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Sponsor:

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St. Paul, MN 55144**

3M

FINAL REPORT - ANALYTICAL STUDY

Study Title:

Covance Laboratories Contamination Testing

Performing Laboratory:

**3M Environmental Technology and Safety Services
3M ENVIRONMENTAL LABORATORY
Field Analytical Technologies
935 Bush Avenue
St. Paul, MN 55106**

**ET & SS Study No: FS-980618-1
Initiation Date: June 29, 1998
3M Laboratory Request No: U1927**

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1.0 SUMMARY

SUMMARY

STUDY IDENTIFICATION
Covance Laboratories Contamination Testing

3M ET&SS Study Number: FS-980618-1

Test Substance: NA

Sponsor: 3M Toxicology Services
Building 220-2E-2
3M Center
St. Paul, MN 55144

Sponsor's Representative: Andrew Seacat
3M Toxicology Services
Building 220-2E-2
3M Center
St. Paul, MN 55144

Study Director: James T. Wolter
3M Field Analytical Technologies Group
935 Bush Avenue
Building 2-3E-09
St. Paul, MN 55106

Test Site: Covance Laboratories
3301 Kingsman Blvd.
Madison, WI 53704

Contract Laboratory: Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414

Proposed Study Timetable

Experimental Start Date: June 29, 1998

Experimental Completion Date: June 30, 1998

Draft Report Date: September 9, 1998

2.0 INTRODUCTION

INTRODUCTION

2.1 Study Title

Covance Laboratories Contamination Testing

2.2 Purpose

Covance Laboratories has been contracted by 3M to conduct toxicological studies of n-methyl FOSE alcohol, n-ethyl FOSE alcohol, and potassium perfluorooctanesulfonate on rats. Recent results have indicated trace amounts of n-ethyl FOSE metabolites are present in the liver and blood of the control rats used in these studies. It has been speculated that the control rats are being exposed to one or more of these test compounds through the air, either as a particulate or gas. The objective of this study was to investigate potential contamination sources within the study housing area of these studies.

2.3 Regulatory Compliance

The testing was not performed for compliance purposes. Testing was requested by John Butenhoff of 3M Toxicology Services for use as internal 3M confidential information only.

2.4 Quality Assurance

The protocol and study conduct were reviewed by the quality assurance unit in accordance with 3M Environmental Technology and Safety Services (ET & SS) standard operating procedures and policies.

2.5 Summary of Test Results

In air samples taken from Room 3045, EtFOSE-OH was detected by high performance liquid chromatography (HPLC)/electrospray mass spectrometry (ESMS) at levels below the practical quantitation limit (approximately 0.17 ppb/L) but above the method detection limit (approximately 0.02 ppb/L). PFOS was not detected at levels above the blanks in any room. Analysis of wipes from the backs of rats in Room 3045 contained a measurable amount of EtFOSE-OH; wipes from rats in other rooms did not. Due to variations in sampling technique, wipe samples were not quantifiable. Wipes from animal backs were not analyzed for PFOS.

INTRODUCTION

The Fourier transform infrared (FTIR) test results for the target analytes were below the detection limit of the instrumentation (approximately 100 ppb). Fluorochemical compounds were not detected. Ammonia was the only detectable compound within the FTIR spectra other than carbon dioxide and water. The ammonia results are presented in the following table along with the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) time-weighted average (TWA) concentration for an 8-hour workday.

**Table 2.0-1:
Summary of Room Test Results**

<u>Source</u> Constituent	Sampling Method	Average Concentration	ACGIH TLV: TWA – 8 Hr Work Day
<u>Room 349</u> Ammonia	FTIR	1.60 ppm	25 ppm
<u>Room 3004</u> Ammonia	FTIR	7.17 ppm	25 ppm
<u>Room 3045</u> Ammonia	FTIR	8.26 ppm	25 ppm

3.0 MATERIALS

MATERIALS

3.1 Test, Control, and Reference Substances

The test and control materials are not applicable to this study. The reference materials were ethylene, nitrogen, n-methyl FOSE alcohol and n-ethyl FOSE alcohol for FTIR monitoring.

3.2 Source of Materials

The reference materials were as follows:

n-methyl FOSE alcohol – Lot 648
n-ethyl FOSE alcohol – TN-A-1884 61691-16

Certified gases provided by Oxygen Services Co., Inc.:

nominal 20 ppmv ethylene in nitrogen
zero grade nitrogen

4.0 EXPERIMENTAL - OVERVIEW

EXPERIMENTAL - OVERVIEW

4.1 Test Program

Extractive and local open path (LOPIR) FTIR spectroscopy as well as fast gas chromatography (GC)-ion mobility spectrometry (IMS) were used to verify or refute the presence of fluorinated compounds at ppbv levels in the dietary study housing air at Covance Laboratories. Additionally, silica gel tubes, charcoal tubes and glass fiber filters were used to screen for the presence of the test compounds in the study housing air. It was anticipated that any test compounds present as airborne particulates or adsorbed onto airborne particulates were trapped by both the filters and sorbent tubes.

Samples were taken from each room of the rat drinking water for electrospray mass spectrometry (ESMS) analysis. Wipes of the rat cages were taken for extraction and analysis. 6-liter SUMMA passivated canister samples were obtained from each room for analysis by cryofocus GC/MS.

Three separate studies are currently being conducted for 3M Toxicology at Covance Laboratories, one for each test compound. The control and dosed rats for a given study are housed in the same room, while there are separate rat housing rooms for each study. All three rooms were investigated with the stated techniques on both Monday, June 29 and Tuesday, June 30. Monday was a change-out day for the rat cages where there was expected to be a significant amount of activity in the housing rooms. Tuesday was expected to be non-eventful in the housing areas.

The following tables present a summary of sorbent tubes, filters, and tissue wipes collected during the test program. Samples were identified by room number, type of sample (SG = Silica Gel Tube, C = Charcoal Tube, GF = Glass Fiber Filter), location within the room, and a possible 2 on the end indicating the second time the room had been sampled. Schematics of each room and sampling locations are presented in Figures 4.0-1 through 4.0-6.

EXPERIMENTAL - OVERVIEW

**Table 4.0-1:
Summary of Adsorbent Tube and Filter Sampling – June 29, 1998**

<u>Sample Identification</u>	<u>Sample Start Time (hrs)</u>	<u>Sample Stop Time (hrs)</u>	<u>Sample Duration (min)</u>	<u>Sample Pump ID.</u>	<u>Pump Flow Rate (Lpm)</u>	<u>Total Volume of Air Sampled (L)</u>
3045C-1A&B	10:40	12:48	128	E273	0.62	79.4
3045GF-A	10:40	12:48	128	3M 45347	2.03	260
3045SG-A	8:48	11:48	180	(1) 134469	0.57	103
3045C-2A&B	10:40	12:48	128	E1158	0.88	113
3045GF-B	10:40	12:48	128	E277	2.05	262
3045SG-B	8:48	11:48	180	(5) 45351	0.53	95.4
3045C-3A&B	10:40	12:48	128	E2069	1.12	143
3045GF-C	10:40	12:48	128	E2071	2.60	333
3045SG-C	8:48	11:48	180	(3) BFE101186	0.59	106
349C-1A&B	14:09	16:12	123	E1158	0.83	102
349GF-A	14:09	16:12	123	E274	2.06	253
349SG-A	14:09	16:12	123	(1) 134469	0.51	62.7
349C-2A&B	14:09	16:12	123	E2069	1.12	138
349GF-B	14:09	16:12	123	E277	2.04	251
349SG-B	14:09	16:12	123	(3) BFE101186	0.51	62.7
349C-3A&B	14:09	16:12	123	E273	0.60	73.8
349GF-C	14:09	16:12	123	3M 45347	2.02	248
349SG-C	14:09	16:12	123	(5) 45351	0.51	62.7

**Table 4.0-2:
Summary of Adsorbent Tube and Filter Sampling – June 30, 1998**

<u>Sample Identification</u>	<u>Sample Start Time (hrs)</u>	<u>Sample Stop Time (hrs)</u>	<u>Sample Duration (min)</u>	<u>Sample Pump ID.</u>	<u>Pump Flow Rate (Lpm)</u>	<u>Total Volume of Air Sampled (L)</u>
3045C-1A2&B2	8:27	10:34	127	E1158	0.83	105
3045GF-A2	8:27	10:34	127	3M 45347	2.01	255
3045SG-A2	8:27	10:34	127	(1) 134469	0.60	76.2
3045C-2A2&B2	8:27	10:34	127	E273	0.60	76.2
3045GF-B2	8:27	10:34	127	E277	2.05	260
3045SG-B2	8:27	10:34	127	(5) 45351	0.53	67.3
3004C-1A&B	8:32	10:57	145	E2069	1.11	161
3004GF-A	8:32	10:57	145	E274	2.06	299
3004SG-A	8:32	10:57	145	(3) BFE101186	0.63	91.4
3004C-2A&B	11:04	12:52	108	E2069	1.11	120
3004GF-B	11:04	12:52	108	E274	2.07	224
3004SG-B	11:04	12:52	108	(3) BFE101186	0.56	60.5
349C-1A2&B2	10:53	12:45	112	E1158	0.81	90.7
349GF-A2	10:53	12:45	112	3M 45347	2.02	226
349SG-A2	10:53	12:45	112	(1) 134469	0.60	67.2
349C-2A2&B2	10:53	12:45	112	E273	0.59	68.1
349GF-B2	10:53	12:45	112	E277	2.04	228
349SG-B2	10:53	12:45	112	(5) 45351*	0.60	67.2

*Note: Initial flow used for total volume sampled.

EXPERIMENTAL - OVERVIEW

**Table 4.0-3:
Summary of Tissue Wipe Sampling – June 29, 1998**

<u>Sample Description</u>	<u>Sample Identification</u>	<u>Room Number</u>	<u>Sample Time (hrs)</u>	<u>Cage Identification</u>
Tissue Blank in Room 3045	Wipe #1	3045	11:10	-
Tissue Blank in Room 3045	Wipe #2	3045	11:11	-
Door Handle in Room 3045	Wipe #3	3045	11:46	-
Front Center Floor in Room 3045	Wipe #4	3045	11:41	-
Middle Center Floor in Room 3045	Wipe #5	3045	11:43	-
Back Center Floor in Room 3045	Wipe #6	3045	11:44	-
Bottom of Cage	Wipe #7	3045	11:15	C90716
Side of Cage	Wipe #8	3045	11:16	C90716
Back of Rat	Wipe #9	3045	11:17	C90716
Bottom of Cage	Wipe #10	3045	11:21	C90739
Back of Rat	Wipe #11	3045	11:22	C90739
Bottom of Cage	Wipe #12	3045	11:25	C90744
Back of Rat	Wipe #13	3045	11:26	C90744
Bottom of Cage	Wipe #14	3045	11:29	C90946
Back of Rat	Wipe #15	3045	11:30	C90946
Bottom of Cage	Wipe #16	3045	11:33	C90951
Side of Cage	Wipe #17	3045	11:34	C90951
Back of Rat	Wipe #18	3045	11:35	C90951
Bottom of Cage	Wipe #19	3045	11:37	C90956
Back of Rat	Wipe #20	3045	11:38	C90956
Tissue Blank in Room 3004	Wipe #21	3004	14:25	-
Template Blank in Room 3004	Wipe #22	3004	14:26	-
Wipe Blank in Room 3004	Wipe #23	3004	14:53	-
Door Handle in Room 3004	Wipe #24	3004	14:52	-
Front Center Floor in Room 3004	Wipe #25	3004	14:49	-
Middle Center Floor in Room 3004	Wipe #26	3004	14:50	-
Back Center Floor in Room 3004	Wipe #27	3004	14:51	-
Bottom of Cage	Wipe #28	3004	14:30	C92518
Side of Cage	Wipe #29	3004	14:31	C92518
Back of Rat	Wipe #30	3004	14:32	C92518
Bottom of Cage	Wipe #31	3004	14:35	C92523
Back of Rat	Wipe #32	3004	14:36	C92523
Bottom of Cage	Wipe #33	3004	14:38	C92528
Back of Rat	Wipe #34	3004	14:39	C92528
Bottom of Cage	Wipe #35	3004	14:41	C92757
Side of Cage	Wipe #36	3004	14:42	C92757
Back of Rat	Wipe #37	3004	14:43	C92757
Bottom of Cage	Wipe #38	3004	14:44	C92762
Back of Rat	Wipe #39	3004	14:45	C92762
Bottom of Cage	Wipe #40	3004	14:46	C92767
Back of Rat	Wipe #41	3004	14:47	C92767

EXPERIMENTAL - OVERVIEW

**Table 4.0-4:
Summary of Tissue Wipe Sampling – June 30, 1998**

<u>Sample Description</u>	<u>Sample Identification</u>	<u>Room Number</u>	<u>Sample Time (hrs)</u>	<u>Cage Identification</u>
Wipe Blank in Room 349	Wipe #42	349	15:00	-
Wipe Blank in Room 349	Wipe #43	349	15:01	-
Template Blank in Room 349	Wipe #44	349	15:02	-
Front Center Floor in Room 349	Wipe #45	349	15:20	-
Middle Center Floor in Room 349	Wipe #46	349	15:21	-
Back Center Floor in Room 349	Wipe #47	349	15:22	-
Door Handle in Room 349	Wipe #48	349	15:23	-
Bottom of Cage	Wipe #49	349	15:04	C94491
Side of Cage	Wipe #50	349	15:06	C94491
Back of Rat	Wipe #51	349	15:07	C94491
Bottom of Cage	Wipe #52	349	15:07	C94496
Back of Rat	Wipe #53	349	15:08	C94496
Bottom of Cage	Wipe #54	349	15:10	C94492
Back of Rat	Wipe #55	349	15:11	C94492
Bottom of Cage	Wipe #56	349	15:12	C94526
Side of Cage	Wipe #57	349	15:14	C94526
Back of Rat	Wipe #58	349	15:15	C94526
Bottom of Cage	Wipe #59	349	15:16	C94521
Back of Rat	Wipe #60	349	15:17	C94521
Bottom of Cage	Wipe #61	349	15:18	C94522
Back of Rat	Wipe #62	349	15:19	C94522

4.2 Results

The results of FTIR analysis are presented in Table 4.0-5 on page 12. The results of the fast GC-ion mobility spectrometry, sorbent tubes, filters, tissue wipes, canisters, and water analyses are presented in the Signed Reports from Individual Scientists Section of the Appendix.

EXPERIMENTAL - OVERVIEW

**Table 4.0-5:
Summary of FTIR Results – June 29, 1998**

Ammonia Method (Results In ppmv)

Room 3045		NH₃	Error±
c0007.abs	6/29/98 9:02	7.138	0.08
c0008.abs	6/29/98 9:04	7.881	0.09
c0009.abs	6/29/98 9:06	7.46	0.08
c0010.abs	6/29/98 9:07	7.477	0.08
c0011.abs	6/29/98 9:09	7.642	0.08
c0012.abs	6/29/98 9:11	7.624	0.08
c0013.abs	6/29/98 9:13	7.787	0.09
c0014.abs	6/29/98 9:14	7.772	0.09
c0015.abs	6/29/98 9:20	7.928	0.09
c0016.abs	6/29/98 9:21	8.131	0.09
c0017.abs	6/29/98 9:23	8.605	0.09
c0018.abs	6/29/98 9:25	8.632	0.09
c0019.abs	6/29/98 9:27	8.673	0.09
c0020.abs	6/29/98 9:28	8.348	0.09
c0021.abs	6/29/98 9:30	8.705	0.1
c0022.abs	6/29/98 9:32	9.354	0.11
c0023.abs	6/29/98 9:34	9.129	0.1
c0024.abs	6/29/98 9:35	9.371	0.11
c0025.abs	6/29/98 9:37	9.338	0.11
Average, ppmv =		8.26	0.09

Room 349		NH₃	Error±
c0026.abs	6/29/98 9:47	1.794	0.02
c0027.abs	6/29/98 9:49	1.772	0.02
c0028.abs	6/29/98 9:50	1.656	0.02
c0029.abs	6/29/98 9:52	1.698	0.02
c0030.abs	6/29/98 9:54	1.591	0.02
c0031.abs	6/29/98 9:56	1.54	0.02
c0032.abs	6/29/98 9:57	1.425	0.02
c0033.abs	6/29/98 9:59	1.463	0.02
c0034.abs	6/29/98 10:01	1.464	0.02
Average, ppmv =		1.60	0.02

Room 3004		NH₃	Error±
c0035.abs	6/29/98 10:11	7.218	0.08
c0036.abs	6/29/98 10:12	7.168	0.08
c0037.abs	6/29/98 10:14	6.845	0.08
c0038.abs	6/29/98 10:16	7.119	0.08
c0039.abs	6/29/98 10:18	7.182	0.08
c0040.abs	6/29/98 10:19	7.296	0.08
c0041.abs	6/29/98 10:21	7.393	0.08
Average, ppmv =		7.17	0.08

EXPERIMENTAL - OVERVIEW

4.3 Process Description

Three separate studies are currently being conducted for 3M Toxicology Services at Covance Laboratories, one for each test compound: of n-methyl FOSE alcohol, n-ethyl FOSE alcohol, and potassium perfluorooctanesulfonate. The control and dosed rats for a given study are housed in the same room, while there are separate rat housing rooms for each study.

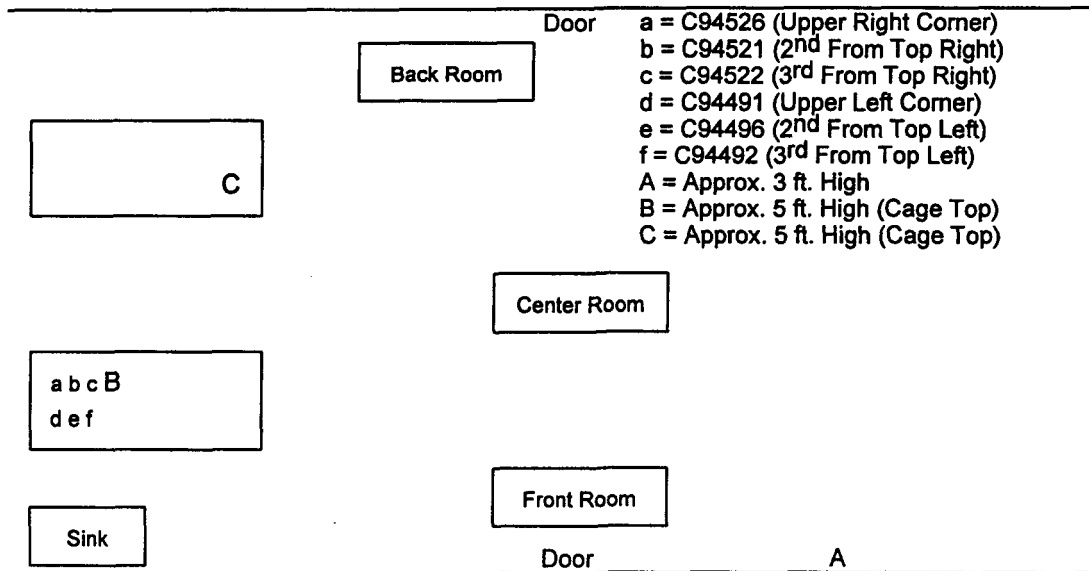


Figure 4.0-1: Room 349 Schematic and Sampling Locations – June 29, 1998

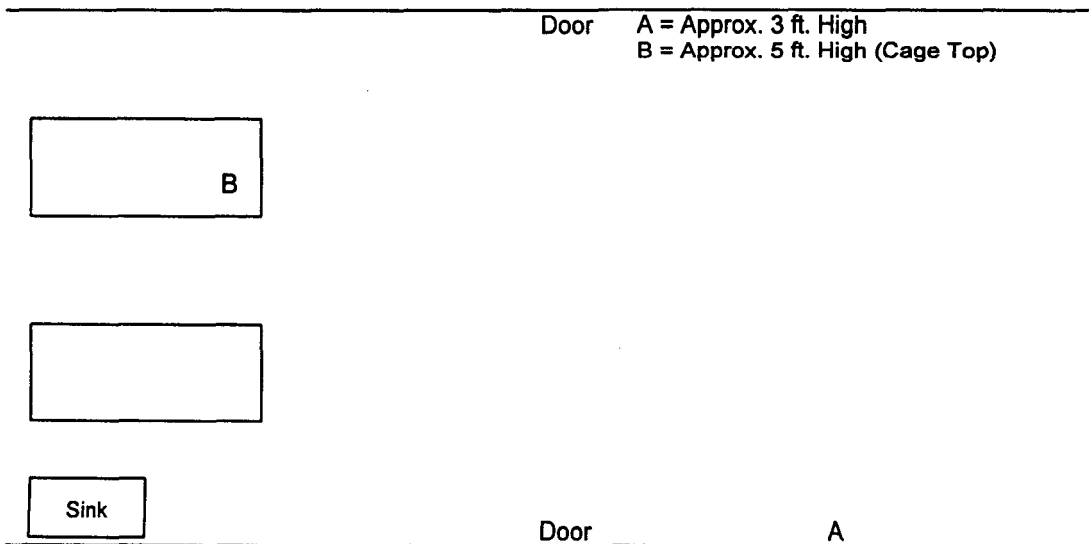


Figure 4.0-2: Room 349 Schematic and Sampling Locations – June 30, 1998

EXPERIMENTAL - OVERVIEW

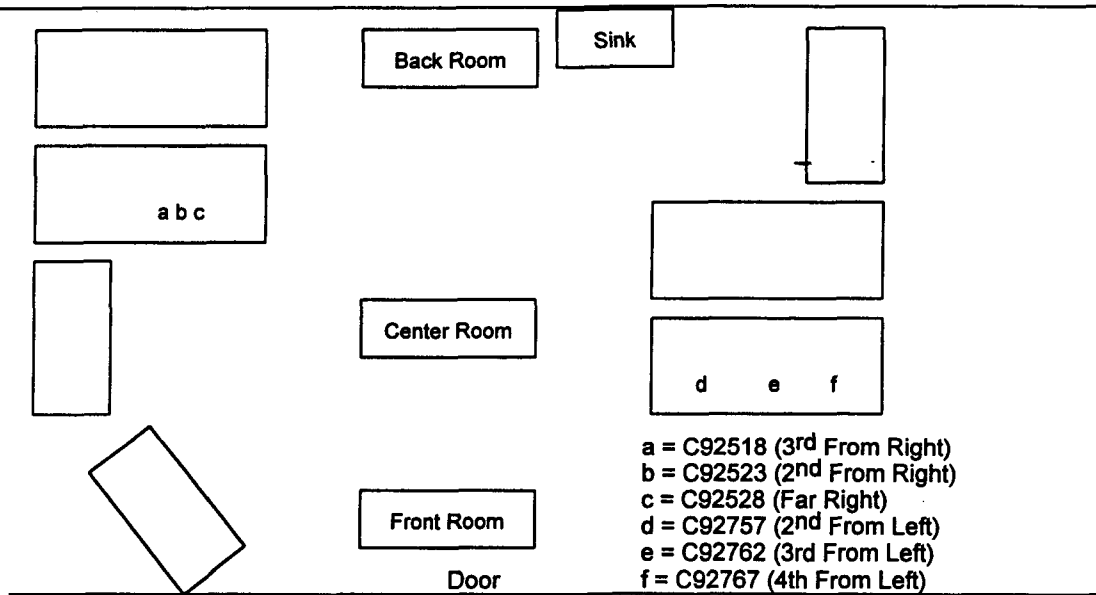


Figure 4.0-3: Room 3004 Schematic and Sampling Locations – June 29, 1998

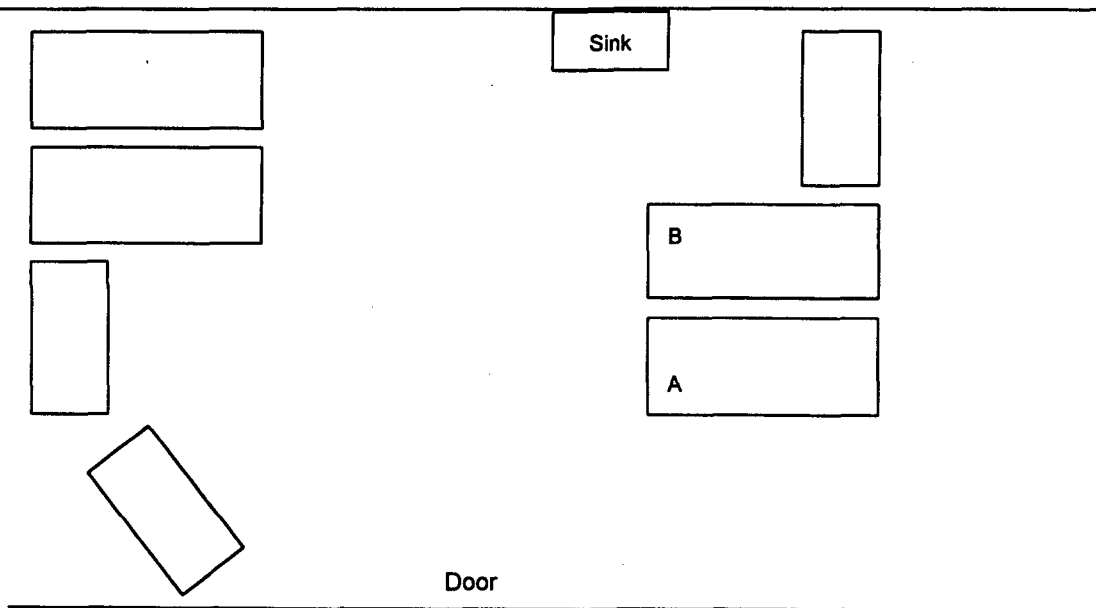


Figure 4.0-4: Room 3004 Schematic and Sampling Locations – June 30, 1998

EXPERIMENTAL - OVERVIEW

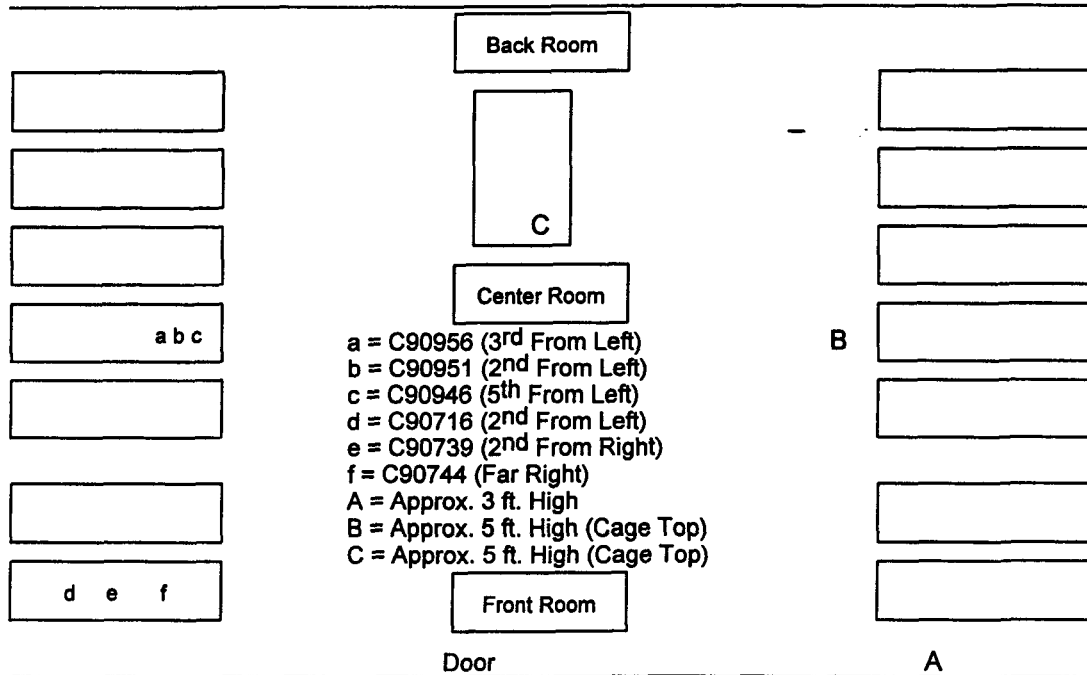


Figure 4.0-5: Room 3045 Schematic and Sampling Locations – June 29, 1998

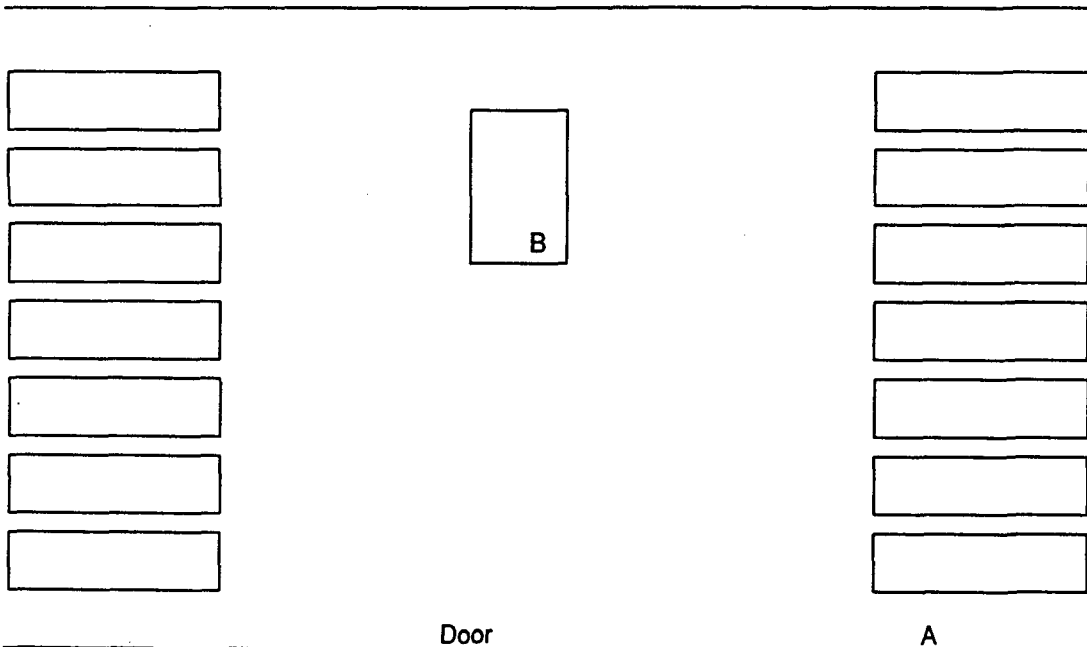


Figure 4.0-6: Room 3045 Schematic and Sampling Locations – June 30, 1998

5.0 EXPERIMENTAL - METHODS

EXPERIMENTAL - METHODS

The following table summarizes the U.S. EPA methods and their respective sources.

**Table 5.0-1:
Summary of Sampling Procedures**

Title 40 CFR Part 63 (July 1, 1996)

Method 320 "Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy"

Methods for Determination of Toxic Organic Compounds in Air (June 1988)

Method TO14 "Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis"

Due to the screening nature of this study, specific methods were not followed. Instead, the testing used the guidance provided by US EPA Methods 320 and TO14. The data quality objectives for this testing were quantitative screening.

Major aspects of the sampling, recovery and analytical procedures are summarized on the following pages.

EXPERIMENTAL - METHODS

5.1 Fast GC-Ion Mobility Spectrometry

A hand-portable, GC/IMS Environmental Vapor Monitor II was used for direct monitoring of atmospheric vapors. The GC/IMS instrument is based on the combination of Graseby Ionics, IMS technology for ultra sensitive detection of gas phase analytes with high speed automated vapor sampling – transfer line gas chromatography sampling and separation capabilities developed by FemtoScan. The instrument was operated in the positive ion (G) mode in which the instrument creates and detects positive ions created from the ionization of the GC column effluent.

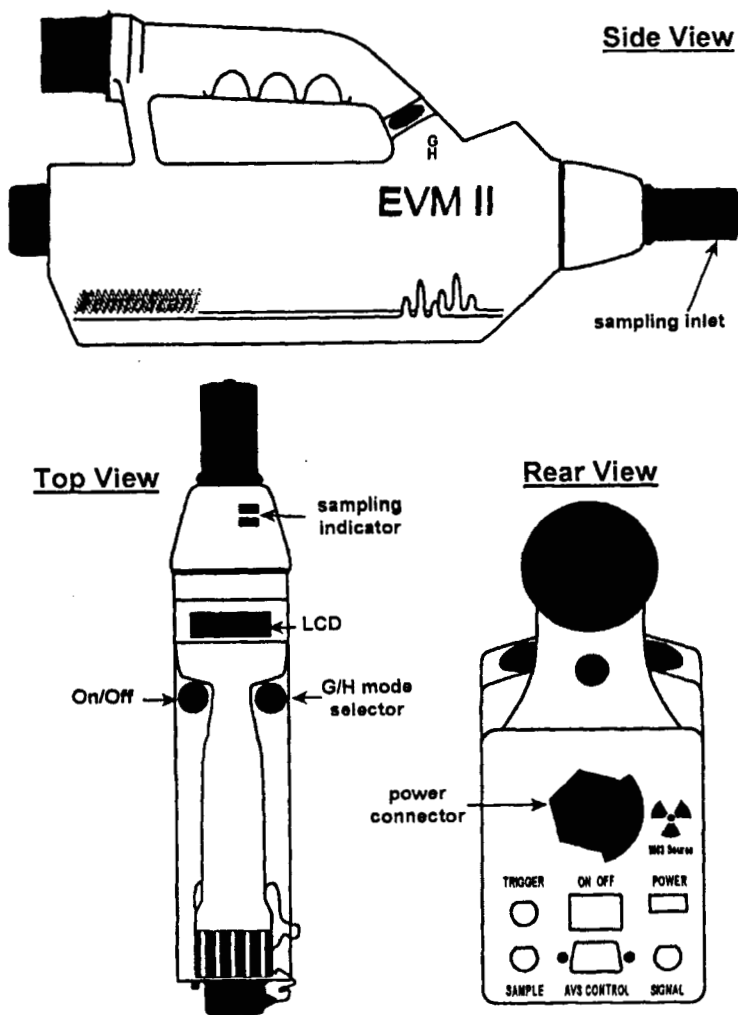


Figure 5.0-1: Fast GC-Ion Mobility Spectrometry Monitor

EXPERIMENTAL - METHODS

5.2 Fourier Transform Infrared Spectroscopy – EPA Method 320

FTIR testing was performed using US EPA Method 320 guidelines. Room air was sampled through five feet of unheated, ¼" PFA Teflon sample transfer line and a nickel coated stainless 10-m infrared multi-pass gas cell with a gas sampling pump for the extractive system. A 90-m path was used for the LOPIR instrument that was utilized by maneuvering the system to a selected area within the room and collecting data for a certain period of time.

All components were constructed of nickel-coated metal, stainless steel or Teflon to reduce the number of reactive sites within the sampling system. The sampling configuration allows the operator to deliver spike gas, sample gas or spiked sample gas. The data quality objectives for this project were identified as "Quantitative Screening."

FTIR Instrument. The FTIR equipment employed for this field test was Midac Model I2000 extractive FTIR system and the LOPIR instrument. Both systems were configured with ZnSe beam splitters and a 1-mm mercury cadmium telluride (MCT) detector. All gas cell windows were ZnSe. The inside walls and mirror housing of the multi-pass gas cell were nickel coated stainless steel construction. The spectrometers have an ultimate resolution of 0.5 cm^{-1} unapodized. The software used to acquire and manipulate all data was Midac AutoQuant 3.01. The CLS methods used for analyte quantitation are included in the AutoQuant CLS Method Section of the Appendix. A portable computer was used for data acquisition.

FTIR Instrument Settings. Apodized (triangle) data was collected from 4500 to 650 cm^{-1} with 64 co-added scans at 0.5 cm^{-1} resolution (gain 1). Gas cell pressure was continuously monitored for the extractive system using a Pressure Digital Manometer (PDM) attached directly to the FTIR sample cell.

Reference Spectra. The Hanst spectrum for ammonia was used for sample quantitation. Spectra developed by 3M Company were used for ethylene.

Background Spectra. Background spectra were generated on the test instrument using compressed cylinders of high purity dry nitrogen. Any test system change included the generation of additional background spectra.

AutoQuant Method Pathlength Determination. The certified concentration of ethylene was inserted for the instrument pathlength in the method. The method then returned the instrument pathlength rather than the ethylene concentration. The instrument pathlength was found by averaging all pathlength determinations for the given instrument during the testing. A 90-m pathlength, based on instrument calibration performed within the laboratory prior to the test, was used for the analysis of ammonia.

EXPERIMENTAL - METHODS**Fourier Transform Infrared Spectroscopy (Continued)**

Data Storage. All data were collected and stored as interferogram, single-beam, and absorbance spectra on Zip disks during the testing. All data were also stored on CD ROMs located in the 3M ET & SS Archives. Each spectrum recorded during the field tests was assigned a unique file name with the extensions .int, .sb, and .abs for interferogram, single-beam, and absorbance data, respectively. Hard copies of data sheets containing these names, instrumental conditions, gas cell temperature, gas cell nominal pathlength, gas cell pressure, and other notes were collected.

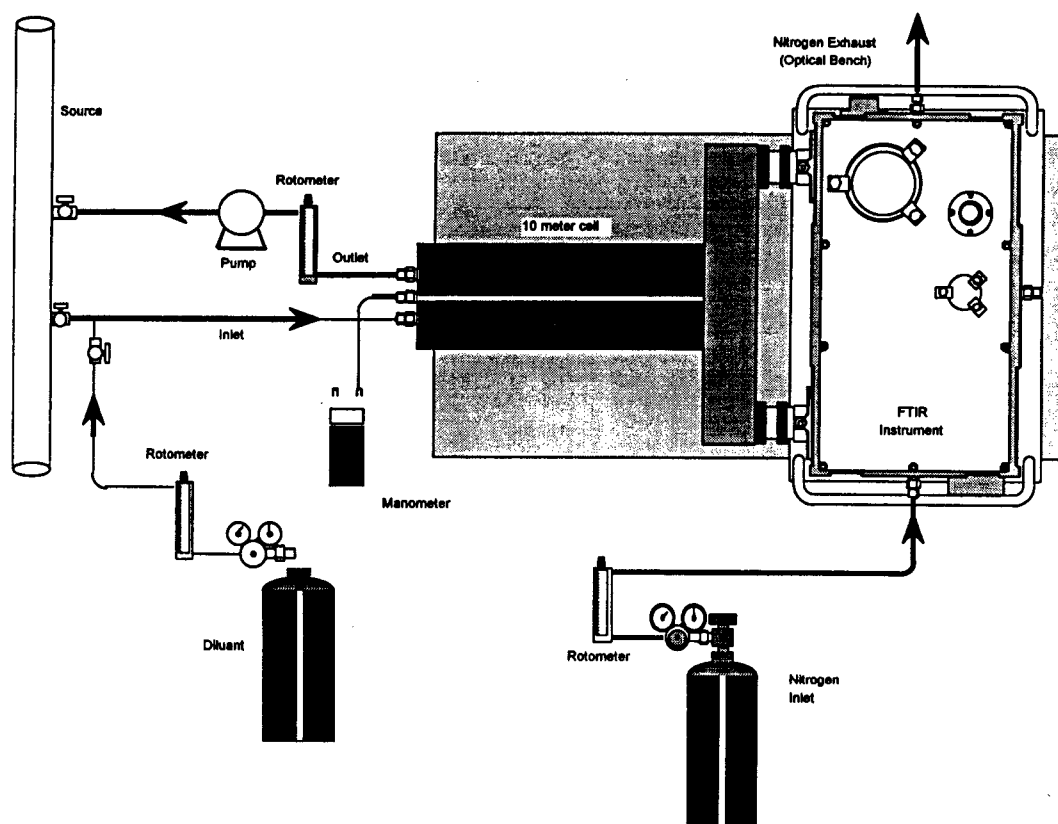


Figure 5.0-2: Extractive FTIR Schematic

EXPERIMENTAL - METHODS

5.3 SUMMA Canisters Gas Chromatography/Mass Spectrometry – EPA Method TO14

EPA Method TO14 was used to measure concentrations of various compounds in Rooms 349, 3004 and 3045. Air was drawn from the source into a pre-evacuated SUMMA® passivated canister.

To analyze the contents of the SUMMA® canisters, the water vapor in the gas sample was reduced by a Nafion® dryer, and the compounds were concentrated by collection into a cryogenically cooled trap. The cryogen was removed and the temperature of the trap raised. The compounds originally collected in the trap were revolatilized, separated on a gas chromatograph (GC) column, then identified and quantified by a detector.

The SUMMA® canisters were analyzed by Pace Analytical Services located in St. Paul, Minnesota.

5.4 Sorbent Tubes, Filters, Wipes, and Water Samples Electro spray Mass Spectrometry

Samples were collected using peristaltic pumps that were calibrated prior to sampling using a piston driven BIOS™ dry-cal meter. Sampling media used for the collection of fluorochemicals contained silica gel in tubes, charcoal in tubes, or glass fiber from filters. Wipe samples were collected using methanol as a soaking agent and a 100cm² paper template. Water samples were collected in 1-gallon polyethylene bottles from an individual rack selected in each of the rooms analyzed.

Sorbent tubes and filter samples were stationed at two to three locations within the room being sampled, once the sample pump flow had been calibrated. One silica gel tube, two charcoal tubes (front and back), and a glass fiber filter were stationed at each location. Pump flow rates were approximately 0.5 to 2.1 lpm for each monitoring location.

Additional tissue wipe sampling of rats, rat cages, floor areas, and door handles also was completed for each of the sampling rooms. Sampling was performed by soaking a tissue with methanol, wiping the sample area of 100 cm² inside a template (or the back of the animal selected), and placing the tissue inside a 40-ml I-Chem™ sample vial. All samples taken at the facility were placed on ice during the transportation from the facility to the laboratory.

The samples were analyzed by Pace Analytical Services and 3M Industrial Hygiene located in St. Paul, Minnesota.

6.0 DATA ANALYSIS**DATA ANALYSIS**

Midac AutoQuant 3.01 software was used for collection and analysis of FTIR sample spectra generated during the testing. The spectral library standard for ammonia (H85NH3) was selected from the Hanst Library for data analysis. The AutoQuant classic least squares method is presented in the AutoQuant CLS Method Section of the Appendix.

7.0 CONCLUSION**CONCLUSION**

EtFOSE-OH detected in air samples indicates that contamination in control animals may be due to respiration of gas phase or airborne particles of EtFOSE-OH. Filter samples collected by wiping the backs of test animals were also determined to contain EtFOSE-OH. Test material transferred from animal to animal during handling episodes by the animal technicians may be another route of contamination exposure.

It should be noted that the studies taking place at Covance Laboratories are for toxicology purposes. Although the ammonia concentrations determined for each of the rooms are less than the ACGIH TLV TWA for humans, the extrapolation for the effect of these concentrations on rats should be considered.

8.0 MAINTENANCE OF RAW DATA AND RECORDS

MAINTENANCE OF RAW DATA AND RECORDS

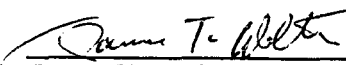
All original data, or copies thereof, were available at 3M ET&SS to facilitate review and auditing the study during its progress and before acceptance of the final report. When the final report is completed, control material reserve samples, all original paper data, including those items listed below will be retained in the archives of 3M ET&SS for a period of ten years following signing of the final report. The following raw data and records will be maintained in the study folder in the archives:

- Approved protocol and amendments
- Study correspondence
- Shipping records
- Raw data (field and laboratory)
- Approved final report (original signed copy)
- Electronic copies of data

Supporting records to be retained separately from the study folder in the archives will include, but not necessarily be limited to the following:

- Training records
- Calibration records
- Instrument maintenance logs
- Standard operating procedures, equipment procedures, and methods
- Appropriate samples

Approved By:



James T. Wolter, Ph.D.
Study Director

9/23/98

Completion Date

9.0 APPENDICES

APPENDICES

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9.2 Signed Reports from Individual ScientistsB
9.3 Key Personnel Involved in the StudyC
9.4 Materials and Equipment.....D
9.5 Field DataE
9.6 Field Data PrintoutsF
9.7 AutoQuant CLS Method.....G
9.8 Chains of CustodyH

9.1 Protocol and Amendments

A

Sponsor:

3M Toxicology Services
Bldg 220-2E-2
St. Paul, MN 55144

PROTOCOL

Study Title:

Covance Laboratories Contamination Testing

Performing Laboratory:

3M Environmental Technology and Safety Services
3M ENVIRONMENTAL LABORATORY
3M Field Analytical Technologies Group
935 Bush Avenue
St. Paul, MN 55106

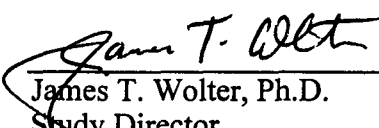
ET & SS Study No: FS-980618-1

Initiation Date: June 29, 1998

Author: James T. Wolter

3M Laboratory Request No: U1927

Approved By:


James T. Wolter, Ph.D.
Study Director

Date

7/7/98

Andrew Seacat

Sponsor's Representative

Date

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3.0 TEST, CONTROL, AND REFERENCE MATERIALS.....3

4.0 EXPERIMENTAL - OVERVIEW.....4

5.0 EXPERIMENTAL - METHODS.....5

6.0 DATA ANALYSIS.....6

7.0 REPORT.....7

8.0 MAINTENANCE OF RAW DATA AND RECORDS.....8

9.0 GENERAL PROJECT OUTLINE.....9

1.0 SUMMARY

SUMMARY

STUDY IDENTIFICATION

Covance Laboratories Contamination Testing

3M ET&SS Study Number: FS-980618-1

Test Material: NA

Sponsor: 3M Toxicology Services
St. Paul, MN

Sponsors Representative: Andrew Seacat
3M Toxicology Services
Bldg 220-2E-2
St. Paul, MN 55144

Study Director: James T. Wolter
3M Field Analytical Technologies Group
935 Bush Avenue
Building 2-3E-09
St. Paul, MN 55106

Test Site: Covance Laboratories
3301 Kingsman Blvd.
Madison, WI 53704

Proposed Study Timetable

Experimental Start Date: June 29, 1998

Experimental Completion Date: June 30, 1998

Final Report Date: July 10, 1998

2.0 INTRODUCTION

INTRODUCTION

2

2.1 Study Title

Covance Laboratories Contamination Testing

2.2 Purpose

Covance Laboratories has been contracted by 3M to conduct toxicological studies of n-methyl FOSE alcohol, n-ethyl FOSE alcohol, and potassium perfluorooctanesulfonate on rats. Recent results have indicated trace amounts of n-ethyl FOSE metabolites are present in the liver and blood of the control rats used in these studies. It has been speculated that the control rats are being exposed to one or more of these test compounds through the air, either as a particulate or gas. The objective of this study is to investigate potential contamination sources within the rat housing area of these studies.

2.3 Regulatory Compliance

This testing is not being performed for regulatory compliance.

2.4 Quality Assurance

The protocol, study conduct, and the final report will be audited by the quality assurance unit in accordance with 3M Environmental Technology and Safety Services (ET & SS) standard operating procedures and policies.

3.0 TEST, CONTROL, AND REFERENCE MATERIALS

TEST, CONTROL, AND REFERENCE MATERIALS

3

Test and control materials are not applicable to this study.

The reference materials are as follows:

- n-methyl FOSE Alcohol – Lot 648
- n-ethyl FOSE Alcohol – TN-A-1884 61691-16
- nominal 20 ppmv ethylene in nitrogen
- zero grade nitrogen

4.0 EXPERIMENTAL - OVERVIEW**EXPERIMENTAL - OVERVIEW****4****4.1 Test Program**

Local open path Fourier transform infrared spectroscopy (LOPIR) and Fast GC-Ion Mobility Spectrometry will be used to verify or refute the presence of fluorinated compounds at ppbv levels in the dietary study housing air at Covance Laboratories. Additionally, charcoal and glass fiber adsorption tubes will be used to screen for the presence of the test compounds in the study housing air. It is anticipated that any test compounds present as airborne particulates or adsorbed onto airborne particulates will be trapped by both the glass fibers and charcoal. Samples will be taken of the rat drinking water for LC/MS/MS analysis. Wipes of the rat cages will be taken for extraction and analysis. 6 liter SUMMA passivated canister samples will be taken for analysis by cryofocus GC/MS. Samples will be taken from housing room air and the air intakes and exhausts for the rooms.

Three separate studies are currently being conducted for 3M Toxicology at Covance Laboratories, one for each test compound. The control and dosed rats for a given study are housed in the same room, while there are separate rat housing rooms for each study. All three rooms will be investigated with the stated techniques on both Monday, June 29 and Tuesday, June 30. Monday is a change-out day for the rat cages where there is expected to be a significant amount of activity in the housing rooms. Tuesday is expected to be noneventful in the housing areas.

5.0 EXPERIMENTAL - METHODS**EXPERIMENTAL - METHODS****5**

Localized Open Path Fourier Transform Infrared Spectroscopy (LOPIR) will follow guidance given in US EPA Method 320. Details of the quantitation method used will be provided in the final report.

Adsorption methods are currently being developed and validated for the target compounds. Coconut Charcoal and Glass Fibers will be used as adsorbants. Details of the methods will be provided in the final report.

6 Liter SUMMA Passivated Canister samples will be taken and analyzed by cryofocussed GCMS. Details of the method will be given in the final report.

Details of the Ion-Mobility Spectrometer method will be provided in the final report.

5.1 Process Description

A schematic of Covance Laboratories specifically identifying and documenting the rat housing rooms, ventilation, and location of control and dosed rat cages will be provided in the final report.

6.0 DATA ANALYSIS

DATA ANALYSIS

The data analysis will be performed in accordance with the methods stated in this protocol.

7.0 REPORT**REPORT**

7

The final report will include the following information if applicable:

- A summary of the test.
- A brief process description, indicating equipment operation during testing; as well as any other information which may influence the final report.
- A simple schematic diagram or photo of the laboratory, showing the sampling locations.
- The sampling and analytical procedures, detailing all aspects of sampling and analysis. Diagrams or photos of test equipment and methods will be included.
- Complete raw field data, lab analyses and the test results (showing all calculations).
- Calibration data regarding all sampling and measuring equipment utilized during testing.

8.0 MAINTENANCE OF RAW DATA AND RECORDS**MAINTENANCE OF RAW DATA AND RECORDS****8**

All original data, or copies thereof, will be available at 3M ET&SS to facilitate review and auditing the study during its progress and before acceptance of the final report.

When the final report is completed, control material reserve samples, all original paper data, including those items listed below will be retained in the archives of 3M ET&SS for a period of ten years following signing of the final report. The following raw data and records will be maintained in the study folder in the archives:

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- Approved final report (original signed copy)
- Electronic copies of data

Supporting records to be retained separately from the study folder in the archives will include, but not necessarily be limited to the following:

- Training records
- Calibration records
- Instrument maintenance logs
- Standard operating procedures, equipment procedures, and methods
- Appropriate samples

9.0 GENERAL PROJECT OUTLINE

GENERAL PROJECT OUTLINE

Field Analytical Technologies / General Project Outline

To: Dale Bacon - ET & S Environmental Lab 2-3E-09
Ron Cressman - ET & S Environmental Lab 2-3E-09
Jess Eldridge - ET & S Field Analytical Technologies 2-3E-09
Timothy Gutzkow - Pace
Kurt Oldenburg- ET & S Field Analytical Technologies 2-3E-09
Bill Reagen - ET & S Field Analytical Technologies 2-3E-09
Jeff Stock - ET & S Field Analytical Technologies 2-3E-09
Tom Wagner - Quest Analytical
Anh-Dao Vo - ET & S Field Analytical Technologies 2-3E-09

From: Jim Wolter - ET&S Field Analytical Technologies 2-3E-09

Date: June 18, 1998

Subject: Covance Contamination Testing

Project Number - FS-980618-1
Lab Request No.- U1927
Test Date(s) June 29-30, 1998

Monitoring Requested by:
Name: John Butenhoff
Toxicology Services
Bldg 220-2E-2
Telephone No. (612) 733-1962
FAX No. (612) 733-1733

Monitoring Coordinated by:
Jim Wolter
3M / ET&SS
Building 2-3E-09
935 Bush Ave.
PO Box 33331
St. Paul, MN 55133-3331
Telephone No. (612) 778-7644
Cellular No. (612) 270-0387
Pager No. 1-888-415-0942
FAX No. (612) 778-4226

GENERAL PROJECT OUTLINE

10

Plant Location / Contact

Plant Name: Covance Laboratories

Address: 3301 Kingsman Blvd. Madison, WI 53704

Plant Contact: Peter Tomford 608-241-7207.

Project Objective

Covance Laboratories has been contracted by 3M to conduct toxicological studies of n-ethyl FOSE alcohol, methyl FOSE alcohol, and potassium perfluorooctanesulfonate on rats. Recent results have indicated trace amounts of n-ethyl FOSE metabolites are present in the liver and blood of the control rats used in these studies. It has been speculated that the control rats are being exposed to one or more of these test compounds through the air, either as a particulate or gas. The objective of this study is to measure the concentrations of the target analytes at the lowest limits of detection possible at the time of testing. LOPIR will be used to verify or refute the presence of fluorochemicals in the air at ppbv or greater concentrations. Method development and validation for sampling and subsequent extraction/desorption using adsorption techniques are currently underway.

Project Schedule

Equipment Preparation - Friday, June 26

Travel - Sunday, June 28

Equipment Set-up - Monday, June 29

Monitoring/Testing - June 29-30

Return Travel - Tuesday, June 30

Processes Requiring Testing

Indoor Air and Cages at Covance

Test Parameters

n-ethyl FOSE alcohol, methyl FOSE alcohol, perfluorooctanesulfonyl fluoride, perfluorooctanesulfonic acid or salts of perfluorooctanesulfonic acid

Test Conditions

Ambient

Gas Stream Characteristics

Indoor Air

Test Methods

LOPIR, Adsorption/GC, Canister GC/MS, LCMS

Estimated Project Cost

\$ 5,000

GENERAL PROJECT OUTLINE

Reporting Requirements

Type of report(s) required;

- 3 copies of Comprehensive Final Report for John Butenhoff
- 1 copy of Comprehensive Final Report for LIRN Archives
- 1 copy of Comprehensive Final Report for Field Archives
- 1 copy of Comprehensive Final Report for QAU Archives

Supplemental Information

The following personnel will need plant entrance and non-escort privileges:

- Jim Wolter - 3M
- Kurt Oldenburg - 3M
- Andrew Seacat - 3M
- Timothy Johnson - 3M
- Timothy Gutzkow - PACE Laboratories (3M contract No. E-4878-S)
- Tom Wagner - Quest Analytical

Invoicing must be sent to monitoring coordinator including;

- Invoice Date
- Project Description
- Test Dates
- 3M Project No.
- 3M Lab Request No.
- Cost Itemization

**GLP Study
Protocol Amendment**

Study Number: U1927

Study Title: Covance Laboratories Contamination Testing

Study Director: James T. Wolter

Amendment Date: September 9, 1998

Amendment Number: 1

The study protocol in the experimental overview section stated that samples would be taken from the air intakes and exhausts for the rooms. These samples were not obtained during the study conduct.

The study protocol does not refer to silica gel as an adsorbent media. Silica gel, charcoal, and glass fiber were used as adsorbents during the study conduct.

The study protocol states that the final report will include a schematic of Covance Laboratories specifically identifying the rat housing rooms, ventilation, and location of control and dosed rat cages. Location of ventilation, control rat cages, and dosed rat cages were not documented.

These changes would not be expected to have an effect on the outcome of the study.

Approved by:


Study Director

9/23/98

Date

9.2 Signed Reports from Individual Scientists

B

Analytical Results and Summary

3M Lab Request U1927

Covance Contamination Testing

Contract Laboratory: Pace - I

Prepared by: William J. Arseneau

ANALYTICAL SUMMARY

Lab Request No.: U1927

Contract Lab: Pace-I

Department: 0211

3M Requester: J. T. Wolter

Project No.: FS980618-1

Project Lead: J. T. Wolter

Project Description: Covance Contamination Testing

Sample Matrix: Whole air samples collected in SUMMA canisters.

Sample Available Date: 08/01/98

Summary Prepared by: William Arseneau, Pace-I

Date: 9/3/98

Introduction

Three whole air samples were submitted for gas chromatography/mass spectrometry analysis. The samples were received in 3 liter (L) SUMMA canisters. The samples were analyzed at ambient temperature by a method closely resembling the US Environmental Protection Agency (USEPA) Compendium Method TO-14. Method TO-14 requires a specific list of target compounds. The analytes of interest for this project are ethylfose alcohol (etFOSE-OH), methylfose alcohol (meFOSE-OH) and perfluorooctanesulfonyl fluoride (POSF). An attempt to detect etFOSE-OH and meFOSE-OH was unsuccessful at concentrations up to 5 ppmv. A ppbv detection limit is not attainable using this method.

Analytical Results

All quantitative data associated with this report are to be considered estimates. The typical five-point calibration curve associated with method TO-14 was not analyzed. A three-point calibration curve at 25, 50, and 100 parts per billion by volume (ppbv) was analyzed for POSF to show that the instrument was capable of detecting the target analytes at these concentrations. Based on the response of the 25 ppbv calibration standard the quantitation limit is estimated at 10 ppbv. POSF was not detected in the samples at or above 10 ppbv, but several other compounds were detected. These compounds were reported as tentatively identified compounds (TICs) in the *Report of Laboratory Analysis* found in Appendix A. The TICs were quantified against the average response factor from the total ion chromatograms of the POSF in the calibration curve (See Appendix A).

Analytical Summary

Modified EPA Compendium Method TO14

Summary

A Microscale Purge-and-Trap technique was used to analyze the standard and the sample associated with lab request R2584. An aliquot of the whole air sample contained in a SUMMA canister was trapped under integrated mass flow control on a glass bead trap held at -150°C. The condensed sample on the glass bead trap was then quantitatively transferred to a Tenax trap held at -10°C. The Tenax was then desorbed onto an open-tubular cryofocusing trap held at -180°C. The cryofocusing trap was then heated to transfer the VOC's to the head of the analytical column where the sample components were separated and finally detected by a mass spectrometer in the scan mode. A detailed listing of the analytical parameters can be found under *Procedure*

Method TO-14 is a method designed for the analysis of volatile organic compounds in ambient air where SUMMA canisters are used for sampling. The working range for Method TO-14 is 0.10 to 200 parts per billion by volume (ppbv). An aliquot of air, typically 50 - 500 cc, is removed from the canister under electronic mass flow control and cryogenically focused on a glass bead trap. The condensed sample is then desorbed onto to the analytical column for separation of the sample components. The detector specified in Method TO-14 is a mass spectrometer. This method yields a very precise and accurate technique for the analysis of ambient level air samples collected in SUMMA canisters.

Sample Preparation

The samples were pressurized with zero grade nitrogen to a final pressure of 15.0 psig (29.7psia) in order to introduce the samples into the Entech air concentrator. The dilution factor was accounted for in the sample result calculations and the practical quantitation limits were adjusted accordingly.

Procedure

GC/MS/Gas Loop Parameters (Instrument ID "Alphie")

A Hewlett-Packard 5890 GC coupled to a Hewlett-Packard 5989 MS and an Entech 7000 air sample preconcentrator and 7016 canister autosampler were used.

The GC/MS gas loop injection system configuration is listed below:

GC column: RTX-624 60m, 0.32mm i.d., 1,8 micron film thickness, sn:77398.

GC oven temperature program:

Initial temp.:	-20°C for 1.0 min.
Ramp 1:	15°C/min. to 60°C, hold 0 min.
Ramp 2:	10°C/min. to 150°C, hold 0.67 min.
Injection port temp.:	260°C
Interface temp.:	200°C
Purge A:	Initial value OFF
Split flow:	20 mL/min.
Column head press.	5 psi hold 6 min. ramp to 15 psi at 1 psi/min.
Solvent delay:	None

7000 Preconcentrator/7016 Canister Manifold

<u>During Concentration</u>	<u>Temperature (°C)</u>
Module No. 1, Glass Bead Cryotrap	-150
Module No. 2, Sorbent Packed Cryotrap	-10
Module No. 3, Focusing Trap	-180

<u>Desorb/Transfer/Inject</u>	<u>Preheat (°C)</u>	<u>Final Temp. (°C)</u>	<u>Time (min.)</u>
Module No. 1, Glass Bead Cryotrap	20	20	2
Module No. 2, Sorbent Packed Cryotrap	50	180	3.5
Module No. 3, Focusing Trap	N/A	100	2

<u>Media Concentrated/Transferred</u>	<u>Volume (cc)</u>	<u>Flow Rate (scc/min.)</u>
Sample	200	150
Sweep/Dry Purge	50	100
Transfer to Packed Column	40	10
Line Conditioning Sample Flush Before Trapping		5 sec.
Carrier Flush Before Trapping		2 sec.
Total Cycle Time		38 min.

<u>System Bakeout</u>	<u>Temperature (°C)</u>	<u>Time (Min.)</u>
Module No. 1, Glass Bead Trap	130	5
Module No. 2, Sorbent Packed Trap	190	5

<u>Regulated Zone</u>	<u>Temperature (°C)</u>
8-Port Valve	100
GC Transfer Line	100
Manifold Transfer Line	100
16-Position Select Valve	100
Sample Container	Ambient
Transfer line:	100

Mass spectrometer parameters:

Ionization mode:	+EI
Scan range:	29 to 550 amu
Scans per second:	1.3
Source temp.:	250°C
Quadrupole temp.:	125°C

Instrument Calibration Procedure

A three-point calibration curve was established for POSF by analyzing different volumes of a custom prepared standard. The percent relative standard deviation (%RSD) for the target compound was 2.9%. The calibration is considered acceptable if the %RSD is less than or equal to 30%.

Qualitative Analysis

Sample mass spectra are compared to the mass spectrum of a standard of the suspected compound. Two criteria must be satisfied to verify the target compound identifications: (1) elution of the sample component at the same GC retention time as the standard component, and (2) correspondence of the sample component and standard component mass spectra. Standard and sample mass spectra are compared using reference spectra obtained on the GC/MS system being used. The mass spectra used for comparison are from the same standard as that used for retention time comparison. Mass spectral requirements are as follows:

All ions present in the standard mass spectra at a relative intensity greater than 10% (most abundant ion in the spectrum equals 100%) must be present in the sample spectrum.

The relative intensities of ions specified above must agree within +/- 20% between the standard and sample spectra.

Ions greater than 10% in the sample spectrum but not present in the standard spectrum must be considered and accounted for by the analyst making the comparison. The verification process should favor a false positive.

Non-target components present in the sample were tentatively identified based on a spectral library search. The spectrum of a tentatively identified compound (TIC) was compared to a NBS and WILEY reference spectral library. Based on the ions present and the relative abundance of each ion, the software determined the best spectral match. A retention time index was also taken into consideration in the search algorithm. The TICs listed in this report were not closely reviewed by the analyst and are listed in the report based solely on a computer search of the sample spectra.

Quantitative Analysis

An internal standard quantitation technique was used to calculate the analyte concentration. For calibrated compounds, a relative response factor was calculated as follows for each level of calibration:

Equation 1

$$\text{Response Factor } (R_f) = \frac{(C_x)}{(A_x)}$$

where, A_x = Reconstructed ion chromatogram area for the compound;
 C_x = Concentration of the compound (ppbv).

The average relative response factor was then determined based on the calibration points. This average relative response factor was then used to calculate the concentration of an analyte in the sample as follows:

Equation 2:

$$\text{Concentration (ppmv)} = \frac{(A_x)(C_i)(D_f)}{(A_i)(\overline{R_f})}$$

where,

A_x = Sample extracted ion chromatogram area for the quantitation ion of compound x ,

C_i = Concentration of the associated internal standard (ppmv),

D_f = Dilution factor,

A_i = Extracted ion chromatogram area for the internal standard quantitation ion,

$\overline{R_f}$ = Average relative response factor for compound x .

Equation 2 was also used for tentatively identified compounds.

Quality Control Procedure

Prior to standard or sample analysis, a system performance check sample (50 ng 4-bromofluorobenzene) was analyzed to verify the mass spectral performance. This performance sample was compliant. In addition to the calibration curve, a method blank and closing calibration check standard were analyzed. The closing calibration check standard met acceptance criteria ($\pm 25\%$ difference).

Closing

These analytical summary and associated analytical results have been reviewed and are approved for release by the following analysts. Any questions or comments may be directed to either Bill or Dennis.



William J. Arseneau, Pace-I Analytical Chemist
(612) 778-5875



Dennis R. Seeger, Pace-I Analytical Advanced Chemist
(612) 778-6093

Appendix A

Report of Laboratory Analysis

3M Lab Request No.:	U1927	Requester Name:	J.T. Wolter
Department:	0211	Project Lead:	J.T. Wolter
Project No.:	FS980618-1	Phone No.:	(612) 778-6176
Date Received:	8/3/98		
Project Description:	Covance Contamination Testing	Report Date:	September 10, 1998
3M Sample No.:	U1927-123	Initial Pressure (psia):	14.7
Sample Desc.:	Room 3045	Final Pressure (psia):	29.7
Canister No.:	E1900	Pressure Dilution Factor:	2.0
Date Collected:	6/29/98 10:53	Analytical Dilution Factor:	1
Analytical Method:	GC/MS		
Date Analyzed:	9/4/98		

<u>Method Analytes</u>	<u>Molecular Weight</u>	<u>Quantitation Limit</u>	<u>Analyte Estimated Concentration</u>	
			<u>ppbv</u>	<u>ug/scm</u>
POSF	502	10	ND	ND

<u>Tentatively Identified Compounds (TIC)</u>	<u>Molecular Weight</u>	<u>Quality Fit Factor %</u>	<u>Estimated TIC Concentration</u>		<u>Q</u>
			<u>ppbv</u>	<u>ug/scm</u>	
Methane, chlorodifluoro-	86	83	22	79	N,J
Propane, 2-methyl-	58	83	14	34	N,J
Butane	58	74	7.3	18	N,J
Acetaldehyde	44	9.0	6.0	11	N,J
Methanol	32	2.0	28	37	N,J
Butane, 2-methyl-	72	90	9.1	27	N,J
Pentane	72	83	3.0	9.0	N,J
Ethanol	46	72	14	27	N,J
2-Propanone	58	9.0	6.0	14	N,J
1-(3'-Cyclopentenyl)-2-pentanone	152	9.0	2.4	15	N,J
Hexane	86	86	2.9	10	N,J
Methane, dichloro-	45	5.0	11	21	N,J
2-Propenal	56	5.0	2.6	6.1	N,J
Butanal	72	12	3.9	12	N,J
Cyclopropane	42	4.0	2.1	3.7	N,J
Benzene, methyl-	92	90	6.2	24	N,J
1,2-Benzisothiazole	135	91	24	130	N,J

Definitions:

J Estimated concentration, quantitated amount is either below the detection limit or an estimate for a TIC.
N Presumptive identification based on spectral library search.
ND Not Detected at or above the quantitation limit.
ppbv Parts per Billion by Volume
ug/scm Micrograms per Standard Cubic Meter
psia Pounds per Square Inch Absolute

3M Lab Request No.:	U1927	Requester Name:	J.T. Wolter
Department:	0211	Project Lead:	J.T. Wolter
Project No.:	FS980618-1	Phone No.:	(612) 778-6176
Date Received:	8/3/98		
Project Description:	Covance Contamination Testing	Report Date:	September 10, 1998
3M Sample No.:	U1927-124	Initial Pressure (psia):	14.7
Sample Desc.:	Room 349	Final Pressure (psia):	29.7
Canister No.:	E349	Pressure Dilution Factor:	2.0
Date Collected:	6/29/98 15:29	Analytical Dilution Factor:	1
Analytical Method:	GC/MS		
Date Analyzed:	9/4/98		

<u>Method Analytes</u>	<u>Molecular Weight</u>	<u>Quantitation Limit</u> ppbv	<u>Analyte Estimated Concentration</u>	
			ppbv	ug/scm
POSF	502	10	ND	ND

<u>Tentatively Identified Compounds (TIC)</u>	<u>Molecular Weight</u>	<u>Quality Fit Factor %</u>	<u>Estimated TIC Concentration</u>		<u>Q</u>
			ppbv	ug/scm	
Acetaldehyde	44	83	30	55	N,J
Methanol	32	1.0	3200	4300	N,J
Ethanol	46	72	11	21	N,J
2-Propanone	58	80	43	100	N,J
2-Propanol, 2-methyl-	74	78	11	34	N,J
Hexane	86	90	9.1	33	N,J
Oxirane, (ethoxymethyl)-	102	4.0	1.4	5.9	N,J
Propanal, 2,2-dimethyl-	86	46	44	160	N,J
2-Butanone	72	59	6.8	20	N,J
1-Pentene, 2,4,4-trimethyl-	112	78	9.8	46	N,J
2-Hexanone, 5-methyl-	114	72	20	95	N,J
Benzothiazole	135	87	15	84	N,J

Definitions:

J Estimated concentration, quantitated amount is either below the detection limit or an estimate for a TIC.
N Presumptive identification based on spectral library search.
ND Not Detected at or above the quantitation limit.
ppbv Parts per Billion by Volume
ug/scm Micrograms per Standard Cubic Meter
psia Pounds per Square Inch Absolute

3M Lab Request No.:	U1927	Requester Name:	J.T. Wolter
Department:	0211	Project Lead:	J.T. Wolter
Project No.:	FS980618-1	Phone No.:	(612) 778-6176
Date Received:	8/3/98		
Project Description:	Covance Contamination Testing	Report Date:	September 10, 1998
3M Sample No.:	U1927-125	Initial Pressure (psia):	14.7
Sample Desc.:	Room 3004	Final Pressure (psia):	29.7
Canister No.:	E1893	Pressure Dilution Factor:	2.0
Date Collected:	6/30/98 12:24	Analytical Dilution Factor:	1
Analytical Method:	GC/MS		
Date Analyzed:	9/4/98		

<u>Method Analytes</u>	<u>Molecular Weight</u>	<u>Quantitation Limit</u>	<u>Analyte Estimated Concentration</u>	
			<u>ppbv</u>	<u>ug/scm</u>
POSF	502	10	ND	ND

<u>Tentatively Identified Compounds (TIC)</u>	<u>Molecular Weight</u>	<u>Quality Fit Factor %</u>	<u>Estimated TIC Concentration</u>		<u>Q</u>
			<u>ppbv</u>	<u>ug/scm</u>	
Acetaldehyde	44	83	19	35	N,J
Methanol	32	2.0	87	120	N,J
Butane, 2-methyl-	72	4.0	7.8	23	N,J
Ethanol	46	86	28	54	N,J
2-Propanone	58	64	7.6	18	N,J
1-Propanol	60	9.0	8.5	21	N,J
Butanal	72	22	6.7	20	N,J
2-Butanone	72	9.0	4.3	13	N,J
Isooctane	114	78	5.2	25	N,J
1-Butanol	74	9.0	4.7	14	N,J
Benzene, 1-ethyl-2-methyl-	120	74	22	110	N,J
Benzene, 1-ethyl-4-methyl-	120	91	17	85	N,J
Benzene, 1-ethyl-3-methyl-	120	59	5.0	25	N,J
Disulfide, dimethyl	94	91	4.2	16	N,J
Benzene, methyl-	92	64	2.8	11	N,J
Benzene, 1,2,3-trimethyl-	120	94	28	140	N,J
Benzothiazole	86	2.0	10	36	N,J

Definitions:

J Estimated concentration, quantitated amount is either below the detection limit or an estimate for a TIC.

N Presumptive identification based on spectral library search.

ND Not Detected at or above the quantitation limit.

ppbv Parts per Billion by Volume

ug/scm Micrograms per Standard Cubic Meter

psia Pounds per Square Inch Absolute

3M Lab Request No.:	U1927	Requester Name:	J.T. Wolter
Department:	0211	Project Lead:	J.T. Wolter
Project No.:	FS980618-1	Phone No.:	(612) 778-6176
Date Received:	8/3/98		
Project Description:	Covance Contamination Testing	Report Date:	September 10, 1998

3M Sample No.:	Method Blank	Initial Pressure (psia):	29.7
Sample Desc.:	Method Blank	Final Pressure (psia):	29.7
Canister No.:	NA	Pressure Dilution Factor:	1.0
Date Collected:	NA	Analytical Dilution Factor:	1
Analytical Method:	GC/MS		
Date Analyzed:	9/4/98		

<u>Method Analytes</u>	<u>Molecular Weight</u>	<u>Quantitation Limit</u>	<u>Analyte Estimated Concentration</u>	
			<u>ppbv</u>	<u>ug/scm</u>
POSF	502	5	ND	ND

<u>Tentatively Identified Compounds (TIC)</u>	<u>Molecular Weight</u>	<u>Quality Fit Factor %</u>	<u>Estimated TIC Concentration</u>		<u>Q</u>
			<u>ppbv</u>	<u>ug/scm</u>	
None Detected	NA	NA	ND	ND	

Definitions:

- J** Estimated concentration, quantitated amount is either below the detection limit or an estimate for a TIC.
- N** Presumptive identification based on spectral library search.
- ND** Not Detected at or above the quantitation limit.
- ppbv** Parts per Billion by Volume
- ug/scm** Micrograms per Standard Cubic Meter
- psia** Pounds per Square Inch Absolute

3M Environmental Laboratory - Fluorine Analytical Chemistry Team

Lisa Dick / Kris Hansen
Fluorine Analytical Chemistry Team
Building 2-3E-09
612-778-7540 / 612-778-6018
ladick@mmm.com / kjhansen@mmm.com

Summary report: Analysis of Air Samples and Animal Wipe Samples Collected at Covance Laboratory

Summary:

Possible fluorochemical contamination of the animal housing facilities at Covance Laboratory became an issue when detectable levels of fluorochemicals were identified in control test animals. Analysis of liver and sera samples from the control animals indicated the presence of perfluorooctanesulfonate (PFOS) and other metabolites of 2(N-ethylperfluorooctane sulfonamido)-ethyl alcohol (ethyl-FOSE-OH). Air and airborne particle samples were collected at Covance by Jim Wolter and Kurt Oldenburg of the 3M Environmental Lab Field Group. [Details of the sampling procedure can be found in a report by Jim Wolter and Kurt Oldenburg.] Filters wiped across the backs of study animals were collected and analyzed. Wipe samples from cages, doorhandles, and floors were collected but not analyzed.

In air samples taken from Room 3045, EtFOSE-OH was detected by high pressure liquid chromatography – electrospray mass spectrometry (HPLC/ESMS) at levels below the practical quantitation limit (approximately 0.17 ppb/L) but above the method detection limit (approximately 0.02 ppb/L). PFOS was not detected at levels above the blanks in any room. This is not unexpected because PFOS is a non-volatile salt. Analysis of wipes from the backs of rats by gas chromatography – mass spectrometry (GC/MS) in Room 3045 contained a measurable amount of EtFOSE-OH; wipes from rats in other rooms did not. Due to variations in sampling technique, wipe samples were not quantifiable. Due to sample limitations, wipes from animal backs were not analyzed for PFOS.

EtFOSE-OH Levels in Covance Lab Environment

Covance Sample Location	Number of samples	EtFOSE-OH detection
Room 3045 Air Samples (GF and charcoal)	4 out of 8	0.02 ppb/L < detect < 0.17 ppb/L
Room 3004, 349 Air Samples (GF and charcoal)	16	Non-detect
Room 3045 Rat Backs	6	Detect (8 ppb/wipe average)
Room 3004, 349 Rat Backs	12	Non-detect

Experimental summary:

Sample preparation: Methanol or ether extraction of filters and wipe samples

Glass fiber filter and charcoal adsorbates were split and then prepared by extraction with either ether or methanol. All of the charcoal inside the sterile tubes was extracted with methanol. Final sample volumes were 1 mL. Rat back wipes were prepared by extraction with ether to a final volume of 1 mL.

GC: Analysis of EtFOSE-OH in extracts

In gas chromatography, an aliquot of sample is injected and vaporized onto a chromatographic column. Individual components of the sample adsorb to the stationary phase of the column. As the temperature is raised, components are eluted from the column based on physical and chemical characteristics. An inert gaseous mobile phase carries the components through the column. Carrier gas flow rate, column temperature and gas pressure are adjusted to optimize chromatographic separation.

MS: Analysis of EtFOSE-OH in extracts

One method for producing ions for mass spectra is by bombardment with energetic electrons. In addition to the formation of a molecular ion, a series of reactions leads to the formation of other fragment ions that may be larger or smaller than the molecular ion and are useful for compound identification and quantitation.

HPLC: Analysis of PFOS and EtFOSE-OH in extracts

In HPLC, an aliquot of extract is injected and passed through a liquid phase chromatographic column. Based on the affinity of the analyte for the stationary phase in the column relative to the liquid mobile phase, the analyte is retained for a characteristic amount of time. For example, in a standard solution PFOS may elute at 10.5 minutes. Retention times between a standard PFOS solution and the analyte extracted from filter fibers in this analysis were matched to within 1% on the HPLC system.

ES/MS: Analysis of PFOS and EtFOSE-OH in extracts

Following HPLC separation, ES/MS provides a rapid and accurate means for analyzing a wide range of organic compounds, including fluorochemicals. Electrospray, one of the softest ionization techniques available, is generally operated at relatively mild temperatures. Molecules are ionized, fragmented, and detected. Initially, the mass to charge range $m/z = 100$ to 1210 is monitored following direct flow injection of the samples. Ions characteristic of known fluorochemicals were observed. These results are used to select ions that can be monitored selectively for quantitative results.

Analysis of organic fluorine standard compound indicates that the primary ion characteristic of EtFOSE-OH is $m/z = 630$ amu, corresponding to the mass of the compound complexed to acetate anion from the running buffer: $C_8F_{17}SO_2N(C_2H_5)(CH_2CH_2OH)/CH_3COO^-$. The primary ion for PFOS is $m/z = 499$ amu, corresponding to the mass of the anion $C_8F_{17}SO_3^-$. Single ion monitoring was used to determine the concentrations of these ions in the samples.

Quality control summary:

Methanol blanks were analyzed periodically to ensure complete isolation of the sample. Charcoal and glass fiber filter blanks collected on site were also analyzed and found to be blank. Quantitation of HPLC-ESMS data for fluorochemicals in air samples is based on the linear regression of 5 point standard curves from 10 ppb to 1000 ppb or matrix spike recovery comparisons. Quantitation of wipe samples is difficult due to variations in sampling technique but qualitative data is reliable.

Quantitation of GC-MS peaks is based on the recovery of known spike amounts in the same sample matrix and on the linear regression of 5 point standard curves.

Instrumental specifics:*GC/Mass Spectrometers*

Hewlett-Packard ATD 400 Gas Chromatograph and Mass Spectrometer

Column: J& W DB-624 30m
Temperature ramp: 50°C to 250°C @ 20°C/min
250°C hold 5 min
Carrier gas: Helium
Spike volume: 25 µL
Oven temperature: 180°C
Trap low temp.: -30°C
Desorb time: 10 min.
Trap fast: Yes
Trap high temp.: 250°C
Line temperature: 225°C
Pressure: 18.4 psi
Valve temperature: 225°C
Trap hold: 5 min.
Desorb flow: 25 mL/min
Ions monitored: 540, 448 amu
Source temperature: 250°C
Quad temperature: 125°C
EM volts: 2598 V
Interface temperature: 250°C

HPLC system

Hewlett-Packard Series 1100 Liquid Chromatograph

Column: Keystone Betasil C18 column, 2 X 100 mm, 5 µm particle size
Flow rate: 300 µl/min
Solvent A: 2.0 mM ammonium acetate
Solvent B: Methanol
Solvent Gradient: 40% to 90% B in 8.5 minutes
Hold at 90% B for 3 minutes
Return to 40% B in 1 minute
Hold at 40% B for 1 minute
Injection volume: 10 µL
Run time: 13.5 minutes

Electrospray Mass Spectrometer

Micromass Platform II atmospheric pressure ionization (API) mass spectrometer

Mass Lynx 2.1 software
Cone voltage: - 60V
Mode: electrospray negative
Source temperature: 90°C
Analyzer pressure: 9.2×10^{-5} mBar
Ions: 630, 526, 499
Electrode: cross-flow

Conclusions:

EtFOSE-OH detected in air samples indicates that contamination in control animals may be due to respiration of gas phase or airborne particles of EtFOSE-OH. Filter samples collected by wiping the backs of test animals were also determined to contain EtFOSE-OH. Test material transferred from animal to animal during handling episodes by the animal technicians may be another route of contamination exposure.

Personnel involved with project:

Extractions:	Ogi Krupljanin	7/2/98, 7/9/98, 8/10/98
GC/MS:	Kent Lindstrom	8/12/98
LC/MS:	Lisa Dick, Kris Hansen, Joy Jenkins	7/2/98, 7/13/98

Raw data archival:

ES/MS: Chromatograms included with report. Electronic copy stored on CD within Environmental Lab – Fluorine Analytical Chemistry Team area (Harold Johnson).

GC/MS: Chromatograms included with report. Electronic copy stored on tape cartridge within Environmental Lab – 2nd Floor (Steve Sanders).

To: S. Kruse
Analyst: Glenn Johnson
Request #: A142581
Project #: B41141A6LA
Date: 8/17/98

3M Industrial Hygiene Lab
201-BW-11

Analysis done by capillary GC/ECD

N-MeFOSE

Sample ID	N-MeFOSE mg/cu. meter
116-Bik	0.9 μ g
66	< 0.005
70	< 0.005
74	< 0.005
78	< 0.008
82	0.014
86	0.025
90	< 0.007
94	< 0.007
98	0.019
102	0.048
106	< 0.007
110	< 0.007

N-Et-FOSE

Sample ID	N-Et-FOSE mg/cu. meter
116-Bik	2.5 μ g
66	0.027
70	0.005
74	0.030
78	< 0.008
82	0.073
86	0.110
90	< 0.007
94	< 0.007
98	0.041
102	< 0.008
106	< 0.007
110	0.007

All samples are blank corrected.

Glenn Johnson

Glenn Johnson, Analyst

Date: 8-18-98

Fast GC-Ion Mobility Parameters

Scan Timing

Duration: 60 s
Frequency: 3.003 Hz

Scan Data Range

Start: 0.333 s
Stop: 59.61 s
Peak Width: 2 s
Resolution Factor: 30

AVS Control Timers

GC Cycle Timing
Duration: 59 s
Delay: 1 s

AVS Sampling
Duration: 2.00 s
Delay: 1 s

IMS Separation

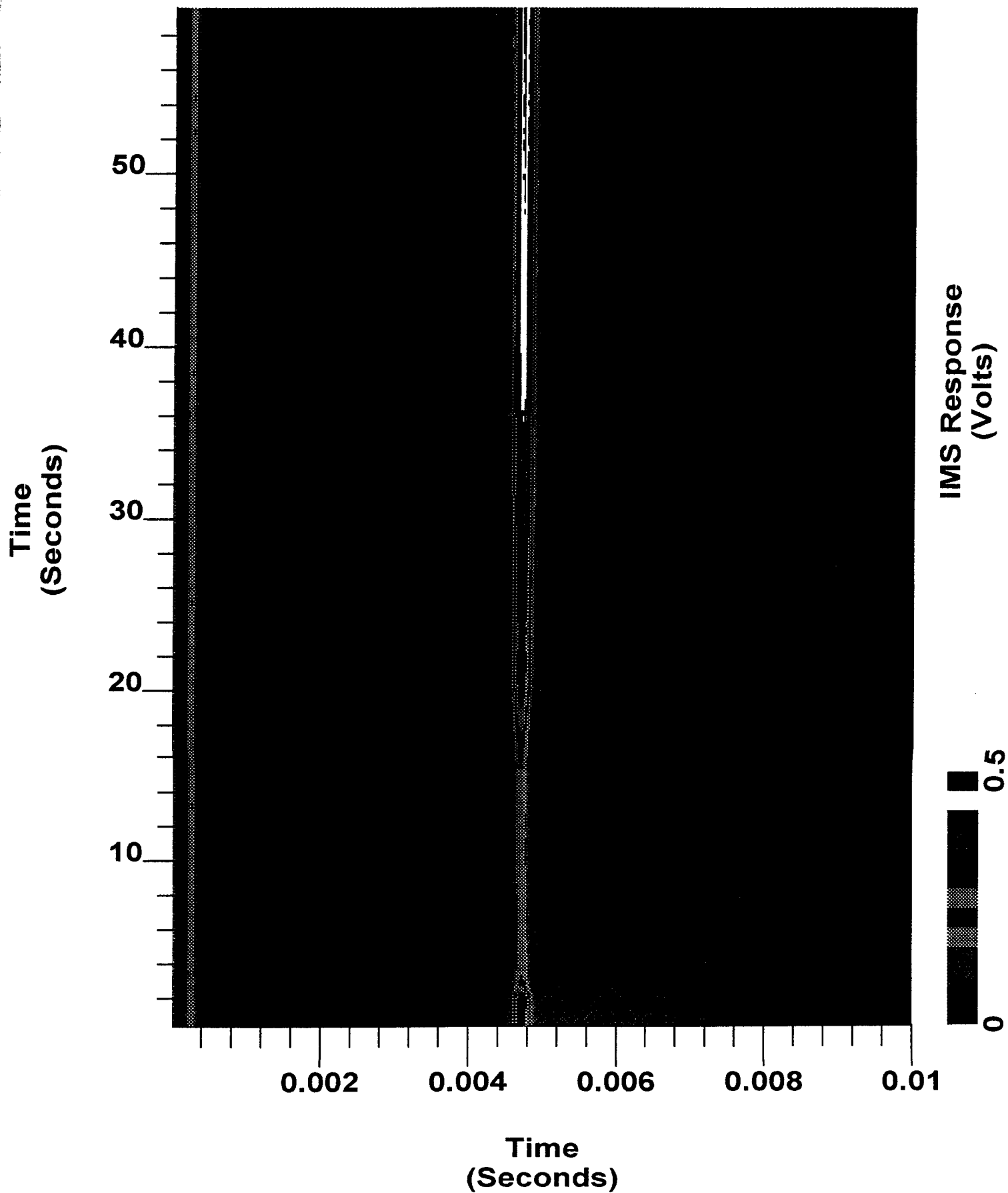
Scan Timing

Duration: 0.01 s
Trigger: 0.0002 s
Frequency: 5e4 Hz
Averages: 8

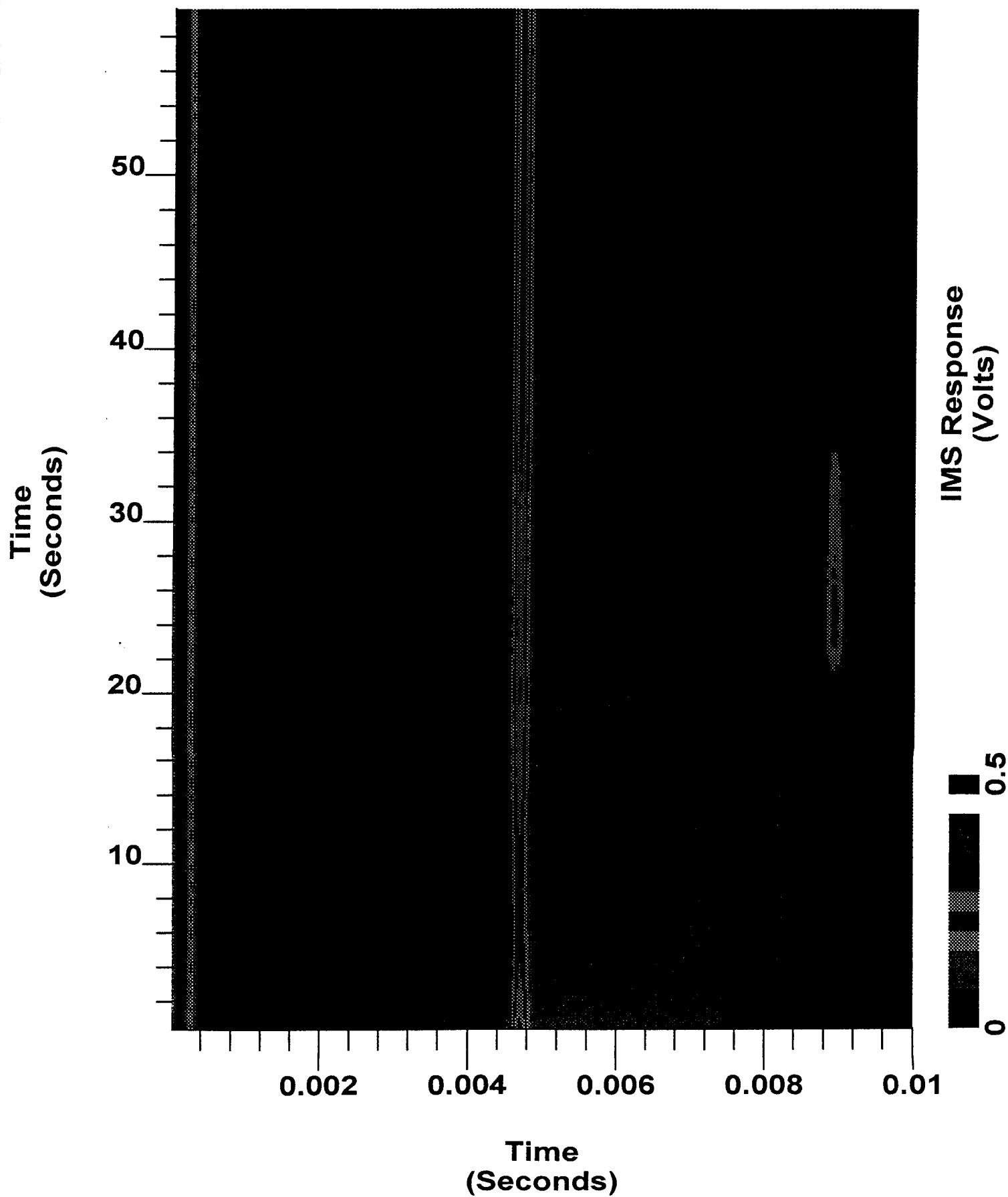
Scan Axis Range

Start: 2e-5 s
Stop: 0.01 s
Peak Width: 0.0002 s
Resolution Factor: 30

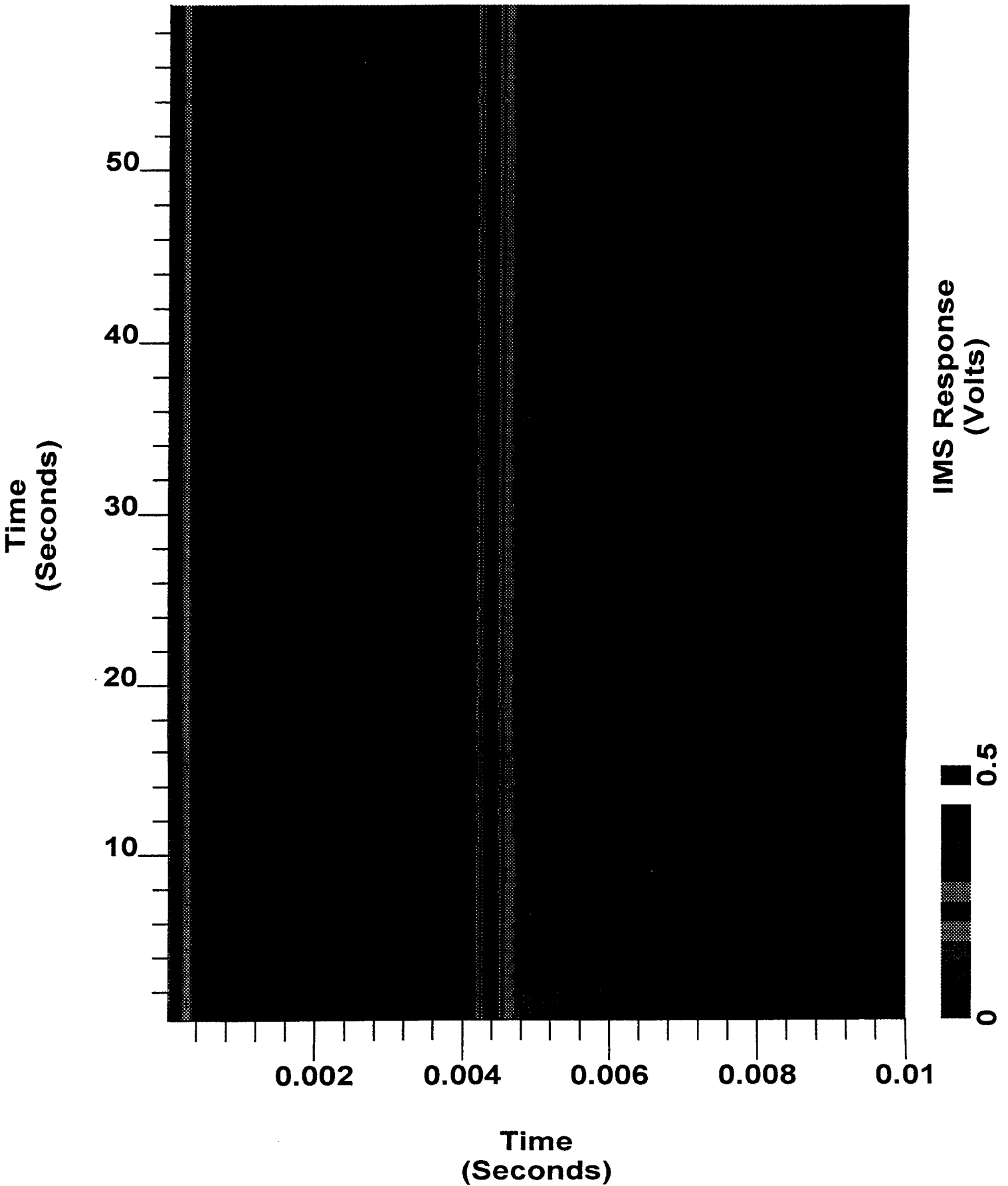
n-Methyl FOSE-OH



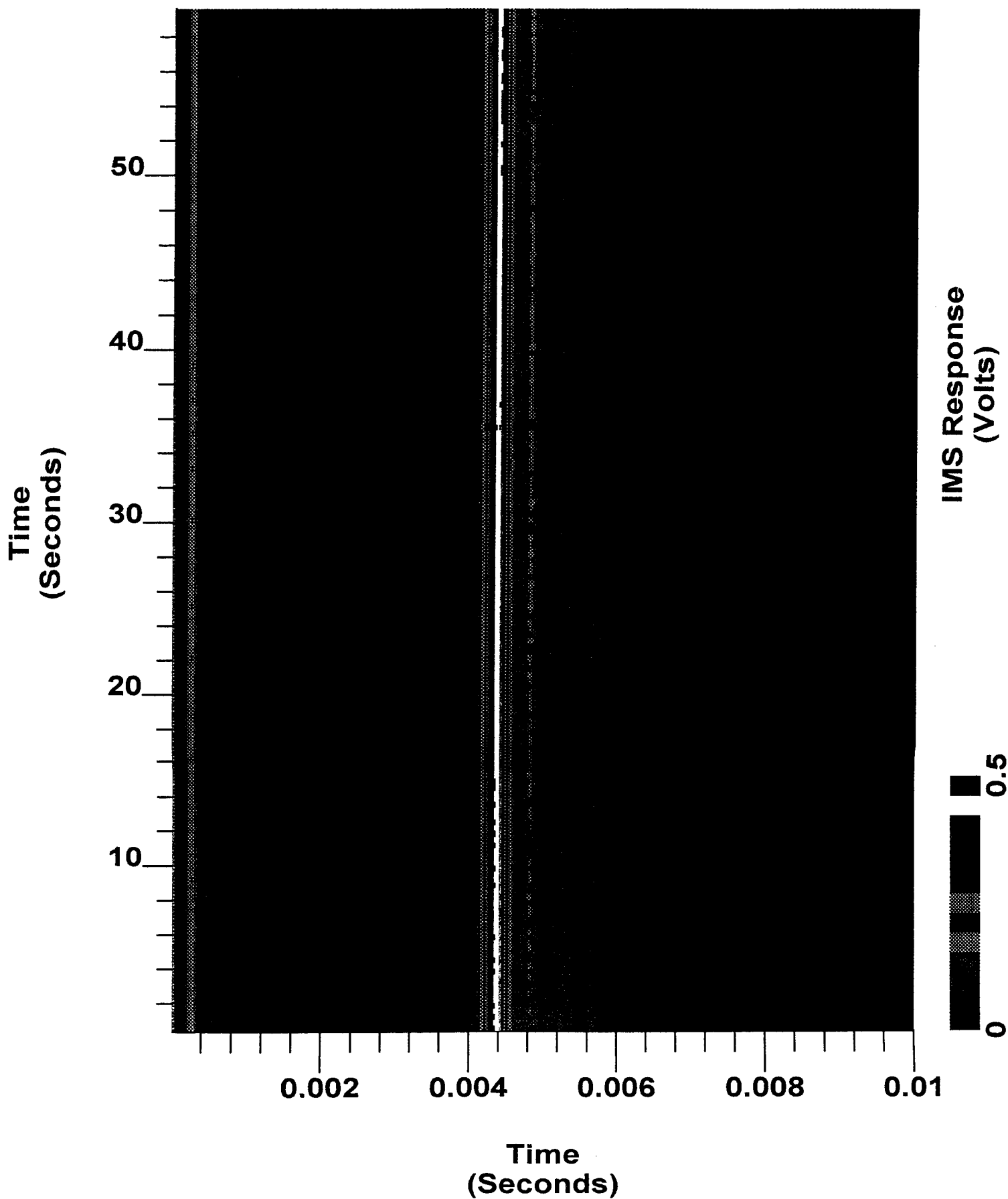
n-Ethyl FOSE-OH



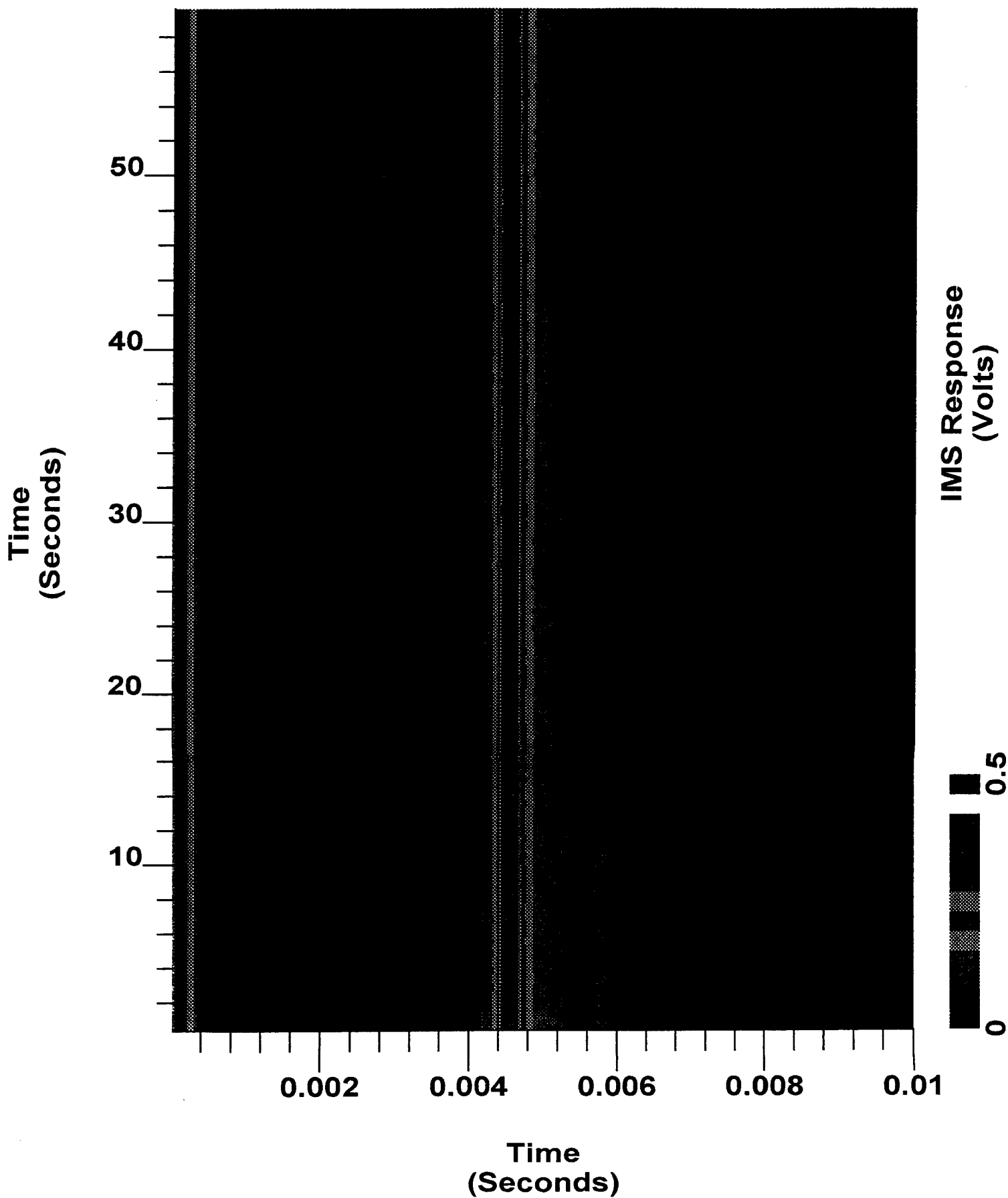
Ethyl FOSE Room Cage 6



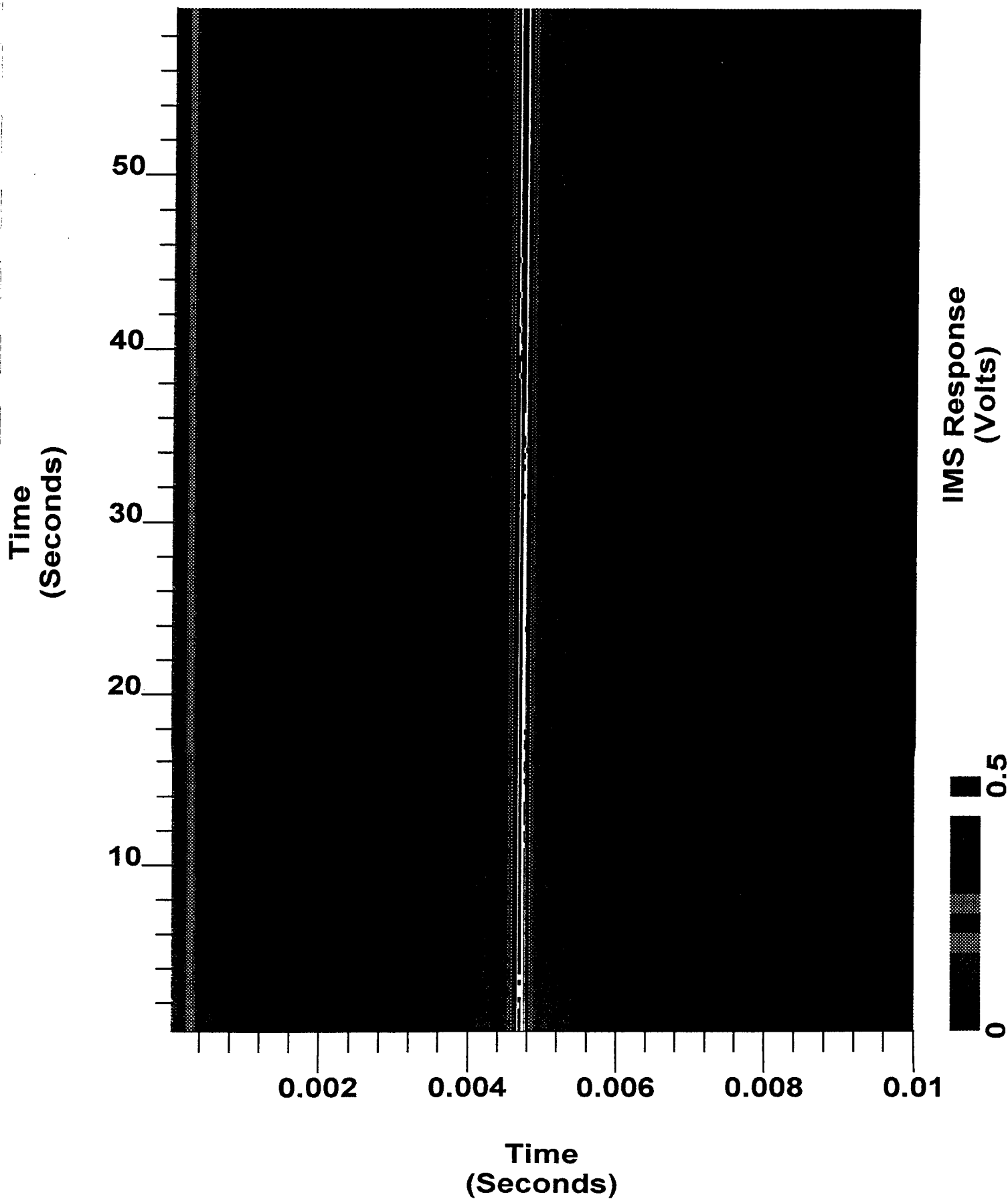
Methyl FOSE Room



PFOS Room



Environmental Lab Air



9.3 Key Personnel Involved in the Study

C

3M Environmental Laboratory

Key Personnel Involved In the Study

Project Coordination:

John Butenhoff
Andrew Seacat
James Wolter

Sampling:

Tim Gutzgow
Shawn Kruse
Kurt Oldenburg
James Wolter

EPA Method TO14 Analysis:

Bill Arseneau

Sorbent Tubes, Filters, Wipes, and Water Analysis:

Lisa Dick
Kris Hansen
Shawn Kruse

Documentation and Reporting:

Elizabeth Daugherty
Tim Gutzgow
James Wolter

Archives:

Rich Youngblom

Quality Assurance Unit:

Tom Wagner

9.4 Materials and Equipment

D

Facility: Covance Laboratories Project Title: Covance Laboratories Contamination Testing
 Address: 3301 Kingman Blvd. Dept./Project Number: 4291 / ~~BV4291~~ BV42911000
 City, State Zip: Madison, WI 53704 Contact: Peter Trufid 608-241-7207

Loaded	Quantity	Loaded	Quantity	Loaded	Quantity
<input checked="" type="checkbox"/> Extractive FTIR System "0"	1	<input checked="" type="checkbox"/> Polyethylene Tubing - 1/4"	1	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Open Path FTIR System ^{with}	1	<input checked="" type="checkbox"/> Polyethylene Tubing - 3/8"	-1	<input type="checkbox"/>	
<input checked="" type="checkbox"/> FTIR Support Kit Set* B	1	<input checked="" type="checkbox"/> Teflon Tubing - 1/4" (100')	2 ROLLS	<input type="checkbox"/>	
Airflow Kit*	1	<input checked="" type="checkbox"/> Teflon Tubing - 3/8" (50')	1 ROLL	<input type="checkbox"/>	
BIOS Calibrator Kit*	1	<input type="checkbox"/> SS Tubing _____ ft.		<input type="checkbox"/>	
Expendable Kit	1	<input type="checkbox"/> MicroTip FID Kit		<input type="checkbox"/>	
FTIR Support Kit	1	<input type="checkbox"/> MicroTip PID Kit		<input type="checkbox"/>	
Gas Conditioning Kit*	1	<input checked="" type="checkbox"/> Tool Kit	1	<input type="checkbox"/>	
Mass Flow Kit	1	<input type="checkbox"/> Climbing Kit*		<input type="checkbox"/>	
Power Kit*	1	<input type="checkbox"/> 50' Rope / Clip		<input type="checkbox"/>	
Pump Kit*	1	<input type="checkbox"/> Transport Kit		<input type="checkbox"/>	
Regulator Kit	1	<input type="checkbox"/> Tents		<input type="checkbox"/>	
Rotometer Kit	1	<input type="checkbox"/> Tarps		Gas Standards	
Swagelok Kit	1	<input type="checkbox"/> MET Station*		<input checked="" type="checkbox"/> Gas St'd #1 <u>Zero N₂</u>	<u>003</u>
<input checked="" type="checkbox"/> Computer Kit*	1	<input type="checkbox"/> Communication Radios*		<input checked="" type="checkbox"/> Gas St'd #2 <u>20 ppm Ethylene</u>	1
<input checked="" type="checkbox"/> SKC Pump Kit*	10	<input type="checkbox"/> 12 Vdc Deep Cycle Batt.*		<input checked="" type="checkbox"/> Gas St'd #3 <u>1 ppm Ethylene</u>	1
<input type="checkbox"/> Gilibrator Kit*		<input type="checkbox"/> AC Generator*		<input type="checkbox"/> Gas St'd #4 _____	
<input checked="" type="checkbox"/> Printer Kit*	1	<input type="checkbox"/> Gasoline Can / Funnel		<input type="checkbox"/> Gas St'd #5 _____	
<input checked="" type="checkbox"/> Dewar (Liquid Nitrogen)	1	<input type="checkbox"/> Support Kit Covers		<input checked="" type="checkbox"/> Regulator #1 <u>580</u>	
<input type="checkbox"/> 110 Vac Heated Pump*		<input type="checkbox"/> Transport Cart Cover		<input checked="" type="checkbox"/> Regulator #2 <u>350</u>	
<input type="checkbox"/> Heated Sample Line-25 ft.*		<input type="checkbox"/> HF Safety Kit		<input type="checkbox"/> Regulator #3 _____	
<input type="checkbox"/> Heated Sample Line-50 ft.*		<input type="checkbox"/> Personnel Safety Kit		FENTON EUM II 1	
<input type="checkbox"/> Heated Sample Line-100 ft.*		<input checked="" type="checkbox"/> BIOS AIR Pao KITS #1 & #2		Vehicles	
<input type="checkbox"/> Heated Line Controller*		<input checked="" type="checkbox"/> EXTRA (0-24 LPM) ROTAMETER		<input checked="" type="checkbox"/> Cube Van	1
<input type="checkbox"/> S-Type Pitot Tube		<input checked="" type="checkbox"/> CYLINDER CLAMPS		<input type="checkbox"/> CEM Trailer	
<input type="checkbox"/> Standard Pitot Tube _____ ft.		<input checked="" type="checkbox"/> 3 CYLINDER CART		<input type="checkbox"/> Suburban	
<input type="checkbox"/> Summa Canister - 1L		<input type="checkbox"/>		<input type="checkbox"/> Trailer - Mobile Lab	
<input checked="" type="checkbox"/> Summa Canister - 6L	12	<input type="checkbox"/>		<input type="checkbox"/> Truck - Mobile Lab	

Comments/Additional:

* Equipment Check Form Required

Form Completed by: JM/KEU Date Completed: 4/24/99 Present on Site:

9.5 Field Data

E

Project Name: Covance Process Name:
 Computer ID: 103 FTIR: LOPIR Operator(s): KEO/TGG Date: 6/29/98
 Collect Desc: Covance Lab 6/29/98 Collect Subdirectory: I 29 Jun 98
 Backup: Zip Interval: 0 # Samples: -1 # Scans: 64 Pathlength: 90m
 Method Desc:
 Method Subdirectory: Method File Name:
 Created: Interferogram Single Beam Residual Absorbance

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)
B60001	8:14	Hallway air background - Shroud closed - 128 scans	—	—	—
C001-3	8:32	Hallway air	—	—	—
B60002	8:40	Hallway air background - Shroud open	—	—	—
4-26	8:41	Hallway air	—	—	—
7-14	9:02	Room 3004 45 Res	—	—	—
15-25	9:20	Room 3004 Between Packs 4/5	—	—	—

Comments:
 Temp: 21.5°C

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)
26-34	9:47	Room 349	—	—	—
35-	10:11	Room 3004 by group 6 caps	—	—	—

Comments:

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)

Comments:

Project Name: LOWANO Process Name:

Computer ID: 104 FTIR: 0 Operator(s): KED Date: 6/29/98

Collect Desc: LOWANO extractive Collect Subdirectory: 29 Jun 98

Backup. (n): Zip Interval: 0 # Samples: -1 # Scans: 64 Pathlength: 10.5

Method Desc: LOWANO

Method Subdirectory: Method File Name:

Created: Interferogram Single Beam Residual Absorbance

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)
060001	10:59	Room Air background - hallway	4	-5.2	—
0001-5	11:14	Hallway Air	4	-5.0	—
06-0002	12:56	Hallway Air background	4	-4.8	—
0-7	12:58	Hallway Air	4	-4.9	—
8-11	13:12	Room 3045, Group 4 waste tray	4	-4.7	—
12-16	13:20	Room 3045, Group 6 waste tray	4	-4.8	—

Comments:

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)
17-21	13:36	Room 3004, group 6 food dish	4	-4.5	—
22-	14:04	Room 3041, group 6 waste tray	4	-4.6	—

Comments:

File Name	Time (24 hrs)	Description	Flow (lpm)	Static (in H2O)	Diluant (factor)

Comments:

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Rm. 3045

Project COVANCE
 Sampling Location A
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E 273
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min	—	0.62	—	—	—	—	79.36L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045C-1A & B

Analytical Parameters _____

Additional Comments _____

CHARCOAL TUBES
SKC-5 → AVER IN LPM → 0.62
E 273

A

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 3045

Project COVANCE
 Sampling Location A
 Date 6-29-98 Test No. 1
 Operators TGG / SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 3m 45347
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min	-	2.03	-	-	-	-	259.84L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 30456F-A

Analytical Parameters _____

Additional Comments _____

GLASS FIBER
(45347) AVER LPM = 2.03

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Ln 3045 by Vent (A)
 Date 6/30/98 ^{KEO} 6/29/98 Test No. _____
 Operators TG/SRK
 Barometric Pressure _____ Inches Hg
 Source Gas Temperature _____ °F
 Estimated Moisture Content _____ % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 134469
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method _____

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:48	10:48	180min		0.57					1026 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Silica gel tube 3045SG-A

Analytical Parameters _____

Additional Comments (*) *134469 = 0.57 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 3045

Project COVANCE
 Sampling Location B
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E1158
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min	—	0.88	—	—	—	—	112.64 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045C-2A & B

Analytical Parameters _____

Additional Comments _____

E1158 (CHARCOM) = 0.88 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 3045

Project COVANCE
 Sampling Location B
 Date 6-29-98 Test No. 1
 Operators TGG/ak
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5 °C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E277
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min	—	2.05	—	—	—	—	262.4L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045 GF-B

Analytical Parameters _____

Additional Comments _____

SKC-1 (E277)
~~E200 2092~~ → AVER. IN LPM = 2.05 LPM TGG
 GLASS FIBER
 (B-1 CELL
 B-2 BIOS)

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance LEO
 Sampling Location RM 3045 by vent RM 3045 (B)
 Date 6/29/98 Test No. _____
 Operators TGG/SRK
 Barometric Pressure _____ Inches Hg
 Source Gas Temperature _____ °F
 Estimated Moisture Content _____ % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 45351
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica Gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method _____

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:48	11:48	180min		0.53					95.4 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045 SG-B

Analytical Parameters _____

Additional Comments (5) *45351 = 0.53 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 3045

Project COVANCE
 Sampling Location C
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E 2069
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min	—	1.12	—	—	—	—	143.36 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045C-3A & B

Analytical Parameters

Additional Comments
ADD EXTRA SHEET
Flow CHARCOAL AVER. (1.12 LPM PRE) → E 2069
Flow GLASS FIBER AVER (2.6 LPM PRE) → E 2071
LOCATION C → On top of #3 Cage near center of room
 6329-228

SAMPLE COLLECTION
~~Midget Sampling Train~~ Field Data Sheet

Room 3045

Project COVANCE
 Sampling Location C
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5 °C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E2071
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:40	12:48	128 min.	-	2.6	-	-	-	-	332.8 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3045 GF-C

Analytical Parameters _____

Additional Comments E2071

GLASS FIBER Flow = 2.6 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covanta
 Sampling Location Room 3045 (6)
 Date 6/29/98 Test No. _____
 Operators TGG/SRK
 Barometric Pressure _____ Inches Hg
 Source Gas Temperature _____ °F
 Estimated Moisture Content _____ % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number BFE 101186
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method _____

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:48	11:48	180 min		0.59					106.2 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Silica gel rx 3045 SG-C

Analytical Parameters

Additional Comments (*3) BFE 101186 = 0.59 lpm

SAMPLE COLLECTION
~~Midget Sampling Train~~ Field Data Sheet

Room 349

Project COVANCE
 Sampling Location A
 Date 6-29-98 Test No. 1
 Operators TGG / SPK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E1158
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 MIN	-	0.83	-	-	-	-	102.09 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349C-1A & B

Analytical Parameters _____

Additional Comments CHARCOAL TUBES

E1158 Flow = 0.83 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location A
 Date 6-29-98 Test No. 1
 Operators TLL/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E 274
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 MIN.	-	2.06	-	-	-	-	253.38L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349 GF-A

Analytical Parameters _____

Additional Comments GLASS FIBER

E 274

~~E 2071~~ Flow = 2.06 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location A
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 3m 134469
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other TUBE
 Sample Medium I.D. No. SILICA GEL
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min	—	0.51	—	—	—	—	62.73 L
2										
3										
4										
5										
6										

Blank Preparation _____
 Sample Train Description 34956-A

Analytical Parameters _____
 Additional Comments SILICA GEL

1 (3m #134469) Flow = 0.51 Lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location B
 Date 6-29-98 Test No. 1
 Operators TGG / SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E2069
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min.	—	1.12	—	—	—	—	137.76L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349C-2A & B

Analytical Parameters _____

Additional Comments CHARCOAL TUBES

E 2069 FLOW = 1.12 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location A TGG B
 Date 6-29-98 Test No. 1
 Operators TGG / SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E277
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method _____

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 _{MIN}	—	2.04	—	—	—	—	250.922
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 3496F-B

Analytical Parameters _____

Additional Comments GLASS FIBER

(SKC) E277 Flow = 2.04 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location B
 Date 6-29-98 Test No. 1
 Operators TGG/SEK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number BFE 1011-86
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other SILICA GEL TUBE
 Sample Medium I.D. No. SILICA GEL
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min	-	0.51	-	-	-	-	62.73 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349 SG-B

Analytical Parameters _____

Additional Comments SILICA GEL

(3) BFE 1011-86 Flow = 0.51 Lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location C
 Date 6-29-98 Test No. 1
 Operators TBB/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E273
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min.	—	0.60	—	—	—	—	73.8 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349C-3A & B

Analytical Parameters _____

Additional Comments CHARCOAL TUBES

SXC5 (E273) Flow = 0.60 Lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE
 Sampling Location C
 Date 6-29-98 Test No. 1
 Operators TGG/SEK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°c
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 3m 45347
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. GLASS FIBER
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min	-	2.02	-	-	-	-	248.46L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349 GF-C

Analytical Parameters _____

Additional Comments GLASS FIBER

(#2) 3m 45347 FLOW = 2.02 LPM

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Room 349

Project COVANCE

Pump Type: Constant Rate Stroke Counter

Sampling Location C

Identification Number 3m 45351

Date 6-29-98 Test No. 1

Sample Type: Source Ambient Personal

Operators TGG/SPK

Sample Medium: Filter Carbon Tube

Barometric Pressure NA Inches Hg

Impinger Other TUBE

Source Gas Temperature 21.5°C °F

Sample Medium I.D. No. SILICA GEL

Estimated Moisture Content NA % v/v

Backup Medium I.D. No. _____

Concurrent Airflow: Yes No

Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	14:09	16:12	123 min.	-	0.51	-	-	-	-	62.73 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description 349SG-C

Analytical Parameters _____

Additional Comments SILICA GEL

(#5) 3m 45351 = 0.51 LPM FLOW

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 3045 by Vent
 Date 6/30/98 Test No. 2
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8°C °F
 Estimated Moisture Content 59.5 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E1158
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127min	—	0.83	—	—	—	—	105.4l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Charcoal Tube 3045C-1A2 & 1B2

Analytical Parameters _____

Additional Comments E1158 = 0.83 lpm

Sample Collection
Midget Sampling Train Field Data Sheet

Project Lowrance
 Sampling Location Rm 3045 by Vent (A)
 Date 6/30/98 Test No. 2
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8°C
 Estimated Moisture Content 59.5 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 45347
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127 min	—	2.01	—	—	—	—	255.27 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Glass fiber filter 3045GF-A2

Analytical Parameters _____

Additional Comments (2) #45347 = 2.01 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 3045 by vent
 Date 6/30/98 Test No. 2
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8 C
 Estimated Moisture Content 59.5 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 134469
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127 min	—	0.60	—	—	—	—	76.20 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Silica gel tube 3045SG-A2

Analytical Parameters

Additional Comments (#1) * 134469 = ~~0.53 lpm~~ 0.60 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 3045 on High dose Pack
 Date 6/30/98 Test No. 2
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8 °C
 Estimated Moisture Content 59.5 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E273
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127 min	—	0.60	—	—	—	—	76.20l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Charcoal tube 3045C - 2A2 & 2B2

Analytical Parameters _____

Additional Comments (SKL 5) #E273 = 0.60 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project LOWRIE
 Sampling Location 2m 3045 on High dose 1944
 Date 6/30/98 Test No. 1
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8 °C °F
 Estimated Moisture Content 59.5 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E277
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127 min	—	2.05	—	—	—	—	260.35
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Glass fiber filter 3045 GF-B2

Analytical Parameters

Additional Comments (SKC 1) # E277 = 2.05 lpm

Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 3045 on High Dose Pack (B)
 Date 6/30/98 Test No. 2
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.8°C °F
 Estimated Moisture Content 59.6 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 45351
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:27	10:34	127 min	—	0.53	—	—	—	—	67.31 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Silica gel Tube 304556-B2

Analytical Parameters

Additional Comments (*5) #45351 = 0.53 lpm

SAMPLE COLLECTION
~~Midget Sampling Train~~ Field Data Sheet

Project LOVANCE
 Sampling Location Room 3004 on High dose Rack
 Date 6/30/98 Test No. 1
 Operators TGG / SRK / KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.6 °C °F
 Estimated Moisture Content 58.1 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E 2069
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:32	10:57	145 min	—	1.11	—	—	—	—	160.95 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Charcoal Tube 3004C - 1A & B

Analytical Parameters _____

Additional Comments E 2069 = 1.11 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 3004 on High dose Pack
 Date 6/30/98 Test No. 1
 Operators Tbb / SRK / KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.6°C °F
 Estimated Moisture Content 58.1 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E274
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:32	10:57	145 min	—	2.06	—	—	—	—	298.70 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Glass fiber filter 3004 GF-A

Analytical Parameters _____

Additional Comments (SKC 4) *E274 = 2.06 lpm

SAMPLE COLLECTION

Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Room 3004 on High dose Rack
 Date 6/30/98 Test No. 1
 Operators TGG/SRK/KEO
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.6 C
 Estimated Moisture Content 58.1 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number BFE 101186
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica Gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	8:32	10:57	145 min	—	0.63	—	—	—	—	91.35 l
2										
3										
4										
5										
6										

Vial Preparation _____

Sample Train Description Silica gel tube 3004 SG-A

Analytical Parameters

Additional Comments (*) BFE 101186 = ^{KEO} 0.49 lpm 0.63 lpm

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance Pump Type: Constant Rate Stroke Counter
 Sampling Location Room 349 on HGA 2nd Floor (B) Identification Number E277
 Date 6/30/98 Test No. 2 Sample Type: Source Ambient Personal
 Operators TGG/SRK Sample Medium: Filter Carbon Tube
 Barometric Pressure NA Inches Hg Impinger Other _____
 Source Gas Temperature ~ 21.5 °C Sample Medium I.D. No. _____
 Estimated Moisture Content NA % v/v Backup Medium I.D. No. _____
 Concurrent Airflow: Yes No Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	112 MIN	—	2.04	—	—	—	—	228.48L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Glass fiber filter 349GF-B2

Analytical Parameters _____

Additional Comments (SKC 1) E277

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Rm 349 on High dose racks (B)
 Date 6/30/98 Test No. 2
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 45351
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	112 min	—	0.58?	—	—	—	—	64.96L (67.2L)
2										
3										
4										
5										
6										

Based on 0.60 Lpm measured earlier in day

Blank Preparation _____
 Sample Train Description Silica gel tube 3495G-B2

Analytical Parameters _____
 Additional Comments (A5) #45351

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location Room 3045
 Date 6-29-98 Test No. 1
 Operators TGG
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number AA TGG E 1900
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other CAVISTEE
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method CSAB

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	10:54	~1 min	—	—	—	—	—	—	3 LITERS
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location Room 349
 Date 6-29-98 Test No. 1
 Operators TGG
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number NA TAG E1899
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other CANISTER
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method Grab

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	15:25	15:26	~1 min	-	-	-	-	-	-	3 LITERS
2										
3										
4										
5										
6										

Blank Preparation _____
 Sample Train Description _____
 Analytical Parameters _____
 Additional Comments _____

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE

Pump Type: Constant Rate Stroke Counter

Sampling Location Room 3004

Identification Number E1893

Date 6-30-98 Test No. 1

Sample Type: Source Ambient Personal

Operators TGG

Sample Medium: Filter Carbon Tube

Barometric Pressure NA Inches Hg

Impinger Other CANISTER

Source Gas Temperature 21.6°C ~~°F~~

Sample Medium I.D. No. _____

Estimated Moisture Content 59.5 ~~100%~~ v/v

Backup Medium I.D. No. _____

Concurrent Airflow: Yes No

Sampling Method GRAB

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	12:24	12:25	~1 min	-	-	-	-	-	-	3 LITER
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location Room 3004
 Date 6-30-98 Test No. 1
 Operators TGB
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.6°C F
 Estimated Moisture Content 58.1 % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number W-Room 3004
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other BOTTLE
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method GRAB OFF RACK NEAR
(OF WATER) BOTTOM VALV

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	12:33	12:34	~1 min	—	—	—	—	—	—	~3/4 can
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE

Sampling Location Room 3045

Date 6-30-98 Test No. 1

Operators TGG

Barometric Pressure NA Inches Hg

Source Gas Temperature 21.8°C

Estimated Moisture Content 59.5 % v/v

Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter

Identification Number W-Room 3045

Sample Type: Source Ambient Personal

Sample Medium: Filter Carbon Tube

Impinger Other BOTTLE

Sample Medium I.D. No. _____

Backup Medium I.D. No. _____

Sampling Method GRAB OF WATER OFF RACI
NEAR BOTTOM BLEED VALVE.

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	12:40	12:41	~1 min.	—	—	—	—	—	—	~1/2 GAL.
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location Room 349
 Date 6/30/98 Test No. 1
 Operators TGG
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5c °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number W-Room 349
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other BOTTLE
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method GRAB SAMPLE OFF PACK
OF WATER FROM BLEED VALVE NEAR
BOTTOM!

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	12:44	12:45	~1 min	—	—	—	—	—	—	~1/2 GAL.
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location STAGING AREA
 Date 6-29-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~70 °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number CHECK COMMENTS BELOW
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other SILICA GEL TUBE
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method CHECK BLANK PREPARATION BELOW

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	16:30	—	—	—	—	—	—	—	—	0
2										
3										
4										
5										
6										

Blank Preparation OPENED & SEALED

Sample Train Description _____

Analytical Parameters _____

Additional Comments _____

2 GLASS FIBER FILTERS, 3 CHARCOAL TUBES, 3 SILICA GEL TUBES

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project COVANCE
 Sampling Location STAGING AREA
 Date 6-30-98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~70 °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number CHECK COMMENTS BELOW
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other SILICA GEL TUBE
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method CHECK BLANK PREPARATION BELOW

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	12:00	—	—	—	—	—	—	—	—	0
2										
3										
4										
5										
6										

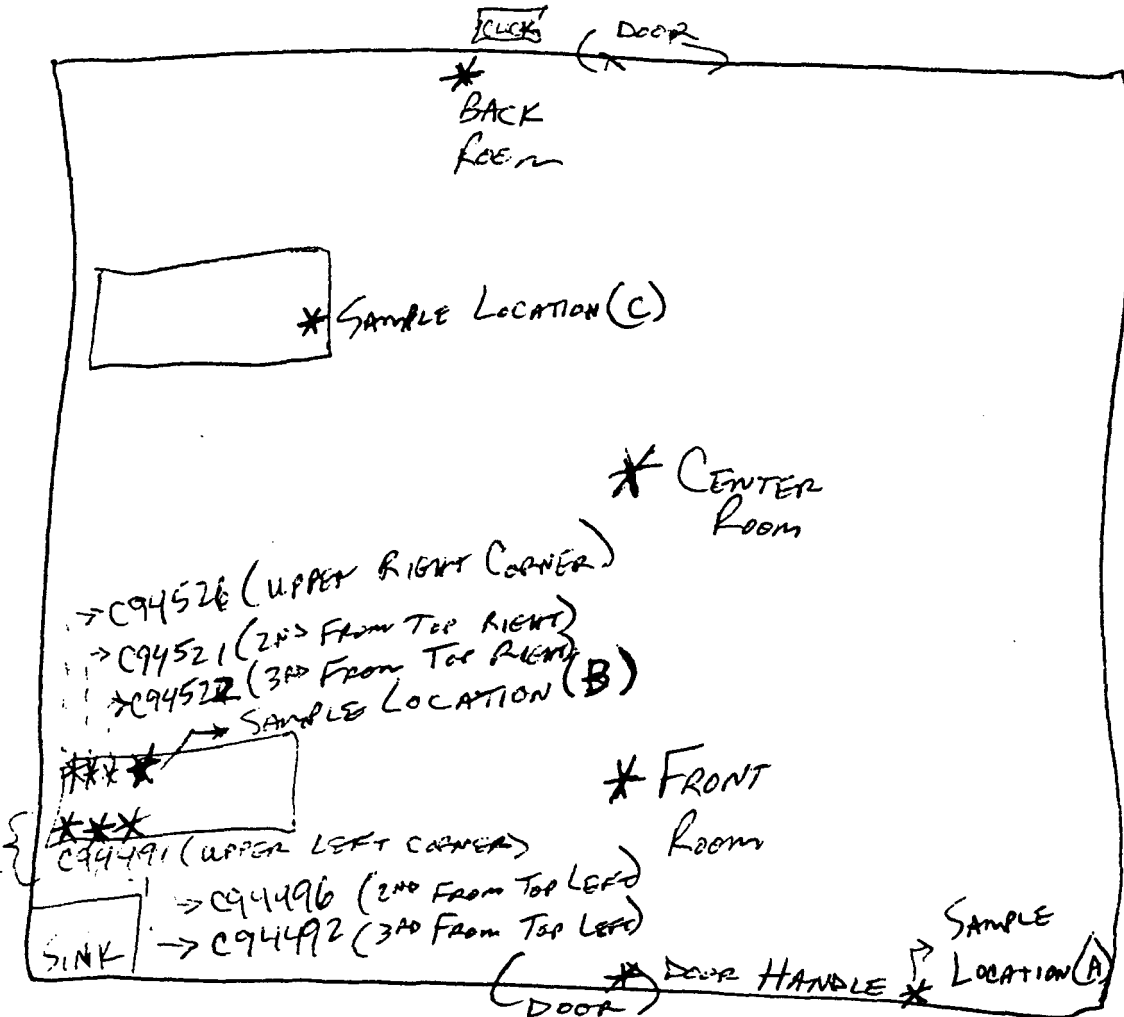
Blank Preparation OPENED & SEALED

Sample Train Description —

Analytical Parameters —

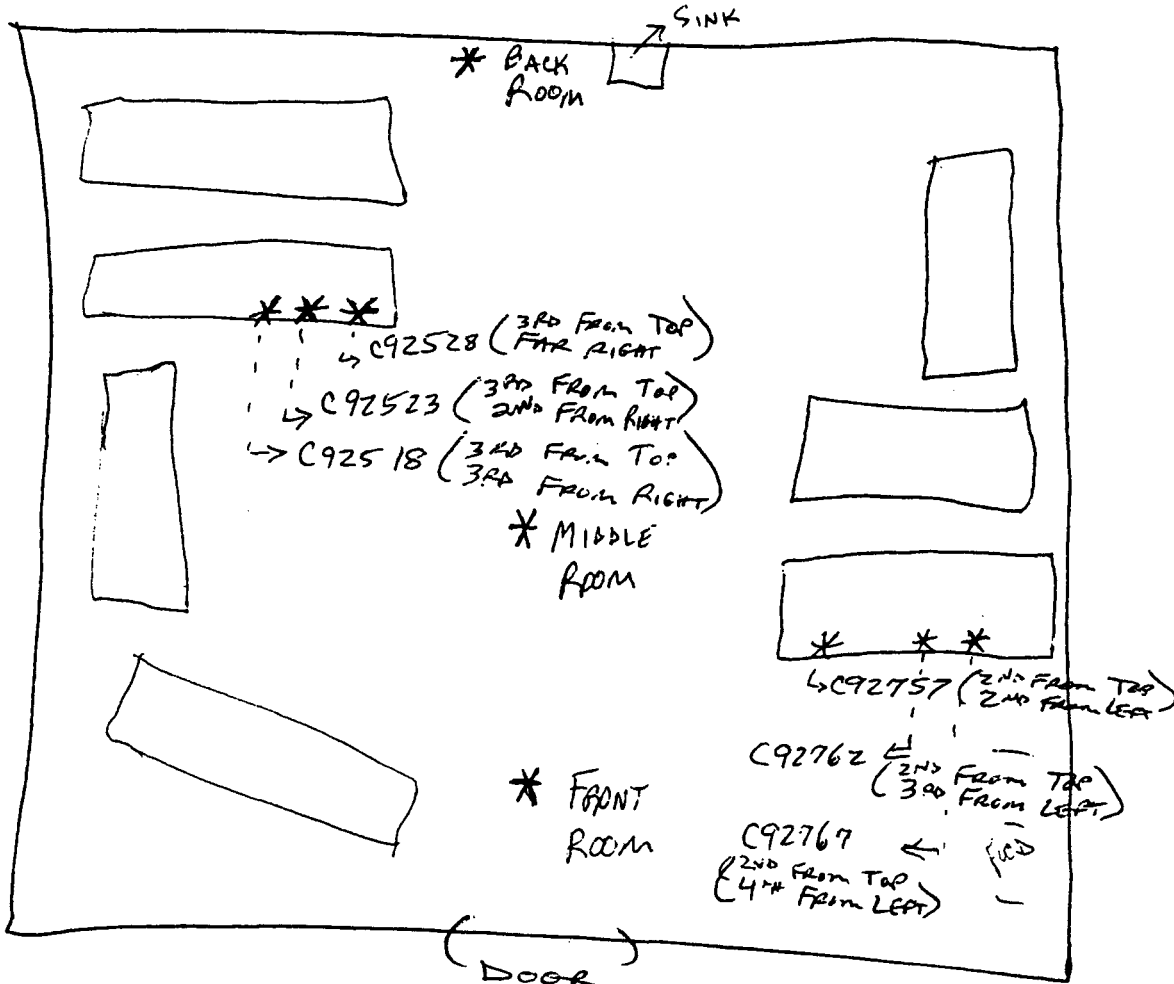
Additional Comments 1 GLASS FIBER FILTER, 2 CHARCOAL TUBES, 1 SILICA GEL TUBE

Room 349



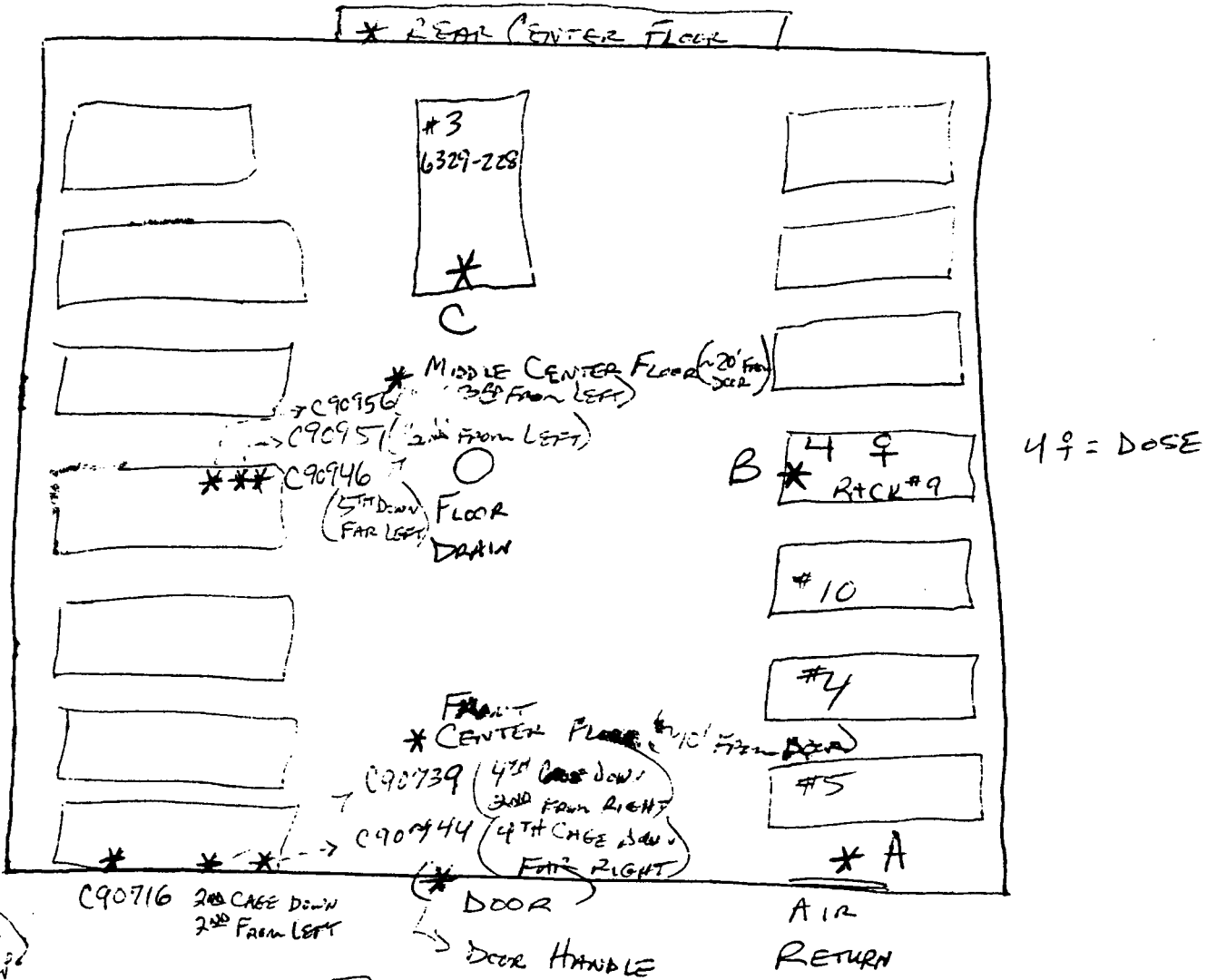
S

Room 3004



Control

Room 3045 ~ 2:50



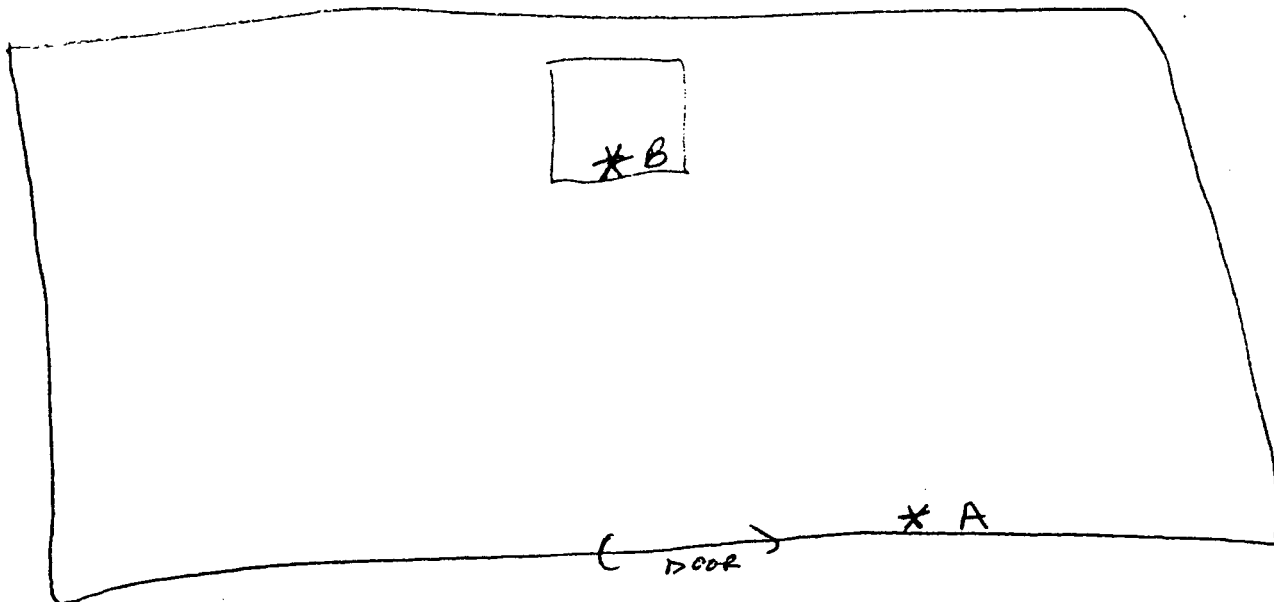
A = ~3' HIGH [(3045 GF-A, 3045 C-1A/B) → 3045 SG-A]

B = ~5' HIGH [(3045 GF-B, 3045 C-2A/B) → 3045 SG-B]
(ON TOP OF CAGE)

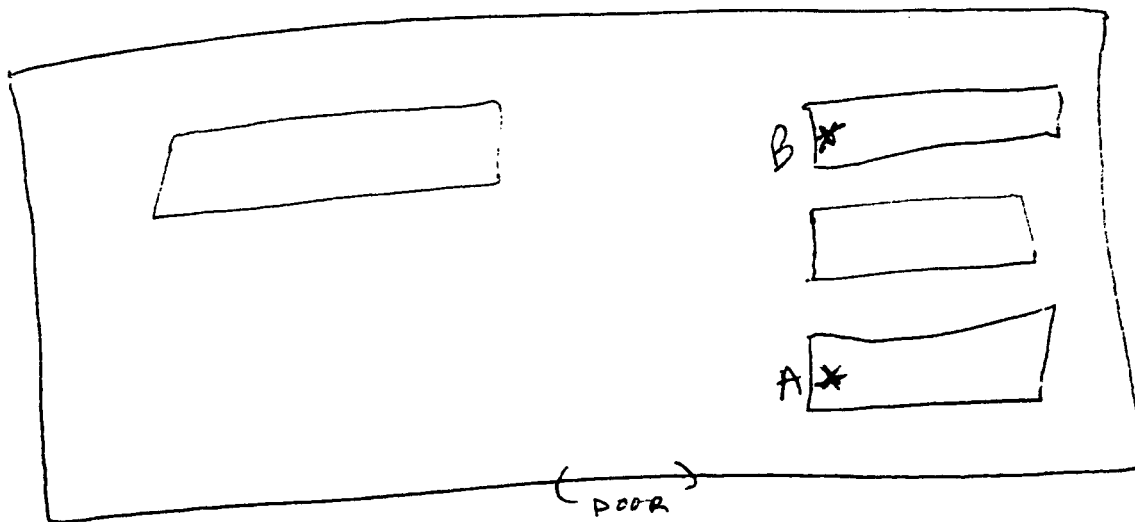
C = ~5' HIGH [(3045 GF-C, 3045 C-3A/B) → 3045 SG-C]
(ON TOP OF CAGE)

GF = GLASS FIBER FILTER
C = CHARCOAL TUBE

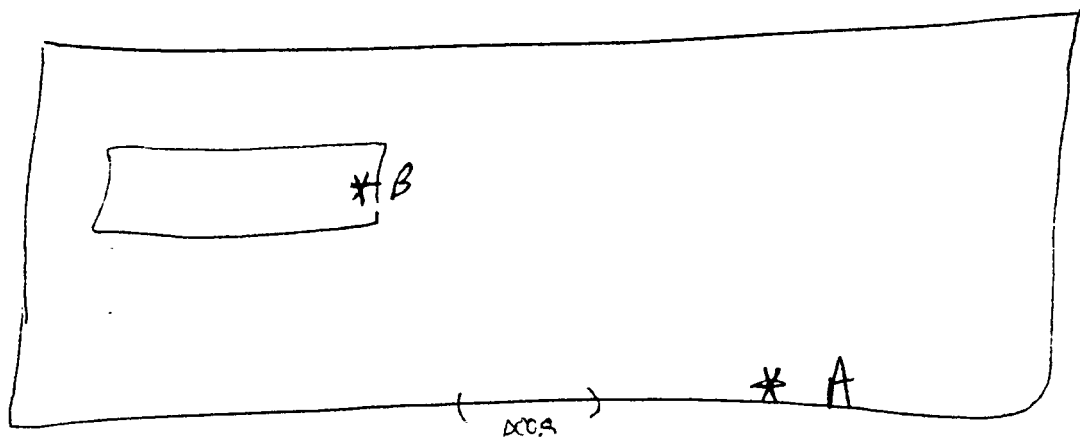
Room 3045



Room 3004



Room 349



SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Govanq
 Sampling Location Room 3004 near rear of room
 Date 6/30/98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E 2069
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	11:04	12:52	108 min	—	1.11	—	—	—	—	119.88 l
2										
3										
4										
5										
6										

Blank Preparation _____
 Sample Train Description Charcoal tube 3004C-2A^{TGG} & 2B^{TGG}

Analytical Parameters _____
 Additional Comments E 2069

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Room 3004 near left of room
 Date 6/30/98 Test No. 1
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E274
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	11:04	12:52	108 min	—	2.07	—	—	—	—	223.56 L
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Glass fiber filters 3004 GF-B

Analytical Parameters _____

Additional Comments (SKC4) *E274

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Room 3004 new rear of room
 Date 6/30/98 Test No. 1
 Operators T66/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number BFE 101186
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	11:04	12:52	108 min	—	0.56	—	—	—	—	60.48 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Silica gel Tube 3004 56-B

Analytical Parameters

Additional Comments (*3) BFE 101186

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Lowrance
 Sampling Location Room 319 by Vent (A)
 Date 6/30/98 Test No. 2
 Operators T66/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number E1158
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	17 min	—	0.181	—	—	—	—	90.72 l
2										
3										
4										
5										
6										

Blank Preparation _____

Sample Train Description Charcoal Tube 349C-1A2 & 1B2

Analytical Parameters _____

Additional Comments E1158

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Covance
 Sampling Location Room 349 by Vent (A)
 Date 6/30/98 Test No. 2
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5°C
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 45347
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	112 MIN	—	2.02	—	—	—	—	226.24L
2										
3										
4										
5										
6										

Blank Preparation _____
 Sample Train Description Glass fiber filter 349GF-A2

Analytical Parameters _____
 Additional Comments (2) *45347

SAMPLE COLLECTION Midget Sampling Train Field Data Sheet

Project Lowane
 Sampling Location Room 349 by vent (A)
 Date 6/30/98 Test No. 2
 Operators TGG/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature 21.5°C ~~F~~
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number 134469
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other Silica gel
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	112mm	—	0.60	—	—	—	—	67.20 l
2										
3										
4										
5										
6										

Blank Preparation _____
 Sample Train Description Silica gel tube 349 SG-A 2

Analytical Parameters _____
 Additional Comments (*) # 134469

SAMPLE COLLECTION
Midget Sampling Train Field Data Sheet

Project Govante
 Sampling Location Room 349 on high dose racks (B)
 Date 6/30/98 Test No. 2
 Operators T66/SRK
 Barometric Pressure NA Inches Hg
 Source Gas Temperature ~21.5°C °F
 Estimated Moisture Content NA % v/v
 Concurrent Airflow: Yes No

Pump Type: Constant Rate Stroke Counter
 Identification Number _____
 Sample Type: Source Ambient Personal
 Sample Medium: Filter Carbon Tube
 Impinger Other _____
 Sample Medium I.D. No. _____
 Backup Medium I.D. No. _____
 Sampling Method EXTRACTIVE

Run No.	Sampling Time		Sample Duration	Sampling Rate		Stroke Counting				Sample Volume
	Start	Stop		Rotameter Setting	Calibrated LPM	Initial Count	Final Count	Total Strokes	Stroke Volume	
1	10:53	12:45	112 min	—	0.59	—	—	—	—	(66.08)
2										
3										
4										
5										
6										

Blank Preparation _____

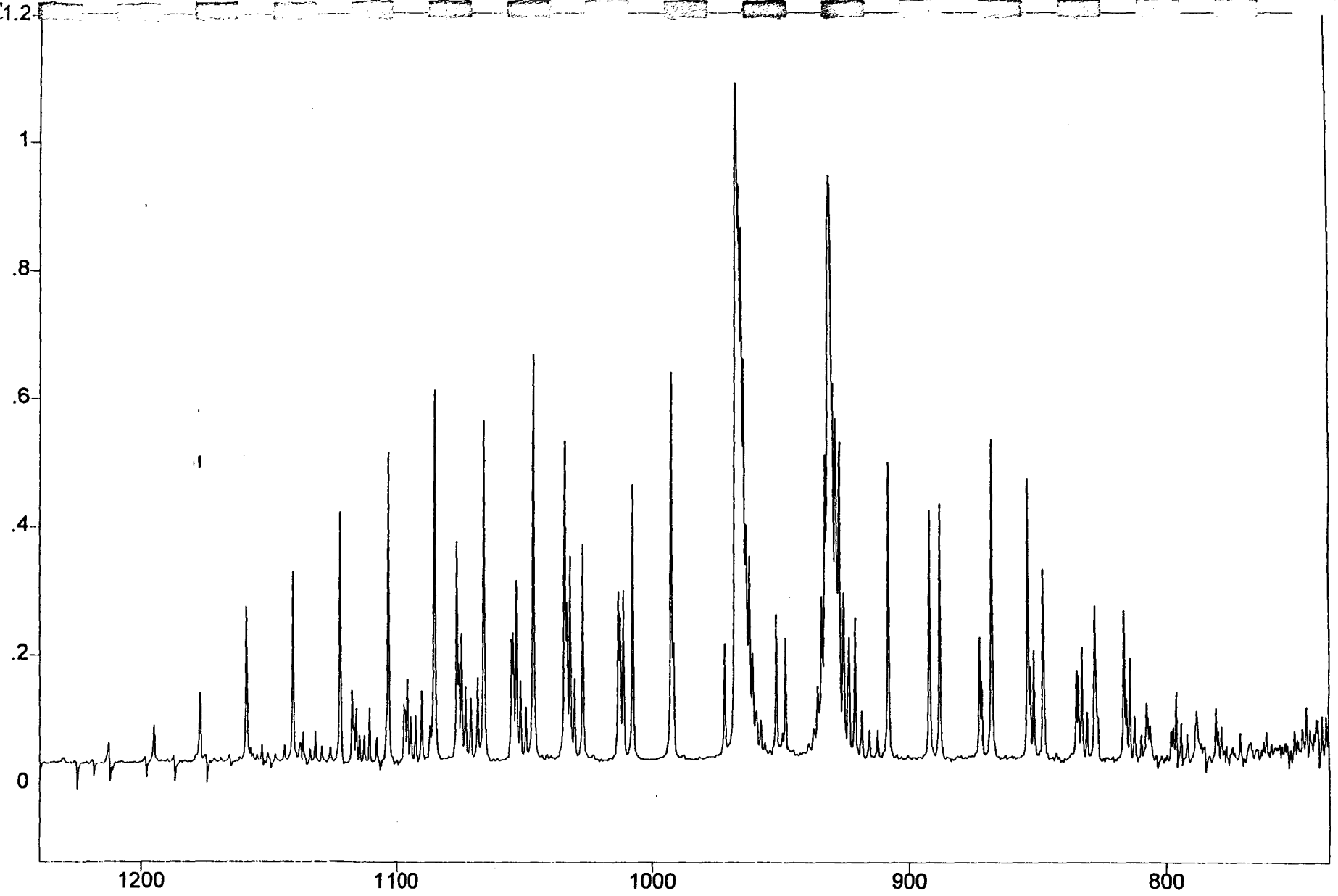
Sample Train Description Chemical tube 349C-2A2 & 2B2

Analytical Parameters _____

Additional Comments (SKL5) *E273

9.6 Field Data Printouts

F



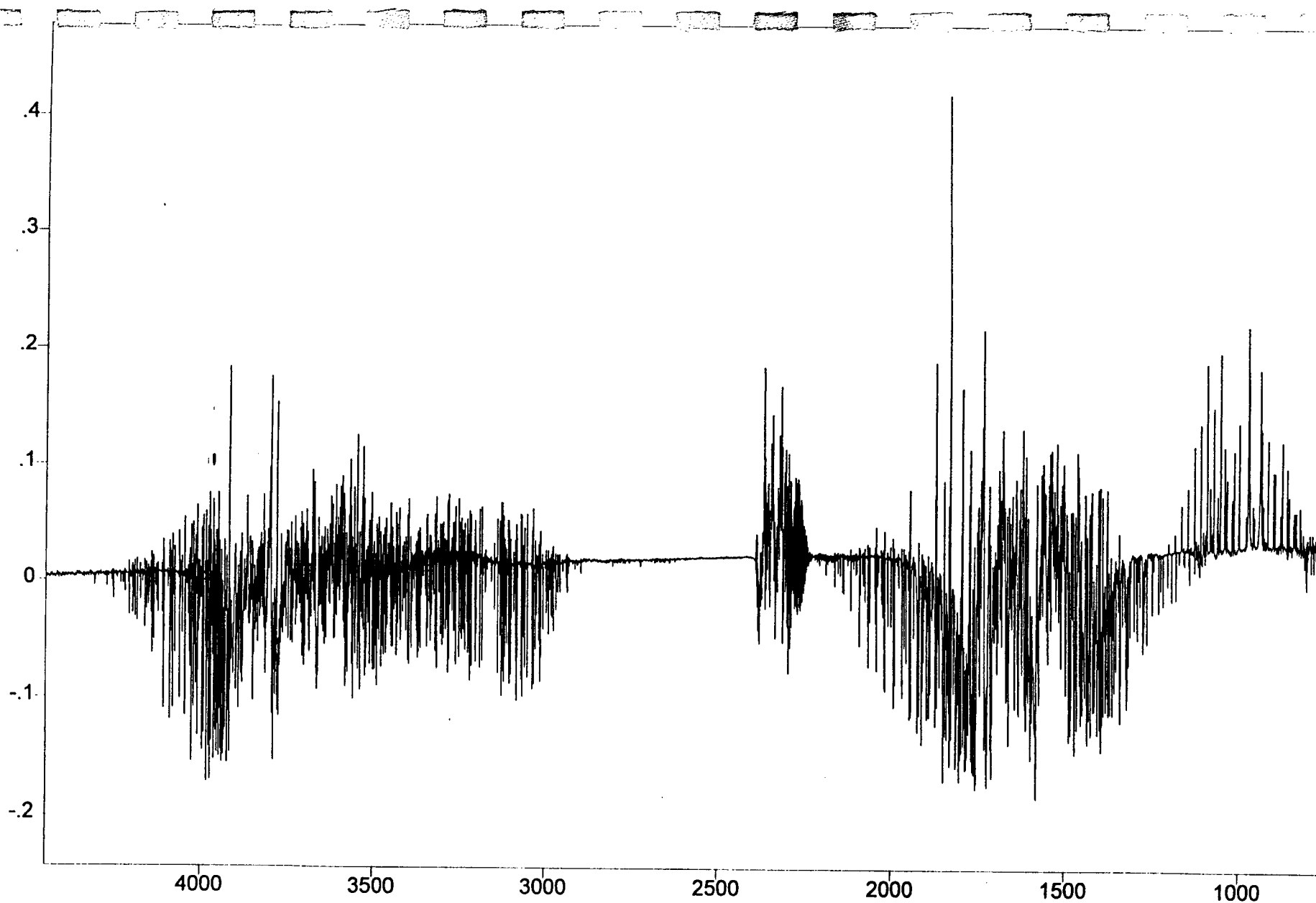
Absorbance / Wavenumber (cm-1)

File # 1 = C0021

Rm. 3045 racks 4+5,static,~90M,amb,IH inst.

Stacked X-Zoom CURSOR

6/29/98 9:31 AM Res=None



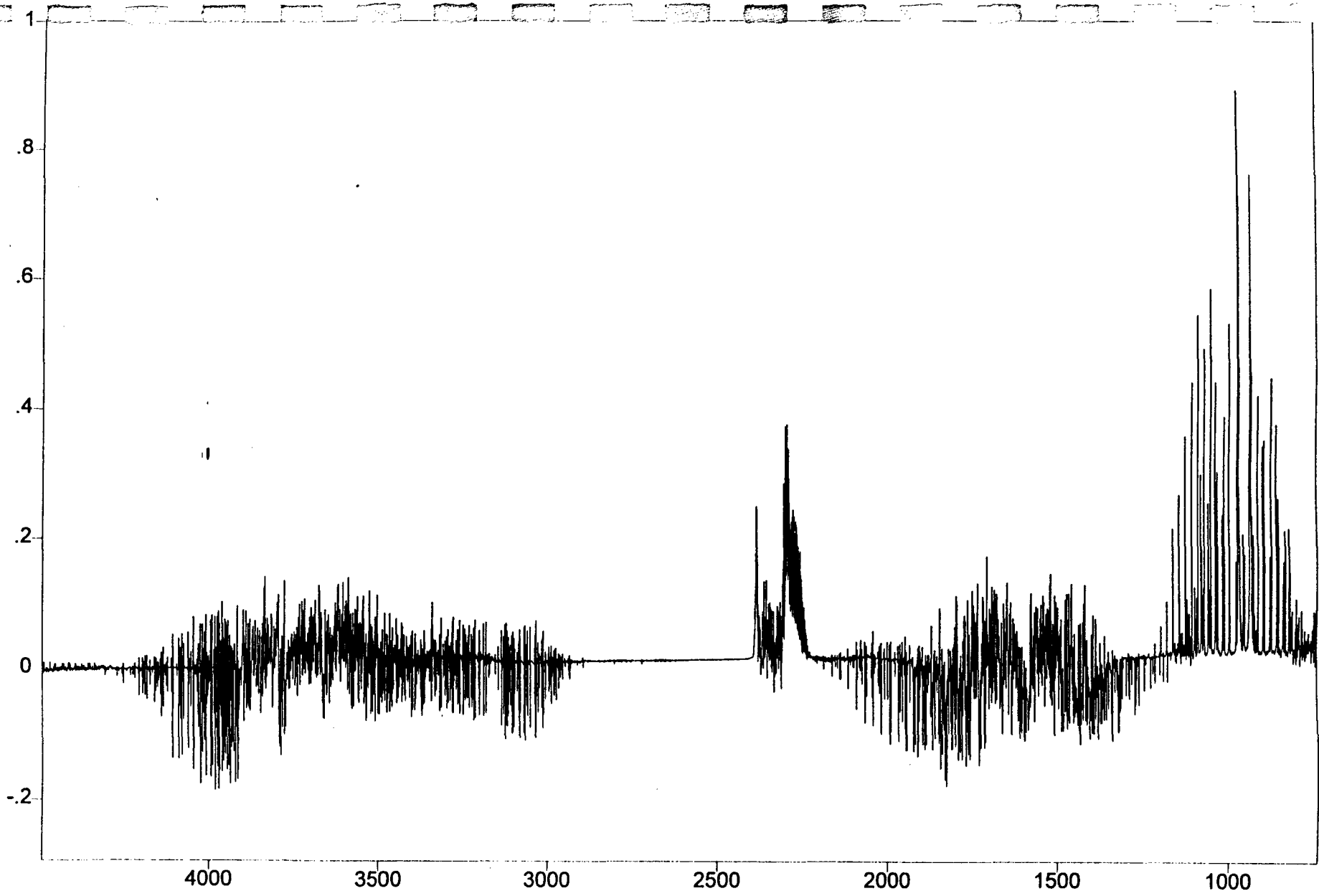
Absorbance / Wavenumber (cm-1)

File # 1 = C0034

Rm. 349,,static,~90M,amb,IH inst.

Stacked X-Zoom CURSOR

6/29/98 10:01 AM Res=None



Absorbance / Wavenumber (cm-1)

File # 1 = C0038

Rm. 3004 by grp 6,static,~90M,amb,IH inst.

Stacked X-Zoom CURSOR

6/29/98 10:16 AM Res=None

9.7 AutoQuant CLS Method

G

Method Map generated 07-08-1998 3:25:07 PM

Method Name: Ammonia

Method Path: C:\AUTOQ3\METHODS\AMMONIA\AMMONIA.ME

Method Type: AutoQuant 3.0

Linear Analysis mode

Temperature & Pressure Adjustments: OFF

Mass Emission Computations: OFF

Method Parameters:

Wavenumber range: 650.00 - 4500.00

Fingerprint zoom: 650.00 - 1400.00

Path Length = 90

Interfere Criterion = 2500

Gain number = .5

Apodization = Triangle

Phase Correct = Mertz

Resolution = .5

Baseline Correction: Quadratic

Compound: NH3

Alarms: Disabled

Output: Disabled

Spectrum: H85NH3.SPC

Primary: Yes

Reference concentration = 85.00

Region #1: 879.08 - 1044.79

9.8 Chains of Custody

H

Form 35176 - PW0

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code MADISON, W.F.	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) Tim Gutzkow		Contractor FACE			Number Containers of each							Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment Comments
Sampler Signature <i>[Signature]</i>		Date 7-1-98			Preservatives								
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC	MeOH			
1	BLANK WIPE # 1	6-29-98	11:10	SOLID						✓	1	BLANK IN Rm. #3045 U1927	
2	BLANK WIPE # 2	6-29-98	11:11	SOLID						✓	1	BLANK IN Rm. #3045	
3	WIPE # 3	6-29-98	11:46	SOLID						✓	1	DOOR HANDLE Rm. #3045	
4	WIPE # 4	6-29-98	11:41	SOLID						✓	1	FRONT CENTER FLOOR Rm #3045	
5	WIPE # 5	6-29-98	11:43	SOLID						✓	1	MIDDLE CENTER FLOOR Rm #3045	
6	WIPE # 6	6-29-98	11:44	SOLID						✓	1	REAR CENTER FLOOR Rm. #3045	
7	WIPE # 7	6-29-98	11:15	SOLID						✓	1	C90716 BOTTOM	
8	WIPE # 8	6-29-98	11:16	SOLID						✓	1	C90716 SIDE	
9	WIPE # 9	6-29-98	11:17	SOLID						✓	1	C90716 RAT	
10	WIPE # 10	6-29-98	11:21	SOLID						✓	1	C90739 BOTTOM	
11	WIPE # 11	6-29-98	11:22	SOLID						✓	1	C90739 RAT	
12	WIPE # 12	6-29-98	11:25	SOLID						✓	1	C90744 BOTTOM	
13	WIPE # 13	6-29-98	11:26	SOLID						✓	1	C90744 RAT	

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-13	<i>[Signature]</i>	1114	7/1/98		<i>[Signature]</i> / 3M	11:20	7/1/98

10784

Request: JTW
3M Project Lead: JTW

Form 35176 - PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code MADISON, WI.	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) Tim Gatzkow		Contractor PACE			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment Comments
Sampler Signature <i>[Signature]</i>		Date 7-1-98			Preservatives							
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC	MeOH		
1	Wipe #14	6/29/98	11:29	Solid						✓	1	C90946 BOTTOM - 14
2	Wipe #15	6/29/98	11:30	Solid						✓	1	C90946 RAT - 15
3	Wipe #16	6/29/98	11:33	Solid						✓	1	C90951 BOTTOM - 16
4	Wipe #17	6/29/98	11:34	Solid						✓	1	C90951 SIDE - 17
5	Wipe #18	6/29/98	11:35	Solid						✓	1	C90951 RAT - 18
6	Wipe #19	6/29/98	11:37	Solid						✓	1	C90956 BOTTOM - 19
7	Wipe #20	6/29/98	11:38	Solid						✓	1	C90956 RAT - 20
8	Wipe #21	6/29/98	14:25	Solid						✓	1	TISSUE BLANK IN Rm #3004 - 21
9	Wipe #22	6/29/98	14:26	Solid						✓	1	TEMPLATE BLANK IN Rm #3004 - 22
10	Wipe #23	6/29/98	14:53	Solid						✓	1	WIPE BLANK IN Rm #3004 - 23
11	Wipe #24	6/29/98	14:52	Solid						✓	1	DOOR HANDLE IN Rm #3004 - 24
12	Wipe #25	6/29/98	14:49	Solid						✓	1	FRONT of Room of Rm #3004 - 25
13	Wipe #26	6/29/98	14:50	Solid						✓	1	MIDDLE of Room of Rm #3004 - 26

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-13	<i>[Signature]</i>	11:14	7/1/98		<i>[Signature]</i> 3M	11:20	7/1/98

Chain of Custody Record
3M Environmental Laboratory

10785

3M requester	STW
3M Project Lead	STW
3M Facility	COVANCE LABS
3M Project Title	COVANCE CONTAMINATION TEST
3M Project Number	FS-980618-1
3M Facility Contact	
3M Department Number	
City, State, Zip Code	MAISON, W.F.
3M Telephone Number	
Lab Request/Template Number	U.1927

Form 35176 - PWQ

3M Facility	COVANCE LABS	3M Project Title	COVANCE CONTAMINATION TEST	3M Project Number	FS-980618-1
Address		3M Facility Contact		3M Department Number	
City, State, Zip Code	MAISON, W.F.	3M Telephone Number		Lab Request/Template Number	U.1927

Sampled By (Print)		Contractor			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment Comments	
Sampler Signature		Date			Preservatives								
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC	MeOH			
		7-1-98											
1	Wipe #27	6/29/98	14:51	Solid						✓	1	BACK OF ROOM IN Rm #3004 (UA27)	27
2	Wipe #28	6/29/98	14:30	Solid						✓	1	C92518 BOTTOM	28
3	Wipe #29	6/29/98	14:31	Solid						✓	1	C92518 SIDE	29
4	Wipe #30	6/29/98	14:32	Solid						✓	1	C92518 RAT	30
5	Wipe #31	6/29/98	14:35	Solid						✓	1	C92523 BOTTOM	31
6	Wipe #32	6/29/98	14:36	Solid						✓	1	C92523 RAT	32
7	Wipe #33	6/29/98	14:38	Solid						✓	1	C92528 BOTTOM	33
8	Wipe #34	6/29/98	14:39	Solid						✓	1	C92528 RAT	34
9	Wipe #35	6/29/98	14:41	Solid						✓	1	C92757 BOTTOM	35
10	Wipe #36	6/29/98	14:42	Solid						✓	1	C92757 SIDE	36
11	Wipe #37	6/29/98	14:43	Solid						✓	1	C92757 RAT	37
12	Wipe #38	6/29/98	14:44	Solid						✓	1	C92762 BOTTOM	38
13	Wipe #39	6/29/98	14:45	Solid						✓	1	C92762 RAT	39

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-13	Tim Gitzkow	11:14	7/1/98		PO Fennell/3M	11:20	7/1/98

Chain of Custody Record
3M Environmental Laboratory

10786

3M Requester

STW

3M Project Lead

STW

Form 35176 - PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code MADISON, WI	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) <i>Tim Gutzkow</i>		Contractor PACE			Number Containers of each							Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment Comments
Sampler Signature <i>Tim Gutzkow</i>		Date 7-1-98			Preservatives								
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC	MeOH			
1	Wipe #40	6/29/98	14:46	Solid						✓	1	C92767 BOTTOM	U1927 -4
2	Wipe #41	6/29/98	14:47	Solid						✓	1	C92767 RAT	-4
3	Wipe #42	6/29/98	15:00	Solid						✓	1	WIPE BLANK IN Rm. #349	-4:
4	Wipe #43	6/29/98	15:01	Solid						✓	1	WIPE BLANK IN Rm. #349	-4:
5	Wipe #44	6/29/98	15:02	Solid						✓	1	TEMPLATE BLANK IN Rm. #349	-4:
6	Wipe #45	6/29/98	15:20	Solid						✓	1	FRONT OF ROOM IN Rm. #349	-4:
7	Wipe #46	6/29/98	15:21	Solid						✓	1	CENTER OF ROOM IN Rm. #349	-46
8	Wipe #47	6/29/98	15:22	Solid						✓	1	BACK OF ROOM IN Rm. #349	-4:
9	Wipe #48	6/29/98	15:23	Solid						✓	1	DOOR HANDLE OF Rm. #349	-46
10	Wipe #49	6/29/98	15:04	Solid						✓	1	C94491 BOTTOM	-40
11	Wipe #50	6/29/98	15:06	Solid						✓	1	C94491 SIDE	-50
12	Wipe #51	6/29/98	15:07	Solid						✓	1	C94491 RAT	-51
13	Wipe #52	6/29/98	15:07	Solid						✓	1	C94496 BOTTOM	-52

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-13	<i>Tim Gutzkow</i>	11:14	7/1/98		<i>Paul L.../3M</i>	11:20	7/1/98

Chain of Custody record
3M Environmental Laboratory

11505

Request: *ITW*
3M Project Lead: *ITW*

Form 35176 - PWO

3M Facility <i>COVANCE LABS</i>	3M Project Title <i>COVANCE CONTAMINATION TEST</i>	3M Project Number <i>FS-980618-1</i>
Address	3M Facility Contact	3M Department Number
City, State, Zip Code	3M Telephone Number	Lab Request/Template Number <i>U1927</i>

Sampled By (Print) <i>Tim Gutzkow</i>		Contractor <i>FACE</i>			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment		
Sample Signature <i>Tim Gutzkow</i>		Date <i>7-1-98</i>			Preservatives							Comments		
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC	MeOH				
1	Wipe *53	6/29/98	15:08	Solid						✓	1	C94496	RAT	U1927
2	Wipe *54	6/29/98	15:10	Solid						✓	1	C94492	BOTTOM	
3	Wipe *55	6/29/98	15:11	Solid						✓	1	C94492	RAT	
4	Wipe *56	6/29/98	15:12	Solid						✓	1	C94526	BOTTOM	
5	Wipe *57	6/29/98	15:14	Solid						✓	1	C94526	SIDE	
6	Wipe *58	6/29/98	15:15	Solid						✓	1	C94526	RAT	
7	Wipe *59	6/29/98	15:16	Solid						✓	1	C94521	BOTTOM	
8	Wipe *60	6/29/98	15:17	Solid						✓	1	C94521	RAT	
9	Wipe *61	6/29/98	15:18	Solid						✓	1	C94522	BOTTOM	
10	Wipe *62	6/29/98	15:19	Solid						✓	1	C94522	RAT	
11														
12														
13														

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-10	<i>Tim Gutzkow</i>	11:14	7/1/98		<i>[Signature]</i> BM	11:20	7/1/98

Chain of Custody record

3M Environmental Laboratory

11506

Request: **JTW**
 3M Project Lead: **JTW**

Form 35176-PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code MADISON, WI.	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) Tim Gutzkow		Contractor Pace			Number Containers of each					Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment * TO 3M INDUSTRIAL HYGIENE Comments VALUE SAMPLED LKN	
Sampler Signature <i>Tim Gutzkow</i>		Date 7-1-98			Preservatives							
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC			
1	3045C-1A	6-29-98	10:40	AIR	✓						1	FRONT 79.36 L U1927-63
2	3045C-1B	6-29-98	10:40	AIR	✓						1	BACK 79.36 L -64
3	3045GF-A	6-29-98	10:40	AIR	✓						1	259.84 L -65
4	3045SG-A	6-29-98	8:48	AIR	✓						1	102.60 L -66
5	3045C-2A	6-29-98	10:40	AIR	✓						1	FRONT 112.64 L -67
6	3045C-2B	6-29-98	10:40	AIR	✓						1	BACK 112.64 L -68
7	3045GF-B	6-29-98	10:40	AIR	✓						1	262.4 L -69
8	3045SG-B	6-29-98	8:48	AIR	✓						1	95.4 L -70
9	3045C-3A	6-29-98	10:40	AIR	✓						1	FRONT 143.36 L -71
10	3045C-3B	6-29-98	10:40	AIR	✓						1	BACK 143.36 L -72
11	3045GF-C	6-29-98	10:40	AIR	✓						1	332.80 L -73
12	3045SG-C	6-29-98	8:48	AIR	✓						1	106.20 L -74
13	349C-1A	6-29-98	14:09	AIR	✓						1	FRONT 102.09 L -75

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1, 12	<i>Tim Gutzkow</i>	11:14	7-1-98		<i>Paul Bennett/3M</i>	11:20	7/1/98
* 4, 8, 12	<i>Paul Bennett/3M</i>	8:30	7/6/98				

11507

Requester: **STW**
3M Project Lead: **STW**

Form 35176 - PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) <i>Tim Guzikow</i>		Contractor <i>PACE</i>			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment <input checked="" type="checkbox"/> TO 3M INDUSTRIAL HYGIENE COMMENTS VOLUME IN LITERS SAMPLED LAN		
Sampler Signature <i>Tim Guzikow</i>		Date <i>7-1-98</i>			Preservatives									
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC					
1	349c-1B	6-29-98	14:09	AIR	✓						1	BACK	102.09	U1927-76
2	349GF-A	6-29-98	14:09	AIR	✓						1		253.98	-77
3	349SE-A	6-29-98	14:09	AIR	✓						1		62.73	-78
4	349C-2A	6-29-98	14:09	AIR	✓						1	FRONT	137.76	-79
5	349C-2B	6-29-98	14:09	AIR	✓						1	BACK	137.76	-80
6	349GF-B	6-29-98	14:09	AIR	✓						1		250.92	-81
7	349SG-B	6-29-98	14:09	AIR	✓						1		62.73	-82
8	349C-3A	6-29-98	14:09	AIR	✓						1	FRONT	73.80	-83
9	349C-3B	6-29-98	14:09	AIR	✓						1	BACK	73.80	-84
10	349GF-C	6-29-98	14:09	AIR	✓						1		248.46	-85
11	349SE-C	6-29-98	14:09	AIR	✓						1		62.73	-86
12		6-29-98		AIR	✓						1			
13		6-29-98		AIR	✓						1			

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1, 11	<i>Tim Guzikow</i>	11:14	7-1-98		<i>Paul Smith / 3M</i>	11:20	7/1/98
* 3, 7, 11	<i>Paul Smith / 3M</i>	8:30	7/1/98				

Request... ITW
3M Project Lead ITW
3M Project Number FS-980618-1
3M Department Number
3M Telephone Number
Lab Request/Template Number U1927

Form 35176 - PWO

3M Facility COVANCE LABS
3M Project Title COVANCE CONTAMINATION TEST
3M Project Number FS-980618-1
Address
3M Facility Contact
3M Department Number
City, State, Zip Code MADISON, WI.
3M Telephone Number
Lab Request/Template Number U1927

Sampled By (Print) TIM CONTAKOW		Contractor ACE			Number Containers of each					Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment * TO 3M INDUSTRIAL HYGIENE BLDG 221 Comments VALUE IN LITERS SAMPLED LFN		
Sampler Signature [Signature]		Date 7-1-98			Preservatives								
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC				
1	3045C-1A2	6/30/98	8:27	AIR	✓					1	FRONT	105.41	U1927-87
2	3045C-1B2	6/30/98	8:27	AIR	✓					1	BACK	105.41	-88
3	3045GF-A2	6/30/98	8:27	AIR	✓					1		255.27	-89
4	3045SF-A2	6-30-98	8:27	AIR	✓					1		76.20	-90
5	3045C-2A2	6-30-98	8:27	AIR	✓					1	FRONT	76.20	-91
6	3045C-2B2	6-30-98	8:27	AIR	✓					1	BACK	76.20	-92
7	3045GF-B2	6-30-98	8:27	AIR	✓					1		260.35	-93
8	3045SG-B2	6-30-98	8:27	AIR	✓					1		67.31	-94
9	3004C-1A	6-30-98	8:32	AIR	✓					1	FRONT	160.95	-95
10	3004C-1B	6-30-98	8:32	AIR	✓					1	BACK	160.95	-96
11	3004GF-A	6-30-98	8:32	AIR	✓					1		298.70	-97
12	3004SG-A	6-30-98	8:32	AIR	✓					1		91.35	-98
13	3004C-2A ¹⁰⁶	6-30-98	11:04	AIR	✓					1	FRONT	119.88	-99

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-13	[Signature]	11:14	7-1-98		[Signature] 3M	11:20	7/1/98
* 4, 8, 12	[Signature] 3M	8:30	7/6/98				

Request: **JTW**
 3M Project Lead: **JTW**
 3M Project Number: **FS-980618-1**
 3M Department Number:
 Lab Request/Template Number: **U1927**

Form 35176 - PWO

3M Facility: **COVANCE LABS**
 3M Project Title: **COVANCE CONTAMINATION LABORATORY TEST**
 Address:
 3M Facility Contact:
 City, State, Zip Code: **MADISON, WI.**
 3M Telephone Number:
 Lab Request/Template Number: **U1927**

Item #	Sample Description	Date	Time	Matrix	Preservatives					Total Containers of Each Item	Comments
					None	HNO ₃	H ₂ SO ₄	NaOH	VOC		
<input type="checkbox"/> Samples Split See Attachment Comments * TO 3M INDUSTR. KYLLINE BLDG 2											
Volume in Liters Sampled LPN											
1	3004C-2B	6-30-98	11:04	AIR	✓					1	BACK 119.88 U1927-100
2	3004EF-B	6-30-98	11:04	AIR	✓					1	223.56 -101
3	3004SG-B	6-30-98	11:04	AIR	✓					1	60.48 -102
4	349C-1A2	6-30-98	10:53	AIR	✓					1	FRONT 90.72 -103
5	349C-1B2	6-30-98	10:53	AIR	✓					1	BACK 90.72 -104
6	349GF-A2	6-30-98	10:53	AIR	✓					1	226.24 -105
7	349SG-A2	6-30-98	10:53	AIR	✓					1	67.20 -106
8	349C-2A2	6-30-98	10:53	AIR	✓					1	FRONT 66.08 -107
9	349C-2B2	6-30-98	10:53	AIR	✓					1	BACK 66.08 -108
10	349GF-B2	6-30-98	10:53	AIR	✓					1	228.48 -109
11	349SG-B2	6-30-98	10:53	AIR	✓					1	67.20 -110
12	6-30-98	6-30-98	10:53	AIR	✓					1	
13	6-30-98	6-30-98	10:53	AIR	✓					1	

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-11	<i>[Signature]</i>	11:14	7.1-98		<i>[Signature]</i> / 3M	11:20	7/1/98
* 3, 7, 11	<i>[Signature]</i>	8:30	7/6/98				

Form 35176 - PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code MADISON, WI.	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) <i>Tim Gutze</i>		Contractor <i>PACE</i>			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment	
Sampler Signature <i>[Signature]</i>		Date <i>7-1-98</i>			Preservatives							Comments	
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC				
1	GF-BLANK 1	6-29-98	16:30	AIR	✓						1		
2	GF-BLANK 2	6-29-98	16:30	AIR	✓						1		
3	C-BLANK 1	6-29-98	16:30	AIR	✓						1		
4	C-BLANK 2	6-29-98	16:30	AIR	✓						1		
5	C-BLANK 3	6-29-98	16:30	AIR	✓						1		
6	SG-BLANK 1	6-29-98	16:30	AIR	✓						1		
7	SG-BLANK 2	6-29-98	16:30	AIR	✓						1		
8	SG-BLANK 3	6-29-98	16:30	AIR	✓						1		
9	6/30 GF BLANK	6-30-98	12:00	AIR	✓						1		
10	6/30 C-BLANK 1	6-30-98	12:00	AIR	✓						1		
11	6/30 C-BLANK 2	6-30-98	12:00	AIR	✓						1		
12	6/30 SG BLANK	6-30-98	12:00	AIR	✓						1		
13													

* TO 3M INDUSTRIAL HYGIENE BLDG 2
U1927 LPN

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-12	<i>[Signature]</i>	11:14	7-1-98		<i>[Signature]</i> / 3M	11:20	7/1/98
* 6, 7, 8, 12	<i>[Signature]</i>	8:30	7/6/98				

Chain of Custody Record

3M Environmental Laboratory

11537

3M Requester JTW
3M Project Lead JTW

Form 35176 - PWO

3M Facility COVANCE LABS	3M Project Title COVANCE CONTAMINATION TEST	3M Project Number FS-980618-1
Address	3M Facility Contact	3M Department Number
City, State, Zip Code	3M Telephone Number	Lab Request/Template Number U1927

Sampled By (Print) <i>Jim Gutzkow</i>		Contractor PACE			Number Containers of each						Total Containers of Each Item	<input type="checkbox"/> Samples Split See Attachment	
Sampler Signature <i>Jim Gutzkow</i>		Date 7-1-98			Preservatives							Comments	
Item #	Sample Description	Date	Time	Matrix	None	HNO ₃	H ₂ SO ₄	NaOH	VOC				
1	Room 3045	6-29-98	10:53	AIR	✓						1	CAN *E 1900	-123
2	Room 349	6-29-98	15:25	AIR	✓						1	CAN *E 1899	-124
3	Room 3004	6-30-98	12:24	AIR	✓						1	CAN *E 1893	-125
4	W-Room 3004	6-30-98	12:33	WATER	✓						1		-126
5	W-Room 3045	6-30-98	12:40	WATER	✓						1		-127
6	W-Room 349	6-30-98	12:44	WATER	✓						1		-128
7													
8													
9													
10													
11													
12													
13													

Item #	Relinquished By/Affiliation	Time	Date	Shipped Via	Received By/Affiliation	Time	Date
1-6	<i>Jim Gutzkow</i>	11:14	7-1-98		<i>Pat Smith/3M</i>	11:20	7/1/98