	14:20	11:20	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.2	0.6	0.0	0.9	5.5	4.3
17260068	7/26/98	14:22	11:22	0.0	6.1	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	5.7	4.3
17260069	7/26/98	14:24	11:24	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	5.6	4.3

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17260070	7/26/98	14:26	11:26	0.0	6.2	0.0	1.2	0.0	0.6	0.0	0.3	3.1	0.6	0.0	0.9	7.1	4.3
17260071	7/26/98	14:49	11:49	0.0	4.9	0.0	0.9	0.0	0.5	0.0	0.3	2.8	0.5	0.0	0.7	4.9	3.7
17260072	7/26/98	14:50	11:50	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	5.1	3.9
17260073	7/26/98	14:52	11:52	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	5.1	4.0
17260074	7/26/98	14:54	11:54	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	4.9	4.0
17260075	7/26/98	14:56	11:56	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	4.8	4.0
17260076	7/26/98	14:57	11:57	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.2	4.0
17260077	7/26/98	14:59	11:59	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.2	4.0
17260078	7/26/98	15:01	12:01	0.0	5.6	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.6	4.0
17260079	7/26/98	15:03	12:03	0.0	5.6	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.7	4.0
17260080	7/26/98	15:05	12:05	0.0	5.6	0.0	1.1	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.7	4.0
17260081	7/26/98	15:06	12:06	0.0	5.6	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	5.5	4.0
17260082	7/26/98	15:08	12:08	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.1	4.0
17260083	7/26/98	15:10	12:10	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.4	4.0
17260084	7/26/98	15:12	12:12	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.8	4.0
17260085	7/26/98	15:13	12:13	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.8	4.0
17260086	7/26/98	15:15	12:15	0.0	5.5	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	5.5	4.0
17260087	7/26/98	15:17	12:17	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.2	3.9
17260088	7/26/98	15:19	12:19	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.5	3.9
17260089	7/26/98	15:20	12:20	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	7.0	4.0
17260090	7/26/98	15:22	12:22	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	6.3	4.0
17260091	7/26/98	15:24	12:24	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.4	3.9
17260092	7/26/98	15:26	12:26	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	5.0	3.9
17260093	7/26/98	15:28	12:28	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.7	5.3	3.9
17260094	7/26/98	15:29	12:29	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	6.0	3.9
17260095	7/26/98	15:31	12:31	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	7.2	3.9
17260096	7/26/98	15:33	12:33	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.7	6.5	3.9
17260097	7/26/98	15:35	12:35	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.8	3.9
17260098	7/26/98	15:36	12:36	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.5	3.9
17260099	7/26/98	15:38	12:38	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.5	3.9
17260100	7/26/98	15:40	12:40	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.4	3.8
17260101	7/26/98	15:42	12:42	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.7	3.9
17260102	7/26/98	15:43	12:43	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.7	3.9
17260103	7/26/98	15:45	12:45	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.1	3.9

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17260104	7/26/98	15:47	12:47	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	6.0	3.9
17260105	7/26/98	15:49	12:49	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	3.0	0.5	0.0	0.7	6.0	3.9
17260106	7/26/98	15:50	12:50	0.0	5.0	0.0	0.9	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.3	3.8
17260107	7/26/98	15:52	12:52	0.0	5.0	0.0	0.9	0.0	0.5	0.0	0.3	2.8	0.5	0.0	0.7	5.1	3.7
17260108	7/26/98	15:54	12:54	0.0	5.1	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.1	3.8
17260109	7/26/98	15:56	12:56	0.0	5.1	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.1	3.8
17260110	7/26/98	15:57	12:57	0.0	5.1	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.1	3.8
17260111	7/26/98	15:59	12:59	0.0	5.1	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.4	3.8
17260112	7/26/98	16:01	13:01	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.6	3.8
17260113	7/26/98	16:03	13:03	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.4	3.9
17260114	7/26/98	16:05	13:05	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.5	0.0	0.7	5.4	3.8
17260115	7/26/98	16:06	13:06	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.1	3.9
17260116	7/26/98	16:08	13:08	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.2	3.9
17260117	7/26/98	16:10	13:10	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.9	3.9
17260118	7/26/98	16:12	13:12	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	5.4	3.9
17260119	7/26/98	16:13	13:13	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	5.3	3.9
17260120	7/26/98	16:15	13:15	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	5.3	3.9
17260121	7/26/98	16:17	13:17	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	5.3	3.9
17260122	7/26/98	16:19	13:19	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	4.9	3.9
17260123	7/26/98	16:21	13:21	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	5.3	3.9
17260124	7/26/98	16:22	13:22	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	4.8	3.9
17260125	7/26/98	16:24	13:24	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	4.7	3.9
17260126	7/26/98	16:26	13:26	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.8	0.0	4.0
17260127	7/26/98	16:28	13:28	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.8	0.0	4.0
17260128	7/26/98	16:29	13:29	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.8	4.7	3.9
17260129	7/26/98	16:31	13:31	0.0	5.4	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.8	0.0	4.0
17260130	7/26/98	16:33	13:33	0.0	5.3	0.0	1.0	0.0	0.5	0.0	0.3	2.9	0.6	0.0	0.7	4.9	3.9
17260131	7/26/98	16:35	13:35	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	4.6	3.8
17260132	7/26/98	16:37	13:37	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	0.0	3.9
17260133	7/26/98	16:38	13:38	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.7	0.5	0.0	0.7	0.0	3.9
17260134	7/26/98	16:40	13:40	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.5	0.0	0.7	0.0	3.9
17260135	7/26/98	16:42	13:42	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	5.3	3.8
17260136	7/26/98	16:44	13:44	0.0	5.2	0.0	1.0	0.0	0.5	0.0	0.3	2.8	0.6	0.0	0.7	4.6	3.8
			Average --->	0.0	5.8	0.0	1.1	0.0	0.5	0.0	0.3	3.0	0.6	0.0	0.8	3.5	4.3

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17270001	7/27/98	10:06	7:06	0.0	3.7	0.0	0.7	1.9	0.1	0.0	0.2	2.8	0.4	0.0	0.5	7.9	3.0
17270002	7/27/98	10:08	7:08	0.0	4.2	0.0	0.8	2.5	0.1	0.0	0.3	3.1	0.4	0.0	0.6	10.1	3.2
17270003	7/27/98	10:09	7:09	0.0	4.3	0.0	0.8	2.5	0.1	0.0	0.3	3.2	0.5	1.6	0.6	11.3	3.3
17270004	7/27/98	10:11	7:11	0.0	4.5	0.0	0.8	2.6	0.1	0.0	0.3	3.2	0.5	1.6	0.6	9.8	3.4
17270005	7/27/98	10:13	7:13	0.0	4.6	0.0	0.9	2.8	0.1	0.0	0.3	3.1	0.5	0.0	0.6	7.6	3.4
17270006	7/27/98	10:15	7:15	0.0	4.3	0.0	0.8	2.3	0.1	0.0	0.3	3.1	0.5	0.0	0.6	6.9	3.3
17270007	7/27/98	10:17	7:17	0.0	4.1	0.0	0.8	1.4	0.1	0.0	0.3	3.0	0.4	0.0	0.6	6.7	3.2
17270008	7/27/98	10:18	7:18	0.0	4.0	0.0	0.8	1.0	0.1	0.0	0.3	3.0	0.4	0.0	0.6	6.6	3.2
17270009	7/27/98	10:20	7:20	0.0	4.3	0.0	0.8	1.2	0.1	0.0	0.3	3.0	0.5	0.0	0.6	7.5	3.3
17270010	7/27/98	10:22	7:22	0.0	4.2	0.0	0.8	1.3	0.1	0.0	0.3	3.1	0.4	0.0	0.6	6.4	3.3
17270011	7/27/98	10:24	7:24	0.0	4.1	0.0	0.8	0.8	0.1	0.0	0.3	3.0	0.4	0.0	0.6	4.4	3.2
17270012	7/27/98	10:25	7:25	0.0	4.0	0.0	0.7	0.5	0.1	0.0	0.2	3.0	0.4	0.0	0.6	0.0	3.3
17270013	7/27/98	10:27	7:27	0.0	4.0	0.0	0.7	0.4	0.1	0.0	0.2	3.0	0.4	0.0	0.6	0.0	3.3
17270014	7/27/98	10:29	7:29	0.0	4.0	0.0	0.8	0.0	0.4	0.0	0.3	3.0	0.4	0.0	0.6	0.0	3.3
17270015	7/27/98	10:31	7:31	0.0	4.1	0.0	0.8	0.0	0.4	0.0	0.3	3.0	0.4	0.0	0.6	0.0	3.3
17270016	7/27/98	10:33	7:33	0.0	4.1	0.0	0.8	0.0	0.4	0.0	0.3	3.0	0.4	0.0	0.6	0.0	3.4
17270017	7/27/98	10:34	7:34	0.0	4.1	0.0	0.8	0.0	0.4	0.0	0.3	3.0	0.4	0.0	0.6	6.0	3.3
17270018	7/27/98	10:36	7:36	0.0	4.1	0.0	0.8	0.0	0.4	0.0	0.3	2.9	0.4	0.0	0.6	5.4	3.3
17270019	7/27/98	10:38	7:38	0.0	4.5	0.0	0.8	0.7	0.1	0.0	0.3	3.0	0.5	0.0	0.6	8.1	3.5
17270020	7/27/98	10:40	7:40	0.0	4.7	0.0	0.9	1.5	0.1	0.0	0.3	3.0	0.5	0.0	0.7	8.9	3.6
17270021	7/27/98	10:41	7:41	0.0	4.8	0.0	0.9	2.2	0.2	0.0	0.3	3.1	0.5	0.0	0.7	9.2	3.6
17270022	7/27/98	10:43	7:43	0.0	4.4	0.0	0.8	1.4	0.1	0.0	0.3	3.0	0.5	0.0	0.6	6.1	3.4
17270023	7/27/98	10:45	7:45	0.0	4.5	0.0	0.8	1.3	0.1	0.0	0.3	3.1	0.5	0.0	0.6	8.5	3.5
17270024	7/27/98	10:47	7:47	0.0	4.6	0.0	0.9	1.8	0.1	0.0	0.3	3.1	0.5	0.0	0.7	10.0	3.6
17270025	7/27/98	10:49	7:49	0.0	4.8	0.0	0.9	2.3	0.2	0.0	0.3	3.2	0.5	0.0	0.7	9.8	3.7
17270026	7/27/98	10:50	7:50	0.0	4.6	0.0	0.9	2.0	0.1	0.0	0.3	3.1	0.5	0.0	0.6	8.5	3.6
17270027	7/27/98	10:52	7:52	0.0	4.4	0.0	0.8	1.4	0.1	0.0	0.3	3.0	0.5	0.0	0.6	11.7	3.5
17270028	7/27/98	10:54	7:54	0.0	4.4	0.0	0.8	1.3	0.1	0.0	0.3	3.0	0.5	0.0	0.6	13.0	3.6
17270029	7/27/98	10:56	7:56	0.0	4.7	0.0	0.9	2.0	0.1	0.0	0.3	3.1	0.5	0.0	0.7	9.8	3.7
17270030	7/27/98	10:57	7:57	0.0	4.9	0.0	0.9	2.6	0.2	0.0	0.3	3.2	0.5	0.0	0.7	8.1	3.8
17270031	7/27/98	10:59	7:59	0.0	4.7	0.0	0.9	2.0	0.1	0.0	0.3	3.1	0.5	0.0	0.7	6.1	3.7
17270032	7/27/98	11:01	8:01	0.0	4.7	0.0	0.9	1.5	0.1	0.0	0.3	3.1	0.5	0.0	0.7	6.9	3.7
17270033	7/27/98	11:03	8:03	0.0	5.2	0.0	1.0	2.2	0.2	0.0	0.3	3.2	0.5	0.0	0.7	6.7	3.9
17270034	7/27/98	11:05	8:05	0.0	5.3	0.0	1.0	2.4	0.2	0.0	0.3	3.3	0.6	0.0	0.8	6.2	4.0
17270035	7/27/98	11:06	8:06	0.0	5.2	0.0	1.0	2.5	0.2	0.0	0.3	3.3	0.5	0.0	0.7	5.5	3.9
17270036	7/27/98	11:08	8:08	0.0	4.8	0.0	0.9	1.6	0.2	0.0	0.3	3.2	0.5	0.0	0.7	0.0	3.9
17270037	7/27/98	11:10	8:10	0.0	4.7	0.0	0.9	1.1	0.1	0.0	0.3	3.2	0.5	0.0	0.7	0.0	3.9

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17270037	7/27/98	11:10	8:10	0.0	4.7	0.0	0.9	1.1	0.1	0.0	0.3	3.2	0.5	0.0	0.7	0.0	3.9
17270038	7/27/98	11:12	8:12	0.0	5.0	0.0	0.9	2.3	0.2	0.0	0.3	3.3	0.5	0.0	0.7	0.0	4.1
17270039	7/27/98	11:13	8:13	0.0	5.4	0.0	1.0	3.3	0.2	0.0	0.3	3.4	0.6	0.0	0.8	4.6	4.1
17270040	7/27/98	11:15	8:15	0.0	5.4	0.0	1.0	3.4	0.2	0.0	0.3	3.5	0.6	0.0	0.8	5.4	4.1
17270041	7/27/98	11:17	8:17	0.0	5.3	0.0	1.0	3.3	0.2	0.0	0.3	3.5	0.5	0.0	0.7	5.9	4.0
17270042	7/27/98	11:19	8:19	0.0	5.1	0.0	1.0	3.0	0.2	0.0	0.3	3.5	0.5	0.0	0.7	5.0	3.9
17270043	7/27/98	11:21	8:21	0.0	5.3	0.0	1.0	3.3	0.2	0.0	0.3	3.6	0.5	0.0	0.7	5.0	4.0
17270044	7/27/98	11:22	8:22	0.0	5.5	0.0	1.0	3.8	0.2	0.0	0.3	3.7	0.6	0.0	0.8	5.6	4.1
17270045	7/27/98	11:24	8:24	0.0	5.5	0.0	1.0	3.7	0.2	0.0	0.3	3.7	0.6	0.0	0.8	5.7	4.2
17270046	7/27/98	11:26	8:26	0.0	5.5	0.0	1.0	4.0	0.2	0.0	0.3	3.8	0.6	0.0	0.8	5.9	4.1
17270047	7/27/98	11:28	8:28	0.0	5.5	0.0	1.0	3.7	0.2	0.0	0.3	3.8	0.6	0.0	0.8	5.8	4.2
17270048	7/27/98	11:29	8:29	0.0	5.6	0.0	1.1	3.4	0.2	0.0	0.3	3.9	0.6	0.0	0.8	5.7	4.2
17270049	7/27/98	11:31	8:31	0.0	5.6	0.0	1.0	3.6	0.2	0.0	0.3	4.0	0.6	0.0	0.8	11.5	4.2
17270050	7/27/98	11:33	8:33	0.0	5.7	0.0	1.1	4.4	0.2	0.0	0.3	4.1	0.6	0.0	0.8	11.5	4.3
17270051	7/27/98	11:35	8:35	0.0	5.9	0.0	1.1	4.9	0.2	0.0	0.3	4.1	0.6	0.0	0.8	8.2	4.5
17270052	7/27/98	11:37	8:37	0.0	5.9	0.0	1.1	4.5	0.2	0.0	0.3	4.2	0.6	0.0	0.8	7.0	4.4
17270053	7/27/98	11:38	8:38	0.0	5.7	0.0	1.1	4.4	0.2	0.0	0.3	4.1	0.6	0.0	0.8	6.0	4.3
17270054	7/27/98	11:40	8:40	0.0	5.8	0.0	1.1	4.0	0.2	0.0	0.3	4.1	0.6	0.0	0.8	6.8	4.4
17270055	7/27/98	11:42	8:42	0.0	5.9	0.0	1.1	4.7	0.2	0.0	0.3	3.9	0.6	0.0	0.8	6.8	4.4
17270056	7/27/98	11:44	8:44	0.0	5.8	0.0	1.1	5.0	0.2	0.0	0.3	3.6	0.6	0.0	0.8	7.6	4.4
17270057	7/27/98	11:45	8:45	0.0	5.6	0.0	1.0	4.7	0.2	0.0	0.3	3.7	0.6	0.0	0.8	12.3	4.3
17270058	7/27/98	11:47	8:47	0.0	5.6	0.0	1.1	3.8	0.2	0.0	0.3	3.4	0.6	0.0	0.8	6.6	4.3
17270059	7/27/98	11:49	8:49	0.0	5.6	0.0	1.0	3.0	0.2	0.0	0.3	3.3	0.6	0.0	0.8	5.3	4.3
17270060	7/27/98	11:51	8:51	0.0	5.8	0.0	1.1	3.1	0.2	0.0	0.3	3.3	0.6	0.0	0.8	5.2	4.4
17270061	7/27/98	11:53	8:53	0.0	5.9	0.0	1.1	3.4	0.2	0.0	0.3	3.3	0.6	0.0	0.8	5.5	4.5
17270062	7/27/98	11:54	8:54	0.0	6.0	0.0	1.1	3.4	0.2	0.0	0.3	3.2	0.6	0.0	0.8	5.2	4.5
17270063	7/27/98	11:56	8:56	0.0	5.8	0.0	1.1	2.9	0.2	0.0	0.3	3.2	0.6	0.0	0.8	5.4	4.4
17270064	7/27/98	11:58	8:58	0.0	6.0	0.0	1.1	3.4	0.2	0.0	0.3	3.2	0.6	0.0	0.8	5.9	4.5
17270065	7/27/98	12:00	9:00	0.0	5.9	0.0	1.1	3.2	0.2	0.0	0.3	3.2	0.6	0.0	0.8	5.9	4.5
17270066	7/27/98	12:01	9:01	0.0	5.9	0.0	1.1	3.4	0.2	0.0	0.3	3.2	0.6	0.0	0.8	7.1	4.5
17270067	7/27/98	12:03	9:03	0.0	6.0	0.0	1.1	3.5	0.2	0.0	0.4	3.1	0.6	0.0	0.9	6.8	4.6
17270068	7/27/98	12:05	9:05	0.0	6.0	0.0	1.1	3.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	6.6	4.5
17270069	7/27/98	12:07	9:07	0.0	6.2	0.0	1.2	4.2	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.8	4.7
17270070	7/27/98	12:09	9:09	0.0	5.8	0.0	1.1	4.8	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.1	4.5
17270071	7/27/98	12:10	9:10	0.0	5.7	0.0	1.1	3.6	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.0	4.4
17270072	7/27/98	12:12	9:12	0.0	5.9	0.0	1.1	3.2	0.2	0.0	0.3	3.1	0.6	0.0	0.8	4.9	4.5
17270073	7/27/98	12:14	9:14	0.0	6.1	0.0	1.1	3.5	0.2	0.0	0.4	3.1	0.6	0.0	0.9	5.2	4.6

Table - . Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17270074	7/27/98	12:16	9:16	0.0	6.0	0.0	1.1	3.3	0.2	0.0	0.4	3.0	0.6	0.0	0.8	5.4	4.6
17270075	7/27/98	12:17	9:17	0.0	6.0	0.0	1.1	3.4	0.2	0.0	0.4	3.1	0.6	0.0	0.8	5.0	4.6
17270076	7/27/98	12:19	9:19	0.0	6.0	0.0	1.1	3.8	0.2	0.0	0.4	3.0	0.6	0.0	0.9	5.5	4.6
17270077	7/27/98	12:21	9:21	0.0	5.7	0.0	1.1	3.0	0.2	0.0	0.3	3.0	0.6	0.0	0.8	4.9	4.5
17270078	7/27/98	12:23	9:23	0.0	5.6	0.0	1.1	2.5	0.2	0.0	0.3	3.0	0.6	0.0	0.8	4.8	4.4
17270079	7/27/98	12:25	9:25	0.0	5.8	0.0	1.1	2.4	0.2	0.0	0.3	3.0	0.6	0.0	0.8	4.9	4.5
17270080	7/27/98	12:26	9:26	0.0	5.6	0.0	1.0	2.1	0.2	0.0	0.3	3.0	0.6	0.0	0.8	5.4	4.4
17270081	7/27/98	12:28	9:28	0.0	5.7	0.0	1.1	1.9	0.2	0.0	0.3	3.0	0.6	0.0	0.8	5.7	4.4
17270082	7/27/98	12:30	9:30	0.0	5.9	0.0	1.1	2.2	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.8	4.5
17270083	7/27/98	12:32	9:32	0.0	5.8	0.0	1.1	2.3	0.2	0.0	0.3	3.0	0.6	0.0	0.8	5.6	4.5
17270089	7/27/98	12:57	9:57	0.0	5.2	0.0	1.0	1.9	0.2	0.0	0.3	2.8	0.5	0.0	0.7	5.6	4.2
17270090	7/27/98	12:59	9:59	0.0	5.6	0.0	1.1	3.6	0.2	0.0	0.3	3.2	0.6	0.0	0.8	7.6	4.4
17270091	7/27/98	13:01	10:01	0.0	6.0	0.0	1.1	3.9	0.2	0.0	0.4	3.3	0.6	0.0	0.8	5.7	4.6
17270092	7/27/98	13:03	10:03	0.0	5.9	0.0	1.1	2.9	0.2	0.0	0.4	3.2	0.6	0.0	0.8	5.2	4.6
17270093	7/27/98	13:05	10:05	0.0	6.1	0.0	1.1	3.1	0.2	0.0	0.4	3.2	0.6	0.0	0.9	6.4	4.7
17270094	7/27/98	13:06	10:06	0.0	6.2	0.0	1.2	3.5	0.2	0.0	0.4	3.3	0.6	0.0	0.9	7.1	4.8
17270095	7/27/98	13:08	10:08	0.0	6.3	0.0	1.2	3.6	0.2	0.0	0.4	3.3	0.6	0.0	0.9	6.6	4.8
17270096	7/27/98	13:10	10:10	0.0	6.3	0.0	1.2	3.5	0.2	0.0	0.4	3.3	0.6	0.0	0.9	5.8	4.8
17270097	7/27/98	13:12	10:12	0.0	6.3	0.0	1.2	3.4	0.2	0.0	0.4	3.2	0.7	0.0	0.9	5.5	4.8
17270098	7/27/98	13:13	10:13	0.0	6.2	0.0	1.2	3.3	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.5	4.8
17270099	7/27/98	13:15	10:15	0.0	6.0	0.0	1.1	2.9	0.2	0.0	0.4	3.2	0.6	0.0	0.8	5.4	4.6
17270100	7/27/98	13:17	10:17	0.0	6.1	0.0	1.1	2.7	0.2	0.0	0.4	3.2	0.6	0.0	0.9	6.8	4.7
17270101	7/27/98	13:19	10:19	0.0	6.1	0.0	1.1	2.9	0.2	0.0	0.4	3.2	0.6	0.0	0.9	6.0	4.7
17270102	7/27/98	13:21	10:21	0.0	5.7	0.0	1.1	2.3	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.7
17270103	7/27/98	13:22	10:22	0.0	5.8	0.0	1.1	2.1	0.2	0.0	0.3	3.1	0.6	0.0	0.8	0.0	4.8
17270104	7/27/98	13:24	10:24	0.0	6.1	0.0	1.1	2.5	0.2	0.0	0.4	3.2	0.6	0.0	0.9	5.2	4.7
17270105	7/27/98	13:26	10:26	0.0	5.9	0.0	1.1	2.4	0.2	0.0	0.3	3.1	0.6	0.0	0.8	5.3	4.6
17270106	7/27/98	13:28	10:28	0.0	6.0	0.0	1.1	2.6	0.2	0.0	0.4	3.1	0.6	0.0	0.9	5.5	4.7
17270107	7/27/98	13:29	10:29	0.0	6.4	0.0	1.2	2.9	0.2	0.0	0.4	3.2	0.7	0.0	0.9	5.3	4.8
17270108	7/27/98	13:31	10:31	0.0	6.5	0.0	1.2	3.3	0.2	0.0	0.4	3.2	0.7	0.0	0.9	6.3	4.9
17270109	7/27/98	13:33	10:33	0.0	6.2	0.0	1.2	3.7	0.2	0.0	0.4	3.3	0.6	0.0	0.9	10.2	4.8
17270110	7/27/98	13:35	10:35	0.0	6.4	0.0	1.2	3.8	0.2	0.0	0.4	3.3	0.7	0.0	0.9	12.1	4.9
17270111	7/27/98	13:37	10:37	0.0	6.4	0.0	1.2	5.3	0.2	0.0	0.4	3.5	0.7	0.0	0.9	13.8	4.9
17270112	7/27/98	13:38	10:38	0.0	6.8	0.0	0.7	6.2	0.2	0.5	0.4	3.6	0.7	0.0	1.0	10.4	5.1
17270113	7/27/98	13:40	10:40	0.0	6.4	0.0	1.2	5.0	0.2	0.5	0.4	3.5	0.7	0.0	0.9	8.4	4.9
17270114	7/27/98	13:42	10:42	0.0	6.1	0.0	1.1	4.2	0.2	0.0	0.4	3.4	0.6	0.0	0.9	6.8	4.7

Table _-_. Tunnel Emissions Duct

File Name	Date	Time	Time	Toluene		Propane (ppm)	Uncer-tainty	Hexane (ppm)	Uncer-tainty	Ethylene (ppm)	Uncer-tainty	Methane (ppm)	Uncer-tainty	Formal-dehyde (ppm)	Uncer-tainty	CO (ppm)	Uncer-tainty
17270115	7/27/98	14:15	11:15	24.3	4.8	0.0	2.4	37.7	0.6	1.2	0.9	5.7	2.1	8.4	2.8	0.0	12.8
17270116	7/27/98	14:17	11:17	10.7	2.5	0.0	1.3	14.7	0.3	0.8	0.5	4.0	1.1	3.9	1.5	9.4	7.3
17270117	7/27/98	14:19	11:19	0.0	7.3	0.0	1.4	7.8	0.2	0.7	0.4	3.5	0.8	0.0	1.0	6.7	5.3
17270118	7/27/98	14:21	11:21	0.0	6.7	0.0	1.3	6.1	0.2	0.7	0.4	3.3	0.7	0.0	1.0	7.6	5.0
17270119	7/27/98	14:22	11:22	0.0	6.5	0.0	1.2	5.1	0.2	0.7	0.4	3.3	0.7	0.0	0.9	6.5	4.9
17270120	7/27/98	14:24	11:24	0.0	6.7	0.0	1.3	5.1	0.2	0.6	0.4	3.3	0.7	0.0	0.9	6.5	5.0
17270121	7/27/98	14:26	11:26	0.0	6.4	0.0	1.2	4.8	0.2	0.7	0.4	3.2	0.7	0.0	0.9	6.2	4.8
17270122	7/27/98	14:28	11:28	0.0	6.3	0.0	1.2	4.2	0.2	0.7	0.4	3.2	0.7	0.0	0.9	6.1	4.7
17270123	7/27/98	14:29	11:29	0.0	6.2	0.0	1.2	3.7	0.2	0.7	0.4	3.2	0.6	0.0	0.9	5.8	4.7
17270124	7/27/98	14:31	11:31	0.0	6.1	0.0	1.1	3.6	0.2	0.7	0.4	3.2	0.6	0.0	0.9	6.0	4.6
17270125	7/27/98	14:33	11:33	0.0	6.2	0.0	1.2	3.3	0.2	0.7	0.4	3.2	0.6	0.0	0.9	6.1	4.6
17270126	7/27/98	14:35	11:35	0.0	6.5	0.0	1.2	3.9	0.2	0.8	0.4	3.2	0.7	0.0	0.9	7.6	4.8
17270127	7/27/98	14:37	11:37	0.0	6.6	0.0	1.2	4.8	0.2	0.8	0.4	3.4	0.7	0.0	0.9	16.5	4.9
17270128	7/27/98	14:38	11:38	0.0	6.6	0.0	1.2	6.4	0.3	0.8	0.4	3.6	0.7	0.0	0.9	17.7	5.0
17270129	7/27/98	14:40	11:40	0.0	6.6	0.0	1.2	5.9	0.2	0.8	0.4	3.5	0.7	0.0	0.9	11.6	4.9
17270130	7/27/98	14:42	11:42	0.0	6.4	0.0	1.2	5.0	0.2	0.7	0.4	3.3	0.7	0.0	0.9	9.4	4.8
17270131	7/27/98	14:44	11:44	0.0	6.4	0.0	1.2	4.6	0.2	0.7	0.4	3.3	0.7	0.0	0.9	8.0	4.8
17270132	7/27/98	14:45	11:45	0.0	6.5	0.0	1.2	4.5	0.2	0.7	0.4	3.3	0.7	0.0	0.9	7.2	4.8
17270133	7/27/98	14:47	11:47	0.0	6.3	0.0	1.2	4.3	0.2	0.7	0.4	3.2	0.7	0.0	0.9	6.4	4.8
17270134	7/27/98	14:49	11:49	0.0	6.2	0.0	1.2	3.7	0.2	0.8	0.4	3.2	0.6	0.0	0.9	5.8	4.7
17270135	7/27/98	14:51	11:51	0.0	6.4	0.0	1.2	3.8	0.2	0.7	0.4	3.2	0.7	0.0	0.9	6.2	4.8
17270136	7/27/98	14:52	11:52	0.0	6.4	0.0	1.2	4.0	0.2	0.7	0.4	3.2	0.7	0.0	0.9	6.9	4.8
17270137	7/27/98	14:54	11:54	0.0	6.5	0.0	1.2	4.3	0.2	0.8	0.4	3.3	0.7	0.0	0.9	11.0	4.9
17270138	7/27/98	14:56	11:56	0.0	6.3	0.0	1.2	4.1	0.2	0.8	0.4	3.2	0.6	0.0	0.9	8.8	4.7
17270139	7/27/98	14:58	11:58	0.0	6.4	0.0	1.2	4.2	0.2	0.7	0.4	3.2	0.7	0.0	0.9	7.8	4.8
17270140	7/27/98	15:00	12:00	0.0	6.5	0.0	1.2	4.7	0.2	0.8	0.4	3.3	0.7	0.0	0.9	7.9	4.8
SP0727B	7/27/98	17:13	14:13	151.0	2.0	0.0	0.3	0.0	0.2	1.9	1.7	2.3	0.3	1.3	0.4	3.1	0.2
			Average --->	0.0	5.6	0.0	1.0	3.1	0.2	0.1	0.3	3.3	0.6	0.0	0.8	6.7	4.3

Silo Emissions Duct

File Name	Date	Time	Toluene (ppm)	Uncertainty	Iso-Octane (ppm)	Uncertainty	Hexane (ppm)	Uncertainty	Ethylene (ppm)	Uncertainty	Methane (ppm)	ncertaint	Formalde-hyde (ppm)	ncertaint	CO (ppm)	Uncertainty
17240003	7/24/98	7:25	53.6	10.6	9.8	2.1	104.0	2.9	1.4	0.7	10.3	4.5	16.4	6.1	61.3	10.6
17240004	7/24/98	7:26	86.8	17.1	15.7	3.4	165.2	4.7	2.2	0.9	15.6	7.2	23.8	9.8	115.4	65.0
17240005	7/24/98	7:28	108.9	21.7	18.4	4.3	205.3	6.0	2.7	1.2	18.6	9.2	28.5	12.4	97.7	18.6
17240006	7/24/98	7:30	126.8	25.7	20.5	5.1	238.3	7.1	3.1	1.4	21.3	10.9	32.1	14.7	104.1	22.0
17240007	7/24/98	7:32	167.9	37.2	23.5	7.4	258.7	10.3	3.7	1.6	31.5	15.9		21.4	108.0	25.6
17240008	7/24/98	7:34	182.6	41.0	25.0	8.2	276.7	11.3	3.9	1.7	33.9	17.5		23.6	107.9	28.2
17240009	7/24/98	7:35	191.9	44.2	23.7	8.8	284.5	12.2	4.1	1.9	34.9	18.8		25.7	104.0	31.8
17240010	7/24/98	7:37	200.9	46.6	25.8	9.3	294.3	12.9	4.3	2.0	36.0	19.9		27.1	104.4	34.0
17240011	7/24/98	7:39	176.8	45.5	16.9	9.0	331.9	12.6	4.4	2.1		14.6		19.5	105.6	37.0
17240012	7/24/98	7:41	192.0	52.9	14.4	10.5	356.0	14.6	4.6	2.2		18.0		24.0	107.3	39.2
17240013	7/24/98	7:42	201.5	58.0	11.9	11.5	371.0	16.0	4.6	2.3		20.2		27.0	106.1	42.7
17240014	7/24/98	7:44	234.9	59.0	23.8	11.8	314.8	16.3	4.7	2.4		14.6		33.5	96.6	48.2
17240015	7/24/98	7:46	236.2	59.6	26.8	11.9	313.8	16.4	4.7	2.4		14.8		33.8	95.7	49.2
17240016	7/24/98	7:48	174.6	36.9	23.3	7.3	302.1	10.2	4.6	2.4		10.0	37.5	21.1	89.5	47.9
17240017	7/24/98	7:49	163.4	34.2	22.7	6.8	288.4	9.4	4.4	2.3	23.6	14.5	37.9	19.6	88.3	44.7
17240018	7/24/98	7:51	206.8	48.8	26.7	9.7	284.5	13.5	4.3	2.2	36.2	20.8		28.5	95.7	41.3
17240019	7/24/98	7:53	179.1	45.3	17.0	9.0	330.6	12.5	4.3	2.2		14.6		19.5	100.7	40.4
17240020	7/24/98	7:55	210.9	49.9	27.0	9.9	289.2	13.8	4.3	2.3	35.8	21.3		29.1	95.6	42.7
17240021	7/24/98	7:56	224.0	53.2	29.6	10.6	293.4	14.7	4.5	2.4		10.7		31.1	96.9	49.1
17240022	7/24/98	7:58	216.6	51.5	28.2	10.3	290.2	14.2	4.3	2.4	36.8	21.9		30.0	97.7	46.4
17240023	7/24/98	8:00	216.9	51.3	26.8	10.2	292.9	14.1	4.2	2.4	37.3	21.9		29.9	97.9	46.4
17240077	7/24/98	9:39	109.9	23.3	13.1	4.6	204.4	6.4	3.5	1.9	18.4	9.9	28.7	13.3	76.8	31.2
17240078	7/24/98	9:41	108.5	23.5	12.0	4.6	201.5	6.5	3.6	1.9	18.0	9.9	30.4	13.4	73.4	31.0
17240079	7/24/98	9:43	102.9	22.2	11.7	4.4	191.4	6.1	3.5	1.9	17.0	9.4	28.3	12.7	67.9	30.7
17240080	7/24/98	9:45	101.8	21.9	11.9	4.3	187.5	6.1	3.5	1.9	16.8	9.3	27.6	12.5	67.0	30.5
17240081	7/24/98	9:46	100.8	21.5	12.2	4.3	186.7	5.9	3.3	1.9	16.8	9.1	26.6	12.3	67.6	29.9
17240082	7/24/98	9:48	102.0	21.8	11.9	4.3	188.5	6.0	3.4	1.8	16.9	9.2	27.7	12.5	69.8	29.2
17240083	7/24/98	9:50	105.5	22.2	13.0	4.4	194.9	6.1	3.3	1.8	17.4	9.4	27.7	12.7	72.9	28.6
17240084	7/24/98	9:52	106.7	22.4	13.1	4.4	197.2	6.2	3.3	1.8	17.2	9.5	27.2	12.8	70.8	29.2
17240085	7/24/98	9:53	105.4	22.5	12.0	4.5	194.7	6.2	3.4	1.9	17.2	9.5	28.0	12.9	68.4	30.1
17240086	7/24/98	9:55	103.2	22.2	12.0	4.4	191.0	6.1	3.5	1.9	17.1	9.4	27.8	12.7	70.0	30.5
17240087	7/24/98	9:57	102.8	22.0	12.1	4.4	192.7	6.1	3.4	1.8	17.5	9.3	28.6	12.6	75.8	29.7
17240088	7/24/98	9:59	103.7	21.9	13.0	4.3	192.4	6.1	3.2	1.8	17.4	9.3	27.7	12.5	77.1	28.5
17240089	7/24/98	10:00	104.4	22.0	12.9	4.4	193.4	6.1	3.2	1.7	17.5	9.3	27.9	12.6	77.1	27.7
17240090	7/24/98	10:02	102.8	21.7	12.9	4.3	191.4	6.0	3.2	1.8	17.3	9.2	27.6	12.4	75.4	28.0
17240091	7/24/98	10:04	101.8	21.5	12.6	4.2	188.2	5.9	3.1	1.7	17.0	9.1	27.2	12.3	73.4	27.4
17240092	7/24/98	10:06	100.8	21.5	12.2	4.3	187.8	5.9	3.2	1.7	16.7	9.1	28.4	12.3	73.7	26.5
17240093	7/24/98	10:07	101.3	21.5	12.1	4.3	189.2	5.9	3.2	1.7	16.8	9.1	27.9	12.3	73.2	27.2
17240094	7/24/98	10:09	98.7	21.0	12.0	4.2	183.3	5.8	3.2	1.7	16.4	8.9	26.6	12.0	70.8	27.4

Silo Emissions Duct

File Name	Date	Time	Toluene (ppm)	Uncertainty	Iso-Octane (ppm)	Uncertainty	Hexane (ppm)	Uncertainty	Ethylene (ppm)	Uncertainty	Methane (ppm)	ncertaint	Formalde-hyde (ppm)	ncertaint	CO (ppm)	Uncertainty
17240094	7/24/98	10:09	98.7	21.0	12.0	4.2	183.3	5.8	3.2	1.7	16.4	8.9	26.6	12.0	70.8	27.4
17240095	7/24/98	10:11	95.3	20.2	11.7	4.0	177.2	5.6	3.1	1.6	15.9	8.6	26.3	11.6	69.4	26.1
17240096	7/24/98	10:13	94.6	19.9	11.7	3.9	176.2	5.5	3.0	1.6	15.7	8.4	26.1	11.4	70.0	24.7
17240097	7/24/98	10:14	95.1	19.9	11.7	3.9	176.6	5.5	3.0	1.6	15.7	8.4	25.8	11.4	68.5	24.6
17240098	7/24/98	10:16	94.1	20.1	11.2	4.0	175.5	5.5	3.1	1.6	15.6	8.5	26.5	11.5	66.7	25.9
17240099	7/24/98	10:18	92.2	19.6	10.5	3.9	172.4	5.4	3.1	1.6	15.2	8.3	25.8	11.2	64.7	25.7
17240100	7/24/98	10:20	91.1	19.3	10.6	3.8	169.9	5.3	3.0	1.5	15.1	8.2	26.0	11.0	66.4	24.2
17240101	7/24/98	10:22	91.3	19.1	10.8	3.8	170.6	5.3	3.0	1.5	15.5	8.1	25.1	10.9	70.8	24.4
17240102	7/24/98	10:23	90.2	19.1	10.3	3.8	170.2	5.3	3.0	1.6	15.6	8.1	26.1	10.9	74.4	24.8
17240103	7/24/98	10:25	92.0	19.3	10.6	3.8	172.1	5.3	3.0	1.6	16.2	8.2	26.2	11.1	79.2	25.9
17240104	7/24/98	10:27	94.0	19.7	10.5	3.9	177.2	5.4	3.0	1.6	16.8	8.3	26.8	11.3	84.4	26.0
Average -->			130.4	29.7	15.7	5.9	221.1	8.2	3.5	1.8	16.9	11.4	19.0	16.5	81.7	31.9

Silo Emissions Duct

File Name	Date	Time	Toluene (ppm)	Uncertainty	Iso-Octane (ppm)	Uncertainty	Hexane (ppm)	Uncertainty	Ethylene (ppm)	Uncertainty	Methane (ppm)	ncertaint	Formalde-hyde (ppm)	ncertaint	CO (ppm)	Uncertainty
17250052	7/25/98	8:42		10.6		1.0	3.2	0.3		0.6	3.1	1.1		1.5		8.3
17250053	7/25/98	8:43		11.3		0.6	6.1	0.4		0.6	4.5	1.2		1.6	29.5	8.5
17250054	7/25/98	8:45		13.7	1.8	0.7	20.8	1.2		0.7	7.3	1.6	6.6	2.1	69.0	10.2
17250055	7/25/98	8:47	27.1	6.0	4.7	1.2	53.2	1.7		0.9	10.2	2.6	12.7	3.5	88.6	11.6
17250056	7/25/98	8:49	54.4	11.4	6.9	2.3	105.5	3.2	2.3	1.0	13.5	4.8	20.9	6.5	104.9	16.2
17250057	7/25/98	8:51	98.3	21.3	7.9	4.2	181.3	5.9	3.3	1.7	17.2	9.0	31.7	12.2	102.4	30.0
17250058	7/25/98	8:52		284.5		14.6	273.5	9.6		3.7		30.0		40.2		179.3
17250059	7/25/98	8:54		305.0		15.8	322.8	10.5		15.5		32.2		43.1		212.8
17250060	7/25/98	8:56		427.0		39.1	333.6	14.2		23.0		45.1		60.3		253.4
17250061	7/25/98	8:58		425.1		38.9	337.0	14.3		23.7		44.9		60.0		243.5
17250062	7/25/98	8:59		452.3		41.4	326.2	15.0		26.2		47.8		63.9		245.8
17250063	7/25/98	9:01		435.2		39.9	334.5	14.7		27.4		46.0		61.5		252.4
17250064	7/25/98	9:03		434.2		39.8	319.8	14.6		27.6		45.9		61.3		253.5
17250065	7/25/98	9:05		432.7		21.7	297.5	14.4		27.0		45.7		61.1		250.7
17250066	7/25/98	9:06		408.1		20.2	253.6	13.4		22.7		43.1		57.6		244.6
17250067	7/25/98	9:08		401.3		19.7	242.1	13.1		23.2		42.4		56.7		246.8
17250068	7/25/98	9:10		402.5		19.7	235.7	13.1		18.7		42.5		56.9		223.7
17250069	7/25/98	9:12		403.3		19.7	225.9	13.1		18.6		42.6		57.0		223.8
17250070	7/25/98	9:13		355.6		17.4	214.8	11.5		18.6		37.6		50.2		222.4
17250071	7/25/98	9:15		321.4		15.6	209.0	10.4		19.3		33.9		45.4		228.2
17250072	7/25/98	9:17		303.8		14.8	216.5	9.9		14.0		32.1		42.9		214.9
17250073	7/25/98	9:19		288.9		14.4	216.5	9.5		13.5		30.5		40.8		218.5
17250074	7/25/98	9:20		291.9		14.6	214.1	9.6		13.7		30.8		41.2		222.0
17250075	7/25/98	9:22		302.2		14.7	208.5	9.8		19.4		31.9		42.7		211.4
Average -->			7.5	281.2	0.9	18.0	214.7	9.7	0.2	15.1	2.3	30.2	3.0	40.4	16.4	176.4

Silo Emissions Duct

File Name	Date	Time	Toluene (ppm)	Uncertainty	Iso-Octane (ppm)	Uncertainty	Hexane (ppm)	Uncertainty	Ethylene (ppm)	Uncertainty	Methane (ppm)	ncertaint	Formalde-hyde (ppm)	ncertaint	CO (ppm)	Uncertainty
SED0727A	7/27/98	10:51	522.4	197.7		75.9	233.1	26.5		54.2		87.4		117.0	426.4	390.7
SED0727B	7/27/98	11:01		357.7		32.8	126.0	11.3	62.9	16.1		37.8		50.5		288.7
SED0727C	7/27/98	11:12		571.2		27.2	150.5	18.1		37.5		60.3		80.7		326.7
Average -->			174.1	375.6		45.3	169.9	18.6	21.0	35.9		61.8		82.7	142.1	335.4

Estimated Quantitation Limits (QL, ppm) From FTIR Spectra of Direct Samples Taken From the Silo, Loadout, and Process Stack Locations.

Compound Name	Molar Mass (g/mol)	Silo QL (ppm)	Loadout QL (ppm)	Process Stack QL (ppm)
Acetaldehyde	44.05	1.20	0.34	1.49
Benzene	78.11	3.77	1.89	5.36
Carbonyl Sulfide	60.07	0.16	0.07	0.07
Methyl Chloride	50.49	2.92	3.83	2.52
Methyl Chloroform	133.42	0.37	0.41	2.16
1,1-dichloroethane	98.96	0.42	0.45	1.3
Toluene	92.13	3.52	2.4	12.56
1,3-Butadiene	54.09	0.45	0.5	2.27
Methanol	32.04	1.96	0.78	2.08
Cumene	120.19	0.76	0.38	2.24
Ethylbenzene	106.16	3.48	2.06	3.95
Hexane	86.17	0.06	0.21	0.42
Methylene chloride	84.94	0.39	0.35	2.27
Propionaldehyde	58.08	0.37	0.82	0.31
Styrene	104.14	1.38	1.31	2.69
1, 1,2,2-Tetrachloroethane	167.86	0.23	0.32	0.88
p-Xylene	106.16	1.44	1.08	0.82
o-Xylene	106.16	0.09	0.68	6.91
m-Xylene	106.16	2.48	0.79	8.73
2,2,4-Trimethylpentane	114.22	0.45	0.25	0.32
Formaldehyde	30.03	1.15	0.48	3.94
SO_2	64.1	2.94	0.36	2.94
NO	30.0	4.38	1.21	4.38
NO_2	46.0	0.63	0.20	0.63
N_2O	44.0	0.19	0.024	0.19

Differences in quantitation limits among the locations are primarily due to differences in moisture concentration.

Procedure for Estimating Quantitation Limits

Measurement limits are typically estimated by using the method to analyze samples known to contain zero concentrations of the target analytes. Usually these samples are blanks that are prepared by procedures similar to the samples.

For Method 320 the samples are spectra. The most important feature of the spectra for determining measurement limits is the spectral absorbance of interfering compounds. For this source the major interfering species were water vapor and carbon dioxide. The objective is to prepare spectra containing levels of water vapor and CO_2, equivalent to those in the sample spectra, but containing none of the target analytes. These spectra are then analyzed using the same computer program that was used to analyze the sample spectra. The average of the concentration results obtained from this analysis are presented as the estimated quantitation limits for the target analytes.

The spectra were prepared from the sample spectra measured in the field. Most of the sample spectra contained primarily percent levels of water vapor and CO_2 with a mixture of ppm concentrations of hydrocarbon species. The interference concentrations were similar in all of the spectra at each location, but in most of the samples the hydrocarbon spectral absorbance was relatively low, while in some samples the hydrocarbon absorbance was much higher. The hydrocarbon absorbance was removed from some low-hydrocarbon spectra with little effect on the absorbance of the interferences. This was done by scaling a high-hydrocarbon spectrum and then subtracting the result from a low-hydrocarbon spectrum. For example spectrum "17240103" was multiplied by a constant factor of 0.01 and the result was subtracted from spectrum "17240075" (see figures 1 and 2). Some of these spectra had also been spiked with SF_6 , which was removed by subtracting a scaled spectrum of the SF_6 , standard. This procedure was performed on at least three spectra from each location. The subtracted spectra were then analyzed with the computer program. The results for each compound were averaged and the averages are presented in Table 1 as the quantitation limits for the listed HAPs. Before the quantitation limit analysis the program was modified to include a reference spectrum of acetaldehyde, but this did not significantly affect the results for the other target analytes. The advantage of preparing the spectra by the above procedure is that these spectra closely model the sample spectra.

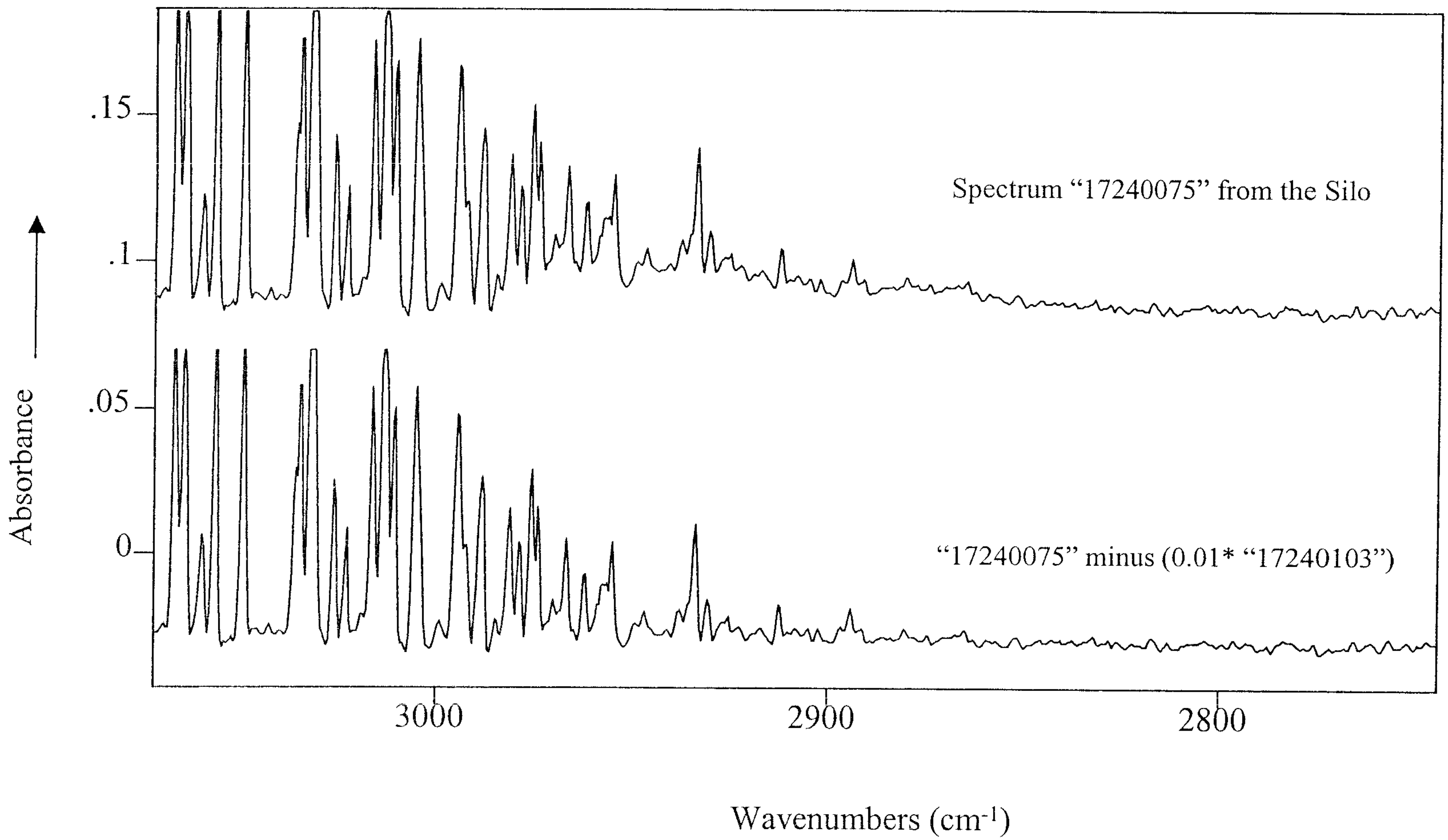


Figure 1. Spectrum before and after hydrocarbon subtraction to prepare for quantitation limit analysis. Both spectra are plotted on the same absorbance scale from -.045 to .07 absorbance units. Note that the water vapor features don't change appreciably after subtraction of the hydrocarbon component.

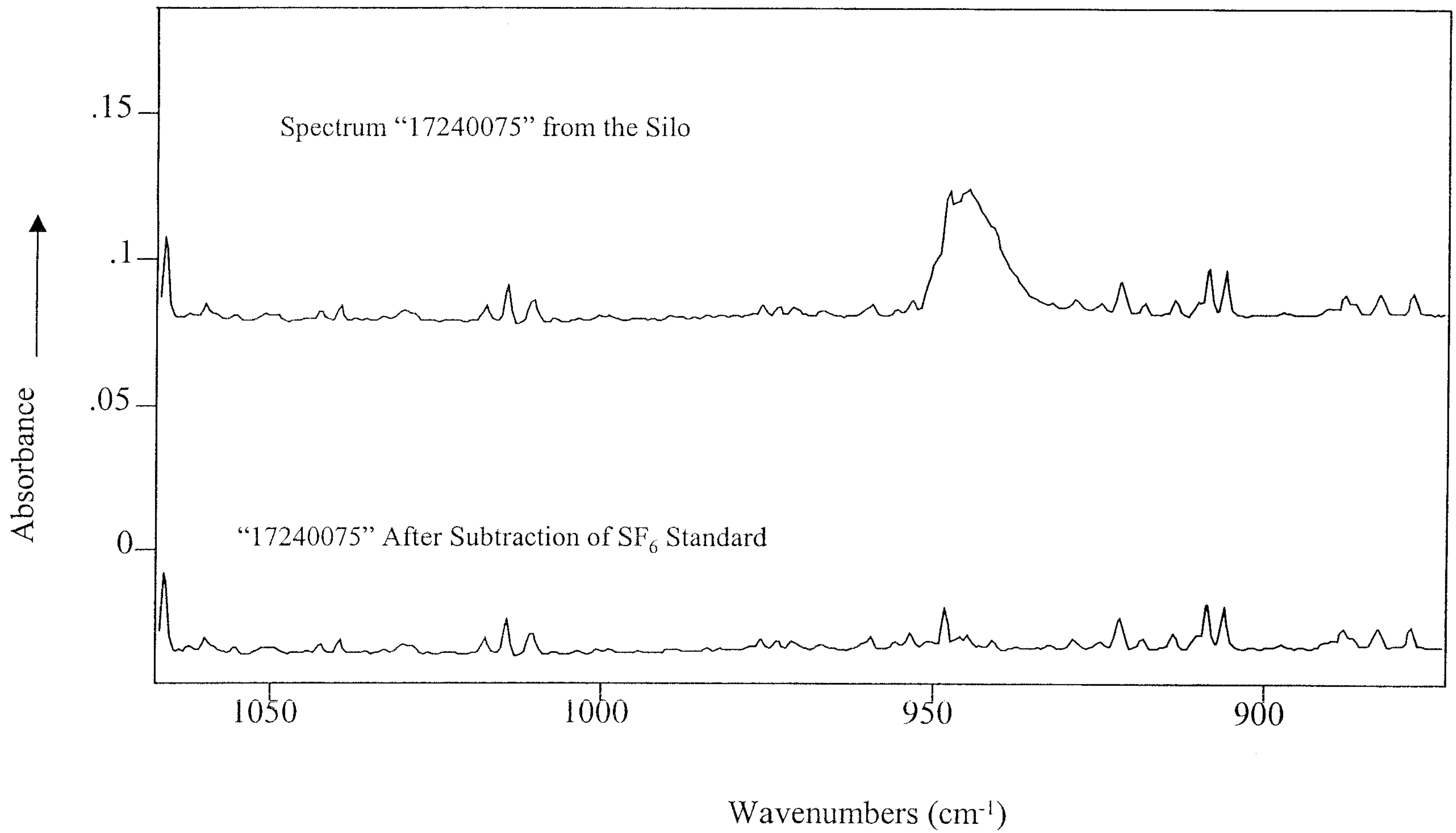


Figure 2. Same Spectra as in Figure 1 plotted on a scale from -.045 to .07 absorbance units. The SF_6 in the top spectrum resulted from the controlled release of the gas standard during testing.

Appendix D

Sample Concentration FTIR Results

Tenax Concentration Factors

Run No.	Location	Date	Adj. Volume (L)	Cell Volume (L)	Conc. Factor
–	Train Blank	7/20/98	85	6.3	13.5
–	Train Blank	7/21/98	86		13.6
–	Train Blank	7/22/98	85		13.5
–	Upwind	7/22/98	82		13.0
1	Process Stack	7/21/98	239		37.9
2	Process Stack	7/22/98	211		33.5
1	TED	7/24/98	338		53.7
1	SED	7/24/98	177		28.1
2	TED	7/25/98	336		53.3
2	TED (duplicate)	7/25/98	213		33.8
2	SED	7/25/98	169		26.8
3	TED	7/27/98	331		52.5
3	TED (duplicate)	7/27/98	331		52.5
3	SED	7/27/98	173		27.5
4	TED	7/26/98	328		52.1

Table ______. Adjusted Tenax Concentration Sample Volumes

Run #	Sampling Location	VOST Console No.	Date	Volume sampled (L)	Meter temp. (°C)	BP ("Hg)	Meter coef.	Adjusted volume (m^3)
1	#1	1	7/23/98	69.4	25.6	29.28	0.971	0.065
1-Rerun	#1	1	7/24/98	187.7	22.6	29.30	0.971	0.177
2	#1	1	7/25/98	181.0	25.1	29.28	0.971	0.169
3	#1	1	7/27/98	187.6	27.3	29.17	0.971	0.173
1	#3	1	7/21/98	268.6	41.1	29.35	0.971	0.239
2	#3	1	7/22/98	233.7	36.1	29.31	0.971	0.211
Blank	#3	1	7/20/98	93.2	32.2	29.33	0.971	0.085
Preliminary	Tunnel Entrance	3	7/22/98	90.2	34.4	29.34	0.978	0.082
Preliminary	Loadout	3	7/23/98	108.2	23.1	29.33	0.978	0.103
1	Loadout	3	7/24/98	360.0	26.2	29.35	0.978	0.338
2	Loadout	3	7/25/98	360.0	27.9	29.33	0.978	0.336
2-Dup.	Loadout	2	7/25/98	231.5	34.4	29.33	0.983	0.213
3	Loadout	3	7/27/98	360.1	31.9	29.24	0.978	0.331
3-Dup	Loadout	2	7/27/98	360.1	33.3	29.24	0.983	0.331
4	Loadout	3	7/26/98	360.0	35.2	29.31	0.978	0.328
Blank	Trailer	3	7/21/98	90.3	23.1	29.30	0.978	0.086
Blank	Trailer	3	7/22/98	90.5	26.0	29.34	0.978	0.085

Summary of Tenax Concentrated Samples

Date	Run	Sample	Trap Nos.	Spectral Files	Spiking	Notes
7/20/98	—	Train Blank	101	T010720i T010720f T010720g	NA	
7/21/98	—	Train Blank	103	T030720i T030721f	NA	
7/22/98	—	Train Blank	101	T010722i T010722f	NA	
7/22/98	—	Upwind	102	T020722i T020722f	NA	
7/21/98	1	Process Stack	102 101	T020720i T020721f T020721g T010720g T010721f	8.5L NA	
7/22/98	2	Process Stack	106 105	T060721i T060722f T050721i T050722f	8.5L NA	
7/23/98	1-aborted	Tunnel Exhaust Duct Silo Exhaust Duct	104 103 108 107	T040720i T040723f T030722i T030723f T080722i T080723f T070722i T070723f	8.5L NA 8.5L NA	
7/24/98	1	Tunnel Exhust Silo Exhaust Duct	112 111 106 105	T120722i T120725f %110722i T110725f T060723i T060725f T050723i NA	16.5L NA 16.5L NA	 Sample lost-overhead

Date	Run	Sample	Trap Nos.	Spectral Files	Spiking	Notes
7/25/98	2	Tunnel Exhaust Duct	101	T010723i T010725f	16.5L	
			107	T070724i T070725f	NA	
			113	T130723i T130725f	16.5L	Duplicate Train
			103	T030724i T030725f	NA	Duplicate Train
		Silo Exhaust Duct	102	T020723i T020725f	16.5L	
			104	T040724i T040725f	NA	
7/26/98	4	Tunnel Exhaust Duct	115	T150725i T150726f	16.5L	
			108	T080725i T080726f	NA	
7/27/98	3	Tunnel Exhaust Duct	111	T110726i T110727f	16.8L	
			107	T070726i T070727f	NA	
			101	T010726i T010727f	16.8L	Duplicate Train
			103	T030726i T030727f	NA	Duplicate Train
		Silo Exhaust Duct	113	T130726i T130727f	16.8L	1:1 dilution w/N_2 during final desorption
			104	T040726i T040727f	NA	

File Name	Date	Time	Benzene	ppm Δ	Toluene-d8 [1]	ppm Δ [2]	Methyl chloride	ppm Δ [2]	Methyle chloroform	ppm Δ [2]	Ethylene dichloride	ppm Δ [2]	Toluene	ppm Δ [2]
Train Blanks														
T010720I	7/20/98	19:13	0.0	0.8	14.6	4.2	0.0	2.2	1.7	0.2	0.8	0.5	0.0	2.3
T010720F	7/20/98	21:39	0.0	1.0	13.0	5.9	0.0	2.8	2.6	0.3	0.0	0.6	0.0	2.9
T010720G	7/20/98	21:53	0.0	0.7	0.0	3.8	0.0	2.1	1.7	0.2	0.0	0.4	0.0	2.1
T030720I	7/20/98	20:52	0.0	1.2	28.0	9.2	0.0	4.2	4.1	0.4	0.0	1.1	0.0	4.4
T030721F	7/21/98	20:58	0.0	1.9	0.0	8.5	0.0	5.1	0.0	0.4	0.0	1.0	4.8	1.1
T010722I	7/22/98	11:42	0.0	0.7	0.0	0.9	0.0	1.8	0.1	0.0	0.0	0.1	5.4	0.4
T010722F	7/22/98	20:51	0.0	1.1	0.0	6.0	0.0	3.1	0.0	0.3	0.0	0.7	0.0	3.2
Average			0.0	1.1	7.9	5.5	0.0	3.0	1.4	0.3	0.1	0.6	2.6	2.3

[1] High CO_2 gives a false positive

[2] ppm Δ = the estimted uncertainty in the measurement

File Name	Date	1,3-butadiene	ppm Δ [2]	Methanol	ppm Δ [2]	Cumene	ppm Δ [2]	Ethyl benzene	ppm Δ [2]	Hexane	ppm Δ [2]	Methylene chloride	ppm Δ [2]	Propionaldehyde	ppm Δ [2]
Train Blanks															
T010720I	7/20/98	0.0	0.4	0.4	0.3	0.0	0.8	0.0	0.8	1.6	0.1	0.0	0.3	0.0	0.4
T010720F	7/20/98	0.0	0.6	0.0	0.4	0.0	0.5	0.0	3.0	6.9	0.3	0.0	0.4	0.0	0.5
T010720G	7/20/98	0.0	0.4	0.4	0.3	0.0	0.8	0.0	0.8	1.2	0.1	0.0	0.3	0.0	0.3
T030720I	7/20/98	0.0	1.0	0.0	0.7	0.0	0.8	0.0	4.4	14.4	0.2	1.5	0.6	0.0	0.7
T030721F	7/21/98	0.0	0.9	0.0	0.7	0.0	2.0	0.0	5.4	4.1	0.2	0.0	0.6	0.0	0.9
T010722I	7/22/98	0.2	0.1	0.0	0.1	0.0	0.7	0.0	1.9	1.3	0.1	0.0	0.1	2.3	0.2
T010722F	7/22/98	0.0	0.6	0.5	0.4	0.0	1.2	0.0	3.2	2.1	0.1	0.0	0.4	0.0	0.5
Average		0.1	0.6	0.1	0.5	0.0	1.2	0.0	3.7	4.5	0.2	0.2	0.4	0.3	0.5

[1] High CO_2 gives a false p

[2] ppm Δ = the estimted un

File Name	Date	Styrene	ppm Δ [2]	1,1,2,2-Tetrachloroethane	ppm Δ [2]	p-Xylene	ppm Δ [2]	o-Xylene	ppm Δ [2]	m-Xylene	ppm Δ [2]	2,2,4-Trimethylpentane	ppm Δ [2]	Formaldehyde	ppm Δ [2]
Train Blanks															
T010720I	7/20/98	0.0	0.7	1.3	0.3	1.5	0.7	0.0	1.4	0.0	0.7	0.0	0.2	1.4	0.3
T010720F	7/20/98	0.0	0.9	2.1	0.4	1.7	0.9	0.0	1.8	0.0	0.9	1.8	0.2	2.3	0.4
T010720G	7/20/98	0.0	0.6	1.5	0.3	1.6	0.6	0.0	1.3	0.0	0.7	0.0	0.2	2.0	0.4
T030720I	7/20/98	0.0	1.6	2.9	0.7	3.8	1.7	0.0	2.5	3.3	1.4	0.0	0.4	3.9	0.7
T030721F	7/21/98	0.0	1.4	0.0	0.6	0.0	1.4	0.0	2.7	0.0	4.2	0.0	0.5	1.2	0.6
T010722I	7/22/98	0.0	0.2	0.0	0.1	0.0	0.1	0.0	1.1	0.0	1.5	0.0	0.2	0.0	0.3
T010722F	7/22/98	0.0	1.0	0.0	0.4	0.0	1.0	0.0	2.0	0.0	2.5	0.0	0.3	0.5	0.4
Average		0.0	0.9	1.1	0.4	1.2	0.9	0.0	1.8	0.5	1.7	0.3	0.3	1.6	0.4

[1] High CO_2 gives a false p

[2] ppm Δ = the estimted un

File Name	Date	Time	Benzene	ppm Δ [2]	Toluene-d8 [1]	ppm Δ [2]	Methyl chloride	ppm Δ [2]	Methyle chloroform	ppm Δ [2]	Ethylene dichloride	ppm Δ [2]
Upwinds												
T020722I	7/22/98	14:26	0.0	1.9	0.0	8.9	0.0	5.3	0.0	0.4	0.0	1.0
T020722F	7/22/98	20:10	0.0	3.8	21.0	16.4	0.0	10.6	0.0	0.8	0.0	2.0
Average			0.0	2.9	10.5	12.6	0.0	7.9	0.0	0.6	0.0	1.5

File Name	Date	Toluene	ppm Δ [2]	1,3-butadiene	ppm Δ [2]	Methanol	ppm Δ [2]	Cumene	ppm Δ [2]	Ethyl benzene	ppm Δ [2]	Hexane	ppm Δ [2]
Upwinds													
T020722I	7/22/98	0.0	5.5	0.0	0.9	0.0	0.6	0.0	2.0	0.0	5.5	1.2	0.2
T020722F	7/22/98	0.0	11.0	0.0	1.8	0.0	1.4	0.0	4.1	0.0	11.1	2.8	0.3
Average		0.0	8.2	0.0	1.4	0.0	1.0	0.0	3.1	0.0	8.3	2.0	0.2

File Name	Date	Methylene chloride	ppm Δ 2	Propional dehyde	ppm Δ 2	Styrene	ppm Δ 2	1,1,2,2-Tetrachlor oethane	ppm Δ 2	p-Xylene	ppm Δ 2	o-Xylene	ppm Δ 2
Upwinds													
T020722I	7/22/98	0.0	0.6	0.0	0.9	0.0	1.5	0.0	0.6	0.0	1.5	0.0	3.3
T020722F	7/22/98	0.0	1.3	0.0	1.8	0.0	3.0	0.0	1.3	0.0	2.9	0.0	6.7
Average		0.0	0.9	0.0	1.3	0.0	2.2	0.0	1.0	0.0	2.2	0.0	5.0

File Name	Date	m-Xylene	ppm Δ [2]	2,2,4-Trimethyl pentane	ppm Δ [2]	Formaldeh yde	ppm Δ [2]
Upwinds							
T020722I	7/22/98	0.0	4.3	0.0	0.5	0.7	0.6
T020722F	7/22/98	0.0	8.6	0.0	1.1	0.0	1.5
Average		0.0	6.4	0.0	0.8	0.3	1.1

File Name	Date	Time	Benzene	ppm Δ [2]	Toluene-d8 [1]	ppm Δ [2]	Methyl chloride	ppm Δ [2]	Methyle chloroform	ppm Δ [2]	Ethylene dichloride	ppm Δ [2]
Silo Exhaust												
T080723F	**7/23/98**	**17:38**	**0.0**	**194.3**	**399.1**	**109.7**	**0.0**	**771.2**	**0.0**	**5.1**	**0.0**	**13.0**
T070723F	7/23/98	17:25	0.0	1.9	0.0	9.4	0.0	5.3	1.2	0.4	1.9	1.0
T060725F	**7/25/98**	**19:08**	**242.1**	**194.0**	**1477.0**	**351.8**	**0.0**	**1043.1**	**0.0**	**16.3**	**0.0**	**41.9**
T020725F	**7/25/98**	**18:46**	**215.0**	**193.4**	**1346.1**	**368.8**	**0.0**	**1030.5**	**0.0**	**17.1**	**0.0**	**43.8**
T040725F	7/25/98	16:14	0.0	13.7	0.0	24.0	0.0	28.0	0.0	1.1	8.0	2.6
T130726I	7/26/98	18:33	0.0	1.0	0.0	4.7	0.0	2.7	0.0	0.2	0.0	0.5
T130727F	**7/27/98**	**18:31**	**334.1**	**195.1**	**0.0**	**68.9**	**0.0**	**1085.0**	**10.8**	**3.0**	**0.0**	**7.8**
T040726I	7/26/98	19:08	0.0	0.8	0.0	3.5	0.0	2.2	0.0	0.2	0.0	0.4
T040727F	**7/27/98**	**16:59**	**0.0**	**142.6**	**0.0**	**22.4**	**0.0**	**565.5**	**0.0**	**1.0**	**0.0**	**2.5**
Average			0.0	4.3	0.0	10.4	0.0	9.5	0.3	0.5	2.5	1.1

File Name	Date	Toluene	ppm Δ ²	1,3-butadiene	ppm Δ ²	Methanol	ppm Δ ²	Cumene	ppm Δ ²	Ethyl benzene	ppm Δ ²
Silo Exhaust											
T080723F	**7/23/98**	**0.0**	**801.5**	**0.0**	**11.8**	**0.0**	**8.8**	**0.0**	**297.1**	**0.0**	**301.9**
T070723F	7/23/98	0.0	5.5	0.0	0.8	0.0	0.7	0.0	2.0	0.0	2.2
T060725F	**7/25/98**	**0.0**	**1084.1**	**0.0**	**38.3**	**0.0**	**28.5**	**0.0**	**401.9**	**0.0**	**443.5**
T020725F	**7/25/98**	**0.0**	**1071.0**	**0.0**	**40.0**	**0.0**	**29.7**	**0.0**	**397.1**	**0.0**	**438.9**
T040725F	7/25/98	0.0	31.9	5.5	2.1	0.0	1.9	0.0	10.8	0.0	19.1
T130726I	7/26/98	0.0	2.8	0.0	0.5	0.0	0.3	0.0	1.0	0.0	0.9
T130727F	**7/27/98**	**0.0**	**1127.7**	**0.0**	**7.1**	**0.0**	**5.3**	**0.0**	**418.1**	**0.0**	**462.1**
T040726I	7/26/98	0.0	2.2	0.0	0.4	0.4	0.2	0.0	0.8	0.0	0.8
T040727F	**7/27/98**	**0.0**	**587.8**	**9.9**	**2.3**	**0.0**	**1.7**	**0.0**	**217.9**	**0.0**	**220.2**
Average		0.0	10.6	1.4	0.9	0.1	0.8	0.0	3.7	0.0	5.7

File Name	Date	Hexane	ppm Δ^2	Methylene chloride	ppm Δ^2	Propional dehyde	ppm Δ^2	Styrene	ppm Δ^2	1,1,2,2-Tetrachlor oethane	ppm Δ^2
Silo Exhaust											
T080723F	**7/23/98**	**1197.6**	**34.9**	**0.0**	**8.2**	**0.0**	**128.1**	**29.7**	**16.8**	**12.5**	**6.7**
T070723F	7/23/98	7.5	0.5	0.0	0.7	15.2	0.9	0.0	1.6	0.0	0.7
T060725F	**7/25/98**	**840.3**	**73.9**	**0.0**	**26.5**	**0.0**	**173.2**	**111.0**	**54.1**	**0.0**	**26.9**
T020725F	**7/25/98**	**854.1**	**73.7**	**0.0**	**27.7**	**0.0**	**171.1**	**85.1**	**56.5**	**36.2**	**22.7**
T040725F	7/25/98	145.1	4.6	0.0	1.7	0.0	8.5	0.0	4.1	3.0	1.5
T130726I	7/26/98	0.7	0.1	0.0	0.3	0.0	0.4	0.0	0.8	0.0	0.3
T130727F	**7/27/98**	**859.5**	**79.0**	**10.3**	**3.4**	**0.0**	**180.2**	**61.2**	**10.3**	**26.6**	**4.5**
T040726I	7/26/98	1.2	0.1	0.0	0.2	0.0	0.4	0.0	0.6	0.0	0.3
T040727F	**7/27/98**	**1095.6**	**52.3**	**0.0**	**1.6**	**0.0**	**84.7**	**6.9**	**3.9**	**0.0**	**1.5**
Average		38.6	1.3	0.0	0.7	3.8	2.6	0.0	1.8	0.7	0.7

File Name	Date	p-Xylene	ppm Δ 2	o-Xylene	ppm Δ 2	m-Xylene	ppm Δ 2	2,2,4-Trimethyl pentane	ppm Δ 2	Formaldeh yde	ppm Δ 2
Silo Exhaust											
T080723F	**7/23/98**	**0.0**	**18.8**	**0.0**	**487.2**	**727.4**	**201.8**	**0.0**	**46.6**	**613.6**	**100.1**
T070723F	7/23/98	0.0	1.6	3.6	1.2	0.0	4.3	1.2	0.3	6.8	0.8
T060725F	**7/25/98**	**0.0**	**60.8**	**0.0**	**659.0**	**0.0**	**845.4**	**0.0**	**71.5**	**724.3**	**133.7**
T020725F	**7/25/98**	**0.0**	**63.5**	**0.0**	**651.0**	**0.0**	**835.2**	**0.0**	**70.7**	**733.6**	**133.3**
T040725F	7/25/98	0.0	4.0	0.0	28.0	96.1	13.9	30.1	3.0	46.6	6.6
T130726I	7/26/98	0.0	0.8	0.0	1.7	0.0	0.8	0.0	0.2	0.0	0.3
T130727F	**7/27/98**	**0.0**	**11.3**	**0.0**	**685.5**	**0.0**	**879.4**	**0.0**	**74.5**	**857.0**	**141.1**
T040726I	7/26/98	0.0	0.6	0.0	1.4	0.0	0.7	0.0	0.1	0.0	0.3
T040727F	**7/27/98**	**0.0**	**3.7**	**0.0**	**357.3**	**289.7**	**153.8**	**61.2**	**35.0**	**0.0**	**82.6**
Average		0.0	1.7	0.9	8.1	24.0	4.9	7.8	0.9	13.3	2.0

File Name	Date	Time	Benzene	ppm Δ [2]	Toluene-d8 [1]	ppm Δ [2]	Methyl chloride	ppm Δ [2]	Methyle chloroform	ppm Δ [2]	Ethylene dichloride	ppm Δ [2]	Toluene	ppm Δ [2]
Tunnel Exhaust														
T040723F	7/23/98	16:51	0.0	2.9	18.3	12.9	0.0	10.3	0.0	0.6	0.0	1.6	0.0	10.8
T030723F	7/23/98	17:08	0.0	1.4	0.0	7.0	0.0	3.9	0.0	0.3	0.0	0.8	0.0	4.1
T120725F	7/25/98	18:00	0.0	12.2	276.9	78.1	0.0	31.2	0.0	3.7	0.0	9.5	35.4	9.5
T110725F	7/25/98	16:01	0.0	2.6	12.8	10.2	0.0	7.2	0.0	0.5	0.0	1.2	0.0	7.5
T010725F	7/25/98	18:33	0.0	11.8	197.1	64.1	0.0	28.0	0.0	3.0	0.0	7.8	0.0	31.2
T070725F	7/25/98	15:48	0.0	3.0	17.8	12.1	0.0	8.3	0.0	0.6	0.0	1.5	0.0	8.6
T030725F	7/25/98	15:32	0.0	1.9	0.0	7.6	0.0	5.1	0.0	0.3	0.0	0.9	0.0	5.3
T150726F	7/26/98	19:47	0.0	3.8	88.9	39.6	0.0	20.6	0.0	1.9	0.0	4.8	0.0	21.4
T080726F	7/26/98	19:24	0.0	5.4	40.1	25.3	0.0	15.0	0.0	1.2	0.0	3.1	0.0	15.5
T110727F	7/27/98	18:00	0.0	14.6	226.5	71.6	0.0	32.5	0.0	3.4	0.0	8.7	0.0	38.8
T070727F	7/27/98	16:47	10.9	4.1	143.1	59.5	0.0	24.6	0.0	2.8	0.0	7.2	0.0	25.6
T010727F	**7/27/98**	**17:45**	**0.0**	**51.6**	**1724.8**	**413.7**	**0.0**	**142.1**	**0.0**	**19.6**	**0.0**	**50.3**	**0.0**	**147.7**
T030727F	7/27/98	17:30	0.0	3.7	0.0	17.9	0.0	10.3	0.0	0.8	0.0	2.0	0.0	10.7
Average			0.8	9.2	211.3	63.1	0.0	26.1	0.0	3.0	0.0	7.7	2.7	25.9

File Name	Date	1,3-butadiene	ppm Δ 2	Methanol	ppm Δ 2	Cumene	ppm Δ 2	Ethyl benzene	ppm Δ 2	Hexane	ppm Δ 2	Methylene chloride	ppm Δ 2	Propional dehyde	ppm Δ 2
Tunnel Exhaust															
T040723F	7/23/98	0.0	1.4	0.0	1.1	0.0	4.0	0.0	10.8	34.2	1.1	0.0	1.0	0.0	1.7
T030723F	7/23/98	0.0	0.7	0.0	0.5	0.0	1.5	0.0	1.1	2.3	0.3	0.0	0.5	0.0	0.7
T120725F	7/25/98	0.0	8.7	0.0	6.5	0.0	12.0	0.0	32.6	102.7	3.2	0.0	6.0	0.0	5.2
T110725F	7/25/98	0.0	1.1	0.0	0.8	0.0	2.8	0.0	7.5	4.8	0.5	0.0	0.8	0.0	1.2
T010725F	7/25/98	0.0	7.1	0.0	5.3	0.0	10.8	0.0	29.2	79.3	2.9	0.0	4.9	0.0	4.6
T070725F	7/25/98	0.0	1.3	0.0	1.0	0.0	3.2	0.0	8.6	3.0	0.5	0.0	0.9	0.0	1.4
T030725F	7/25/98	0.0	0.8	0.0	0.6	0.0	2.0	0.0	5.3	1.2	0.3	0.0	0.5	0.0	0.8
T150726F	7/26/98	0.0	4.4	0.0	3.3	0.0	7.9	0.0	21.5	30.0	0.7	0.0	3.1	0.0	3.4
T080726F	7/26/98	0.0	2.8	0.0	2.1	0.0	5.8	0.0	15.6	3.2	0.5	0.0	1.9	0.0	2.5
T110727F	7/27/98	0.0	8.0	0.0	5.9	0.0	12.5	0.0	33.9	116.7	3.7	0.0	5.5	0.0	5.4
T070727F	7/27/98	0.0	6.6	0.0	4.9	0.0	9.5	0.0	25.7	0.0	2.5	0.0	4.6	0.0	4.1
T010727F	**7/27/98**	**0.0**	**45.9**	**0.0**	**34.2**	**0.0**	**54.8**	**0.0**	**148.5**	**95.1**	**4.5**	**0.0**	**31.8**	**0.0**	**23.6**
T030727F	7/27/98	0.0	1.9	0.0	1.4	0.0	4.0	0.0	10.7	4.3	0.7	0.0	1.3	0.0	1.7
Average		0.0	7.0	0.0	5.2	0.0	10.1	0.0	27.0	36.7	1.6	0.0	4.8	0.0	4.3

File Name	Date	Styrene	ppm Δ [2]	1,1,2,2-Tetrachloroethane	ppm Δ [2]	p-Xylene	ppm Δ [2]	o-Xylene	ppm Δ [2]	m-Xylene	ppm Δ [2]	2,2,4-Trimethylpentane	ppm Δ [2]	Formaldehyde	ppm Δ [2]
Tunnel Exhaust															
T040723F	7/23/98	0.0	2.4	0.0	1.0	0.0	2.3	0.0	5.9	20.9	3.3	2.8	0.7	6.8	1.6
T030723F	7/23/98	0.0	1.2	0.0	0.5	0.0	1.1	0.0	2.5	0.0	3.2	0.0	0.4	0.0	0.6
T120725F	7/25/98	0.0	14.2	0.0	6.1	0.0	13.8	0.0	22.5	0.0	25.3	6.9	2.3	28.2	5.1
T110725F	7/25/98	0.0	1.8	0.0	0.8	0.0	1.8	0.0	4.5	0.0	5.8	0.0	0.7	1.5	0.8
T010725F	7/25/98	0.0	11.7	0.0	5.0	0.0	11.3	0.0	17.9	50.9	8.8	2.9	1.9	13.6	4.2
T070725F	7/25/98	0.0	2.2	0.0	0.9	0.0	2.1	0.0	5.2	0.0	6.7	0.0	0.8	1.9	0.9
T030725F	7/25/98	0.0	1.3	0.0	0.6	0.0	1.3	0.0	3.2	0.0	4.1	0.0	0.5	0.8	0.6
T150726F	7/26/98	0.0	7.2	0.0	3.1	0.0	7.0	0.0	13.0	0.0	16.7	0.0	1.4	3.3	2.6
T080726F	7/26/98	0.0	4.6	0.0	2.0	0.0	4.5	0.0	9.5	0.0	12.1	0.0	1.5	0.0	2.2
T110727F	7/27/98	0.0	13.0	0.0	5.6	0.0	12.6	0.0	22.2	75.5	11.2	2.5	2.4	18.9	5.3
T070727F	7/27/98	0.0	10.8	0.0	4.6	0.0	10.5	0.0	15.6	0.0	20.0	0.0	2.5	0.0	3.6
T010727F	**7/27/98**	**0.0**	**75.3**	**0.0**	**32.3**	**0.0**	**73.0**	**0.0**	**89.8**	**0.0**	**115.2**	**0.0**	**7.3**	**21.6**	**16.6**
T030727F	7/27/98	0.0	3.0	0.0	1.3	0.0	3.0	0.0	6.5	0.0	8.3	1.0	0.5	0.0	1.5
Average		0.0	11.4	0.0	4.9	0.0	11.1	0.0	16.8	11.3	18.5	1.2	1.8	7.4	3.5

File Name	Date	Time	Benzene	ppm Δ [2]	Toluene-d8 [1]	ppm Δ [2]	Methyl chloride	ppm Δ [2]	Methyle chloroform	ppm Δ [2]	Ethylene dichloride	ppm Δ [2]
Process Stack												
T020721F	7/21/98	20:10	0.0	12.1	362.0	97.8	0.0	38.3	0.0	4.6	0.0	11.7
T010721F	7/21/98	20:41	32.6	7.5	1917.8	340.3	0.0	45.2	0.0	16.1	0.0	41.3
T060722F	7/22/98	19:28	16.7	6.9	162.0	66.6	0.0	30.4	0.0	3.1	0.0	8.1
T050722F	7/22/98	19:55	26.9	7.1	1925.6	339.1	0.0	42.4	0.0	16.1	0.0	41.2
Average			19.0	8.4	1091.9	210.9	0.0	39.1	0.0	10.0	0.0	25.6

File Name	Date	Toluene	ppm Δ [2]	1,3-butadiene	ppm Δ [2]	Methanol	ppm Δ [2]	Cumene	ppm Δ [2]	Ethyl benzene	ppm Δ [2]	Hexane	ppm Δ [2]
Process Stack													
T020721F	7/21/98	92.0	9.0	13.5	9.6	0.0	7.9	0.0	14.8	0.0	40.1	79.0	1.5
T010721F	7/21/98	0.0	47.0	0.0	37.7	0.0	28.0	0.0	17.4	0.0	47.2	9.2	1.5
T060722F	7/22/98	0.0	31.6	10.6	5.8	0.0	5.5	0.0	11.7	0.0	31.7	37.6	1.9
T050722F	7/22/98	0.0	44.1	0.0	37.6	0.0	28.0	0.0	16.3	0.0	44.3	5.9	1.4
Average		23.0	32.9	6.0	22.7	0.0	17.4	0.0	15.1	0.0	40.8	32.9	1.6

File Name	Date	Methylene chloride	ppm Δ [2]	Propional dehyde	ppm Δ [2]	Styrene	ppm Δ [2]	1,1,2,2-Tetrachlor oethane	ppm Δ [2]	p-Xylene	ppm Δ [2]	o-Xylene	ppm Δ [2]
Process Stack													
T020721F	7/21/98	0.0	7.4	8.0	6.3	17.3	17.0	0.0	7.5	0.0	16.9	0.0	22.6
T010721F	7/21/98	0.0	26.1	10.5	5.8	0.0	61.8	0.0	26.5	0.0	59.9	0.0	28.6
T060722F	7/22/98	0.0	5.1	0.0	4.9	0.0	12.0	0.0	5.2	0.0	11.7	22.1	8.7
T050722F	7/22/98	0.0	26.0	7.6	5.4	0.0	61.6	0.0	26.4	0.0	59.7	0.0	26.8
Average		0.0	16.2	6.5	5.6	4.3	38.1	0.0	16.4	0.0	37.1	5.5	21.7

File Name	Date	m-Xylene	ppm Δ [2]	2,2,4-Trimethyl pentane	ppm Δ [2]	Formaldeh yde	ppm Δ [2]
Process Stack							
T020721F	7/21/98	0.0	31.1	0.0	3.9	16.5	5.8
T010721F	7/21/98	0.0	36.7	0.0	4.5	0.0	6.6
T060722F	7/22/98	0.0	24.6	0.0	3.1	9.7	3.8
T050722F	7/22/98	0.0	34.4	0.0	4.3	0.0	6.2
Average		0.0	31.7	0.0	3.9	6.6	5.6

Appendix E

THC Data

Run 1 - Dryer Stack - 7/21/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC	0.0	0.0	0.0	Pass
	90.3	90.2	0.1	Pass
	50.2	50.9	0.7	Pass
	25.0	25.0	0.0	Pass

Instrument Span for THC is 100 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
0.0	0.3	0.3	Pass

1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
0.3	0.3	0.0	Pass

Span Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
90.2	89.9	0.3	Pass

1st Drift Check Value	Final Value	Difference As % Error	Pass/Fail
89.9	89.5	0.4	Pass

Run 2 - Dryer Stack - 7/22/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC	0.0	0.2	0.2	Pass
	90.3	90.1	0.2	Pass
	50.2	50.6	0.4	Pass
	25.0	25.6	0.6	Pass

Instrument Span for THC is 100 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
0.2	-0.1	0.3	Pass

1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
-0.1	0.3	0.4	Pass

Span Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
90.2	90.9	0.7	Pass

1st Drift Check Value	Final Value	Difference As % Error	Pass/Fail
89.9	90.3	0.4	Pass

Run 1 - Load Out - 7/24/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As %span error	Pass/ Fail
THC	0.0	1.2	0.1	Pass
	899.0	905.1	0.6	Pass
	498.0	508.0	1.0	Pass
	249.0	246.0	0.3	Pass

Instrument Span for THC Silo is 1000 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC	1.2	-0.1	0.1	Pass

Span Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Silo	905.0	906.8	0.2	Pass

Pass/Fail Criteria for Drift is +/-3% of THC Span

Run 2 - Load Out - 7/25/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC	0.0	1.7	0.2	Pass
	899.0	902.4	0.3	Pass
	498.0	506.3	0.8	Pass
	249.0	254.6	0.6	Pass

Instrument Span for THC is 1000 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC	1.7	3.7	0.2	Pass

Span Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Silo	902.0	900.1	0.2	Pass

Pass/Fail Criteria for Drift is +/-3% of THC Span

Run 3 - Load Out - 7/27/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC Silo	0.0	1.1	0.1	Pass
	899.0	907.6	0.9	Pass
	498.0	505.0	0.7	Pass
	249.0	261.3	1.2	Pass

Instrument Span for THC Silo is 1000 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC Tunnel	0.0	0.2	0.2	Pass
	90.4	90.4	0.0	Pass
	50.2	50.9	0.7	Pass
	25.0	25.5	0.5	Pass

Instrument Span for THC Tunnel is 100 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Silo	1.1	-0.9	0.2	Pass

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Tunnel	0.2	0.1	0.1	Pass

Span Drift

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Silo	907.6	903.3	0.4	Pass

	Initial Value	Final Value	Difference As % span error	Pass/Fail
THC Tunnel	90.4	90.6	0.2	Pass

Pass/Fail Criteria for Drift is +/-3% of THC Span

Run 4 - Baseline - 7/26/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC	0.0	0.2	0.2	Pass
	90.3	90.6	0.3	Pass
	50.2	51.1	0.9	Pass
	25.0	25.5	0.5	Pass

Instrument Span for THC is 100 ppm
Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
0.2	0.1	0.1	Pass

1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
0.1	0.1	0.0	Pass

Span Drift

Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
90.5	90.4	0.1	Pass

1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
90.4	90.8	0.4	Pass

Intermittent Load Dump - 7/25/98

Calibration Error Determination

	Cal Gas Value	Measured Value	Difference As % span error	Pass/ Fail
THC	0.0	0.2	0.2	Pass
	90.4	90.7	0.3	Pass
	50.2	50.9	0.7	Pass
	25.0	24.7	0.3	Pass

Instrument Span for THC is 100 ppm

Pass/Fail Criteria is +/- 5% of Cal Gas for THC

Zero Drift

	Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
THC	0.2	0.4	0.2	Pass

	1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
	0.4	0.0	0.4	Pass

Span Drift

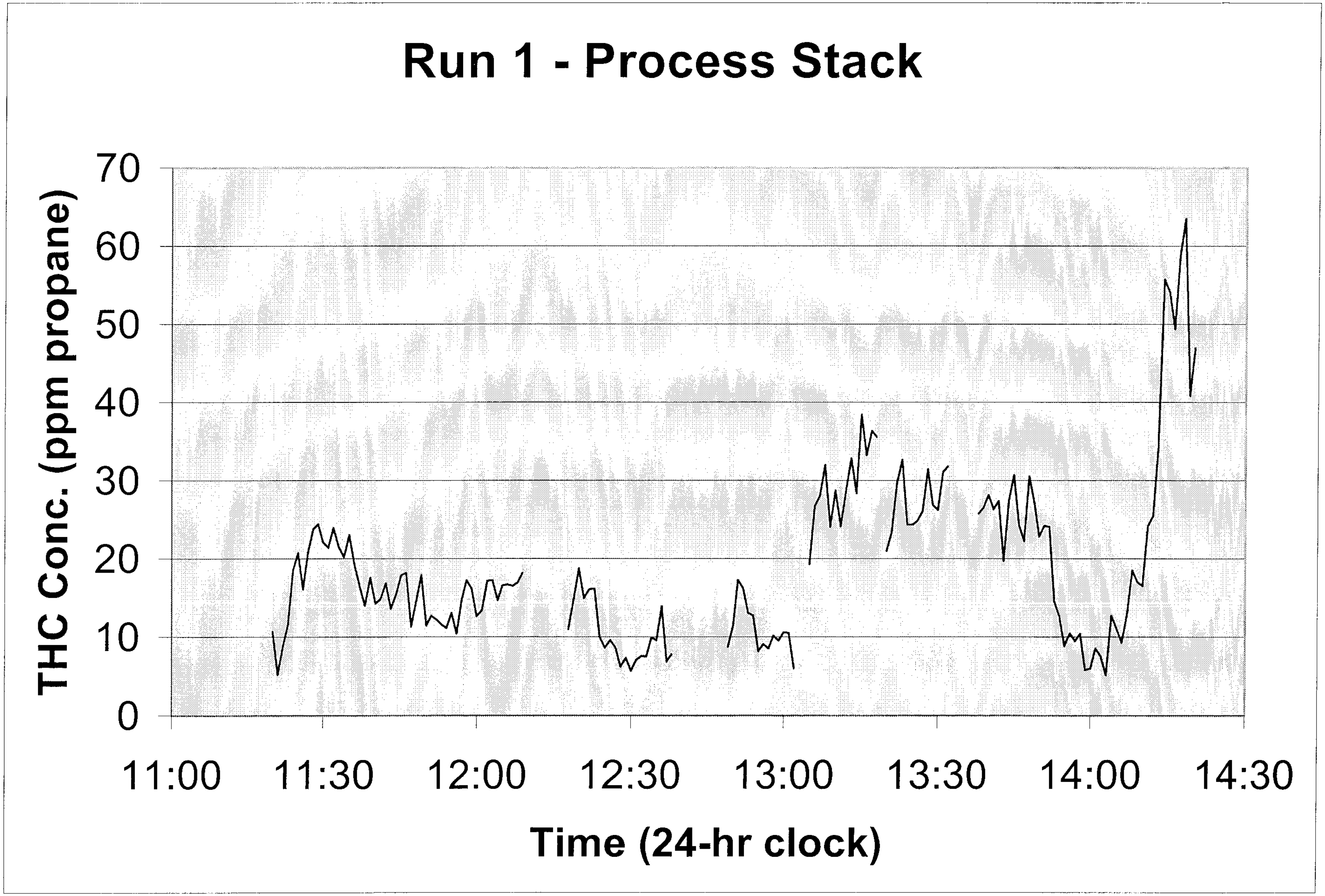
	Initial Value	1st Drift Check Value	Difference As % span error	Pass/Fail
THC Silo	90.7	90.4	0.3	Pass

	1st Drift Check Value	Final Value	Difference As % span error	Pass/Fail
	90.4	90.4	0.0	Pass

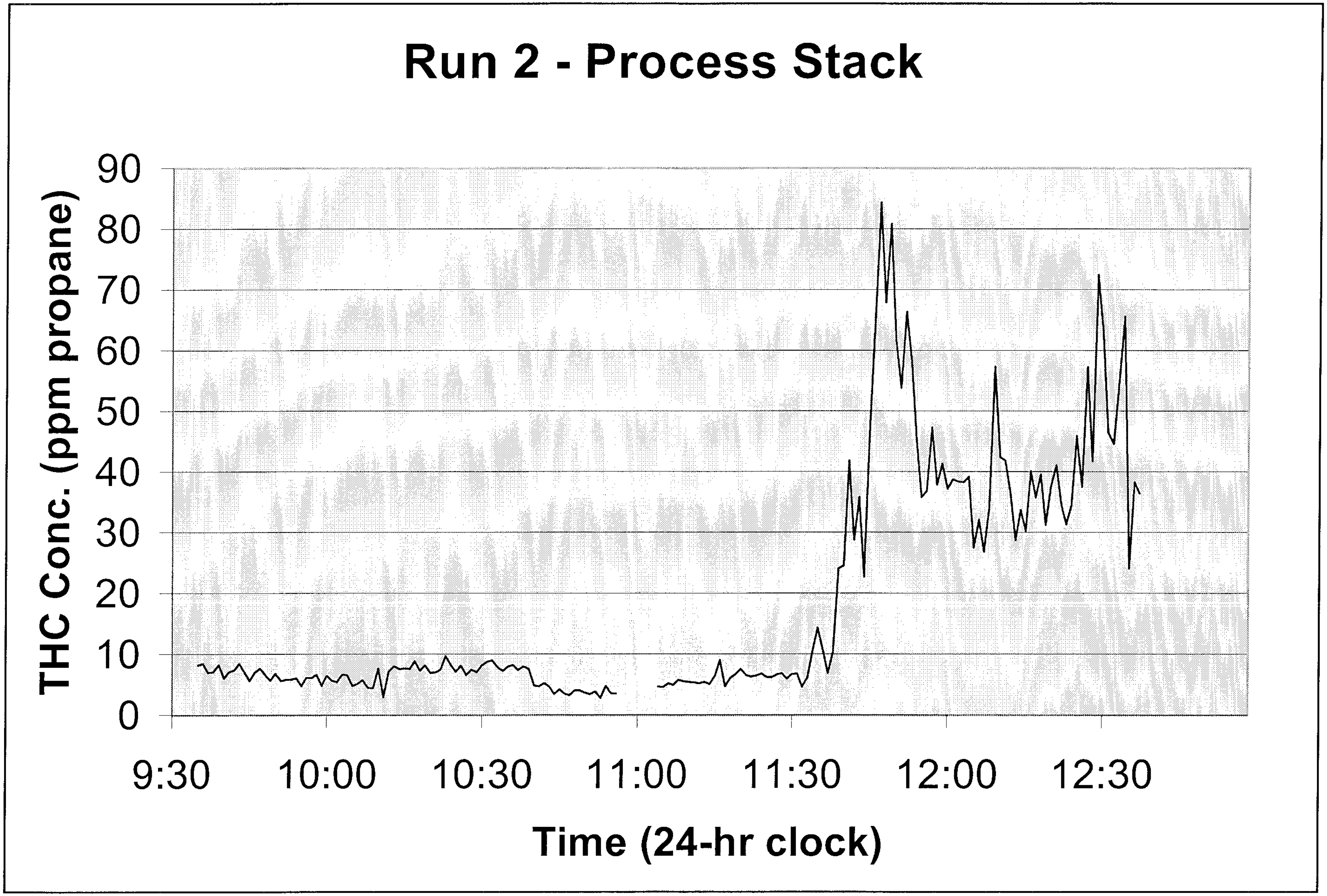
Pass/Fail Criteria for Drift is +/-3% of THC Span

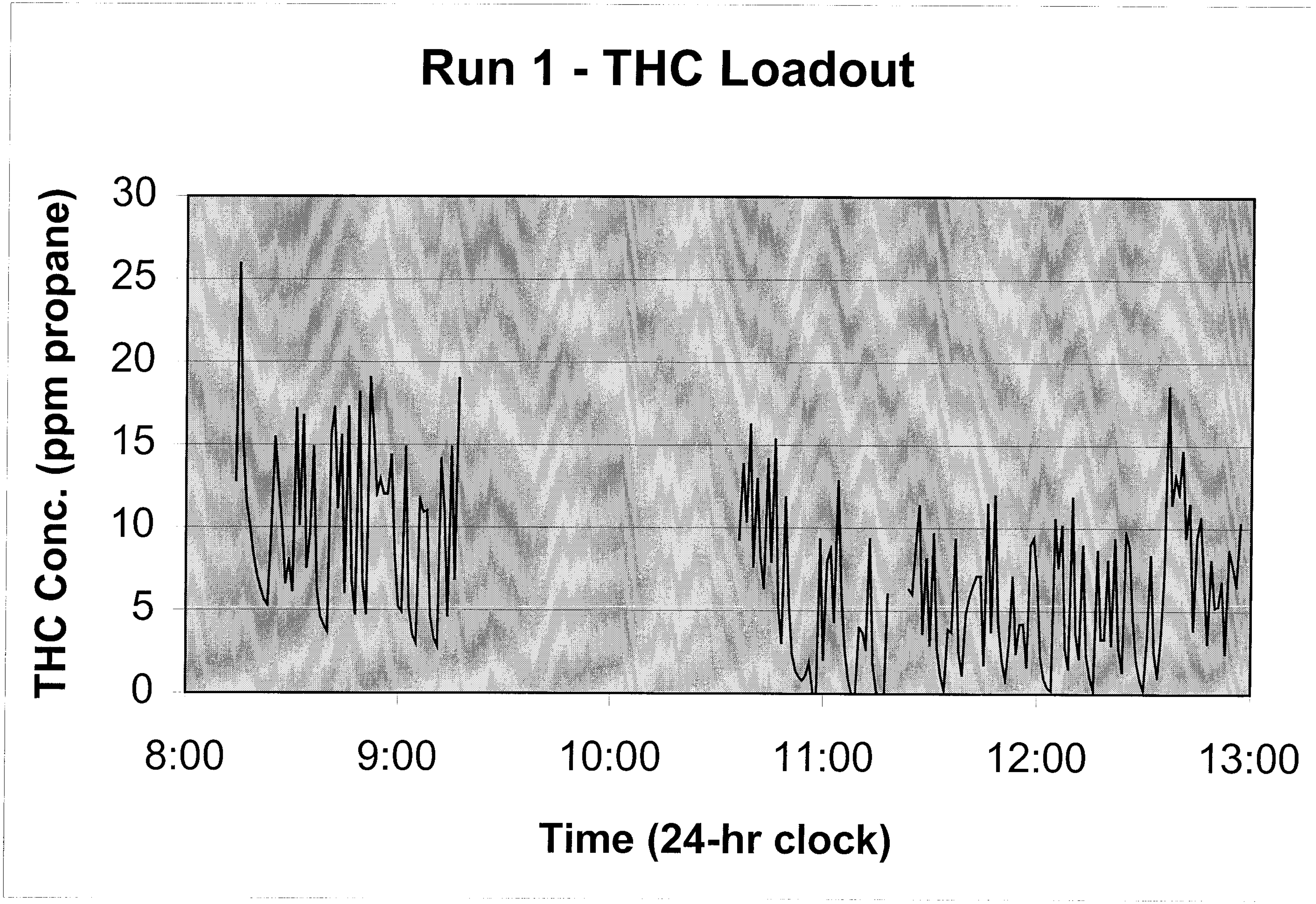
Response Times

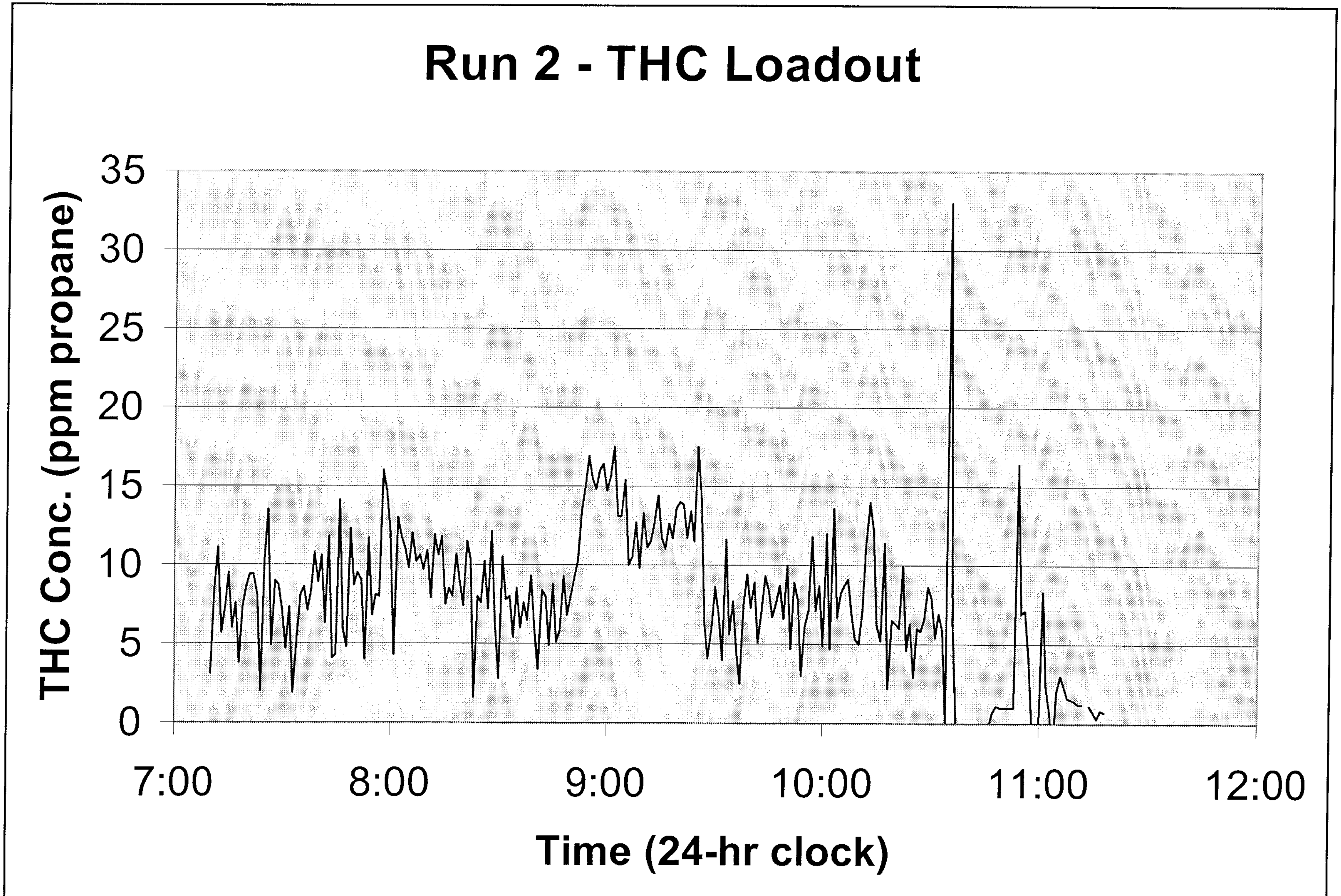
Analyzer	Response Time
THC Silo	1 min. 25 sec.
THC Tunnel	35 sec.
THC Dryer Stack	1 min. 30 sec.

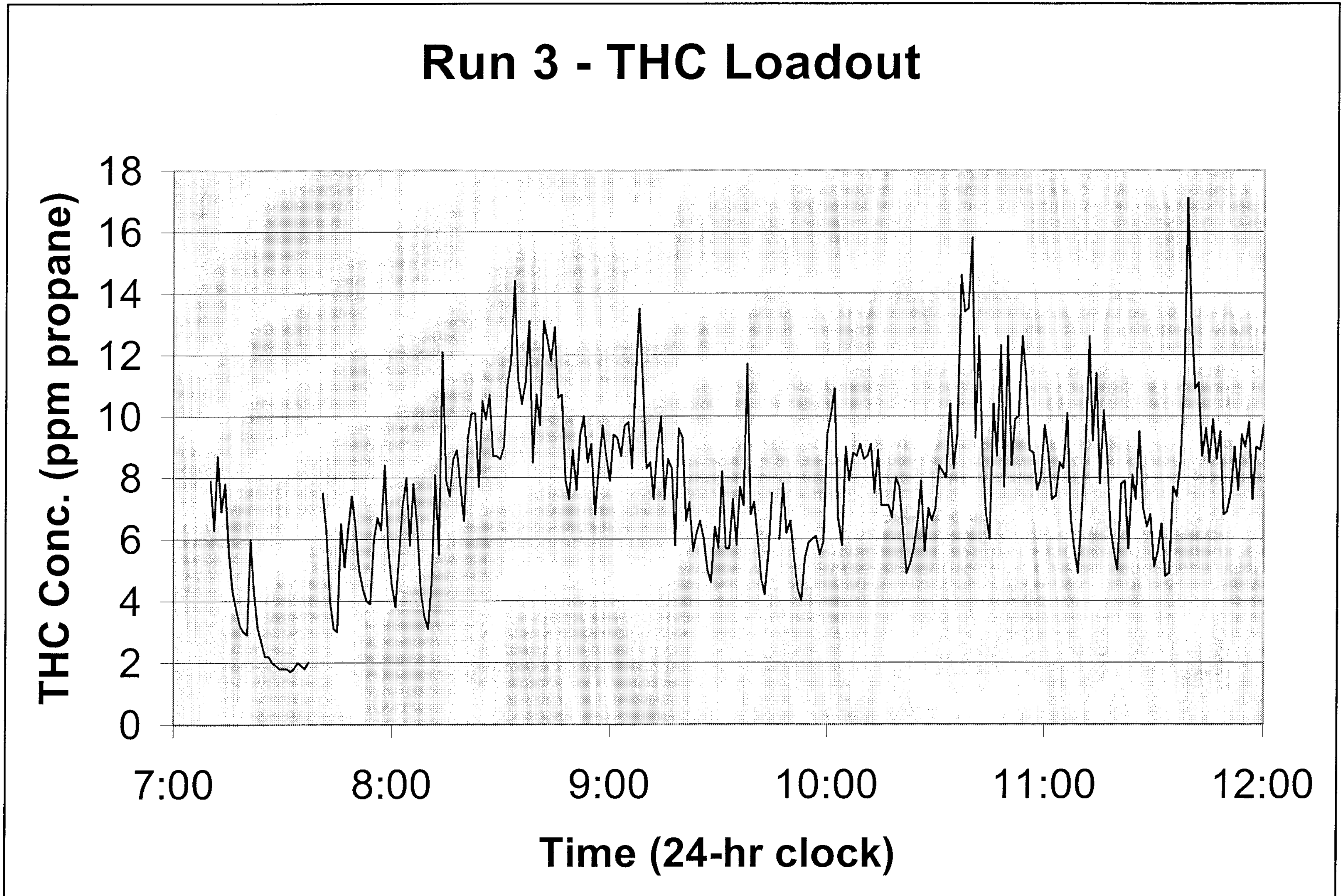


Run 1 - Process Stack
THC Conc. (ppm propane)
0
10
20
30
40
50
60
70
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
Time (24-hr clock)

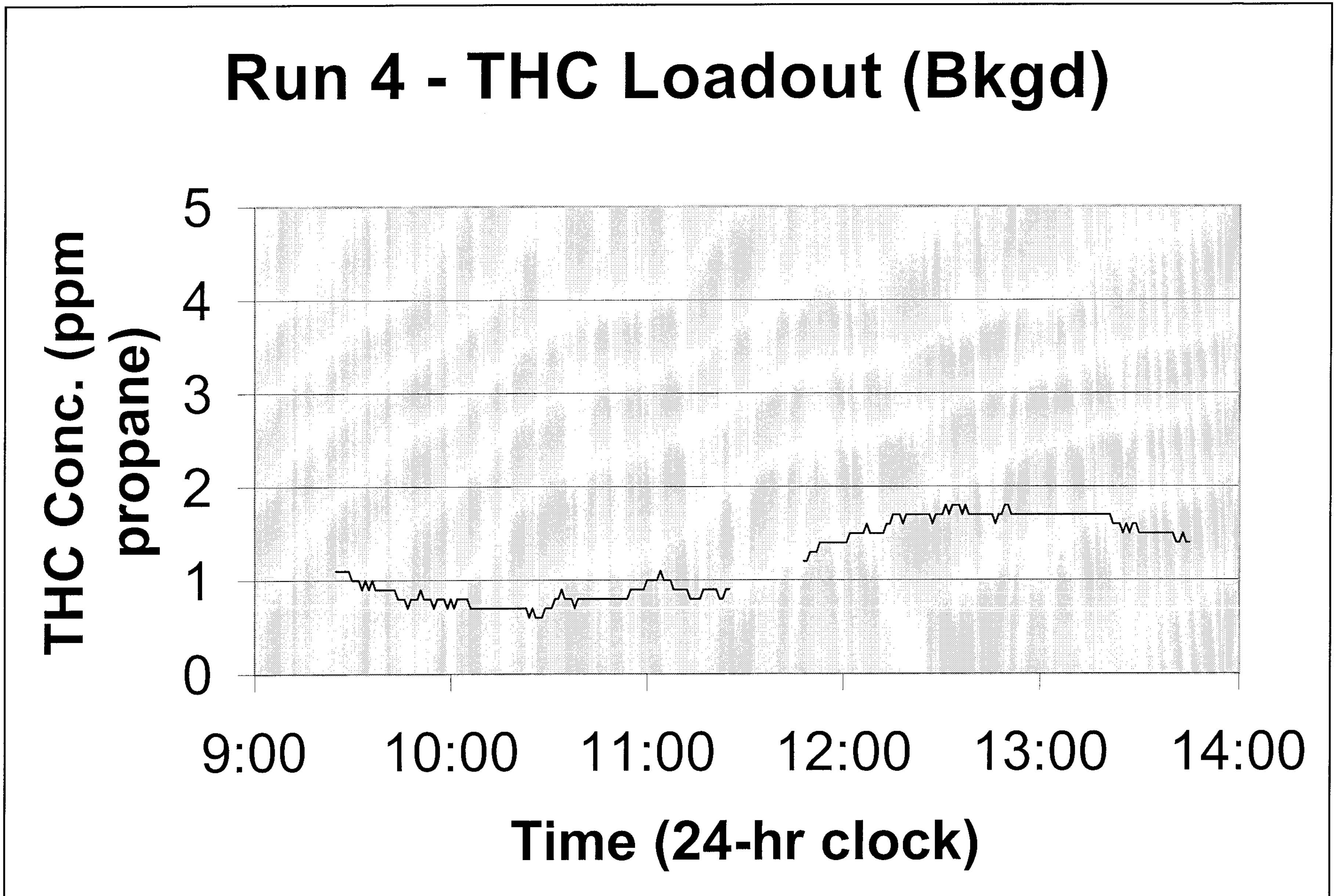

Run 2 - Process Stack
THC Conc. (ppm propane)
90
80
70
60
50
40
30
20
10
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
Time (24-hr clock)


Run 1 - THC Loadout
THC Conc. (ppm propane)
30
25
20
15
10
5
0
8:00
9:00
10:00
11:00
12:00
13:00
Time (24-hr clock)

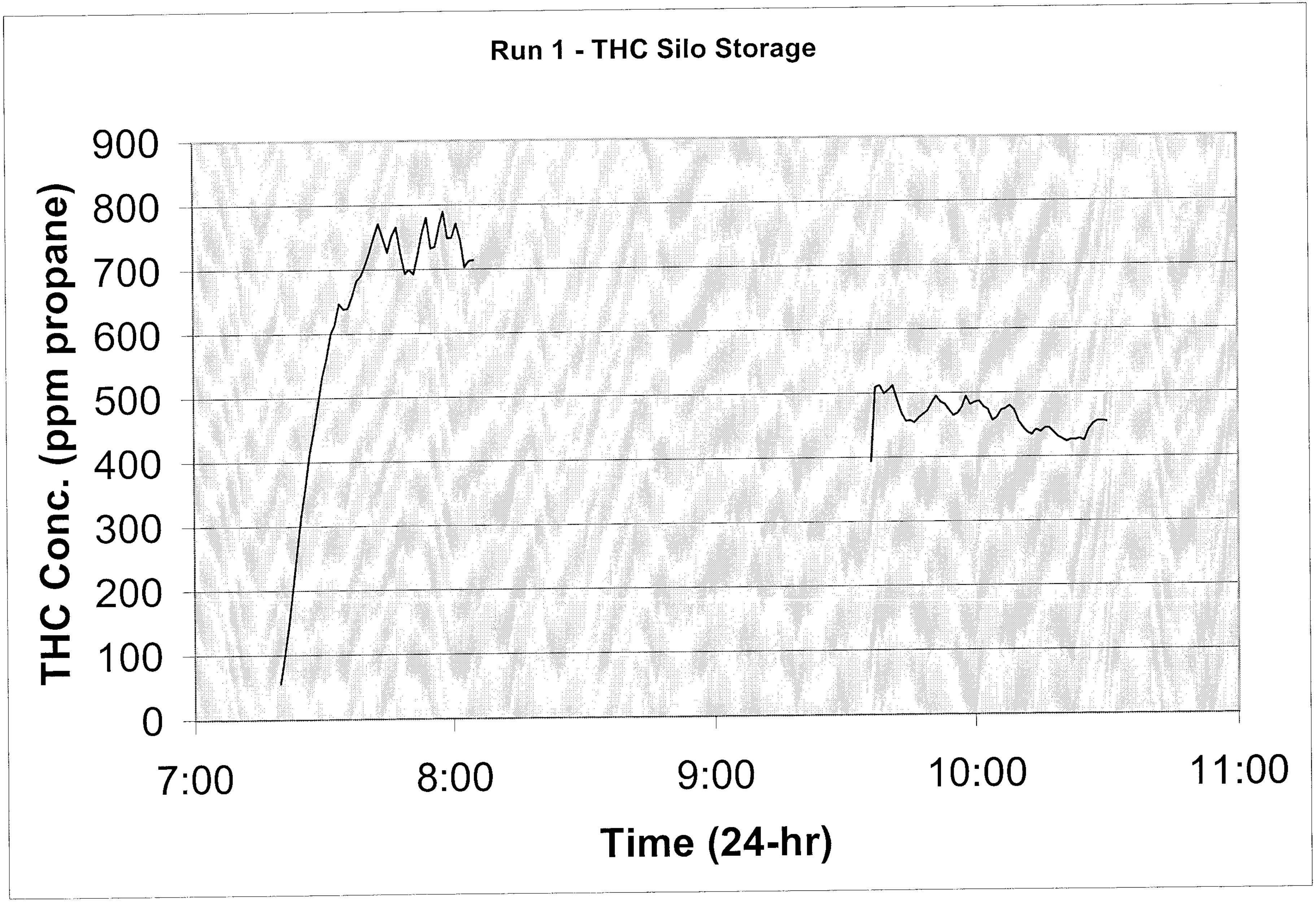

Run 2 - THC Loadout
THC Conc. (ppm propane)
35
30
25
20
15
10
5
0
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)



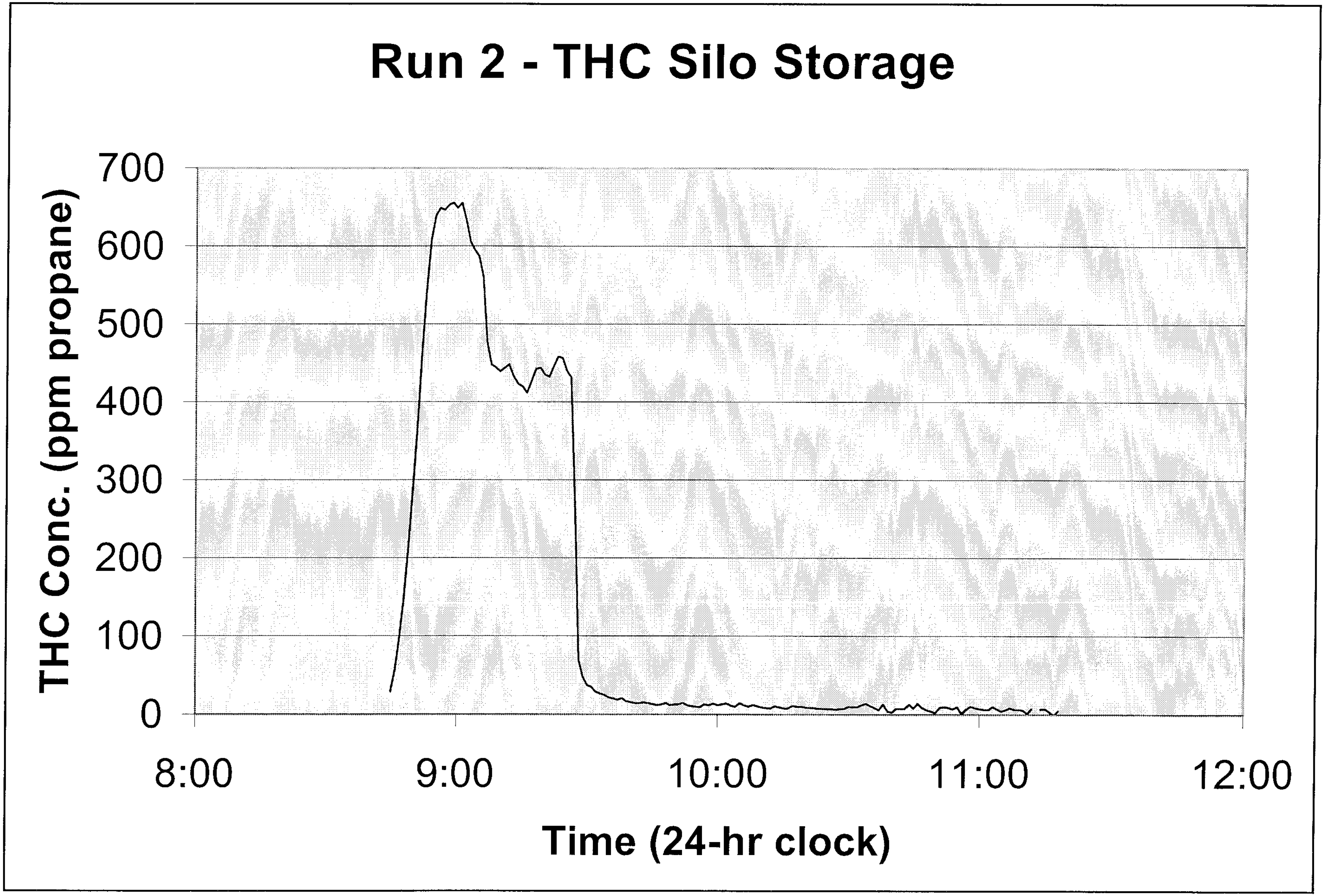
Run 3 - THC Loadout
THC Conc. (ppm propane)
0
2
4
6
8
10
12
14
16
18
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)



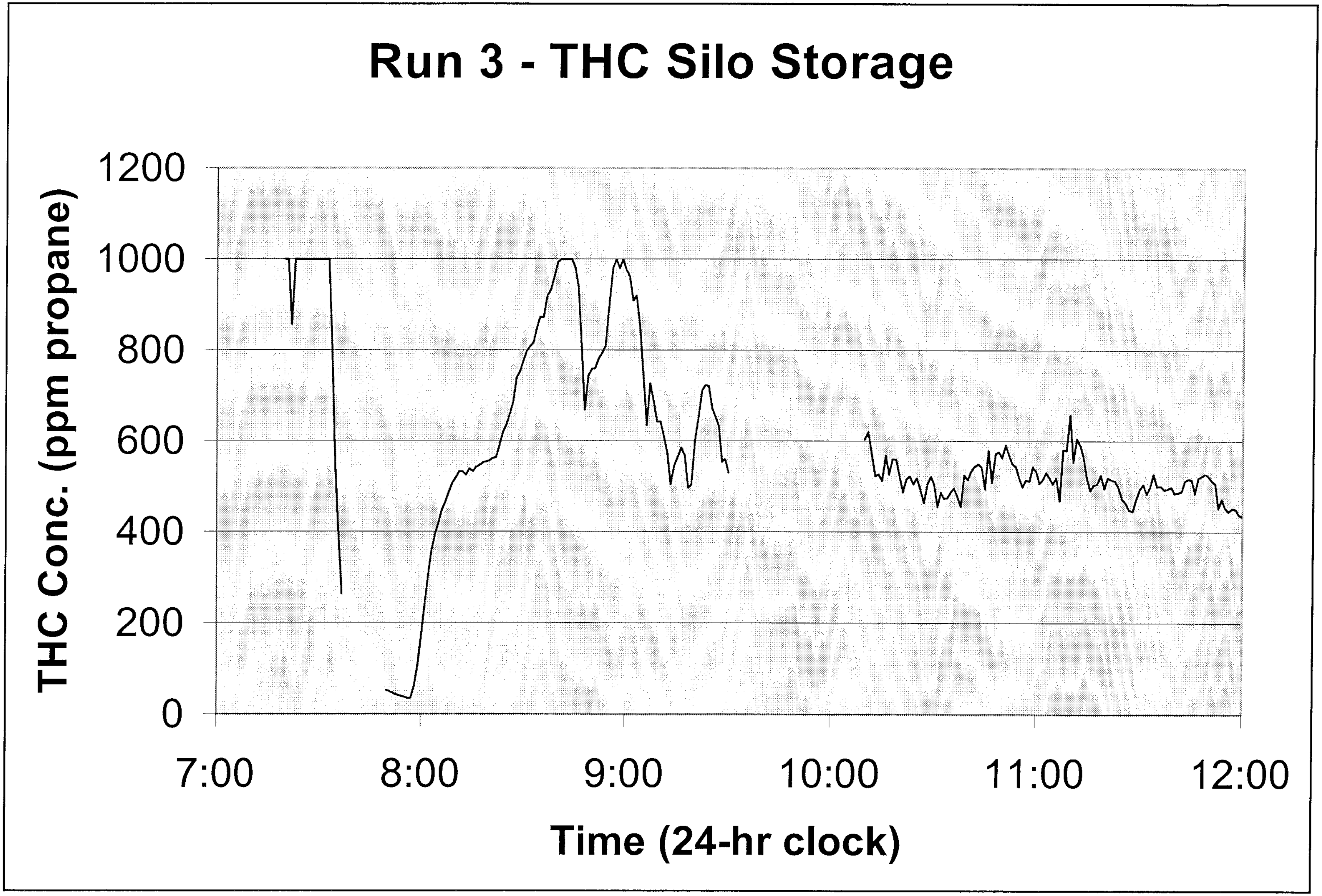
Run 4 - THC Loadout (Bkgd)
THC Conc. (ppm propane)
5
4
3
2
1
0
9:00
10:00
11:00
12:00
13:00
14:00
Time (24-hr clock)

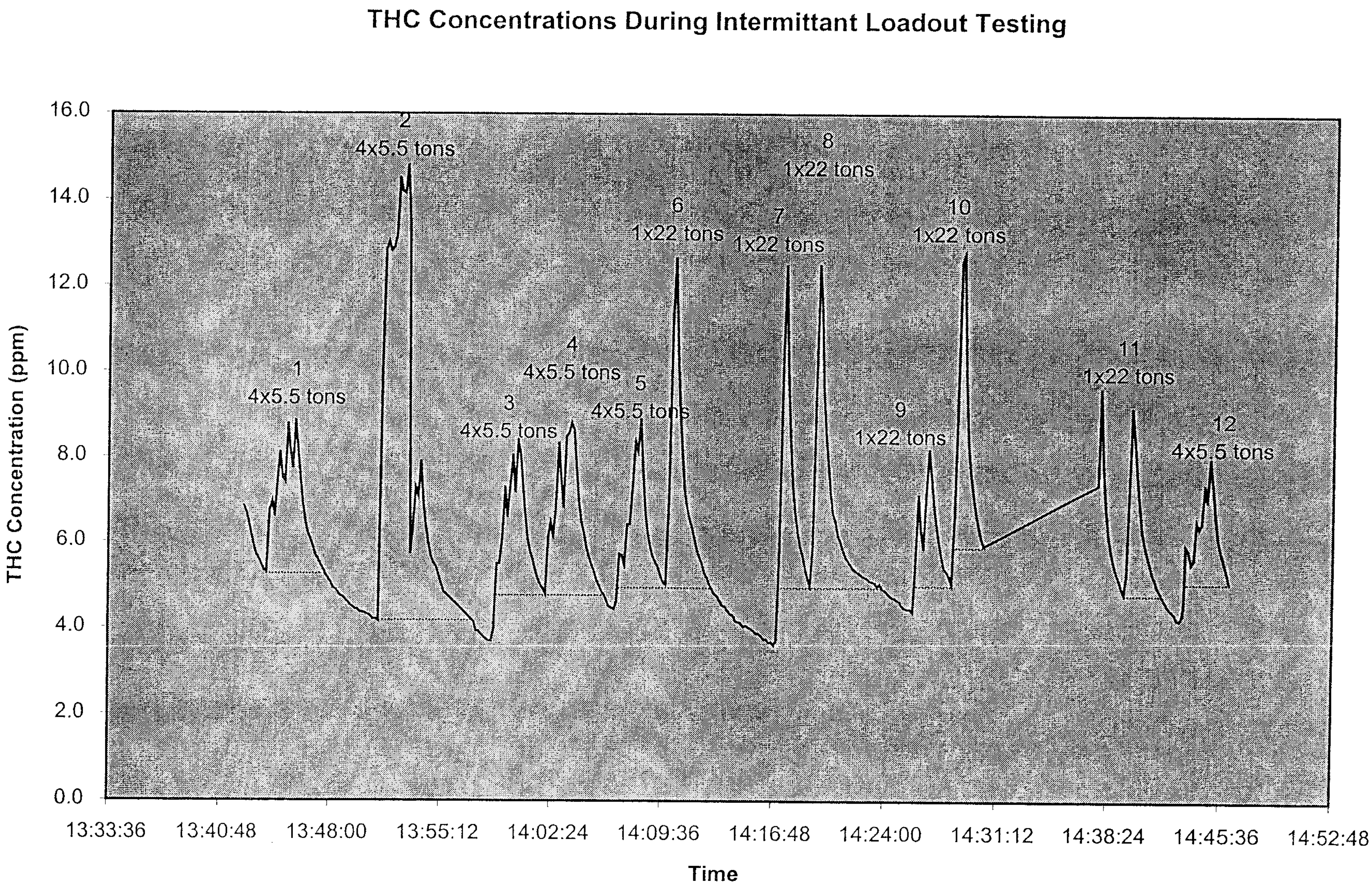


Run 1 - THC Silo Storage
THC Conc. (ppm propane)
900
800
700
600
500
400
300
200
100
0
7:00
8:00
9:00
10:00
11:00
Time (24-hr)



Run 2 - THC Silo Storage
THC Conc. (ppm propane)
700
600
500
400
300
200
100
0
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)


Run 3 - THC Silo Storage
THC Conc. (ppm propane)
1200
1000
800
600
400
200
0
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)


THC Concentrations During Intermittant Loadout Testing
THC Concentration (ppm)
Time
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
13:33:36
13:40:48
13:48:00
13:55:12
14:02:24
14:09:36
14:16:48
14:24:00
14:31:12
14:38:24
14:45:36
14:52:48
1
4x5.5 tons
2
4x5.5 tons
3
4x5.5 tons
4
4x5.5 tons
5
4x5.5 tons
6
1x22 tons
7
1x22 tons
8
1x22 tons
9
1x22 tons
10
1x22 tons
11
1x22 tons
12
4x5.5 tons

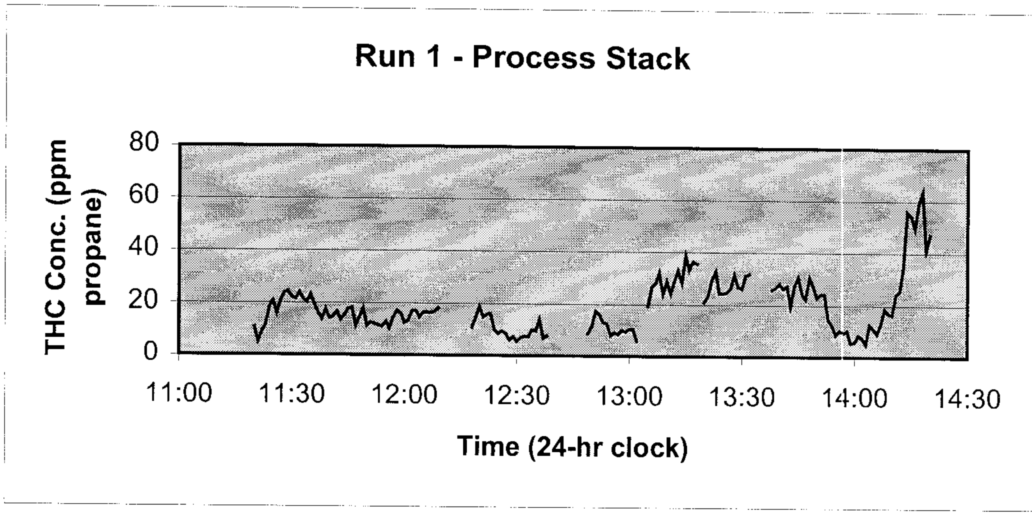
Plant C
Run 1 Dryer Stack
Date: 7/21/98
Project # 4701-08-03-04
Operator: Gulick

TIME 24 hr		THC Dryer Stack ppm
1120	11:20	10.7
1121	11:21	5.2
1122	11:22	8.7
1123	11:23	11.5
1124	11:24	18.5
1125	11:25	20.7
1126	11:26	16.1
1127	11:27	20.8
1128	11:28	23.8
1129	11:29	24.4
1130	11:30	22.1
1131	11:31	21.4
1132	11:32	23.9
1133	11:33	21.5
1134	11:34	20.2
1135	11:35	23.0
1136	11:36	19.3
1137	11:37	16.5
1138	11:38	14.0
1139	11:39	17.6
1140	11:40	14.2
1141	11:41	14.8
1142	11:42	16.9
1143	11:43	13.6
1144	11:44	15.4
1145	11:45	17.9
1146	11:46	18.2
1147	11:47	11.3
1148	11:48	14.6
1149	11:49	17.9
1150	11:50	11.4
1151	11:51	12.7
1152	11:52	12.2
1153	11:53	11.6
1154	11:54	11.1
1155	11:55	13.1
1156	11:56	10.4

1157	11:57	14.7
1158	11:58	17.2
1159	11:59	16.2
1200	12:00	12.6
1201	12:01	13.4
1202	12:02	17.1
1203	12:03	17.2
1204	12:04	14.6
1205	12:05	16.5
1206	12:06	16.7
1207	12:07	16.5
1208	12:08	16.9
1209	12:09	18.2
Flame Out		
1218	12:18	11.0
1219	12:19	14.7
1220	12:20	18.8
1221	12:21	14.9
1222	12:22	16.0
1223	12:23	16.2
1224	12:24	10.0
1225	12:25	8.6
1226	12:26	9.6
1227	12:27	8.6
1228	12:28	6.2
1229	12:29	7.3
1230	12:30	5.7
1231	12:31	7.1
1232	12:32	7.6
1233	12:33	7.5
1234	12:34	9.9
1235	12:35	9.6
0:00	12:36	13.9
0:00	12:37	6.9
0:00	12:38	7.8
Calibration Check		
1249	12:49	8.8
1250	12:50	11.4
1251	12:51	17.3
1252	12:52	16.2
1253	12:53	13.0
1254	12:54	12.7
1255	12:55	8.1
1256	12:56	9.1
1257	12:57	8.5
1258	12:58	10.1

1259	12:59	9.5
1300	13:00	10.6
1301	13:01	10.5
1302	13:02	6.0
Flame Out		
1305	13:05	19.3
1306	13:06	26.7
1307	13:07	28.0
1308	13:08	32.0
1309	13:09	24.0
1310	13:10	28.7
1311	13:11	24.1
1312	13:12	28.7
1313	13:13	32.8
1314	13:14	28.4
1315	13:15	38.4
1316	13:16	33.2
1317	13:17	36.3
1318	13:18	35.5
Flame Out		
1320	13:20	21.0
1321	13:21	23.4
1322	13:22	29.6
1323	13:23	32.6
1324	13:24	24.3
1325	13:25	24.3
1326	13:26	24.8
1327	13:27	26.0
1328	13:28	31.4
1329	13:29	26.9
1330	13:30	26.2
1331	13:31	31.1
1332	13:32	31.8
Flame Out		
1338	13:38	25.7
1339	13:39	26.5
1340	13:40	28.1
1341	13:41	26.3
1342	13:42	27.4
1343	13:43	19.7
1344	13:44	27.5
1345	13:45	30.7
1346	13:46	24.2
1347	13:47	22.2
1348	13:48	30.5
1349	13:49	27.1

1350	13:50	22.8
1351	13:51	24.2
1352	13:52	24.0
1353	13:53	14.5
1354	13:54	12.6
1355	13:55	8.8
1356	13:56	10.5
1357	13:57	9.5
1358	13:58	10.4
1359	13:59	5.8
1400	14:00	6.0
1401	14:01	8.5
1402	14:02	7.6
1403	14:03	5.1
1404	14:04	12.7
1405	14:05	11.0
1406	14:06	9.3
1407	14:07	12.8
1408	14:08	18.5
1409	14:09	17.0
1410	14:10	16.5
1411	14:11	24.2
1412	14:12	25.5
1413	14:13	34.1
1414	14:14	55.8
1415	14:15	54.1
1416	14:16	49.4
1417	14:17	58.9
1418	14:18	63.5
1419	14:19	40.8
1420	14:20	47.0
Minimum=		5.1
Maximum=		63.5
Average=		19.2



Run 1 - Process Stack
THC Conc. (ppm propane)
80
60
40
20
0
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
Time (24-hr clock)

Plant C
Run 2 Dryer Stack
Date: 7/21/98
Project # 4701=08-03-04
Operator: Gulick

TIME 24 hr		THC Dryer Stack ppm
935	9:35	8.2
936	9:36	8.4
937	9:37	7.0
938	9:38	7.1
939	9:39	8.2
940	9:40	6.0
941	9:41	7.1
942	9:42	7.3
943	9:43	8.4
944	9:44	7.1
945	9:45	5.6
946	9:46	6.9
947	9:47	7.6
948	9:48	6.6
949	9:49	5.6
950	9:50	6.8
951	9:51	5.6
952	9:52	5.8
953	9:53	5.8
954	9:54	6.0
955	9:55	4.7
956	9:56	6.1
957	9:57	6.1
958	9:58	6.6
959	9:59	4.8
1000	10:00	6.5
1001	10:01	5.6
1002	10:02	5.4
1003	10:03	6.6
1004	10:04	6.5
1005	10:05	4.8
1006	10:06	5.1
1007	10:07	5.7
1008	10:08	4.5
1009	10:09	4.4
1010	10:10	7.7
1011	10:11	2.9

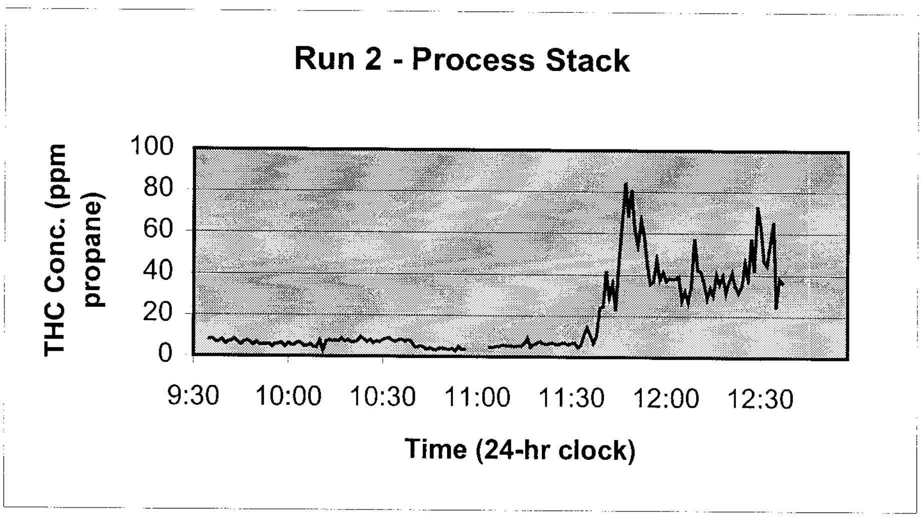
1012	10:12	7.2
1013	10:13	8.0
1014	10:14	7.5
1015	10:15	7.6
1016	10:16	7.5
1017	10:17	8.8
1018	10:18	7.2
1019	10:19	8.1
1020	10:20	6.9
1021	10:21	7.0
1022	10:22	7.5
1023	10:23	9.7
1024	10:24	8.2
1025	10:25	7.1
1026	10:26	8.1
1027	10:27	6.6
1028	10:28	7.4
1029	10:29	7.0
1030	10:30	8.1
1031	10:31	8.7
1032	10:32	9.0
1033	10:33	7.8
1034	10:34	7.2
1035	10:35	7.9
1036	10:36	8.2
1037	10:37	7.3
1038	10:38	8.0
1039	10:39	7.5
1040	10:40	4.9
1041	10:41	4.7
1042	10:42	5.2
1043	10:43	4.6
1044	10:44	3.4
1045	10:45	4.2
1046	10:46	3.5
1047	10:47	3.2
1048	10:48	4.0
1049	10:49	4.0
1050	10:50	3.7
1051	10:51	3.4
1052	10:52	3.8
1053	10:53	2.8
1054	10:54	4.8
1055	10:55	3.6
1056	10:56	3.5

Calibration Check

1104	11:04	4.7
1105	11:05	4.6
1106	11:06	5.2
1107	11:07	4.9
1108	11:08	5.8
1109	11:09	5.5
1110	11:10	5.4
1111	11:11	5.3
1112	11:12	5.2
1113	11:13	5.4
1114	11:14	5.1
1115	11:15	6.4
1116	11:16	9.0
1117	11:17	4.7
1118	11:18	6.0
1119	11:19	6.7
1120	11:20	7.6
1121	11:21	6.5
1122	11:22	6.3
1123	11:23	6.5
1124	11:24	6.8
1125	11:25	6.2
1126	11:26	6.2
1127	11:27	6.6
1128	11:28	6.8
1129	11:29	6.0
1130	11:30	6.7
1131	11:31	6.8
1132	11:32	4.6
1133	11:33	6.1
1134	11:34	10.6
1135	11:35	14.3
1136	11:36	10.7
1137	11:37	6.9
1138	11:38	10.3
1139	11:39	24.1
1140	11:40	24.5
1141	11:41	41.8
1142	11:42	28.8
1143	11:43	35.8
1144	11:44	22.7
1145	11:45	46.7
1146	11:46	65.4
1147	11:47	84.4
1148	11:48	67.9
1149	11:49	80.9

1150	11:50	61.6
1151	11:51	53.8
1152	11:52	66.3
1153	11:53	58.3
1154	11:54	45.1
1155	11:55	35.8
1156	11:56	36.8
1157	11:57	47.3
1158	11:58	37.8
1159	11:59	41.3
1200	12:00	37.2
1201	12:01	38.7
1202	12:02	38.3
1203	12:03	38.3
1204	12:04	39.2
1205	12:05	27.5
1206	12:06	32.1
1207	12:07	26.8
1208	12:08	34.0
1209	12:09	57.3
1210	12:10	42.4
1211	12:11	41.8
1212	12:12	36.5
1213	12:13	28.7
1214	12:14	33.7
1215	12:15	30.2
1216	12:16	40.1
1217	12:17	35.7
1218	12:18	39.6
1219	12:19	31.2
1220	12:20	37.5
1221	12:21	41.0
1222	12:22	34.5
1223	12:23	31.3
1224	12:24	34.4
1225	12:25	45.9
1226	12:26	37.5
1227	12:27	57.3
1228	12:28	41.7
1229	12:29	72.5
1230	12:30	63.3
1231	12:31	46.4
1232	12:32	44.6
1233	12:33	55.1
1234	12:34	65.6
1235	12:35	24.1

1236	12:36	38.3
1237	12:37	36.4
Minimum=		2.8
Maximum=		84.4
Average=		18.7



Plant C
Run 1 Load Out
Date 7/24/98
Project # 4701-08-03-04
Operator: Gulick

Time 24 hr		THC Silo ppm		THC Tunnel ppm
720	7:20	56.1	7:20	
721	7:21	99.8	7:21	
722	7:22	146.2	7:22	
723	7:23	202.8	7:23	
724	7:24	259.0	7:24	
725	7:25	314.7	7:25	
726	7:26	360.5	7:26	
727	7:27	412.4	7:27	
728	7:28	447.5	7:28	
729	7:29	490.0	7:29	
730	7:30	532.5	7:30	
731	7:31	560.9	7:31	
732	7:32	599.7	7:32	
733	7:33	614.5	7:33	
734	7:34	647.5	7:34	
735	7:35	638.6	7:35	
736	7:36	639.6	7:36	
737	7:37	658.4	7:37	
738	7:38	682.0	7:38	
739	7:39	690.3	7:39	
740	7:40	707.7	7:40	
741	7:41	726.4	7:41	
742	7:42	749.8	7:42	
743	7:43	771.4	7:43	
744	7:44	748.9	7:44	
745	7:45	726.4	7:45	
746	7:46	751.0	7:46	
747	7:47	765.5	7:47	
748	7:48	724.9	7:48	
749	7:49	692.9	7:49	
750	7:50	699.6	7:50	
751	7:51	692.4	7:51	
752	7:52	723.1	7:52	
753	7:53	757.2	7:53	
754	7:54	780.2	7:54	
755	7:55	732.6	7:55	
756	7:56	734.5	7:56	

757	7:57	767.0	7:57	
758	7:58	789.5	7:58	
759	7:59	747.8	7:59	
800	8:00	748.5	8:00	
801	8:01	770.8	8:01	
802	8:02	744.2	8:02	
803	8:03	702.6	8:03	
804	8:04	712.4	8:04	
805	8:05	714.0	8:05	
806	8:06		8:06	
807	8:07		8:07	
808	8:08		8:08	
809	8:09		8:09	
810	8:10		8:10	
811	8:11		8:11	
812	8:12		8:12	
813	8:13		8:13	
814	8:14		8:14	12.8
815	8:15		8:15	26.0
816	8:16		8:16	15.5
817	8:17		8:17	11.5
818	8:18		8:18	10.1
819	8:19		8:19	8.4
820	8:20		8:20	7.1
821	8:21		8:21	6.3
822	8:22		8:22	5.6
823	8:23		8:23	5.3
824	8:24		8:24	10.0
825	8:25		8:25	15.5
826	8:26		8:26	12.7
827	8:27		8:27	10.1
828	8:28		8:28	6.6
829	8:29		8:29	8.0
830	8:30		8:30	6.1
831	8:31		8:31	17.2
832	8:32		8:32	10.1
833	8:33		8:33	16.8
834	8:34		8:34	7.5
835	8:35		8:35	9.6
836	8:36		8:36	14.9
837	8:37		8:37	6.2
838	8:38		8:38	4.6
839	8:39		8:39	4.1
840	8:40		8:40	3.7
841	8:41		8:41	15.6
842	8:42		8:42	17.3

843	8:43		8:43	11.1
844	8:44		8:44	15.6
845	8:45		8:45	6.0
846	8:46		8:46	17.3
847	8:47		8:47	6.8
848	8:48		8:48	4.7
849	8:49		8:49	18.2
850	8:50		8:50	6.6
851	8:51		8:51	4.7
852	8:52		8:52	19.1
853	8:53		8:53	16.0
854	8:54		8:54	12.0
855	8:55		8:55	12.9
856	8:56		8:56	12.0
857	8:57		8:57	12.0
858	8:58		8:58	14.4
859	8:59		8:59	8.3
900	9:00		9:00	5.2
901	9:01		9:01	4.9
902	9:02		9:02	14.9
903	9:03		9:03	5.2
904	9:04		9:04	3.5
905	9:05		9:05	3.0
906	9:06		9:06	11.7
907	9:07		9:07	10.9
908	9:08		9:08	11.0
909	9:09		9:09	4.6
910	9:10		9:10	3.3
911	9:11		9:11	2.8
912	9:12		9:12	14.2
913	9:13		9:13	11.0
914	9:14		9:14	4.6
915	9:15		9:15	14.9
916	9:16		9:16	6.8
917	9:17		9:17	19.0
Off Line				
936	9:36	394.0	9:36	
937	9:37	509.3	9:37	
938	9:38	512.5	9:38	
939	9:39	499.6	9:39	
940	9:40	505.3	9:40	
941	9:41	512.2	9:41	
942	9:42	489.5	9:42	
943	9:43	468.7	9:43	
944	9:44	456.3	9:44	
945	9:45	457.5	9:45	

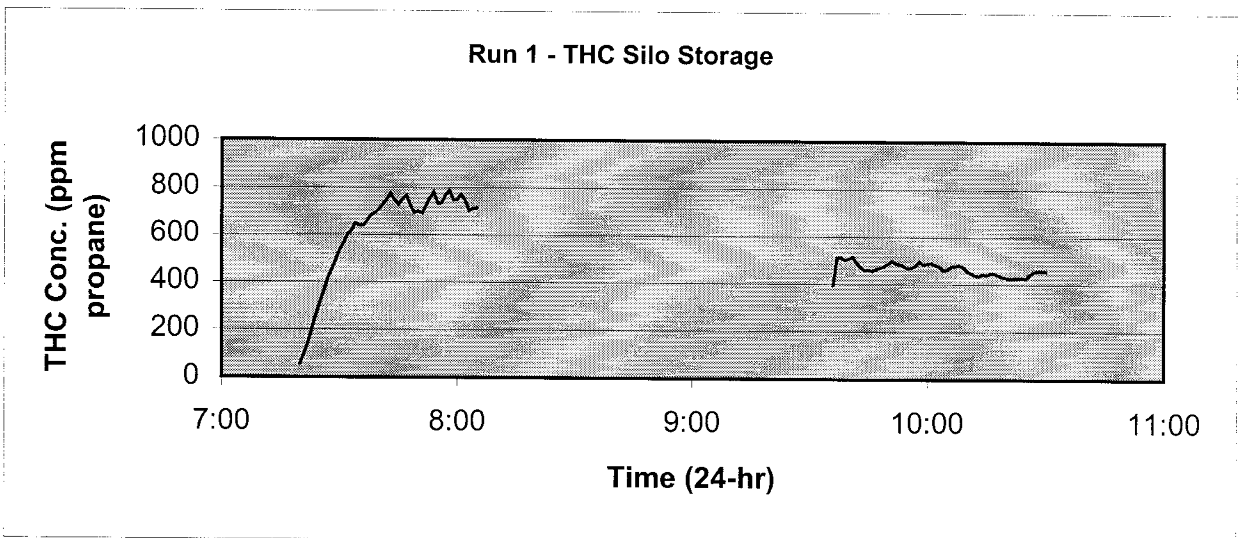
946	9:46	454.1	9:46
947	9:47	461.6	9:47
948	9:48	467.1	9:48
949	9:49	472.5	9:49
950	9:50	484.4	9:50
951	9:51	495.4	9:51
952	9:52	485.9	9:52
953	9:53	482.8	9:53
954	9:54	473.7	9:54
955	9:55	465.0	9:55
956	9:56	468.1	9:56
957	9:57	477.0	9:57
958	9:58	494.8	9:58
959	9:59	481.6	9:59
1000	10:00	485.2	10:00
1001	10:01	487.3	10:01
1002	10:02	477.8	10:02
1003	10:03	473.7	10:03
1004	10:04	457.0	10:04
1005	10:05	460.9	10:05
1006	10:06	472.6	10:06
1007	10:07	475.1	10:07
1008	10:08	479.8	10:08
1009	10:09	473.3	10:09
1010	10:10	454.8	10:10
1011	10:11	445.9	10:11
1012	10:12	438.0	10:12
1013	10:13	434.1	10:13
1014	10:14	442.0	10:14
1015	10:15	438.8	10:15
1016	10:16	444.6	10:16
1017	10:17	444.7	10:17
1018	10:18	437.7	10:18
1019	10:19	430.8	10:19
1020	10:20	427.2	10:20
1021	10:21	423.3	10:21
1022	10:22	426.2	10:22
1023	10:23	425.9	10:23
1024	10:24	427.9	10:24
1025	10:25	424.6	10:25
1026	10:26	442.1	10:26
1027	10:27	451.3	10:27
1028	10:28	455.2	10:28
1029	10:29	455.4	10:29
1030	10:30	454.3	10:30
1031	10:31		10:31

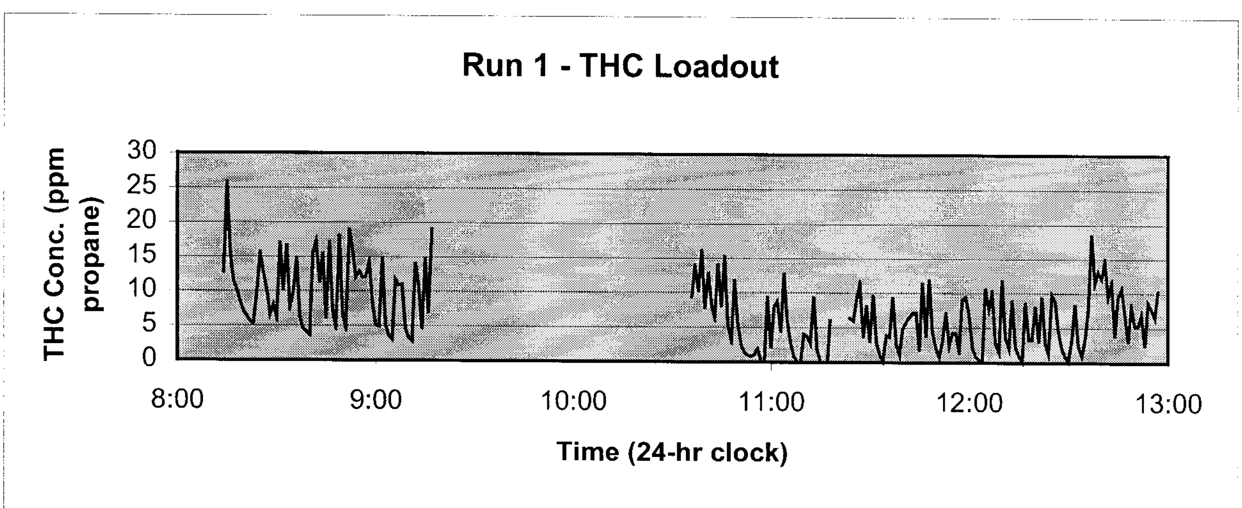
1032	10:32	10:32	
1033	10:33	10:33	
1034	10:34	10:34	
1035	10:35	10:35	
1036	10:36	10:36	9.3
1037	10:37	10:37	13.9
1038	10:38	10:38	10.3
1039	10:39	10:39	16.3
1040	10:40	10:40	7.6
1041	10:41	10:41	13.0
1042	10:42	10:42	8.2
1043	10:43	10:43	6.3
1044	10:44	10:44	14.2
1045	10:45	10:45	7.9
1046	10:46	10:46	15.4
1047	10:47	10:47	5.3
1048	10:48	10:48	3.0
1049	10:49	10:49	11.9
1050	10:50	10:50	5.5
1051	10:51	10:51	2.4
1052	10:52	10:52	1.4
1053	10:53	10:53	1.0
1054	10:54	10:54	0.8
1055	10:55	10:55	1.1
1056	10:56	10:56	1.9
1057	10:57	10:57	0.1
1058	10:58	10:58	-0.2
1059	10:59	10:59	9.3
1100	11:00	11:00	2.0
1101	11:01	11:01	8.0
1102	11:02	11:02	8.7
1103	11:03	11:03	4.3
1104	11:04	11:04	12.9
1105	11:05	11:05	5.9
1106	11:06	11:06	2.6
1107	11:07	11:07	0.8
1108	11:08	11:08	0.0
1109	11:09	11:09	-0.2
1110	11:10	11:10	4.0
1111	11:11	11:11	3.7
1112	11:12	11:12	2.7
1113	11:13	11:13	9.4
1114	11:14	11:14	1.8
1115	11:15	11:15	0.2
1116	11:16	11:16	-0.6
1117	11:17	11:17	-1.1

1118	11:18	11:18	6.0
Off Line			
1124	11:24	11:24	6.3
1125	11:25	11:25	6.0
1126	11:26	11:26	9.0
1127	11:27	11:27	11.4
1128	11:28	11:28	3.6
1129	11:29	11:29	8.2
1130	11:30	11:30	2.9
1131	11:31	11:31	9.7
1132	11:32	11:32	2.8
1133	11:33	11:33	1.1
1134	11:34	11:34	0.2
1135	11:35	11:35	3.9
1136	11:36	11:36	3.7
1137	11:37	11:37	9.4
1138	11:38	11:38	2.5
1139	11:39	11:39	1.1
1140	11:40	11:40	4.8
1141	11:41	11:41	5.8
1142	11:42	11:42	6.5
1143	11:43	11:43	7.1
1144	11:44	11:44	7.1
1145	11:45	11:45	1.7
1146	11:46	11:46	11.5
1147	11:47	11:47	3.7
1148	11:48	11:48	12.0
1149	11:49	11:49	4.3
1150	11:50	11:50	2.0
1151	11:51	11:51	0.8
1152	11:52	11:52	3.0
1153	11:53	11:53	7.1
1154	11:54	11:54	2.4
1155	11:55	11:55	4.2
1156	11:56	11:56	4.2
1157	11:57	11:57	1.6
1158	11:58	11:58	9.0
1159	11:59	11:59	9.4
1200	12:00	12:00	6.9
1201	12:01	12:01	2.2
1202	12:02	12:02	0.9
1203	12:03	12:03	0.4
1204	12:04	12:04	0.2
1205	12:05	12:05	10.6
1206	12:06	12:06	7.6
1207	12:07	12:07	10.2

1208	12:08	12:08	2.7
1209	12:09	12:09	1.5
1210	12:10	12:10	11.9
1211	12:11	12:11	3.6
1212	12:12	12:12	2.1
1213	12:13	12:13	9.0
1214	12:14	12:14	2.3
1215	12:15	12:15	1.0
1216	12:16	12:16	0.2
1217	12:17	12:17	8.7
1218	12:18	12:18	3.3
1219	12:19	12:19	3.3
1220	12:20	12:20	8.1
1221	12:21	12:21	2.9
1222	12:22	12:22	9.4
1223	12:23	12:23	2.8
1224	12:24	12:24	1.3
1225	12:25	12:25	9.7
1226	12:26	12:26	8.9
1227	12:27	12:27	4.6
1228	12:28	12:28	2.0
1229	12:29	12:29	0.9
1230	12:30	12:30	0.2
1231	12:31	12:31	3.3
1232	12:32	12:32	8.4
1233	12:33	12:33	2.5
1234	12:34	12:34	1.0
1235	12:35	12:35	3.3
1236	12:36	12:36	7.3
1237	12:37	12:37	18.6
1238	12:38	12:38	11.4
1239	12:39	12:39	13.1
1240	12:40	12:40	12.1
1241	12:41	12:41	14.7
1242	12:42	12:42	9.4
1243	12:43	12:43	11.5
1244	12:44	12:44	3.8
1245	12:45	12:45	9.4
1246	12:46	12:46	10.6
1247	12:47	12:47	6.9
1248	12:48	12:48	3.0
1249	12:49	12:49	8.1
1250	12:50	12:50	5.2
1251	12:51	12:51	5.3
1252	12:52	12:52	6.8
1253	12:53	12:53	2.4

1254	12:54		12:54	8.6
1255	12:55		12:55	7.7
1256	12:56		12:56	6.5
1257	12:57		12:57	10.3
Minimum=		56.1		-1.1
Maximum=		789.5		26.0
Average=		531.4		7.1





Plant C
Run 2 Load Out
Date: 7/25/98
Project # 4701-08-03-04
Operator: Gulick

Time 24 hr		THC Tunnel ppm		THC Silo ppm
710	7:10	3.1	7:10	
711	7:11	8.5	7:11	
712	7:12	11.1	7:12	
713	7:13	5.7	7:13	
714	7:14	7.3	7:14	
715	7:15	9.5	7:15	
716	7:16	6.0	7:16	
717	7:17	7.6	7:17	
718	7:18	3.8	7:18	
719	7:19	7.3	7:19	
720	7:20	8.6	7:20	
721	7:21	9.4	7:21	
722	7:22	9.4	7:22	
723	7:23	8.1	7:23	
724	7:24	2.0	7:24	
725	7:25	10.4	7:25	
726	7:26	13.5	7:26	
727	7:27	4.9	7:27	
728	7:28	9.0	7:28	
729	7:29	8.7	7:29	
730	7:30	7.2	7:30	
731	7:31	4.7	7:31	
732	7:32	7.3	7:32	
733	7:33	1.9	7:33	
734	7:34	5.3	7:34	
735	7:35	8.1	7:35	
736	7:36	8.6	7:36	
737	7:37	7.1	7:37	
738	7:38	8.3	7:38	
739	7:39	10.8	7:39	
740	7:40	8.9	7:40	
741	7:41	10.6	7:41	
742	7:42	6.3	7:42	
743	7:43	11.8	7:43	
744	7:44	4.1	7:44	
745	7:45	4.3	7:45	
746	7:46	14.1	7:46	

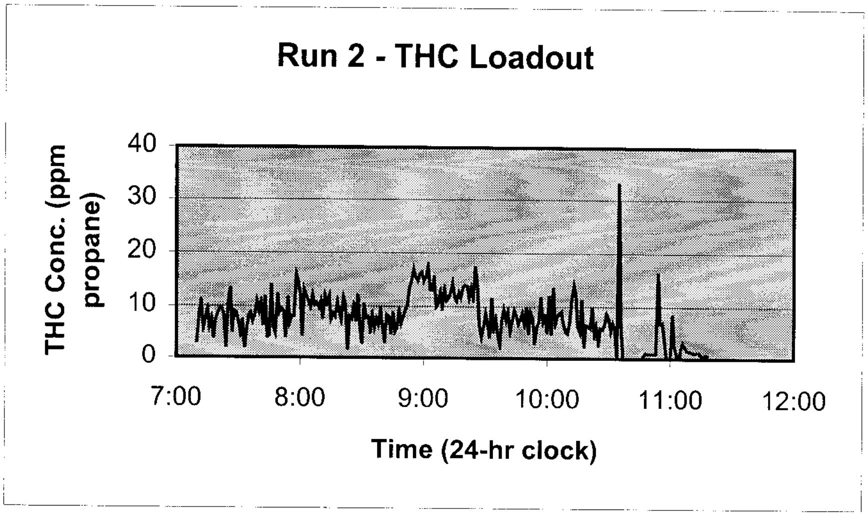
747	7:47	5.9	7:47
748	7:48	4.8	7:48
749	7:49	12.3	7:49
750	7:50	8.7	7:50
751	7:51	9.5	7:51
752	7:52	9.0	7:52
753	7:53	4.0	7:53
754	7:54	11.7	7:54
755	7:55	6.8	7:55
756	7:56	8.1	7:56
757	7:57	8.0	7:57
758	7:58	16.0	7:58
759	7:59	14.7	7:59
800	8:00	12.1	8:00
801	8:01	4.3	8:01
802	8:02	13.0	8:02
803	8:03	11.8	8:03
804	8:04	11.0	8:04
805	8:05	9.8	8:05
806	8:06	12.0	8:06
807	8:07	10.2	8:07
808	8:08	10.6	8:08
809	8:09	9.7	8:09
810	8:10	10.9	8:10
811	8:11	7.9	8:11
812	8:12	11.9	8:12
813	8:13	10.6	8:13
814	8:14	11.8	8:14
815	8:15	7.5	8:15
816	8:16	8.5	8:16
817	8:17	8.0	8:17
818	8:18	10.7	8:18
819	8:19	8.9	8:19
820	8:20	7.4	8:20
821	8:21	11.5	8:21
822	8:22	10.3	8:22
823	8:23	1.6	8:23
824	8:24	8.0	8:24
825	8:25	7.6	8:25
826	8:26	10.2	8:26
827	8:27	7.2	8:27
828	8:28	12.1	8:28
829	8:29	6.3	8:29
830	8:30	2.8	8:30
831	8:31	10.5	8:31
832	8:32	7.8	8:32

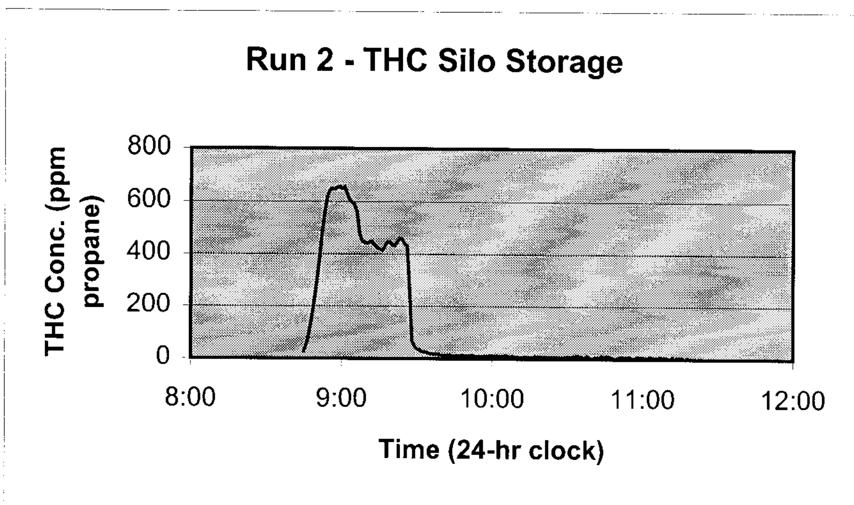
833	8:33	8.0	8:33	
834	8:34	5.4	8:34	
835	8:35	8.5	8:35	
836	8:36	6.0	8:36	
837	8:37	7.6	8:37	
838	8:38	6.5	8:38	
839	8:39	9.3	8:39	
840	8:40	6.0	8:40	
841	8:41	3.4	8:41	
842	8:42	8.4	8:42	
843	8:43	8.0	8:43	
844	8:44	4.9	8:44	
845	8:45	8.8	8:45	28.9
846	8:46	5.1	8:46	56.4
847	8:47	5.8	8:47	97.8
848	8:48	9.3	8:48	147.5
849	8:49	6.8	8:49	213.1
850	8:50	8.0	8:50	286.7
851	8:51	9.2	8:51	370.5
852	8:52	10.3	8:52	468.5
853	8:53	13.4	8:53	548.6
854	8:54	15.0	8:54	609.1
855	8:55	16.9	8:55	639.2
856	8:56	15.5	8:56	648.8
857	8:57	14.8	8:57	646.2
858	8:58	16.0	8:58	652.6
859	8:59	16.4	8:59	655.6
900	9:00	14.7	9:00	649.0
901	9:01	15.6	9:01	655.2
902	9:02	17.5	9:02	632.3
903	9:03	13.1	9:03	605.6
904	9:04	13.1	9:04	595.1
905	9:05	15.4	9:05	587.0
906	9:06	10.0	9:06	560.5
907	9:07	10.5	9:07	477.3
908	9:08	12.7	9:08	447.8
909	9:09	9.8	9:09	444.7
910	9:10	13.3	9:10	439.2
911	9:11	11.1	9:11	443.7
912	9:12	11.5	9:12	448.3
913	9:13	12.6	9:13	433.1
914	9:14	14.4	9:14	423.6
915	9:15	11.7	9:15	419.6
916	9:16	11.0	9:16	411.9
917	9:17	12.6	9:17	426.8
918	9:18	11.7	9:18	442.7

919	9:19	13.6	9:19	443.8
920	9:20	14.0	9:20	435.0
921	9:21	13.8	9:21	432.5
922	9:22	11.7	9:22	446.5
923	9:23	13.4	9:23	458.4
924	9:24	11.5	9:24	456.5
925	9:25	17.5	9:25	439.9
926	9:26	14.2	9:26	431.5
927	9:27	6.4	9:27	264.3
928	9:28	4.1	9:28	69.3
929	9:29	5.9	9:29	48.0
930	9:30	8.6	9:30	37.5
931	9:31	6.9	9:31	35.0
932	9:32	4.0	9:32	28.8
933	9:33	11.6	9:33	26.3
934	9:34	5.6	9:34	24.5
935	9:35	7.7	9:35	21.3
936	9:36	4.5	9:36	20.3
937	9:37	2.5	9:37	18.4
938	9:38	7.5	9:38	20.5
939	9:39	9.4	9:39	16.7
940	9:40	7.3	9:40	15.3
941	9:41	8.9	9:41	14.2
942	9:42	5.1	9:42	14.2
943	9:43	7.0	9:43	15.1
944	9:44	9.3	9:44	14.1
945	9:45	8.4	9:45	12.8
946	9:46	6.7	9:46	12.0
947	9:47	7.6	9:47	12.5
948	9:48	8.7	9:48	14.2
949	9:49	6.6	9:49	11.7
950	9:50	10.0	9:50	12.6
951	9:51	4.7	9:51	12.7
952	9:52	8.9	9:52	14.4
953	9:53	7.8	9:53	11.5
954	9:54	3.0	9:54	10.3
955	9:55	6.1	9:55	9.7
956	9:56	7.1	9:56	9.3
957	9:57	11.8	9:57	12.8
958	9:58	7.1	9:58	11.5
959	9:59	8.7	9:59	13.7
1000	10:00	4.9	10:00	12.0
1001	10:01	12.0	10:01	12.7
1002	10:02	4.7	10:02	13.9
1003	10:03	13.6	10:03	11.1
1004	10:04	6.7	10:04	9.9

1005	10:05	8.2	10:05	14.2
1006	10:06	8.7	10:06	11.5
1007	10:07	9.1	10:07	9.7
1008	10:08	6.9	10:08	11.9
1009	10:09	5.3	10:09	10.4
1010	10:10	5.0	10:10	9.0
1011	10:11	7.0	10:11	8.0
1012	10:12	11.3	10:12	7.6
1013	10:13	14.0	10:13	10.3
1014	10:14	12.3	10:14	8.9
1015	10:15	6.2	10:15	7.8
1016	10:16	5.2	10:16	7.8
1017	10:17	11.4	10:17	10.8
1018	10:18	2.2	10:18	10.1
1019	10:19	6.5	10:19	10.2
1020	10:20	6.3	10:20	8.9
1021	10:21	6.0	10:21	8.4
1022	10:22	9.9	10:22	7.9
1023	10:23	4.6	10:23	7.4
1024	10:24	6.3	10:24	7.1
1025	10:25	2.9	10:25	6.8
1026	10:26	6.0	10:26	6.8
1027	10:27	5.8	10:27	6.3
1028	10:28	6.6	10:28	6.7
1029	10:29	8.6	10:29	7.1
1030	10:30	7.9	10:30	9.9
1031	10:31	5.4	10:31	9.1
1032	10:32	6.9	10:32	9.6
1033	10:33	5.9	10:33	12.0
1034	10:34	-0.1	10:34	13.6
1035	10:35	33.0	10:35	10.7
1036	10:36	6.2	10:36	8.4
1037	10:37	0.0	10:37	5.5
1038	10:38	-0.2	10:38	12.9
1039	10:39	-0.2	10:39	4.0
1040	10:40	-0.2	10:40	2.8
1041	10:41	-0.2	10:41	7.5
1042	10:42	-0.1	10:42	7.0
1043	10:43	-0.2	10:43	7.4
1044	10:44	-0.2	10:44	12.7
1045	10:45	-0.2	10:45	7.8
1046	10:46	-0.2	10:46	13.8
1047	10:47	0.7	10:47	8.2
1048	10:48	1.1	10:48	5.6
1049	10:49	1.0	10:49	4.1
1050	10:50	1.0	10:50	1.8

1051	10:51	1.0	10:51	8.7
1052	10:52	1.0	10:52	9.5
1053	10:53	1.0	10:53	8.6
1054	10:54	16.4	10:54	6.9
1055	10:55	6.9	10:55	9.4
1056	10:56	7.1	10:56	0.5
1057	10:57	4.1	10:57	6.6
1058	10:58	-0.2	10:58	10.2
1059	10:59	-3.2	10:59	8.4
1100	11:00	-0.1	11:00	7.0
1101	11:01	8.3	11:01	6.2
1102	11:02	2.3	11:02	6.0
1103	11:03	0.7	11:03	9.9
1104	11:04	-1.9	11:04	6.8
1105	11:05	2.0	11:05	4.2
1106	11:06	3.0	11:06	5.7
1107	11:07	2.3	11:07	8.2
1108	11:08	1.6	11:08	6.1
1109	11:09	1.5	11:09	6.2
1110	11:10	1.4	11:10	5.0
1111	11:11	1.2	11:11	1.2
1112	11:12	1.2	11:12	7.2
Offline				
1114	11:14	1.1	11:14	6.4
1115	11:15	0.7	11:15	6.7
1116	11:16	0.3	11:16	3.7
1117	11:17	0.8	11:17	-1.1
1118	11:18	0.7	11:18	4.4
Minimum=		-3.2		-1.1
Maximum=		33.0		655.6
Average=		7.7		135.1


Run 2 - THC Loadout
THC Conc. (ppm propane)
40
30
20
10
0
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)


Run 2 - THC Silo Storage
THC Conc. (ppm propane)
800
600
400
200
0
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)

Plant C
Run 3 Loadout
Date: 7/27/98
Project # 4701-08-03-04
Operator: Gulick

TIME		THC Tunnel ppm		THC Silo ppm	
710	7:10	7.9	7:10		
711	7:11	6.3	7:11		
712	7:12	8.7	7:12		
713	7:13	6.9	7:13		
714	7:14	7.8	7:14		
715	7:15	5.6	7:15		
716	7:16	4.3	7:16		
717	7:17	3.7	7:17		
718	7:18	3.2	7:18		
719	7:19	3.0	7:19		
720	7:20	2.9	7:20	999.5	999.5 = Off Scale
721	7:21	6.0	7:21	999.5	
722	7:22	4.3	7:22	856.4	
723	7:23	3.1	7:23	999.5	
725	7:25	2.2	7:25	999.5	
726	7:26	2.2	7:26	999.5	
727	7:27	2.0	7:27	999.5	
728	7:28	1.9	7:28	999.5	
729	7:29	1.8	7:29	999.5	
730	7:30	1.8	7:30	999.5	
731	7:31	1.8	7:31	999.5	
732	7:32	1.7	7:32	999.5	
733	7:33	1.8	7:33	999.5	
734	7:34	2.0	7:34	811.9	
735	7:35	1.9	7:35	548.2	
736	7:36	1.8	7:36	388.9	
737	7:37	2.0	7:37	263.2	
741	7:41	7.5	7:41		
742	7:42	6.3	7:42		
743	7:43	4.0	7:43		
744	7:44	3.1	7:44		
745	7:45	3.0	7:45		
746	7:46	6.5	7:46		
747	7:47	5.1	7:47		
748	7:48	6.3	7:48		

749	7:49	7.4	7:49	
750	7:50	6.4	7:50	52.5
751	7:51	5.0	7:51	49.5
752	7:52	4.4	7:52	45.5
753	7:53	4.0	7:53	42.2
754	7:54	3.9	7:54	39.6
755	7:55	6.0	7:55	37.6
756	7:56	6.7	7:56	34.9
757	7:57	6.3	7:57	35.2
758	7:58	8.4	7:58	61.0
759	7:59	5.7	7:59	105.2
800	8:00	4.5	8:00	167.0
801	8:01	3.8	8:01	235.9
802	8:02	5.4	8:02	301.3
803	8:03	7.1	8:03	355.7
804	8:04	8.0	8:04	393.7
805	8:05	5.8	8:05	419.8
806	8:06	7.8	8:06	448.1
807	8:07	6.4	8:07	466.0
808	8:08	4.3	8:08	487.8
809	8:09	3.5	8:09	505.9
810	8:10	3.1	8:10	518.6
811	8:11	4.6	8:11	532.2
812	8:12	8.1	8:12	532.6
813	8:13	5.5	8:13	524.7
814	8:14	12.1	8:14	538.5
815	8:15	7.9	8:15	532.6
816	8:16	7.4	8:16	542.7
817	8:17	8.6	8:17	545.4
818	8:18	8.9	8:18	552.0
819	8:19	7.7	8:19	553.9
820	8:20	6.6	8:20	556.5
821	8:21	9.3	8:21	561.7
822	8:22	10.1	8:22	563.1
823	8:23	10.1	8:23	589.8
824	8:24	7.7	8:24	618.6
825	8:25	10.5	8:25	634.8
826	8:26	9.9	8:26	658.4
827	8:27	10.7	8:27	686.2
828	8:28	8.7	8:28	738.8
829	8:29	8.7	8:29	752.5
830	8:30	8.6	8:30	776.0
831	8:31	9.0	8:31	797.0
832	8:32	11.0	8:32	807.4
833	8:33	11.8	8:33	816.0

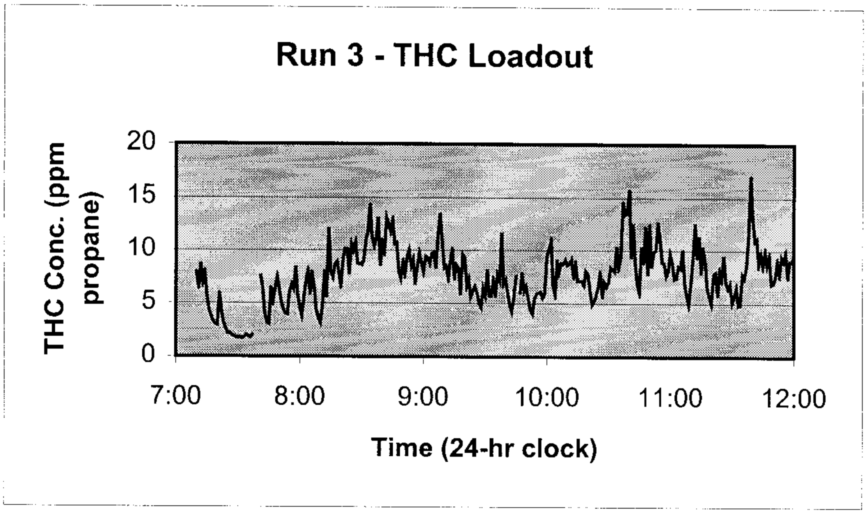
834	8:34	14.4	8:34	847.2
835	8:35	11.2	8:35	872.3
836	8:36	10.4	8:36	871.7
837	8:37	11.1	8:37	919.0
838	8:38	13.1	8:38	931.7
839	8:39	8.5	8:39	960.3
840	8:40	10.7	8:40	993.6
841	8:41	9.7	8:41	999.5
842	8:42	13.1	8:42	999.5
843	8:43	12.5	8:43	999.5
844	8:44	11.8	8:44	999.5
845	8:45	12.9	8:45	982.1
846	8:46	10.6	8:46	939.4
847	8:47	10.7	8:47	815.5
848	8:48	7.9	8:48	668.0
849	8:49	7.3	8:49	743.7
850	8:50	8.9	8:50	758.1
851	8:51	7.6	8:51	759.6
852	8:52	9.4	8:52	781.1
853	8:53	10.0	8:53	794.4
854	8:54	8.5	8:54	810.1
855	8:55	9.1	8:55	900.8
856	8:56	6.8	8:56	979.8
857	8:57	8.4	8:57	999.5
858	8:58	9.7	8:58	979.7
859	8:59	8.7	8:59	999.5
900	9:00	7.9	9:00	976.6
901	9:01	9.4	9:01	962.0
902	9:02	9.3	9:02	909.3
903	9:03	8.7	9:03	919.7
904	9:04	9.7	9:04	852.7
905	9:05	9.8	9:05	745.0
906	9:06	8.3	9:06	634.0
907	9:07	11.2	9:07	726.4
908	9:08	13.5	9:08	687.6
909	9:09	11.1	9:09	642.3
910	9:10	8.3	9:10	642.1
911	9:11	8.5	9:11	610.3
912	9:12	7.3	9:12	573.2
913	9:13	9.0	9:13	504.3
914	9:14	10.0	9:14	545.8
915	9:15	7.3	9:15	564.8
916	9:16	8.6	9:16	585.0
917	9:17	8.3	9:17	568.2
918	9:18	5.8	9:18	497.0

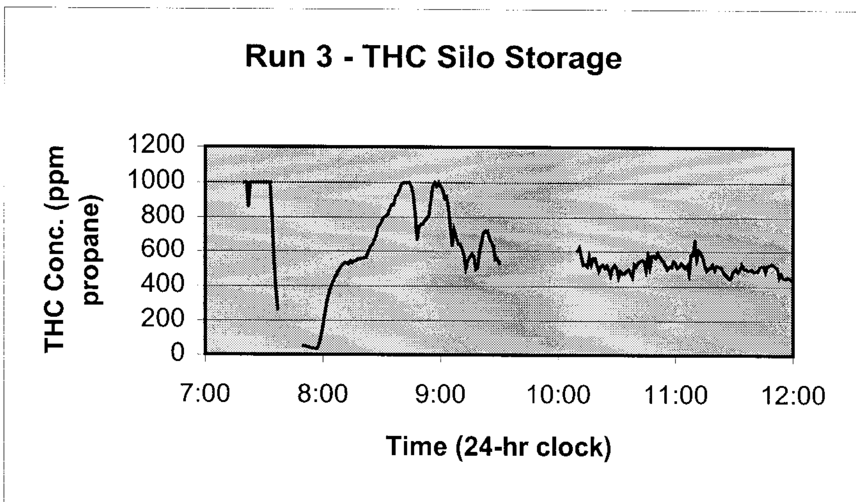
919	9:19	9.6	9:19	503.3
920	9:20	9.3	9:20	601.4
921	9:21	6.6	9:21	651.2
922	9:22	7.2	9:22	710.8
923	9:23	5.6	9:23	722.4
924	9:24	6.2	9:24	720.5
925	9:25	6.6	9:25	672.0
926	9:26	6.0	9:26	653.6
927	9:27	5.0	9:27	632.6
928	9:28	4.6	9:28	554.0
929	9:29	6.4	9:29	559.7
930	9:30	5.7	9:30	530.3
931	9:31	8.2	9:31	
932	9:32	5.7	9:32	
933	9:33	5.7	9:33	
934	9:34	7.3	9:34	
935	9:35	5.8	9:35	
936	9:36	7.7	9:36	
937	9:37	7.1	9:37	
938	9:38	11.7	9:38	
939	9:39	6.8	9:39	
940	9:40	7.2	9:40	
941	9:41	6.0	9:41	
942	9:42	4.7	9:42	
943	9:43	4.2	9:43	
944	9:44	5.6	9:44	
945	9:45	7.5	9:45	
947	9:47	6.0	9:47	
948	9:48	7.8	9:48	
949	9:49	6.2	9:49	
950	9:50	6.6	9:50	
951	9:51	5.4	9:51	
952	9:52	4.4	9:52	
953	9:53	4.0	9:53	
954	9:54	5.4	9:54	
955	9:55	5.9	9:55	
956	9:56	6.0	9:56	
957	9:57	6.1	9:57	
958	9:58	5.5	9:58	
959	9:59	5.9	9:59	
1000	10:00	9.4	10:00	
1001	10:01	10.1	10:01	
1002	10:02	10.9	10:02	
1003	10:03	6.7	10:03	

1004	10:04	5.8	10:04	
1005	10:05	9.0	10:05	
1006	10:06	7.9	10:06	
1007	10:07	8.8	10:07	
1008	10:08	8.7	10:08	
1009	10:09	9.1	10:09	
1010	10:10	8.6	10:10	603.4
1011	10:11	8.7	10:11	619.9
1012	10:12	9.1	10:12	570.4
1013	10:13	7.5	10:13	522.9
1014	10:14	8.9	10:14	526.6
1015	10:15	7.1	10:15	512.5
1016	10:16	7.1	10:16	568.3
1017	10:17	7.1	10:17	526.1
1018	10:18	6.7	10:18	560.2
1019	10:19	8.0	10:19	559.1
1020	10:20	7.7	10:20	524.7
1021	10:21	6.3	10:21	486.9
1022	10:22	4.9	10:22	516.0
1023	10:23	5.2	10:23	522.2
1024	10:24	5.7	10:24	505.5
1025	10:25	6.6	10:25	518.0
1026	10:26	7.9	10:26	493.9
1027	10:27	5.6	10:27	463.6
1028	10:28	7.0	10:28	505.2
1029	10:29	6.6	10:29	521.8
1030	10:30	7.0	10:30	503.7
1031	10:31	8.4	10:31	455.1
1032	10:32	8.2	10:32	486.5
1033	10:33	8.0	10:33	473.6
1034	10:34	10.4	10:34	475.0
1035	10:35	8.3	10:35	488.1
1036	10:36	9.4	10:36	496.3
1037	10:37	14.6	10:37	477.9
1038	10:38	13.4	10:38	455.6
1039	10:39	13.5	10:39	525.3
1040	10:40	15.8	10:40	514.2
1041	10:41	9.3	10:41	533.4
1042	10:42	12.6	10:42	543.4
1043	10:43	8.7	10:43	549.3
1044	10:44	6.8	10:44	541.9
1045	10:45	6.0	10:45	494.1
1046	10:46	10.4	10:46	578.8
1047	10:47	8.7	10:47	508.5
1048	10:48	12.3	10:48	571.6

1049	10:49	7.7	10:49	576.2
1050	10:50	12.6	10:50	562.7
1051	10:51	8.4	10:51	591.2
1052	10:52	9.9	10:52	569.7
1053	10:53	10.0	10:53	550.3
1054	10:54	12.6	10:54	543.4
1055	10:55	11.3	10:55	518.4
1056	10:56	8.9	10:56	499.3
1057	10:57	8.8	10:57	514.1
1058	10:58	7.6	10:58	511.4
1059	10:59	8.0	10:59	543.1
1100	11:00	9.7	11:00	533.2
1101	11:01	8.8	11:01	506.3
1102	11:02	7.3	11:02	514.9
1103	11:03	7.4	11:03	530.8
1104	11:04	8.5	11:04	518.4
1105	11:05	8.3	11:05	505.3
1106	11:06	10.1	11:06	519.8
1107	11:07	6.7	11:07	468.7
1108	11:08	5.7	11:08	580.6
1109	11:09	4.9	11:09	579.3
1110	11:10	6.9	11:10	657.3
1111	11:11	9.1	11:11	553.5
1112	11:12	12.6	11:12	605.3
1113	11:13	9.2	11:13	589.7
1114	11:14	11.4	11:14	565.8
1115	11:15	7.8	11:15	518.4
1116	11:16	10.2	11:16	491.0
1117	11:17	8.9	11:17	503.6
1118	11:18	6.4	11:18	505.5
1119	11:19	5.6	11:19	525.1
1120	11:20	5.0	11:20	495.6
1121	11:21	7.8	11:21	518.5
1122	11:22	7.9	11:22	514.3
1123	11:23	5.7	11:23	511.9
1124	11:24	8.1	11:24	497.2
1125	11:25	7.3	11:25	472.3
1126	11:26	9.5	11:26	463.4
1127	11:27	7.0	11:27	448.1
1128	11:28	6.4	11:28	445.2
1129	11:29	6.8	11:29	474.0
1130	11:30	5.1	11:30	493.6
1131	11:31	5.6	11:31	504.4
1132	11:32	6.5	11:32	483.7
1133	11:33	4.8	11:33	498.5

1134	11:34	4.9	11:34	527.0
1135	11:35	7.7	11:35	499.8
1136	11:36	7.4	11:36	500.9
1137	11:37	8.5	11:37	492.8
1138	11:38	11.3	11:38	495.0
1139	11:39	17.1	11:39	498.6
1140	11:40	13.2	11:40	484.9
1141	11:41	10.9	11:41	486.6
1142	11:42	11.1	11:42	489.8
1143	11:43	8.7	11:43	512.0
1144	11:44	9.6	11:44	516.6
1145	11:45	8.5	11:45	514.6
1146	11:46	9.9	11:46	485.2
1147	11:47	8.6	11:47	518.9
1148	11:48	9.5	11:48	522.9
1149	11:49	6.8	11:49	527.5
1150	11:50	6.9	11:50	523.8
1151	11:51	7.5	11:51	512.5
1152	11:52	9.0	11:52	505.9
1153	11:53	7.6	11:53	452.6
1154	11:54	9.4	11:54	471.9
1155	11:55	9.0	11:55	452.3
1156	11:56	9.8	11:56	444.7
1157	11:57	7.3	11:57	451.4
1158	11:58	9.0	11:58	449.8
1159	11:59	8.9	11:59	437.7
1200	12:00	9.7	12:00	433.8
Minimum=		1.7		34.9
Maximum=		17.1		999.5
Average=		7.7		590.1


Run 3 - THC Loadout
THC Conc. (ppm propane)
20
15
10
5
0
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)


Run 3 - THC Silo Storage
THC Conc. (ppm propane)
1200
1000
800
600
400
200
0
7:00
8:00
9:00
10:00
11:00
12:00
Time (24-hr clock)

Plant C
Run 4 - Baseline
Date: 7/26/98
Project # 4701-08-03-04
Operator: Gulick

TIME 24 hr		THC Tunnel ppm
925	9:25	1.1
926	9:26	1.1
927	9:27	1.1
928	9:28	1.1
929	9:29	1.1
930	9:30	1.0
931	9:31	1.0
932	9:32	1.0
933	9:33	0.9
934	9:34	1.0
935	9:35	0.9
936	9:36	1.0
937	9:37	0.9
938	9:38	0.9
939	9:39	0.9
940	9:40	0.9
941	9:41	0.9
942	9:42	0.9
943	9:43	0.9
944	9:44	0.8
945	9:45	0.8
946	9:46	0.8
947	9:47	0.7
948	9:48	0.8
949	9:49	0.8
950	9:50	0.8
951	9:51	0.9
952	9:52	0.8
953	9:53	0.8
954	9:54	0.8
955	9:55	0.7
956	9:56	0.8
957	9:57	0.8
958	9:58	0.8
959	9:59	0.7
1000	10:00	0.8
1001	10:01	0.7
1002	10:02	0.8
1003	10:03	0.8
1004	10:04	0.8

1005	10:05	0.8
1006	10:06	0.7
1007	10:07	0.7
1008	10:08	0.7
1009	10:09	0.7
1010	10:10	0.7
1011	10:11	0.7
1012	10:12	0.7
1013	10:13	0.7
1014	10:14	0.7
1015	10:15	0.7
1016	10:16	0.7
1017	10:17	0.7
1018	10:18	0.7
1019	10:19	0.7
1020	10:20	0.7
1021	10:21	0.7
1022	10:22	0.7
1023	10:23	0.7
1024	10:24	0.6
1025	10:25	0.7
1026	10:26	0.6
1027	10:27	0.6
1028	10:28	0.6
1029	10:29	0.7
1030	10:30	0.7
1031	10:31	0.7
1032	10:32	0.8
1033	10:33	0.8
1034	10:34	0.9
1035	10:35	0.8
1036	10:36	0.8
1037	10:37	0.8
1038	10:38	0.7
1039	10:39	0.8
1040	10:40	0.8
1041	10:41	0.8
1042	10:42	0.8
1043	10:43	0.8
1044	10:44	0.8
1045	10:45	0.8
1046	10:46	0.8
1047	10:47	0.8
1048	10:48	0.8
1049	10:49	0.8
1050	10:50	0.8
1051	10:51	0.8
1052	10:52	0.8
1053	10:53	0.8

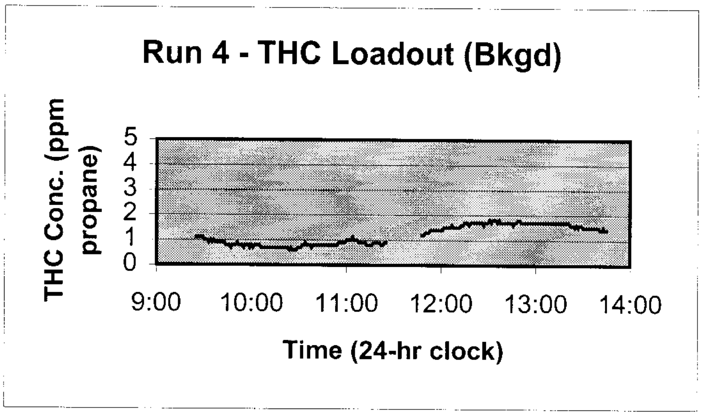
1054	10:54	0.8	
1055	10:55	0.9	
1056	10:56	0.9	
1057	10:57	0.9	
1058	10:58	0.9	
1059	10:59	0.9	
1100	11:00	1.0	
1101	11:01	1.0	
1102	11:02	1.0	
1103	11:03	1.0	
1104	11:04	1.1	
1105	11:05	1.0	
1106	11:06	1.0	
1107	11:07	1.0	
1108	11:08	0.9	
1109	11:09	0.9	
1110	11:10	0.9	
1111	11:11	0.9	
1112	11:12	0.9	
1113	11:13	0.8	
1114	11:14	0.8	
1115	11:15	0.8	
1116	11:16	0.8	
1117	11:17	0.9	
1118	11:18	0.9	
1119	11:19	0.9	
1120	11:20	0.9	
1121	11:21	0.9	
1122	11:22	0.8	
1123	11:23	0.8	1st half
1124	11:24	0.9	average=
1125	11:25	0.9	0.83
Cal Check			
1148	11:48	1.2	
1149	11:49	1.2	
1150	11:50	1.3	
1151	11:51	1.3	
1152	11:52	1.3	
1153	11:53	1.4	
1154	11:54	1.4	
1155	11:55	1.4	
1156	11:56	1.4	
1157	11:57	1.4	
1158	11:58	1.4	
1159	11:59	1.4	
1200	12:00	1.4	
1201	12:01	1.4	
1202	12:02	1.5	
1203	12:03	1.5	

1204	12:04	1.5
1205	12:05	1.5
1206	12:06	1.5
1207	12:07	1.6
1208	12:08	1.5
1209	12:09	1.5
1210	12:10	1.5
1211	12:11	1.5
1212	12:12	1.5
1213	12:13	1.6
1214	12:14	1.6
1215	12:15	1.7
1216	12:16	1.7
1217	12:17	1.7
1218	12:18	1.6
1219	12:19	1.7
1220	12:20	1.7
1221	12:21	1.7
1222	12:22	1.7
1223	12:23	1.7
1224	12:24	1.7
1225	12:25	1.7
1226	12:26	1.7
1227	12:27	1.6
1228	12:28	1.7
1229	12:29	1.7
1230	12:30	1.7
1231	12:31	1.8
1232	12:32	1.7
1233	12:33	1.8
1234	12:34	1.8
1235	12:35	1.8
1236	12:36	1.7
1237	12:37	1.8
1238	12:38	1.7
1239	12:39	1.7
1240	12:40	1.7
1241	12:41	1.7
1242	12:42	1.7
1243	12:43	1.7
1244	12:44	1.7
1245	12:45	1.7
1246	12:46	1.6
1247	12:47	1.7
1248	12:48	1.7
1249	12:49	1.8
1250	12:50	1.8
1251	12:51	1.7
1252	12:52	1.7

1253	12:53	1.7
1254	12:54	1.7
1255	12:55	1.7
1256	12:56	1.7
1257	12:57	1.7
1258	12:58	1.7
1259	12:59	1.7
1300	13:00	1.7
1301	13:01	1.7
1302	13:02	1.7
1303	13:03	1.7
1304	13:04	1.7
1305	13:05	1.7
1306	13:06	1.7
1307	13:07	1.7
1308	13:08	1.7
1309	13:09	1.7
1310	13:10	1.7
1311	13:11	1.7
1312	13:12	1.7
1313	13:13	1.7
1314	13:14	1.7
1315	13:15	1.7
1316	13:16	1.7
1317	13:17	1.7
1318	13:18	1.7
1319	13:19	1.7
1320	13:20	1.7
1321	13:21	1.7
1322	13:22	1.6
1323	13:23	1.6
1324	13:24	1.6
1325	13:25	1.5
1326	13:26	1.6
1327	13:27	1.5
1328	13:28	1.6
1329	13:29	1.6
1330	13:30	1.5
1331	13:31	1.5
1332	13:32	1.5
1333	13:33	1.5
1334	13:34	1.5
1335	13:35	1.5
1336	13:36	1.5
1337	13:37	1.5
1338	13:38	1.5
1339	13:39	1.5
1340	13:40	1.5
1341	13:41	1.4

1342	13:42	1.4
1343	13:43	1.5
1344	13:44	1.4
1345	13:45	1.4

Minimum=	0.6
Maximum=	1.8
Average=	1.2



Plant C
Intermittent Loading Test 1
Date: 7/25/98
Project # 4701-08-03-04
Operator: Gulick

TIME Hours	Min	Sec		THC Tunnel ppm			
13	42	24	13:42:24	6.8			
13	42	34	13:42:34	6.7			
13	42	44	13:42:44	6.5			
13	42	54	13:42:54	6.2			
13	43	4	13:43:04	5.9			
13	43	14	13:43:14	5.7			
13	43	24	13:43:24	5.6			
13	43	34	13:43:34	5.5			
13	43	44	13:43:44	5.3			
13	43	54	13:43:54	5.3		52.979	
13	44	4	13:44:04	6.7		67.432	
13	44	14	13:44:14	7.0		69.531	
13	44	24	13:44:24	6.6		66.26	
13	44	34	13:44:34	7.5		75.049	
13	44	44	13:44:44	8.1		81.299	
13	44	54	13:44:54	7.5		75.049	
13	45	4	13:45:04	7.4	5.0	74.17	
13	45	14	13:45:14	8.8		87.939	
13	45	24	13:45:24	8.1		81.494	
13	45	34	13:45:34	7.7	5.0	77.246	
13	45	44	13:45:44	8.9		88.672	
13	45	54	13:45:54	8.2		81.738	
13	46	4	13:46:04	7.5	5.0	74.902	
13	46	14	13:46:14	6.9		68.945	
13	46	24	13:46:24	6.5		64.941	
13	46	34	13:46:34	6.2	5.0	62.061	
13	46	44	13:46:44	6.1		60.742	
13	46	54	13:46:54	5.9		58.936	
13	47	4	13:47:04	5.7		56.934	
13	47	14	13:47:14	5.6		55.908	
13	47	24	13:47:24	5.5		54.59	
13	47	34	13:47:34	5.4		26.782	
13	47	39	13:47:39	5.3		1563.599	=Integral 1
13	47	44	13:47:44	5.2			
13	47	54	13:47:54	5.1			
13	48	4	13:48:04	5.1			
13	48	14	13:48:14	4.9			

13	48	24	13:48:24	4.9		
13	48	34	13:48:34	4.8		
13	48	44	13:48:44	4.7		
13	48	54	13:48:54	4.7		
13	49	4	13:49:04	4.7		
13	49	14	13:49:14	4.6		
13	49	24	13:49:24	4.5		
13	49	34	13:49:34	4.5		
13	49	44	13:49:44	4.4		
13	49	54	13:49:54	4.4		
13	50	4	13:50:04	4.4		
13	50	14	13:50:14	4.4		
13	50	24	13:50:24	4.3		
13	50	34	13:50:34	4.3		
13	50	44	13:50:44	4.3		
13	50	54	13:50:54	4.2		
13	51	4	13:51:04	4.2		
13	51	14	13:51:14	4.2		41.602
13	51	24	13:51:24	10.1		100.635
13	51	34	13:51:34	12.8		128.418
13	51	44	13:51:44	13.0		130.127
13	51	54	13:51:54	12.8		128.125
13	52	4	13:52:04	12.9	5.0	128.906
13	52	14	13:52:14	13.2		131.836
13	52	24	13:52:24	14.5		144.922
13	52	34	13:52:34	14.2	5.0	141.797
13	52	44	13:52:44	14.1		141.406
13	52	54	13:52:54	14.8		148.145
13	53	4	13:53:04	13.4	5.0	134.18
13	53	14	13:53:14	5.7		57.178
13	53	24	13:53:24	6.3		62.744
13	53	34	13:53:34	7.3	5.0	72.803
13	53	44	13:53:44	7.1		70.947
13	53	54	13:53:54	7.9		79.102
13	54	4	13:54:04	6.9		69.336
13	54	14	13:54:14	6.4		63.818
13	54	24	13:54:24	6.0		59.863
13	54	34	13:54:34	5.7		56.641
13	54	44	13:54:44	5.5		55.029
13	54	54	13:54:54	5.4		54.248
13	55	4	13:55:04	5.2		52.148
13	55	14	13:55:14	5.0		50.244
13	55	24	13:55:24	4.8		2304.2 = Integral 2
13	57	21	13:57:21	4.2		
13	57	31	13:57:31	3.9		
13	57	41	13:57:41	3.9		

13	57	51	13:57:51	3.9			
13	58	1	13:58:01	3.8	5.0		
13	58	11	13:58:11	3.7			
13	58	21	13:58:21	3.7			
13	58	31	13:58:31	3.7	5.0		
13	58	41	13:58:41	4.0			
13	58	46	13:58:46	4.8		24	
13	58	51	13:58:51	5.5		54.883	
13	59	1	13:59:01	5.5	5.0	55.029	
13	59	11	13:59:11	6.0		60.498	
13	59	21	13:59:21	7.3		73.145	
13	59	31	13:59:31	6.6	5.0	65.82	
13	59	41	13:59:41	7.4		73.584	
13	59	51	13:59:51	8.1		80.713	
14	0	1	14:00:01	7.2		71.631	
14	0	11	14:00:11	8.4		83.887	
14	0	21	14:00:21	8.1		80.957	
14	0	31	14:00:31	7.3		73.193	
14	0	41	14:00:41	6.7		66.504	
14	0	51	14:00:51	6.1		60.742	
14	1	1	14:01:01	5.8	5.0	57.764	
14	1	11	14:01:11	5.6		56.055	
14	1	21	14:01:21	5.3		53.467	
14	1	31	14:01:31	5.2	5.0	51.514	
14	1	41	14:01:41	5.0		50.098	
14	1	51	14:01:51	4.9		49.121	
14	2	1	14:02:01	4.8	5.0	1242.605 = Integral 3	48.047
14	2	11	14:02:11	6.1			61.279
14	2	21	14:02:21	6.5			64.648
14	2	31	14:02:31	6.1	5.0		61.475
14	2	41	14:02:41	6.9			68.652
14	2	51	14:02:51	8.4			83.594
14	3	1	14:03:01	7.5			75
14	3	11	14:03:11	6.8			68.066
14	3	21	14:03:21	8.5			84.912
14	3	31	14:03:31	8.6			85.596
14	3	41	14:03:41	8.8			88.037
14	3	51	14:03:51	8.6			86.475
14	4	1	14:04:01	7.8			77.734
14	4	11	14:04:11	7.0			69.678
14	4	21	14:04:21	6.5			64.941
14	4	31	14:04:31	6.2			62.354
14	4	41	14:04:41	5.9			58.984
14	4	51	14:04:51	5.7			56.592
14	5	1	14:05:01	5.5			54.834

14	5	11	14:05:11	5.3			53.271
14	5	21	14:05:21	5.1			51.318
14	5	31	14:05:31	5.0			50.049
14	5	41	14:05:41	4.9			48.682
14	5	51	14:05:51	4.8		Integral 4 =	1524.218
14	6	1	14:06:01	4.7	###		
14	6	11	14:06:11	4.5			
14	6	21	14:06:21	4.5			
14	6	31	14:06:31	4.4			
14	6	41	14:06:41	4.6			
14	6	45	14:06:45	5.0	30		
14	6	51	14:06:51	5.7	57.324		
14	7	1	14:07:01	5.7	57.08		
14	7	11	14:07:11	5.5	54.688		
14	7	21	14:07:21	6.4	64.258		
14	7	31	14:07:31	6.4	64.258		
14	7	41	14:07:41	7.3	73.193		
14	7	51	14:07:51	8.4	83.74		
14	8	1	14:08:01	8.1	81.494		
14	8	11	14:08:11	8.9	89.063		
14	8	21	14:08:21	7.7	76.611		
14	8	31	14:08:31	6.7	67.236		
14	8	41	14:08:41	6.2	62.207		
14	8	51	14:08:51	5.9	58.984		
14	9	1	14:09:01	5.7	56.738		
14	9	11	14:09:11	5.5	55.322		
14	9	21	14:09:21	5.4	54.248		
14	9	31	14:09:31	5.2	52.148		
14	9	41	14:09:41	5.1	50.684		
14	9	51	14:09:51	5.0	1189.276	=Integral 5	50.098
14	10	1	14:10:01	7.1			70.752
14	10	11	14:10:11	11.2			112.354
14	10	21	14:10:21	12.7			126.758
14	10	31	14:10:31	10.6			106.006
14	10	41	14:10:41	9.1			90.723
14	10	51	14:10:51	8.1			80.908
14	11	1	14:11:01	7.3			72.51
14	11	11	14:11:11	6.8			68.359
14	11	21	14:11:21	6.6			65.527
14	11	31	14:11:31	6.4			63.574
14	11	41	14:11:41	6.1			60.84
14	11	51	14:11:51	5.8			58.203
14	12	1	14:12:01	5.6			56.396
14	12	11	14:12:11	5.5			55.029
14	12	21	14:12:21	5.3			52.734

14	12	31	14:12:31	5.2				51.758
14	12	41	14:12:41	5.0			Integral 6 =	1242.529
14	12	51	14:12:51	4.9				
14	13	1	14:13:01	4.8				
14	13	11	14:13:11	4.8				
14	13	21	14:13:21	4.6				
14	13	31	14:13:31	4.5				
14	13	41	14:13:41	4.5				
14	13	51	14:13:51	4.4				
14	14	1	14:14:01	4.3				
14	14	11	14:14:11	4.3				
14	14	21	14:14:21	4.2				
14	14	31	14:14:31	4.1				
14	14	41	14:14:41	4.1				
14	14	51	14:14:51	4.0				
14	15	1	14:15:01	4.1				
14	15	11	14:15:11	4.0				
14	15	21	14:15:21	4.0				
14	15	31	14:15:31	4.0				
14	15	41	14:15:41	3.9				
14	15	51	14:15:51	3.9				
14	16	1	14:16:01	3.8				
14	16	11	14:16:11	3.8				
14	16	21	14:16:21	3.8				
14	16	31	14:16:31	3.7				
14	16	41	14:16:41	3.7				
14	16	51	14:16:51	3.6				
14	17	1	14:17:01	3.7	###			
14	17	7	14:17:07	5.0		20		
14	17	11	14:17:11	6.0		60.254		
14	17	21	14:17:21	10.3		103.32		
14	17	31	14:17:31	12.5		125.049		
14	17	41	14:17:41	9.9		99.219		
14	17	51	14:17:51	8.4		83.936		
14	18	1	14:18:01	7.3		73.096		
14	18	11	14:18:11	6.7		67.09		
14	18	21	14:18:21	6.3		62.695		
14	18	31	14:18:31	5.9		59.082		
14	18	41	14:18:41	5.7		57.178		
14	18	51	14:18:51	5.4		54.004		
14	19	1	14:19:01	5.2	###	51.709		
14	19	11	14:19:11	5.0		916.632	= Integral 7	50
14	19	21	14:19:21	5.9				59.277
14	19	31	14:19:31	9.7				96.68
14	19	41	14:19:41	12.5				125.195

14	19	51	14:19:51	11.7				116.699
14	20	1	14:20:01	9.6				96.436
14	20	11	14:20:11	8.6				85.938
14	20	21	14:20:21	7.9				78.662
14	20	31	14:20:31	7.1				71.387
14	20	41	14:20:41	6.7				66.797
14	20	51	14:20:51	6.5				65.186
14	21	1	14:21:01	6.2				61.768
14	21	11	14:21:11	6.0				60.205
14	21	21	14:21:21	5.8				58.203
14	21	31	14:21:31	5.7				56.592
14	21	41	14:21:41	5.6				55.615
14	21	51	14:21:51	5.5				54.59
14	22	1	14:22:01	5.4				53.857
14	22	11	14:22:11	5.3				53.369
14	22	21	14:22:21	5.3				52.881
14	22	31	14:22:31	5.2				52.441
14	22	41	14:22:41	5.2				52.051
14	22	51	14:22:51	5.2				51.807
14	23	1	14:23:01	5.1				51.221
14	23	11	14:23:11	5.1				50.977
14	23	21	14:23:21	5.1				50.781
14	23	31	14:23:31	5.0			Integral 8 =	1728.615
14	23	41	14:23:41	5.0				
14	23	51	14:23:51	4.9				
14	24	1	14:24:01	4.9				
14	24	11	14:24:11	4.8				
14	24	21	14:24:21	4.8				
14	24	31	14:24:31	4.7				
14	24	41	14:24:41	4.7				
14	24	51	14:24:51	4.7				
14	25	1	14:25:01	4.6				
14	25	11	14:25:11	4.5				
14	25	21	14:25:21	4.5				
14	25	31	14:25:31	4.5				
14	25	41	14:25:41	4.5				
14	25	51	14:25:51	4.4				
14	25	57	14:25:57	5.1		20.4		
14	26	1	14:26:01	5.6	###	56.152		
14	26	11	14:26:11	7.1		71.484		
14	26	21	14:26:21	6.3		62.793		
14	26	31	14:26:31	5.8		58.496		
14	26	41	14:26:41	7.2		71.826		
14	26	51	14:26:51	8.2		82.178		
14	27	1	14:27:01	7.6		75.83		
14	27	11	14:27:11	6.9		68.848		

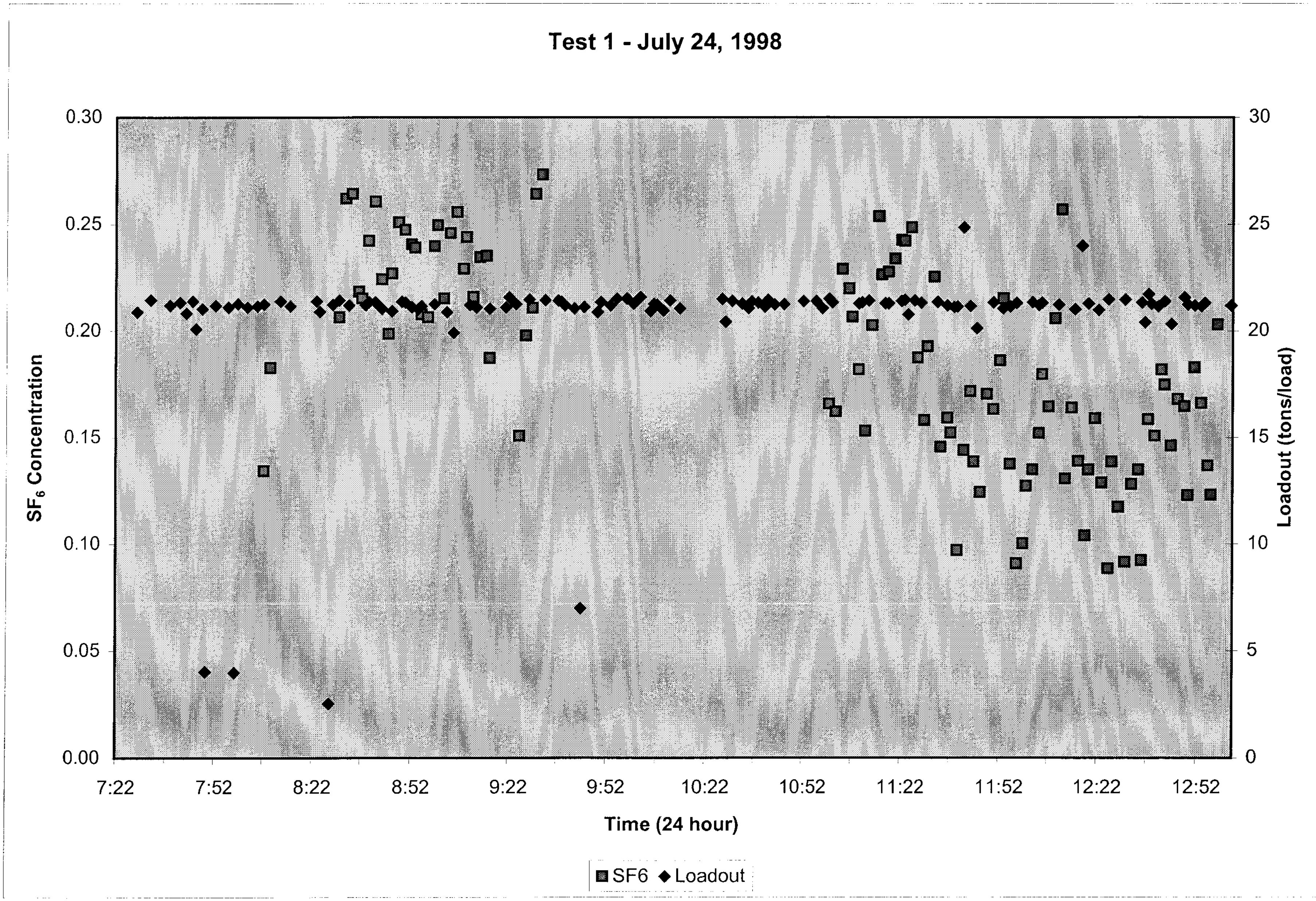
14	27	21	14:27:21	6.4		64.258		
14	27	31	14:27:31	6.0		60.303		
14	27	41	14:27:41	5.7		56.982		
14	27	51	14:27:51	5.4		54.199		
14	28	1	14:28:01	5.3	###	53.467		
14	28	11	14:28:11	5.2		52.197		
14	28	21	14:28:21	5.1		25.2685		
14	28	26	14:28:26	5.9		934.6815	=Integral 9	
14	28	31	14:28:31	6.6				66.162
14	28	41	14:28:41	9.2				92.432
14	28	51	14:28:51	12.6				125.537
14	29	1	14:29:01	12.8				127.588
14	29	11	14:29:11	10.0				99.658
14	29	21	14:29:21	8.4				83.936
14	29	31	14:29:31	7.6				76.465
14	29	41	14:29:41	7.2				71.582
14	29	51	14:29:51	6.7				67.139
14	30	1	14:30:01	6.4				64.063
14	30	11	14:30:11	6.1				61.23
14	30	21	14:30:21	5.9			Integal 10 =	935.792
14	37	45	14:37:45	7.4				
14	37	55	14:37:55	9.7				
14	38	5	14:38:05	7.8				
14	38	15	14:38:15	6.8				
14	38	25	14:38:25	6.2				
14	38	35	14:38:35	5.8				
14	38	45	14:38:45	5.5				
14	38	55	14:38:55	5.3				
14	39	5	14:39:05	5.2	###			
14	39	15	14:39:15	5.0				
14	39	25	14:39:25	4.8		48.291		
14	39	35	14:39:35	5.3		52.881		
14	39	45	14:39:45	7.2		71.582		
14	39	55	14:39:55	9.2		91.943		
14	40	5	14:40:05	8.5		84.814		
14	40	15	14:40:15	7.6		76.221		
14	40	25	14:40:25	7.0		69.58		
14	40	35	14:40:35	6.3		62.842		
14	40	45	14:40:45	6.0		59.912		
14	40	55	14:40:55	5.7		57.275		
14	41	5	14:41:05	5.5		55.176		
14	41	15	14:41:15	5.3		52.93		
14	41	25	14:41:25	5.2		51.611		
14	41	35	14:41:35	5.0		49.658		
14	41	45	14:41:45	4.9		48.828		

14	41	55	14:41:55	4.8	933.544	= Integral 11
14	42	5	14:42:05	4.7		
14	42	15	14:42:15	4.6		
14	42	25	14:42:25	4.5		
14	42	35	14:42:35	4.4		
14	42	45	14:42:45	4.4		
14	42	55	14:42:55	4.2		
14	43	5	14:43:05	4.2		
14	43	15	14:43:15	4.3		
14	43	20	14:43:20	4.6	23	
14	43	25	14:43:25	5.9	59.473	
14	43	35	14:43:35	5.9	58.594	
14	43	45	14:43:45	5.5	55.322	
14	43	55	14:43:55	5.6	56.152	
14	44	5	14:44:05	6.5	65.234	
14	44	15	14:44:15	6.4	63.623	
14	44	25	14:44:25	6.5	64.893	
14	44	35	14:44:35	7.4	73.779	
14	44	45	14:44:45	7.0	69.922	
14	44	55	14:44:55	8.0	80.225	
14	45	5	14:45:05	7.4	73.926	
14	45	15	14:45:15	6.7	66.797	
14	45	25	14:45:25	6.1	61.084	
14	45	35	14:45:35	5.8	58.252	
14	45	45	14:45:45	5.6	55.908	
14	45	55	14:45:55	5.4	53.76	
14	46	5	14:46:05	5.1	1039.944	=Integral 12

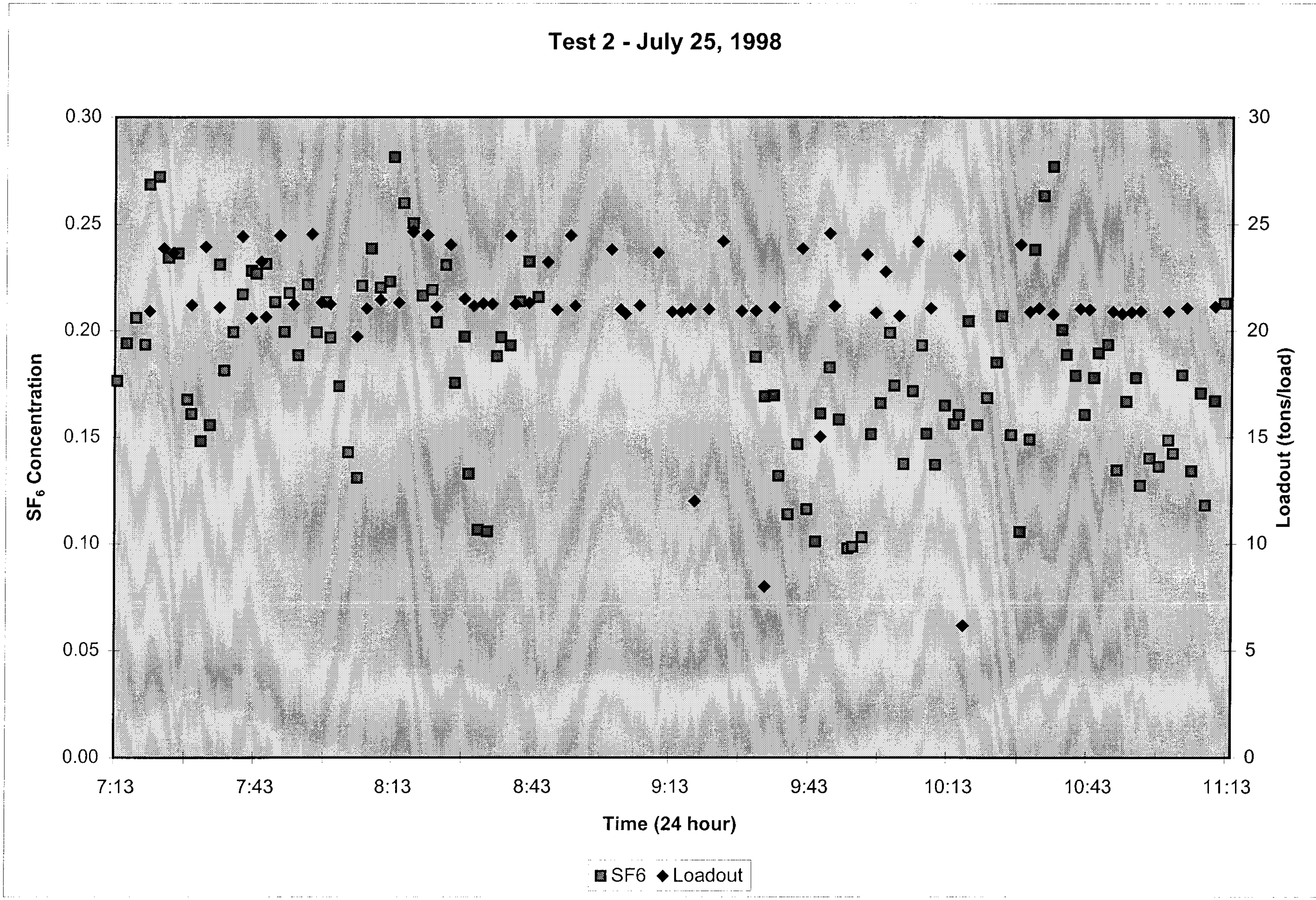
Minimum=	3.6
Maximum=	14.8
Average=	3.6

Appendix F

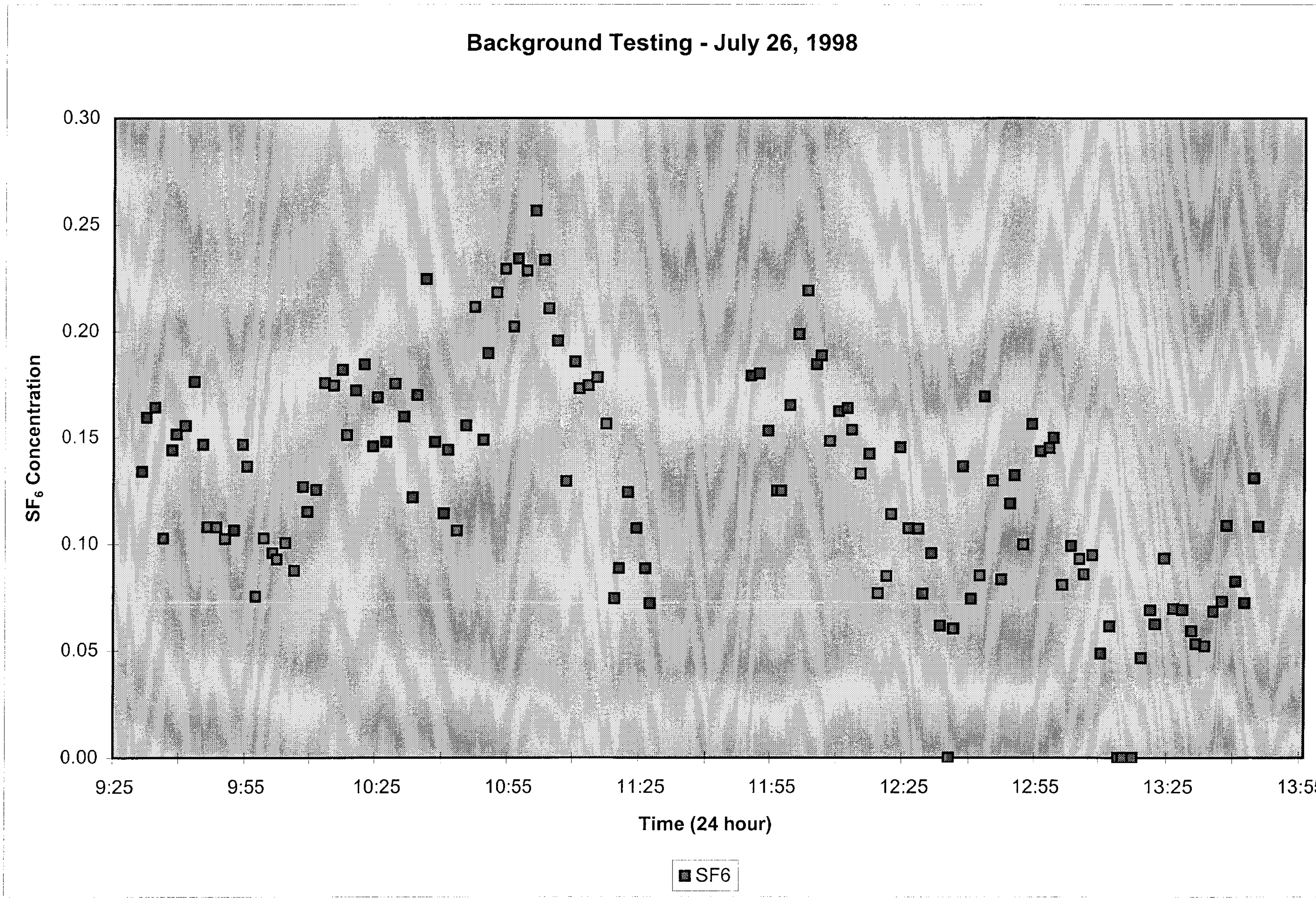
SF_6 Capture and Loadout Summaries



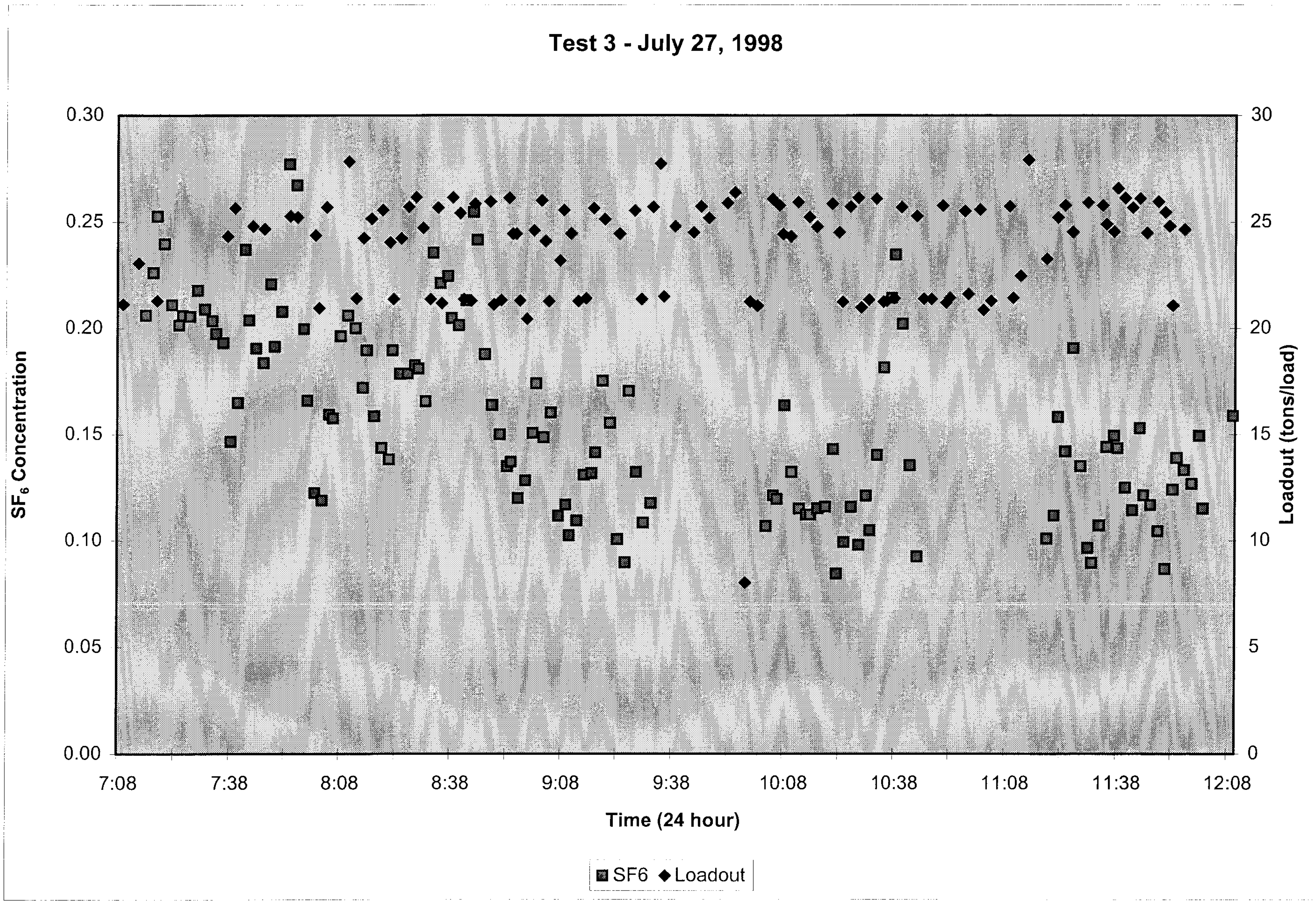
724adj1 list.xls chart1



725adj1 list.xls chart1



726LISTadj1.xls chart1



727LISTadj1.xls chart1

Run 1 - Capture Efficiency LCL Calculations

SF6 Release Rates	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**	**No. 6**	**No. 7**	**All NA**
Avg. Release Rate (LPM)	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07
Gas SF6 concentration	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199
Mass release rate (g/min)	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490
Time of Release (min)	25	23	23	25	24	25	25	7
Mass released (g)	12.26	11.28	11.28	12.26	11.77	12.26	12.26	3.43
Capture Rates								
Avg. Concentration (ppm)	0.236	0.228	0.208	0.170	0.163	0.125	0.160	0.202
Avg. Concentration (g/ft3)	4.05E-05	3.92E-05	3.58E-05	2.93E-05	2.81E-05	2.15E-05	2.75E-05	3.47E-05
Stack Gas Flowrate (acfm)	11261	11261	11261	11261	11261	11261	11261	11261
Capture Rate (g/min)	0.456	0.442	0.403	0.330	0.316	0.242	0.310	0.391
Sampling Time (min)	25	23	23	25	24	25	25	7
Total Capture (g)	11.40	10.16	9.26	8.25	7.58	6.05	7.74	2.74
Avg. Capture Efficiency	93.0	90.1	82.1	67.3	64.4	49.4	63.1	79.7

Run 1 - Statistical Calculations

LCL Subset No.	CE	Time Interval (24-hr) Start	Stop
No. 1	93.0	8:30	8:55
No. 2	90.1	8:55	9:18
No. 3	82.1	11:00	11:23
No. 4	67.3	11:23	11:48
No. 5	64.4	11:48	12:12
No. 6	49.4	12:12	12:37
No. 7	63.1	12:37	13:02
Average	72.8		
Std. Dev.	16.0011		
n	7		
t	1.440		
LCL	64.058		

Run 2 - Capture Efficiency LCL Calculations

SF6 Release Rates	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**	**No. 6**	**No. 7**	**No. 8**
Avg. Release Rate (LPM)	4.04	4.04	4.04	4.04	4.04	4.04	4.04	4.04
Gas SF6 concentration	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199	0.0199
Mass release rate (g/min)	0.487	0.487	0.487	0.487	0.487	0.487	0.487	0.487
Time of Release (min)	23	23	23	23	27	26	25	25
Mass released (g)	11.20	11.20	11.20	11.20	13.14	12.66	12.17	12.17
Capture Rates								
Avg. Concentration (ppm)	0.203	0.211	0.213	0.184	0.139	0.168	0.192	0.154
Avg. Concentration (g/ft3)	3.50E-05	3.62E-05	3.67E-05	3.16E-05	2.39E-05	2.89E-05	3.29E-05	2.65E-05
Stack Gas Flowrate (acfm)	10922	10922	10922	10922	10922	10922	10922	10922
Capture Rate (g/min)	0.382	0.395	0.401	0.345	0.261	0.316	0.360	0.289
Sampling Time (min)	23	23	23	23	27	26	25	25
Total Capture (g)	8.78	9.09	9.22	7.95	7.06	8.22	8.99	7.22
Avg. Capture Efficiency	78.5	81.2	82.3	71.0	53.7	65.0	73.9	59.4

Run 2 - Statistical Calculations

		Time Interval (24-hr)	
LCL Subset No.	CE	Start	Stop
No. 1	78.5	7:13	7:36
No. 2	81.2	7:36	7:59
No. 3	82.3	7:59	8:22
No. 4	71.0	8:22	8:45
No. 5	53.7	9:31	9:58
No. 6	65.0	9:58	10:24
No. 7	73.9	10:24	10:49
No. 8	59.4	10:49	11:14
Average	70.6		
Std. Dev.	10.4603		
n	8		
t	1.415		
LCL	65.367		

Run 3 - Capture Efficiency LCL Calculations

SF6 Release Rates	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**	**No. 6**	**No. 7**	**No. 8**	**No. 9**	**No. 10**
Avg. Release Rate (LPM)	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01
Gas SF6 concentration	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200
Mass release rate (g/min)	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486
Time of Release (min)	25	23	23	23	23	22	21	22	21	23
Mass released (g)	12.14	11.17	11.17	11.17	11.17	10.68	10.20	10.68	10.20	11.17
Capture Rates										
Avg. Concentration (ppm)	0.208	0.202	0.170	0.207	0.138	0.130	0.120	0.145	0.131	0.124
Avg. Concentration (g/ft3)	3.58E-05	3.48E-05	2.92E-05	3.56E-05	2.38E-05	2.24E-05	2.06E-05	2.49E-05	2.25E-05	2.13E-05
Stack Gas Flowrate (acfm)	10832	10832	10832	10832	10832	10832	10832	10832	10832	10832
Capture Rate (g/min)	0.388	0.377	0.316	0.385	0.258	0.242	0.224	0.270	0.243	0.230
Sampling Time (min)	25	23	23	23	23	22	21	22	21	23
Total Capture (g)	9.69	8.67	7.27	8.87	5.92	5.33	4.70	5.94	5.11	5.30
Avg. Capture Efficiency	79.8	77.6	65.1	79.4	53.0	49.9	46.1	55.6	50.1	47.4

Run 3 - Statistical Calculations

LCL Subset No.	CE	Time Interval (24-hr) Start	Stop
No. 1	79.8	7:15	7:40
No. 2	77.6	7:40	8:03
No. 3	65.1	8:03	8:26
No. 4	79.4	8:26	8:49
No. 5	53.0	8:49	9:12
No. 6	49.9	9:12	9:34
No. 7	46.1	10:03	10:24
No. 8	55.6	10:24	10:46
No. 9	50.1	11:19	11:40
No. 10	47.4	11:40	12:03
Average	60.4		
Std. Dev.	13.8381		
n	10		
t	1.383		
LCL	54.356		

Run 4 - Capture Efficiency LCL Calculations

SF6 Release Rates	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**	**No. 6**	**No. 7**	**No. 8**	**No. 9**	**No. 10**
Avg. Release Rate (LPM)	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Gas SF6 concentration	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200
Mass release rate (g/min)	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498	0.498
Time of Release (min)	24	25	23	23	23	25	23	23	23	23
Mass released (g)	11.94	12.44	11.45	11.45	11.45	12.44	11.45	11.45	11.45	11.45
Capture Rates										
Avg. Concentration (ppm)	0.136	0.125	0.160	0.202	0.135	0.168	0.093	0.125	0.057	0.080
Avg. Concentration (g/ft3)	2.34E-05	2.14E-05	2.75E-05	3.47E-05	2.31E-05	2.88E-05	1.60E-05	2.15E-05	9.80E-06	1.38E-05
Stack Gas Flowrate (acfm)	11886	11886	11886	11886	11886	11886	11886	11886	11886	11886
Capture Rate (g/min)	0.278	0.254	0.327	0.413	0.275	0.342	0.190	0.255	0.116	0.163
Sampling Time (min)	24	25	23	23	23	25	23	23	23	23
Total Capture (g)	6.68	6.36	7.51	9.49	6.32	8.56	4.36	5.87	2.68	3.76
Avg. Capture Efficiency	55.9	51.1	65.6	82.9	55.2	68.8	38.1	51.3	23.4	32.8

Run 4 - Statistical Calculations		Time Interval (24-hr)	
LCL Subset No.	CE	Start	Stop
No. 1	55.9	9:31	9:55
No. 2	51.1	9:55	10:20
No. 3	65.6	10:20	10:43
No. 4	82.9	10:43	11:06
No. 5	55.2	11:06	11:29
No. 6	68.8	11:50	12:15
No. 7	38.1	12:15	12:38
No. 8	51.3	12:38	13:01
No. 9	23.4	13:01	13:24
No. 10	32.8	13:24	13:47
Average	52.5		
Std. Dev.	17.7252		
n	10		
t	1.383		
LCL	44.777		

Run 1 - 7/24/98 (equal intervals)

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
NA	17240026 ASF	7/24/98	8:07	0.134	
NA	17240027 ASF	7/24/98	8:09	0.183	
No. 1	17240039 ASF	7/24/98	8:30	0.206	
	17240040 ASF	7/24/98	8:32	0.262	
	17240041 ASF	7/24/98	8:34	0.264	
	17240042 ASF	7/24/98	8:36	0.218	
	17240043 ASF	7/24/98	8:37	0.215	
	17240044 ASF	7/24/98	8:39	0.242	
	17240045 ASF	7/24/98	8:41	0.261	
	17240046 ASF	7/24/98	8:43	0.224	
	17240047 ASF	7/24/98	8:45	0.199	
	17240048 ASF	7/24/98	8:46	0.227	Time (min)
	17240049 ASF	7/24/98	8:48	0.251	25
	17240050 ASF	7/24/98	8:50	0.247	
	17240051 ASF	7/24/98	8:52	0.241	Avg. (ppm)
	17240052 ASF	7/24/98	8:53	0.239	0.236
No. 2	17240053 ASF	7/24/98	8:55	0.208	
	17240054 ASF	7/24/98	8:57	0.206	
	17240055 ASF	7/24/98	8:59	0.240	
	17240056 ASF	7/24/98	9:00	0.250	
	17240057 ASF	7/24/98	9:02	0.215	
	17240058 ASF	7/24/98	9:04	0.246	
	17240059 ASF	7/24/98	9:06	0.256	
	17240060 ASF	7/24/98	9:08	0.229	
	17240061 ASF	7/24/98	9:09	0.244	Time (min)
	17240062 ASF	7/24/98	9:11	0.216	23
	17240063 ASF	7/24/98	9:13	0.235	
	17240064 ASF	7/24/98	9:15	0.235	Avg. (ppm)
	17240065 ASF	7/24/98	9:16	0.187	0.228
NA	17240070 ASF	7/24/98	9:25	0.151	
NA	17240071 ASF	7/24/98	9:27	0.198	
NA	17240072 ASF	7/24/98	9:29	0.211	
NA	17240073 ASF	7/24/98	9:30	0.264	
NA	17240074 ASF	7/24/98	9:32	0.273	
No. 3	17240122 ASF	7/24/98	11:00	0.166	
	17240123 ASF	7/24/98	11:02	0.162	
	17240124 ASF	7/24/98	11:04	0.229	
	17240125 ASF	7/24/98	11:06	0.220	
	17240126 ASF	7/24/98	11:07	0.207	
	17240127 ASF	7/24/98	11:09	0.182	
	17240128 ASF	7/24/98	11:11	0.153	
	17240129 ASF	7/24/98	11:13	0.203	
	17240130 ASF	7/24/98	11:15	0.254	Time (min)
	17240131 ASF	7/24/98	11:16	0.226	23
	17240132 ASF	7/24/98	11:18	0.228	

	17240133 ASF	7/24/98	11:20	0.234	Avg. (ppm)
	17240134 ASF	7/24/98	11:22	0.243	0.208
No. 4	17240135 ASF	7/24/98	11:23	0.242	
	17240136 ASF	7/24/98	11:25	0.248	
	17240137 ASF	7/24/98	11:27	0.187	
	17240138 ASF	7/24/98	11:29	0.158	
	17240139 ASF	7/24/98	11:30	0.193	
	17240140 ASF	7/24/98	11:32	0.225	
	17240141 ASF	7/24/98	11:34	0.145	
	17240142 ASF	7/24/98	11:36	0.159	
	17240143 ASF	7/24/98	11:37	0.152	
	17240144 ASF	7/24/98	11:39	0.097	Time (min)
	17240145 ASF	7/24/98	11:41	0.144	25
	17240146 ASF	7/24/98	11:43	0.172	
	17240147 ASF	7/24/98	11:44	0.139	Avg. (ppm)
	17240148 ASF	7/24/98	11:46	0.124	0.170
No. 5	17240149 ASF	7/24/98	11:48	0.170	
	17240150 ASF	7/24/98	11:50	0.163	
	17240151 ASF	7/24/98	11:52	0.186	
	17240152 ASF	7/24/98	11:53	0.215	
	17240153 ASF	7/24/98	11:55	0.137	
	17240154 ASF	7/24/98	11:57	0.091	
	17240155 ASF	7/24/98	11:59	0.100	
	17240156 ASF	7/24/98	12:00	0.127	
	17240157 ASF	7/24/98	12:02	0.135	
	17240158 ASF	7/24/98	12:04	0.152	Time (min)
	17240159 ASF	7/24/98	12:05	0.180	24
	17240160 ASF	7/24/98	12:07	0.164	
	17240161 ASF	7/24/98	12:09	0.206	Avg. (ppm)
	17240162 ASF	7/24/98	12:11	0.257	0.163
No. 6	17240163 ASF	7/24/98	12:12	0.131	
	17240164 ASF	7/24/98	12:14	0.164	
	17240165 ASF	7/24/98	12:16	0.139	
	17240166 ASF	7/24/98	12:18	0.104	
	17240167 ASF	7/24/98	12:19	0.135	
	17240168 ASF	7/24/98	12:21	0.159	
	17240169 ASF	7/24/98	12:23	0.129	
	17240170 ASF	7/24/98	12:25	0.089	
	17240171 ASF	7/24/98	12:26	0.139	
	17240172 ASF	7/24/98	12:28	0.117	Time (min)
	17240173 ASF	7/24/98	12:30	0.092	25
	17240174 ASF	7/24/98	12:32	0.128	
	17240175 ASF	7/24/98	12:34	0.135	Avg. (ppm)
	17240176 ASF	7/24/98	12:35	0.092	0.125
No. 7	17240177 ASF	7/24/98	12:37	0.159	
	17240178 ASF	7/24/98	12:39	0.151	
	17240179 ASF	7/24/98	12:41	0.182	
	17240180 ASF	7/24/98	12:42	0.175	
	17240181 ASF	7/24/98	12:44	0.146	

	17240182 ASF	7/24/98	12:46	0.168	
	17240183 ASF	7/24/98	12:48	0.165	
	17240184 ASF	7/24/98	12:49	0.123	
	17240185 ASF	7/24/98	12:51	0.183	Time (min)
	17240186 ASF	7/24/98	12:53	0.166	25
	17240187 ASF	7/24/98	12:55	0.137	
	17240188 ASF	7/24/98	12:56	0.123	Avg. (ppm)
	17240189 ASF	7/24/98	12:58	0.203	0.160
			13:02		
					Time (min)
All NA's					7
					Avg (ppm)
					0.202

Run 2 - 7/25/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
No. 1	17250001 ASF	7/25/98	7:13	0.176	
	17250002 ASF	7/25/98	7:15	0.194	
	17250003 ASF	7/25/98	7:17	0.206	
	17250004 ASF	7/25/98	7:19	0.193	
	17250005 ASF	7/25/98	7:20	0.269	
	17250006 ASF	7/25/98	7:22	0.272	
	17250007 ASF	7/25/98	7:24	0.234	
	17250008 ASF	7/25/98	7:26	0.236	
	17250009 ASF	7/25/98	7:28	0.168	Time (min)
	17250010 ASF	7/25/98	7:29	0.161	23
	17250011 ASF	7/25/98	7:31	0.148	
	17250012 ASF	7/25/98	7:33	0.156	Avg. (ppm)
	17250013 ASF	7/25/98	7:35	0.231	0.203
No. 2	17250014 ASF	7/25/98	7:36	0.181	
	17250015 ASF	7/25/98	7:38	0.199	
	17250016 ASF	7/25/98	7:40	0.217	
	17250017 ASF	7/25/98	7:42	0.228	
	17250018 ASF	7/25/98	7:43	0.227	
	17250019 ASF	7/25/98	7:45	0.231	
	17250020 ASF	7/25/98	7:47	0.213	
	17250021 ASF	7/25/98	7:49	0.199	
	17250022 ASF	7/25/98	7:50	0.218	Time (min)
	17250023 ASF	7/25/98	7:52	0.188	23
	17250024 ASF	7/25/98	7:54	0.222	
	17250025 ASF	7/25/98	7:56	0.199	Avg. (ppm)
	17250026 ASF	7/25/98	7:58	0.213	0.211
No. 3	17250027 ASF	7/25/98	7:59	0.197	
	17250028 ASF	7/25/98	8:01	0.174	
	17250029 ASF	7/25/98	8:03	0.143	
	17250030 ASF	7/25/98	8:05	0.131	
	17250031 ASF	7/25/98	8:06	0.221	
	17250032 ASF	7/25/98	8:08	0.238	
	17250033 ASF	7/25/98	8:10	0.220	
	17250034 ASF	7/25/98	8:12	0.223	
	17250035 ASF	7/25/98	8:13	0.281	Time (min)
	17250036 ASF	7/25/98	8:15	0.260	23
	17250037 ASF	7/25/98	8:17	0.250	
	17250038 ASF	7/25/98	8:19	0.216	Avg. (ppm)
	17250039 ASF	7/25/98	8:21	0.219	0.213
No. 4	17250040 ASF	7/25/98	8:22	0.204	
	17250041 ASF	7/25/98	8:24	0.231	
	17250042 ASF	7/25/98	8:26	0.175	
	17250043 ASF	7/25/98	8:28	0.197	
	17250044 ASF	7/25/98	8:29	0.133	

Run 2 - 7/25/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
	17250045 ASF	7/25/98	8:31	0.107	
	17250046 ASF	7/25/98	8:33	0.106	
	17250047 ASF	7/25/98	8:35	0.188	
	17250048 ASF	7/25/98	8:36	0.197	Time (min)
	17250049 ASF	7/25/98	8:38	0.193	23
	17250050 ASF	7/25/98	8:40	0.214	
	17250051 ASF	7/25/98	8:42	0.232	Avg. (ppm)
	17250052 ASF	7/25/98	8:44	0.216	0.184
No. 5	17250077 ASF	7/25/98	9:31	0.188	
	17250078 ASF	7/25/98	9:33	0.169	
	17250079 ASF	7/25/98	9:35	0.170	
	17250080 ASF	7/25/98	9:36	0.132	
	17250081 ASF	7/25/98	9:38	0.114	
	17250082 ASF	7/25/98	9:40	0.147	
	17250083 ASF	7/25/98	9:42	0.116	
	17250084 ASF	7/25/98	9:44	0.101	
	17250085 ASF	7/25/98	9:45	0.161	
	17250086 ASF	7/25/98	9:47	0.183	
	17250087 ASF	7/25/98	9:49	0.158	Time (min)
	17250088 ASF	7/25/98	9:51	0.098	27
	17250089 ASF	7/25/98	9:52	0.099	
	17250090 ASF	7/25/98	9:54	0.103	Avg. (ppm)
	17250091 ASF	7/25/98	9:56	0.151	0.139
No. 6	17250092 ASF	7/25/98	9:58	0.166	
	17250093 ASF	7/25/98	10:00	0.199	
	17250094 ASF	7/25/98	10:01	0.174	
	17250095 ASF	7/25/98	10:03	0.137	
	17250096 ASF	7/25/98	10:05	0.172	
	17250097 ASF	7/25/98	10:07	0.193	
	17250098 ASF	7/25/98	10:08	0.152	
	17250099 ASF	7/25/98	10:10	0.137	
	17250100 ASF	7/25/98	10:12	0.165	
	17250101 ASF	7/25/98	10:14	0.156	
	17250102 ASF	7/25/98	10:15	0.160	Time (min)
	17250103 ASF	7/25/98	10:17	0.204	26
	17250104 ASF	7/25/98	10:19	0.156	
	17250105 ASF	7/25/98	10:21	0.168	Avg. (ppm)
	17250106 ASF	7/25/98	10:23	0.185	0.168
No. 7	17250107 ASF	7/25/98	10:24	0.207	
	17250108 ASF	7/25/98	10:26	0.151	
	17250109 ASF	7/25/98	10:28	0.106	
	17250110 ASF	7/25/98	10:30	0.149	
	17250111 ASF	7/25/98	10:31	0.238	
	17250112 ASF	7/25/98	10:33	0.263	

Run 2 - 7/25/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
	17250113 ASF	7/25/98	10:35	0.277	
	17250114 ASF	7/25/98	10:37	0.200	
	17250115 ASF	7/25/98	10:38	0.189	
	17250116 ASF	7/25/98	10:40	0.179	Time (min)
	17250117 ASF	7/25/98	10:42	0.161	25
	17250118 ASF	7/25/98	10:44	0.178	
	17250119 ASF	7/25/98	10:45	0.190	Avg. (ppm)
	17250120 ASF	7/25/98	10:47	0.193	0.191
No. 8	17250121 ASF	7/25/98	10:49	0.135	
	17250122 ASF	7/25/98	10:51	0.167	
	17250123 ASF	7/25/98	10:53	0.178	
	17250124 ASF	7/25/98	10:54	0.127	
	17250125 ASF	7/25/98	10:56	0.140	
	17250126 ASF	7/25/98	10:58	0.136	
	17250127 ASF	7/25/98	11:00	0.149	
	17250128 ASF	7/25/98	11:01	0.142	
	17250129 ASF	7/25/98	11:03	0.179	
	17250130 ASF	7/25/98	11:05	0.134	Time (min)
	17250131 ASF	7/25/98	11:07	0.171	25
	17250132 ASF	7/25/98	11:08	0.118	
	17250133 ASF	7/25/98	11:10	0.167	Avg. (ppm)
	17250134 ASF	7/25/98	11:12	0.213	0.154

Run 3 - 7/27/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
No. 1	17270005 ASF	7/27/98	7:15	0.206	
	17270006 ASF	7/27/98	7:17	0.226	
	17270007 ASF	7/27/98	7:18	0.253	
	17270008 ASF	7/27/98	7:20	0.240	
	17270009 ASF	7/27/98	7:22	0.211	
	17270010 ASF	7/27/98	7:24	0.201	
	17270011 ASF	7/27/98	7:25	0.206	
	17270012 ASF	7/27/98	7:27	0.205	
	17270013 ASF	7/27/98	7:29	0.218	
	17270014 ASF	7/27/98	7:31	0.209	Time (min)
	17270015 ASF	7/27/98	7:33	0.203	25
	17270016 ASF	7/27/98	7:34	0.197	
	17270017 ASF	7/27/98	7:36	0.193	Avg. (ppm)
	17270018 ASF	7/27/98	7:38	0.147	0.208
No. 2	17270019 ASF	7/27/98	7:40	0.165	
	17270020 ASF	7/27/98	7:42	0.237	
	17270021 ASF	7/27/98	7:43	0.204	
	17270022 ASF	7/27/98	7:45	0.190	
	17270023 ASF	7/27/98	7:47	0.184	
	17270024 ASF	7/27/98	7:49	0.221	
	17270025 ASF	7/27/98	7:50	0.191	
	17270026 ASF	7/27/98	7:52	0.208	
	17270027 ASF	7/27/98	7:54	0.277	Time (min)
	17270028 ASF	7/27/98	7:56	0.267	23
	17270029 ASF	7/27/98	7:58	0.200	
	17270030 ASF	7/27/98	7:59	0.166	Avg. (ppm)
	17270031 ASF	7/27/98	8:01	0.122	0.202
No. 3	17270032 ASF	7/27/98	8:03	0.119	
	17270033 ASF	7/27/98	8:05	0.159	
	17270034 ASF	7/27/98	8:06	0.157	
	17270035 ASF	7/27/98	8:08	0.196	
	17270036 ASF	7/27/98	8:10	0.206	
	17270037 ASF	7/27/98	8:12	0.200	
	17270038 ASF	7/27/98	8:14	0.172	
	17270039 ASF	7/27/98	8:15	0.190	
	17270040 ASF	7/27/98	8:17	0.158	Time (min)
	17270041 ASF	7/27/98	8:19	0.144	23
	17270042 ASF	7/27/98	8:21	0.138	
	17270043 ASF	7/27/98	8:22	0.190	Avg. (ppm)
	17270044 ASF	7/27/98	8:24	0.178	0.170
No. 4	17270045 ASF	7/27/98	8:26	0.179	
	17270046 ASF	7/27/98	8:28	0.182	
	17270047 ASF	7/27/98	8:29	0.181	
	17270048 ASF	7/27/98	8:31	0.166	

Run 3 - 7/27/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
	17270049 ASF	7/27/98	8:33	0.235	
	17270050 ASF	7/27/98	8:35	0.221	
	17270051 ASF	7/27/98	8:37	0.225	
	17270052 ASF	7/27/98	8:38	0.205	
	17270053 ASF	7/27/98	8:40	0.201	Time (min)
	17270054 ASF	7/27/98	8:42	0.213	23
	17270055 ASF	7/27/98	8:44	0.255	
	17270056 ASF	7/27/98	8:45	0.241	Avg. (ppm)
	17270057 ASF	7/27/98	8:47	0.188	0.207
No. 5	17270058 ASF	7/27/98	8:49	0.164	
	17270059 ASF	7/27/98	8:51	0.150	
	17270060 ASF	7/27/98	8:53	0.135	
	17270061 ASF	7/27/98	8:54	0.137	
	17270062 ASF	7/27/98	8:56	0.120	
	17270063 ASF	7/27/98	8:58	0.128	
	17270064 ASF	7/27/98	9:00	0.151	
	17270065 ASF	7/27/98	9:01	0.174	
	17270066 ASF	7/27/98	9:03	0.149	Time (min)
	17270067 ASF	7/27/98	9:05	0.160	23
	17270068 ASF	7/27/98	9:07	0.112	
	17270069 ASF	7/27/98	9:09	0.117	Avg. (ppm)
	17270070 ASF	7/27/98	9:10	0.102	0.138
No. 6	17270071 ASF	7/27/98	9:12	0.109	
	17270072 ASF	7/27/98	9:14	0.131	
	17270073 ASF	7/27/98	9:16	0.132	
	17270074 ASF	7/27/98	9:17	0.141	
	17270075 ASF	7/27/98	9:19	0.175	
	17270076 ASF	7/27/98	9:21	0.155	
	17270077 ASF	7/27/98	9:23	0.101	
	17270078 ASF	7/27/98	9:25	0.090	Time (min)
	17270079 ASF	7/27/98	9:26	0.170	22
	17270080 ASF	7/27/98	9:28	0.132	
	17270081 ASF	7/27/98	9:30	0.108	Avg. (ppm)
	17270082 ASF	7/27/98	9:32	0.118	0.130
No. 7	17270091 ASF	7/27/98	10:03	0.107	
	17270092 ASF	7/27/98	10:05	0.121	
	17270093 ASF	7/27/98	10:06	0.120	
	17270094 ASF	7/27/98	10:08	0.164	
	17270095 ASF	7/27/98	10:10	0.132	
	17270096 ASF	7/27/98	10:12	0.115	
	17270097 ASF	7/27/98	10:14	0.112	
	17270098 ASF	7/27/98	10:15	0.112	Time (min)
	17270099 ASF	7/27/98	10:17	0.115	21
	17270100 ASF	7/27/98	10:19	0.116	

Run 3 - 7/27/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
	17270101 ASF	7/27/98	10:21	0.143	Avg. (ppm)
	17270102 ASF	7/27/98	10:22	0.084	0.120
No. 8	17270103 ASF	7/27/98	10:24	0.099	
	17270104 ASF	7/27/98	10:26	0.116	
	17270105 ASF	7/27/98	10:28	0.098	
	17270106 ASF	7/27/98	10:30	0.121	
	17270107 ASF	7/27/98	10:31	0.105	
	17270108 ASF	7/27/98	10:33	0.140	
	17270109 ASF	7/27/98	10:35	0.181	
	17270110 ASF	7/27/98	10:37	0.214	Time (min)
	17270111 ASF	7/27/98	10:38	0.235	22
	17270112 ASF	7/27/98	10:40	0.202	
	17270113 ASF	7/27/98	10:42	0.135	Avg. (ppm)
	17270114 ASF	7/27/98	10:44	0.092	0.145
No. 9	17270116 ASF	7/27/98	11:19	0.101	
	17270117 ASF	7/27/98	11:21	0.112	
	17270118 ASF	7/27/98	11:22	0.158	
	17270119 ASF	7/27/98	11:24	0.142	
	17270120 ASF	7/27/98	11:26	0.191	
	17270121 ASF	7/27/98	11:28	0.135	
	17270122 ASF	7/27/98	11:30	0.096	
	17270123 ASF	7/27/98	11:31	0.089	Time (min)
	17270124 ASF	7/27/98	11:33	0.107	21
	17270125 ASF	7/27/98	11:35	0.144	
	17270126 ASF	7/27/98	11:37	0.149	Avg. (ppm)
	17270127 ASF	7/27/98	11:38	0.143	0.131
No. 10	17270128 ASF	7/27/98	11:40	0.125	
	17270129 ASF	7/27/98	11:42	0.114	
	17270130 ASF	7/27/98	11:44	0.153	
	17270131 ASF	7/27/98	11:45	0.121	
	17270132 ASF	7/27/98	11:47	0.117	
	17270133 ASF	7/27/98	11:49	0.104	
	17270134 ASF	7/27/98	11:51	0.087	
	17270135 ASF	7/27/98	11:53	0.124	
	17270136 ASF	7/27/98	11:54	0.139	Time (min)
	17270137 ASF	7/27/98	11:56	0.133	23
	17270138 ASF	7/27/98	11:58	0.127	
	17270139 ASF	7/27/98	12:00	0.149	Avg. (ppm)
	17270140 ASF	7/27/98	12:01	0.115	0.124

Run 4 - 7/26/98

Subsample	Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Subsample Time & Avg.
No. 1	17260004 ASF	7/26/98	9:31	0.134	
	17260005 ASF	7/26/98	9:32	0.160	
	17260006 ASF	7/26/98	9:34	0.164	
	17260007 ASF	7/26/98	9:36	0.103	
	17260008 ASF	7/26/98	9:38	0.144	
	17260009 ASF	7/26/98	9:39	0.152	
	17260010 ASF	7/26/98	9:41	0.156	
	17260011 ASF	7/26/98	9:43	0.176	
	17260012 ASF	7/26/98	9:45	0.147	
	17260013 ASF	7/26/98	9:46	0.108	Time (min)
	17260014 ASF	7/26/98	9:48	0.108	24
	17260015 ASF	7/26/98	9:50	0.103	
	17260016 ASF	7/26/98	9:52	0.107	Avg. (ppm)
	17260017 ASF	7/26/98	9:54	0.147	0.136
No. 2	17260018 ASF	7/26/98	9:55	0.136	
	17260019 ASF	7/26/98	9:57	0.075	
	17260020 ASF	7/26/98	9:59	0.103	
	17260021 ASF	7/26/98	10:01	0.096	
	17260022 ASF	7/26/98	10:02	0.093	
	17260023 ASF	7/26/98	10:04	0.101	
	17260024 ASF	7/26/98	10:06	0.088	
	17260025 ASF	7/26/98	10:08	0.127	
	17260026 ASF	7/26/98	10:09	0.115	
	17260027 ASF	7/26/98	10:11	0.125	Time (min)
	17260028 ASF	7/26/98	10:13	0.176	25
	17260029 ASF	7/26/98	10:15	0.175	
	17260030 ASF	7/26/98	10:17	0.182	Avg. (ppm)
	17260031 ASF	7/26/98	10:18	0.151	0.124
No. 3	17260032 ASF	7/26/98	10:20	0.172	
	17260033 ASF	7/26/98	10:22	0.184	
	17260034 ASF	7/26/98	10:24	0.146	
	17260035 ASF	7/26/98	10:25	0.169	
	17260036 ASF	7/26/98	10:27	0.148	
	17260037 ASF	7/26/98	10:29	0.175	
	17260038 ASF	7/26/98	10:31	0.160	
	17260039 ASF	7/26/98	10:33	0.122	
	17260040 ASF	7/26/98	10:34	0.170	Time (min)
	17260041 ASF	7/26/98	10:36	0.225	23
	17260042 ASF	7/26/98	10:38	0.148	
	17260043 ASF	7/26/98	10:40	0.114	Avg. (ppm)
	17260044 ASF	7/26/98	10:41	0.144	0.160
No. 4	17260045 ASF	7/26/98	10:43	0.106	
	17260046 ASF	7/26/98	10:45	0.156	
	17260047 ASF	7/26/98	10:47	0.211	

				SF_6 Conc.	Subsample
	17260048 ASF	7/26/98	10:49	0.149	
	17260049 ASF	7/26/98	10:50	0.190	
	17260050 ASF	7/26/98	10:52	0.218	
	17260051 ASF	7/26/98	10:54	0.229	
	17260052 ASF	7/26/98	10:56	0.202	
	17260053 ASF	7/26/98	10:57	0.234	Time (min)
	17260054 ASF	7/26/98	10:59	0.229	23
	17260055 ASF	7/26/98	11:01	0.257	
	17260056 ASF	7/26/98	11:03	0.234	Avg. (ppm)
	17260057 ASF	7/26/98	11:04	0.211	0.202
No. 5	17260058 ASF	7/26/98	11:06	0.195	
	17260059 ASF	7/26/98	11:08	0.129	
	17260060 ASF	7/26/98	11:10	0.186	
	17260061 ASF	7/26/98	11:11	0.173	
	17260062 ASF	7/26/98	11:13	0.175	
	17260063 ASF	7/26/98	11:15	0.178	
	17260064 ASF	7/26/98	11:17	0.157	
	17260065 ASF	7/26/98	11:19	0.074	
	17260066 ASF	7/26/98	11:20	0.089	Time (min)
	17260067 ASF	7/26/98	11:22	0.124	23
	17260068 ASF	7/26/98	11:24	0.107	
	17260069 ASF	7/26/98	11:26	0.089	Avg. (ppm)
	17260070 ASF	7/26/98	11:27	0.072	0.135
No. 6	17260071 ASF	7/26/98	11:50	0.179	
	17260072 ASF	7/26/98	11:52	0.180	
	17260073 ASF	7/26/98	11:54	0.153	
	17260074 ASF	7/26/98	11:56	0.125	
	17260075 ASF	7/26/98	11:57	0.125	
	17260076 ASF	7/26/98	11:59	0.165	
	17260077 ASF	7/26/98	12:01	0.199	
	17260078 ASF	7/26/98	12:03	0.219	
	17260079 ASF	7/26/98	12:05	0.185	
	17260080 ASF	7/26/98	12:06	0.189	Time (min)
	17260081 ASF	7/26/98	12:08	0.148	25
	17260082 ASF	7/26/98	12:10	0.162	
	17260083 ASF	7/26/98	12:12	0.164	Avg. (ppm)
	17260084 ASF	7/26/98	12:13	0.154	0.168
No. 7	17260085 ASF	7/26/98	12:15	0.133	
	17260086 ASF	7/26/98	12:17	0.142	
	17260087 ASF	7/26/98	12:19	0.077	
	17260088 ASF	7/26/98	12:21	0.085	
	17260089 ASF	7/26/98	12:22	0.114	
	17260090 ASF	7/26/98	12:24	0.145	
	17260091 ASF	7/26/98	12:26	0.107	
	17260092 ASF	7/26/98	12:28	0.107	
	17260093 ASF	7/26/98	12:29	0.077	Time (min)
	17260094 ASF	7/26/98	12:31	0.096	23
	17260095 ASF	7/26/98	12:33	0.062	

				SF_6 Conc.	Subsample
	17260096 ASF	7/26/98	12:35	0.000	Avg. (ppm)
	17260097 ASF	7/26/98	12:36	0.060	0.093
No. 8	17260098 ASF	7/26/98	12:38	0.137	
	17260099 ASF	7/26/98	12:40	0.074	
	17260100 ASF	7/26/98	12:42	0.085	
	17260101 ASF	7/26/98	12:43	0.169	
	17260102 ASF	7/26/98	12:45	0.130	
	17260103 ASF	7/26/98	12:47	0.083	
	17260104 ASF	7/26/98	12:49	0.119	
	17260105 ASF	7/26/98	12:50	0.132	
	17260106 ASF	7/26/98	12:52	0.100	Time (min)
	17260107 ASF	7/26/98	12:54	0.156	23
	17260108 ASF	7/26/98	12:56	0.144	
	17260109 ASF	7/26/98	12:58	0.145	Avg. (ppm)
	17260110 ASF	7/26/98	12:59	0.150	0.125
No. 9	17260111 ASF	7/26/98	13:01	0.081	
	17260112 ASF	7/26/98	13:03	0.099	
	17260113 ASF	7/26/98	13:05	0.093	
	17260114 ASF	7/26/98	13:06	0.086	
	17260115 ASF	7/26/98	13:08	0.095	
	17260116 ASF	7/26/98	13:10	0.049	
	17260117 ASF	7/26/98	13:12	0.061	
	17260118 ASF	7/26/98	13:14	0.000	
	17260119 ASF	7/26/98	13:15	0.000	Time (min)
	17260120 ASF	7/26/98	13:17	0.000	23
	17260121 ASF	7/26/98	13:19	0.047	
	17260122 ASF	7/26/98	13:21	0.069	Avg. (ppm)
	17260123 ASF	7/26/98	13:22	0.062	0.057
No. 10	17260124 ASF	7/26/98	13:24	0.093	
	17260125 ASF	7/26/98	13:26	0.070	
	17260126 ASF	7/26/98	13:28	0.069	
	17260127 ASF	7/26/98	13:30	0.059	
	17260128 ASF	7/26/98	13:31	0.053	
	17260129 ASF	7/26/98	13:33	0.052	
	17260130 ASF	7/26/98	13:35	0.068	
	17260131 ASF	7/26/98	13:37	0.073	
	17260132 ASF	7/26/98	13:38	0.109	Time (min)
	17260133 ASF	7/26/98	13:40	0.082	23
	17260134 ASF	7/26/98	13:42	0.072	
	17260135 ASF	7/26/98	13:44	0.131	Avg. (ppm)
	17260136 ASF	7/26/98	13:45	0.108	0.080

File list for 7/24/98 - Run 1 Loadout and Silo

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17240001 ASF	7/24/98	7:22			Silo Exhaust Duct (SED) being monitored by FTIR, capture data not usable.
17240002 ASF	7/24/98	7:24			
17240003 ASF	7/24/98	7:26			
17240004 ASF	7/24/98	7:28		20.89	
17240005 ASF	7/24/98	7:30			
17240006 ASF	7/24/98	7:32		21.45	
17240007 ASF	7/24/98	7:34			
17240008 ASF	7/24/98	7:35			
17240009 ASF	7/24/98	7:37			
		7:38		21.20	
17240010 ASF	7/24/98	7:39			
17240011 ASF	7/24/98	7:41		21.34	
17240012 ASF	7/24/98	7:42			
		7:43		20.83	
17240013 ASF	7/24/98	7:44			
		7:45		21.39	
17240014 ASF	7/24/98	7:46		20.10	
17240015 ASF	7/24/98	7:48		21.04	
		7:49		4.03	
17240016 ASF	7/24/98	7:50			
17240017 ASF	7/24/98	7:51			
		7:52		21.19	
17240018 ASF	7/24/98	7:53			
17240019 ASF	7/24/98	7:55			
		7:56		21.12	
17240020 ASF	7/24/98	7:57			
17240021 ASF	7/24/98	7:58		3.99	
		7:59		21.27	
17240022 ASF	7/24/98	8:00			
17240023 ASF	7/24/98	8:02		21.12	
17240024 ASF	7/24/98	8:04			
17240025 ASF	7/24/98	8:05		21.17	Usable data.
17240026 ASF	7/24/98	8:07	0.134	21.25	
17240027 ASF	7/24/98	8:09	0.183		
17240028 ASF	7/24/98	8:11			Silo 1 being used sporadically, capture data not usable.
		8:12		21.39	
17240029 ASF	7/24/98	8:13			
17240030 ASF	7/24/98	8:14			
		8:15		21.16	
17240031 ASF	7/24/98	8:16			
17240032 ASF	7/24/98	8:18			
17240033 ASF	7/24/98	8:20			
17240034 ASF	7/24/98	8:21			
17240035 ASF	7/24/98	8:23		21.40	

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		8:24		20.91	
17240036 ASF	7/24/98	8:25			
17240037 ASF	7/24/98	8:27		2.54	
17240038 ASF	7/24/98	8:28		21.22	
17240039 ASF	7/24/98	8:30	0.206	21.43	Usable data.
17240040 ASF	7/24/98	8:32	0.262		
		8:33		21.20	
17240041 ASF	7/24/98	8:34	0.264		
17240042 ASF	7/24/98	8:36	0.218		
17240043 ASF	7/24/98	8:37	0.215		
		8:38		21.22	
17240044 ASF	7/24/98	8:39	0.242	21.36	
17240045 ASF	7/24/98	8:41	0.261	21.35	
17240046 ASF	7/24/98	8:43	0.224	21.05	
17240047 ASF	7/24/98	8:45	0.199		
17240048 ASF	7/24/98	8:46	0.227		
		8:46		20.94	
17240049 ASF	7/24/98	8:48	0.251		
		8:49		21.38	
17240050 ASF	7/24/98	8:50	0.247	21.33	
17240051 ASF	7/24/98	8:52	0.241	21.12	
17240052 ASF	7/24/98	8:53	0.239		
		8:54		21.04	
17240053 ASF	7/24/98	8:55	0.208	21.17	
17240054 ASF	7/24/98	8:57	0.206		
17240055 ASF	7/24/98	8:59	0.240	21.26	
17240056 ASF	7/24/98	9:00	0.250		
17240057 ASF	7/24/98	9:02	0.215		
		9:03		20.88	
17240058 ASF	7/24/98	9:04	0.246		
		9:05		19.91	
17240059 ASF	7/24/98	9:06	0.256		
17240060 ASF	7/24/98	9:08	0.229		
17240061 ASF	7/24/98	9:09	0.244		
		9:10		21.22	Gate open on truck; 2 tons
17240062 ASF	7/24/98	9:11	0.216		spilled in tunnel.
		9:12		21.10	
17240063 ASF	7/24/98	9:13	0.235		
17240064 ASF	7/24/98	9:15	0.235		
17240065 ASF	7/24/98	9:16	0.187	21.04	
17240066 ASF	7/24/98	9:18			THC spike gas run through
17240067 ASF	7/24/98	9:20			sample lines, capture data
		9:21		21.10	not usable.
17240068 ASF	7/24/98	9:22		21.58	Spill cleaned up in tunnel
17240069 ASF	7/24/98	9:24		21.27	
17240070 ASF	7/24/98	9:25	0.151		Usable data.
17240071 ASF	7/24/98	9:27	0.198		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		9:28		21.46	
17240072 ASF	7/24/98	9:29	0.211		
17240073 ASF	7/24/98	9:30	0.264		
17240074 ASF	7/24/98	9:32	0.273		
		9:33		21.44	Silo Exhaust Duct (SED)
17240075 ASF	7/24/98	9:34			being monitored by FTIR,
		9:37		21.42	capture data not usable.
		9:38		21.36	
17240076 ASF	7/24/98	9:39		21.20	
17240077 ASF	7/24/98	9:41			
		9:42		21.06	
17240078 ASF	7/24/98	9:43			
		9:44		7.00	
17240079 ASF	7/24/98	9:45		21.13	
17240080 ASF	7/24/98	9:46			
17240081 ASF	7/24/98	9:48			
		9:49		20.88	
17240082 ASF	7/24/98	9:50		21.34	
17240083 ASF	7/24/98	9:52			
17240084 ASF	7/24/98	9:53		21.20	
17240085 ASF	7/24/98	9:55		21.53	
17240086 ASF	7/24/98	9:57			
		9:58		21.52	
17240087 ASF	7/24/98	9:59			
17240088 ASF	7/24/98	10:00		21.29	
17240089 ASF	7/24/98	10:02		21.60	
17240090 ASF	7/24/98	10:04			
		10:05		20.94	
17240091 ASF	7/24/98	10:06		21.27	
		10:07		21.22	
17240092 ASF	7/24/98	10:08			
17240093 ASF	7/24/98	10:09		20.96	
17240094 ASF	7/24/98	10:11		21.44	
17240095 ASF	7/24/98	10:13			
		10:14		21.06	
17240096 ASF	7/24/98	10:15			
17240097 ASF	7/24/98	10:16			
17240098 ASF	7/24/98	10:18			
17240099 ASF	7/24/98	10:20			
17240100 ASF	7/24/98	10:22			
17240101 ASF	7/24/98	10:23			
17240102 ASF	7/24/98	10:25			
17240103 ASF	7/24/98	10:27		21.50	
		10:28		20.43	
17240104 ASF	7/24/98	10:29			
		10:30		21.41	
17240105 ASF	7/24/98	10:31			

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17240106 ASF	7/24/98	10:32			
		10:33		21.29	
17240107 ASF	7/24/98	10:34			
		10:35		21.08	
17240108 ASF	7/24/98	10:36		21.39	
17240109 ASF	7/24/98	10:38		21.33	
17240110 ASF	7/24/98	10:39			
		10:40		21.14	
17240111 ASF	7/24/98	10:41		21.45	
17240112 ASF	7/24/98	10:43		21.25	
17240113 ASF	7/24/98	10:45			
17240114 ASF	7/24/98	10:46		21.26	
17240115 ASF	7/24/98	10:48			
17240116 ASF	7/24/98	10:50			
17240117 ASF	7/24/98	10:52		21.40	
17240118 ASF	7/24/98	10:53			
17240119 ASF	7/24/98	10:55			
		10:56		21.40	
17240120 ASF	7/24/98	10:57			
		10:58		21.07	
17240121 ASF	7/24/98	10:59			
17240122 ASF	7/24/98	11:00	0.166	21.51	Usable data.
		11:01		21.33	
17240123 ASF	7/24/98	11:02	0.162		
17240124 ASF	7/24/98	11:04	0.229		
17240125 ASF	7/24/98	11:06	0.220		
17240126 ASF	7/24/98	11:07	0.207		
17240127 ASF	7/24/98	11:09	0.182	21.29	
		11:10		21.34	
17240128 ASF	7/24/98	11:11	0.153		
		11:12		21.42	
17240129 ASF	7/24/98	11:13	0.203		
17240130 ASF	7/24/98	11:15	0.254		
17240131 ASF	7/24/98	11:16	0.226		
		11:17		21.30	
17240132 ASF	7/24/98	11:18	0.228	21.29	
17240133 ASF	7/24/98	11:20	0.234		
17240134 ASF	7/24/98	11:22	0.243	21.40	
17240135 ASF	7/24/98	11:23	0.242	21.45	
		11:24		20.78	
17240136 ASF	7/24/98	11:25	0.248		
		11:26		21.43	
17240137 ASF	7/24/98	11:27	0.187		
		11:28		21.32	
17240138 ASF	7/24/98	11:29	0.158		
17240139 ASF	7/24/98	11:30	0.193		
17240140 ASF	7/24/98	11:32	0.225		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		11:33		21.35	
17240141 ASF	7/24/98	11:34	0.145		
17240142 ASF	7/24/98	11:36	0.159	21.19	
17240143 ASF	7/24/98	11:37	0.152		
		11:38		21.12	
17240144 ASF	7/24/98	11:39	0.097	21.14	
17240145 ASF	7/24/98	11:41	0.144	24.84	
17240146 ASF	7/24/98	11:43	0.172	21.17	
17240147 ASF	7/24/98	11:44	0.139		
		11:45		20.12	
17240148 ASF	7/24/98	11:46	0.124		
17240149 ASF	7/24/98	11:48	0.170		
17240150 ASF	7/24/98	11:50	0.163	21.34	
17240151 ASF	7/24/98	11:52	0.186		
17240152 ASF	7/24/98	11:53	0.215	21.06	
17240153 ASF	7/24/98	11:55	0.137	21.15	
17240154 ASF	7/24/98	11:57	0.091	21.31	
17240155 ASF	7/24/98	11:59	0.100		
17240156 ASF	7/24/98	12:00	0.127		
17240157 ASF	7/24/98	12:02	0.135	21.35	
17240158 ASF	7/24/98	12:04	0.152	21.22	
17240159 ASF	7/24/98	12:05	0.180	21.32	
17240160 ASF	7/24/98	12:07	0.164		
17240161 ASF	7/24/98	12:09	0.206		
		12:10		21.22	
17240162 ASF	7/24/98	12:11	0.257		
17240163 ASF	7/24/98	12:12	0.131		
17240164 ASF	7/24/98	12:14	0.164		
		12:15		21.02	
17240165 ASF	7/24/98	12:16	0.139		
		12:17		23.99	
17240166 ASF	7/24/98	12:18	0.104		
17240167 ASF	7/24/98	12:19	0.135	21.29	
17240168 ASF	7/24/98	12:21	0.159		
		12:22		21.00	
17240169 ASF	7/24/98	12:23	0.129		
17240170 ASF	7/24/98	12:25	0.089	21.47	
17240171 ASF	7/24/98	12:26	0.139		
17240172 ASF	7/24/98	12:28	0.117		
17240173 ASF	7/24/98	12:30	0.092	21.46	
17240174 ASF	7/24/98	12:32	0.128		
17240175 ASF	7/24/98	12:34	0.135		
17240176 ASF	7/24/98	12:35	0.092	21.33	
		12:36		20.40	
17240177 ASF	7/24/98	12:37	0.159	21.73	
		12:38		21.28	
17240178 ASF	7/24/98	12:39	0.151		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		12:40		21.16	
17240179 ASF	7/24/98	12:41	0.182		
17240180 ASF	7/24/98	12:42	0.175	21.39	
17240181 ASF	7/24/98	12:44	0.146	20.33	
17240182 ASF	7/24/98	12:46	0.168		
17240183 ASF	7/24/98	12:48	0.165	21.57	
17240184 ASF	7/24/98	12:49	0.123	21.25	
17240185 ASF	7/24/98	12:51	0.183	21.20	
17240186 ASF	7/24/98	12:53	0.166	21.17	
		12:54		21.31	
17240187 ASF	7/24/98	12:55	0.137		
17240188 ASF	7/24/98	12:56	0.123		
17240189 ASF	7/24/98	12:58	0.203		
		13:02		21.19	
Average Concentration (ppm)			0.185		
Maximum Concentration (ppm)			0.273		
Minimum Concentration (ppm)			0.089		
Average Concentration (g/ft^3)			3.17E-05		
Stack Gas Flowrate (acfm)			11,261		
Capture Rate (g/min)			0.357		
Sampling Time (min)			173		
Total Capture (g)			61.8		
Loadout during capture tests (tons/hr)				478.05	
Loadout during all testing (tons/hr)				453.17	

File list for 7/25/98 - Run 2 Loadout and Silo

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		7:02		21.12	
		7:04		21.43	
		7:08			
		7:09		21.24	
		7:12		21.02	
17250001 ASF	7/25/98	7:13	0.176		Usable data.
17250002 ASF	7/25/98	7:15	0.194		
17250003 ASF	7/25/98	7:17	0.206		
17250004 ASF	7/25/98	7:19	0.193		
17250005 ASF	7/25/98	7:20	0.269	20.92	
17250006 ASF	7/25/98	7:22	0.272		
		7:23		23.87	
17250007 ASF	7/25/98	7:24	0.234		
		7:25		23.65	
17250008 ASF	7/25/98	7:26	0.236		
17250009 ASF	7/25/98	7:28	0.168		
17250010 ASF	7/25/98	7:29	0.161	21.21	
17250011 ASF	7/25/98	7:31	0.148		
		7:32		23.93	
17250012 ASF	7/25/98	7:33	0.156		
17250013 ASF	7/25/98	7:35	0.231	21.09	
17250014 ASF	7/25/98	7:36	0.181		
17250015 ASF	7/25/98	7:38	0.199		
17250016 ASF	7/25/98	7:40	0.217	24.43	
17250017 ASF	7/25/98	7:42	0.228	20.59	
17250018 ASF	7/25/98	7:43	0.227		
		7:44		23.24	
17250019 ASF	7/25/98	7:45	0.231	20.64	
17250020 ASF	7/25/98	7:47	0.213		
		7:48		24.47	
17250021 ASF	7/25/98	7:49	0.199		
17250022 ASF	7/25/98	7:50	0.218		
		7:51		21.26	
17250023 ASF	7/25/98	7:52	0.188		
17250024 ASF	7/25/98	7:54	0.222		
		7:55		24.52	
17250025 ASF	7/25/98	7:56	0.199		
		7:57		21.32	
17250026 ASF	7/25/98	7:58	0.213		
17250027 ASF	7/25/98	7:59	0.197	21.26	
17250028 ASF	7/25/98	8:01	0.174		
17250029 ASF	7/25/98	8:03	0.143		
17250030 ASF	7/25/98	8:05	0.131	19.73	
17250031 ASF	7/25/98	8:06	0.221		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		8:07		21.05	
17250032 ASF	7/25/98	8:08	0.238		
17250033 ASF	7/25/98	8:10	0.220	21.45	
17250034 ASF	7/25/98	8:12	0.223		
17250035 ASF	7/25/98	8:13	0.281		
		8:14		21.31	
17250036 ASF	7/25/98	8:15	0.260		
17250037 ASF	7/25/98	8:17	0.250	24.65	
17250038 ASF	7/25/98	8:19	0.216		
		8:20		24.48	
17250039 ASF	7/25/98	8:21	0.219		
17250040 ASF	7/25/98	8:22	0.204	21.13	
17250041 ASF	7/25/98	8:24	0.231		
		8:25		24.03	
17250042 ASF	7/25/98	8:26	0.175		
17250043 ASF	7/25/98	8:28	0.197	21.50	
17250044 ASF	7/25/98	8:29	0.133		
		8:30		21.16	
17250045 ASF	7/25/98	8:31	0.107		
		8:32		21.27	
17250046 ASF	7/25/98	8:33	0.106		
		8:34		21.25	
17250047 ASF	7/25/98	8:35	0.188		
17250048 ASF	7/25/98	8:36	0.197		
17250049 ASF	7/25/98	8:38	0.193	24.45	
		8:39		21.26	
17250050 ASF	7/25/98	8:40	0.214		
17250051 ASF	7/25/98	8:42	0.232	21.30	
17250052 ASF	7/25/98	8:44	0.216		
17250053 ASF	7/25/98	8:45			SED being monitored by
		8:46		23.21	FTIR, capture data not
17250054 ASF	7/25/98	8:47			usable.
		8:48		21.00	
17250055 ASF	7/25/98	8:49			
17250056 ASF	7/25/98	8:51		24.47	
17250057 ASF	7/25/98	8:52		21.18	
17250058 ASF	7/25/98	8:54			
17250059 ASF	7/25/98	8:56			
17250060 ASF	7/25/98	8:58			
17250061 ASF	7/25/98	8:59			
		9:00		23.80	
17250062 ASF	7/25/98	9:01			
		9:02		21.00	
17250063 ASF	7/25/98	9:03		20.80	
17250064 ASF	7/25/98	9:05			
17250065 ASF	7/25/98	9:06		21.18	
17250066 ASF	7/25/98	9:08			

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17250067 ASF	7/25/98	9:10		23.67	
17250068 ASF	7/25/98	9:12			
17250069 ASF	7/25/98	9:13		20.89	
17250070 ASF	7/25/98	9:15		20.87	
17250071 ASF	7/25/98	9:17		21.02	
		9:18		12.00	
17250072 ASF	7/25/98	9:19			
17250073 ASF	7/25/98	9:20			
		9:21		21.01	
17250074 ASF	7/25/98	9:22			
17250075 ASF	7/25/98	9:24		24.19	
17250076 ASF	7/25/98	9:26			
		9:28		20.93	
17250077 ASF	7/25/98	9:31	0.188	20.94	Usable data.
17250078 ASF	7/25/98	9:33	0.169	8.00	
17250079 ASF	7/25/98	9:35	0.170	21.10	
17250080 ASF	7/25/98	9:36	0.132		
17250081 ASF	7/25/98	9:38	0.114		
17250082 ASF	7/25/98	9:40	0.147		
		9:41		23.87	
17250083 ASF	7/25/98	9:42	0.116		
17250084 ASF	7/25/98	9:44	0.101		
17250085 ASF	7/25/98	9:45	0.161	15.03	
17250086 ASF	7/25/98	9:47	0.183	24.58	
		9:48		21.17	
17250087 ASF	7/25/98	9:49	0.158		
17250088 ASF	7/25/98	9:51	0.098		
17250089 ASF	7/25/98	9:52	0.099		
17250090 ASF	7/25/98	9:54	0.103		
		9:55		23.58	
17250091 ASF	7/25/98	9:56	0.151		
		9:57		20.86	
17250092 ASF	7/25/98	9:58	0.166		
		9:59		22.79	
17250093 ASF	7/25/98	10:00	0.199		
17250094 ASF	7/25/98	10:01	0.174		
		10:02		20.70	
17250095 ASF	7/25/98	10:03	0.137		
17250096 ASF	7/25/98	10:05	0.172		
		10:06		24.19	
17250097 ASF	7/25/98	10:07	0.193		
17250098 ASF	7/25/98	10:08	0.152		
		10:09		21.06	
17250099 ASF	7/25/98	10:10	0.137		
17250100 ASF	7/25/98	10:12	0.165		
17250101 ASF	7/25/98	10:14	0.156		
17250102 ASF	7/25/98	10:15	0.160	23.54	

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		10:16		6.18	
17250103 ASF	7/25/98	10:17	0.204		
17250104 ASF	7/25/98	10:19	0.156		
17250105 ASF	7/25/98	10:21	0.168		
17250106 ASF	7/25/98	10:23	0.185		
17250107 ASF	7/25/98	10:24	0.207		
17250108 ASF	7/25/98	10:26	0.151		
17250109 ASF	7/25/98	10:28	0.106	24.06	
17250110 ASF	7/25/98	10:30	0.149	20.91	
17250111 ASF	7/25/98	10:31	0.238		
		10:32		21.06	
17250112 ASF	7/25/98	10:33	0.263		
17250113 ASF	7/25/98	10:35	0.277	20.79	
17250114 ASF	7/25/98	10:37	0.200		
17250115 ASF	7/25/98	10:38	0.189		
		10:39			
17250116 ASF	7/25/98	10:40	0.179		
		10:41		21.03	
17250117 ASF	7/25/98	10:42	0.161		
		10:43		21.00	
17250118 ASF	7/25/98	10:44	0.178		
17250119 ASF	7/25/98	10:45	0.190		
		10:46			
17250120 ASF	7/25/98	10:47	0.193		
		10:48		20.90	
17250121 ASF	7/25/98	10:49	0.135		
		10:50		20.80	
17250122 ASF	7/25/98	10:51	0.167		
		10:52		20.87	
17250123 ASF	7/25/98	10:53	0.178		
17250124 ASF	7/25/98	10:54	0.127	20.91	
17250125 ASF	7/25/98	10:56	0.140		
17250126 ASF	7/25/98	10:58	0.136		
17250127 ASF	7/25/98	11:00	0.149	20.91	
17250128 ASF	7/25/98	11:01	0.142		
17250129 ASF	7/25/98	11:03	0.179		
		11:04		21.07	
17250130 ASF	7/25/98	11:05	0.134		
17250131 ASF	7/25/98	11:07	0.171		
17250132 ASF	7/25/98	11:08	0.118		
17250133 ASF	7/25/98	11:10	0.167	21.13	
17250134 ASF	7/25/98	11:12	0.213		

Average Concentration (ppm)	0.182
Maximum Concentration (ppm)	0.281
Minimum Concentration (ppm)	0.098
Average Concentration (g/ft^3)	3.13E-05

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
Stack Gas Flowrate (acfm)			10,922		
Capture Rate (g/min)			0.341		
Sampling Time (min)			192		
Total Capture (g)			65.6		
Loadout during capture tests (tons/hr)				391.41	
Loadout during all testing (tons/hr)				399.72	

File list for 7/27/98 - Run 3 Loadout and Silo

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17270001 ASF	7/27/98	7:08			
17270002 ASF	7/27/98	7:09		21.13	
17270003 ASF	7/27/98	7:11			
17270004 ASF	7/27/98	7:13		23.06	
17270005 ASF	7/27/98	7:15	0.206		Usable data.
17270006 ASF	7/27/98	7:17	0.226		
17270007 ASF	7/27/98	7:18	0.253	21.28	
17270008 ASF	7/27/98	7:20	0.240		
17270009 ASF	7/27/98	7:22	0.211		
17270010 ASF	7/27/98	7:24	0.201		
17270011 ASF	7/27/98	7:25	0.206		
17270012 ASF	7/27/98	7:27	0.205		
17270013 ASF	7/27/98	7:29	0.218		
17270014 ASF	7/27/98	7:31	0.209		
17270015 ASF	7/27/98	7:33	0.203		
17270016 ASF	7/27/98	7:34	0.197		
17270017 ASF	7/27/98	7:36	0.193		
		7:37		24.33	
17270018 ASF	7/27/98	7:38	0.147		
		7:39		25.65	
17270019 ASF	7/27/98	7:40	0.165		
17270020 ASF	7/27/98	7:42	0.237		
17270021 ASF	7/27/98	7:43	0.204		
		7:44		24.80	
17270022 ASF	7/27/98	7:45	0.190		
17270023 ASF	7/27/98	7:47	0.184	24.66	
17270024 ASF	7/27/98	7:49	0.221		
17270025 ASF	7/27/98	7:50	0.191		
17270026 ASF	7/27/98	7:52	0.208		
17270027 ASF	7/27/98	7:54	0.277	25.28	
17270028 ASF	7/27/98	7:56	0.267	25.21	
17270029 ASF	7/27/98	7:58	0.200		
17270030 ASF	7/27/98	7:59	0.166		
17270031 ASF	7/27/98	8:01	0.122	24.38	
		8:02		20.95	
17270032 ASF	7/27/98	8:03	0.119		
		8:04		25.70	
17270033 ASF	7/27/98	8:05	0.159		
17270034 ASF	7/27/98	8:06	0.157		
17270035 ASF	7/27/98	8:08	0.196		
17270036 ASF	7/27/98	8:10	0.206	27.84	
17270037 ASF	7/27/98	8:12	0.200	21.40	
17270038 ASF	7/27/98	8:14	0.172	24.25	
17270039 ASF	7/27/98	8:15	0.190		
		8:16		25.16	

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17270040 ASF	7/27/98	8:17	0.158		
17270041 ASF	7/27/98	8:19	0.144	25.56	
17270042 ASF	7/27/98	8:21	0.138	24.04	
17270043 ASF	7/27/98	8:22	0.190	21.38	
		8:23			
17270044 ASF	7/27/98	8:24	0.178	24.23	
		8:25			
17270045 ASF	7/27/98	8:26	0.179	25.71	
17270046 ASF	7/27/98	8:28	0.182	26.16	
17270047 ASF	7/27/98	8:29	0.181		
		8:30		24.72	
17270048 ASF	7/27/98	8:31	0.166		
		8:32		21.37	
17270049 ASF	7/27/98	8:33	0.235		
		8:34		25.66	
17270050 ASF	7/27/98	8:35	0.221	21.18	
17270051 ASF	7/27/98	8:37	0.225		
17270052 ASF	7/27/98	8:38	0.205	26.16	
17270053 ASF	7/27/98	8:40	0.201	25.40	
		8:41		21.36	
17270054 ASF	7/27/98	8:42	0.213		
		8:43		21.30	
17270055 ASF	7/27/98	8:44	0.255	25.84	
17270056 ASF	7/27/98	8:45	0.241		
17270057 ASF	7/27/98	8:47	0.188		
		8:48		25.96	
17270058 ASF	7/27/98	8:49	0.164	21.12	
17270059 ASF	7/27/98	8:51	0.150	21.33	
17270060 ASF	7/27/98	8:53	0.135	26.13	
17270061 ASF	7/27/98	8:54	0.137	24.45	
		8:55		24.45	
17270062 ASF	7/27/98	8:56	0.120	21.31	
17270063 ASF	7/27/98	8:58	0.128	20.44	
17270064 ASF	7/27/98	9:00	0.151	24.61	
17270065 ASF	7/27/98	9:01	0.174		
		9:02		26.01	
17270066 ASF	7/27/98	9:03	0.149	24.10	
		9:04		21.28	
17270067 ASF	7/27/98	9:05	0.160		
17270068 ASF	7/27/98	9:07	0.112	23.19	
		9:08		25.55	
17270069 ASF	7/27/98	9:09	0.117		
17270070 ASF	7/27/98	9:10	0.102	24.46	
17270071 ASF	7/27/98	9:12	0.109	21.28	
17270072 ASF	7/27/98	9:14	0.131	21.37	
17270073 ASF	7/27/98	9:16	0.132	25.64	
17270074 ASF	7/27/98	9:17	0.141		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
17270075 ASF	7/27/98	9:19	0.175	25.13	
17270076 ASF	7/27/98	9:21	0.155		
17270077 ASF	7/27/98	9:23	0.101	24.44	
17270078 ASF	7/27/98	9:25	0.090		
17270079 ASF	7/27/98	9:26	0.170		
		9:27		25.54	
17270080 ASF	7/27/98	9:28	0.132		
		9:29		21.36	
17270081 ASF	7/27/98	9:30	0.108		
17270082 ASF	7/27/98	9:32	0.118	25.71	
17270083 ASF	7/27/98	9:33			Instrument off-line for
		9:34		27.74	manual method port change,
17270084 ASF	7/27/98	9:35		21.49	capture data not usable.
17270085 ASF	7/27/98	9:37			
		9:38		24.79	
17270086 ASF	7/27/98	9:39			
		9:43		24.51	
		9:45		25.72	
		9:47		25.18	
		9:52		25.88	
17270087 ASF	7/27/98	9:54		26.39	
17270088 ASF	7/27/98	9:56			
		9:57		8.02	
		9:58		21.26	
17270089 ASF	7/27/98	9:59			
		10:00		21.07	
17270090 ASF	7/27/98	10:01			
17270091 ASF	7/27/98	10:03	0.107		Usable data.
		10:04		26.08	
17270092 ASF	7/27/98	10:05	0.121		
17270093 ASF	7/27/98	10:06	0.120	25.78	
		10:07		24.42	
17270094 ASF	7/27/98	10:08	0.164		
		10:09		24.33	
17270095 ASF	7/27/98	10:10	0.132		
		10:11		25.93	
17270096 ASF	7/27/98	10:12	0.115		
17270097 ASF	7/27/98	10:14	0.112	25.22	
17270098 ASF	7/27/98	10:15	0.112		
		10:16		24.78	
17270099 ASF	7/27/98	10:17	0.115		
17270100 ASF	7/27/98	10:19	0.116		
		10:20		25.86	
17270101 ASF	7/27/98	10:21	0.143		
17270102 ASF	7/27/98	10:22	0.084	24.52	
		10:23		21.25	
17270103 ASF	7/27/98	10:24	0.099		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		10:25		25.72	
17270104 ASF	7/27/98	10:26	0.116		
		10:27		26.14	
17270105 ASF	7/27/98	10:28	0.098	20.98	
17270106 ASF	7/27/98	10:30	0.121	21.35	
17270107 ASF	7/27/98	10:31	0.105		
		10:32		26.10	
17270108 ASF	7/27/98	10:33	0.140		
		10:34		21.25	
17270109 ASF	7/27/98	10:35	0.181	21.29	
17270110 ASF	7/27/98	10:37	0.214	21.40	
17270111 ASF	7/27/98	10:38	0.235		
		10:39		25.70	
17270112 ASF	7/27/98	10:40	0.202		
17270113 ASF	7/27/98	10:42	0.135		
		10:43		25.28	
17270114 ASF	7/27/98	10:44	0.092		
		10:45		21.39	SED being monitored by
		10:47		21.38	FTIR (grab samples),
		10:50		25.76	capture data not usable.
		10:51		21.21	
		10:52		21.44	
		10:56		25.52	
		10:57		21.61	
		11:00		25.58	
		11:01		20.87	
		11:03		21.30	
		11:08		25.74	
		11:09		21.45	
		11:11		22.47	
		11:13		27.91	
17270115 ASF	7/27/98	11:17			Usable data.
		11:18		23.26	
17270116 ASF	7/27/98	11:19	0.101		
17270117 ASF	7/27/98	11:21	0.112	25.22	
17270118 ASF	7/27/98	11:22	0.158		
		11:23		25.78	
17270119 ASF	7/27/98	11:24	0.142		
		11:25		24.53	
17270120 ASF	7/27/98	11:26	0.191		
17270121 ASF	7/27/98	11:28	0.135		
		11:29		25.92	
17270122 ASF	7/27/98	11:30	0.096		
17270123 ASF	7/27/98	11:31	0.089		
17270124 ASF	7/27/98	11:33	0.107	25.79	
		11:34		24.91	
17270125 ASF	7/27/98	11:35	0.144		

Filename	Date	Time (PST)	SF_6 Conc. (ppm)	Load Out (tons)	Comments
		11:36		24.56	
17270126 ASF	7/27/98	11:37	0.149	26.60	
17270127 ASF	7/27/98	11:38	0.143		
		11:39		26.14	
17270128 ASF	7/27/98	11:40	0.125		
		11:41		25.67	
17270129 ASF	7/27/98	11:42	0.114		
		11:43		26.10	
17270130 ASF	7/27/98	11:44	0.153		
17270131 ASF	7/27/98	11:45	0.121	24.49	
17270132 ASF	7/27/98	11:47	0.117		
		11:48		25.96	
17270133 ASF	7/27/98	11:49	0.104		
		11:50		25.46	
17270134 ASF	7/27/98	11:51	0.087	24.81	
		11:52		21.08	
17270135 ASF	7/27/98	11:53	0.124		
17270136 ASF	7/27/98	11:54	0.139		
		11:55		24.64	
17270137 ASF	7/27/98	11:56	0.133		
17270138 ASF	7/27/98	11:58	0.127		
17270139 ASF	7/27/98	12:00	0.149		
17270140 ASF	7/27/98	12:01	0.115		
Average Concentration (ppm)			0.159		
Maximum Concentration (ppm)			0.277094		
Minimum Concentration (ppm)			0.0843839		
Average Concentration (g/ft^3)			2.73E-05		
Stack Gas Flowrate (acfm)			10,832		
Capture Rate (g/min)			0.296		
Sampling Time (min)			217		
Total Capture (g)			64.2		
Loadout during capture tests (tons/hr)				722.69	
Loadout during all testing (tons/hr)				573.38	

File list for 7/26/98 - Run 4 (Background) Loadout

Filename	Date	Time (PST	SF_6 Conc. (ppm)	Comments
17260001 ASF	7/26/98	9:25		
17260002 ASF	7/26/98	9:27		
17260003 ASF	7/26/98	9:29		
17260004 ASF	7/26/98	9:31	0.134	
17260005 ASF	7/26/98	9:32	0.160	
17260006 ASF	7/26/98	9:34	0.164	
17260007 ASF	7/26/98	9:36	0.103	
17260008 ASF	7/26/98	9:38	0.144	
17260009 ASF	7/26/98	9:39	0.152	
17260010 ASF	7/26/98	9:41	0.156	
17260011 ASF	7/26/98	9:43	0.176	
17260012 ASF	7/26/98	9:45	0.147	
17260013 ASF	7/26/98	9:46	0.108	
17260014 ASF	7/26/98	9:48	0.108	
17260015 ASF	7/26/98	9:50	0.103	
17260016 ASF	7/26/98	9:52	0.107	
17260017 ASF	7/26/98	9:54	0.147	
17260018 ASF	7/26/98	9:55	0.136	
17260019 ASF	7/26/98	9:57	0.075	
17260020 ASF	7/26/98	9:59	0.103	
17260021 ASF	7/26/98	10:01	0.096	
17260022 ASF	7/26/98	10:02	0.093	
17260023 ASF	7/26/98	10:04	0.101	
17260024 ASF	7/26/98	10:06	0.088	
17260025 ASF	7/26/98	10:08	0.127	
17260026 ASF	7/26/98	10:09	0.115	
17260027 ASF	7/26/98	10:11	0.125	
17260028 ASF	7/26/98	10:13	0.176	
17260029 ASF	7/26/98	10:15	0.175	
17260030 ASF	7/26/98	10:17	0.182	
17260031 ASF	7/26/98	10:18	0.151	
17260032 ASF	7/26/98	10:20	0.172	
17260033 ASF	7/26/98	10:22	0.184	
17260034 ASF	7/26/98	10:24	0.146	
17260035 ASF	7/26/98	10:25	0.169	
17260036 ASF	7/26/98	10:27	0.148	
17260037 ASF	7/26/98	10:29	0.175	
17260038 ASF	7/26/98	10:31	0.160	
17260039 ASF	7/26/98	10:33	0.122	
17260040 ASF	7/26/98	10:34	0.170	
17260041 ASF	7/26/98	10:36	0.225	
17260042 ASF	7/26/98	10:38	0.148	
17260043 ASF	7/26/98	10:40	0.114	
17260044 ASF	7/26/98	10:41	0.144	

Filename	Date	Time (PST	SF_6 Conc. (ppm)	Comments
17260045 ASF	7/26/98	10:43	0.106	
17260046 ASF	7/26/98	10:45	0.156	
17260047 ASF	7/26/98	10:47	0.211	
17260048 ASF	7/26/98	10:49	0.149	
17260049 ASF	7/26/98	10:50	0.190	
17260050 ASF	7/26/98	10:52	0.218	
17260051 ASF	7/26/98	10:54	0.229	
17260052 ASF	7/26/98	10:56	0.202	
17260053 ASF	7/26/98	10:57	0.234	
17260054 ASF	7/26/98	10:59	0.229	
17260055 ASF	7/26/98	11:01	0.257	
17260056 ASF	7/26/98	11:03	0.234	
17260057 ASF	7/26/98	11:04	0.211	
17260058 ASF	7/26/98	11:06	0.195	
17260059 ASF	7/26/98	11:08	0.129	
17260060 ASF	7/26/98	11:10	0.186	
17260061 ASF	7/26/98	11:11	0.173	
17260062 ASF	7/26/98	11:13	0.175	
17260063 ASF	7/26/98	11:15	0.178	
17260064 ASF	7/26/98	11:17	0.157	
17260065 ASF	7/26/98	11:19	0.074	
17260066 ASF	7/26/98	11:20	0.089	
17260067 ASF	7/26/98	11:22	0.124	
17260068 ASF	7/26/98	11:24	0.107	
17260069 ASF	7/26/98	11:26	0.089	
17260070 ASF	7/26/98	11:27	0.072	
17260071 ASF	7/26/98	11:50	0.179	
17260072 ASF	7/26/98	11:52	0.180	
17260073 ASF	7/26/98	11:54	0.153	
17260074 ASF	7/26/98	11:56	0.125	
17260075 ASF	7/26/98	11:57	0.125	
17260076 ASF	7/26/98	11:59	0.165	
17260077 ASF	7/26/98	12:01	0.199	
17260078 ASF	7/26/98	12:03	0.219	
17260079 ASF	7/26/98	12:05	0.185	
17260080 ASF	7/26/98	12:06	0.189	
17260081 ASF	7/26/98	12:08	0.148	
17260082 ASF	7/26/98	12:10	0.162	
17260083 ASF	7/26/98	12:12	0.164	
17260084 ASF	7/26/98	12:13	0.154	
17260085 ASF	7/26/98	12:15	0.133	
17260086 ASF	7/26/98	12:17	0.142	
17260087 ASF	7/26/98	12:19	0.077	
17260088 ASF	7/26/98	12:21	0.085	
17260089 ASF	7/26/98	12:22	0.114	
17260090 ASF	7/26/98	12:24	0.145	
17260091 ASF	7/26/98	12:26	0.107	

Filename	Date	Time (PST	SF_6 Conc. (ppm)	Comments
17260092 ASF	7/26/98	12:28	0.107	
17260093 ASF	7/26/98	12:29	0.077	
17260094 ASF	7/26/98	12:31	0.096	
17260095 ASF	7/26/98	12:33	0.062	
17260096 ASF	7/26/98	12:35	0.000	
17260097 ASF	7/26/98	12:36	0.060	
17260098 ASF	7/26/98	12:38	0.137	
17260099 ASF	7/26/98	12:40	0.074	
17260100 ASF	7/26/98	12:42	0.085	
17260101 ASF	7/26/98	12:43	0.169	
17260102 ASF	7/26/98	12:45	0.130	
17260103 ASF	7/26/98	12:47	0.083	
17260104 ASF	7/26/98	12:49	0.119	
17260105 ASF	7/26/98	12:50	0.132	
17260106 ASF	7/26/98	12:52	0.100	
17260107 ASF	7/26/98	12:54	0.156	
17260108 ASF	7/26/98	12:56	0.144	
17260109 ASF	7/26/98	12:58	0.145	
17260110 ASF	7/26/98	12:59	0.150	
17260111 ASF	7/26/98	13:01	0.081	
17260112 ASF	7/26/98	13:03	0.099	
17260113 ASF	7/26/98	13:05	0.093	
17260114 ASF	7/26/98	13:06	0.086	
17260115 ASF	7/26/98	13:08	0.095	
17260116 ASF	7/26/98	13:10	0.049	
17260117 ASF	7/26/98	13:12	0.061	
17260118 ASF	7/26/98	13:14	0.000	
17260119 ASF	7/26/98	13:15	0.000	
17260120 ASF	7/26/98	13:17	0.000	
17260121 ASF	7/26/98	13:19	0.047	
17260122 ASF	7/26/98	13:21	0.069	
17260123 ASF	7/26/98	13:22	0.062	
17260124 ASF	7/26/98	13:24	0.093	
17260125 ASF	7/26/98	13:26	0.070	
17260126 ASF	7/26/98	13:28	0.069	
17260127 ASF	7/26/98	13:30	0.059	
17260128 ASF	7/26/98	13:31	0.053	
17260129 ASF	7/26/98	13:33	0.052	
17260130 ASF	7/26/98	13:35	0.068	
17260131 ASF	7/26/98	13:37	0.073	
17260132 ASF	7/26/98	13:38	0.109	
17260133 ASF	7/26/98	13:40	0.082	
17260134 ASF	7/26/98	13:42	0.072	
17260135 ASF	7/26/98	13:44	0.131	
17260136 ASF	7/26/98	13:45	0.108	
Average Concentration (ppm)			0.128	

Filename	Date	Time (PST	SF_6 Conc. (ppm)	Comments
Maximum Concentration (ppm)			0.257	
Minimum Concentration (ppm)			0.000	
Average Concentration (g/ft^3)			2.21E-05	
Stack Gas Flowrate (acfm)			11,886	
Capture Rate (g/min)			0.262	
Sampling Time (min)			254	
Total Capture (g)			66.6	

Appendix G

SF_6 Gas Release Data

SF6 Gas Delivery Data Spreadsheet
Loadout Run 1 Date: 7/24/98

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
8:05:00	2	4.06	Usable data	4.06
8:06:00	2	4.03		4.03
8:07:00	2	4.00		4.00
8:08:00			Stop Gas Release	
8:13:30	2	4.07	Resume Gas Release	
8:14:00	2	4.05		
8:15:00	2	4.03	Silo 1 being used sporadically;	
8:16:00	2	4.00	data not usable.	
8:16:30			Stop Gas Release	
8:26:30	3	4.14	Resume Gas Release	
8:27:00	3	4.13		
8:28:00	3	4.10		
8:29:00	2	4.00		
8:30:00	2	4.03	Usable data	4.03
8:31:00	3	4.08		4.08
8:32:00	3	4.10		4.10
8:33:00	3	4.11		4.11
8:34:00	2	4.03		4.03
8:35:00	2	4.04		4.04
8:36:00	2	4.04		4.04
8:37:00	2	4.04		4.04
8:38:00	2	4.04		4.04
8:39:00	2	4.04		4.04
8:40:00	2	4.04		4.04
8:41:00	2	4.04		4.04
8:42:00	3	4.10		4.10
8:43:00	2	4.03		4.03
8:44:00	2	4.04		4.04
8:45:00	2	4.04		4.04
8:46:00	3	4.10		4.10
8:47:00	3	4.11		4.11
8:48:00	3	4.11		2.05
8:48:30	2	4.03		2.01
8:49:00	2	4.04		4.04
8:50:00	2	4.04		4.04
8:51:00	2	4.04		4.04
8:52:00	2	4.04		4.04
8:53:00	4	4.10		4.10
8:54:00	3	4.08		4.08
8:55:00	3	4.10		4.10
8:56:00	4	4.08		4.08
8:57:00	4	4.08		4.08
8:58:00	4	4.09		4.09
8:59:00	4	4.09		4.09

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
9:00:00	2	4.00		4.00
9:01:00	2	4.02		4.02
9:02:00	2	4.02		4.02
9:03:00	2	4.02		4.02
9:04:00	2	4.02		4.02
9:05:00	3	4.09		4.09
9:06:00	2	4.03		4.03
9:07:00	2	4.02		4.02
9:08:00	2	4.02		4.02
9:09:00	2	4.02		4.02
9:10:00	2	4.03		4.03
9:11:00	2	4.03		4.03
9:12:00	2	4.02		4.02
9:13:00	2	4.02		4.02
9:14:00	2	4.09		4.09
9:15:00	3	4.09		4.09
9:16:00	3	4.10		4.10
9:17:00	4	4.12	THC spike gas run through	
9:18:00	4	4.13	sample lines; capture data	
9:19:00	4	4.14	not usable.	
9:20:00	4	4.14		
9:21:00	4	4.14		
9:22:00	2	4.04		
9:23:00	3	4.10		
9:24:00	2	4.03		
9:25:00	2	4.05	Usable data.	4.05
9:26:00	2	4.04		4.04
9:27:00	2	4.05		4.05
9:28:00	2	4.04		4.04
9:29:00	2	4.03		4.03
9:30:00	2	4.03		4.03
9:31:00	2	4.03		4.03
9:32:00	2	4.04		4.04
9:33:00	2	4.03	SED being monitored by FTIR;	
9:34:00	2	4.03	capture data not usable.	
9:35:00			Stop Gas Release	
10:57:00	5	4.08	Resume Gas Release	
10:58:00	5	4.05		
10:59:00	3	4.03		
11:00:00	3	4.03	Usable data.	4.03
11:01:00	4	4.07		4.07
11:02:00	5	4.04		4.04
11:03:00	5	4.04		4.04
11:04:00	5	4.05		4.05
11:05:00	5	4.05		4.05
11:06:00	5	4.05		4.05
11:07:00	5	4.05		4.05
11:08:00	5	4.05		4.05

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
11:09:00	5	4.05		4.05
11:10:00	4	4.07		4.07
11:11:00	3	4.04		4.04
11:12:00	3	4.05		4.05
11:13:00	3	4.05		4.05
11:14:00	3	4.05		4.05
11:15:00	3	4.05		4.05
11:16:00	4	4.05		4.05
11:17:00	4	4.06		4.06
11:18:00	4	4.06		4.06
11:19:00	3	4.04		4.04
11:20:00	3	4.05		4.05
11:21:00	3	4.04		4.04
11:22:00	4	4.04		4.04
11:23:00	4	4.05		4.05
11:24:00	4	4.05		4.05
11:25:00	4	4.05		4.05
11:26:00	4	4.05		4.05
11:27:00	3	4.03		4.03
11:28:00	3	4.03		4.03
11:29:00	2	3.95		3.95
11:30:00	2	3.98		3.98
11:31:00	2	4.00		4.00
11:32:00	2	4.00		4.00
11:33:00	2	4.00		4.00
11:34:00	2	4.00		4.00
11:35:00	3	4.00		4.00
11:36:00	3	4.02		4.02
11:37:00	3	4.03		4.03
11:38:00	3	4.02		4.02
11:39:00	2	3.98		3.98
11:40:00	2	3.99		3.99
11:41:00	3	4.02		4.02
11:42:00	3	4.00		4.00
11:43:00	2	4.00		4.00
11:44:00	2	3.99		3.99
11:45:00	2	4.00		4.00
11:46:00	2	4.00		4.00
11:47:00	2	4.00		4.00
11:48:00	2	4.00		4.00
11:49:00	2	4.00		4.00
11:50:00	2	4.00		4.00
11:51:00	2	4.00		4.00
11:52:00	2	3.99		3.99
11:53:00	2	4.00		4.00
11:54:00	2	4.00		4.00
11:55:00	2	4.00		4.00
11:56:00	2	4.00		4.00

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
11:57:00	2	4.00		4.00
11:58:00	2	4.00		4.00
11:59:00	2	4.00		4.00
12:00:00	2	4.00		4.00
12:01:00	2	4.00		4.00
12:02:00	2	4.00		4.00
12:03:00	2	4.00		4.00
12:04:00	2	4.00		4.00
12:05:00	2	4.00		4.00
12:06:00	2	4.00		4.00
12:07:00	2	4.00		4.00
12:08:00	2	4.00		4.00
12:09:00	2	4.00		4.00
12:10:00	2	4.00		4.00
12:11:00	2	4.00		4.00
12:12:00	2	4.00		4.00
12:13:00	2	4.00		4.00
12:14:00	2	4.00		4.00
12:15:00	2	4.00		4.00
12:16:00	2	4.00		4.00
12:17:00	2	4.00		4.00
12:18:00	2	3.99		3.99
12:19:00	2	3.99		3.99
12:20:00	2	3.99		3.99
12:21:00	2	3.99		3.99
12:22:00	2	4.00		4.00
12:23:00	2	4.00		4.00
12:24:00	2	4.00		4.00
12:25:00	2	4.00		4.00
12:26:00	2	4.00		4.00
12:27:00	2	4.00		4.00
12:28:00	2	4.00		4.00
12:29:00	2	4.00		4.00
12:30:00	2	4.00		4.00
12:31:00	2	4.00		4.00
12:32:00	2	4.00		4.00
12:33:00	2	4.00		4.00
12:34:00	2	4.00		4.00
12:35:00	2	4.00		4.00
12:36:00	3	4.00		4.00
12:37:00	2	4.02		4.02
12:38:00	2	4.00		4.00
12:39:00	2	4.00		4.00
12:40:00	2	4.00		4.00
12:41:00	2	4.00		4.00
12:42:00	2	4.00		4.00
12:43:00	2	4.00		4.00
12:44:00	2	4.00		4.00

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
12:45:00	2	4.00		4.00
12:46:00	2	4.00		4.00
12:47:00	2	4.00		4.00
12:48:00	2	4.00		4.00
12:49:00	4	4.07		4.07
12:50:00	4	4.06		4.06
12:51:00	4	4.06		4.06
12:52:00	4	4.06		4.06
12:53:00	2	4.00		4.00
12:54:00	2	4.00		4.00
12:55:00	2	4.00		4.00
12:56:00	2	4.00		4.00
12:57:00	Stop Gas Release		End of run	
Average Release Rate (LPM) =				4.07
Mass Release Rate (g/min) =				0.491
Time of Release (min) =				173
Mass Released (g) =				84.9

SF6 Gas Delivery Data Spreadsheet
Loadout Run 2

Date: 7/25/98

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
7:10:00	3	4.10		
7:11:00	5	4.00		
7:12:00	5	4.05		
7:13:00	5	4.06	Usable data.	4.06
7:14:00	5	4.07		4.07
7:15:00	5	4.08		4.08
7:16:00	5	4.00		4.00
7:17:00	3	4.06		4.06
7:18:00	3	4.06		4.06
7:19:00	3	4.06		4.06
7:20:00	3	4.06		4.06
7:21:00	3	4.06		4.06
7:22:00	3	4.06		2.03
7:22:30	2	4.02		2.01
7:23:00	2	4.03		4.03
7:24:00	2	4.04		4.04
7:25:00	3	4.07		4.07
7:26:00	3	4.07		4.07
7:27:00	3	4.08		4.08
7:28:00	3	4.08		8.16
7:30:00	2	4.04		4.04
7:31:00	2	4.05		2.02
7:31:30	3	4.08		2.04
7:32:00	3	4.08		4.08
7:33:00	3	4.08		4.08
7:34:00	3	4.08		4.08
7:35:00	3	4.08		4.08
7:36:00	3	4.09		4.09
7:37:00	2	4.04		4.04
7:38:00	2	4.05		4.05
7:39:00	2	4.05		4.05
7:40:00	2	4.05		4.05
7:41:00	2	4.05		4.05
7:42:00	3	4.09		4.09
7:43:00	3	4.08		2.04
7:43:30	2	4.04		2.02
7:44:00	2	4.04		4.04
7:45:00	2	4.04		4.04
7:46:00	2	4.05		4.05
7:47:00	2	4.05		2.02
7:47:30	3	4.07		2.03
7:48:00	3	4.07		4.07
7:49:00	3	4.07		4.07
7:50:00	2	4.03		4.03

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
7:51:00	2	4.05		4.05
7:52:00	2	4.05		4.05
7:53:00	2	4.04		4.04
7:54:00	2	4.04		4.04
7:55:00	3	4.07		4.07
7:56:00	3	4.06		4.06
7:57:00	3	4.06		4.06
7:58:00	3	4.06		4.06
7:59:00	3	4.06		2.03
7:59:30	2	4.03		2.01
8:00:00	2	4.03		4.03
8:01:00	2	4.03		4.03
8:02:00	2	4.03		4.03
8:03:00	2	4.04		2.02
8:03:30	3	4.04		2.02
8:04:00	3	4.04		4.04
8:05:00	3	4.04		4.04
8:06:00	3	4.04		4.04
8:07:00	3	4.04		4.04
8:08:00	2	4.03		4.03
8:09:00	3	4.04		4.04
8:10:00	3	4.00		4.00
8:11:00	3	4.00		4.00
8:12:00	4	4.09		4.09
8:13:00	4	4.09		4.09
8:14:00	4	4.09		4.09
8:15:00	4	4.09		4.09
8:16:00	4	4.09		2.04
8:16:30	3	4.00		2.00
8:17:00	3	4.00		4.00
8:18:00	3	4.00		4.00
8:19:00	3	4.00		4.00
8:20:00	3	4.00		4.00
8:21:00	3	4.00		4.00
8:22:00	5	4.04		4.04
8:23:00	5	4.03		4.03
8:24:00	3	4.00		4.00
8:25:00	3	4.00		4.00
8:26:00	3	4.00		4.00
8:27:00	2	4.00		4.00
8:28:00	2	4.00		4.00
8:29:00	2	4.02		4.02
8:30:00	3	4.03		4.03
8:31:00	3	4.02		4.02
8:32:00	3	4.02		4.02
8:33:00	3	4.00		4.00
8:34:00	3	4.00		4.00
8:35:00	2	4.00		4.00

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
8:36:00	2	4.00		2.00
8:36:30	4	4.08		2.04
8:37:00	4	4.08		4.08
8:38:00	4	4.07		4.07
8:39:00	4	4.07		4.07
8:40:00	4	4.06		4.06
8:41:00	3	3.97		3.97
8:42:00	3	3.98		3.98
8:43:00	5	4.00		4.00
8:44:00			Stop Gas Release	
9:27:00	2	4.00	Resume Gas Release	
9:28:00	2	3.97	SED being monitored by FTIR;	
9:29:00	2	3.95	capture data not usable.	
9:30:00	2	4.06		
9:31:00	2	4.06	Usable data.	4.06
9:32:00	2	4.06		4.06
9:33:00	3	4.06		4.06
9:34:00	3	4.07		4.07
9:35:00	2	4.11		4.11
9:36:00	2	4.11		4.11
9:37:00	2	4.05		4.05
9:38:00	2	4.05		4.05
9:39:00	2	4.05		4.05
9:40:00	2	4.05		4.05
9:41:00	2	4.05		4.05
9:42:00	2	4.05		4.05
9:43:00	2	4.05		4.05
9:44:00	2	4.05		4.05
9:45:00	2	4.04		4.04
9:46:00	3	4.05		4.05
9:47:00	2	4.04		4.04
9:48:00	2	4.04		4.04
9:49:00	2	4.05		4.05
9:50:00	2	4.05		4.05
9:51:00	2	4.05		4.05
9:52:00	2	4.05		4.05
9:53:00	2	4.05		4.05
9:54:00	2	4.04		4.04
9:55:00	2	4.03		4.03
9:56:00	2	4.04		4.04
9:57:00	2	4.03		4.03
9:58:00	2	4.04		4.04
9:59:00	2	4.03		4.03
10:00:00	2	4.03		4.03
10:01:00	2	4.03		4.03
10:02:00	2	4.04		4.04
10:03:00	2	4.04		4.04
10:04:00	2	4.04		4.04

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
10:05:00	2	4.04		4.04
10:06:00	2	4.04		4.04
10:07:00	2	4.04		4.04
10:08:00	2	4.04		4.04
10:09:00	2	4.04		4.04
10:10:00	2	4.03		4.03
10:11:00	2	4.03		4.03
10:12:00	2	4.03		4.03
10:13:00	2	4.04		4.04
10:14:00	2	4.04		4.04
10:15:00	2	4.04		4.04
10:16:00	2	4.04		4.04
10:17:00	3	4.05		4.05
10:18:00	3	4.06		4.06
10:19:00	3	4.07		4.07
10:20:00	3	4.06		4.06
10:21:00	3	4.06		4.06
10:22:00	3	4.09		4.09
10:23:00	3	4.06		4.06
10:24:00	3	4.06		4.06
10:25:00	3	4.07		4.07
10:26:00	2	4.00		4.00
10:27:00	2	4.00		4.00
10:28:00	2	4.00		4.00
10:29:00	2	4.00		4.00
10:30:00	4	4.05		4.05
10:31:00	4	4.07		4.07
10:32:00	4	4.06		4.06
10:33:00	4	4.06		4.06
10:34:00	4	4.06		4.06
10:35:00	4	4.06		4.06
10:36:00	4	4.06		4.06
10:37:00	4	4.06		4.06
10:38:00	4	4.06		4.06
10:39:00	4	4.05		4.05
10:40:00	4	4.05		4.05
10:41:00	4	4.05		4.05
10:42:00	5	3.96		3.96
10:43:00	5	3.96		3.96
10:44:00	5	3.97		3.97
10:45:00	5	3.97		3.97
10:46:00	5	3.97		3.97
10:47:00	5	3.97		3.97
10:48:00	2	4.04		4.04
10:49:00	2	4.04		4.04
10:50:00	2	4.03		4.03
10:51:00	2	4.00		4.00
10:52:00	2	4.00		4.00

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
10:53:00	2	3.98		3.98
10:54:00	2	3.96		3.96
10:55:00	2	4.00		4.00
10:56:00	2	4.00		4.00
10:57:00	2	4.00		4.00
10:58:00	2	4.00		4.00
10:59:00	2	4.00		4.00
11:00:00	2	4.00		4.00
11:01:00	2	4.00		4.00
11:02:00	2	4.00		4.00
11:03:00	2	4.00		4.00
11:04:00	2	4.00		4.00
11:05:00	2	4.00		4.00
11:06:00	2	4.00		4.00
11:07:00	2	4.00		4.00
11:08:00	2	4.00		4.00
11:09:00	2	4.00		4.00
11:10:00	2	4.00		4.00
11:11:00	2	3.99		3.99
11:12:00	2	3.98	End of Run	
11:13:00	2	3.99		
11:14:00	2	3.99		
11:15:00	2	3.99		
11:16:00	2	3.99		
11:17:00	2	4.02		
11:18:00	2	4.00		
11:19:00	2	4.00		
11:20:00	2	3.99		
11:21:00	2	3.99		
11:22:00	2	3.98		
11:23:00	2	3.97		
11:24:00	2	3.97		
11:25:00	2	3.98		
11:26:00	2	3.99		
11:27:00	2	3.99		
11:28:00	2	4.00		
11:29:00	2	4.03		
11:29:30			Stop Gas Release	

Average Release Rate (LPM) =	4.04
Mass Release Rate (g/min) =	0.486
Time of Release (min) =	192
Mass Released (g) =	93

SF6 Gas Delivery Data Spreadsheet
Loadout Run 3

Date: 7/27/98

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
7:10:00	2	4.00	Start Gas Release	
7:11:00	2	3.97		
7:12:00	2	4.03		
7:13:00	2	4.03		
7:14:00	2	4.04		
7:15:00	2	4.04	Usable data.	4.04
7:16:00	2	4.04		4.04
7:17:00	2	4.04		4.04
7:18:00	2	4.04		4.04
7:19:00	2	4.04		4.04
7:20:00	2	4.04		4.04
7:21:00	2	4.04		4.04
7:22:00	2	4.03		4.03
7:23:00	2	4.03		4.03
7:24:00	2	4.03		4.03
7:25:00	2	4.02		4.02
7:26:00	2	4.00		4.00
7:27:00	2	4.00		4.00
7:28:00	2	4.00		4.00
7:29:00	2	4.00		4.00
7:30:00	2	4.00		4.00
7:31:00	2	4.00		4.00
7:32:00	2	4.00		4.00
7:33:00	2	4.00		4.00
7:34:00	2	4.00		4.00
7:35:00	2	4.00		4.00
7:36:00	2	4.00		4.00
7:37:00	2	4.00		4.00
7:38:00	2	4.00		4.00
7:39:00	2	4.00		4.00
7:40:00	2	3.99		3.99
7:41:00	2	3.99		3.99
7:42:00	2	3.99		3.99
7:43:00	2	3.99		3.99
7:44:00	2	3.99		3.99
7:45:00	2	3.99		3.99
7:46:00	2	3.99		3.99
7:47:00	2	3.99		3.99
7:48:00	2	3.99		3.99
7:49:00	2	3.99		3.99
7:50:00	2	3.99		3.99
7:51:00	2	4.00		4.00
7:52:00	2	4.00		4.00
7:53:00	2	3.99		3.99

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
7:54:00	2	3.99		3.99
7:55:00	2	3.99		3.99
7:56:00	2	3.99		3.99
7:57:00	2	3.99		3.99
7:58:00	2	3.98		3.98
7:59:00	2	4.00		4.00
8:00:00	2	4.00		4.00
8:01:00	2	4.00		4.00
8:02:00	2	4.00		4.00
8:03:00	2	4.00		4.00
8:04:00	2	4.00		4.00
8:05:00	2	4.00		4.00
8:06:00	2	4.00		4.00
8:07:00	2	4.00		4.00
8:08:00	2	4.00		4.00
8:09:00	2	4.00		4.00
8:10:00	2	4.00		4.00
8:11:00	2	4.00		4.00
8:12:00	2	4.00		4.00
8:13:00	2	4.00		4.00
8:14:00	2	4.00		4.00
8:15:00	2	4.00		4.00
8:16:00	2	4.00		4.00
8:17:00	2	4.00		4.00
8:18:00	2	4.00		4.00
8:19:00	2	4.00		4.00
8:20:00	2	4.00		4.00
8:21:00	2	4.00		4.00
8:22:00	2	4.00		4.00
8:23:00	2	4.00		4.00
8:24:00	2	4.00		4.00
8:25:00	2	4.00		4.00
8:26:00	2	4.00		4.00
8:27:00	2	4.00		4.00
8:28:00	2	4.00		4.00
8:29:00	2	4.00		4.00
8:30:00	4	4.06		4.06
8:31:00	4	4.07		4.07
8:32:00	4	4.00		4.00
8:33:00	4	4.00		4.00
8:34:00	4	4.00		4.00
8:35:00	4	4.00		4.00
8:36:00	4	4.00		4.00
8:37:00	4	4.00		4.00
8:38:00	4	4.00		4.00
8:39:00	4	4.00		4.00
8:40:00	4	4.00		4.00
8:41:00	4	4.02		4.02

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
8:42:00	4	4.00		4.00
8:43:00	4	4.02		4.02
8:44:00	5	3.99		3.99
8:45:00	2	4.00		4.00
8:46:00	2	4.00		4.00
8:47:00	2	4.00		4.00
8:48:00	2	4.00		4.00
8:49:00	2	4.00		4.00
8:50:00	2	4.00		4.00
8:51:00	2	4.00		4.00
8:52:00	2	4.00		4.00
8:53:00	2	4.00		4.00
8:54:00	2	4.00		4.00
8:55:00	2	4.00		4.00
8:56:00	2	4.00		4.00
8:57:00	2	4.00		4.00
8:58:00	2	4.00		4.00
8:59:00	2	4.02		4.02
9:00:00	2	4.00		4.00
9:01:00	2	4.00		4.00
9:02:00	2	4.00		4.00
9:03:00	2	4.00		4.00
9:04:00	2	4.00		4.00
9:05:00	2	4.00		4.00
9:06:00	2	4.00		4.00
9:07:00	2	4.00		4.00
9:08:00	2	4.00		4.00
9:09:00	2	4.00		4.00
9:10:00	2	4.00		4.00
9:11:00	2	4.00		4.00
9:12:00	2	3.99		3.99
9:13:00	2	3.99		3.99
9:14:00	2	3.99		3.99
9:15:00	2	3.99		3.99
9:16:00	2	3.99		3.99
9:17:00	2	3.99		3.99
9:18:00	2	4.04		4.04
9:19:00	2	4.04		4.04
9:20:00	2	4.04		4.04
9:21:00	2	4.03		4.03
9:22:00	2	4.02		4.02
9:23:00	2	4.03		4.03
9:24:00	2	4.03		4.03
9:25:00	2	4.03		4.03
9:26:00	2	4.04		4.04
9:27:00	2	4.04		4.04
9:28:00	2	4.04		4.04
9:29:00	2	4.04		4.04

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
9:30:00	2	4.04		4.04
9:31:00	2	4.04		4.04
9:32:00			Stop Gas Release	
9:52:00	2	4.08	Resume Gas Release	
9:53:00	2	4.00		
9:54:00	2	3.98	Instrument off-line for manual	
9:55:00	2	3.98	method port change;	
9:56:00	2	3.98		
9:57:00			Stop Gas Release	
9:59:00	2	4.03	Resume Gas Release	
10:00:00	2	4.00		
10:01:00	2	3.99		
10:02:00	2	3.98		
10:03:00	2	3.99	Usable data.	3.99
10:04:00	2	3.99		3.99
10:05:00	2	3.99		3.99
10:06:00	2	3.99		3.99
10:07:00	2	3.99		3.99
10:08:00	2	3.99		3.99
10:09:00	2	3.99		3.99
10:10:00	2	3.99		3.99
10:11:00	2	3.99		3.99
10:12:00	2	4.00		4.00
10:13:00	2	4.00		4.00
10:14:00	2	3.99		3.99
10:15:00	2	3.99		3.99
10:16:00	2	3.99		3.99
10:17:00	2	3.99		3.99
10:18:00	2	3.99		3.99
10:19:00	2	3.99		3.99
10:20:00	2	3.98		3.98
10:21:00	2	3.99		3.99
10:22:00	2	3.98		3.98
10:23:00	2	4.00		4.00
10:24:00	2	4.00		4.00
10:25:00	2	4.00		4.00
10:26:00	2	4.00		4.00
10:27:00	2	4.00		4.00
10:28:00	2	4.00		4.00
10:29:00	2	4.00		4.00
10:30:00	2	4.00		4.00
10:31:00	5	4.00		4.00
10:32:00	2	4.02		4.02
10:33:00	2	4.03		4.03
10:34:00	5	4.00		4.00
10:35:00	5	3.99		3.99
10:36:00	5	3.99		3.99
10:37:00	5	3.99		3.99

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
10:38:00	5	3.99		3.99
10:39:00	5	3.99		3.99
10:40:00	5	3.99		3.99
10:41:00	5	4.03		4.03
10:42:00	5	3.99		3.99
10:43:00	5	4.00		4.00
10:44:00	5	4.00	SED being monitored by FTIR	
10:45:00	5	4.00	(grab samples); data not usable.	
10:46:00	5	4.00		
10:47:00	5	3.99		
10:48:00	5	3.99		
10:49:00	2	4.00		
10:50:00	2	4.00		
10:51:00	2	4.07		
10:52:00	2	4.04		
10:53:00	2	4.04		
10:54:00	2	4.03		
10:55:00	2	4.04		
10:56:00	2	4.04		
10:57:00	2	4.04		
10:58:00	2	4.04		
10:59:00	2	4.05		
11:00:00	2	4.05		
11:01:00	2	4.05		
11:02:00	2	4.06		
11:03:00	2	4.00		
11:04:00	2	4.00		
11:05:00	2	4.00		
11:06:00	2	4.00		
11:07:00	2	4.00		
11:08:00	2	4.00		
11:09:00	2	4.00		
11:10:00	2	4.00		
11:11:00	2	4.00		
11:12:00	2	4.00		
11:13:00	2	4.00		
11:14:00	2	4.00		
11:15:00	2	4.00		
11:16:00	2	4.00		
11:17:00	2	4.00	Usable data.	4.00
11:18:00	2	4.00		4.00
11:19:00	2	4.00		4.00
11:20:00	2	4.00		4.00
11:21:00	2	4.00		4.00
11:22:00	2	4.00		4.00
11:23:00	2	4.03		4.03
11:24:00	2	4.04		4.04
11:25:00	2	4.00		4.00

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
11:26:00	2	3.98		3.98
11:27:00	2	3.99		3.99
11:28:00	2	3.99		3.99
11:29:00	2	3.99		3.99
11:30:00	2	3.99		3.99
11:31:00	2	3.99		3.99
11:32:00	2	3.99		3.99
11:33:00	2	3.99		3.99
11:34:00	2	4.00		4.00
11:35:00	2	4.00		
11:35:30	1		Stop Gas Release	
11:37:00	2	4.00	Resume Gas Release	4.00
11:38:00	2	3.96		3.96
11:39:00	2	4.03		4.03
11:40:00	2	4.05		4.05
11:41:00	2	4.05		4.05
11:42:00	2	4.05		4.05
11:43:00	2	4.04		4.04
11:44:00	2	4.04		4.04
11:45:00	2	4.04		4.04
11:46:00	2	4.04		4.04
11:47:00	2	4.04		4.04
11:48:00	2	4.04		4.04
11:49:00	2	4.04		4.04
11:50:00	2	4.04		4.04
11:51:00	2	4.00		4.00
11:52:00	2	4.00		
11:53:00	1		Stop Gas Release	
11:54:30	2	4.05	Resume Gas Release	2.02
11:55:00	2	4.03		4.03
11:56:00	2	4.00		4.00
11:57:00	2	3.99		3.99
11:58:00	2	3.99		3.99
11:59:00	2	3.99		3.99
12:00:00			Stop Gas Release	
			End of Run	
Average Release Rate (LPM) =				4.01
Mass Release Rate (g/min) =				0.485
Time of Release (min) =				217
Mass Released (g) =				105

SF6 Gas Delivery Data Spreadsheet
Background Loadout Run 4

Date: 7/26/98

Time	Silo No.	Flow Rate (LPM)	Comments	Liters
9:27:00	2	4.13		
9:30:00	2	4.13		56.79
9:43:45	2	4.10		66.63
10:00:00	2	4.12		135.96
10:33:00	2	4.06		117.74
11:02:00	2	4.15		53.95
11:15:00	2	4.16		104.00
11:40:00	2	4.24		161.84
12:18:10	2	4.05		116.76
12:47:00	2	4.04		54.86
13:00:35	2	4.04		184.83
13:46:20	2		End of Run	

Average Release Rate (LPM) =	4.11
Mass Release Rate (g/min) =	0.497
Time of Release (min) =	256
Mass Released (g) =	128

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 1

Date: 7-24-98

Operator: D. NEAL

Gas Cylinder No: ALM013870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0805	#2	4.06	13	TRUCK IN TUNNEL, CLOUDY
0806	#2	4.03	13	" " "
0807	#2	4.00	13	" " " WIND SPEED 0-200 FPM
0808	STOP	GAS RELEASE		INTO TUNNEL, 0-100 FPM
				CROSS WIND.
0813.5	#2	4.07	13	TRUCK IN TUNNEL, RESUME GAS RELEASE
0814	#2	4.05	13	" " "
0815	#2	4.03	13	" " "
0816	#2	4.00	13	" " "
0816.5	STOP	GAS RELEASE		
0826.5	#3	4.14	13	TRUCK IN TUNNEL, RESUME GAS RELEASE
0827	#3	4.13	13	" " "
0828	#3	4.10	13	" " "
0829	#2	4.00	13	" " "
0830	#2	4.03	13	" " "
0831	#3	4.08	13	" " "
0832	#3	4.10	13	" " "
0833	#3	4.11	13	" " "
0834	#2	4.03	13	" " "
0835	#2	4.04	13	" " "
0836	#2	4.04	13	" " "
0837	#2	4.04	13	" " "
0838	#2	4.04	13	" " "
0839	#2	4.04	13	" " "
0840	#2	4.04	13	" " "
0841	#2	4.04	13	" " "
0842	#3	4.10	13	" " " CLOUDY, WIND SPEED AND
0843	#2	4.03	13	" " " DIRECTION UNCHANGED.
0844	#2	4.04	13	" " "
0845	#2	4.04	13	" " "
0846	#3	4.10	13	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04 | Run No. 1

Client/Source: PLANT C | Date: 7-24-98

Sampling Location: PTE Loadout | Operator: D. NEAL

MASS FLOW ~~Dry Gas~~ Meter No: R-0308 | Gas Cylinder No: ALMØ13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0847	#3	4.11	14	TRUCK IN TUNNEL
0848	#3	4.11	14	" " "
0848.5	#2	4.03	14	" " "
0849	#2	4.04	14	" " "
0850	#2	4.04	14	" " "
0851	#2	4.04	14	" " "
0852	#2	4.04	14	" " "
0853	#4	4.10	14	" " "
0854	#3	4.08	14	" " "
0855	#3	4.10	14	" " "
0856	#4	4.08	14	" " "
0857	#4	4.08	14	" " "
0858	#4	4.09	14	" " "
0859	#4	4.09	14	" " "
0900	#2	4.00	14	" " "
0901	#2	4.02	14	" " "
0902	#2	4.02	14	NO TRUCK IN TUNNEL
0903	#2	4.02	14	" " " "
0904	#2	4.02	14	" " " "
0905	#3	4.09	14	TRUCK IN TUNNEL
0906	#2	4.03	14	" " "
0907	#2	4.02	14	NO TRUCK IN TUNNEL
0908	#2	4.02	14	" " " "
0909	#2	4.02	14	" " " "
0910	#2	4.03	14	TRUCK IN TUNNEL
0911	#2	4.03	14	" " " CLOUDY, WIND SPEED
0912	#2	4.02	14	" " " & DIRECTION UNCHANGED
0913	#2	4.02	14	" " "
0914	#3	4.09	14	" " "
0915	#3	4.09	14	NO TRUCK IN TUNNEL
0916	#3	4.10	14	" " " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Run No. 1
Client/Source: PLANT C
Date: 7-24-98
Sampling Location: PTE Loadout
Operator: D. NEAL
~~Gas Gas~~ MASS FLOW Meter No: R-0308
Gas Cylinder No: ALM Ø13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0917	#4	4.12	14	TRUCK IN TUNNEL
0918	#4	4.13	14	" " "
0919	#4	4.14	14	NO TRUCK IN TUNNEL
0920	#4	4.14	14	" " " "
0921	#4	4.14	14	" " " "
0922	#2	4.04	14	TRUCK IN TUNNEL
0923	#3	4.10	14	" " "
0924	#2	4.03	14	" " "
0925	#2	4.05	14	" " "
0926	#2	4.04	14	" " "
0927	#2	4.05	14	" " "
0928	#2	4.04	14	" " "
0929	#2	4.03	14	" " "
0930	#2	4.03	14	" " "
0931	#2	4.03	14	" " "
0932	#2	4.04	14	" " "
0933	#2	4.03	14	" " "
0934	#2	4.03	14	" " "
0935	STOP	GAS RELEASE		
1057	#5	4.08	14	TRUCK IN TUNNEL, RESUME GAS RELEASE
1058	#5	4.05	14	" " " CLOUDY. WIND SPEED
1059	#3	4.03	14	" " " 100-250 FPM GUST
1100	~~#9~~ 3	4.03	14	" " " ~~Too~~ To 300+ FPM
1101	#4	4.07	14	" " "
1102	#5	4.04	14	" " "
1103	#5	4.04	14	" " "
1104	#5	4.05	14	" " "
1105	#5	4.05	14	NO TRUCK IN TUNNEL
1106	#5	4.05	14	" " " "
1107	#5	4.05	14	" " " "
1108	#5	4.05	14	TRUCK IN TUNNEL

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 1

Date: 7-24-98

Operator: B. NEAL

Gas Cylinder No: ALMØ1387Ø

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1109	#5	4.05	14	TRUCK IN TUNNEL
11Ø0	#4	4.07	14	" " "
1111	#3	4.04	14	" " "
1112	#3	4.05	14	" " "
1113	#3	4.05	14	NO TRUCK IN TUNNEL CLOUDY
1114	#3	4.05	14	" " " " WIND SPEED 0-250 FPM.
1115	#3	4.05	14	" " " " 300+ CROSS WIND.
1116	#4	4.05	14	TRUCK IN TUNNEL
1117	#4	4.06	14	" " "
1118	#4	4.06	14	" " "
1119	#3	4.04	14	" " "
1120	#3	4.05	14	" " "
1121	#3	4.04	14	" " "
1122	~~#3~~ 4	4.04	14	" " "
1123	#4	4.05	14	" " " CLOUDY
1124	#4	4.05	14	" " " WINDS VARIABLE
1125	#4	4.05	14	" " " 0-250 FPM GUSTS TO 300+
1126	#4	4.05	14	" " "
1127	#3	4.03	14	" " "
1128	#3	4.03	14	" " "
1129	#2	3.95	14	" " "
1130	#2	3.98	14	" " "
1131	#2	4.00	14	" " "
1132	#2	4.00	14	" " "
1133	#2	4.00	14	" " "
1134	#2	4.00	14	" " "
1135	#3	4.00	14	" " "
1136	#3	4.02	14	" " "
1137	#3	4.03	14	" " "
1138	#3	4.02	14	" " "
1139	#2	3.98	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Run No. 1
Client/Source: PLANT C
Date: 7-24-98
Sampling Location: PTE Loadout
Operator: D. NEAL
MASS FLOW ~~Dry Gas~~ Meter No: R-030B
Gas Cylinder No: ALMØ13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1140	#2	3.99	14	TRUCK IN TUNNEL
1141	#3	4.02	14	" " "
1142	#3	4.00	14	" " "
1143	#2	4.00	14	" " "
1144	#2	3.99	14	" " "
1145	#2	4.00	14	" " "
1146	#2	4.00	14	" " "
1147	#2	4.00	14	" " " CLOUDY, WINDS SAME
1148	#2	4.00	14	" " "
1149	#2	4.00	14	" " "
1150	#2	4.00	14	" " "
1151	#2	4.00	14	" " "
1152	#2	3.99	14	" " "
1153	#2	4.00	14	" " "
1154	#2	4.00	14	" " "
1155	#2	4.00	14	" " "
1156	#2	4.00	14	" " "
1157	#2	4.00	14	" " "
1158	#2	4.00	14	" " "
1159	#2	4.00	14	NO TRUCK IN TUNNEL
1200	#2	4.00	14	" " " "
1201	#2	4.00	14	TRUCK IN TUNNEL, MOSTLY CLOUDY
1202	#2	4.00	14	" " " WINDS 300+ FPM
1203	#2	4.00	14	" " " WINDS 8-10 MPH
1204	#2	4.00	14	" " "
1205	#2	4.00	14	" " "
1206	#2	4.00	14	" " "
1207	#2	4.00	14	" " "
1208	#2	4.00	14	" " "
1209	#2	4.00	14	" " "
1210	#2	4.00	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

FLOW METER ~~Dry Gas~~ Meter No: R-0308

Run No. 1

Date: 7-24-98

Operator: D. NEAL

Gas Cylinder No: ALM Ø1387Ø

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1211	#2	4.00	14	TRUCK IN TUNNEL
1212	#2	4.00	14	" " "
1213	#2	4.00	14	" " "
1214	#2	4.00	14	" " "
1215	#2	4.00	14	" " "
1216	#2	4.00	14	" " "
1217	#2	4.00	14	" " "
1218	#2	3.99	14	" " "
1219	#2	3.99	14	" " "
1220	#2	3.99	14	" " "
1221	#2	3.99	14	" " "
1222	#2	4.00	14	" " "
1223	#2	4.00	14	" " "
1224	#2	4.00	14	" " "
1225	#2	4.00	14	" " "
1226	#2	4.00	14	NO TRUCK IN TUNNEL
1227	#2	4.00	14	TRUCK IN TUNNEL. MOSTLY CLOUDY
1228	#2	4.00	14	" " " WINDS SOME
1229	#2	4.00	14	" " "
1230	#2	4.00	14	" " "
1231	#2	4.00	14	" " "
1232	#2	4.00	14	" " "
1233	#2	4.00	14	" " "
1234	#2	4.00	14	" " "
1235	#2	4.00	14	" " "
1236	#3	4.00	14	" " "
1237	#2	4.02	14	" " "
1238	#2	4.00	14	" " "
1239	#2	4.00	14	" " "
1240	#2	4.00	14	" " "
1241	#2	4.00	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 1
Date: 7-24-98
Operator: D. NEEL
Gas Cylinder No: ALM Ø1387Ø

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1242	#2	4.00	14	TRUCK IN TUNNEL
1243	#2	4.00	14	" " "
1244	#2	4.00	14	" " "
1245	#2	4.00	14	" " "
1246	#2	4.00	14	" " "
1247	#2	4.00	14	" " "
1248	#2	4.00	14	" " "
1249	#4	4.07	14	" " "
1250	#4	4.06	14	" " "
1251	#4	4.06	14	" " "
1252	#4	4.06	14	" " "
1253	#2	4.00	14	" " "
1254	#2	4.00	14	" " "
1255	#2	4.00	14	" " "
1256	#2	4.00	14	" " "
1257	STOP	GAS RELEASE		END OF RUN

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04 Run No. 2

Client/Source: PLANT C Date: 7-25-98

Sampling Location: PTE Loadout Operator: D. NEAL

MASS FLOW ~~Dry Gas~~ Meter No: R-0308 Gas Cylinder No: ALM Ø1387Ø

Time	Silo No.	Flow Rate	Pres. PSI	Comments
710	#3	4.10	14	START RUN. TRUCK IN TUNNEL
711	#5	4.00	14	TRUCK IN TUNNEL CLOUDY, WIND SPEED
712	#5	4.05	14	" " " 0-250 FPM INTO TUNNEL,
713	#5	4.06	14	" " " CROSS WIND 100-250 FPM.
714	#5	4.07	14	NO TRUCK IN TUNNEL
715	#5	4.08	14	" " " "
716	#5	4.00	14	" " " "
717	#3	4.06	14	" " " "
718	#3	4.06	14	" " " "
719	#3	4.06	14	TRUCK IN TUNNEL
720	#3	4.06	14	" " "
721	#3	4.06	14	" " "
722	#3	4.06	14	" " "
722.5	#2	4.02	14	" " "
723	#2	4.03	14	" " "
724	#2	4.04	14	" " "
725	#3	4.07	14	" " "
726	#3	4.07	14	" " "
727	#3	4.08	14	" " "
728	#3	4.08	14	" " "
729	#3	4.08	14	" " "
730	#2	4.04	14	" " "
731	#2	4.05	14	" " "
731.5	#3	4.08	14	" " "
732	#3	4.08	14	" " "
733	#3	4.08	14	" " "
734	#3	4.08	14	" " "
735	#3	4.08	14	" " "
736	#3	4.07	14	" " " WINDS SAME
737	#2	4.04	14	" " " W/ GUSTS TO 300+ FPM
738	#2	4.05	14	" " " 3-4 MPH

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 2

Date: 7-25-98

Operator: D. NEAL

Gas Cylinder No: ALM 013870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0739	#2	4.05	14	TRUCK IN TUNNEL
0740	#2	4.05	14	" " "
0741	#2	4.05	14	" " "
0742	#3	4.09	14	" " "
0743	#3	4.08	14	" " "
0743.5	#2	4.04	14	" " "
0744	#2	4.04	14	" " "
0745	#2	4.04	14	" " "
0746	#2	4.05	14	" " "
0747	#2	4.05	14	" " "
0747.5	#3	4.07	14	" " "
0748	#3	4.07	14	" " "
0749	#3	4.07	14	" " "
0750	#2	4.03	14	" " "
0751	#2	4.05	14	" " "
0752	#2	4.05	14	" " "
0753	#2	4.04	14	" " "
0754	#2	4.04	14	" " "
0755	#3	4.07	14	" " "
0756	#3	4.06	14	" " "
0757	#3	4.06	14	" " "
0758	#3	4.06	14	" " "
0759	#3	4.06	14	" " "
0759.5	#2	4.03	14	" " "
0800	#2	4.03	14	" " "
0801	#2	4.03	14	" " "
0802	#2	4.03	14	" " "
0803	#2	4.04	14	" " "
0803.5	#3	4.04	14	" " "
0804	#3	4.04	14	" " "
0805	#3	4.04	14	" " "

SF6 Gas Delivery data Spreadsheet

Sheet 3 of 8

Mri Project No. 4701-08-03-04

Run No. 2

Client/Source: PLANT C

Date: 7-25-98

Sampling Location: PTE Loadout

Operator: D. NEAL

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Gas Cylinder No: ALM Ø13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0806	#3	4.04	14	TRUCK IN TUNNEL. WINDS SAME
0807	#3	4.04	14	" " "
0808	#2	4.03	14	" " "
0809	#3	4.04	14	" " "
0810	#3	4.00	14	" " "
0811	#3	4.00	14	" " "
0812	~~#3~~ 4	4.09	14	" " "
0813	#4	4.09	14	" " "
0814	#4	4.09	14	" " "
0815	#4	4.09	14	" " "
0816	#4	4.09	14	" " "
0816.5	#3	4.00	14	" " "
0817	#3	4.00	14	" " "
0818	#3	4.00	14	" " "
0819	#3	4.00	14	" " "
0820	#3	4.00	14	" " "
0821	#3	4.00	14	" " "
0822	#5	4.04	14	" " "
0823	#5	4.03	14	" " "
0824	#3	4.00	14	" " "
0825	#3	4.00	14	" " " MOSTLY CLOUDY
0826	#3	4.00	14	" " " WINDS SAME
0827	#2	4.00	14	" " "
0828	#2	4.00	14	" " "
0829	#2	4.02	14	" " "
0830	#3	4.03	14	" " "
0831	#3	4.02	14	" " "
0832	#3	4.02	14	" " "
0833	#3	4.00	14	" " "
0834	#3	4.00	14	" " "
0835	#2	4.00	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MOSS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 2

Date: 7-25-98

Operator: D. NEAL

Gas Cylinder No: ALMØ13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0836	#2	4.00	14	TRUCK IN TUNNEL
0836.5	#4	4.08	14	" " "
0837	#4	4.08	14	" " "
0838	#4	4.07	14	" " "
0839	#4	4.07	14	" " "
0840	#4	4.06	14	" " "
0841	#3	3.97	14	" " "
0842	#3	3.98	14	" " " MOSTLY CLOUDY
0843	#5	4.00	14	" " " WINDS SAME
0844	STOP	GAS RELEASE		
0927	#2	4.00	14	TRUCK IN TUNNEL SUNNY, RESUME GAS
0928	#2	3.97	14	" " " RELEASE
0929	#2	3.95	14	" " " WINDS SAME
0930	#2	4.06	14	" " "
0931	#2	4.06	14	" " "
0932	#2	4.06	14	" " "
0933	#3	4.06	14	" " "
0934	#3	4.07	14	" " "
0935	#2	4.11	14	" " "
0936	#2	4.11	14	" " "
0937	#2	4.05	14	" " "
0938	#2	4.05	14	" " "
0939	#2	4.05	14	" " "
0940	#2	4.05	14	" " "
0941	#2	4.05	14	" " "
0942	#2	4.05	14	" " "
0943	#2	4.05	14	" " "
0944	#2	4.05	14	" " "
0945	#2	4.04	14	" " "
0946	#3	4.05	14	" " "
0947	#2	4.04	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 2

Date: 7-25-98

Operator: D. NEAL

Gas Cylinder No: ALM Ø13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0948	#2	4.04	14	TRUCK IN TUNNEL
0949	#2	4.05	14	" " "
0950	#2	4.05	14	" " "
0951	#2	4.05	14	" " "
0952	#2	4.05	14	" " "
0953	#2	4.05	14	" " "
0954	#2	4.04	14	" " "
0955	#2	4.03	14	" " "
0956	#2	4.04	14	" " " SUNNY
0957	#2	4.03	14	" " " 5-7 MPH
0958	#2	4.04	14	" " "
0959	#2	4.03	14	" " "
1000	#2	4.03	14	" " "
1001	#2	4.03	14	" " "
1002	#2	4.04	14	" " "
1003	#2	4.04	14	" " "
1004	#2	4.04	14	" " "
1005	#2	4.04	14	" " "
1006	#2	4.04	14	" " "
1007	#2	4.04	14	" " "
1008	#2	4.04	14	" " "
1009	#2	4.04	14	" " "
1010	#2	4.03	14	" " "
1011	#2	4.03	14	" " "
1012	#2	4.03	14	" " "
1013	#2	4.04	14	" " "
1014	#2	4.04	14	" " "
1015	#2	4.04	14	" " "
1016	#2	4.04	14	" " "
1017	#3	4.05	14	" " "
1018	#3	4.06	14	" " "

SF6 Gas Delivery data Spreadsheet

Sheet 6 of 8

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
~~Dry Gas~~ Mass Flow Meter No: R-0308

Run No. 2
Date: 7-25-98
Operator: D. NEAL
Gas Cylinder No: ALMØ13870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1019	#3	4.07	14	TRUCK IN TUNNEL
1020	#3	4.06	14	" " "
1021	#3	4.06	14	" " " SUNNY
1022	#3	4.07	14	" " " WINDS SAME
1023	#3	4.06	14	" " "
1024	#3	4.06	14	" " "
1025	#3	4.07	14	" " "
1026	#2	4.00	14	" " "
1027	#2	4.00	14	" " "
1028	#2	4.00	14	" " "
1029	#2	4.00	14	" " "
1030	#4	4.05	14	" " "
1031	#4	4.07	14	" " "
1032	#4	4.06	14	" " "
1033	#4	4.06	14	" " "
1034	#4	4.06	14	" " "
1035	#4	4.06	14	" " "
1036	#4	4.06	14	" " "
1037	#4	4.06	14	" " "
1038	#4	4.06	14	" " "
1039	#4	4.05	14	" " "
1040	#4	4.05	14	" " "
1041	#4	4.05	14	" " "
1042	#5	~~4.~~ 3.96	14	" " "
1043	#5	3.96	14	" " "
1044	#5	3.97	14	" " " SUNNY
1045	#5	3.97	14	" " " WINDS 5-10 MPH
1046	#5	3.97	14	" " "
1047	#5	3.97	14	" " "
1048	#2	4.04	14	" " "
1049	#2	4.04	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
~~Dry Gas~~ MASS FLOW Meter No: R-0308

Run No. 2
Date: 7-25-98
Operator: D. NEAL
Gas Cylinder No: ALMØ13810

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1050	#2	4.03	14	TRUCK IN TUNNEL
1051	#2	4.00	14	" " "
1052	#2	4.00	14	" " "
1053	#2	3.98	14	" " "
1054	#2	3.96	14	" " "
1055	#2	4.00	14	" " "
1056	#2	4.00	14	" " "
1057	#2	4.00	14	" " "
1058	#2	4.00	14	" " "
1059	#2	4.00	14	" " "
1100	#2	4.00	14	" " "
1101	#2	4.00	14	" " "
1102	#2	4.00	14	" " "
1103	#2	4.00	14	" " "
1104	#2	4.00	14	" " "
1105	#2	4.00	14	" " " SUNNY
1106	#2	4.00	14	" " " WINDS SAME
1107	#2	4.00	14	NO TRUCK IN TUNNEL
1108	#2	4.00	14	TRUCK IN TUNNEL
1109	#2	4.00	14	" " " WINDS CALM
1110	#2	4.00	14	" " " 0-100 FPM
1111	#2	3.99	14	" " " WINDS PICKED BACK
1112	#2	3.98	14	" " " up TO SAME AS BEFORE
1113	#2	3.99	14	NO TRUCK IN TUNNEL WINDS 0-250 FPM
1114	#2	3.99	14	" " " " GUSTS TO 500+ FPM
1115	#2	3.99	14	" " " "
1116	#2	3.99	14	" " " "
1117	#2	4.02	14	" " " "
1118	#2	4.00	14	" " " "
1119	#2	4.00	14	TRUCK IN TUNNEL
1120	#2	3.99	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 2
Date: 7-25-98
Operator: D. NEAL
Gas Cylinder No: ALM013870

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1121	#2	3.99	14	NO TRUCK IN TUNNEL
1122	#2	3.98	14	" " " "
1123	#2	3.97	14	" " " "
1124	#2	3.97	14	" " " "
1125	#2	3.98	14	TRUCK IN TUNNEL
1126	#2	3.99	14	" " "
1127	#2	3.99	14	NO TRUCK IN TUNNEL
1128	#2	4.00	14	" " " "
1129	#2	4.03	14	" " " "
1129.5	STOP	GAS RELEASE		END OF RUN

SF6 Gas Delivery data Spreadsheet

Sheet 1 of 9

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Run No. 3

Date: 7-2

Operator: D. NEAL

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0710	#2	4.00	14	TRUCK IN TUNNEL, SUNNY
0711	#2	3.97	14	" " "
0712	#2	4.03	14	" " "
0713	#2	4.03	14	" " "
0714	#2	4.04	14	" " "
0715	#2	4.04	14	" " " WINDS 0-50 FPM
0716	#2	4.04	14	" " " GUSTS TO 100 FPM
0717	#2	4.04	14	" " "
0718	#2	4.04	14	" " "
0719	#2	4.04	14	" " "
0720	#2	4.04	14	NO TRUCK IN TUNNEL
0721	#2	4.04	14	" " " "
0722	#2	4.03	14	" " " "
0723	#2	4.03	14	" " " "
0724	#2	4.03	14	" " " "
0725	#2	4.02	14	" " " "
0726	#2	4.00	14	" " " "
0727	#2	4.00	14	" " " "
0728	#2	4.00	14	" " " "
0729	#2	4.00	14	" " " "
0730	#2	4.00	14	" " " "
0731	#2	4.00	14	TRUCK IN TUNNEL
0732	#2	4.00	14	" " "
0733	#2	4.00	14	NO TRUCK IN TUNNEL
0734	#2	4.00	14	TRUCK IN TUNNEL
0735	#2	4.00	14	" " "
0736	#2	4.00	14	" " "
0737	#2	4.00	14	" " "
0738	#2	4.00	14	" " "
0739	#2	4.00	14	" " "
0740	#2	3.99	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
MASS FLOW ~~Dry Gas~~ Meter No: R-030B

Run No. 3
Date: 7-27-98
Operator: D. NEAL
Gas Cylinder No: AAL-19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0741	#2	~~4~~3.99	14	NO TRUCK IN TUNNEL, SUNNY
0742	#2	3.99	14	" " " " WINDS SAME
0743	#2	3.99	14	" " " "
0744	#2	3.99	14	TRUCK IN TUNNEL
0745	#2	3.99	14	" " "
0746	#2	3.99	14	" " "
0747	#2	3.99	14	" " "
0748	#2	3.99	14	" " "
0749	#2	3.99	14	" " "
0750	#2	3.99	14	" " "
0751	#2	4.00	14	" " "
0752	#2	4.00	14	" " "
0753	#2	3.99	14	" " "
0754	#2	3.99	14	" " "
0755	#2	3.99	14	" " "
0756	#2	3.99	14	" " "
0757	#2	3.99	14	" " "
0758	#2	3.98	14	" " "
0759	#2	4.00	14	" " "
0800	#2	4.00	14	" " "
0801	#2	4.00	14	" " "
0802	#2	4.00	14	" " "
0803	#2	4.00	14	" " "
0804	#2	4.00	14	" " "
0805	#2	4.00	14	" " "
0806	#2	4.00	14	" " "
0807	#2	4.00	14	" " " SUNNY
0808	#2	4.00	14	" " " WINDS ~~SAME~~ ON 0-200 FPM
0809	#2	4.00	14	" " " GUSTS TO 300+ FPM
0810	#2	4.00	14	" " "
0811	#2	4.00	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

~~Dry Gas~~ MASS FLOW Meter No: R-0308

Run No. 3

Date: 7-27-98

Operator: D. NEAL

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0812	#2	4.00	14	TRUCK IN TUNNEL
0813	#2	4.00	14	" " "
0814	#2	4.00	14	" " " SUNNY
0815	#2	4.00	14	" " " WINDS 0-100 FPM
0816	#2	4.00	14	" " " GUSTS TO 150 FPM
0817	#2	4.00	14	" " "
0818	#2	4.00	14	" " "
0819	#2	4.00	14	" " "
0820	#2	4.00	14	" " "
0821	#2	4.00	14	" " "
0822	#2	4.00	14	" " "
0823	#2	4.00	14	" " "
0824	#2	4.00	14	" " "
0825	#2	4.00	14	" " "
0826	#2	4.00	14	" " "
0827	#2	4.00	14	" " "
0828	#2	4.00	14	" " "
0829	#2	4.00	14	" " "
0830	#4	4.06	14	" " "
0831	#4	4.07	14	" " "
0832	#4	4.00	14	" " "
0833	#4	4.00	14	" " " SUNNY
0834	#4	4.00	14	" " " WINDS SAME
0835	#4	4.00	14	" " "
0836	#4	4.00	14	" " "
0837	#4	4.00	14	" " "
0838	#4	4.00	14	" " "
0839	#4	4.00	14	" " "
0840	#4	4.00	14	" " "
0841	#4	4.02	14	" " "
0842	#4	4.00	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
~~Dry Gas~~ MASS FLOW Meter No: R-0308

Run No. 3
Date: 7-29-98
Operator: D. NEAL
Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0843	#4	4.02	14	TRUCK IN TUNNEL
0844	#5	3.99	14	" " "
0845	#2	4.00	14	" " "
0846	#2	4.00	14	" " " SUNNY
0847	#2	4.00	14	" " " WINDS 100-200 FPM
0848	#2	4.00	14	" " " GUSTS TO 250 FPM
0849	#2	4.00	14	" " "
0850	#2	4.00	14	" " "
0851	#2	4.00	14	" " "
0852	#2	4.00	14	" " "
0853	#2	4.00	14	" " "
0854	#2	4.00	14	" " "
0855	#2	4.00	14	" " "
0856	#2	4.00	14	" " "
0857	#2	4.00	14	" " "
0858	#2	4.00	14	" " "
0859	#2	4.02	14	" " " SUNNY
0900	#2	4.00	14	" " " WINDS 100-250 FPM
0901	#2	4.00	14	" " " GUSTS TO 300+ FPM
0902	#2	4.00	14	" " "
0903	#2	4.00	14	" " "
0904	#2	4.00	14	" " "
0905	#2	4.00	14	" " "
0906	#2	4.00	14	" " "
0907	#2	4.00	14	" " "
0908	#2	4.00	14	" " "
0909	#2	4.00	14	" " "
0910	#2	4.00	14	" " "
0911	#2	4.00	14	" " "
0912	#2	3.99	14	" " "
0913	#2	3.99	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Run No. 3
Client/Source: PLANT C
Date: 7-27-98
Sampling Location: PTE Loadout
Operator: D. NEAL / A. PAGE
~~Dry Gas~~ MASS FLOW Meter No: R-0308
Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0914	#2	3.99	14	TRUCK IN TUNNEL SUNNY
0915	#2	3.99	14	" " " WINDS SAME
0916	#2	3.99	14	" " "
0917	#2	3.99	14	" " "
0918	#2	4.04	14	" " "
0919	#2	4.04	14	" " "
0920	#2	4.04	14	" " "
0921	#2	4.03	14	" " "
0922	#2	4.02	14	" " "
0923	#2	4.03	14	" " "
0924	#2	4.03	14	" " "
0925	#2	4.03	14	" " "
0926	#2	4.04	14	" " "
0927	#2	4.04	14	" " " SUNNY
0928	#2	4.04	14	" " " WINDS SAME
0929	#2	4.04	14	" " "
0930	#2	4.04	14	" " "
0931	#2	4.04	14	" " "
0932	STOP	GAS RELEASE		
0952	#2	4.08	14	TRUCK IN TUNNEL
0953	#2	4.00	14	" " "
0954	#2	3.98	14	" " " SUNNY
0955	#2	3.98	14	" " " WINDS SAME
0956	#2	3.98	14	" " "
0957	~~#1~~ per Release	Stop Gas Release		
0959	#2	4.03	14	TRUCK IN TUNNEL
1000	#2	4.00	14	" " "
1001	#2	3.99	14	NO TRUCK IN TUNNEL
1002	#2	3.98	14	TRUCK IN TUNNEL
1003	#2	3.99	14	" " "
1004	#2	3.99	14	" " "

SF6 Gas Delivery data Spreadsheet

Sheet 6 of 9

Mri Project No. 4701-08-03-04

Run No. 3

Client/Source: PLANT C

Date: 7-27-98

Sampling Location: PTE Loadout

Operator: D. NEAL

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1005	#2	3.99	14	TRUCK IN TUNNEL
1006	#2	3.99	14	" " "
1007	#2	3.99	14	" " "
1008	#2	3.99	14	" " "
1009	#2	3.99	14	" " "
1010	#2	3.99	14	" " "
1011	#2	3.99	14	" " "
1012	#2	4.00	14	" " "
1013	#2	4.00	14	" " " SUNNY
1014	#2	3.99	14	" " " WINDS 100-250 FPM
1015	#2	3.99	14	" " " GUSTS TO 300+ FPM
1016	#2	3.99	14	" " "
1017	#2	3.99	14	" " "
1018	#2	3.99	14	" " "
1019	#2	3.99	14	" " "
1020	#2	3.98	14	" " "
1021	#2	3.99	14	" " "
1022	#2	3.98	14	" " "
1023	#2	4.00	14	" " "
1024	#2	4.00	14	" " "
1025	#2	4.00	14	" " "
1026	#2	4.00	14	" " "
1027	#2	4.00	14	" " "
1028	#2	4.00	14	" " "
1029	#2	4.00	14	" " "
1030	#2	4.00	14	" " "
1031	#~~2~~5	4.00	14	" " "
1032	#2	4.02	14	" " "
1033	#2	4.03	14	" " "
1034	#5	4.00	14	" " "
1035	#5	3.99	14	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: PLANT C
Sampling Location: PTE Loadout
~~Dry Gas~~ MASS FLOW Meter No: R-0308

Run No. 3
Date: 7-27-98
Operator: D. NEAL
Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1036	#5	3.99	14	TRUCK IN TUNNEL
1037	#5	3.99	14	" " "
1038	#5	3.99	14	" " "
1039	#5	3.99	14	" " " SUNNY
1040	#5	3.99	14	" " " WINDS 100-250 FPM
1041	#5	4.03	14	" " " GUSTS TO 300+ FPM
1042	#5	3.99	14	" " "
1043	#5	4.00	14	" " "
1044	#5	4.00	14	" " "
1045	#5	4.00	14	" " "
1046	#5	4.00	14	" " "
1047	#5	3.99	14	" " "
1048	#5	3.99	14	" " "
1049	#2	4.00	14	" " "
1050	#2	4.00	14	" " "
1051	#2	4.07	14	" " "
1052	#2	4.04	14	" " "
1053	#2	4.04	14	" " "
1054	#2	4.03	13	" " "
1055	#2	4.04	13	" " " SUNNY
1056	#2	4.04	13	" " " WINDS SAME
1057	#2	4.04	13	" " "
1058	#2	4.04	13	" " "
1059	#2	4.05	13	" " "
1100	#2	4.05	13	" " "
1101	#2	4.05	13	" " "
1102	#2	4.06	13	" " "
1103	#2	4.00	13	" " "
1104	#2	4.00	13	" " "
1105	#2	4.00	13	" " "
1106	#2	4.00	13	" " "

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: PLANT C

Sampling Location: PTE Loadout

~~Dry Gas~~ MASS FLOW Meter No: R-0308

Run No. 3

Date: 7-27-98

Operator: D. NEAL

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1107	#2	4.00	13	TRUCK IN TUNNEL
1108	#2	4.00	13	" " " SUNNY
1109	#2	4.00	13	" " " WINDS 100-250 FPM
1110	#2	4.00	13	" " " GUSTS TO 300+ FPM
1111	#2	4.00	13	" " "
1112	#2	4.00	13	" " "
1113	#2	4.00	13	" " "
1114	#2	4.00	13	" " "
1115	#2	4.00	13	" " "
1116	#2	4.00	13	" " "
1117	#2	4.00	13	" " "
1118	#2	4.00	13	" " "
1119	#2	4.00	13	" " "
1120	#2	4.00	13	" " "
1121	#2	4.00	13	" " "
1122	#2	4.00	13	" " "
1123	#2	4.03	13	" " "
1124	#2	4.04	13	" " "
1125	#2	4.00	13	" " "
1126	#2	3.98	13	" " "
1127	#2	3.99	13	" " "
1128	#2	3.99	13	" " "
1129	#2	3.99	13	" " " SUNNY
1130	#2	3.99	13	" " " WINDS SAME
1131	#2	3.99	13	" " "
1132	#2	3.99	13	" " "
1133	#2	3.99	13	" " "
1134	#2	4.00	13	" " "
1135	#2	4.00	13	" " "
1135.5	#1	STOP GAS RELEASE		
1137	#2	4.00	13	TRUCK IN TUNNEL

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Run No. 3

Client/Source: PLANT C

Date: 7-27-98

Sampling Location: PTE Loadout

Operator: D. NEAL

MASS FLOW ~~Dry Gas~~ Meter No: R-0308

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1138	#2	3.96	13	TRUCK IN TUNNEL
1139	#2	4.03	13	" " "
1140	#2	4.05	13	" " " SUNNY
1141	#2	4.05	13	" " " WINDS 100-250 FPM
1142	#2	4.05	13	" " " GUSTS TO 300+ FPM
1143	#2	4.04	13	" " "
1144	#2	4.04	13	" " "
1145	#2	4.04	13	" " "
1146	#2	4.04	13	" " "
1147	#2	4.04	13	" " "
1148	#2	4.04	13	" " "
1149	#2	4.04	13	" " "
1150	#2	4.04	13	" " "
1151	#2	4.00	13	" " "
1152	#2	4.00	13	" " "
1153	#1	STOP GAS RELEASE		
1154.5	#2	4.05	13	TRUCK IN TUNNEL
1155	#2	4.03	13	" " "
1156	#2	4.00	13	" " "
1157	#2	3.99	13	" " "
1158	#2	3.99	13	" " "
1159	#2	3.99	13	" " "
1200	STOP	GAS RELEASE		END OF RUN

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: Plant C
Sampling Location: PTE Loadout
Dry Gas Meter No: MASS Flowmeter R-0308
2000 psi in cylinder @ START

Run No. 4 (BACKGROUND)
Date: 7/26/98
Operator: Klamm
Gas Cylinder No: AAL19338 (2.0% SF6)

Time	Silo No.	Flow Rate	Pres. PSI	Comments
0927	2	4.13	14	START Run 4 (BKGRD). START SF6 Release
				Winds calm. Sunny. 3-5 mph winds
0930	2	4.13	14	Truck 30 in Tunnel (Two trucks through Tunnel)
0933				Truck 29 enter
0935				Truck 30 ~~enter~~ arrive @ entrance
0936				Truck 30 enter
0939				Truck 29 arrive @ entrance
0939.60				Truck 29 enter
0943				Truck 30 arrive @ entrance
0943.45	2	4.10	14	Truck 30 enter
0945				Truck 29 arrive @ entrance
0946.50				Truck 29 enter
0950.15				Truck 30 arrive @ entrance
0950.50				Truck 30 enter
0953.34				Truck 29 arrive @ entrance
0954.00				Truck 29 enter
0957.10				Truck 30 arrive @ entrance
0957.50				Truck 30 enter
1000.45				Truck 29 arrive @ entrance
1000.55				Truck 29 enter
1000	2	4.12	14	~~Truck 30 arrive @ entrance~~
1004.20				Truck 30 arrive @ entrance
1004.25				Truck 30 enter
1007.40				Truck 29 arrive @ entrance
1008.05				Truck 29 enter
1011.00				Truck 30 arrive @ entrance
1011.35				Truck 30 enter
1013.35				Truck 29 arrive @ entrance
1013.55				Truck 29 enter
1017.10				Truck 30 arrive @ entrance
1017.50				Truck 30 enter

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: Plant C

Sampling Location: PTE Loadout

Dry Gas Meter No: R-0308

Run No. 4 (Background)

Date: 7/26/98

Operator: Klamm

Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1020.35				Truck 29 arrive @ entrance
1020.40				Truck 29 enter
1023.40				Truck 30 arrive @ entrance
1024.20				Truck 30 enter
1025.50				Truck 29 arrive @ entrance
1027.20				Truck 29 enter
1028.37				Truck 30 arrive @ entrance
1030.35				Truck 30 enter
1031.15				Truck 29 arrive @ entrance
1033	2	4.06	14	~~Truck 30 enter~~
1033.50				Truck 29 AEM enter
1034.05				Truck 30 AEM arrive @ entrance
1037.17				Truck 30 AEM enter
1040.00				Truck 29 AEM arrive @ entrance
1040.35				Truck 29 enter
1042.00				Truck 30 arrive @ entrance
1043.25				Truck 30 enter
1044.55				Truck 29 arrive @ entrance
1046.15				Truck 29 enter
1047.30				Truck 30 arrive @ entrance
1049.40				Truck 30 enter
1050:00				Truck 29 arrive @ entrance
10 52:25				Truck 29 enter —
10:53:50				Truck 30 arrives @ entrance
10:55:39				Truck 30 enters —
10:56:58				Truck 29 arrive @ entrance
10:58:29				Truck 29 enters —
10:59:40				Truck 30 arrive @ entrance
11:01:42				Truck 30 enters —
~~1100~~	2	4.15	14	~~Truck 29 arrive @ entrance~~
11:03:14				Truck 29 arrives @ entrance

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: Plant C

Sampling Location: PTE Loadout

Dry Gas Meter No: R-0308

Run No. 4 (Background)

Date: 7/26/98

Operator: Klamm

Gas Cylinder No: AAL19338

	Time	Silo No.	Flow Rate	Pres. PSI	Comments
	11:04:36				Truck 29 enters –
	11:05:54				Truck 30 arrives @ entrance
	11:06:56				Truck 30 enters –
	11:08:29				Truck 29 arrives @ entrance
	11:09:44				Truck 29 enters
	11:10:53				Truck 30 arrive @ entrance
	11:12:52				Truck 30 enters
	11:14:25				Truck 29 arrives @ entrance
Scott	~~11:15~~	2	4.16	14	~~Truck 29 enters~~
	11:15:47				Truck 29 enters
	11:16:01				Truck 30 arrives @ entrance
	11:18:55				Truck 30 enters
	11:20:29				Truck 29 arrives @ entrance
	11:21:48				Truck 29 enters
	11:23:16				Truck 30 arrives @ entrance
	11:24:59				Truck 30 enters –
*	11:26:19				Truck 29 arrives @ entrance
	11:26:19				Truck 29 enters
	11:29:15				Truck 30 arrives @ entrance
	11:32:10				Truck 30 enters
	11:33:46				Truck 29 arrives @ entrance
	11:34:39				Truck 29 enters –
	11:36:20				Truck 30 arrives @ entrace
	11:37:59				Truck 30 enters –
	11:39:37				Truck 29 arrives @ entrance
	~~11:40~~	2	4.24	14	~~Truck 29 enters~~
Stopped before arriving at ramp Near heated ~~oil~~ tanks	11:40:46				Truck 29 enters
	11:43:27				Truck 30 arrives @ entrance
	11:43:49				Truck 30 enters
	11:45:40				Truck 29 arrives @ entrance
	11:46:45				Truck 29 enters

SF6 Gas Delivery data Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: Plant C
Sampling Location: PTE Loadout
Dry Gas Meter No: R-0308
Run No. 4 (Background)
Date: 7/24/98
Operator: KLAMM
Gas Cylinder No: AAL19338

stopped for water entrance 20' before entrance →

Time	Silo No.	Flow Rate	Pres. PSI	Comments
11:48:16				Truck 30 arrives @ entrance
11:49:57				Truck 30 enters —
11:51:41				Truck 29 arrives @ entrance
11:52:40		← pulled to normal stopping	area	Truck 29 enters
11:53:51	11:56:33			Truck 30 arrives @ entrance
11:56:46				Truck 30 enters
11:58:30				Truck 29 arrives @ entrance
11:59:58				Truck 29 enters
12:01:34				Truck 30 arrives @ entrance
12:03:18				Truck 30 enters
12:04:42				Truck 29 arrives @ entrance
12:05:51				Truck 29 enters
12:07:26				Truck 30 arrives @ entrance
12:09:10				Truck 30 enters
1211.45				Truck 29 arrives @ entrance
1211.55				Truck 29 enters
1213.10				Truck 30 arrives @ entrance
1215.20				Truck 30 enters
1216.35				Truck 29 arrives @ entrance
1218.10	2	4.05	14	Truck 29 enters
1219.30				Truck 30 arrives @ entrance
12 21:15				Truck 30 enters
12:22:50				Truck 29 arrives @ entrance
12:24:10				Truck 29 enters
12:25:15				Truck 30 arrives @ entrance
12:27:15				Truck 30 enters
12:28:15				Truck 29 arrives @ entrance
12:30:45				Truck 29 enters
12:32:05				Truck 30 arrives @ entrance
12:34:20				Truck 30 enters

SF6 Gas Delivery data Spreadsheet

Sheet 5 of 6

Mri Project No. 4701-08-03-04
Client/Source: Plant C
Sampling Location: PTE Loadout
Dry Gas Meter No: R-0308

Run No. 4 (Background)
Date: 7/26/98
Operator: KLAMM
Gas Cylinder No: AAL 19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
12:36:20				Truck 29 arrives @ entrance
12:37:00				Truck 29 enters
12:38:25				Truck 30 arrives @ entrance
12:40:15				Truck 30 enters
12:42:00				Truck 29 arrives @ entrance
12:42:55				Truck 29 enters
12:44:05				Truck 30 arrives @ entrance
12:46:40				Truck 30 enters
12:47	2	4:04	14	
12:47:50				Truck 29 arrives @ entrance
12:49:25				Truck 29 enters
12:51:05				Truck 30 arrives @ entrance
12:52:40				Truck 30 enters
12:54:15				Truck 29 arrives @ entrance
12:55:30				Truck 29 enters
				Winds @ doorway 200-400 fpm. (unblocked)
				0-200 fpm (blocked with truck)
12:57:10				Truck 30 arrives @ entrance
12:59:05				Truck 30 enters
13:00:35	2	4:04	14	Truck 29 arrives @ entrance
13:01:25				Truck 29 enters
13:02:40				Truck 30 arrives @ entrance
13:05:00				Truck 30 enters
13:06:50				Truck 29 arrives @ entrance
13:07:30				Truck 29 enters
13:08:50 ±				Truck 30 arrives @ entrance
13:10:45				Truck 30 enters
13:13:25				Truck 29 arrives @ entrance
				Velocity in Tunnel ≈ 400 fpm w/ outside
				velocity @ 550 fpm w/o truck in entrance
13:13:45				Truck 29 enters

12 mils
3 hrs
4 mi/hr

SF6 Gas Delivery data Spreadsheet

Sheet 6 of 6

Mri Project No. 4701-08-03-04
Client/Source: Plant C
Sampling Location: PTE Loadout
Dry Gas Meter No: R-0308

Run No. 4 (Background)
Date: 7/26/98
Operator: KLAMM
Gas Cylinder No: AAL19338

Time	Silo No.	Flow Rate	Pres. PSI	Comments
1315:10				Truck 30 arrives @ entrance
13:16:45				Truck 30 enters
13:1~~9~~:00				Truck 29 arrives @ entrance
13:19:50				Truck 29 enters
1323:45				Truck 30 arrives @ entrance
				after watering
1323:45				Truck 30 enters
13:24 55				Truck 29 arrives @ entrance
1326 15				Truck 29 enters
				~~Truck 30~~ Velocity in tunnel peaks @ 600 fpm
				during gust w/ ave about 150 fpm Truck @ entrance
13:27:45				Truck 30 arrives @ entrance
1329:50				Truck 30 enters
				outside air vel peaks @ 850 fpm
13:31:15				Truck 29 arrives @ entrance
1332:20				Truck 29 enters
1333:10				Truck 30 arrives @ entrance
13:35:35				Truck 30 enters
13:36:55				Truck 29 arrives @ entrance
13:38:35				Truck 29 enters
13:40:20				Truck 30 arrives @ entrance
13:4~~8~~:00				Truck 29 arrives & enters
1344:20				Truck 30 arrives @ entrance
1346:20				Truck 30 enters
		Finish		

Appendix H

Loadout Raw Data

Orange County Name (State Name)

1002 III B3 AR-4000 (Same as 1024 Type B 3/4"
30% RAP
5.2% Liquid Asphalt (AR-4000)
36% Rock Dust ~~(Sand)~~
24% 3/8" Rock
22% Crushed 1/2" Rock
18% 3/4" Rock

1004 III C3 AR-4000 (1/2") (Same as 1018 1/2" Fine)
30% RAP
5.5% Liquid Asphat
43% Rock Dust
42% 3/8" Rock
15% 1/2" Rock

1010 III D~~3~~ AR-4000 (3/8")
6.4% Asphalt
20% Sand
54% Rock Dust
26% 3/8" Rock

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA - Plant C
Hot Mix Asphalt

Run No. 1 - Load Out

Date: 7/24/98

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1002	III B3 AR-4000	33	0713	20.86	82	4		2 min difference between
1004	III C3 AR-4000	15	0715	20.88	94	3		production + load out
1024	Type B 3/4	31	0717	21.34	95	4		0717 Began Loading Silo
1002	III B3 AR-4000	33	0719	20.92	89	4		
1004	III C3 AR-4000	~~8~~15	0728	20.89	99	3		Computers Time recorded
1002	III B3 AR-4000	33	0732	21.45	82	~~4~~2		here are from load
1004	III C3 AR-4000	15	0738	21.20	04	3		out computer,
1024	Type B 3/4	31	0741	21.34	15	2		Testing is using
1004	III C3 AR-400	15	0743	20.83	96	3		production computer
1024	Type B 3/4	31	0745	21.39	13	2		time, Production
1002	III B3 AR-4000	33	0746	20.10	05	2		Computer is ahead
1002	III B3 AR-4000	~~33~~10	0748	21.04	93	2		of load out Computer
1004	III C3 AR-4000	47	0749	4.03	91	3		
1024	Type B 3/4	31	0752	21.19	21	2		
1024	Type B 3/4	31	0756	21.12	26	2		
1004	III C3 AR-4000	71	0758	3.99	25	1		
1024	Type B 3/4	49	0759	21.27	86	2		
					~~95~~			
1024	Type B 3/4	31	0802	21.12	29	2		0805 Gas Release Start
1024	Type B 3/4	31	0805	21.17	16	2		
1004	III C3 AR-4000	15	0807	21.25	08	1		
1002	III B3 AR-4000	33	0812	21.39	27	2		
1004	III C3 AR-4000	15	0815	21.16	07	1		
1024	Type B 3/4	31	0823	21.40	20	2		
1004	III C3 AR-400	15	0824	20.91	92	~~X~~3		
1004	III C3 AR-400	75	0827	2.54	25	3		
~~1024~~	~~Type B 3/4"~~	~~31~~ 33	~~0828~~		~~21~~	~~2~~		
1002	III B3 AR-4000	33	0828	21.32	21	2		
1004	III C3 AR-	15	0830	21.43	89	3		
1024	Type B 3/4"	31	0833	21.20	10	2		

PSM

Load-Out Log Spreadsheet

Sheet 2 of 5

Mri Project No. 4701-08-03-04

Client/Source: EPA - Plant C
Hot Mix Asphalt

Run No. 1 - Load Out

Date: 7/24/98

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4	31	0838	21.22	12	2		
1002	III B3 AR-4000	33	0839	21.36	13	2		
1004	III C3 AR-4000	15	0841	21.35	30	3		
1024	Type B 3/4	31	0843	21.05	15	2		
1004	III C3 AR-4000	15	0846	20.94	26	3		
1024	Type B 3/4	31	0849	21.38	92	2		
1002	III B3 AR-4000	33	0850	21.33	29	2		
1002	III B3 AR-4000	10	0852	21.12	93	4		
1004	III C3 AR-4000	15	0854	21.04	16	3		
1024	Type B 3/4	31	0855	21.17	11	4		0858 Began filling Silo ~~8~~ 2 PSM
1002	III B3 AR-4000	33	0859	21.26	09	~~X~~ 2	PSM	
1004	III C3 AR-4000	15	0903	20.88	94	3		
1024	Type B 3/4"	31	0905	19.91	05	2		
1024	Type B 3/4"	31	0910	21.22	86	2		Gate open on truck
1004	III C3 AR-4000	15	0912	21.10	95	~~X~~ 3		Spilling in tunnel
1002	III B3 AR-4000	33	0916	21.04	99	4		2 Ton in tunnel
1004	III C3 AR-4000	15	0921	21.0	88	3		0920 cleaning up in
1024	Type B 3/4"	31	0922	21.58	27	2		tunnel
1024	Type B 3/4"	31	0924	21.27	12	2		
1002	III B3 AR-4000	33	0928	21.46	10	2		
1024	Type B 3/4"	31	0933	21.04	20	2		0921 Sampling began at
1004	III C3 AR-4000	15	0937	21.42	15	3		Location 1
1024	Type B 3/4"	31	0938	21.36	18	2		0935 Stopped Gas Release
1002	III B3 AR4000	33	0939	21.20	21	2		
1024	Type B 3/4"	31	0942	21.06	11	2		
1004	III C3 AR4000	15	0944	7.0	95	3		
1004	III C3 AR4000	15	0945	21.13	13	2		
PSM ~~1024~~	~~Type B 3/4~~	~~31~~ 33			~~91~~	~~2~~		
1002	III B3 AR4000	33	0949	20.88	91	2		

Load-Out Log Spreadsheet

MRI Project No. 4701-08-03-04

Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 1 - Load Out
Date: July 24, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4"	31	0950	21.34	08	2		
1004	III C3 AR-4000	15	0953	21.20	07	3+1		
1024	Type B 3/4"	31	0955	21.53	29	2		
1002	III B3 AR-4000	33	0958	21.52	27	2		
1024	Type B 3/4"	49	1000	21.29	89	2		
1024	Type B 3/4"	31	1002	21.60	09	2		
1004	III C3 AR-4000	15	1005	20.94	02	1		
1002	III B3 AR-4000	33	1006	21.27	12	2		
1024	Type B 3/4"	31	1007	21.22	04	2		
1004	III C3 AR-4000	15	1009	20.96	96	1		
PSM 1024 ~~1002~~	~~III B3 AR-4000~~	~~33~~ 31	1011	21.44	20	2		
1002	III B3 AR-4000	33	1014	21.06	99	2		
1004	III C3 AR-4000	15	1027	21.50	92	1		
1002	III B3 AR-4000	33	1028	20.43	05	5		
1024	Type B 3/4"	31	1030	21.41	11	5		
1004	III C3 AR-4000	15	1033	21.29	18	~~3~~ 1		
1024	Type B 3/4"	31	1035	21.08	16	5		
1024	Type B 3/4"	31	1036	21.39	10	5		
1002	III B3 AR-4000	33	1038	21.33	86	5		
1004	III C3 AR 4000	15	1040	21.14	93	1		
1024	Type B 3/4"	31	1041	21.45	26	5		
1024	Type B 3/4"	31	1043	21.25	21	5		
1002	III B3 AR 4000	33	1046	21.26	08	5		
1004	III C3 AR 4000	15	1052	21.40	91	1+3		
1024	Type B 3/4"	31	1054	21.40	09	5		
1004	III C3 AR-4000	15	1058	21.07	94	3		
1002	III B3 AR 4000	33	1100	21.51	29	4		
1024	Type B 3/4"	31	1101	21.33	27	6		
1002	III B3 AR 4000	33	~~1107~~ 1109	21.29	88	5+4		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 1- Load Out
Date: July 24, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1004	III C3 AR4000	15	11:10	21.34	09	3		
1024	Type B 3/4"	31	1112	21.42	12	4		
1002	III B3 AR4000	33	1117	21.30	04	4		
1004	III C3 AR4000	~~3~~15	1118	21.29	11	3		
1024	Type B 3/4"	31	1122	21.40	20	4		
1024	Type B 3/4"	31	1123	21.45	16	4		
1002	III B3 AR4000	33	1124	20.78	02	4		
1004	III C3 AR4000	15	1126	21.43	13	3		
1024	Type B 3/4"	31	1128	21.32	10	2		
1024	Type B 3/4"	31	1133	21.35	15	2		
1004	III C3 AR4000	15	1136	21.19	95	3		
1002	III B3 AR4000	33	1138	21.12	26	2		
1024	Type B 3/4"	31	1139	21.14	21	2		
1004	III C3 AR 4000	15	1140	↓	3058	3		Front of Truck
1004	III C3 AR4000	15	1141	24.84	3058	3		Back of Truck
1024	Type B 3/4"	31	1143	21.17	96	2		
1024	Type B 3/4"	31	1145	20.12	05	2		
1024	Type B 3/4"	31	1150	21.34	07	2		
1002	III B3 AR4000	33	1153	21.06	08	2		
1024	Type B 3/4"	31	1155	21.15	99	2		
1024	Type B 3/4"	31	1157	21.31	86	2		
1002	III B3 AR4000	33	1202	21.35	27	2		
1024	Type B 3/4"	31	1204	21.22	09	2		
1024	"	31	1205	21.32	29	2		
1002	III B3 AR4000	33	1210	21.02	16	2		
1024	Type B 3/4"	31	1215	21.02	88	2		
1002	III B3 AR4000	33	1217	23.99	3310	2		
1002	III B3 AR 4000	33	1219	21.29	12	2		
1002	III B3 AR4000	33	1222	21.00	15	2		

Load-Out Log Spreadsheet

MRI Project No. 4701-08-03-04

Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 1 Load Out

Date: July 24, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1002	III B3 AR4000	38	1223	21.52	20	2		
1024	Type B 3/4"	31	1225	21.47	~~8~~10	2		
1002	III B3 AR4000	33	1230	21.46	18	2		
1004	III C3 AR4000	15	1235	21.33	21	3		
1024	Type B 3/4"	31	1236	20.40	~~81~~ 91	2		
1002	III B3 AR4000	38	1237	21.73	92	2		
1002	III B3 AR-4000	33	1238	21.28	02	2		
1024	Type B 3/4"	31	1240	21.16	04	2		
1002	III B3 AR4000	38	1242	21.39	26	2		
1024	Type B 3/4"	31	1244	20.23	05	2		
1002	III B3 AR-4000	33	1246	↓	96	2		
↓	↓	↓	1248	21.57	~~03~~	4		
1024	Type B 3/4"	31	1249	21.25	07	4		
1002	III B3 AR4000	38	1251	21.20	93	4		
1024	Type B 3/4"	31	1253	21.17	99	2		
1002	III B3 AR4000	38	1254	21.31	11	2		
1024	Type B 3/4"	31	1301	↓	89	2		
↓	↓	↓	1302	21.19	~~39~~	4		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Run No. 2 - Load Out

Client/Source: EPA / Plant C
Hot Mix Asphalt

Date: July 25, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1004	III C3 AR-4000	11	0702	21.12	20	2		
1024	Type B 3/4"	18	0704	21.43	29	5		
1004	III C3 AR-4000	11	0708	↓	16	2		Same truck
1004	III C3 AR-4000	11	0709	21.24	16	3		
1024	Type B 3/4"	18	0712	21.02	18	5		0715 Sampling
1004	III C3 AR-4000	11	0720	20.92	09	3		
1024	Type B 3/4"	18	0721	↓	312502	2		Front of truck
"	"	18	0723	23.87	312502	2		Back of truck
1018	1/2" Fine	12	0724	↓	3405	3		Front
1018	1/2" Fine	12	0725	23.65	"	3		Back
1024	Type B 3/4"	18	0729	21.21	27	2		~~Front~~
1004	III C3 AR-4000	11	0731	↓	312503	3		~~Back~~ Front
"	"		0732	23.93	↓	3		Back
1018	1/2" Fine	FSM ~~12~~ 12	0735	21.09	23	3		
1024	Type B 3/4"	18	0738	↓	312501	2		Front
"	"	"	0740	24.43	"	"		Back
1004	III C3 AR-4000	11	0742	20.59	25	3		
1024	Type B 3/4"	18	0743	↓	3106	2		Front
"	"	"	0744	23.24	"	"		Back
1024	Type B 3/4"	19	0745	20.64	22	2		
1018	1/2" Fine	12	0747	↓	3425	3		
"	"	"	0748	24.47	"	"		
1024	Type B 3/4"	18	0751	21.26	21	2		
1004	III C3 AR-4000	11	0753	↓	312504	3		Front
"	"	"	0755	24.52	"	"		Back
1018	1/2" Fine	12	0757	21.32	15	3		
1024	Type B 3/4"	18	0759	21.26	11	2		
1004	III C3 AR-4000	11	0805	19.73	08	3		
1024	Type B 3/4"	18	0807	21.05	07	2		

Load-Out Log Spreadsheet

Sheet 2 of 4

Mri Project No. 4701-08-03-04
Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 2 Load Out
Date: July 25, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1018	1/2" Fine	12	~~0809~~ 0810	psn 21.45	29	3		
1024	Type B 3/4"	18	0814	21.31	18	4		
1004	III C3 AR-4000	11	0817	↓	3597	3		Front
"	"	"	0817	24.65	"	"		Back
1018	1/2" Fine	12	0819	↓	3084	3		Front
"	"	"	0820	24.48	"	"		Back
1024	Type B 3/4"	18	0822	21.13	30	5		
1004	III C3 AR-4000	11	0824	↓	312505	3		Front
"	"	"	0825	24.03	"	"		Back
1024	Type B 3/4"	18	0828	21.50	09	2		
1018	1/2" Fine	12	0830	21.16	16	3		
1004	III C3 AR-4000	11	0832	21.27	10	3		
1024	Type B 3/4"	18	0834	21.25	27	2		
1024	Type B 3/4"	18	0837	↓	312501	4		Front
"	"	"	0838	24.45	"	"		Back
1004 psn ~~1024~~	III C3 ~~Type B 3/4"~~	11	0839	21.26	20	3		
1024	Type B 3/4"	18	0842	21.30	21 ~~18~~	5		844 Sampling Silo 2
1024	Type B 3/4"	18	0845	↓	3106	4		Front
"	"	"	0846	23.21	"	4		Back
1004 psn ~~1024~~	III C3 ~~Type B~~ 3/4"	11	0848	21.00		3		
1024	Type B 3/4"	18	0850	↓	312498	2		Front
"	"	"	0851	24.47	~~X~~ "	2		Back
1024	Type B 3/4"	19	0852	21.18	11	2		
1024	Type B 3/4"	18	0859	↓	312503	2		Front
"	"	"	0900	23.80	"	"		Back
1004	III C3 AR-4000	11	0902	21.00	07	3		
1024	Type B 3/4"	18	0903	20.80	25	4		
1024	Type B 3/4"	18	0906	21.18	18	4		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 2 Load Out

Date: July 25, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4"	18	0910	↓	3405	2		Front
"	"	"	0910	23.67	3405	"		Back
1004	III C3 AR4000	11	0913	20.89	30	~~30~~ 3	PSM	
1024	Type B 3/4"	18	0915	20.87	23	~~23~~ 2		
1024	Type B 3/4"	19	0917	21.02	11	2		
1018	1/2" Fine	12 ~~18~~	0918	12.0	09	3		
1024	Type B 3/4"	18	0921	21.01	27	2		
1024	Type B 3/4"	18	0923	↓	312505	2		Front
"	"	"	0924	24.19	"	2		Back
1024	Type B 3/4"	18	0928	20.93	21	2		
1024	Type B 3/4"	18	0931	20.94	08	2		
1018	1/2" Fine	12	0933	8.0	09	3		
1024	Type B 3/4"	18	0935	21.10	15	2		
1024	Type B 3/4"	18	0940	↓	3597	2		Front
"	"	"	0941	23.87	"	"		Back
~~1024~~	~~Type B 3/4"~~	~~18~~	~~0944~~		~~10~~			Cancelled
1004	III C3 AR4000	11	0945	15.03	10	3		
1024	Type B 3/4"	18	0947	↓	3425	2		Front
"	"	"	0948	24.58	"	"		Back
1024	Type B 3/4"	18	0949	21.17	29	2		
1024	Type B 3/4"	18	0954	↓	312505	2		Front
"	"	"	0955	23.58	"	"		Back
1024	Type B 3/4"	19	0957	20.86	11	2		
1024	Type B 3/4"	18	0959	↓	3106	2		Front
"	"	"	0959	22.79	"	"		Back
1024	Type B 3/4"	18	1002	20.70	25	2		
1024	Type B 3/4"	18	1005	↓	34508	2		Front
"	"	"	1006	24.19	"	"		Back
1024	Type B 3/4"	18	1009	21.06	20	2		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Plant C
Hot Mix Asphalt

Run No. 2 Load Out

Date: July 25, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4"	18	1014	↓	312503	2		Front
"	"	"	1015	23.54	"	"		Back
1018	1/2" Fine	12	1016	6.18	22	~~3~~ 4		
1024	Type B 3/4"	18	1027	↓	3084	2		Front
"	"	"	1028	24.06	"	"		Back
1024	Type B 3/4"	18	1030	20.91	18	4		
1024	Type B 3/4"	18	1032	21.06	27	4		
1024	Type B 3/4"	18	1035	20.79	16	4		
1024	Type B 3/4"	18	1039	3.14	21	4		21.03 -3.14
"	"	"	1041	17.89	"	5		17.89
1024	Type B 3/4"	18	1043	21.00	22	5		
1024	Type B 3/4"	18	1046	14.52	11	5		20.90 -14.52
1024	"	18	1048	6.38	~~X~~11	2		6.38
1024	Type B 3/4"	18	1050	20.80	07	2		
1024	Type B 3/4"	18	1052	20.87	08	2		
1024	Type B 3/4"	18	1054	20.91	30	2		
1024	Type B 3/4"	18	1100	20.91	15	2		
1024	Type B 3/4"	18	1104	21.07	29	2		
1024	Type B 3/4"	18	1110	21.13	09	2		
1024	Type B 3/4"	18	1119	20.64	25	2		
1024	Type B 3/4"	18	1124	21.01	20	2		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Source C
Hot Mix Asphalt

Run No. 3 Load Out

Date: July 27, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024 ~~1004~~	Type B 3/4"	22	0702	12.70	1554/03	2		Front 22.98
1024 ~~1004~~	"	22	0704	10.28	"	2		Back 12.70
1024	Type B 3/4"	18	0709	21.13	21	2		
1002	III B3 AR4000	20	0711	11.74	3106	2		Front ~~23.06~~ 11.74
"	"	20	0713	11.32	"	2		Back 11.32
1002	III B3 AR-4000	20	0718	21.28	09	2		
~~ ~~	~~ ~~	~~22~~			~~1717~~	~~2~~		Drop Aborted
1002	III B3 AR-4000	20	0736	12.21	3050/2	2		Front 24.33
"	"		0737	12.12	X "	"		Back 12.21
1024	Type B 3/4"	22	0738	12.75	1717	2		Front 25.65
"	"	"	0739	12.90	"	"		Back 12.75 12.90
1024	Type B 3/4"	28	0743	12.42	3597	2		Front 24.80
"	"	"	0744	12.38	"	"		Back 12.42
1002	III B3 AR-4000	20	0746	12.36	3542	2		Front 24.66
"	"	"	0747	12.30	"	"		Back 12.36
1024	Type B 3/4"	22	0753	12.66	2205	2		Front 25.28
"	"	"	0754	12.62	"	2		Back 12.66 12.62
1024	Type B 3/4"	22	0755	12.34	2305	2		Front 25.21
"	"	"	0756	12.87	"	"		Back ~~12.34~~ 12.87
1002	III B3 AR-4000	20	0800	12.00	3125/1	2		Front
"	"	"	0801	12.38	"	"		Back
1024	Type B 3/4"	18	0802	20.95	16	2		
1024	Type B 3/4"	22	0803	13.00	3475	2		Front
"	"	"	0804	12.70	"	"		Back
1024	Type B 3/4"	22	0809	13.84	1001	2		Front 27.84 13.84
"	"	"	0810	14.00	"	"		Back
1002	III B3 AR-4000	20	0812	21.40	27	2		
1002	III B3 AR-4000	20	0813	12.00	3084	2		Front
"	"	20	0814	12.25	"	"		Back

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04
Client/Source: EPA / Source C Hot Mix Asphalt

Run No. 3 Load Out
Date: July 27, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4"	22	0816	12.76	8280	2		Front 25.16
"	"	"	0816	13.00	"	"		Back 12.76
1024	Type B 3/4"	22	0818	13.00	20640	2		Front
"	"	"	0819	12.56	"	"		Back
1024	Type B 3/4"	78	0820	11.56	312524	2		Front 24.04
"	"	"	0821	12.48	"	"		Back 11.56
1002	III B3 AC4000	38	0822	21.38	12	2		
1002	III B3 AC-4000	20	0824	12.00	3094	2		Front
"	"	"	0824	12.23	"	"		Back
1024	Type B 3/4"	22	0826	13.00	230501	2		Front
"	"	"	0826	12.71	"	"		Back
1024	Type B 3/4"	22	0827	13.03	103207	2		Front
"	"	"	0828	13.13	"	"		Back
1002	III B3 AC-4000	~~78~~ 20	0829	12.05	3200	4		Front
"	"	"	0830	12.67	"	"		Back
1024	Type B 3/4"	18	0832	21.37	29	4		
1024	Type B 3/4"	22	0833	12.78	221505	4		Front
"	"	"	0834	12.88	"	"		Back
1002	III B-3 AC-4000	20	0835	21.18	10	4		
1024	Type B 3/4"	22	0837	13.00	102801	4		Front
"	"	"	0838	13.16	"	"		Back
1024	Type B 3/4"	22	0839	12.93	230506	4		Front
"	"	"	0840	12.47	"	"		Back
1024	Type B 3/4"	18	0841	21.36	20	4		
1002	III B-3 AC4000	20	0842	3.36	13	4		Loaded from
"	"	"	0843	17.94	"	5		~~Front~~ 2 silos
1024	Type B 3/4"	22	0844	12.80	201061	2		
"	"	"	0845	13.04	"	"		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Source C Hot Mix Asphalt

Run No. 3 - Load Out

Date: July 27, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B3 3/4"	22	0847	13.00	199508	2		
"	"	"	0848	12.96	"	"		
1002	III B3 AR 4000	20	0849	21.12	07	2		
1024	Type B3 3/4"	22	0851	21.33	15	2		
1024	Type B3 3/4"	22	0852	13.00	200420	2		Front
"	"	"	0853	13.13	"	"		Back
1024	Type B 3/4"		0854	11.59	102806	2		Front
"	"	"	0855	12.84	"	"		Back
1024	Type B 3/4"	18	0856	21.31	18	2		
1002	III B3 AR 4000	20	0858	20.44	44	2		
1024	Type B 3/4"	22	0859	13.14	121415	2		Front
"	"	"	0900	11.47	"	"		Back
1024	Type B 3/4"	22	0901	13.00	1298	2		Front
"	"	"	0902	13.01	"	"		Back
1002	III B3 AR 4000	20	0902	13.05	374K	2		Front
"	"	"	0903	11.05	"	"		Back
1024	Type B 3/4"	18	0904	21.28	09	2		
1002	III B3 AR 4000	20	0906	12.00	3106	2		Front
"	"	"	0907	11.19	"	"		Back
1024	Type B 3/4"	22	0908	12.94	230504	2		Front
"	"	"	0908	12.61	"	"		Back
1024	Type B 3/4"	22	0910	12.20	154409	2		Front
"	"	"	0910	12.24	"	"		Back
1002	III B3 AR 4000	20	0912	21.28	08	2		
1024	Type B 3/4"	18	0914	21.37	21	2		
1024	Type B 3/4"	22	915	12.12	1717	2		Front
"	"	"	0916	13.52	"	"		Back
1024	Type B 3/4"	22	0917	12.50	2205	2		Front
"	"	"	0919	12.63	"	"		Back

Load-Out Log Spreadsheet

Sheet 4 of 7

Mri Project No. 4701-08-03-04
Client/Source: EPA / Source C
Hot Mix Asphalt

Run No. 3 - Load Out
Date: July 27, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1002	III A-3 AR-4000	20	0921	12.35	303502	2		Front
"	"	"	0923	12.09	"	"		Back
1024	Type B 3/4"	22	0926	12.77	22515	2		Front
"	"	"	0927	12.77		"		Back
1002	III B-3 AR-4000	38	0929	21.36	12	2		
1024	Type B 3/4"	22	0931	13.00	2475	2		Front
"	"	"	0932	12.71	"	"		Back
1024	Type B 3/4"	22	0933	13.00	1001	2		Front
"	"	"	0934	14.74	"	"		Back
1024	Type B 3/4"	18	0935	21.49	27	2		
1002	III A-3 AR-4000	20	0937	12.74	3425	2		Front
"	"	"	0938	12.05	"	"		Back
1002	III B-3 AR-4000	20	0939	12.00	312501	2		Front
"	"	"	0943	12.51	"	"		Back
1024	Type B 3/4"	22	0944	13.00	201064	2		Front
"	"	"	0945	12.72	"	"		Back
1024	Type B 3/4"	22	0946	12.00	23501	2		Front
"	"	"	0947	13.18	"	"		Back
1024	Type B 3/4"	22	0951	12.65	220501	2		Front
"	"	"	0952	13.23	"	"		Back
1024	Type B 3/4"	22	0953	13.12	103202	2		Front
"	"	"	0954	13.27	"	"		Back
1004	III C3 AR 4000	—	0957	8.02	—	1		
1024	Type B 3/4"	18	0958	2.26	10	2		
1002	III B-3 AR-4000	20	1000	21.07	16	2		
1024	Type B 3/4"	22	1003	13.00	102801	2		Front
"	"	"	1004	13.08	3091	"		Back
1024	Type B 3/4"	22	1005	12.86	2215050	2		
"	"	"	1006	12.92	"	"		

Load-Out Log Spreadsheet

Sheet 5 of 7

Mri Project No. 4701-08-03-04

Client/Source: EPA/Source C
Hot Mix Asphalt

Run No. 3 - Load Out
Date: July 27, 1998
Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1002	III B-3 AC-4000	20	1007	12.00	3094	2		Front
"	"	"	"	12.42	"	"		Back
1002	III B-3 AC-4000	20	1009	11.69	3004	2		Front
"	"	"	1009	12.64	"	"		Back
1024	Type B 3/4"	22	1011	13.00	19508	~~[illegible]~~ 2		Front
"	"	"	1011	12.93	"	"		Back
1024	Type B 3/4"	22	1012	13.00	30504	2		Front
"	"	"	1014	~~13.00~~ 12.22	"	"		Back
1002	III B-3 AC-4000	20	1015	12.61	3200	2		Front
"	"	"	1016	12.17	"	"		Back
1024	Type B 3/4"	22	1017	13.00	22106	2		Front
"	"	"	10:20	12.86	"	"		Back
1024	Type B 3/4"	22	1021	12.79	102806	2		Front
"	"	"	1022	11.73	"	"		Back
1024	Type B 3/4"	22	1023	21.25	07	2		
1024	Type B 3/4"	22	1025	12.82	121415	2		Front
"	"	"	1025	12.90	"	"		Back
1024	Type B 3/4"	22	1026	13.00	200420	2		Front
"	"	"	1027	13.14	"	"		Back
1002	III B-3 AC-4000	20	1028	20.98	26	2		
1024	Type B 3/4"	18	1029	8.95	18	2		Filled from
"	"	"	1030	12.40	"	5		2 Silos
1024	Type B 3/4"	22	1032	13.00	1298	2		Front
"	"	"	1032	13.10	"	"		Back
1002	III B-3 AC-4000	38	1034	21.25	12	5		
1002	III B-3 AC-4000	20	1035	21.29	20	5		
1002	III B-3 AC-4000	~~18~~ 20	1037	21.40	29	5		
1024	Type B 3/4"	22	1039	13.01	230506	5		
"	"	"		12.69	"	"		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Source C

Hot Mix Asphalt

Run No. 3 - Load Out

Date: July 27, 1998

Data Recorded By: PS Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024	Type B 3/4"	22	1043	12.80	2305	5		F 25.28 12.80
"	"	"	1043	12.48	"	"		B
1024	Type B 3/4"	18	1045	21.39	15	5		
1002	III B-3 AC-4000	20	1047	21.38	21	5		
1024	Type B 3/4"	22	1049	13.00	1717	~~5~~ 2 PSM		Front
"	"	"	1050	12.76	"	"		Back
1002	III B-3 AC-4000	20	1051	21.21	09	2		
1024	Type B 3/4"	18	1052	21.44	13	2		
1024	Type B 3/4"	22	1054	12.79	15540	2		Front
"	"	"	1056	12.73	"	"		Back
1002	III B-3 AC-4000	20	1057	21.61	30	2		
1024	Type B 3/4"	22	1059	12.86	22515	2		Front
"	"	"	1100	12.72	"	"		Back
1002	III B-3 AC-4000	20	1101	20.87	44	2		
1024	Type B 3/4"	18	1103	21.30	08	2		
1024	Type B 3/4"	24	1107	12.91	2475	2		Front
"	"	"	1108	12.83	"	2		Back
1002	III B-3 AC-4000	20	1109	21.45	27	2		
1024	Type B 3/4"	18	1110	11.50	3246	2		Front
"	"	"	1111	10.97	"	"		Back
1024	Type B 3/4"	22	1113	12.68	1001	2		Front
"	"	"	1113	15.23	"	"		Back
1002	III B-3 AC-4000	20	1118	12.00	3106	2		Front
"	"	"	1118	11.26	"	"		Back
1024	Type B 3/4"	22	1121	12.00	22501	2		Front
"	"	"	1121	13.22	"	"		Back
1024	Type B 3/4"	22	1122	13.00		2		
"	"	"	1123	12.78	"	"		

Load-Out Log Spreadsheet

Mri Project No. 4701-08-03-04

Client/Source: EPA / Source C Hot Mix Asphalt

Run No. 3 - Load Out

Date: July 27, 1998

Data Recorded By: P.S. Murowchick

Product ID	Product Description	Job Name	Time Of Loading	Actual Tons Loaded	Truck No	Silo No.	Mix Temp. in Truck	Comments
1024 ~~1004~~	Type B 3/4"	~~19~~	1125	24.53	303502	2		
1024	Type B 3/4"	22	1128	13.00	123081	2		Front
"	"	"	1129	12.92	"	"		Back
					~~103501~~			
1024	Type B 3/4"	22	1131	13.00	195512	2		Front
"	"	"	1133	12.73	"	"		Back
1024	Type B 3/4"	28	1133	12.00	3597	2		Front
"	"	"	1134	12.91	"	"		Back
1004	III C3 AR4000	17	1135	12.00	312501	1		Front
"	"	"	1136	12.56	"	"		Back
1024	Type B 3/4"	~~20~~ 22	1136	13.00	103202	2		Front
"	"	"	1137	13.60	"	"		Back
1024	Type B 3/4"	22	1138	13.00	102801	2		Front
"	"	"	1139	13.14	"	"		Back
1024	Type B 3/4"	22	1141	13.00	221105	2		Front
"	"	"	1141	12.67	"	2		Back
1024	Type B 3/4"	22	1142	13.00	195508	2		Front
"	"	"	1143	13.10	"	"		Back
1002	III B3 AR4000	20	1144	12.00	3094	2		Front
"	"	"	1145	12.49	"	"		Back
1024	Type B 3/4"	22	1147	13.00	201061	2		Front
"	"	"	1148	12.96	"	"		Back
1024	Type B 3/4"	22	1149	13.00	230504	2		Front
"	"	"	1150	12.46	"	"		Back
1002	III B3 AR4000	20	1151	12.50	3200	2		Front
"	"	"	1151	12.31	"	"		Back
1004	III C3 AR4000	17	1152	21.08	26	1		
1024	Type B 3/4"	22	1154	12.00	102806	2		Front
"	"	"	1155	12.64	"	"		Back

Appendix I

Sample Concentration Procedure and Raw Data Sheets

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 3 Date 07-27-98
Project No. 4701.08.03.04
Barometric Pressure 29.24 in. Hg
Barometer to Location Elevation 50 ft.
Corrected Baro. Pressure 29.19 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume NA Liters
Probe In-Stack Length 6 in.
Probe Liner Material Teflon
First Tenax Tube No. SV-113
Second Tenax Tube No. SV-104

Sample Type* Source
Client USEPA-EMC
Sampling Location #1
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0784
Temperature Controller No. VC-1
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 5.1 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0710	0.000	24	141	15	3.5	150	Process feeding RAP.
0720	~~1~~5.02	24	141	14	3.5	150	Condensate collection
0722	18.005	Stopped	sampling —	No Leak Check			higher than before!
0758	18.005	26	141	15	3.0	150	Process stopped
0808	33.08	27	141	13	3.0	150	feeding RAP
0818	48.18	27	141	12	3.0	150	Plant feeding RAP
0828	63.20	~~27~~ 26	141	12	3.0	150	again, started??
0838	78.15	27	142	11	3.5	150	
0848	93.28	28	142	10	3.5	150	
0858	108.38	29	143	11	3.5	150	
0908	123.40	29	143	11	3.5	150	
0918	138.65	28	143	11	3.5	150	
0928	153.47	29	143	11	3.0	150	
0938	168.58	29	143	11	3.5	150	
0948	183.60	29	141	11	3.5	150	
0951	187.553	Stopped	Sampling				

*Ambient air, train blank, preliminary, duplicate train, or source sample.

Sample Concentrating Procedures for Gas Phase FTIR Analysis

Midwest Research Institute

Version 3

December 23, 1997

1.0 Introduction

This method describes a procedure for collection of volatile organic compounds onto a sorbent material (Tenax), storage of samples (if necessary), thermal desorption of captured volatile compounds from the sorbent material into a multi-pass White cell, and analysis of the gases by FTIR. This method is intended to complement sampling and analysis of pollutant gas streams by EPA Method 320 (FTIR) by providing one mechanism by which, under certain circumstances, greater detection limits can be achieved. The sorbent collection and desorption aspects of this method are based largely upon field and laboratory work performed by Entropy Environmentalists, Inc. (Entropy), laboratory work performed by Midwest Research Institute (MRI), and EPA-approved Tenax-based procedures for stack sampling, such as the Volatile Organic Sampling Train (VOST), SW-846, Method 0030, which is widely used for collection of volatile organic compounds with analysis by GC/MS.

Previous work has been done using Tenax concentrating systems for FTIR analysis by Entropy (1993, 1994) and MRI (1993, 1994), but has not been published. Entropy's work involved validation of certain equipment and procedures based on Method 301, and ultimately the procedures were used for collection of field samples. MRI's work involved laboratory validations of certain equipment and procedures in an effort to duplicate, and potentially improve upon, the techniques developed by Entropy, and was never used to collect field samples. The procedures described in this document represent a hybrid of Entropy's and MRI's collective experiences and also the availability of MRI equipment currently available to collect and analyze samples.

2.0 Sample Collection

A concentrated sample is collected by drawing source gases through a sampling train equipped with one or more Tenax cartridges under controlled conditions. This method uses an oversized (10 g) Tenax trap in order to concentrate a large gas volume while protecting against breakthrough. A second trap may also be placed in-line to provide additional protection against breakthrough, as necessary.

Components of the concentrative FTIR sampling train include a heated stainless steel probe with a glass liner, heated filter and glass filter holder (optional), heated teflon connecting line, a water-cooled glass condenser, nickel adsorbant trap, empty catch flask or impinger for water removal, a second water-cooled glass condenser (optional), a second nickel adsorbant trap (optional), a silica gel drying tube, a calibrated rotometer, a sampling pump, and a dry gas meter. An untreated glass wool plug may also be included at the probe tip as an optional particulate removal method. Treated, or silanized, glass wool should not be used with this sampling system as it has been shown to introduce contamination. All heated components will be kept at a temperature of 120 C or greater to ensure no condensation of water vapor within the system.

The Tenax cartridge design is based largely on the inside-outside VOST configuration from SW-846, Method 0030, without using the outer metal carrier tube. Cartridges will be made of 1" diameter nickel tubing and will be filled with about 10 grams of Tenax TA adsorbant material. Nickel was chosen as the construction material due to its low reactivity and high thermal conductivity. It is believed that glass may have poor heat transfer for a tube of this size, limiting both sample collection and desorption functions, and that stainless steel is considered reactive, and may adsorb trace volatile organics which may be present in the gas stream. Both ends of the tube will be plugged with a 1" diameter screen held in place by a C-clip. Approximately 1" on either end of the tubing will be polished to allow leak-free connection with the end cap o-ring. Cartridges will be individually marked for clear identification and direction of sample flow.

Previous field work with this method by Entropy has demontrated effective sample collection and retention by using a stainless steel U-shaped tube (which was immersed in an ice bath). MRI's straight nickel tube design, which has undergone laboratory validation, is expected to provide even better performance due to reduced chemical reactivity and improved moisture removal. "Drying" of the tube prior to thermal desorption and analysis is discussed further in Section 5.0.

Prior to use in the field, the packed tube will be heated to 350 F while being purged with dry nitrogen (typically 1-2 LPM) for up to 18 hours. Cleanliness may be verified by laboratory FID (pass/fail criteria for THC of <5 ppb), laboratory FTIR, and/or field FTIR, whichever is most appropriate for the necessary application. Note that FTIR checks for cleanliness may allow identification of specific contaminants.

Spiking with a surrogate gas is suggested as a measure of effectiveness of the sampling system and of the desorption/recovery procedures. To be the most representative, spiking should be performed on-line (during normal sample collection) with spike gases passing through the entire Tenax concentrating system, including the probe, if possible. If spiking in this manner is not practical, other types of surrogate and QA spiking should be considered. Section 4.1 of this method describes surrogate spiking procedures in greater detail.

For concentration of the sample gases , one trap or (optionally) two traps will be placed in-line in a sampling train. Inclusion of the second trap allows determination of breakthrough, if any, to be determined. The train is equipped with glass water-cooled condensers and has fittings specifically built to allow connection of the 1" diameter concentrative FTIR Tenax cartridges. A catch flask will be connected at the lower end of the first trap for collection of moisture, but will not be analyzed by FTIR. If necessary, this condensate can be archived and analyzed by purge and trap GC/MS.

Cooling water flow will be maintained through the condensers in order to collect sample gases at the appropriate temperatures. Of primary importance is the temperature at the base of the first condenser (inlet to the first Tenax trap), which must be maintained at 20 C or lower. The condensers will be sized large enough to maintain <20 C temperatures at the desired gas sampling rates.

Sample gas flow will be maintained at 1-5 LPM for the duration of the test, and will depend upon the specific needs of the site being tested. Nominal flow will be set by a calibrated rotometer mounted on the sampling apparatus console, and the exact volume drawn through the collection train will be measured by a dry gas meter. An approximate concentration factor can be calculated by dividing the dry gas meter volume by the FTIR cell volume (nominally 7.0 liters). Thus, sample collection at 1.5 LPM for 4 hrs (240 minutes) produces approximately 360 liters of sample. Dividing 360 by 7 results in a concentration factor of 51. Operating flowrates and breakthrough volumes for this method have not been extensively researched, but in general one can expect concentration factors of up to 50 to be effective and valid samples. Sample gas volumes of up to 400 L (concentration factor of about 57) have been demonstrated in the laboratory for certain compounds.

Since sample collection could potentially involve a time period of up to several hours, the silica gel cartridge should be periodically checked for saturation. Saturation of the silica gel cartridge is apparent when the silica gel begins to turn pink. If necessary, the sampling apparatus can be shut down temporarily to replace the silica gel cartridge. Removal of all water from the gas stream is essential to accurately measuring the dry gas volume of the sample.

Sample train configuration is as shown in Figure 1.

3.0 Sample Storage

Following collection of the sample, sealed end caps will be placed on both ends of the cartridge and the cartridge will be kept on ice in a contaminant-free container. The intention of the method is to store samples only temporarily until analysis can be performed by thermal desorption into the FTIR gas cell. Such analysis will, in all likelihood, be performed in the field within a few hours of sample collection. Sample storage procedures of this method, however, are identical to those of SW-846, Method 0030, which specifies a holding time of 14 days prior to analysis.

4.0 QA/QC Spiking and Blanks

In an effort to somewhat duplicate the QA/QC procedures frequently associated with other methods of sorbent tube sampling, the use of surrogate spikes and analysis of blank traps is included in this method. Application of these procedures, however, must be dictated by the practical aspects of field sampling conditions and the analytical matrix of the actual gas samples. Thus, the following QA/QC procedures should be considered only as guidelines and subject to modification under field conditions.

4.1 Surrogate Spiking

During collection of the actual field samples, traps will be simultaneously spiked with an appropriate, non-native surrogate compound which is both effectively retained by Tenax and which displays a distinct, identifiable infrared absorbance spectrum. Spiking with such surrogates will demonstrate that losses are not occurring due to the sampling equipment itself, and will also verify effective retention and recovery by the Tenax sorbent bed. Since it may be difficult to choose *a priori* a compound or compounds which are non-native, the operator may wish to examine the use of deuterated species for use as surrogates. Deuterated species which are commonly used with Tenax-based analytical systems and which are expected to display useful infrared spectral features include:

Chlorobenzene-d5
1,4-Dichlorobenzene-d4
1,2-Dichlorobenzene-d4
Dichloroethane-d4
Toluene-d8

Non-deuterated species which are also commonly used for other Tenax-based analysis also include:

1,4-Difluorobenzene
4-Bromofluorobenzene
Dibromofluoromethane
Pentafluorobenzene
Fluorobenzene

If possible, the surrogate compound(s) will be purchased as a compressed cylinder gas in nitrogen. Concentrations will be chosen as necessary to establish the necessary spiking level. Some consideration should be given to choosing the gas concentration, since this gas will be used to (1) perform the surrogate spike onto the Tenax trap, and (2) directly fill the FTIR gas cell to generate a reference spectrum for analysis of the surrogate recovery. Gas concentrations should approximate the levels expected in the trap after sample collection (i.e. 20x, 50x, etc., the source gas concentration). Note that two or more gas cylinders at different concentrations may be necessary to generate proper spiking levels in the concentrated trap and direct to the gas cell (for reference spectrum).

On-line surrogate spiking procedure with compressed gases involves first connecting the compressed gas cylinder to a calibrated flowmeter and then connecting to a tee on the back of the sampling probe. During the time of operation for the sampling train (1-hr or more), surrogate gas is metered directly into the back of the sampling probe and drawn through the sampling train along with actual source gases. An accurate record of the surrogate gas flowrate and exact length of time for the spike must be kept, allowing the measured volume of the spike to be calculated. The measured volume of surrogate gas should ideally be such that the amount collected by the Tenax trap, and thus the expected cell concentration as determined by FTIR, is fairly close to the concentrations of the compressed gas standard (which directly fills the FTIR gas cell to generate the recovery reference spectrum).

In situations where the practical constraints of field sampling will not allow on-line surrogate sampling to be performed, a post-test laboratory spiking procedure may be useful. To perform this type of surrogate spike, connect the compressed gas cylinder to a calibrated rotometer, and then connect directly to the concentrative FTIR Tenax trap. The trap must be aligned in the same direction as sample collection was performed, so that surrogate gas will flow in a cocurrent direction. The trap will be kept cold (<20 C) as per normal sample collection, and a measured volume of surrogate gas will be allowed to flow through the trap. Again, the measured volume of surrogate gas should ideally be such that the amount collected by the Tenax trap, and thus the expected cell concentration as determined by FTIR, is fairly close to the concentrations of the compressed gas standard (which directly fills the FTIR gas cell to generate the recovery reference spectrum).

A third option for surrogate spiking is also of use, especially in cases where the surrogate compounds of interest not available in gas cylinders at the necessary concentrations. In these cases, spiking can be performed by using a gastight syringe and neat or mixed chemical solutions. Calculations must be performed to determine the liquid volume needed to achieve the desired spiking level onto the trap and/or into the FTIR gas cell. Using a heated injection port (120 C) to assure full vaporization of the liquid, the measured syringe volume is injected into a flowing dry nitrogen stream (0.5 LPM). For spiking onto the trap, nitrogen flow will be maintained at 0.5 LPM for 10 minutes to assure full transfer of the spike to the Tenax bed. For injection of the standard directly into the evacuated cell, dry nitrogen will be used to backfill the FTIR gas cell until atmospheric pressure is achieved. Note that this method of spiking may introduce a greater amount of imprecision in the spike and recovery determinations than does use of compressed cylinder gases. Use of neat chemicals or chemical solutions for reference spectrum generation will also generally introduce a greater degree of interference from atmospheric water and carbon dioxide bands than does use of compressed cylinder gases, which can be used to thoroughly flush the cell prior to spectral collection.

4.2 Blank Traps

Whenever collecting trace levels of volatile organics on a sorbent material, appropriate blanks must be collected and analyzed. The exact number and types of blanks necessary will vary based upon field conditions, but the following should be considered.

Train or Baseline Blank - In order to demonstrate cleanliness of the sampling equipment itself, install a sorbent tube in the sampling system, connect the probe, and sample approximately 100 L of clean air or dry nitrogen. Desorb the tube using normal procedures and analyze the sample by FTIR to verify that the sampling system is clean. Perform this procedure when the train is initially used at a new sampling location.

Upwind or Ambient Air Blank - To allow for correction for upwind or ambient air contamination, install a sorbent tube in the sampling system, connect the probe, and sample approximately 100 L of ambient air. Desorb the tube using normal procedures and analyze by FTIR. Perform this procedure as necessary to determine upwind or ambient air contamination, or to demonstrate cleanliness.

Field Blank - To determine any contamination which may occur during installation, leak checking, and temporary storage of Tenax traps, collect a field blank sample by taking the trap to the appropriate sampling location and removing the end caps from the Tenax trap for a length of time simulating installation of two traps into the sampling apparatus. Replace the end caps and place the samples in temporary storage (if used). Desorb the tube using normal procedures and analyze by FTIR.

Trip Blank - For samples which will be stored prior to analysis, a blank trap will be kept in each individual container used for sample storage and analyzed for background contamination. These samples will be treated like any other cartridge except that the end caps will not be removed during storage at the site. Note that for many applications of the concentrative FTIR method, samples will be stored for approximately 4-hrs or less and will be analyzed in the field, eliminating the need for trip blanks.

5.0 Thermal Desorption

The thermal desorption procedure involves connecting the Tenax trap to an evacuated FTIR gas cell, heating the trap to the appropriate temperature, and flushing the heated trap with dry nitrogen directly into the evacuated gas cell until full cell pressure is obtained. Analysis can then be performed by FTIR. The following paragraphs provide greater details for the thermal desorption procedure.

Thermocouple placement and temperature control for the thermal desorber have been established in previous experiments. Since the concentrative FTIR cartridge is much larger than traditional Tenax-based sampling cartridges, heat wraps, insulation, and thermocouples may have localized effects. Such effects may ultimately cause degradation of the Tenax and/or poor recovery of the sample.

Similarly, MRI lab personnel have observed thermal degradation of Tenax at 250 C, which, although specified by SW-846, Method 0030 (VOST), potentially leads to poor sample retention and recovery. MRI analysts routinely use thermal desorption temperatures of 200 C for normal VOST analysis without sample loss, and in 1993-94 MRI demonstrated quantitative recovery of the concentrated samples at a thermal desorption temperature of 220 C. Although not physically measured with a thermocouple, it was believed that a shell temperature of 220 C would assure a 200 C temperature at the core of the larger 10-g cartridge.

In order to limit interferences from water in the infrared spectrum, traps will be "dried" prior to analysis. This will be accomplished by maintaining the trap at a cold temperature and purging it with dry nitrogen for 8-10 minutes. Nitrogen flow is expected to be about 2.5 LPM, and will be co-current with the direction of sample flow. Water purged from the trap in this manner will not be retained as part of the condensate fraction. Note that for ambient air or low moisture sources, this "drying" phase may not be necessary. The amount of water present with MRI's straight tube design is expected to be significantly less than the amount present with Entropy's previous U-tube design, since any water drawn through the trap will drop out directly into a catch flask.

Thermal desorption of the traps will be accomplished by using an insulated tubular heater monitored by thermocouples at two locations. The trap will be placed in the heater with flow aligned countercurrent to the sampling flow direction. The upstream end of the trap will be connected to a mass flowmeter or similar precision device and connected to a gas stream of prepurified dry nitrogen. The downstream end of the trap will be connected to the inlet of the FTIR gas cell. Prior to desorption of the trap, the FTIR gas cell will be thoroughly purged with dry nitrogen and evacuated.

Upon initiating the heating cycle (ramp up), nitrogen flow will be maintained through the trap at 0.10 LPM. This flow is necessary to insure heating in the absence of oxygen, which could otherwise contribute to thermal degradation of the Tenax. Upon reaching full temperature (220 C), nitrogen flow will be raised to 0.45 LPM. Flow will then be maintained at 0.45 LPM until full cell pressure is achieved (nominally 760 mm Hg). Typical times for desorption should be approximately 5 minutes for the ramp up cycle and 12-15 minutes for desorption at 0.45 LPM. Previous work performed by MRI demonstrated that complete desorption occurred will before the 15 minute desorption cycle was finished.

Since the sample concentration methods described in this document are intended to provide samples for field analysis, used Tenax traps will not necessarily be returned to the laboratory for analysis and cleanup before reuse. Thus, to clearly demonstrate thorough desorption of the samples, and that individual traps may be returned to use, it is necessary to perform a second thermal desorption and analysis of each trap. Desorption and analysis procedures for the second desorption are identical to those followed for the first desorption. Following the second desorption and verification of trap cleanliness, the trap is again ready to collect field samples. Should the trap show contamination, additional desorptions will be performed as necessary to clean the trap and/or the trap will be removed from service.

Figure 2 shows the equipment configuration for thermal desorption.

6.0 Analysis by FTIR

Sample analysis will follow EPA Method 320, Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive FTIR. Due to the thermal desorption mechanism by which sample is introduced into the gas cell, "Batch" mode must be used to collect the sample spectrum.

7.0 References

1. Entropy Environmentalists, Inc., 1993-1994.

2. Midwest Research Institute, 1993-1994.

3. SW-846, Method 0030, Volatile Organic Sampling Train (VOST), September 1986.

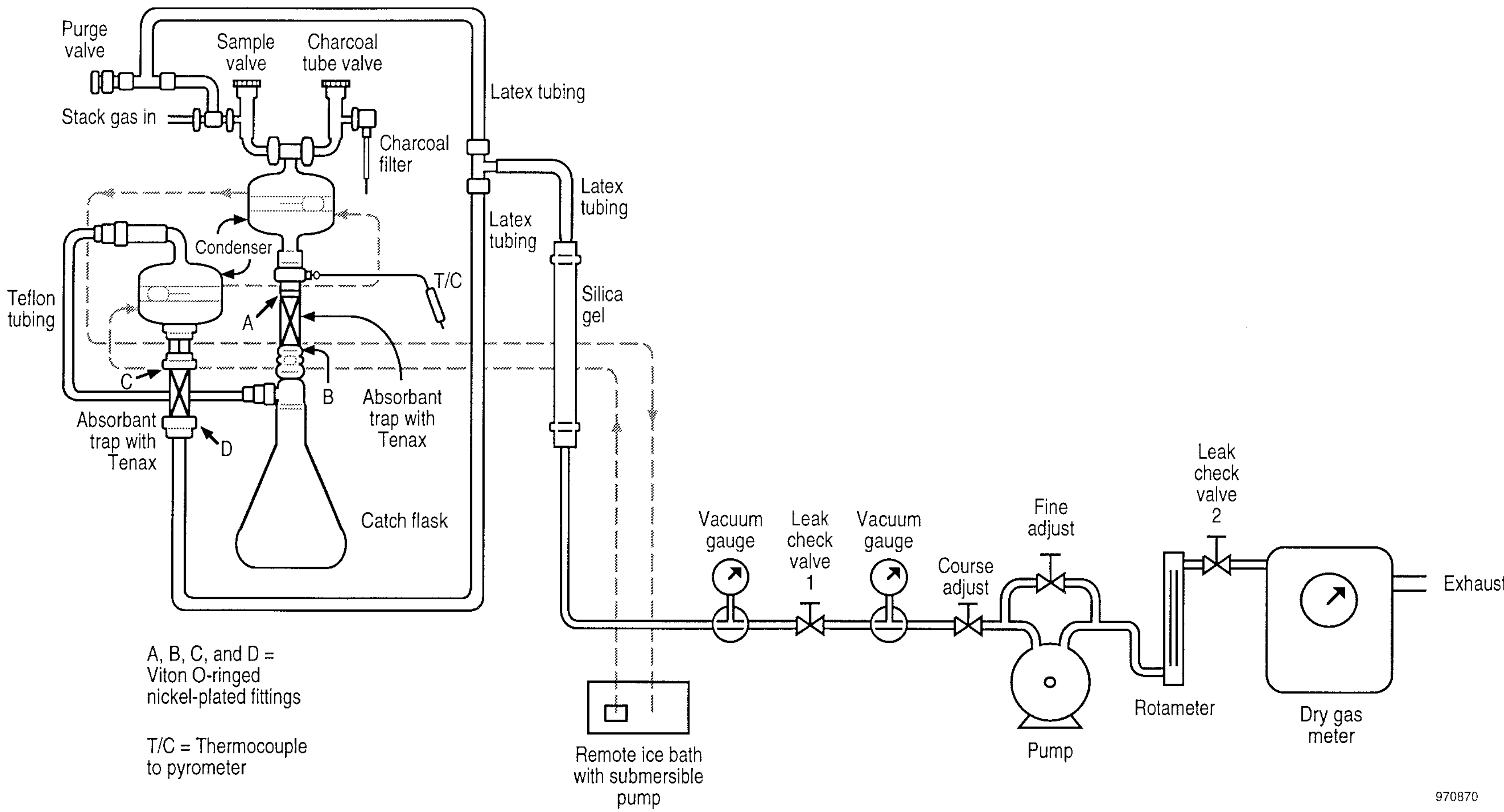


Figure 1. Sample Concentrating System

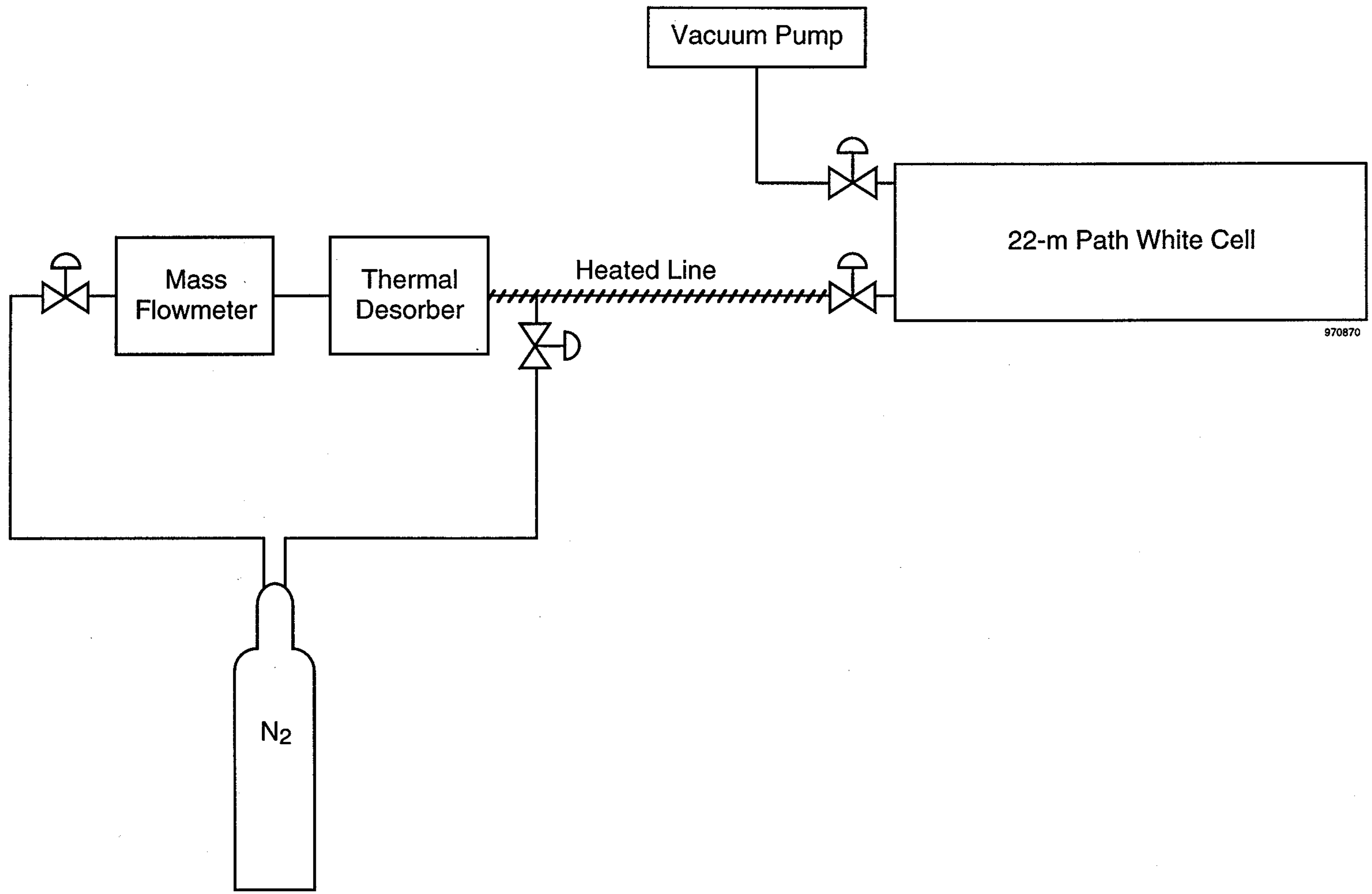


Figure 2. Thermal Desorber System

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. NA Date 07-20-98
Project No. 4701.08.03.04
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation -20 ft.
Corrected Baro. Pressure 29.31 in. Hg
Desired Probe/STL Temperature NA °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 90 Liters
Probe In-Stack Length NA in.
Probe Liner Material NA
First Tenax Tube No. SV101
Second Tenax Tube No. Blank

Sample Type* Train Blank
Client USEPA-EMC
Sampling Location 3
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0783
Temperature Controller No. NA
Temperature Meter No. NA
Heated STL Length NA in.
STL Tubing Material NA

Leak Check from Probe Inlet:
Before Sampling NA in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling NA in. Hg change at ____ in. Hg vacuum for ____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0 in. Hg change at 4.2 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1646	0.000	32	NA	21	2	140	
1656	15.12	32	NA	21	3	140	
1706	30.18	32	NA	21	3	140	
1716	46.05	32	NA	17	4	150	
1726	62.46	32	NA	17	4	150	
1736	78.04	33	NA	18	4	150	
1746	93.240			19 at end			

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. N/A Date 7/21/98
Project No. 4701-08-03-04
Barometric Pressure 29.30 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.30 in. Hg
Desired Probe/STL Temperature N/A °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 90 Liters
Probe In-Stack Length N/A in.
Probe Liner Material N/A
First Tenax Tube No. SU-103
Second Tenax Tube No. BLANK

Sample Type* Train Blank
Client US EPA - EMC
Sampling Location Trailer
Operator EDWARDS
Metering Console No. VOST-3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. 4
Tenax Inlet Thermocouple No. V-4
Temperature Meter No. Y-3918
Temperature Controller No. N/A
Temperature Meter No. N/A
Heated STL Length N/A in.
STL Tubing Material N/A

Leak Check from Probe Inlet:
Before Sampling N/A in. Hg change at ___ in. Hg vacuum for ___ sec.
After Sampling N/A in. Hg change at ___ in. Hg vacuum for ___ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1558	0.00	21	N/A	14	2.0	125	
1608	15.20	22	N/A	12	2.0	~~115~~ RIE	112 (7/21/98, mis-marked reading).
1618	29.91	23	N/A	12	2.0	115	
1628	45.08	23	N/A	12	2.0	115	
1638	59.98	24	N/A	12	2.0	115	
1648	75.01	24	N/A	12	2.0	115	
1658	90.33	25	N/A	12	2.0	115	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

1

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Prelim Date 7/22/98
Project No. 4701-08-03-04
Barometric Pressure 29.34 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.34 in. Hg
Desired Probe/STL Temperature — °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 90 Liters
Probe In-Stack Length N/A in.
Probe Liner Material N/A
First Tenax Tube No. SV-101
Second Tenax Tube No. BLANK

Sample Type* TRAIN BLANK
Client US EPA - EMB
Sampling Location Sampling TRAILER
Operator Edwards
Metering Console No. JOST 3
Dry Gas Meter Correction (Y) 0.998
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. V-7
Temperature Meter No. Y-3918
Temperature Controller No. N/A
Temperature Meter No. N/A
Heated STL Length N/A in.
STL Tubing Material N/A

Leak Check from Probe Inlet:
Before Sampling N/A in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling N/A in. Hg change at ____ in. Hg vacuum for ____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19.5 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1004	0.00	24	N/A	20	2.0	118	
1014	14.91	25	N/A	20	2.0	120	
1024	30.20	26	N/A	19	2.0	120	
1034	45.34	26	N/A	18	2.0	119	
1044	60.28	27	N/A	17	2.0	119	
1054	75.24	27	N/A	16	2.0	119	
1104	90.48	27	N/A	15	2.0	119	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Prelim Date 7/22/98
Project No. 4701-08-03-04
Barometric Pressure 29.34 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.34 in. Hg
Desired Probe/STL Temperature N/A °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 90 Liters
Probe In-Stack Length N/A in.
Probe Liner Material N/A
First Tenax Tube No. SU-102
Second Tenax Tube No. Blank

Sample Type* Upwind TRAIN Blank
Client US-EPA EMB
Sampling Location Upwind at Tunnel Entrance
Operator Edwards
Metering Console No. VOST 3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. VOST 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. N/A
Temperature Meter No. N/A
Heated STL Length N/A in.
STL Tubing Material N/A

Leak Check from Probe Inlet:
Before Sampling N/A in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling N/A in. Hg change at ____ in. Hg vacuum for ____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19.5 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1225	0.0	30	N/A	20	2.0	119	
1235	14.98	32	N/A	18	2.0	120	
1245	29.92	34	N/A	19	2.0	120	
1255	45.21	35	N/A	19	2.0	119	
1305	60.12	36	N/A	19	2.0	119	
1315	75.12	37	N/A	18	2.0	119	
1325	90.15	37	N/A	19	2.0	119	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 1 Date 07-21-98
Project No. 4701.08.03.04
Barometric Pressure 29.37 in. Hg
Barometer to Location Elevation -20 ft.
Corrected Baro. Pressure 29.35 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 20 in.
Probe Liner Material Glass
First Tenax Tube No. SV-102
Second Tenax Tube No. SV-101

Sample Type* source
Client USEPA-EMC
Sampling Location 3
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0783
Temperature Controller No. BC-3
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 16 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 4.9 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1121	0.000	41	140	21	3	150	
1131	15.05	41	140	20	3	150	
1141	29.96	39	140	19	3	150	
1151	44.90	41	140	19	3	150	
1201	59.96	45	140	19	3	150	
1211	75.05	42	140	17	3	150	
1221	90.01	43	140	18	3	150	
1231	105.08	44	140	18	3	150	
1241	119.98	43	140	19	3	150	
1251	135.05	42	140	20	3	150	
1301	150.08	40	140	19	3	150	
1311	165.11	40	140	19	3	150	
1321	180.04	42	140	20	3	150	
1331	194.94	41	140	19	3	150	
1341	210.05	40	141	18	3	150	
1351	225.12	39	141	17	3	150	
1401	240.14	39	141	18	3	150	
1411	255.09	38	141	18	3	150	- shut down 1420:30 plant down
1421	268.600						

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 2 Date 07-22-98
Project No. 4701.08.03.04
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation 20 ft.
Corrected Baro. Pressure 29.31 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 270 Liters
Probe In-Stack Length 20 in.
Probe Liner Material Glass
First Tenax Tube No. SV-106
Second Tenax Tube No. SV-105

Sample Type* Source
Client USEPA-EMC
Sampling Location 3
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0783
Temperature Controller No. BC-3
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling ~~Not done~~ 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 16 in. Hg vacuum for 60 sec.
After Sampling ~~Not done~~ 0.00 in. Hg change at 4.7 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0935	0.000	30	140	18	3	150	
0945	14.95	31	140	15	3	150	
0955	30.02	33	140	14	3	150	
1005	44.94	35	140	14	3	150	
1015	60.05	36	140	14	3	150	
1025	75.10	37	140	14	3	150	
1035	90.12	37	140	14	3	150	
1045	105.00	37	140	14	3	150	
1055	120.03	37	140	14	3	150	
~1200 ~~1105~~	127.760						
1125	127.760	36	140	20	3	150	
1135	142.52	38	140	18	3	150	
1145	157.43	39	140	17	3	150	
1155	172.40	38	141	16	3	150	
1205	187.38	38	140	15	3	150	
1215	202.40	37	141	15	3	150	
1225	217.42	37	141	15	3	150	
1235	232.30	38	141	16	3	150	
1236 ~~1245~~	233.71	Stopped	sampling.				

Remarks: Shut down about 1200. Noticed that condenser inlet (first) was ~~broken~~ disconnected. 1125 restart after reconnecting condenser to tee. Did not run initial leak check–should be ok. Best estimate is that train was broken for less than 5 minutes during sampling. Did not notice anything during previous data readings.

*Ambient air, train blank, preliminary, duplicate train, or source sample.

SUPRVOST.WPD July 16, 1998

This run was aborted.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

7/24/98 Aborted Loadout BE

Run No. ~~1~~ Date 7/23/98
Project No. 4701-08-03-04
Barometric Pressure ______ in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure ______ in. Hg
Desired Probe/STL Temperature 105 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SV-104
Second Tenax Tube No. SV-103

Sample Type* Source Sample
Client US EPA - EMB
Sampling Location ~~Loadout Duct~~ 7/24/98 TED BE
Operator Edwards
Metering Console No. VOST 3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Name of Location Changed to reflect entry by PES.

Leak Check from Probe Inlet:
Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 18.5 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °F ~~°C~~	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0925	0.00	20	107	16	1.5	119	
0935	14.84	20	107	16	1.5	122	
0945	29.95	21	106	15	1.7	122	
0955	45.10	23	107	15	1.5	120	
1005	60.06	24	105	15	1.5	120	
1015	75.15	25	107	15	1.5	118	
1025	90.08	25	107	15	1.5	118	
1035	104.90	27	107	14	1.5	120	
1036:10	106.40						Stop
1042:10	31 sec						Start
1042:41	~~[illegible]~~	EE BE 7-24-98					Stop
1044:50	70 sec						Start
1046:00							Stop
	108.24	Final Volume					

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 1 Date 07-23-98
Project No. 4701.08.03.04
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation 50 ft.
Corrected Baro. Pressure 29.28 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume NA Liters
Probe In-Stack Length 6 in.
Probe Liner Material Teflon
First Tenax Tube No. SV-108
Second Tenax Tube No. SV-107

Sample Type* Source
Client USEPA-EMC
Sampling Location #1
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0784
Temperature Controller No. VC-1
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 4.7 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0949:30	0.000	27	142	16	3	150	
0959:30	15.02	26	142	13	3	150	
1009:30	29.98	24	142	11	3	150	
1018:30	*Stopped	sampling	-Leak Check	0.00 change	@ 4.8" Hg	in 60 sec.	*43.52 Liters - final volume reading
1105	0.000	26	143	16	3	150	
1115	15.12	25	143	14	3	150	
1123	25.900	Stopped	sampling	-Leak Check	0.00 change	@ 4.7" Hg	in 60 sec.
	~~0.000~~	Test scrubbed					

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 1 Date 7/24/98
Project No. 4701-08-03-04
Barometric Pressure 29.35 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.35 in. Hg
Desired Probe/STL Temperature 105 °~~C~~F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SU 112
Second Tenax Tube No. SU 111

Sample Type* Source Sample
Client US EPA - EMB 1
Sampling Location ~~Loadout Port~~ BK TED
Operator Edwards
Metering Console No. VOST 3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. ~~Y-3918~~ BK Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

7/24/98 Name of Location changed to reflect ENTRY BY PES.

7/24/98 wrote entry in wrong blank

Leak Check from Probe Inlet:
Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
After Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

7/24/98 Shutdown with PES. Linecut reflects time of stoppage.

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0720	0.0	20	105	15	2.5	120	Page 1 of 2.
0730	14.95	20	107	13	2.7	120	
0740	30.00	21	105	13	2.7	120	
0750	44.90	22	105	14	2.7	120	
0758:28 ~~0800~~ BK	58.01	Shutdown, Plant on Silo 1.				8:28 so far	
0800:28		Resumed sampling, down 2 min					
0802	60.25	21	105	14	2.7	120	
0807:45 ~~0812~~ BK 7/24/98		Shutdown, Plant on Silo 1.					
0813:45		Resumed Sampling, down 6 min.					
0816:38 ~~08~~ BK 7/24/98		Shutdown, Plant on Silo 1.					
0826:38		Resumed Sampling, down 10 min					
0828	74.94	24	107	14	2.7	120	
0838	90.25	24	105	13	2.7	120	
0848	104.90	24	106	13	2.7	120	
0858	120.20	25	105	13	2.7	120	
0908	135.20	25	106	13	2.7	120	
0918	150.24	26	108	13	2.7	120	
0928	165.25	27	105	13	2.7	120	
0938	180.00	27	105	13	2.7	120	– Down for Port Change
1107	194.75	24	106	15	3.0	120	– Restart at 1057
1117	209.86	25	107	15	3.0	122	
1127	225.15	26	105	15	3.0	121	
1137	240.00	27	105	15	3.0	121	
1147	255.10	28	106	15	3.0	120	
1157	270.20	29	105	16	3.0	120	
1207	284.98	30	106	16	3.0	120	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 1 Date 7/24/98

Project No. 4701-08-03-04

Barometric Pressure 29.35 in. Hg

Barometer to Location Elevation 0 ft.

Corrected Baro. Pressure 29.35 in. Hg

Desired Probe/STL Temperature 105 °~~F~~C

Desired Sampling Rate 1.5 Liters/min

Desired Sample Volume 360 Liters

Probe In-Stack Length 18 in.

Probe Liner Material Glass

First Tenax Tube No. SV 112

Second Tenax Tube No. SV 111

Sample Type* Source Sample

Client US EPA EMB

Sampling Location TED

Operator Edwards

Metering Console No. VOST 3

Dry Gas Meter Correction (Y) 0.978

Sampling Train Unit No. 7

Tenax Inlet Thermocouple No. 7

Temperature Meter No. Y-3918

Temperature Controller No. Sys 2 Box 2

Temperature Meter No. Sys 2 Box 2

Heated STL Length 144 in.

STL Tubing Material Teflon

Leak Check from Probe Inlet:

Before Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

After Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

Leak Check from Valve at Inlet to First Condenser: NA BE 7-24-98

Before Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

After Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1217	300.01	31	105	17	3.0	120	Page 2 of 2
1227	314.92	32	105	17	3.0	120	
1237	330.06	32	106	17	3.0	120	
1247	345.01	33	105	17	3.0	120	
1257	360.01	33	106	17	3.0	120	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 1 Rerun Date 07-24-98
Project No. 4701.08.03.04
Barometric Pressure 29.35 in. Hg
Barometer to Location Elevation 50 ft.
Corrected Baro. Pressure 29.30 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume NA Liters
Probe In-Stack Length 6 in.
Probe Liner Material Teflon
First Tenax Tube No. SV-106
Second Tenax Tube No. SV-105

Sample Type* Source
Client US EPA - EMC
Sampling Location #1
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0784
Temperature Controller No. VC-1
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 4.4 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0720	0.000	20	141	15	3	150	
0730	15.05	20	140	13	3	150	
0740	30.12	21	141	12	3	150	
0750	45.18	19	141	11	3	150	
0800	60.24	18	141	11	3	150	
0801	61.890	Stopped sampling - Leak check 0.00 change @ 4.6" Hg for 60 sec					
0858	0.000	23	142	15	3	150	
0908	14.96	21	141	13	3	150	
0913:30	22.30	Stopped sampling - Leak check 0.00 change @ 3.7" Hg for 60 sec					
0921:30	0.000	23	142	14	3	150	
0931:30	14.95	23	142	12	3	150	
0941:30	30.09	25	143	11	3	150	
0951:30	45.15	25	143	11	3	150	
1001:30	60.20	26	143	12	3	150	
1011:30	75.25	26	143	12	3	150	
1021:30	90.27	26	143	12	3	150	
1030:00	103.550	Stopped sampling					

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 2 Date 7/25/98
Project No. ____
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.33 in. Hg
Desired Probe/STL Temperature 105 °C/F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18" in.
Probe Liner Material Glass
First Tenax Tube No. SV-101
Second Tenax Tube No. SV-107

Sample Type* Source Sample
Client US EPA EMB
Sampling Location TEA
Operator Edwards
Metering Console No. Vost 3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.0 in. Hg change at 20 in. Hg vacuum for 60 sec.
After Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0710	0.00	20	105	17	2.0	120	
0720	14.88	21	106	16	2.0	122	
0730	29.96	22	105	15	2.0	122	
0740	44.98	23	106	15	2.0	122	
0750	60.10	24	108	15	2.0	122	
0800	75.12	25	107	15	2.0	122	
0810	90.26	25	105	16	2.0	121	
0820	105.15	26	106	15	2.0	121	
0830	120.12	27	108	16	2.0	121	
0840	135.01	27	105	16	2.0	121	
0850	149.90	28	106	16	2.0	121	
0900	165.14	29	105	16	2.0	121	
0910	180.16	30	105	17	2.0	121	– Port Change
0926	"	31	105	19	2.0	121	– Restart
0936	195.00	30	106	15	2.0	121	
0946	209.84	32	106	17	2.0	121	
0956	225.08	32	105	17	2.0	121	
1006	240.14	33	105	17	2.0	121	
1016	255.21	33	104	18	2.0	121	
1026	270.18	33	105	18	2.0	121	
1036	284.96	33	106	18	2.0	121	
1046	300.18	34	105	18	2.0	121	
1056	315.22	34	105	18	2.0	121	
1106	329.88	34	105	19	2.0	121	
1116	345.00	35	105	19	2.0	121	
1126	360.00	34	105	19	2.0	121	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Condovt 2 Date 7/25/98
Project No. 4701-08-08-04
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation Ø' ft.
Corrected Baro. Pressure 29.33 in. Hg
Desired Probe/STL Temperature 105 °C
Desired Sampling Rate ____ Liters/min
Desired Sample Volume ____ Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SU 113
Second Tenax Tube No. SU 103

Sample Type* Source Sample Duplicate
Client US EPA EMB
Sampling Location TEO
Operator Edwards / Klamm
Metering Console No. VOST 2
Dry Gas Meter Correction (Y) 0.983
Sampling Train Unit No. 4
Tenax Inlet Thermocouple No. 4
Temperature Meter No. NA
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling ____ in. Hg change at NA BE 7-24-98 in. Hg vacuum for ____ sec.
After Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0711	0.00	22	106	16	2.5	148	
0721	9.50	23	108	14	2.5	148	
0731	18.98	23	110	13	2.5	148	
0741	27.47	25	109	13	2.5	148	
0751	37.02	25	110	13	2.5	148	
0801	46.70	25	107	13	2.5	148	
0811	56.50	27	108	13	2.5	148	
0821	66.42	28	107	13	2.5	148	
0831	76.14	27	108	13	2.5	148	
0841	86.08	28	110	14	2.5	148	
0851	95.88	29	110	14	2.5	148	
0901	105.68	30	112	14	2.5	148	
0911	115.41	30	108	14	2.5	148	— Port Change
0927	"	31	108	17	2.5	148	- Restart
0937	124.40	31	110	15	2.5	148	
0947	134.12	31	113	15	2.5	148	
0957	143.66	32	112	16	2.5	148	
1007	153.41	33	111	17	2.5	148	
1017	163.18	35	114	18	2.5	148	
1027	173.02	38	112	17	2.5	148	
1037	182.74	39	116	17	2.5	148	
1047	192.60	40	117	18	2.5	148	
1057	202.25	41	110	18	2.5	148	
1107	212.04	41	108	18	2.5	148	
1117	221.76	41	104	18	2.5	148	
1127	231.45	42	106	18	2.5	148	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 2 Date 07-25-98
Project No. 4701.08.03.04
Barometric Pressure 29.33 in. Hg
Barometer to Location Elevation 50 ft.
Corrected Baro. Pressure 29.28 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume NA Liters
Probe In-Stack Length 6 in.
Probe Liner Material Teflon
First Tenax Tube No. SV-102
Second Tenax Tube No. SV-104

Sample Type* Source
Client USEPA-EMC
Sampling Location #1
Operator J. Surman
Metering Console No. VOST1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0784
Temperature Controller No. VC-1
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 3.9 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0715	0.000	27	142	16	3	150	
0725	15.11	26	143	14	3	150	
0735	30.21	25	143	12	3	150	
0745	45.32	24	143	11	3	150	
0755	60.44	24	143	11	3	150	
0805	75.40	24	143	11	3	150	
0808	*Shutdown –	Leakcheck	0.00 change @	4.5" Hg for 60 sec.			*Final volume reading 79.650 L
0844	0.000	25	143	15	3	150	
0854	15.09	25	143	13	3	150	
0904	30.05	22	143	13	3	150	
0914	45.01	25	143	12	3	150	
0924	60.12	26	143	12	3	150	
0928	66.565	Shutdown –	Leak check 0.00 change	@ 4.3" Hg for 60 sec.			
0935	0.000	27	143	14	3	150	
0945	15.12	25	143	14	3	150	
0955	30.25	26	142	14	3	150	
0958	34.785	Shutdown.					

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Loadout
Run No. 4 Date 7/26/98
Project No. 4701-08-03-04
Barometric Pressure 29.31 in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure 29.31 in. Hg
Desired Probe/STL Temperature 105 °~~C~~F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360.0 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. 115
Second Tenax Tube No. SU-108

Sample Type* Source SAMPLE
Client USEPA - EMB
Sampling Location TED
Operator Edwards
Metering Console No. VOST 3
Dry Gas Meter Correction (Y) 0.998
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0925	0.00	24	111	19	2.7	121	
0935	14.89	25	111	18	2.7	121	
0945	30.04	26	109	17	2.7	121	
0955	44.90	28	109	16	2.7	121	
1005	60.15	29	108	16	2.7	121	
1015	75.13	31	109	15	2.7	121	
1025	90.21	32	108	15	2.7	121	
1035	105.20	33	108	16	2.7	121	
1045	120.24	33	109	15	2.7	121	
1055	135.04	35	109	14	2.7	121	
1105	150.00	36	108	15	2.7	121	
1115	165.11	37	108	15	2.7	121	
1125	180.02	37	109	16	2.7	121	Port change
1145	"	38	109	15	2.7	121	Restart
1155	195.08	37	107	16	2.7	121	
1205	209.98	37	107	17	2.7	121	
1215	224.99	37	107	16	2.7	121	
1225	240.04	38	107	16	2.7	121	
1235	255.20	39	107	15	2.7	121	
1245	270.21	39	107	14	2.7	121	
1255	285.15	40	107	14	2.7	121	
1305	300.27	40	107	15	2.7	121	
1315	315.06	41	107	17	2.7	121	
1325	330.20	41	106	17	2.7	121	
1335	345.12	41	106	17	2.7	121	
1345	360.04	40	106	18	2.7	121	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 3 Date 7/27/98

Project No. 4701-08-03-04

Barometric Pressure N/A in. Hg

Barometer to Location Elevation Ø ft.

Corrected Baro. Pressure N/A in. Hg

Desired Probe/STL Temperature 105 °~~C~~F

Desired Sampling Rate 1.5 Liters/min

Desired Sample Volume 360 Liters

Probe In-Stack Length 18 in.

Probe Liner Material Glass

First Tenax Tube No. SU 111

Second Tenax Tube No. SU107

Sample Type* Source Sample

Client USEPA - EMB

Sampling Location TED

Operator Edwards

Metering Console No. VOST 3

Dry Gas Meter Correction (Y) 0.978

Sampling Train Unit No. 7

Tenax Inlet Thermocouple No. 7

Temperature Meter No. Y-3918

Temperature Controller No. Sys 2 Box 2

Temperature Meter No. Sys 2 Box 2

Heated STL Length 144 in.

STL Tubing Material Teflon

Leak Check from Probe Inlet:

Before Sampling Ø.0 in. Hg change at 21.5 in. Hg vacuum for 60 sec.

After Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:

Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.

After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0710	0.00	20	105	16	2.0	121	
0720	14.91	21	108	15	2.0	121	
0721:30	16.87						← Down
0740:30	"		Down 19 min, next point at			0749	← Restart
0749	29.70	23	106	18	2.0	122	
0759	44.91	25	105	15	2.0	122	
0809	60.23	27	106	14	2.0	121	
0819	75.18	28	106	14	2.0	121	
0829	90.14	29	105	13	2.0	121	
0839	105.20	30	106	13	2.0	121	
0849	119.99	31	105	13	2.0	121	
0859	135.16	31	105	13	2.0	121	
0909	150.40	31	105	13	2.0	121	
0919	165.12	32	106	14	2.0	121	
0929	180.00	33	105	14	2.0	121	← Port change
0950	"	33	105	18	2.0	121	← Restart
0957:15 ~~1000~~	7/27/98	Stopped, loading out of silo				1	
0959:15		Restart, next point at				1002	
1002	195.00	33	106	17	2.0	121	
1012	209.86	33	105	16	2.0	121	
1022	225.25	34	105	15	2.0	121	
1032	240.01	35	105	15	2.0	121	
1042	255.12	36	105	15	2.0	121	
1052	270.22	37	105	15	2.0	121	
1102	285.30	37	105	16	2.0	121	
1112	300.02	38	105	16	2.0	121	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 3 Date 7/27/98
Project No. 4701-08-03-04
Barometric Pressure N/A in. Hg
Barometer to Location Elevation ∅ ft.
Corrected Baro. Pressure N/A in. Hg
Desired Probe/STL Temperature 105 °C/F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SV 111
Second Tenax Tube No. SV 107

Sample Type* Source Sample
Client USEPA-EMB
Sampling Location TED
Operator Edwards
Metering Console No. VOST 3
Dry Gas Meter Correction (Y) 0.978
Sampling Train Unit No. 7
Tenax Inlet Thermocouple No. 7
Temperature Meter No. Y-3918
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.
Leak Check from Valve at Inlet to First Condenser: NA BE 7-27-98
Before Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.
After Sampling ____ in. Hg change at ____ in. Hg vacuum for ____ sec.

Notes on Spiking:

Momentary shutdown, less than 4 sec.
BK 7/27/98

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1122	315.00	38	105	16	2.0	121	Page 2 of 2
1132	330.26	38	106	16	2.0	121	
1142 ~~1136.45~~ ~~1142~~	345.11	38	106	17	2.0	121	
1152	360.05	39	105	18	2.0	121	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 3 Loadout Date 7/21/98
Project No. 4701-08-03-04
Barometric Pressure NA in. Hg
Barometer to Location Elevation 0 ft.
Corrected Baro. Pressure NA in. Hg
Desired Probe/STL Temperature 105 °F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SU 101
Second Tenax Tube No. SU 103

Sample Type* Duplicate Source Sample
Client USEPA - EMB
Sampling Location TEO
Operator Edwards
Metering Console No. VOST 2
Dry Gas Meter Correction (Y) 0.983
Sampling Train Unit No. 4
Tenax Inlet Thermocouple No. 4
Temperature Meter No. NA
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.0 in. Hg change at 20.0 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 19.0 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.0 in. Hg change at 19.5 in. Hg vacuum for 60 sec.
After Sampling 0.0 in. Hg change at 4.0 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0711	0.00	19	114	14	2.5	150	
0721	14.54	20	108	12	2.5	150	
0722	15.64						Shutdown
0741			Down 19 min, Next	point at		0750	- Restart
0750	29.88	22	111	12	3.0	150	
0800	45.40	23	105	11	3.0	150	
0810	60.51	25	109	12	3.0	150	
0820	76.00	27	109	12	2.5	145	"
0830	90.05	28	107	13	2.5	148	
0840	105.22	28	106	12	2.5	148	
0850	119.88	29	109	12	2.5	150	
0900	134.48	31	110	14	2.5	150	
0910	149.33	31	105	14	3.0	150	
0920	165.50	32	113	14	3.0	150	
0930	180.02	33	111	14	3.0	150	- Port change
0951	"	32	117	19	3.0	150	- Restart
0951:30		Stopped,	loading out of silo				
0959:30		Restarted,	next	point at		1003	
1003	194.75	33	116	18	3.0	150	
1013	210.12	35	116	18	3.0	150	
1023	225.51	37	118	18	3.0	150	
1033	240.22	39	123	17	3.0	150	
1043	254.83	40	124	18	3.0	150	
1053	270.42	41	128	18	3.0	150	
1103	285.09	42	126	18	3.0	150	
1113	299.75	43	124	18	3.0	150	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. Loadout 3 Date 7/27/98
Project No. 4701-08-03-04
Barometric Pressure NA in. Hg
Barometer to Location Elevation Ø ft.
Corrected Baro. Pressure NA in. Hg
Desired Probe/STL Temperature 105 °~~C~~F
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume 360 Liters
Probe In-Stack Length 18 in.
Probe Liner Material Glass
First Tenax Tube No. SV101
Second Tenax Tube No. SV103

Sample Type* Dup - Source Sample
Client USEPA - EMB
Sampling Location TED
Operator Edwards
Metering Console No. VOST 2
Dry Gas Meter Correction (Y) 0.983
Sampling Train Unit No. 4
Tenax Inlet Thermocouple No. 4
Temperature Meter No. NA
Temperature Controller No. Sys 2 Box 2
Temperature Meter No. Sys 2 Box 2
Heated STL Length 144 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.
After Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.
Leak Check from Valve at Inlet to First Condenser:
Before Sampling ______ in. Hg change at NA ______ in. Hg vacuum for ______ sec.
After Sampling ______ in. Hg change at ______ in. Hg vacuum for ______ sec.

BE 7-27-98

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
1123	315.06	43	127	18	3.0	150	Page 2 of 2
1133	330.48	44	126	19	3.0	150	
1143	345.02	44	127	19	3.0	150	
1153	360.06	44	127	19	3.0	150	

*Ambient air, train blank, preliminary, duplicate train, or source sample.

TENAX CONCENTRATED SAMPLE COLLECTION DATA

Run No. 3 Date 07-27-98
Project No. 4701.08.03.04
Barometric Pressure 29.24 in. Hg
Barometer to Location Elevation 50 ft.
Corrected Baro. Pressure 29.19 in. Hg
Desired Probe/STL Temperature 140 °C
Desired Sampling Rate 1.5 Liters/min
Desired Sample Volume NA Liters
Probe In-Stack Length 6 in.
Probe Liner Material Teflon
First Tenax Tube No. SV-113
Second Tenax Tube No. SV-104

Sample Type* Source
Client USEPA-EMC
Sampling Location #1
Operator J. Surman
Metering Console No. VOST 1
Dry Gas Meter Correction (Y) 0.971
Sampling Train Unit No. 5
Tenax Inlet Thermocouple No. 5
Temperature Meter No. Y-0784
Temperature Controller No. VC-1
Temperature Meter No. Y-0783
Heated STL Length 60 in.
STL Tubing Material Teflon

Leak Check from Probe Inlet:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.

Leak Check from Valve at Inlet to First Condenser:
Before Sampling 0.00 in. Hg change at 23 in. Hg vacuum for 60 sec.
After Sampling 0.00 in. Hg change at 5.1 in. Hg vacuum for 60 sec.

Notes on Spiking:

Time, 24-Hr	DGM Reading, Liters	DGM Temp., °C	Probe/STL Temp., °C	1st Tube Inlet Temp., °C	Pump Vacuum, in. Hg	Rotameter Setting	Remarks
0710	0.000	24	141	15	3.5	150	Process feeding RAP.
0720	15.02	24	141	14	3.5	150	Condensate collection
0722	18.005	Stopped	sampling —	No Leak Check			higher than before!
0758	18.005	26	141	15	3.0	150	Process stopped
0808	33.08	27	141	13	3.0	150	feeding RAP
0818	48.18	27	141	12	3.0	150	Plant feeding RAP
0828	63.20	~~27~~ 26	141	12	3.0	150	again, started??
0838	78.15	27	142	11	3.5	150	
0848	93.28	28	142	10	3.5	150	
0858	108.38	29	143	11	3.5	150	
0908	123.40	29	143	11	3.5	150	
0918	138.65	28	143	11	3.5	150	
0928	153.47	29	143	11	3.0	150	
0938	168.58	29	143	11	3.5	150	
0948	183.60	29	141	11	3.5	150	
0951	187.553	Stopped	Sampling				

*Ambient air, train blank, preliminary, duplicate train, or source sample.

Appendix J

Equipment Calibration Data

ANEROID BAROMETER CALIBRATION CHECK

Location:	Kansas City, Missouri
Altitude Above Sea Level:	913 feet
Latitude:	39° 05.8' north
Meteorological Gravity:	32.1516 feet/second^2
Mercury Barometer Description:	Sargent Welch, Cat. S-4519, Lot 791802000

MRI Project No.	4701-08-03-04	
Date:	7-14-98	
Time:	1130	
Readings Obtained By:	D. Neal	SMR for DN
Observed Barometer Reading:	29.21	in. Hg
Mercury Column Temperature:	74	°F
Correction For Temperature:	-0.12	in. Hg
Correction For Gravity:	-0.02	in. Hg
Corrected Barometric Pressure:	29.07	in. Hg

Aneroid Barometer I.D. No.:	Y-2101	
Reading Before Adjustment:	29.06	in. Hg
Calibration Check Result:	within 0.1 in. Hg	
Reading After Adjustment:	(NA)	in. Hg

Remarks:

BAROMETR.WK4 02/27/95 (rev. BAROMTER.WK4 07/14/98 11:46 AM)

ANEROID BAROMETER CALIBRATION CHECK

Location:	Kansas City, Missouri
Altitude Above Sea Level:	913 feet
Latitude:	39° 05.8' north
Meteorological Gravity:	32.1516 feet/second^2
Mercury Barometer Description:	Sargent Welch, Cat. S-4519, Lot 791802000

MRI Project No.	4701		
Date:	8-12-98		
Time:	1648		
Readings Obtained By:	D Neal		Smith for DN
Observed Barometer Reading:	29.33	in. Hg	
Mercury Column Temperature:	73	°F	
Correction For Temperature:	-0.11	in. Hg	
Correction For Gravity:	-0.02	in. Hg	
Corrected Barometric Pressure:	29.20	in. Hg	

Aneroid Barometer I.D. No.:	y-2101	
Reading Before Adjustment:	29.09	in. Hg
Calibration Check Result:	NOT Satisfactory - Needs Adjustment	
Reading After Adjustment:	29.20	in. Hg

Remarks:

CAL-BENCH SERIAL NUMBER AN0125, REV 8.00.06 CALIBRATION DATA

Sierra Instruments, Inc.
5 Harris Court, Bldg. L
Monterey, CA 93940

File Name : c:\Records\RC31392\31392

Test Date: 4/30/1998 Print Date: 4/30/1998
Due Date: 4/30/99

Device Under Test

Description: 30462
Model#: 822S-L-2-OK1-PV1-V1-A1
Serial No: 31392
Accuracy: 1% OF FS
Bypass: LFE
Orifice Size: N/A

Ambient Conditions

Gas Temperature: 71.8 Degrees F
Room Temperature: 73.8 Degrees F
Ambient Pressure: 29.67 In Hg
Back Pressure: 1.753 In H20
Relative Humidity: 45.46 Percent

Master

Serial Number: 0125
Full Scale Flow: 5.0 SLPM

STP

Temperature: 70.0 Degrees F
Pressure: 29.92 In Hg

----- GAS DATA -----

%	Density	N	Cp	Name
100.00	1.250	1.000	0.248	Nitrogen, N2

Test Gas: Nitrogen, N2
Calculated K Factor is: 1.000

----- DATA -----
Full Scale Flow: 5.0 SLPM

Voltage VDC	Indicated Flow SLPM	Actual Flow SLPM	Error % Full Scale	Error % Reading
0.000	0.0000	0.0000	0.0	0.0
1.247	1.2467	1.2562	-0.2	-0.8
2.507	2.5065	2.5232	-0.3	-0.7
3.730	3.7305	3.7486	-0.4	-0.5
5.022	5.0224	5.0237	-0.0	-0.0

----- Device Information -----

Vacuum Test: 5 x 10^- 9 Atm cc/sec (He)
Fittings: 1/4" COMP
Inlet Pressure: 10 PSIG
Sensor mV at Full Scale: N/A
Outlet Pressure: N/A

O-Rings: KALREZ
.ial Number: 31392

Valve Seat material: N/A
Test Date: 4/30/98

----- Test Equipment -----

Cal Bench Asset No.: 0125
%RH Meter Asset No.: 0125
DVM(s) Asset No.: 0298

Barometer Asset No.: 0396
Thermometer Asset No.: 0125

----- Comments -----

0-5 VDC OUTPUT
12-15 VDC INPUT POWER

Calibration Technician: ____________ Date: 4-30-98
JACK SANDOVAL

Q.C. Technician: ____________ Date: 4/30/98

The accuracy of this equipment is 0.2% of reading.
Suggested recalibration due dates for the following critical items are:
The Cal=Bench System: 2/6/2000 D/A and A/D converters: 8/2/1998
Glass Tube Diameters: 1/6/2000 System Clock: 8/2/1998

I.D. NO. 84414
DATE 4.27.98 BY
DUE 4.27.99

Report of Calibration

Report No. 842726
Page 1 of 1

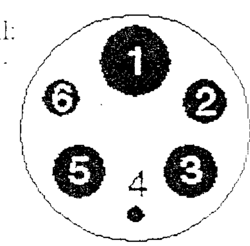
Hart Scientific, Inc.
799 East Utah Valley Drive
American Fork, Utah 84003-9775

Model:	Serial No.:	Customer:
9100A	84414	Midwest Research Institute Kansas City, MO 64110 USA
Description: Dry-Well, HDRC Handheld Block A		
Received Condition: New	Procedure: HST042	Calibration Range (Limited or Full): Full

The standards used in this calibration are traceable to the National Institute of Standards and Technology (NIST) and/or constants of nature (intrinsic standards). The working standards listed are calibrated by comparison with a Standard Platinum Resistance Thermometer (SPRT), Hart model 5681 (low temperatures), Hart model 5684 (high temperatures), and a Hart Super Thermometer, model 1575. Calibration procedures are in accordance with ITS - 90 and ANSI/NCSL Z540 - 1.

Set-Point °C	Actual °C	Error °C	Set-Point °F	Actual °F	Error °F
50.0	49.9	-0.1	122.0	121.8	-0.2
100.0	100.3	0.3	212.0	212.5	0.5
150.0	149.8	-0.2	302.0	301.6	-0.4
200.0	200.1	0.1	392.0	392.2	0.2
250.0	249.6	-0.4	482.0	481.3	-0.7
300.0	300.0	0.0	572.0	572.0	0.0

Test Well:
3



°C Calibration Constants: Zero: -0.2 Span: 0.9

°F Calibration Constants: Zero: -0.4 Span: 1.6

The temperature observations were made by comparison with the following test equipment.

Test Equipment

Instrument	Model	Serial No.	Recall Date
Thermometer, "Super Thermometer"	1575	48048	09/26/1998
Probe, Secon. PRT, 100 ohm 3/16" x 6"	5613	468523	05/06/1998

Approximate Uncertainties: 50 to 300°C ±0.027°C

Performed by: [signature]
John Thomas

Approved by: [signature]

Date: 04/27/1998

Environmental Conditions:
Temperature: 25°C
Humidity: 27% RH

STACK THERMOCOUPLE CALIBRATION DATA FORM

Job No. 4701-08-03-04 Stack Thermocouple No. TP-36

Date 7-14-98 Probe No. TP-3

Ambient Temp. (°F) 76 Barometer 29.07 in. Hg

Performed By D. Alburty Pyrometer No. Y-3517

Avg. Stack Temp. (°F) 108

Reference Instrument: Hart Scientific 9100 HDRC Dry Well
Calibration Date: 4-27-98

Reference Instrument Temp. (°F)	Pyrometer Temp. (°F)	Temp. Difference (°F)	Temp. Difference (%)
86.0	86.2	-0.2	-0.037
122.0	121.8	0.2	0.034
212.0	212.2	-0.2	-0.030

$$\frac{(\text{ref. temp., F} + 460) - (\text{pyro. temp., F} + 460)}{(\text{ref. temp., F} + 460)} \times 100 \leq 1.5\%$$

TSI CERTIFICATE OF CALIBRATION AND TESTING

TSI Model 8350 TSI Serial No. 2268

Description VELOCICALC PORTABLE AIR VELOCITY METER

Calibration Standard WIND TUNNEL CALIBRATION SYSTEM, SERIAL NO. 102

CALIBRATION VERIFICATION RESULTS

Calibration Standard	*Instrument Output*	*Percent Difference*	*Error Compared to Tolerance*
34.7 ft/min	35.0 ft/min	0.9	·*
65.4 ft/min	65.0 ft/min	-0.6	*·
148.9 ft/min	149.7 ft/min	0.5	·*
325.4 ft/min	326.3 ft/min	0.3	·*
652.9 ft/min	652.5 ft/min	-0.1	*
999.0 ft/min	1011.9 ft/min	1.3	· *
1478.4 ft/min	1502.6 ft/min	1.6	· *
2515.1 ft/min	2563.8 ft/min	1.9	· *
4492.7 ft/min	4488.5 ft/min	-0.1	*
7006.5 ft/min	7127.0 ft/min	1.7	· *
8758.3 ft/min	8844.5 ft/min	1.0	· *
32.0 °F	32.0 °F		
140.0 °F	140.0 °F		

Tolerance Limit- 0 Tolerance Limit+

Tolerance Limits:
±2.5% of reading ±2 f/m (30-500), ±10 f/m (500-2000), ±50 f/m (2000-6000), ±100 f/m (6000-10000)

Velocity Corrected to Std Conditions of:
Ambient Temperature: 21.1°C
Barometric Pressure: 760.0 mmHg

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. Furthermore, all test and calibration data supplied by TSI has been obtained using standards whose accuracies are traceable to the National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. Calibration procedures for this instrument comply with MIL-STD-45662A. The accuracy of the calibration facilities is greater than a ratio of 1:1 with respect to the accuracy specifications of the instrument being calibrated.

Applicable Test Report	Report Number	Date Last Verified
DC voltage	811/253708-94	08-05-97
Barometric Pressure	P-8264	05-16-97
Temperature (0°C)	254798	04-10-97
(19-35°C)	203537	04-10-97
(60°C)	216642	10-24-96
Pressure	822/255443-95	04-22-97
	822/254253-94	04-22-97
Velocity	836/254822	01-23-95
Dewpoint	257589	02-12-97

Moriayang
Calibrated by

☒ Final
Function Check

Nov 20, 1997
Calibration Date

TSI Incorporated
Environmental Measurements and Controls Division

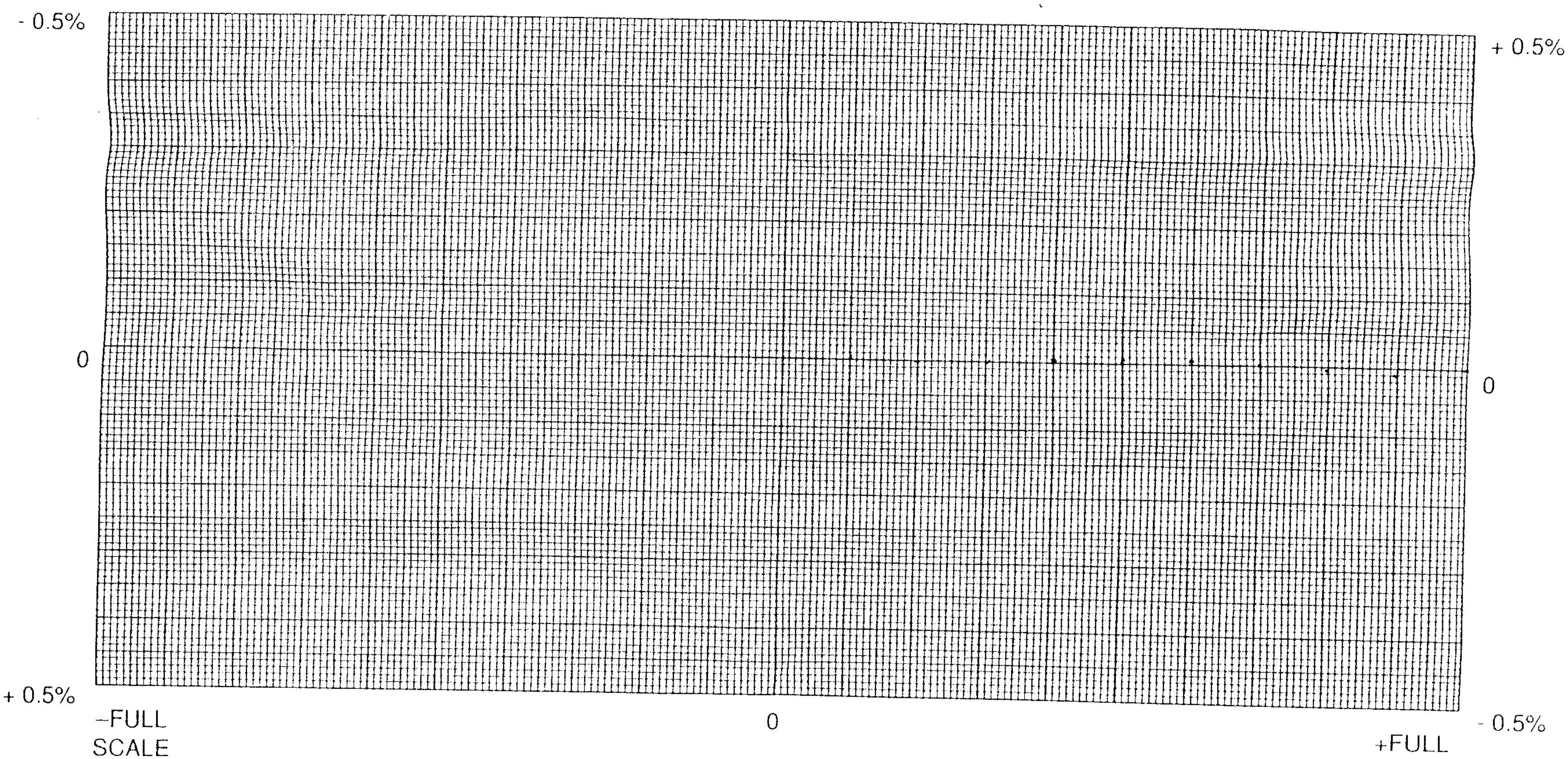
Mailing Address: P.O. Box 64394 St. Paul, MN 55164 USA
Shipping Address: 500 Cardigan Road Shoreview, MN 55126 USA
Phone: (800) 777-8356 or (612) 490-2888 **Fax:** (612) 490-2874

EDWARDS

BY E.R. DATE 3/13/98	SERIAL NUMBER	TYPE	RANGE	CAL.
TRANSDUCER	13126	W60041111	1000 Torr	N/A AT 25°C

DWG. NO. 011899-01 H

LINEARITY DEVIATION VS. PRESSURE

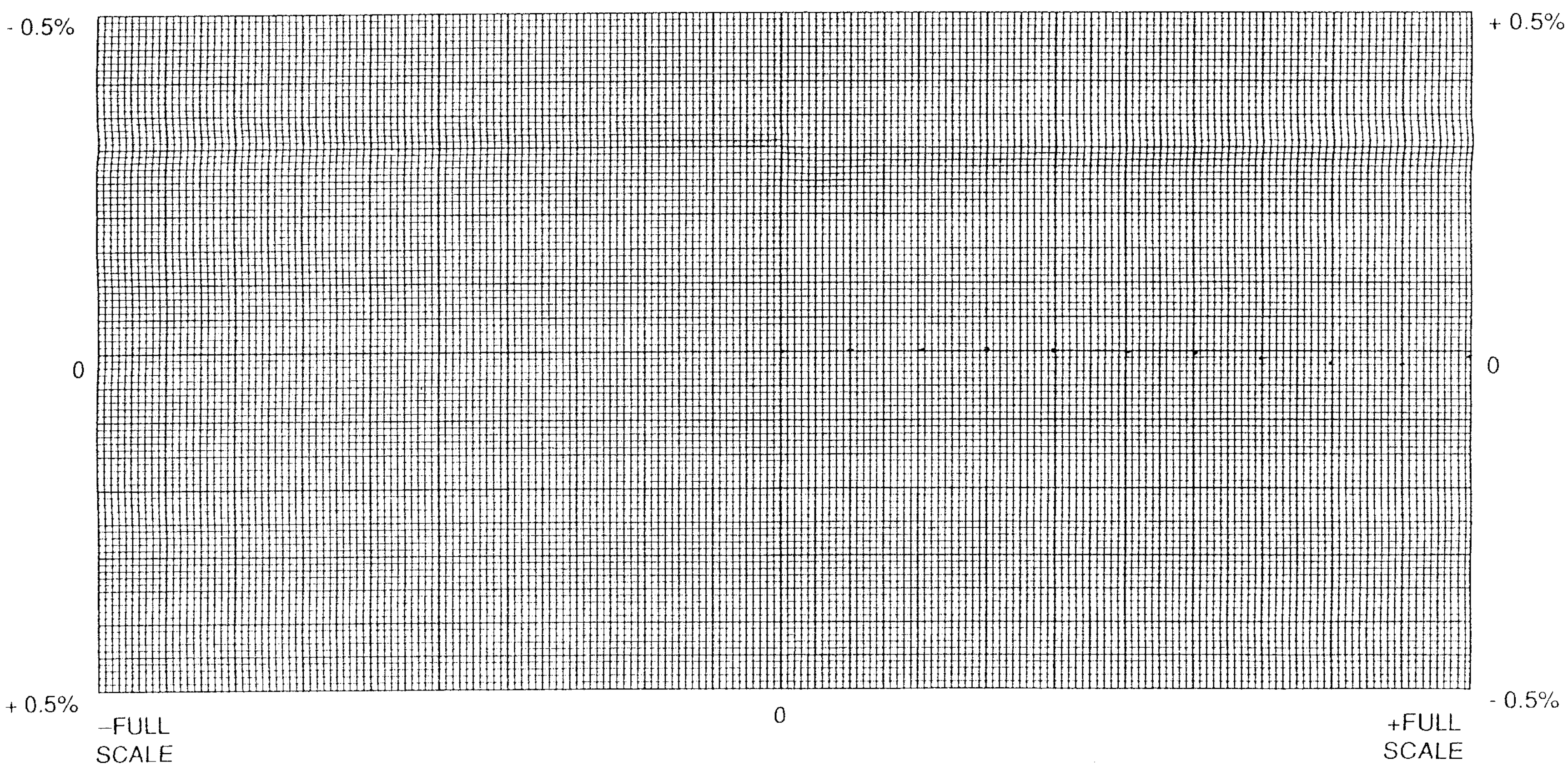


EDWARDS

	BY E.R. DATE 4/2/98	SERIAL NUMBER	TYPE	RANGE	CAL.
	TRANSDUCER	12159	W60041111	1000 Torr	N/A AT 25°C

DWG. NO. 011899-01 H

LINEARITY DEVIATION VS. PRESSURE



WET TEST METER CALIBRATION
Using ASTM Method D 1071 - 83 (Reapproved 1993)

MRI Project No.	NA	Wet Test Meter No.	X-2538
Date:	05/02/97	Previous Wet Test Meter Factor (Yw):	0.9970
Operator:	J. Surman	Temperature Meter No.	Y-0815
Leak Checks:	No leaks	Balance No.	011907

CALIBRATION DATA	Run 1	Run 2	Run 3
Ambient Data:			
Barometric Pressure, in. Hg	28.68	28.68	28.68
Room Temperature, °F	74.0	74.0	74.0
Relative Humidity, percent	45.7%	45.5%	45.2%
Proportion of Water Vapor By Volume in ambient air	0.013	0.013	0.013
Wet Test Meter Data:			
Initial Wet Test Meter Gas Volume, wet liters	0	0	0
Final Wet Test Meter Gas Volume, wet liters	9	9	9
Net Wet Test Meter Gas Volume (Vm), wet liters	9	9	9
Wet Test Meter Gas Temperature (tm), °F	71.5	71.5	71.6
Pressure at Wet Test Meter Inlet, in. w.c.	-1.23	-1.23	-1.23
Aspirator Bottle System Data:			
Bottle Temperature, °F	71.1	71.2	71.3
Bottle Pressure, in. w.c.	-1.32	-1.32	-1.32
Flow Rate Data:			
Time, seconds	545	543	540
Gas Flow Rate, actual dry liters/minute	0.99	1.00	1.00
Average Gas Flow Rate, actual dry liters/minute	1.00		
Water Displacement Data:			
Receptacle A Tare Weight, grams	124.6	124.0	123.6
Receptacle A Gross Weight, grams	3,840.9	3,863.0	3,832.2
Receptacle B Tare Weight, grams	121.9	122.8	123.2
Receptacle B Gross Weight, grams	3,742.9	3,791.0	3,775.2
Receptacle C Tare Weight, grams	122.7	121.0	123.4
Receptacle C Gross Weight, grams	1,766.0	1,693.2	1,750.0
Weight of Water Collected, grams	8,980.6	8,979.4	8,987.2
Buoyancy factor	0.00101	0.00101	0.00101
Correction for Buoyancy, grams	9.04	9.04	9.05
Density of Water at Bottle Temperature, g/mL	0.99788	0.99786	0.99786
Correction for Density of Water at Bottle Temperature to Density at 39.2 °F, grams	19.08	19.26	19.27
Correction for Temperature Difference, grams	6.77	5.07	5.08
Correction for Pressure Difference, grams	1.24	0.40	0.41
Corresponding Weight of Water at Maximum Density, grams	9,016.7	9,013.2	9,021.0
Equivalent Volume, liters	9.017	9.013	9.021
CALIBRATION RESULTS			
Wet Test Meter Calibration Factor (Yw)	1.0019	1.0015	1.0023
Acceptability Criterion: 0.99 < Yw < 1.01			
Tolerance Result:	PASS	PASS	PASS
Average Wet Test Meter Calibration Factor (Yw)	1.0019		

Remarks:

WTMCALB.WK4 09/07/96 (rev. WTM70502.WK4 05/02/97 03:31 PM)

VOST METERING CONSOLE CALIBRATION WITH WET TEST METER

MRI Project No.	4701-08-03-04
Date:	8/13/98
Operator:	B. Edwards

Metering Console No.	**Vost 1**
Previous Dry Gas Meter Factor (Y):	0.971
Calibrated Wet Test Meter No.	X-2538
Wet Test Meter Factor (Yw):	1.0019
Temperature Meter No.	Y-0815

	Run 1	Run 2	Run 3
CALIBRATION DATA			
Barometric Pressure, in. Hg	29.22	29.22	29.22
VOST Data			
Initial Dry Gas Meter Volume, dry liters	0.000	16.910	37.060
Final Dry Gas Meter Volume, dry liters	16.910	37.060	54.080
Net Dry Gas Meter Volume (Vm), dry liters	16.910	20.150	17.020
Dry Gas Meter Temperature, °C:			
Initial Inlet Temperature, °C	26.4	26.6	27.0
Final Inlet Temperature, °C	26.6	26.9	27.4
Initial Outlet Temperature*, °C			
Final Outlet Temperature*, °C			
Average Dry Gas Meter Temperature (tm), °C	26.5	26.8	27.2
Time, seconds	600	720	600
Rotameter Setting	140	140	140
Wet Test Meter Data			
Initial Wet Test Meter Gas Volume, wet liters	0.000	16.600	37.060
Final Wet Test Meter Gas Volume, wet liters	16.600	36.400	54.080
Net Wet Test Meter Gas Volume (Vm), wet liters	16.600	19.800	17.020
Wet Test Meter Gas Temperature, °F:			
Initial Temperature, °F	70.0	70.5	70.5
Final Temperature, °F	70.5	70.5	70.5
Average Wet Test Meter Gas Temperature (tm), °F	70.3	70.5	70.5
Pressure At Wet Test Meter Inlet, in. w.c.	-2.8	-2.8	-2.8
COMPUTED CALIBRATION RESULTS			
Gas Flow Rate, actual dry liters/minute	1.64	1.63	1.68
Average Gas Flow Rate, actual dry liters/minute	1.65		
Dry Gas Meter Volume (Vm(std)), dry std. liters	16.155	19.235	16.223
Wet Test Meter Gas Volume (Vm(std)), dry std. liters	15.646	18.649	16.031
Dry Gas Meter Calibration Factor (Y)	0.968	0.970	0.988
Average Dry Gas Meter Calibration Factor (Y)	**0.975**		
CALIBRATION RESULTS COMPARISON			
Criterion: Y Must Be Within 2% Of Average Y			
Percent Difference Of Y From Average Y	0.71%	0.60%	1.31%
Tolerance Result	**PASS**	**PASS**	**PASS**
COMPARISON WITH PRETEST RESULTS			
Criterion: Y Must Be Within 5% Of Previous Y			
% Difference Of Average Y From Previous Y	0.45%		
Tolerance Result	**PASS**		

* For dry gas meters having only one thermocouple, temperatures are entered as inlet temperatures.

Remarks:

VOST METERING CONSOLE CALIBRATION WITH WET TEST METER

MRI Project No.	4701-08-03-04
Date:	8/14/98
Operator:	Edwards

Metering Console No.	**Vost 2**
Previous Dry Gas Meter Factor (Y):	0.983
Calibrated Wet Test Meter No.	x-2538
Wet Test Meter Factor (Yw):	1.0019
Temperature Meter No.	Y-0815

	Run 1	Run 2	Run 3
CALIBRATION DATA			
Barometric Pressure, in. Hg	29.15	29.15	29.15
VOST Data			
Initial Dry Gas Meter Volume, dry liters	0.000	14.700	30.020
Final Dry Gas Meter Volume, dry liters	14.700	30.020	43.980
Net Dry Gas Meter Volume (Vm), dry liters	14.700	15.320	13.960
Dry Gas Meter Temperature, °C:			
Initial Inlet Temperature, °C	26.1	24.9	26.4
Final Inlet Temperature, °C	24.8	26.4	27.4
Initial Outlet Temperature*, °C			
Final Outlet Temperature*, °C			
Average Dry Gas Meter Temperature (tm), °C	25.5	25.7	26.9
Time, seconds	630	660	600
Rotameter Setting	142	142	142
Wet Test Meter Data			
Initial Wet Test Meter Gas Volume, wet liters	0.000	14.630	29.900
Final Wet Test Meter Gas Volume, wet liters	14.630	29.900	43.730
Net Wet Test Meter Gas Volume (Vm), wet liters	14.630	15.270	13.830
Wet Test Meter Gas Temperature, °F:			
Initial Temperature, °F	68.0	68.0	68.0
Final Temperature, °F	68.0	68.0	68.0
Average Wet Test Meter Gas Temperature (tm), °F	68.0	68.0	68.0
Pressure At Wet Test Meter Inlet, in. w.c.	-2.8	-2.8	-2.8
COMPUTED CALIBRATION RESULTS			
Gas Flow Rate, actual dry liters/minute	1.38	1.37	1.37
Average Gas Flow Rate, actual dry liters/minute	1.38		
Dry Gas Meter Volume (Vm(std)), dry std. liters	14.060	14.643	13.287
Wet Test Meter Gas Volume (Vm(std)), dry std. liters	13.841	14.446	13.084
Dry Gas Meter Calibration Factor (Y)	0.984	0.987	0.985
Average Dry Gas Meter Calibration Factor (Y)	**0.985**		
CALIBRATION RESULTS COMPARISON			
Criterion: Y Must Be Within 2% Of Average Y			
Percent Difference Of Y From Average Y	0.08%	0.14%	0.06%
Tolerance Result	**PASS**	**PASS**	**PASS**
COMPARISON WITH PRETEST RESULTS			
Criterion: Y Must Be Within 5% Of Previous Y			
% Difference Of Average Y From Previous Y	0.23%		
Tolerance Result	**PASS**		

* For dry gas meters having only one thermocouple, temperatures are entered as inlet temperatures.

Remarks:

VOSTCALB.WK4 09/11/95 (rev. 2V470108.WK4 08/27/98 02:43 PM)

VOST METERING CONSOLE CALIBRATION WITH WET TEST METER

MRI Project No.	4701-08-03-04
Date:	8/13/98
Operator:	B. Edwards

Metering Console No.	Vost 3
Previous Dry Gas Meter Factor (Y):	0.978
Calibrated Wet Test Meter No.	X-2538
Wet Test Meter Factor (Yw):	1.0019
Temperature Meter No.	Y-0815

	Run 1	Run 2	Run 3
CALIBRATION DATA			
Barometric Pressure, in. Hg	29.22	29.22	29.22
VOST Data			
Initial Dry Gas Meter Volume, dry liters	0.000	17.220	34.470
Final Dry Gas Meter Volume, dry liters	17.220	34.470	52.730
Net Dry Gas Meter Volume (Vm), dry liters	17.220	17.250	18.260
Dry Gas Meter Temperature, °C:			
Initial Inlet Temperature, °C	23.8	25.4	26.7
Final Inlet Temperature, °C	25.3	26.7	28.0
Initial Outlet Temperature*, °C			
Final Outlet Temperature*, °C			
Average Dry Gas Meter Temperature (tm), °C	24.6	26.1	27.4
Time, seconds	600	630	600
Rotameter Setting	142	142	142
Wet Test Meter Data			
Initial Wet Test Meter Gas Volume, wet liters	0.000	17.320	34.710
Final Wet Test Meter Gas Volume, wet liters	17.320	34.710	52.900
Net Wet Test Meter Gas Volume (Vm), wet liters	17.320	17.390	18.190
Wet Test Meter Gas Temperature, °F:			
Initial Temperature, °F	70.5	70.5	70.5
Final Temperature, °F	70.5	70.5	70.5
Average Wet Test Meter Gas Temperature (tm), °F	70.5	70.5	70.5
Pressure At Wet Test Meter Inlet, in. w.c.	-2.8	-2.8	-2.8
COMPUTED CALIBRATION RESULTS			
Gas Flow Rate, actual dry liters/minute	1.70	1.63	1.80
Average Gas Flow Rate, actual dry liters/minute	1.71		
Dry Gas Meter Volume (Vm(std)), dry std. liters	16.559	16.505	17.396
Wet Test Meter Gas Volume (Vm(std)), dry std. liters	16.313	16.379	17.133
Dry Gas Meter Calibration Factor (Y)	0.985	0.992	0.985
Average Dry Gas Meter Calibration Factor (Y)	**0.987**		
CALIBRATION RESULTS COMPARISON			
Criterion: Y Must Be Within 2% Of Average Y			
Percent Difference Of Y From Average Y	0.24%	0.50%	0.26%
Tolerance Result	**PASS**	**PASS**	**PASS**
COMPARISON WITH PRETEST RESULTS			
Criterion: Y Must Be Within 5% Of Previous Y			
% Difference Of Average Y From Previous Y	0.97%		
Tolerance Result	**PASS**		

* For dry gas meters having only one thermocouple, temperatures are entered as inlet temperatures.

Remarks:

Environics® ISO - 9001 CERT. #97-1068

Daniel A. Kaplinski
Sales Engineer
Environics Inc.
69 Industrial Park Road East • Tolland, CT 06084
(860) 872-1111 • FAX: (860) 870-9333
World Wide Web: http://www.environics.com
E-mail: dkaplinski@environics.com
Computerized Gas Mixing/Dilution/Calibration Systems

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

Mf #: 1, Description: AIR , Size: 10000. SCCM, K-factor: 1.0

SERIAL # AW9502156

This flow controller was calibrated using a Sierra Cal Bench(TM), a traceable Primary Flow Standard Calibration System. This calibration is referenced to dry air at a temperature of 32 F (__C) and a pressure of 29.92 in.Hg (760Torr).

	Set Flow	True Flow
5 %	500.0 CCM	468.02 CCM
10 %	1000.0 CCM	971.62 CCM
20 %	2000.0 CCM	1988.1 CCM
30 %	3000.0 CCM	3010.5 CCM
40 %	4000.0 CCM	4033.6 CCM
50 %	5000.0 CCM	5057.8 CCM
60 %	6000.0 CCM	6076.6 CCM
70 %	7000.0 CCM	7100.2 CCM
80 %	8000.0 CCM	8113.5 CCM
90 %	9000.0 CCM	9125.9 CCM
100%	10000. CCM	10149. CCM

Calibration data was last saved on Thursday 23 April 98 at 07:04:00

Verified by: [signature] Date: 4-23-98

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

Mf #: 2, Description: AIR , Size: 10000. SCCM, K-factor: 1.0

SERIAL # AW9502157

This flow controller was calibrated using a Sierra Cal Bench(TM), a traceable Primary Flow Standard Calibration System. This calibration is referenced to dry air at a temperature of 32F (__C) and a pressure of 29.92 in.Hg (760Torr).

	Set Flow	True Flow
5 %	500.0 CCM	477.98 CCM
10 %	1000.0 CCM	983.77 CCM
20 %	2000.0 CCM	1991.6 CCM
30 %	3000.0 CCM	3021.6 CCM
40 %	4000.0 CCM	4027.6 CCM
50 %	5000.0 CCM	5071.8 CCM
60 %	6000.0 CCM	6063.2 CCM
70 %	7000.0 CCM	7072.1 CCM
80 %	8000.0 CCM	8110.2 CCM
90 %	9000.0 CCM	9117.1 CCM
100%	10000. CCM	10134. CCM

Calibration data was last saved on Thursday 23 April 98 at 07:51:00

Verified by: [signature] Date: 4-23-98

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

Mf #: 3, Description: AIR , Size: 1000.0 SCCM, K-factor: 1.0

SERIAL # Aw 9502153

This flow controller was calibrated using a Sierra Cal Bench(TM), a traceable Primary Flow Standard Calibration System. This calibration is referenced to dry air at a temperature of 32F (__C) and a pressure of 29.92 in.Hg (760Torr).

	Set Flow	True Flow
5 %	50.0 CCM	44.233 CCM
10 %	100.0 CCM	94.868 CCM
20 %	200.0 CCM	196.38 CCM
30 %	300.0 CCM	298.36 CCM
40 %	400.0 CCM	399.54 CCM
50 %	500.0 CCM	498.17 CCM
60 %	600.0 CCM	598.72 CCM
70 %	700.0 CCM	698.88 CCM
80 %	800.0 CCM	799.52 CCM
90 %	900.0 CCM	901.61 CCM
100%	1000.0 CCM	1003.6 CCM

Calibration data was last saved on Thursday 23 April 98 at 08:38:00

Verified by: [signature] Date: 4 - 23 - 98

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

Mf #: 4, Description: AIR , Size: 100.0 SCCM, K-factor: 1.0

SERIAL # AW 9612049

This flow controller was calibrated using a Sierra Cal Bench(TM), a traceable Primary Flow Standard Calibration System. This calibration is referenced to dry air at a temperature of 32 F (__C) and a pressure of 29.92 in.Hg (760Torr).

	Set Flow		True Flow	
5 %	5.0	CCM	5.013	CCM
10 %	10.0	CCM	10.033	CCM
20 %	20.0	CCM	20.078	CCM
30 %	30.0	CCM	30.135	CCM
40 %	40.0	CCM	40.196	CCM
50 %	50.0	CCM	50.254	CCM
60 %	60.0	CCM	60.312	CCM
70 %	70.0	CCM	70.371	CCM
80 %	80.0	CCM	80.44	CCM
90 %	90.0	CCM	90.504	CCM
100%	100.0	CCM	100.57	CCM

Calibration data was last saved on Thursday 23 April 98 at 13:28:00

Verified by: Gregory M Collins Date: 4 - 23 - 98

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS AND CHEMICALS, INC.
518 CAMDEN STREET
PARKERSBURG WV 26101-

Notes:

Order No: 312-020638-01
Batch No: 861-33582

Cylinder No: SG9168085BAL
Cylinder Pressure*: 2000 psig
Certification Date: 08/05/96
Expiration Date: 08/05/99

PO: Rel:

*** Certified Concentration ***		********* Reference Standards *********			************* Analytical Instrumentation *************			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
PROPANE	3690 ±23 PPM	SG9164860BAL	GMIS	4723.0000 PPM	Gow-Mac 750	59405U	07/20/96	GC-FID

Balance Gas: NITROGEN

* Standard should not be used below 150 psig

Analyst: James Laas

Approved By: Richard Fry

AIR PRODUCTS AND CHEMICALS, INC.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628
TELEPHONE (312) 785-3000
FAX (312) 785-3008

DATE: 06/17/98
TIME: 09:40

****
* CERTIFICATE OF ANALYSIS *
****

AIR PRODUCTS & CHEMICALS, INC
13701 GREEN ASH COURT
EARTH CITY MO 63045-

CUSTOMER ACCOUNT : 375
CUSTOMER ORDER NO :
CUST ORD LINE/REL :
ORDER NO : 375-039909-01

REMARKS : In accordance with our internal work instruction A-3, products below are traceable to NIST.

CERTIFIED GAS MIXTURE: HYDROGEN IN HELIUM

BATCH NO	FILL\ ANALYSIS DATE	BAR CODE	CYLINDER NO	COMPONENT REQUESTED	CAS NUMBER	CONCENTRATION REQUESTED	ANALYTICAL RESULT	ANALYTICAL+ ACCURACY (+/-)	UNIT OF MEASURE	LAB MET
861-47678A	Chicago Spec Gas									
	06/11/98	DDP978	SG10397B	HYDROGEN	1333-74-0	40	39.3	1%	MOLAR %	09
				HELIUM	7440-59-7		Balance			
		DJK992	SG137455	HYDROGEN	1333-74-0	40	39.3	1%	MOLAR %	09
				HELIUM	7440-59-7		Balance			
		DRG647	SG303336	HYDROGEN	1333-74-0	40	39.3	1%	MOLAR %	09
				HELIUM	7440-59-7		Balance			
		DJL316	SG7002B	HYDROGEN	1333-74-0	40	39.3	1%	MOLAR %	09
				HELIUM	7440-59-7		Balance			
		DFQ531	SGKK064	HYDROGEN	1333-74-0	40	39.3	1%	MOLAR %	09
				HELIUM	7440-59-7		Balance			

+ Analytical Accuracy may vary for mixtures containing components which present adsorption, stability, or other blending problems.

LIST OF LAB METHODS USED :
09 GC-TCD

(CONTINUED)

Scott Specialty Gases

Shipped From: 6141 EASTON ROAD PLUMSTEADVILLE PA 18949-0310 PO BOX 310
Phone: 215-766-8861 Fax: 215-766-2070

CERTIFICATE OF ANALYSIS

MIDWEST RESEARCH
SCOTT KLAMM
425 VOLKER BLVD

KANSAS CITY MO 64110

PROJECT #: 01-01788-001
PO#: 033452
ITEM #: 0102S3000815AL
DATE: 4/07/98

CYLINDER #: AAL17264
FILL PRESSURE: 1280 PSIG

ANALYTICAL ACCURACY: +/-5%

BLEND TYPE : CERTIFIED WORKING STD

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
SULFUR HEXAFLUORIDE	4.	PPM	3.83	PPM
TOLUENE	100.	PPM	105.	PPM
NITROGEN		BALANCE		BALANCE

ANALYST: T. Ludwig
T.LUDWIG

Scott Specialty Gases

Shipped From: 6141 EASTON ROAD
PLUMSTEADVILLE PA 18949-0310
PO BOX 310
Phone: 215-766-8861
Fax: 215-766-2070

CERTIFICATE OF ANALYSIS

MIDWEST RESEARCH
SCOTT KLAMM
425 VOLKER BLVD

KANSAS CITY MO 64110

PROJECT #: 01-01788-004
PO#: 033452
ITEM #: 01023822 5AL
DATE: 4/07/98

CYLINDER #: ALM033887
FILL PRESSURE: 2000 PSIG

ANALYTICAL ACCURACY: +/-5%

BLEND TYPE : CERTIFIED WORKING STD

COMPONENT	REQUESTED GAS CONC MOLES	ANALYSIS (MOLES)
SULFUR HEXAFLUORIDE	.2 PPM	0.205 PPM
NITROGEN	BALANCE	BALANCE

ANALYST: Al Rojas
AL ROJAS

Scott Specialty Gases

CERTIFICATE OF ANALYSIS

MIDWEST RESEARCH — PO No. 033452

CAS Reg. Component No.	Component	Certified Analysis
2551-62-4	SULFUR HEXAFLUORIDE	2.00 PCT/M
7727-37-9	NITROGEN	BAL

Analysis Date 04/02/98

Analytical Accuracy +/-5% — Analyst B. LEWIS, JR.

Project No 01-01788
Cylinder No. AAL13339
Item No 0102382302 5AL

Grade CERTIFIED WORKING STD

Reorder/Service Contact (215)766-8861 PLUMSTEADVILLE PA 18949

Scott Specialty Gases

CERTIFICATE OF ANALYSIS

MIDWEST RESEARCH — PO No. 033452

CAS Reg. Component No.	Component	Certified Analysis
2551-62-4	SULFUR HEXAFLUORIDE	1.99 PCT/M
7727-37-9	NITROGEN	BAL

Analysis Date 04/02/98

Analytical Accuracy +/-5% — Analyst B. LEWIS, JR.

Project No 01-01788
Cylinder No. ALM013870
Item No 0102392302 5AL

Grade CERTIFIED WORKING STD

Reorder/Service Contact (215)766-8861 PLUMSTEADVILLE PA 18949

Scott Specialty Gases

CERTIFICATE OF ANALYSIS

MIDWEST RESEARCH   PO No   003452

CAS Reg Component No	Component	Certified Analysis	
2037-26-5	TOLUENE D8	10.6	PPM/V
7727-37-9	NITROGEN		BAL

Analysis Date 04/02/98 — Project No 01-21795

Analytical Accuracy +/-5% — Analyst GENYA KOGUT — Cylinder No ALM031909

Item No 01022214725AL

Grade CERTIFIED WORKING STD

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