

Source Sampling Fine Particulate Matter: Stationary Source Characterization Testing of a Smelt Tank at a Pulp and Paper Facility: Volume 2, Appendices



Source Sampling Fine Particulate Matter: Stationary Source Characterization Testing of a Smelt Tank at a Pulp and Paper Facility: Volume 2, Appendices

by

Joan T. Bursey and Dave-Paul Dayton
Eastern Research Group, Inc.
1600 Perimeter Park Drive
Morrisville, NC 27560

Contract No. 68-D7-0001

EPA Project Officer: N. Dean Smith
Air Pollution Prevention and Control Division
National Risk Management and Research Laboratory
Research Triangle Park, NC 27711

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Abstract

Fine particulate matter (PM) of aerodynamic diameter $2.5\text{ }\mu\text{m}$ or less ($\text{PM}_{2.5}$) has been implicated in adverse health effects, and a National Ambient Air Quality Standard for $\text{PM}_{2.5}$ has been promulgated (July 1977) by the U.S. Environmental Protection Agency. A national network of ambient monitoring stations has been established to assist States in determining areas which do not meet the ambient standard for $\text{PM}_{2.5}$. For such areas, it is important to determine the major sources of the $\text{PM}_{2.5}$ so States can devise and institute a control strategy to attain the ambient concentrations set by the standard.

One of the tools often used by States in apportioning ambient $\text{PM}_{2.5}$ to the sources is a source-receptor model. Such a model requires a knowledge of the $\text{PM}_{2.5}$ chemical composition emitted from each of the major sources contributing to the ambient $\text{PM}_{2.5}$ as well as the chemical composition of the $\text{PM}_{2.5}$ collected at the receptor (ambient monitoring) sites. This report provides such a profile for a smelt tank at a pulp and paper facility. Along with the $\text{PM}_{2.5}$ emission profile, data are also provided for gas-phase emissions of several organic compounds. Data are provided in a format suitable to be included in the EPA source profile database, SPECIATE.

Foreword

The U.S. Environmental Protection Agency (EPA) is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory (NRMRL) is the Agency's center for investigation of technological and management approaches for preventing and reducing risks from pollution that threaten human health and the environment. The focus of the Laboratory's research program is on methods and their cost-effectiveness for prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites, sediments and ground water; prevention and control of indoor air pollution; and restoration of ecosystems. NRMRL collaborates with both public and private sector partners to foster technologies that reduce the cost of compliance and to anticipate emerging problems. NRMRL's research provides solutions to environmental problems by: developing and promoting technologies that protect and improve the environment; advancing scientific and engineering information to support regulatory and policy decisions; and providing the technical support and information transfer to ensure implementation of environmental regulations and strategies at the national, state, and community levels.

This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

Lawrence W. Reiter, Acting Director.
National Risk Management Research Laboratory

EPA Review Notice

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Table of Contents

Volume 1, Report

<u>Section</u>	<u>Page</u>
Abstract	ii
List of Tables	viii
List of Figures	x
Nomenclature	xi
Acknowledgments	xii
 Introduction	 1
Characterization of a Smelt Tank at a Pulp and Paper Facility	2
Organization of Report	3
Conclusions	5
Methods and Materials	7
Description of Test Equipment	8
Dilution Sampling System	9
Dilution Sampling System Control Instrumentation	12
Process Description/Site Operation	14
Pre-Test Survey	18
Experimental Procedures	21
Preparation for Test Setup	21
Traverse Point Determination Using EPA Method 1	22
Volumetric Flow Rate Determination Using EPA Method 2	23
Pitot Tube Calibration	23
Calculation of Average Flue Gas Velocity	23
Nozzle Size Determination	24
Measurement of O ₂ and CO ₂ Concentrations	25
Stationary Gas Distribution (as Percent Volume)	25
Dry Molecular Weight of Flue Gas	25
Wet Molecular Weight of Flue Gas	25
Determination of Average Moisture Using EPA Method 4	26
Volume of Dry Gas Sampled at Standard Conditions (dscf)	26
Volume of Water Vapor at Standard Conditions (dscf)	27

Table of Contents (continued)

<u>Section</u>	<u>Page</u>
Calculation of Moisture/Water Content (as Percent Volume)	27
Calculation of Dry Mole Fraction of Flue Gas	28
Setup of the Dilution Sampling System	28
Pre-Test Leak Check	31
Orifice Flow Check	33
Determination of Test Duration	33
Canister/Veriflow Blanks	33
Determination of Flow Rates	34
Sample Collection Arrays	34
Use of the ELPI Particle Size Distribution Analyzer	37
Operation of the Dilution Sampling System with Sample Collection Arrays	40
Dilution System Sample Collection Arrays Recovery	49
Laboratory Experimental Methodology	51
PM _{2.5} Mass	51
Elemental Analysis	51
Water-Soluble Inorganic Ions	51
Elemental Carbon/Organic Carbon	52
Organic Compounds	52
Carbonyl Compounds	53
Canister Analysis: Air Toxics and Speciated Nonmethane Organic Compounds	55
Particle Size Distribution Data	60
Results and Discussion	61
Calculated Emission Factors for PM Mass, Carbonyl Compounds, and Nonmethane Organic Compounds	62
Gas-Phase Carbonyl Compounds	63
Gas-Phase Air Toxics Whole Air Samples	66
Gas-Phase Speciated Nonmethane Organic Compounds	67
PM _{2.5} Elemental Carbon/Organic Carbon, Inorganic Ions, and Element Profile	72
Semivolatile Organic Compounds	73
Particle Size Distribution Data	74
Quality Assurance/Quality Control	79
Field Sampling	79

Table of Contents (continued)

<u>Section</u>	<u>Page</u>
Carbonyl Compound Analysis	81
Concurrent Air Toxics/Speciated Nonmethane Organic Compound Analysis	83
PM Mass Measurements, Elemental Analysis, Water-Soluble Ion Analysis, and GC/MS Analysis	85
References	89

Volume 2, Appendices

A Table of Unit Conversions	A-1
B Smelt Tank Vent, Chain of Custody Documentation	B-1
C Example Calculations: NMOC, Carbonyl, and PM _{2.5} Mass Emission Factors	C-1
D Data Tables for Individual PM _{2.5} Mass Measurements	D-1
E Data Tables for Individual Carbonyl Samples	E-1
F Data Tables for Individual NMOC Samples	F-1
G Data Tables for Individual Air Toxics Samples	G-1
H Data Tables for Individual PM _{2.5} Elemental Samples	H-1
I Data Tables for Individual PM _{2.5} EC/OC Samples	I-1
J Data Tables for Individual PM _{2.5} Inorganic Ion Samples	J-1
K Data Tables for Individual Semivolatile Organic Compounds	K-1
L List of ERG SOPs and EPA MOPs by Title	L-1

Nomenclature

Term	Definition
CMB	chemical mass balance
DNPH	2,4-dinitrophenylhydrazine
EC	elemental carbon
ELPI	Electrical Low Pressure Impactor
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group
FID	flame ionization detector
GC/MS	gas chromatography/mass spectrometry
GRAV	gravimetric analytical method
HEPA	high efficiency particulate arresting
HPLC	high performance liquid chromatography
IC	ion chromatography
MDLs	method detection limits
MSD	mass selective detector
NAAQS	National Ambient Air Quality Standards
NaOH	sodium hydroxide
Na ₂ CO ₃	sodium carbonate
Na ₂ S	sodium sulfide
Na ₂ SO ₄	sodium sulfate
NH ₃	ammonia
NMOCs	nonmethane organic compounds
NO _x	nitrogen oxides
OC	organic carbon
PM	particulate matter
PM ₁₀	PM of aerodynamic diameter 10 µm or less
PM _{2.5}	PM of aerodynamic diameter 2.5 µm or less
PUF	polyurethane foam
RH	relative humidity
SIPs	State Implementation Plans
SO _x	sulfur oxides
SNMOCs	speciated nonmethane organic compounds
TOE	thermal-optical evolution
TRS	total reduced sulfur
TSP	total suspended particulate
VOCs	volatile organic compounds
XRF	X-ray fluorescence

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Appendix A

Table of Unit Conversions

Contents

<u>Table</u>	<u>Page</u>
Unit Conversion Table	A-3

Unit Conversion Table

Multiply	By	To Obtain
atmospheres	101.3	kilopascals
atmospheres	29.92	inches of mercury
atmospheres	760	mm of mercury
atmospheres	33.94	feet of water
atmospheres	14.70	lb/in. ² (psi)
Btu	1054	joules
Btu	2.982×10^{-4}	kilowatt-hours
centimeters	0.3937	inches
cm/sec	1.969	ft/min
cm/sec	0.03281	ft/sec
cm/sec	0.036	km/hr
cm/sec	0.6	m/min
cm ³	3.53×10^{-2}	ft ³
cm ³	10^{-3}	liters
ft ³	0.02832	m ³
ft ³ /min	0.4720	liters per second
in. ³	16.39	cm ³
m ³	35.31	ft ³
ft	12	in.
ft	0.3048	m
ft of water	0.8826	in. mercury
grams	0.03527	ounces
inches	2.540	cm
inches of water	0.07355	inches of mercury
kg	2.20462	lb
km	3280.84	ft
km	0.6214	miles
kilowatts	56.92	Btu per min.
liters	0.03531	ft ³
liters	61.02	in. ³
liters	10^{-3}	m ³
liters per minute	5.855×10^{-4}	ft ³ per second
m	3.28084	ft

(continued)

Multiply	By	To Obtain
m	39.37	in.
m ³	0.02832	ft ³
miles	5280	feet
miles	1.6093	km
ounces	28.35	grams
pounds	453.6	grams
pounds per square inch	703.1	kg/m ²
cm ²	0.1550	in. ²
ft ²	929.0	cm ²
ft ²	0.09290	m ²
temperature (°C + 273)	1	absolute temperature (K)
temperature (°C + 17.8)	1.8	temperature (°F)
temperature (°F + 460)	1	temperature (°Rankin)
temperature (°F-32)	5/9	temperature (°C)
watts	0.05692	Btu per min.
watts	44.26	foot-pounds per min.

APPENDIX B

SMELT TANK VENT
CHAIN OF CUSTODY DOCUMENTATION

Contents

<u>Table</u>	<u>Page</u>
B-1. Sample Log with Sample Identification	B-3
B-2. Denuder Sample Log	B-4
Substrate Logs	B-5
Chain of Custody Records (12/14/01)	B-27
Chain of Custody Records (12/15/01)	B-42
Chain of Custody Records (12/16/01)	B-56

Table B-1. Sample Log with Sample Identification

Smelt Tank Vent Sample Log

Chamber	Port	Position	Substrate	Holder	12/14/01	12/15/01	12/16/01
					Substrate ID	Substrate ID	Substrate ID
residence	2	A1	TF	614	T102201J	T102201S	T082101N
		B1	TF	618	T102201K	T102201T	T100301A
	3	M1	DNPH		IB121401HR1M1	IB121501HR1M1	IB121601HR1M1
		M2	DNPH		IB121401HR1M2	IB121501HR1M2	IB121601HR1M2
	4	A1	QF	622	Q101501H ^a	Q101501T ^a	Q101601C ^a
		A2	PUF	A	P102501A	P102901E	P120401C
		A3	PUF	A	P102501B	P102901F	P120401D
		A4	PUF	B	P102501C	P102901G	P120401E
		A5	PUF	B	P102501D	P102901H	P120401F
		B1	QF	640	Q101501K ^a	Q101501U ^a	Q101601B ^a
	5	M2	SUMMA		IB121401H-SR5M2	IB121501H-SR5M2	IB121601H-SR5M2
	6	A1	TF	633	T102201L	T102201Q	T100301C
		B1	TF	642	T102201N	T102201R	T100301D
	7	M1	ELPI		run time=400 min	run time=479.6 min	run time=479.6 min
	8	A1	QF	585	Q101501J ^a	Q101501S ^a	Q101601D ^a
		A2	PUF	C	P102501E	P102901I	P113001K
		A3	PUF	C	P102501F	P102901J	P113001L
		A4	PUF	D	P102501G	P102901K	P120401A
		A5	PUF	D	P102501H	P102901L	P120401B
		B1	QF	641	Q101501L ^a	Q101501R ^a	Q101601E ^a
	10	M1	D		see Table B-2	see Table B-2	see Table B-2
		M2	D				
		A3	QF	610	Q101501M ^a	Q101501P ^a	Q101601F ^a
		A4	PUF	G	P102501I	P113001A	P113001G
		A5	PUF	G	P102501J	P113001B	P113001H
		A6	PUF	H	P102501K	P113001C	P113001I
		A7	PUF	H	P101801L	P113001D	P113001J
dilution	1	B3	QF	613	Q101501N ^b	Q101501Q ^b	Q101601G ^b
		A1	QF	481	Q101501I ^c	Q101501V ^c	Q101601A ^c
		A2	PUF	E	P102901A	P102901C	P120401G
		A3	PUF	E	P102901B	P102901D	P120401H
	2	B1	TF	564	T102201M	T102201U	T082101M
		M2	SUMMA		IB121401H-SD2M2	IB121501H-SD2M2	IB121601H-SD2M2
	3	M1	DNPH		IB121401HD3M1	IB121501HD3M1	IB121601HD3M1
		M2	DNPH		IB121401HD3M2	IB121501HD3M2	IB121601HD3M2
field blank			QF		Q101501O	IB121501H-SUMA-FB	IB121601H-SUMA-FB
			TF		T102201O	IB121501H-DNPH-FB	IB121601H-DNPH-FB
			PUF	field	P113001E		
			PUF	field	P113001F		
			SUMMA		IB121401H-SUMA-FB		
			DNPH		IB121401H-DNPH-FB		

^a All quartz filter samples in Ports 4 and 8 of the residence chamber for the three day smelt tank tests were composited for analysis.^b All quartz filter samples in Port 10 of the residence chamber for the three day smelt tank tests were composited for analysis.^c All quartz filter samples from the dilution chamber for the three day tests were composited for analysis.

Table B-2. Denuder Sample Log

Denuder Sample Log (smelt tank vent)

	Pair	Position	Denuder			Denuder			Denuder					
			Start	End	min	Start	End	min	Start	End	min			
B-4	1	M1	7:45	8:15	30	D120601-995-1	7:15	7:45	30	D120601-1261-5	7:15	7:45	30	D120601-995-7
		M2				D120601-1259-1				D120601-1551-5				D120601-1259-7
	2	M1	8:18	8:48	30	D120601-1013-1	7:46	8:46	60	D120601-1013-5	7:47	8:47	60	D120601-1013-6
		M2				D120601-1049-1				D120601-1049-5				D120601-1049-6
	3	M1	8:50	9:20	30	D120601-1261-1	8:49	10:49	120	D120601-995-6	8:49	10:49	120	D120601-1261-7
		M2				D120601-1551-1				D120601-1259-6				D120601-1551-7
	4	M1	9:22	9:50	28	D120601-995-2	10:51	14:51	240	D120601-1261-6	10:50	14:50	240	D120601-995-8
		M2				D120601-1259-2				D120601-1551-6				D120601-1259-8
	5	M1	9:51	10:20	29	D120601-1013-2								
		M2				D120601-1049-2								
	6	M1	10:21	10:51	30	D120601-1261-2								
		M2				D120601-1551-2								
	7	M1	10:53	11:19	26	D120601-995-3								
		M2				D120601-1259-3								
	8	M1	11:30	12:00	30	D120601-1013-3								
		M2				D120601-1049-3								
	9	M1	12:01	12:30	29	D120601-1261-3								
		M2				D120601-1551-3								
	10	M1	12:31	13:01	30	D120601-995-4								
		M2				D120601-1259-4								
	11	M1	13:02	13:32	30	D120601-1013-4								
		M2				D120601-1049-4								
	12	M1	13:34	14:04	30	D120601-1261-4								
		M2				D120601-1551-4								
	13	M1	14:06	14:36	30	D120601-995-5								
		M2				D120601-1259-5								

CLEAN SUBSTRATES

Page 1

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/01
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
1	QF	Q051601I	IB102901H	d	1	A1	622
2	QF	Q051601N	IB102901H	r	4	A1	618
3	QF	Q052301C	IB102901H	r	4	B1	641
4	QF	Q052301J	IB102901H	r	8	A1	564
5	QF	Q052301V	IB102901H	r	8	B1	610
6	QF	Q052401X	IB102901H	r	10	A3	481
7	QF	Q052501E	IB102901H	r	10	B3	640
8	QF	Q052501G	IB102901H				FB
9	QF	Q052501J	RB103101H	r	10	B1	640
10	QF	Q052501R	RB103101H	r	10	A1	481
11	QF	Q052501T	RB103101H	r	8	B1	610
12	QF	Q052501V	RB103101H	r	8	A1	564
13	QF	Q052501X	RB103101H	r	4	A1	618
14	QF	Q052901A	RB103101H	r	4	B1	641
15	QF	Q052901B	RB103101H	d	1	A1	622
16	QF	Q052901C	RB110101H	r	10	A1	481
17	QF	Q052901D	RB110101H	r	10	B1	640
18	QF	Q052901E	RB110101H	r	8	B1	610
19	QF	Q052901F	RB110101H	r	8	A1	564
20	QF	Q052901G	RB110101H	r	4	A1	618
21	QF	Q052901H	RB110101H	r	4	B1	641
22	QF	Q052901K	RB110101H	d	1	A1	622
23	QF	Q052901L	BT111301H	r	8	B1	642
24	QF	Q052901M	HB112701H	d	1	A1	481
25	QF	Q052901N	HB112701H	r	4	A1	622
26	QF	Q053001A	HB112701H	r	4	B1	640
27	QF	Q060401J	HB112701H	r	8	A1	585
28	QF	Q060401K	HB112701H	r	8	B1	641
29	QF	Q060401M	HB112701H	r	10	A3	610
30	QF	Q060401N	HB112701H	r	10	B3	613
31	QF	Q060401O	HB112701H	FB	φ	—	FB
32	QF	Q060401P	HB112801H	r	10	A1	610
33	QF	Q060401Q	HB112801H	r	10	B1	613
34	QF	Q060401S		r	8	A1	585
35	QF	Q060401T		r	8	B1	641
36	QF	Q060401U		r	4	A1	622
37	QF	Q060401V		r	4	B1	640
38	QF	Q060401W		d	1	A1	481
39	QF	Q060401X	HB112901H	r	10	A1	610
40	QF	Q060401Y		↓			

HOG
Boiler

TEST
1

TEST
2

T₃

CLEAN SUBSTRATES

Page 2

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001

Tom

Yuanji

*used ST for
smelt tank test*

*VOID
Ripped*

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
41	QF	Q101501A	KB 112901H	r	8	A1	585
42	QF	Q101501B		r	8	B1	641
43	QF	Q101501C		r	4	A1	622
44	QF	Q101501D		r	4	B1	640
45	QF	Q101501E		r	4	A1	622
46	QF	Q101501F		d	1	A1	481
47	QF	Q101501G	BT121001H	r	8	B	613
48	QF	Q101501H	1B121401H	X r	X 4	A1	618
49	QF	Q101501I	1B121401H	X d	X 1	A1	481
50	QF	Q101501J	1B121401H	r	X 8	A81	585
51	QF	Q101501K	1B121401H	r	X 4	BX1	640
52	QF	Q101501L	1B121401H	r	8	B1	641
53	QF	Q101501M	1B121401H	r	10	A1	564
54	QF	Q101501N	1B121401H	r	10	B1	614
55	QF	Q101501O	1B121401H				FB
56	QF	Q101501P	ST121501H	r	10	A1	610
57	QF	Q101501Q		r	10	B1	613
58	QF	Q101501R		r	8	B1	641
59	QF	Q101501S		r	8	A1	585
60	QF	Q101501T		r	4	A1	622
61	QF	Q101501U		r	4	B1	640
62	QF	Q101501V	▽	d	1	A1	481
63	QF	Q101501W					
64	QF	Q101501X					
65	QF	Q101501Y					
66	QF	Q101501Z					
67	QF	Q101601A	ST121601H	d	1	A1	481
68	QF	Q101601B		r	4	B1	640
69	QF	Q101601C		r	4	A1	622
70	QF	Q101601D		r	8	A1	585
71	QF	Q101601E		r	8	B1	641
72	QF	Q101601F		r	10	A1	610
73	QF	Q101601G	↓	r	10	B1	613
74	QF	Q101601H					
75	QF	Q101601I					
76	QF	Q101601J					
77	QF	Q101601K					
78	QF	Q101601L					
79	QF	Q101601M					
80	QF	Q101601N					

TEST
3

SM
622 ✓
613 ✓
TEST
#1

TEST
#2

TEST
#3

CLEAN SUBSTRATES

Page 3

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
1	TF	T100201A	IB102901H	d	1	B1	642
2	TF	T100201B	IB102901H	r	2	A1	585
3	TF	T100201C	IB102901H	r	2	B1	614
4	TF	T100201D	IB102901H	r	6	A1	613
5	TF	T100201E	IB102901H	r	6	B1	633
6	TF	T100201F	IB102901H				FB
7	TF	T100201G	KB103101H	r	6	B1	633
8	TF	T100201H	KB103101H	r	6	A1	613
9	TF	T100201I	KB103101H	r	2	B1	614
10	TF	T100201J	KB103101H	r	2	A1	585
11	TF	T100201K	KB103101H	d	1	B1	642
12	TF	T100201L	RB110101H	r	6	B1	633
13	TF	T100201M	RB110101H	r	6	A1	613
14	TF	T100201N	KB110101H	r	2	B1	614
15	TF	T100201O	KB110101H	r	2	A1	585
16	TF	T100201P	KB110101H	d	1	B1	642
17	TF	T100201R	BT111301H	r	3	A1	633
18	TF	T100201S	HB112701H	d	1	B1	564
19	TF	T100201T	HB112701H	r	2	A1	614
20	TF	T100201U	HB112701H	r	2	B1	618
21	TF	T100201V	HB112701H	r	6	A1	633
22	TF	T100201W	HB112701H	r	6	B1	642
23	TF	T100201X	HB112701H	FB	Φ		FB
24	TF	T100201Y	HB112801H	r	6	A1	633
25	TF	T100201Z		r	6	B1	642
26	TF	T102201A		r	2	A1	614
27	TF	T102201B		r	2	B1	618
28	TF	T102201C		d	1	B1	564
29	TF	T102201D	HB112901H	r	6	A1	633
30	TF	T102201E		r	6	B1	642
31	TF	T102201F		r	2	A1	614
32	TF	T102201G		r	2	B1	618
33	TF	T102201H		d	1	B1	564
34	TF	T102201I	BT121001	r	3	A	610
35	TF	T102201J	IB121401H	XR	X2	AX1	622
36	TF	T102201K	IB121401H	r	2	AX1	633
37	TF	T102201L	IB121401H	r	26	AX1	642
38	TF	T102201M	IB121401H	Xd	X1	AX1	610
39	TF	T102201N	IB121401H	r	6 & 2	AX1	613
40	TF	T102201O	IB121401H	r	Φ		FB

HoG
Boiler

TEST
1

TEST
2

TEST
3

614 ✓
618 ✓
633 ✓
564 ✓
642 ✓

1
SMELT
TANK
TEST
1

Page 4

10/25/2001
Tom
Yuanji

[illegible]

Page 5

10/25/2001
Tom
Yuanji

	No	Type	Substrate ID	Test ID	Sampling Position			
					Chamber	Port	Position	Holder
PA-R	1	Denuder	D071900-995-5	HB112701H	r	10	A1	610/613
	2	Denuder	D060501-1013-2	↓	r	10	A1	↓
PA-R	3	Denuder	D010901-1261-3		r	10	A1	
	4	Denuder	D042601-1551-2		r	10	A1	
PA-R	5	Denuder	D060501-1049-3	↓	r	10	A1	↓
	6	Denuder	D-10901-1259-4		r	10	A1	
				AND SOON FOR TEST 2				
				HB112801H				
				AND TEST 3				
				HB112901H				
PA-R	1	DENUDER	D120601-995-1	ST121401H	r	10	A1	610/613
	2	↓	" 1259-1	↓	r	10	A1	↓
PA-R	3	↓	" 1261-1		r	10	A1	
	4	↓	" 1537-1		r	10	A1	
PA-R	5	↓	" 1013-1	↓	r	10	A1	↓
	6	↓	" 1049-1		r	10	A1	
				and ST121501H				
				and ST121601H				

SMCT

TESTS

1
-3

CLEAN SUBSTRATES

Page 6

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
1	PUF	P101701A	102901H			1	A
2	PUF	P101701B	102901H			2	A
3	PUF	P101701C	103001H			1	B
4	PUF	P101701D	103001H			2	B
5	PUF	P101701E	103001H			1	C
6	PUF	P101701F	103001H			2	C
7	PUF	P101701G	103001H			1	D
8	PUF	P101701H	103001H			2	D
9	PUF	P101701I	103001H			1	E
10	PUF	P101701J	103001H			2	E
11	PUF	P101701K	103001H			1	F
12	PUF	P101701L	103001H			2	F
13	PUF	P101701M	103001H				FIELD BLANK
14	PUF	P101701N	103001H				FIELD BLANK
15	PUF	P101701O	103101H			1	A
16	PUF	P101701P				2	A
17	PUF	P101701Q				1	B
18	PUF	P101701R				2	B
19	PUF	P101701S				1	C
20	PUF	P101701T				2	C
21	PUF	P101701U				1	D
22	PUF	P101701V	103101H			2	D
23	PUF	P101701W	110101H			1	A
24	PUF	P101701X				2	A
25	PUF	P101801A				1	B
26	PUF	P101801B				2	B
27	PUF	P101801C				1	C
28	PUF	P101801D				2	C
29	PUF	P101801E				1	D
30	PUF	P101801F	110101H			2	D
31	PUF	P101801G	112701H	SANED		1	A
32	PUF	P101801H				2	A
33	PUF	P101801I				1	B
34	PUF	P101801J				2	B
35	PUF	P101801K		SPIKED		1	C
36	PUF	P101801L				2	C
37	PUF	P101901A				2	B C
38	PUF	P101901B				2	D
39	PUF	P101901C				2	
40	PUF	P101901D		SPIKED		1	G

A1
A2
B1
B2
C1
C2
D1
D2
TEST
1

CLEAN SUBSTRATES

Page 7

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
41	PUF	P101901E	112701H			2	G
42	PUF	P101901F	CONTINUED	NCI	SPKED	1	H
43	PUF	P101901G				2	H
44	PUF	P101901H			SPKED	1	E
45	PUF	P101901I				2	
46	PUF	P101901J	112801H	SPKED		2	A
47	PUF	P101901K				2	
48	PUF	P101901L				1	B
49	PUF	P102201A				2	B
50	PUF	P102201B		SPKED		1	C
51	PUF	P102201C				2	
52	PUF	P102201D				1	D
53	PUF	P102201E				2	
54	PUF	P102201F		SPKED		1	G
55	PUF	P102201G				2	
56	PUF	P102201H				1	H
57	PUF	P102201I				2	
58	PUF	P102201J		SPKED		1	E
59	PUF	P102201K				2	
60	PUF	P102201L	112901H			1	A
61	PUF	P102301A				2	
62	PUF	P102301B				1	B
63	PUF	P102301C				2	
64	PUF	P102301D				1	C
65	PUF	P102301E				2	
66	PUF	P102301F				1	D
67	PUF	P102301G				2	
68	PUF	P102301H				1	G
69	PUF	P102301I				2	
70	PUF	P102301J				1	H
71	PUF	P102301K				2	
72	PUF	P102301L				1	E
73	PUF	P102401A				2	
74	PUF	P102401B				A1	FBK
75	PUF	P102401C				A2	FBK
76	PUF	P102401D					
77	PUF	P102401E					
78	PUF	P102401F					
79	PUF	P102501A	ST121401H			1	A
80	PUF	P102501B				2	

TEST
1

TEST
2

TEST
3

Page 8

10/25/2001
Tom
Yuanji

[illegible]

S.MELT
TEST
1

Park

JHR says 102901 AOB not 112901

11/30/2001
Tom

Page

11/30/2001
Tom
Yuanji

SHEET
TEST 1
—
TEST 2

Page _____

12/3/2001
Tom
Yuanji

B-14

Page 4

12/5/2001
Tom
Yuanji

[illegible]

SHEET
TEST
3

CLEAN SUBSTRATES

Page 12

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
121	Al foil	A102001U					
122	Al foil	A102001V					
123	Al foil	A102001W					
124	Al foil	A102001X					
125	Al foil	A102001Y					
126	Al foil	A102101A					
127	Al foil	A102101B					
128	Al foil	A102101C					
129	Al foil	A102101D					
130	Al foil	A102101E					
131	Al foil	A102101F					
132	Al foil	A102101G					
133	Al foil	A102101H					
134	Al foil	A102101I					
135	Al foil	A102101J					
	Al foil	A102101E	STIZ1401H &		7		13
		" F	STIZ1501H				12
		" G					11
		" H					10
		VOID					—
		A102101J					9
		" K					8
		" L					7
		" M					6
		VOID					—
		A102101O					5
		" P					4
		" Q					3
		" R					2
		VOID					—
		A102101T					1
	Al foil	A102101V	STIZ1601H				13
		" W					12
		" X					11
		" Y					10
	A102101	A					9
		B					8
		C					7
		D					6
		E					5
		F					4
		G					3
		H					2
		I					1

S.MELT
TANK
TEST
1
2
COMBINED
S.MELT
TEST
3

CLEAN SUBSTRATES

Page 9

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
1	Al foil	A101701A	✓ RB 110101 H	r	7	AI	N/A
2	Al foil	A101701B	✓ void				
3	Al foil	A101701C	✓ RB 110101 H	r	7	AI	
4	Al foil	A101701D		r	7		
5	Al foil	A101701E		r	7		
6	Al foil	A101701F		r	7		
7	Al foil	A101701G		r	7		
8	Al foil	A101701H		r	7		
9	Al foil	A101701I		r	7		
10	Al foil	A101701J		r	7		
11	Al foil	A101701K		r	7		
12	Al foil	A101701L		r	7		
13	Al foil	A101701M		r	7		
14	Al foil	A101701N		r	7	AI	
15	Al foil	A101701O	RB 110101 H				FB
16	Al foil	A101701P	RB 110101 H				
17	Al foil	A101701Q					
18	Al foil	A101701R					
19	Al foil	A101701S					
20	Al foil	A101701T					
21	Al foil	A101701U					
22	Al foil	A101701V					
23	Al foil	A101701W					
24	Al foil	A101701X					
25	Al foil	A101701Y					
26	Al foil	A101601A	✓ RB 110101 H				
27	Al foil	A101601B	✓				
28	Al foil	A101601C	✓				
29	Al foil	A101601D	✓				
30	Al foil	A101601E	✓				
31	Al foil	A101601F	✓				
32	Al foil	A101601G	✓				
33	Al foil	A101601H	✓				
34	Al foil	A101601I	✓				
35	Al foil	A101601J	✓				
36	Al foil	A101601K	✓				
37	Al foil	A101601L	✓				
38	Al foil	A101601M	✓				
39	Al foil	A101601N	✓				
40	Al foil	A101601O	✓				

RECOVERY
BOILER

TESTS
1, 2, 3

BLANK

HOC
BOILER
TESTS
1, 2, 3

CLEAN SUBSTRATES

Page 10

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
41	Al foil	A101601P	✓ 112901 #				
42	Al foil	A101601Q	✓				
43	Al foil	A101601R	✓				
44	Al foil	A101601S	✓				
45	Al foil	A101601T	✓				
46	Al foil	A101601U	✓				
47	Al foil	A101601V	✓				
48	Al foil	A101601W	✓				
49	Al foil	A101601X	✓				
50	Al foil	A101601Y	✓				
51	Al foil	A101801A					
52	Al foil	A101801B					
53	Al foil	A101801C					
54	Al foil	A101801D					
55	Al foil	A101801E					
56	Al foil	A101801F					
57	Al foil	A101801G					
58	Al foil	A101801H					
59	Al foil	A101801I					
60	Al foil	A101801J					
61	Al foil	A101801K					
62	Al foil	A101801L					
63	Al foil	A101801M					
64	Al foil	A101801N					
65	Al foil	A101801O					
66	Al foil	A101801P					
67	Al foil	A101801Q					
68	Al foil	A101801R					
69	Al foil	A101801S					
70	Al foil	A101801T					
71	Al foil	A101801U					
72	Al foil	A101801V					
73	Al foil	A101801W					
74	Al foil	A101801X					
75	Al foil	A101801Y					
76	Al foil	A101901A					
77	Al foil	A101901B					
78	Al foil	A101901C					
79	Al foil	A101901D					
80	Al foil	A101901E					

CLEAN SUBSTRATES

Page 11

Date Substrate Distributed
To Whom Substrate Distributed
FPMCC Lab Personnel

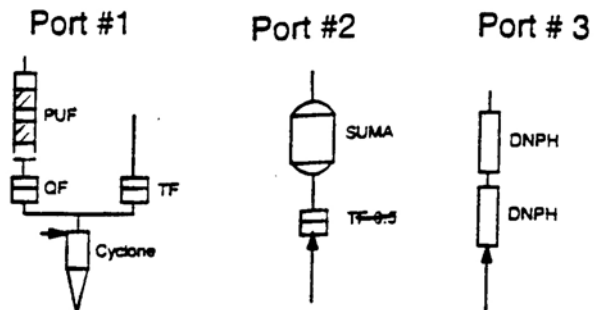
10/25/2001
Tom
Yuanji

No	Type	Substrate ID	Test ID	Sampling Position			
				Chamber	Port	Position	Holder
81	Al foil	A101901F					
82	Al foil	A101901G					
83	Al foil	A101901H					
84	Al foil	A101901I					
85	Al foil	A101901J					
86	Al foil	A101901K					
87	Al foil	A101901L					
88	Al foil	A101901M					
89	Al foil	A101901N					
90	Al foil	A101901O					
91	Al foil	A101901P					
92	Al foil	A101901Q					
93	Al foil	A101901R					
94	Al foil	A101901S					
95	Al foil	A101901T					
96	Al foil	A101901U					
97	Al foil	A101901V					
98	Al foil	A101901W					
99	Al foil	A101901X					
100	Al foil	A101901Y					
101	Al foil	A102001A					
102	Al foil	A102001B					
103	Al foil	A102001C					
104	Al foil	A102001D					
105	Al foil	A102001E					
106	Al foil	A102001F					
107	Al foil	A102001G					
108	Al foil	A102001H					
109	Al foil	A102001I					
110	Al foil	A102001J					
111	Al foil	A102001K					
112	Al foil	A102001L					
113	Al foil	A102001M					
114	Al foil	A102001N					
115	Al foil	A102001O					
116	Al foil	A102001P					
117	Al foil	A102001Q					
118	Al foil	A102001R					
119	Al foil	A102001S					
120	Al foil	A102001T					

ERG TEST #1

COC's

Dilution chamber

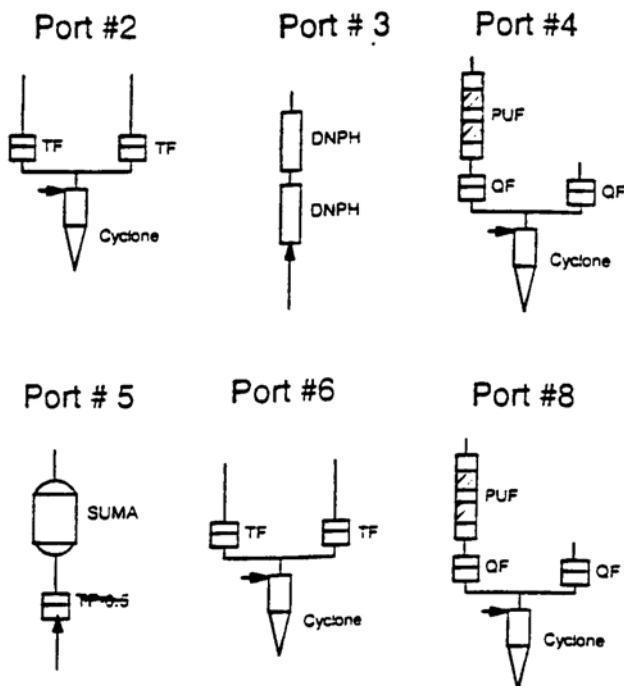


Field Blanks

QF	1
TF	1
PUF	1
SUMA	1
DNPH	1

1 PAIR

Residence chamber

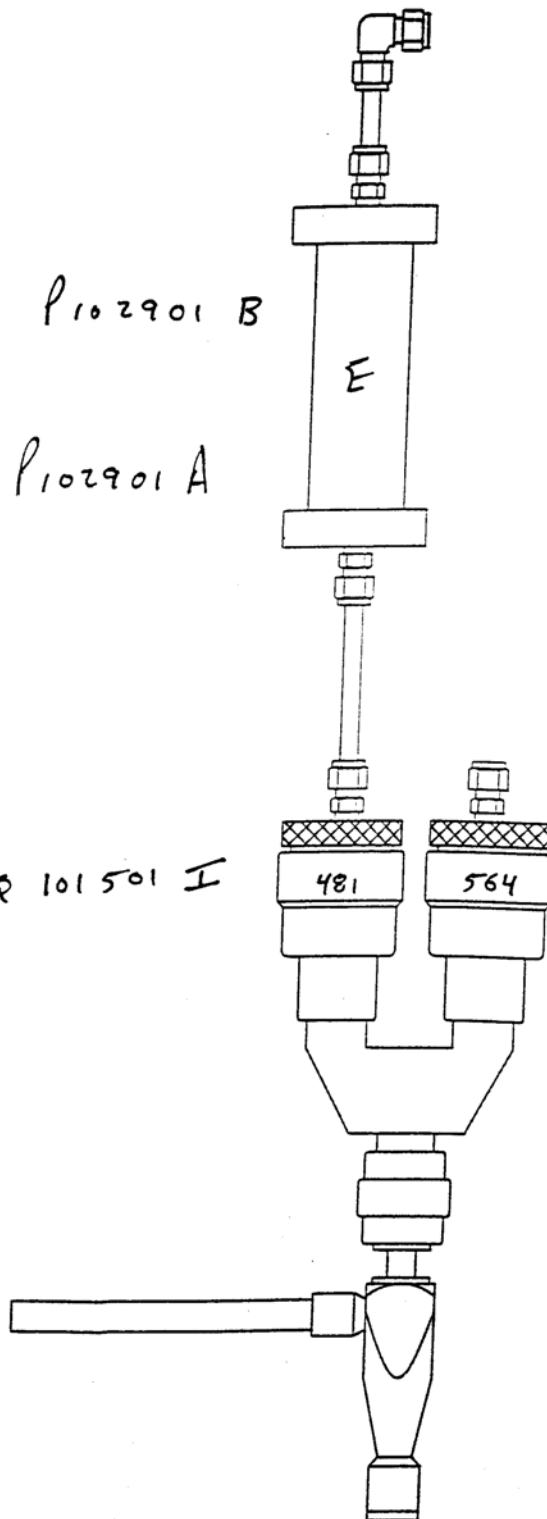


Total Substrates

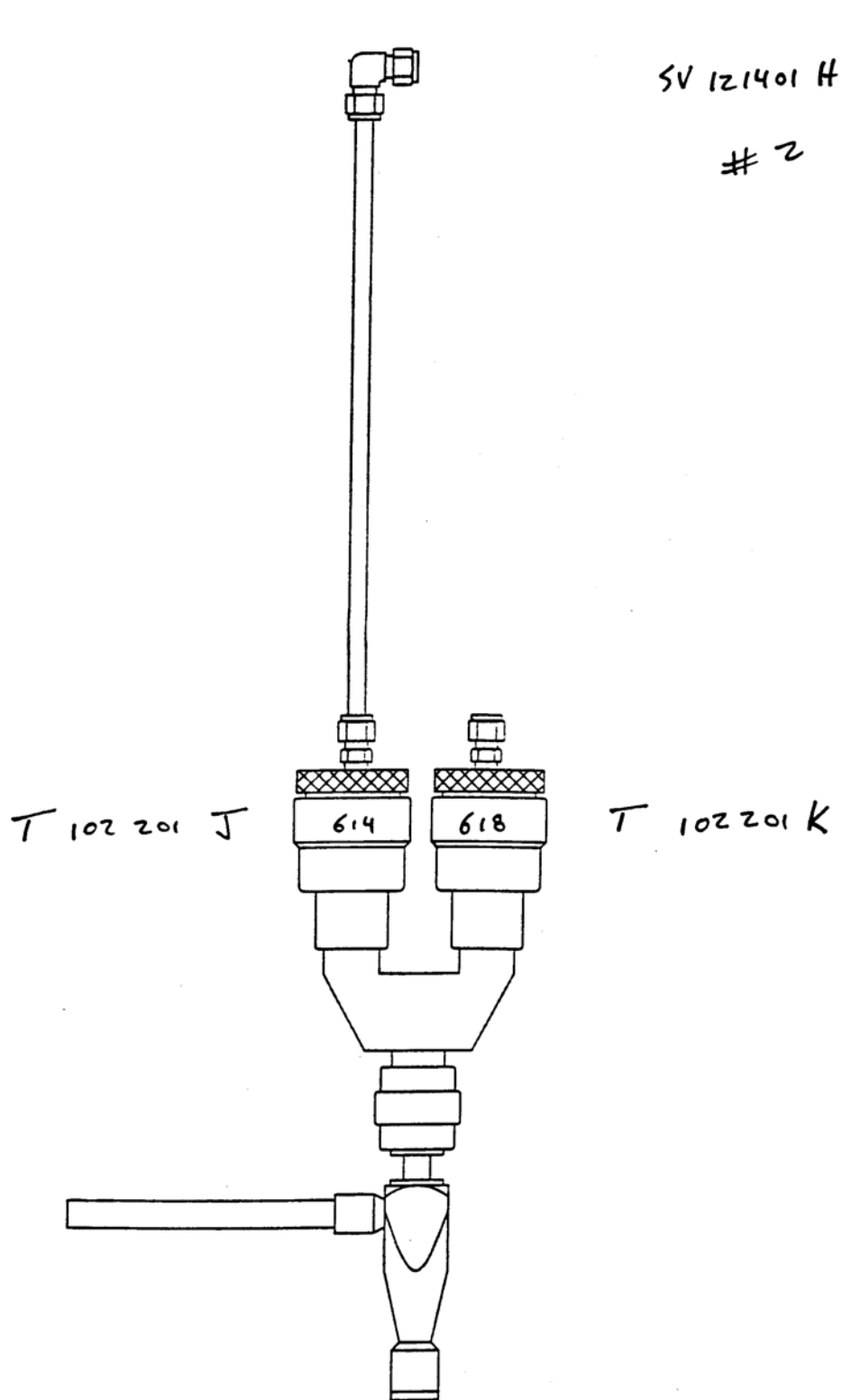
QF	8
TF-0.5	2
TF	6
PUF	9
Denuder	2
SUMA	3 4
DNPH	5

TEST 1
SV121401 H

#1 DILUTION



SPICED I.S. ONTO
PUE A ONLY ✓



TEST 1
SV 121401 H
2

TEST 1

P102501 D

P102501 C

P102501 B

P102501 A

SV 121401 H

4

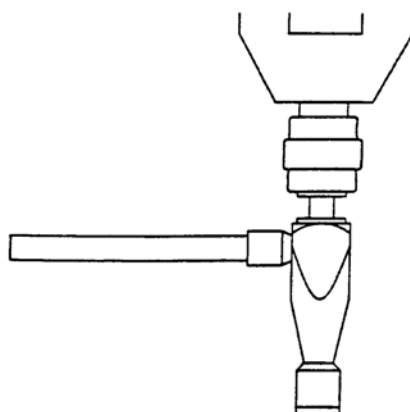
SPIKED I.S.
ONTO PUF
A ONLY

Q 101501 H

622

640

Q 101501 K

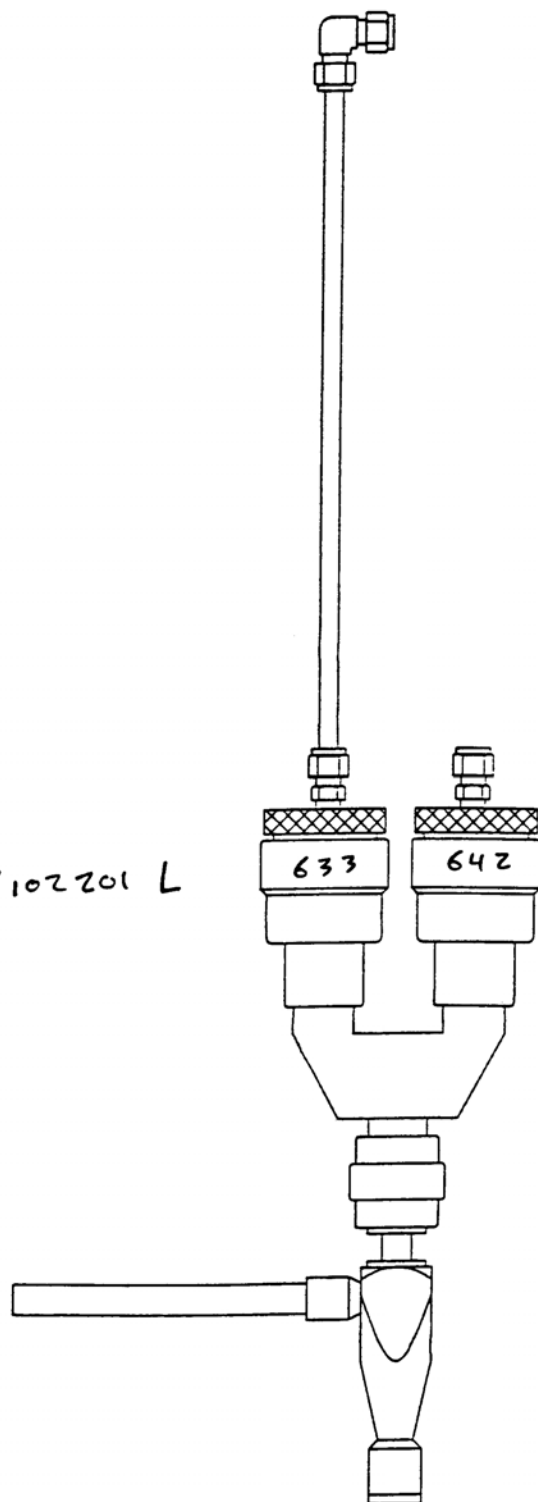


TEST 1

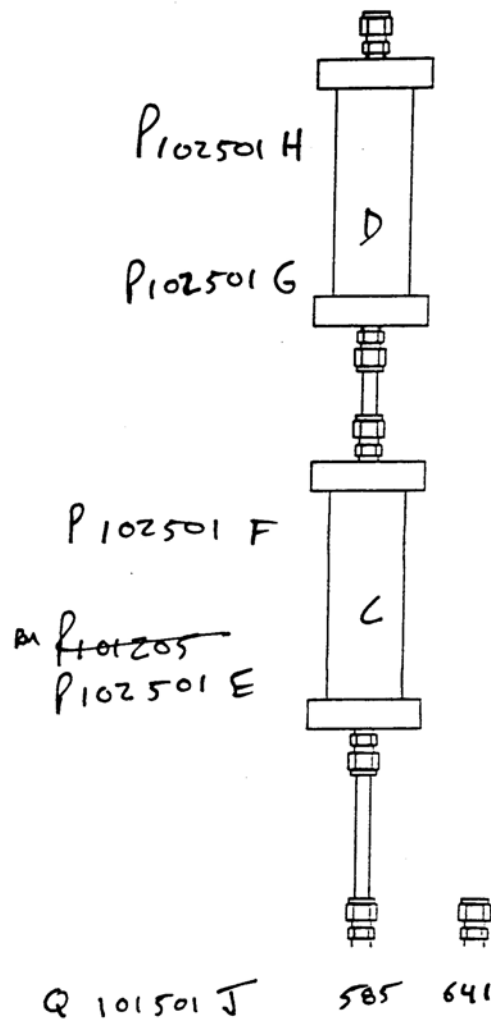
SV 121401 H

6

T_{102201 L}



T_{102201 N}



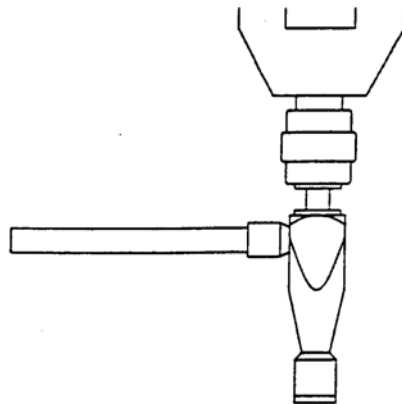
TEST 1

SV121401 H

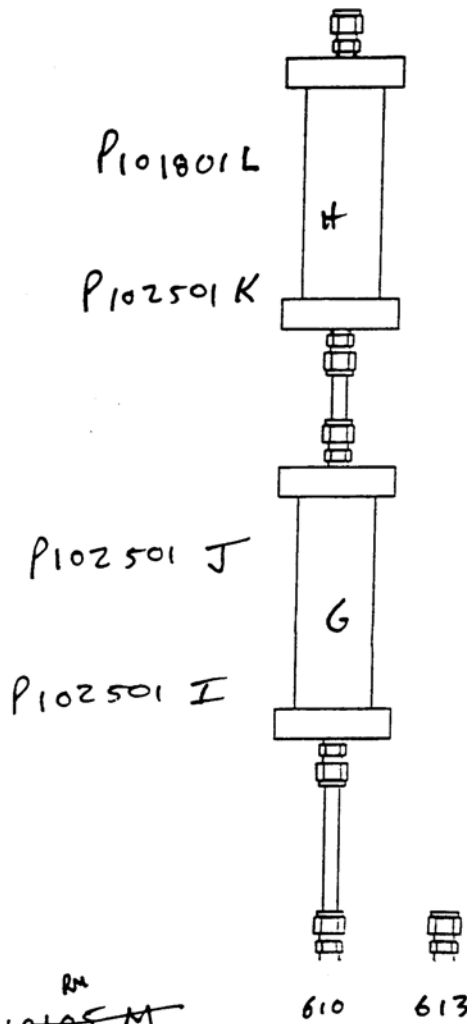
#8

1.5. SPIKED ONTO

PUF E ONLY ✓



✓

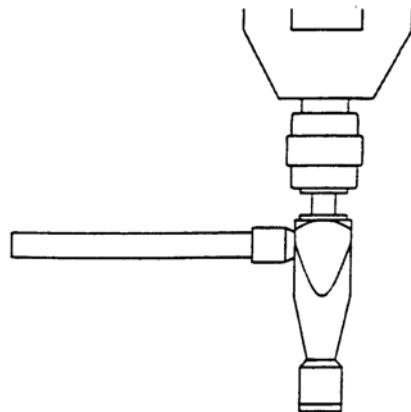


TEST 1
SV 121401 H
10

1.5. SPIKED
ONTO PUF
I ONLY

~~Q 10105 M~~
Q 101501 M

Q 101501 N



Deaerator pair

D120601-995-1
ALIGNED TO READ
- 995-1 - 1259-1



ERG
EASTERN RESEARCH GROUP, INC.

Chain of Custody Record

Page of

PROJECT Wey, Smelt Tank			ANALYSES			REMARKS			SAMI ID NO. (For lab use only)			
SITE Plymouth NC			NO. OF CONTAINERS			SUMMA						
COLLECTED BY (Signature) RF Montz						Derrida						
FIELD SAMPLE ID			SAMPLE MATRIX			DATE/TIME						
ST121401H			PD1A1E			12/14/01						
			PD1A2E									
			QD1A1481									
			TD1B1564									
			TR2A1614									
			TR2B1618									
			QR4A1622									
			QR4B1640									
			PR4A1A									
			PR4A2A									
REMARKS: Test # 1, Friday Friday, 12/14/01												
RECEIVED BY:		DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

RECEIVED FOR LABORATORY BY:		DATE	TIME	AIRBILL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:										



Chain of Custody Record

Page _____ of _____

PROJECT			ANALYSES			NO. OF CONTAINERS														
SITE			NO. OF CONTAINERS			ANALYSES			REMARKS			SAM ID NO. (For lab use only)								
COLLECTED BY (Signature)			DATE/TIME			NO. OF CONTAINERS			ANALYSES			REMARKS			SAM ID NO. (For lab use only)					
FIELD SAMPLE ID.			SAMPLE MATRIX			DATE/TIME			NO. OF CONTAINERS			ANALYSES			REMARKS			SAM ID NO. (For lab use only)		
ST121401H	PR4A3B	12/14/01																		
	PR4A4B																			
	TR6A1633																			
	TR6B1642																			
	PR8A1C																			
	PR8A2C																			
	PR8A3D																			
	PR8A4D																			
	QR8A1585																			
	QR8B1641																			
REMARKS: Test # 1, Friday Friday, 12/14/01																				
RECEIVED BY:		DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME								

LAB USE ONLY			
RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.
REMARKS:			

Test #1, ~~Thursday~~ Friday, 12/14/01

LAB USE ONLY

Wey. Smelt Tank

Test #1, ~~Test #1~~ Friday, 12/14/01

LAB USE ONLY



Chain of Custody Record

Page of

PROJECT			ANALYSES			NO. OF CONTAINERS			REMARKS			SAM ID NO. (For lab use only)																	
SITE			NO. OF CONTAINERS			REMARKS			SAM ID NO. (For lab use only)			DATE																	
COLLECTED BY (Signature)			NO. OF CONTAINERS			REMARKS			SAM ID NO. (For lab use only)			DATE																	
FIELD SAMPLE ID.			NO. OF CONTAINERS			REMARKS			SAM ID NO. (For lab use only)			DATE																	
ST121401H			QR10A1610			12/14/01			Q101501M																				
(			QR10B1613						Q101501N																				
			DR10A1995-1						D120601995-1																				
			DR10A21259-1						D120601259-1																				
			DR10A11013-1						D1206011013-1																				
			DR10A21049-1						D1206011049-1																				
			DR10A11261-1						D1206011261-1																				
			DR10A21551-1						D120601551-1																				
			DR10A1995-2						D120601995-2																				
			DR10A21259-2						D120601259-2																				
REMARKS:			TEST # 1, Tested Friday, 12/14/01			RELINQUISHED BY:			DATE			TIME																	
RECEIVED BY:			DATE			TIME			RELINQUISHED BY:			DATE			TIME														
LAB USE ONLY			DATE			TIME			RECEIVED BY:			DATE			TIME														
RECEIVED FOR LABORATORY BY:			DATE			TIME			AIRBILL NO.			OPENED BY			DATE			TIME			TEMP °C			SEAL #			CONDITION		
REMARKS:			1/2 Hour Benuden change outs - Each pair was for Run for 1/2 Hour, Replaced by next pair & extracted for use later																										

Chain of Custody Record

 ERG ENVIRONMENTAL RESEARCH GROUP, INC.			
PROJECT Wey, Smelt Tank			
SITE Plymouth, NC			
COLLECTED BY (Signature) RF Montz			
FIELD SAMPLE ID	SAMPLE MATRIX	DATE/TIME	
ST121401H	DR10A11013 - 2	12/14/01	
	DR10A21049 - 2		
	DR10A11261 - 2		
	DR10A21551 - 2		
	DR10A1995 - 3		
	DR10A21259 - 3		
	DR10A11013 - 3		
	DR10A21049 - 3		
	DR10A11261 - 3		
	DR10A21551 - 3		
REMARKS: Test #1,			
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:

RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OP

REMARKS: **1/2 Hour den**



Chain of Custody Record

PROJECT			ANALYSES							REMARKS		SAM ID NO. (For lab use only)
Wey. Smelt Tank												
SITE Plymouth, NC												
COLLECTED BY (Signature) RF Montz												
FIELD SAMPLE ID.			SAMPLE MATRIX			DATE/TIME						
ST121401H	DR10A1995-4	12/14/01	Puf	QF	Tf	Devedor	SUMMA	Carboy	D120601995-4			
	DR10AZ1259-4								D1206011259-4			
	DR10A11013-4								D1206011013-4			
	DR10AZ1049-4								D1206011049-4			
	DR10A11261-4								D1206011261-4			
	DR10AZ1551-4								D1206011551-4			
	DR10A1995-5								D120601995-5			
	DR10AZ1259-5								D1206011259-5			
	Qd φ Az 8x10	2082							EKG # 008	Bx10 FICKER (2)		
REMARKS:												
Test # 1, Friday Friday, 12/14/01												
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	

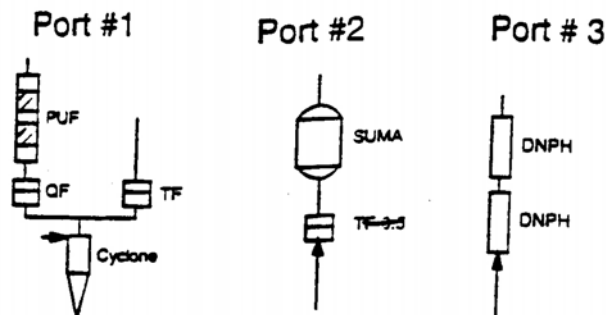
LAB USE ONLY

RECEIVED FOR LABORATORY BY:		DATE	TIME	AIRBILL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION

REMARKS:
1/2 Hour devedor runs & extractions (continued)

ERG TEST #2 -

Dilution chamber



Field Blanks

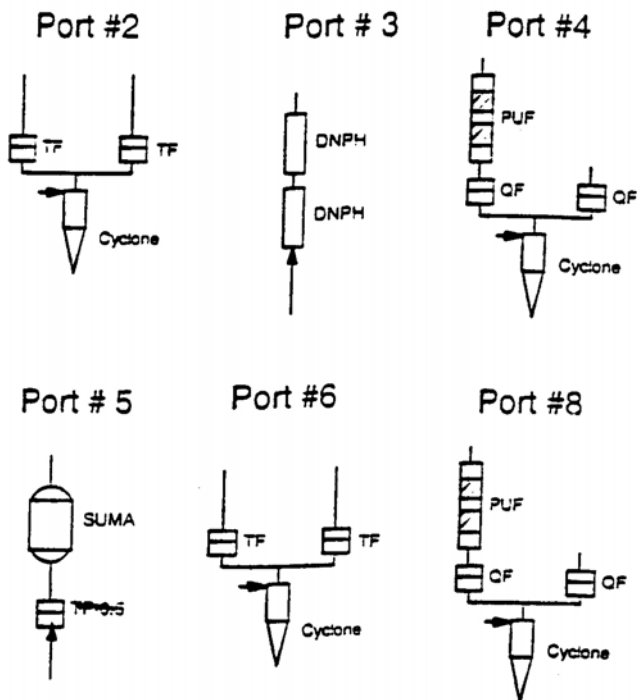
QF	1
TF	1
PUF	1
SUMA	1
DNPH	1

1 PAFR

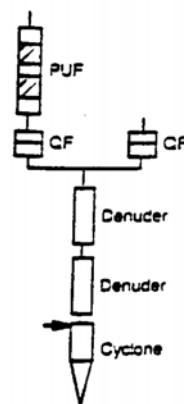
Total Substrates

QF	8
TF-0.5	2
TF	6
PUF	9
Denuder	2
SUMA	3 4
DNPH	5

Residence chamber



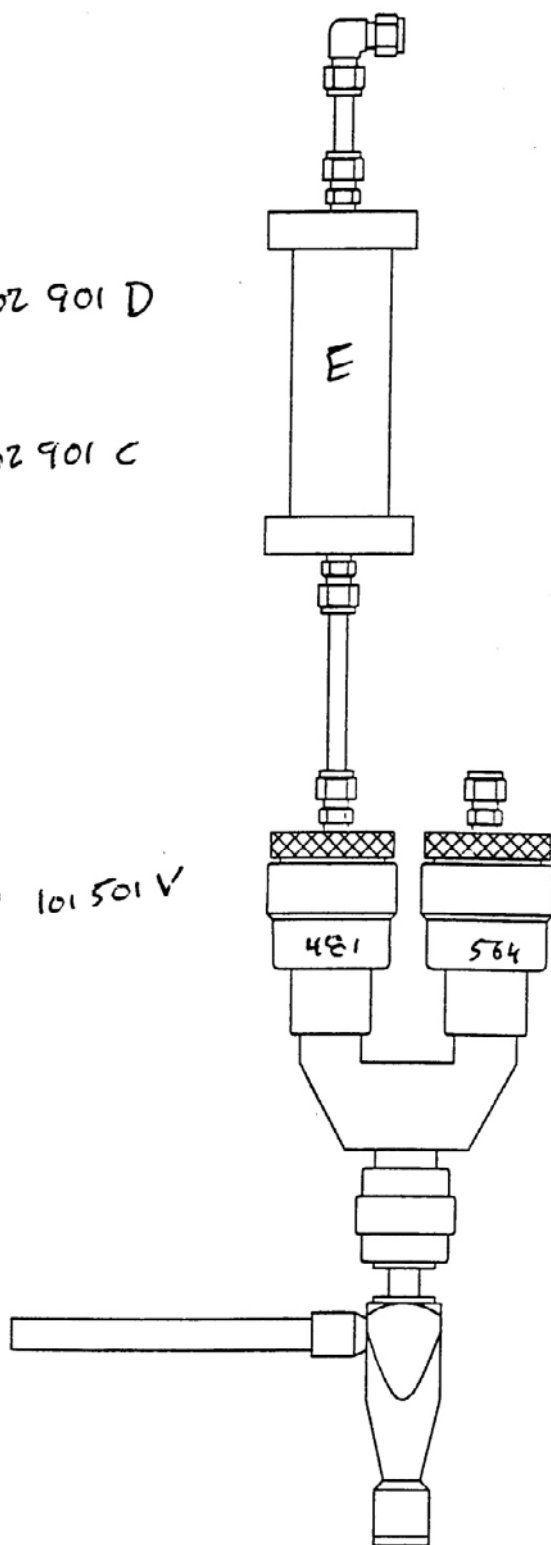
Port #10



P 102 901 D

P 102 901 C

Q 101 501 V



TEST 2

ST 121501 H

1

DILUTION

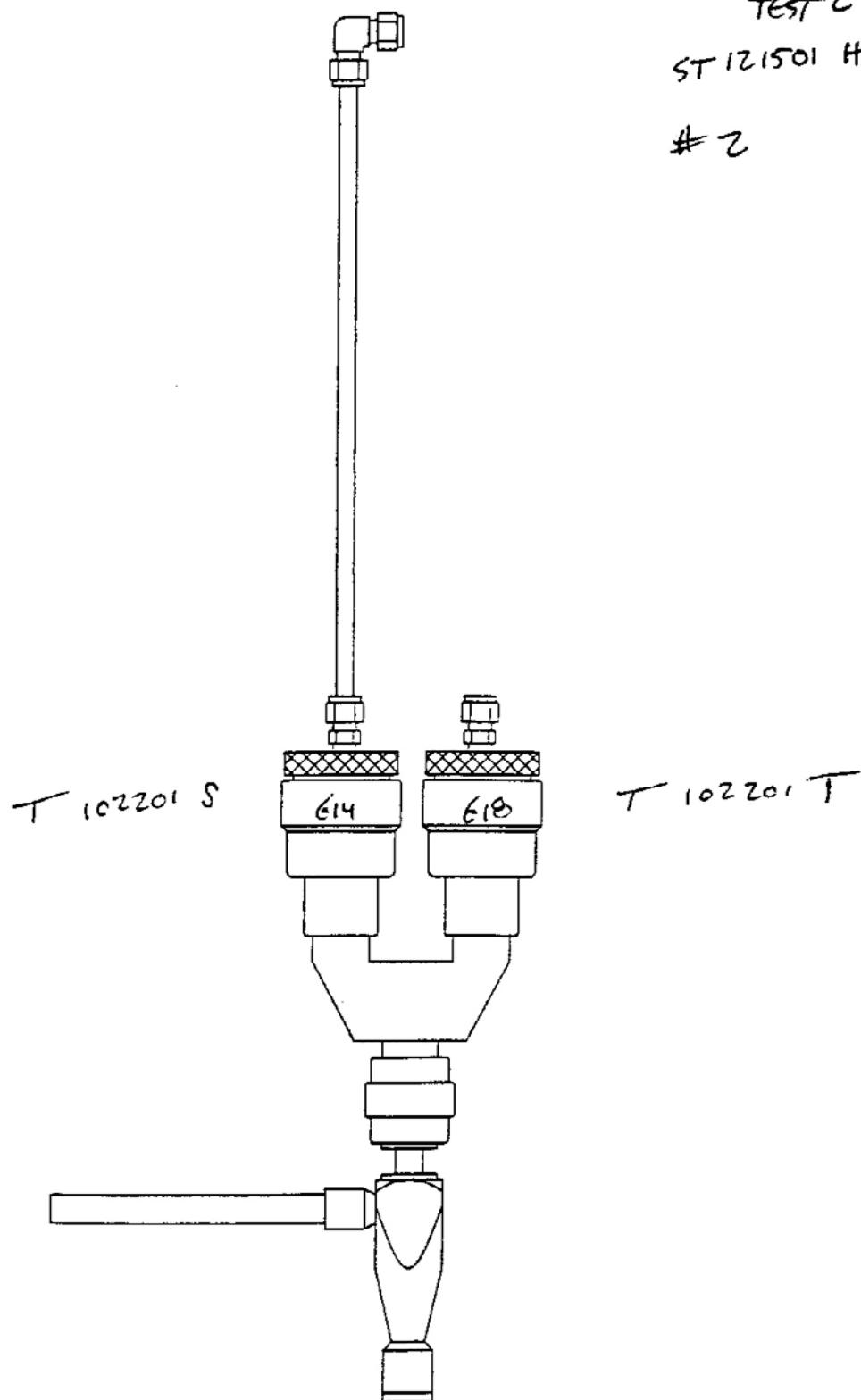
L.S.

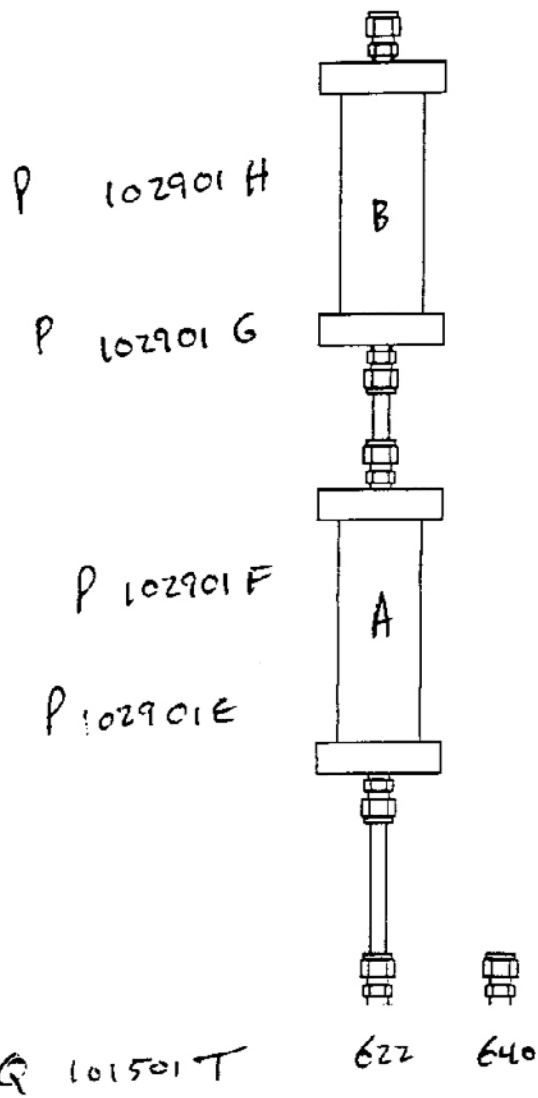
SPIKED
ONTO ✓

C

T 102201 U

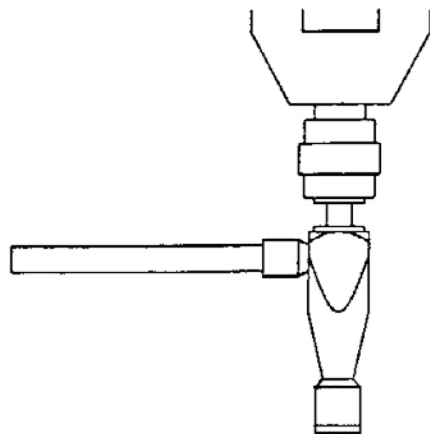
TEST 2
ST 121501 H
2





TEST 2
 ST 121501 H
 # 4

SPIKED I.S.
 ONTO
E ONLY



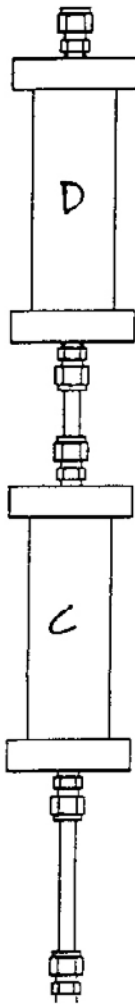
P 102901 L

P 102901 K

P 102901 J

P 102901 I

Q 101501 S



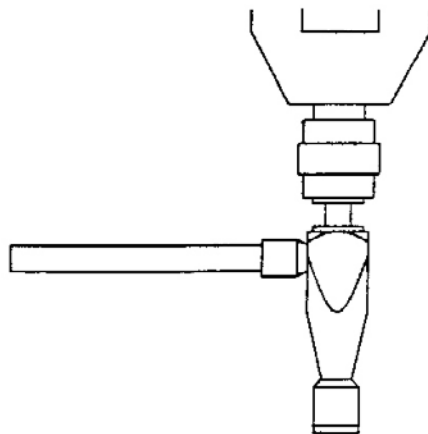
585

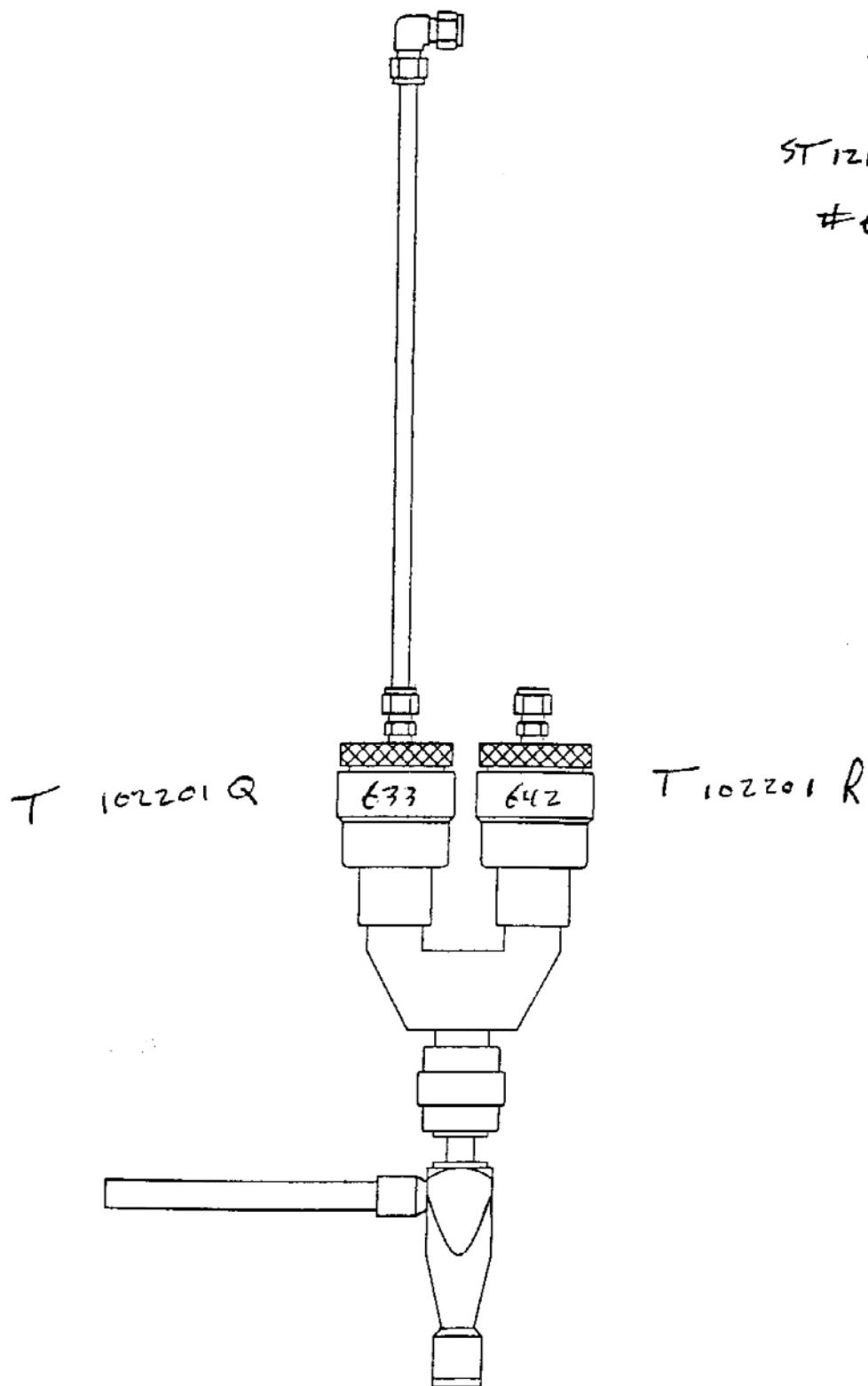
641

Q 101501 R

TEST 2
ST121501 H
8

1.5. SPIKED ONTO
PUF I
ONLY





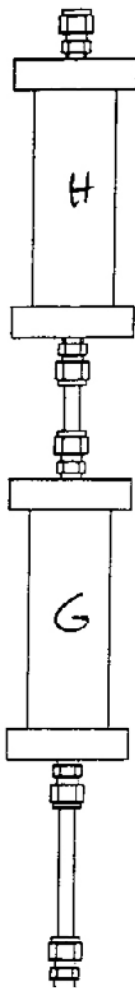
TEST 2
ST 12150114
#6

P 113001 D

P 113001 C

P 113001 B

P 113001 A

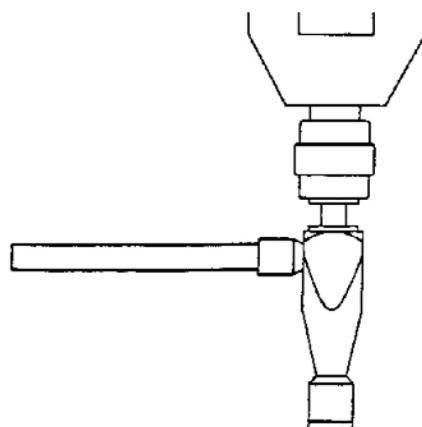


Q 101501 P

610

613

Q 101501 Q



DEWDER
PAIR 1

D 120601 - 1551-5

D 120601 - 1261-5

TEST 2

ST 121501 H

#10

I.S.

SPICED

ONTO

A ONLY

ALIGNED TO READ

↑
5-1551
- 1551-5
1261-5
↑



ENVIRONMENTAL RESEARCH GROUP, INC.

Chain of Custody Record

Page of

PROJECT Wey. Smelt Tank		ANALYSES				REMARKS		SAM ID NO. (For lab use only)			
SITE Plymouth, NC											
COLLECTED BY (Signature) R.F. Maatz											
FIELD SAMPLE ID.	SAMPLE MATRIX	DATE/TIME	NO. OF CONTAINERS	RF	QF	TF	Reverder	SUMMA	Corbany		
ST121501H	PR10A1G	12/15/01									
	PR10A2G										
	PR10A3H										
	PR10A4H										
	QR10A1610										
	QR10B1613										
	DR10A11261-5										
	DR10A21531-5										
	DR10A11013-5										
	DR10A21049-5										
REMARKS: Test #2, Saturday, 12/15/01						RELINQUISHED BY:		DATE	TIME		
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

RECEIVED FOR LABORATORY BY:		DATE	TIME	ARRIBL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:										

PROJECT		Wey. Smelt Tank		ANALYSES		NO. OF CONTAINERS		REMARKS		SAMPLING NO.	
SITE		Plymouth, NC		DATE/TIME		DATE/TIME		DATE/TIME		DATE/TIME	
COLLECTED BY (Signature)		R.F. MARTZ		DATE/TIME		DATE/TIME		DATE/TIME		DATE/TIME	
FIELD SAMPLE ID.	SAMPLE MATRIX	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME
ST121501H	Pd1A1E	12/15/01									
	Pd1A2E										
	Qd1A1 481										
	Td1B1 564										
	TR2A1 614										
	TR2B1 618										
	QR 4A1 622										
	QR 4B1 640										
	PR4A1A										
	PR4A2A										
REMARKS: TEST #2, Sat Sunday, 12/15/01											
RELINQUISHED BY: DATE TIME RECEIVED BY: DATE TIME											

RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:									

ERG
LATEX RESEARCH GROUP, INC.

Chain of Custody Record

Page _____ of _____

PROJECT			ANALYSES			NO. OF CONTAINERS		
Wey. Smelt Tank								
SITE	COLLECTED BY (Signature)	DATE/TIME	QF	TF	Revised	SUMMA	Corbary	REMARKS
FIELD SAMPLE ID.	SAMPLE MATRIX	DATE/TIME	QF	TF	Revised	SUMMA	Corbary	SAM ID NO. (For lab use only)
ST121501H	PR4A3B	12/15/01	✓					P102901G
	PR4A4B		✓					P102901H
	TR6A1G33			✓				T102201Q
	TR6B1G42			✓				T102201R
	PR8A1C							P102901I
	PR8A2C		✓					P102901J
	PR8A3C		✓					P102901K
	PR8A4C		✓					P102901L
	QR8A158S							Q101501S
	QR8B1G41		✓					Q101501R
REMARKS:			RELINQUISHED BY:			DATE		
TEST #2, Saturday, 12/15/01						TIME		
RECEIVED BY:			RECEIVED BY:			DATE		
DATE			DATE			TIME		
TIME			TIME			DATE		
RELINQUISHED BY:			RELINQUISHED BY:			DATE		
DATE			DATE			TIME		
TIME			TIME			DATE		

LAB USE ONLY

RECEIVED FOR LABORATORY BY:		DATE	TIME	ARRIBL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:										



ERG
EASTERN RESEARCH GROUP, INC.

Chain of Custody Record

Page ____ of ____

PROJECT			ANALYSES				REMARKS		SAMPLING NO. (For lab use only)	
Wey. Smelt Tank										
SITE			NO. OF CONTAINERS							
Plymouth, NC										
COLLECTED BY (Signature)										
R.F. MARTZ										
FIELD SAMPLE ID.			SAMPLE MATRIX				DATE/TIME			
ST121501H	SD2A1ST2	12/15/01	PUT	Q	T	Revered	Summa	Coburn	# 4031	T2 is for
	Hd3A1H1T2								Comb. 1-Front	Test #
	Hd3A2H2T2								Comb. 2-Center	2
	Hd3A3H3T2								Comb. 3-Rear	
	SR5A1ST2								# 3503	
	HR3A1H1T2								Comb. 1-Front	
	HR3A2H2T2								Comb. 2-Center	
	HR3A3H3T2								Comb. 3-Rear	
	Qd0A18X10								ERG # 009	8X10 Quantity
	SMEIT Sample								Amber Jar	

REMARKS: Test #2, Saturday, 12/15/01

RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY									
RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:									

ERG
ENVIRONMENTAL RESPONSE GROUP, INC.

Chain of Custody Record

Page _____ of _____

PROJECT		ANALYSES				NO. OF CONTAINERS		REMARKS		SAMPLING		
Wey. Smelt Tank												
SITE		Plymouth, NC										
COLLECTED BY (Signature)		R.F. Moatz										
FIELD SAMPLE ID.		SAMPLE MATRIX				DATE/TIME						
ST121501H	DR10A1 995-6	12/15/01										
	DR10A2 1259-6											
	DR10A1 1261-6											
	DR10A2 1551-6											
	F07A1 FOIL 13											
	F07A1 FOIL 12											
	F07A1 FOIL 11											
	F07A1 FOIL 10											
	F07A1 FOIL 9											
	F07A1 FOIL 8											
REMARKS: TEST #2, Saturday, 12/15/01												
RECEIVED BY:		DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY

RECEIVED FOR LABORATORY BY:		DATE	TIME	AIRBILL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS: Denuden Collected on Test 2 Day was: 1/2 hr., 1 hr., 2 hr., + 4 hr. samples.										



ERG
EASTERN RESEARCH GROUP, INC.

Chain of Custody Record

Page of

PROJECT Wey. Smelt Tank		ANALYSES				REMARKS		SAM ID NO. (For lab use only)
SITE Plymouth, NC								
COLLECTED BY (Signature) R.F. MARTZ								
FIELD SAMPLE ID.	SAMPLE MATRIX	DATE/TIME	NO. OF CONTAINERS					
ST121501H	F ₂₇ A ₁ Foil 7	12/15/01						
	F ₂₇ A ₁ Foil 6							
	F ₂₇ A ₁ Foil 5							
	F ₂₇ A ₁ Foil 4							
	F ₂₇ A ₁ Foil 3							
	F ₂₇ A ₁ Foil 2							
	F ₂₇ A ₁ Foil 1							
	F ₂₇ A ₁ Foil FB							
REMARKS:		TEST #2, Saturday, 12/15/01						
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME

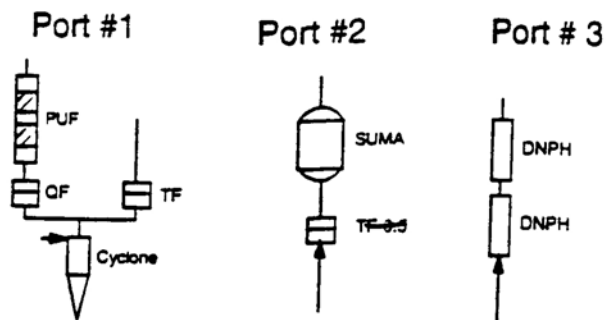
LAB USE ONLY			
RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.
OPENED BY	DATE	TIME	TEMP °C
SEAL #	CONDITION		
REMARKS:			

LAB USE ONLY

B-48

#3 -

Dilution chamber



Field Blanks

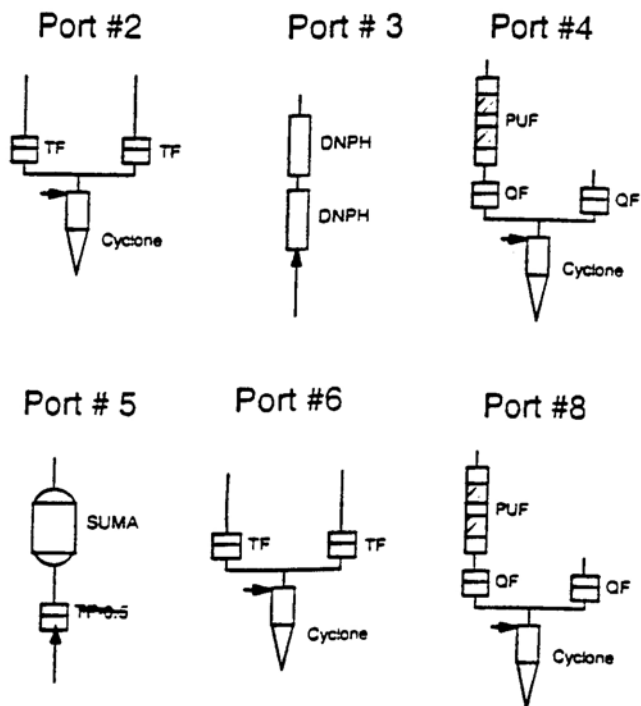
QF	1
TF	1
PUF	1
SUMA	1
DNPH	1

1 pair

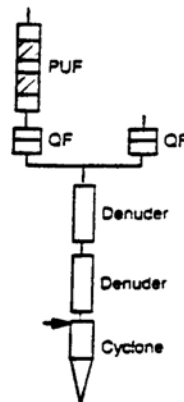
Total Substrates

QF	8
TF-0.5	2
TF	6
PUF	9
Denuder	2
SUMA	3 4
DNPH	5

Residence chamber



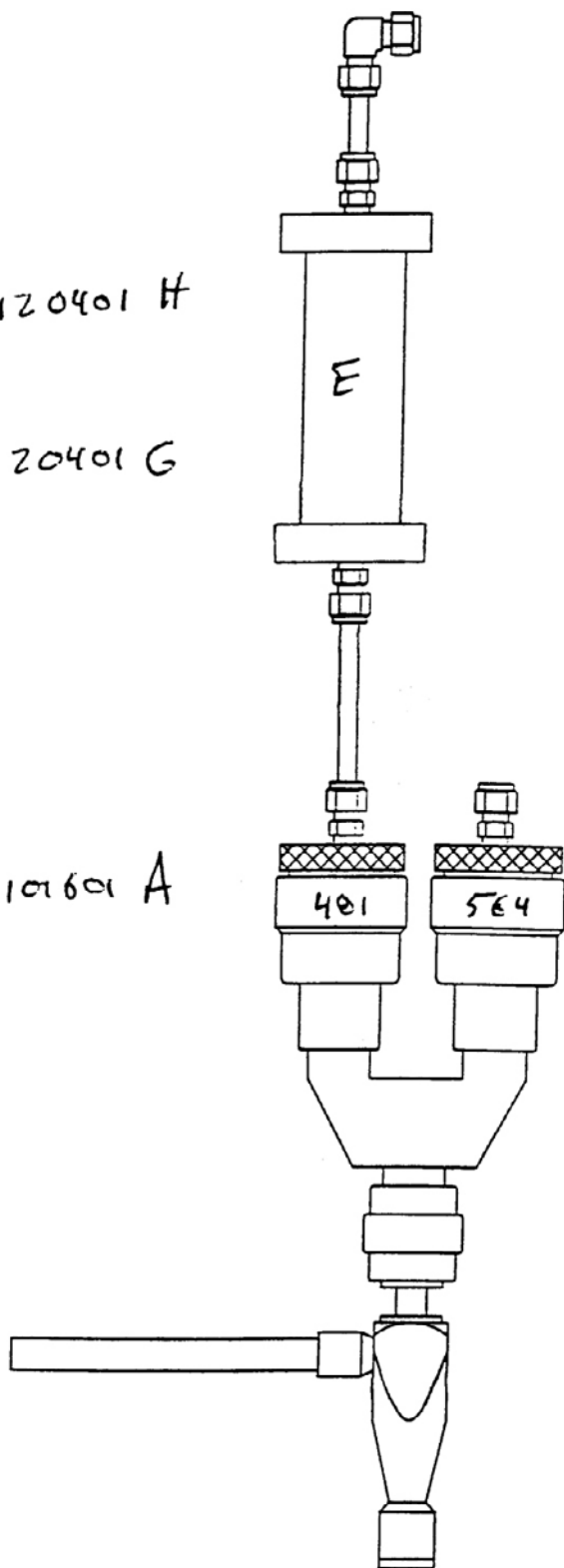
Port #10



P 120401 H

P 120401 G

Q 101601 A



TEST 3
ST 121601

#1
DILUTION

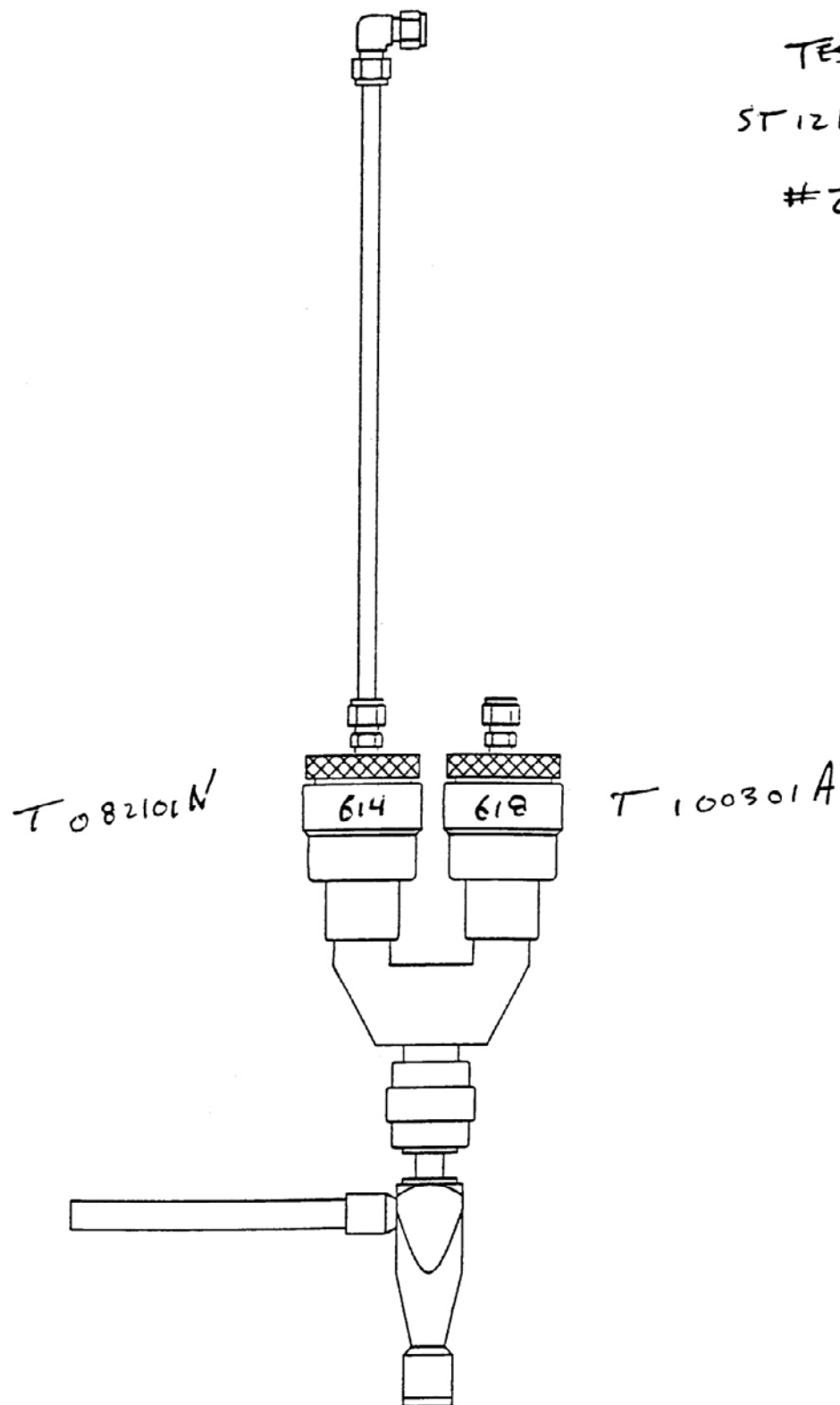
SPIKED ONTO
PUP

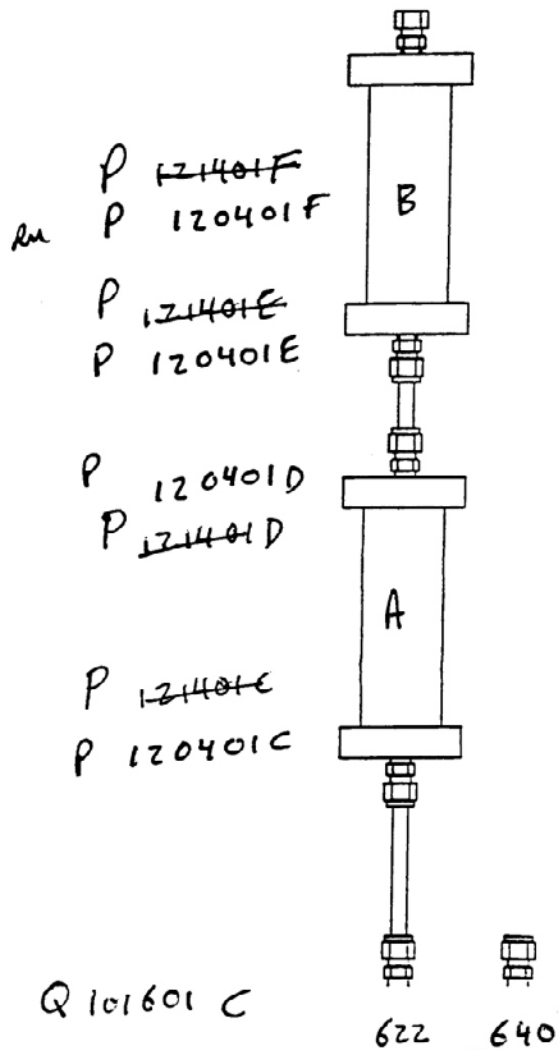
G ONLY

T042101M

TEST 3
ST 12160117

#2





TEST 3

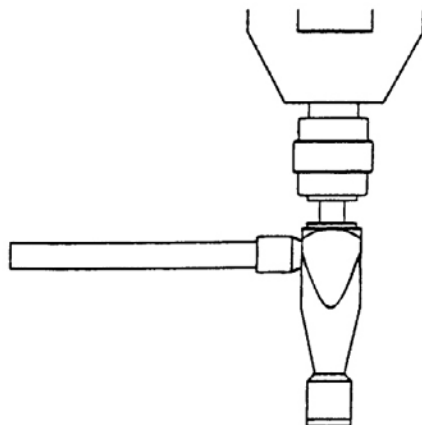
ST 121601

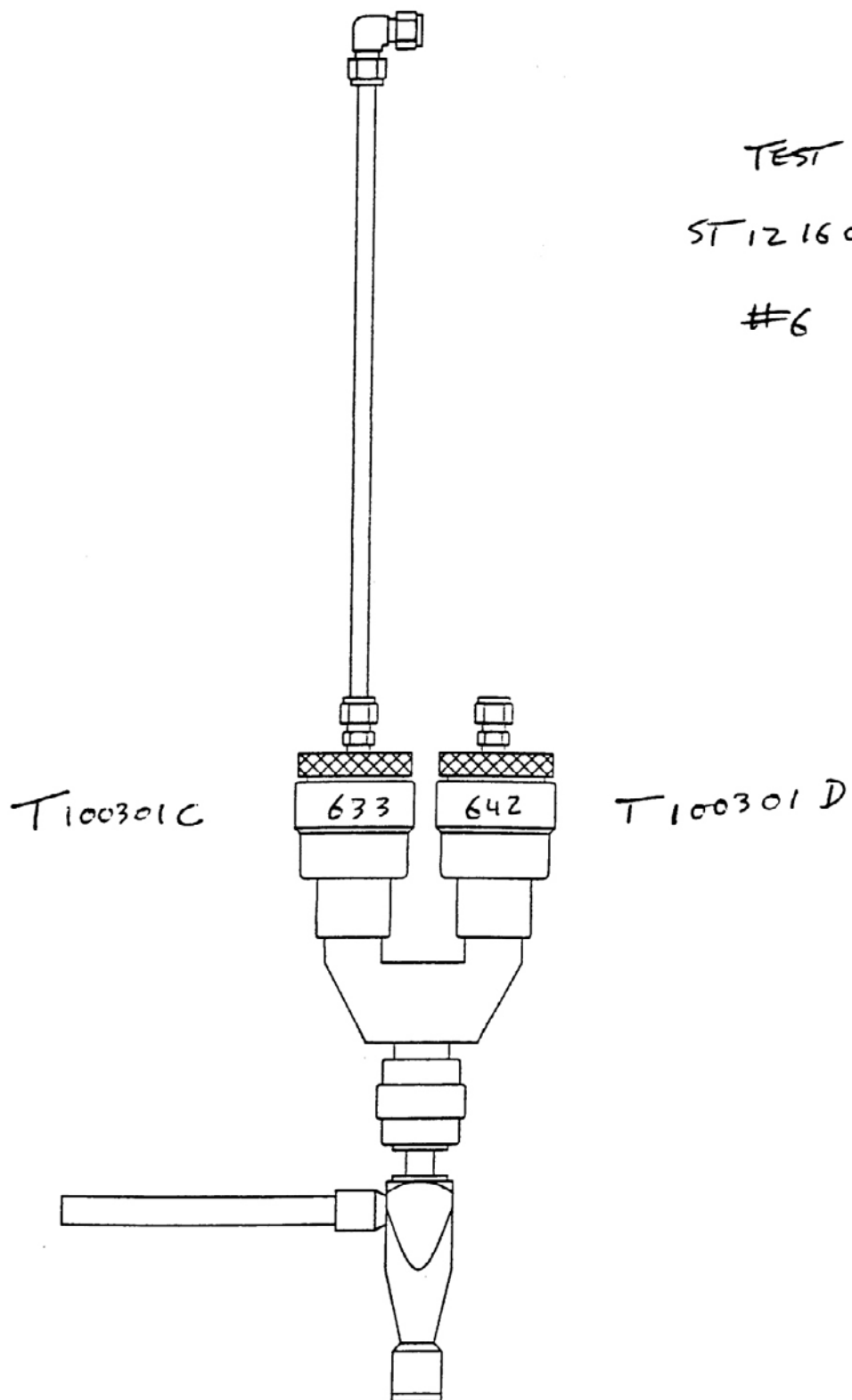
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SPIKED ONTO

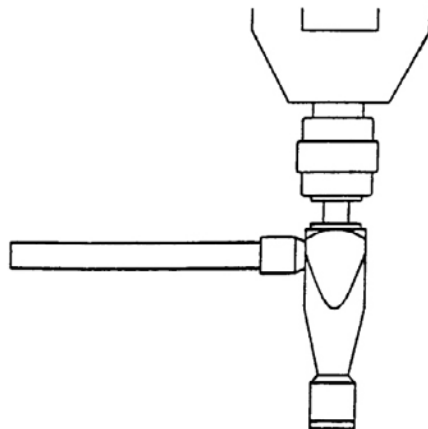
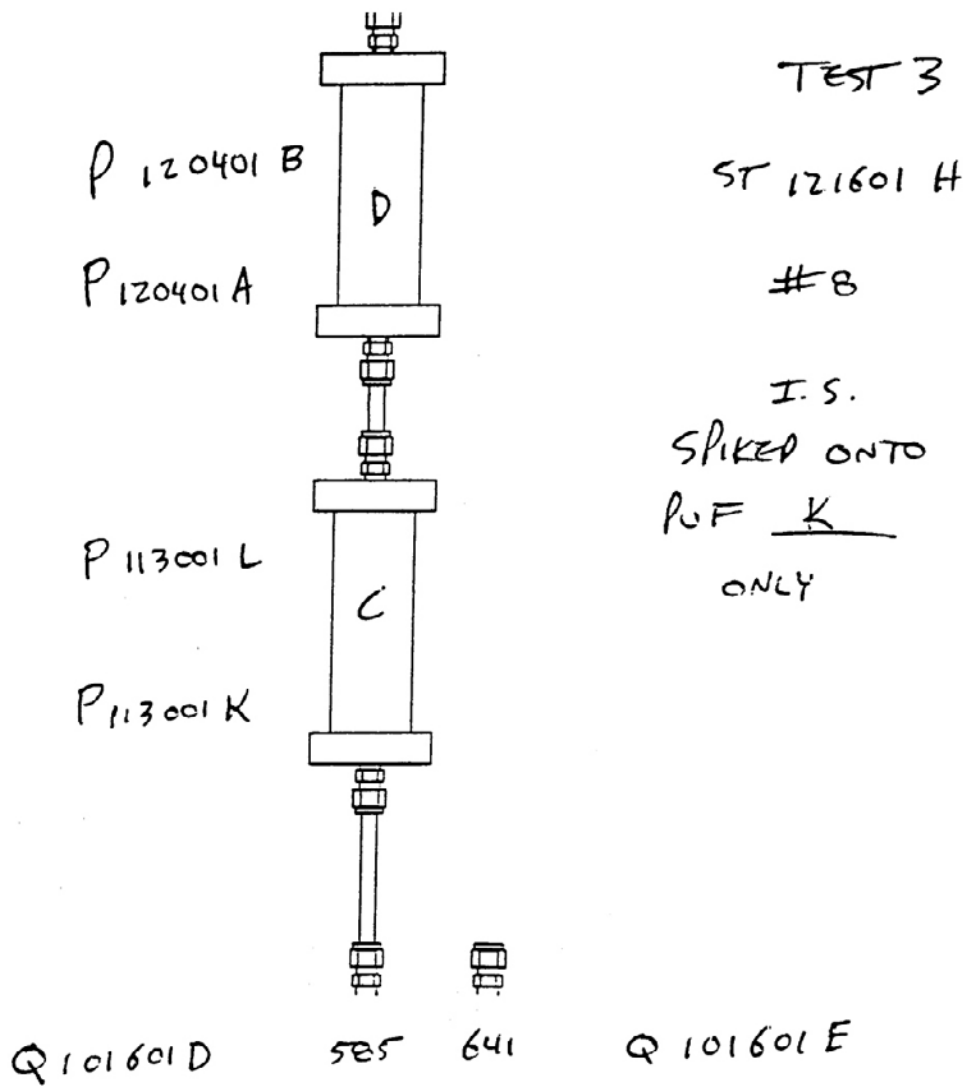
PUF C

ONLY





TEST 3
ST121601H
#6

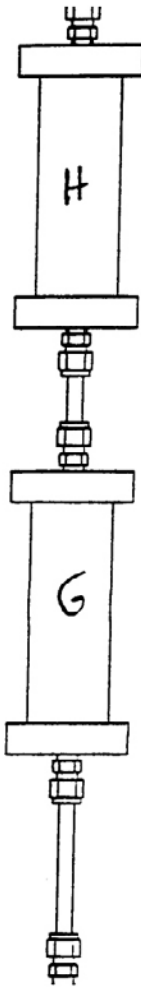


P 113001 J

P 113001 I

P 113001 H

P 113001 G

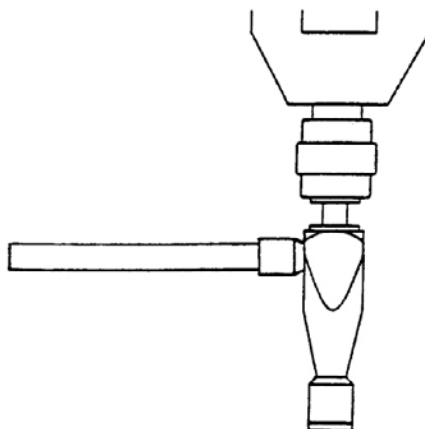


Q 101601 F

610

613

Q 101601 G



DENVER
PAIR 1

D 120601 - 995-7

D 120601 - 1259-7

TEST 3

ST 121601 H

10

SPIKED I.S.

ONTO

PUF

G ONLY

ALIGNED TO READ

— 995-7 — 1259-7 —

Test 3, Sunday, 12/16/01

LAB USE ONLY



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EASTERN RESEARCH GROUP, INC.

Chain of Custody Record

Page of

PROJECT			ANALYSES			REMARKS			SAMPLING NO. (For Lab use only)				
Wey. Smelt Tank													
SITE			NO. OF CONTAINERS			RECEIVED BY:			RELINQUISHED BY:				
Plymouth, AK													
COLLECTED BY (Signature)													
R.F. Miquiz													
FIELD SAMPLE ID.	SAMPLE MATRIX	DATE/TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	
ST171601H	Pd1A1E	12/16/01											
	Pd1A2E												
	Qd1A1481												
	Td1B1564												
	TR2A1614												
	TR2B1618												
	QR4A1622												
	QR4B1640												
	PR4A1A												
	PR4A2A												
REMARKS:													
TEST 3, Sunday, 12/16/01													
RECEIVED BY:			DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY			
RECEIVED FOR LABORATORY BY:	DATE	TIME	ARRIVAL NO.
REMARKS:			



Page ____ of ____

Test 3, Sunday, 12/16/01

LAB USE ONLY



NATIONAL RESEARCH GROUP, INC.

Chain of Custody Record

Page 1 of 1

PROJECT				ANALYSES				REMARKS				CHAIN OF CUSTODY																											
Wey. Smelt Tank																																							
SITE				COLLECTED BY (Signature)				FIELD SAMPLE ID.				DATE/TIME																											
Plymouth, NC				R.F. Moutz																																			
NO. OF CONTAINERS				DATE/TIME				DATE/TIME				DATE/TIME																											
DATE/TIME				DATE/TIME				DATE/TIME				DATE/TIME																											
STN 1601 H	PR 10 A1 G	12/16/01		PR 10 A1 G	SPKED																																		
	PR 10 A2 G			PR 10 A2 H																																			
	PR 10 A3 H			PR 10 A4 H																																			
	QR 10 A1 G10			QR 10 A1 G13																																			
	DR 10 A1 995-7			DR 10 A2 1259-7																																			
	DR 10 A1 1013-6			DR 10 A2 1049-6																																			
REMARKS: TEST 3, Sunday, 12/16/01																																							
RECEIVED BY:				DATE				TIME				DATE				TIME																							
RELINQUISHED BY:				DATE				TIME				DATE				TIME																							
RECEIVED BY:				DATE				TIME				DATE				TIME																							
RELINQUISHED BY:				DATE				TIME				DATE				TIME																							
LAB USE ONLY																																							
RECEIVED FOR LABORATORY BY:				DATE				TIME				ARRIVAL NO.				OPENED BY				DATE				TIME				TEMP °C				SEAL #				CONDITION			
REMARKS:																																							



ERG RESEARCH GROUP, INC.

Chain of Custody Record

Page of

PROJECT			ANALYSES						REMARKS		BAM ID NO. (For lab use only)		
Wey. Smeit Tank													
SITE			NO. OF CONTAINERS										
COLLECTED BY (Signature)													
FIELD SAMPLE ID.			SAMPLE MATRIX										
DATE/TIME													
ST171601H	DR10A1	1261-7	12/16/01								12120601-1261-7		
	DR10A2	1551-7									12120601-1551-7		
	DR10A1	995-8									12120601-995-8		
	DR10A2	1259-8									12120601-1259-8		
	F07A1	Foil 13									A101701 V		
	F07A1	Foil 12									A101701 W		
	F07A1	Foil 11									A101701 X		
	F07A1	Foil 10									A101701 Y		
	F07A1	Foil 9									A102701 A		
	F07A1	Foil 8									A102701 B		
REMARKS:			TEST 3, Sunday, 12/16/01						RELINQUISHED BY:		DATE	TIME	
RECEIVED BY:			DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY

RECEIVED FOR LABORATORY BY:		DATE	TIME	APRILL NO.	OPENED BY	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:										

B-61

Appendix C

Example Calculations: NMOC, Carbonyl, and PM_{2.5} Mass Emission Factors

Contents

<u>Table</u>	<u>Page</u>
C-1. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/14/01)	C-3
C-2. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/15/01)	C-4
C-3. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/16/01)	C-5
C-4. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/14/01)	C-6
C-5. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/15/01)	C-7
C-6. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/16/01)	C-8
C-7. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent (12/14/01)	C-9
C-8. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent (12/15/01)	C-10
C-9. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent (12/16/01)	C-11
C-10. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/14/01)	C-12
C-11. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/15/01)	C-13
C-12. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/16/01)	C-14
C-13. Calculation of PM Emission Factors (12/14/01)	C-15
C-14. Calculation of PM Emission Factors (12/15/01)	C-16
C-15. Calculation of PM Emission Factors (12/16/01)	C-17
C-16. Calculation of Individual Filter PM Emission Factors (12/14/01)	C-18
C-17. Calculation of Individual Filter PM Emission Factors (12/15/01)	C-19
C-18. Calculation of Individual Filter PM Emission Factors (12/16/01)	C-20

Table C-1. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/14/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.16926	µg
Mass fuel consumed	1,016,465	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	400	min
Average venturi flow rate	22.5	sL/min
Average dilution air flow rate	841.73	sL/min
Flow rate at sample collection unit	0.00975	L/min
Calculations		
Total volume of air sampled	266,636,007.8000	L
Volume of combustion air sampled	9000	L
Volume of dilution air	336,692	L
Dilution ratio	38.4102	
Mass flow rate of SNMOC in diluted sample	0.0434	µg/L
Mass flow rate of SNMOC in undiluted sample	1.6670	µg/L
Total mass of SNMOC in sampled air	15,003.0328	µg
SNMOC in total combustion air	377,803,051	µg
Mass emission rate of SNMOC	371.633	µg/kg
Mass emission rate of SNMOC	0.3717	mg/kg
Mass SNMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	400.0	min
Flow rate, dilution air canister	0.009750	L/min
Flow rate, residence chamber canister	0.009750	L/min
Mass SNMOC collected = SNMOC concentration × canister volume		
Parameter	Value	Units
SNMOC residence chamber	0.06751	µg/L
SNMOC dilution air	0.02411	µg/L
Mass SNMOC collected	0.1693	µg
Residence chamber	67.51	µg/m ³
Dilution air	24.11	µg/m ³

Note: Contaminants (*n*-hexane and acetone) deleted from data 12/14/01.

Table C-2. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/15/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.281363	µg
Mass fuel consumed	916,019	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.4	min
Average venturi flow rate	23.2	sL/min
Average dilution air flow rate	851.97	sL/min
Flow rate at sample collection unit	0.008136	L/min
Calculations		
Total volume of air sampled	271,623,255.4000	L
Volume of combustion air sampled	11,122.0800	L
Volume of dilution air	408,434.4180	L
Dilution ratio	37.7228	
Mass flow rate of SNMOC in diluted sample	0.0721	µg/L
Mass flow rate of SNMOC in undiluted sample	2.7212	µg/L
Total mass of SNMOC in sampled air	30,265.5429	µg
SNMOC in total combustion air	739,144,591.4000	µg
Mass emission rate of SNMOC	806.9101	µg/kg
Mass emission rate of SNMOC	0.8069	mg/kg
Mass SNMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	479.38	min
Flow rate, dilution air canister	0.008136	L/min
Flow rate, residence chamber canister	0.008136	L/min
Mass SNMOC collected = SNMOC concentration × canister volume		
Parameter	Value	Units
SNMOC residence chamber	0.10706	µg/L
SNMOC dilution air	0.03495	µg/L
Mass SNMOC collected	0.2814	µg
Residence chamber	107.06	µg/m ³
Dilution air	34.95	µg/m ³

Table C-3. Calculation of Mass Emission Rates: Speciated NMOC (SNMOC), Smelt Tank Vent (12/16/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.1509	µg
Mass fuel consumed	1,127,456	kg
Average combustion air flow rate	20,009	sft ³ /m
Run time	479.58	min
Average venturi flow rate	22.91	sL/min
Average dilution air flow rate	856.03	sL/min
Flow rate at sample collection unit	0.0090	L/min
Calculations		
Total volume of air sampled	271,725,241.6000	L
Volume of combustion air sampled	10,987.1778	L
Volume of dilution air	410,534.8674	L
Dilution ratio	38.3649	
Mass flow rate of SNMOC in diluted sample	0.0351	µg/L
Mass flow rate of SNMOC in undiluted sample	1.3464	µg/L
Total mass of SNMOC in sampled air	14,792.7778	µg
SNMOC in total combustion air	365,842,002.5000	µg
Mass emission rate of SNMOC	324.4845	µg/kg
Mass emission rate of SNMOC	0.3245	mg/kg
Mass SNMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	479.58	min
Flow rate, dilution air canister	0.009383	L/min
Flow rate, residence chamber canister	0.008966	L/min
Mass SNMOC collected = SNMOC concentration × canister volume		
Parameter	Value	Units
SNMOC residence chamber	0.05931	µg/L
SNMOC dilution air	0.02314	µg/L
Mass SNMOC collected	0.1509	µg
Residence chamber	59.31	µg/m ³
Dilution air	23.14	µg/m ³

Table C-4. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/14/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.40092	µg
Mass fuel consumed	1,016,465	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	400.	min
Average venturi flow rate	22.5	sL/min
Average dilution air flow rate	841.73	sL/min
Flow rate at sample collection unit	0.0098	L/min
Calculations		
Total volume of air sampled	226,636,008	L
Volume of combustion air sampled	9000	L
Volume of dilution air	336,692	L
Dilution ratio	38.4102	
Mass flow rate of total NMOC in diluted sample	0.1028	µg/L
Mass flow rate of NMOC in undiluted sample	3.9486	µg/L
Total mass of total NMOC in sampled air	35,537.1376	µg
Total NMOC in total combustion air	894,888,333	µg
Mass emission rate of total NMOC	880.3927	µg/kg
Mass emission rate of total NMOC	0.8803927	mg/kg
Mass Total NMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	400.	min
Flow rate, dilution air canister	0.00975	L/min
Flow rate, residence chamber canister	0.00975	L/min
Mass Total NMOC collected = Total NMOC concentration × canister volume		
Parameter	Value	Units
Total NMOC residence chamber	0.13030	µg/L
Total NMOC dilution air	0.02750	µg/L
Mass Total NMOC collected	0.4009	µg
Residence chamber	130.30	µg/m ³
Dilution air	27.50	µg/m ³

Table C-5. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/15/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.496422	µg
Mass fuel consumed	916,019	kg
Average combustion air flow rate	20,008.935	sft ³ /m
Run time	479.4	min
Average venturi flow rate	23.2	sL/min
Average dilution air flow rate	851.97	sL/min
Flow rate at sample collection unit	0.0081	L/min
Calculations		
Total volume of air sampled	271,623,255	L
Volume of combustion air sampled	11,122.0800	L
Volume of dilution air	408,434.4200	L
Dilution ratio	37.7229	
Mass flow rate of total NMOC in diluted sample	0.1273	µg/L
Mass flow rate of total NMOC in undiluted sample	4.8012	µg/L
Total mass of total NMOC in sampled air	53,398.9240	µg
Total NMOC in total combustion air	1,304,117,572	µg
Mass emission rate of total NMOC	1423.6695	µg/kg
Mass emission rate of total NMOC	1.4237	mg/kg
Mass Total NMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	479.38	min
Flow rate, dilution air canister	0.008136	L/min
Flow rate, residence chamber canister	0.008136	L/min
Mass Total NMOC collected = Total NMOC concentration × canister volume		
Parameter	Value	Units
Total NMOC residence chamber	0.16925	µg/L
Total NMOC dilution air	0.04197	µg/L
Mass Total NMOC collected	0.4964	µg
Residence chamber	169.25	µg/m ³
Dilution air	41.97	µg/m ³

Table C-6. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) NMOC, Smelt Tank Vent (12/16/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	0.3550	µg
Mass fuel consumed	1,127,456	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.5800	min
Average venturi flow rate	22.91	sL/min
Average dilution air flow rate	856.03	sL/min
Flow rate at sample collection unit	0.0090	L/min
Calculations		
Total volume of air sampled	271,725,242	L
Volume of combustion air sampled	10,987.1778	L
Volume of dilution air	410,534.8670	L
Dilution ratio	38.3649	
Mass flow rate of total NMOC in diluted sample	0.0826	µg/L
Mass flow rate of total NMOC in undiluted sample	3.1671	µg/L
Total mass of total NMOC in sampled air	34,797.4365	µg
Total NMOC in total combustion air	860,579,670	µg
Mass emission rate of total NMOC	763.2934	µg/kg
Mass emission rate of total NMOC	0.7633	mg/kg
Mass Total NMOC Collected		
Volume canister = flow rate into canister × test duration		
Parameter	Value	Units
Test duration	479.58	min
Flow rate, dilution air canister	0.009383	L/min
Flow rate, residence chamber canister	0.008966	L/min
Mass Total NMOC collected = Total NMOC concentration × canister volume		
Parameter	Value	Units
Total NMOC residence chamber	0.10996	µg/L
Total NMOC dilution air	0.02619	µg/L
Mass Total NMOC collected	0.3550	µg
Residence chamber	109.96	µg/m ³
Dilution air	23.14	µg/m ³

Table C-7. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent
(12/14/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	4.3690	µg
Mass fuel consumed	1,016,465	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	400.	min
Average venturi flow rate	22.5	sL/min
Average dilution air flow rate	841.73	sL/min
Flow rate at sample collection unit	0.73	L/min
Calculations		
Total volume of air sampled	226,636,007.8000	L
Volume of combustion air sampled	9000	L
Volume of dilution air	336,692	L
Dilution ratio	38.4102	
Mass flow rate of speciated carbonyls in diluted sample	0.0150	µg/L
Mass flow rate of speciated carbonyls in undiluted sample	0.5771	µg/L
Total mass of speciated carbonyls in sampled air	5194.0586	µg
Total speciated carbonyls in total combustion air	130,795,632.9	µg
Mass emission rate of total speciated carbonyls	128.6770	µg/kg
Mass emission rate of total speciated carbonyls	0.1287	mg/kg

Table C-8. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent
(12/15/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	17.7180	µg
Mass fuel consumed	916,019	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.4	min
Average venturi flow rate	23.2	sL/min
Average dilution air flow rate	851.97	sL/min
Flow rate at sample collection unit	0.81	L/min
Calculations		
Total volume of air sampled	271,623,255.4000	L
Volume of combustion air sampled	11,122.0800	L
Volume of dilution air	408,434.4180	L
Dilution ratio	37.7228	
Mass flow rate of speciated carbonyls in diluted sample	0.04566	µg/L
Mass flow rate of speciated carbonyls in undiluted sample	1.7225	µg/L
Total mass of speciated carbonyls in sampled air	19,157.5113	µg
Total speciated carbonyls in total combustion air	467,864,426.7000	µg
Mass emission rate of speciated carbonyls	510.7587	µg/kg
Mass emission rate of speciated carbonyls	0.5108	mg/kg

Table C-9. Calculation of Mass Emission Rates: Speciated Carbonyls, Smelt Tank Vent
(12/16/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	8.3460	µg
Mass fuel consumed	1,127,456	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.58	min
Average venturi flow rate	22.91	sL/min
Average dilution air flow rate	856.03	sL/min
Flow rate at sample collection unit	0.84	L/min
Calculations		
Total volume of air sampled	271,725,242	L
Volume of combustion air sampled	10,987.1778	L
Volume of dilution air	410,534.8670	L
Dilution ratio	38.3649	
Mass flow rate of speciated carbonyls in diluted sample	0.02079	µg/L
Mass flow rate of speciated carbonyls in undiluted sample	0.7975	µg/L
Total mass of speciated carbonyls in sampled air	8762.2293	µg
Total speciated carbonyls in total combustion air	216,699,768	µg
Mass emission rate of total speciated carbonyls	192.2024	µg/kg
Mass emission rate of total speciated carbonyls	0.1922	mg/kg

Table C-10. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/14/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	5.6075	µg
Mass fuel consumed	1,016,465	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	400.	min
Average venturi flow rate	22.5	sL/min
Average dilution air flow rate	841.73	sL/min
Flow rate at sample collection unit	0.73	L/min
Calculations		
Total volume of air sampled	226,636,007.8000	L
Volume of combustion air sampled	9000	L
Volume of dilution air	336,692	L
Dilution ratio	38.4102	
Mass flow rate of total carbonyls in diluted sample	0.0193	µg/L
Mass flow rate of total carbonyls in undiluted sample	0.7407	µg/L
Total mass of total carbonyls in sampled air	6666.4416	µg
Total carbonyls in total combustion air	167,872,856.9	µg
Mass emission rate of total carbonyls	165.1536	µg/kg
Mass emission rate of total carbonyls	0.1652	mg/kg

Table C-11. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/15/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	20.035	µg
Mass fuel consumed	916,019	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.4	min
Average venturi flow rate	23.2	sL/min
Average dilution air flow rate	851.97	sL/min
Flow rate at sample collection unit	0.81	L/min
Calculations		
Total volume of air sampled	271,623,255.4000	L
Volume of combustion air sampled	11,122.0800	L
Volume of dilution air	408,434.4180	L
Dilution ratio	37.7228	
Mass flow rate of total carbonyls in diluted sample	0.05163	µg/L
Mass flow rate of total carbonyls in undiluted sample	1.9477	µg/L
Total mass of total carbonyls in sampled air	21,662.7576	µg
Total carbonyls in total combustion air	529,047,510.4000	µg
Mass emission rate of total carbonyls	577.5511	µg/kg
Mass emission rate of total carbonyls	0.5776	mg/kg

Table C-12. Calculation of Mass Emission Rates: Total (Speciated + Unspeciated) Carbonyls, Smelt Tank Vent (12/16/01)

Quantity	Value	Units
Parameters Required		
Mass of analyte in total combustion air	9.2310	µg
Mass fuel consumed	1,127,456	kg
Average combustion air flow rate	20,008.9353	sft ³ /m
Run time	479.58	min
Average venturi flow rate	22.91	sL/min
Average dilution air flow rate	856.03	sL/min
Flow rate at sample collection unit	0.84	L/min
Calculations		
Total volume of air sampled	271,725,242	L
Volume of combustion air sampled	10,987.1778	L
Volume of dilution air	410,534.8670	L
Dilution ratio	38.3649	
Mass flow rate of total carbonyls in diluted sample	0.02230	µg/L
Mass flow rate of total carbonyls in undiluted sample	0.8821	µg/L
Total mass of total carbonyls in sampled air	9691.3658	µg
Total carbonyls in total combustion air	239,678,356	µg
Mass emission rate of total carbonyls	212.5833	µg/kg
Mass emission rate of total carbonyls	0.2126	mg/kg

Table C-13. Calculation of PM Emission Factors (12/14/01)

Test		12/14/01 (ave)			
1	Sampling time (min)	400			
2	TF sample	T102201J	T102201K	T102201L	T102201N
3	PM mass on filter (mg)	1.743	1.705	1.684	1.757
4	Array flow (sL/min)	8.528	8.528	8.566	8.566
5	PM concentration at filter (mg/L)	0.000511	0.000500	0.000491	0.000513
6a	avg. PM concentration at filter (mg/L)	0.000504			
6b	PM mass on dilution chamber filter (mg)	0.002			
6c	Array flow (sL/min)	8.528			
6d	PM concentration at dilution air (mg/L)	0.000001			
6e	Net PM mass concentration after dilution (mg/L)	0.000503			
7	Probe flow (sL/min)	22.67			
8	Probe flow (m³)	9.07			
9	Dilution air (sL/min)	841.28			
10	Dilution air (m³)	336.51			
11	Dilution ratio	38.11			
12	PM concentration at stack (mg/L)	0.0192			
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	10,865.5			
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	491.43		0	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	2540.7		0.0	
25	Fuel mass feed rate (lb/min)	5602.3		0.0	
26	Fuel heating value (Btu/lb)	4208		19374	
27	Fuel heat feed rate (Btu/min)	23,574,486.8		0.0	
28	Total fuel mass feed rate (kg/min)	2540.7			
29	Emission factor (mg/kg)	4.28			
30	Total fuel heat feed rate (Btu/min)	23,574,486.82			
31	Emission factor (µg/kJ)	0.44			

Stage	Time	Venturi	Total Time	Fraction of Time in Stage
1	213.8	22.5	400	0.5345
2	186.2	22.87		0.4655

Table C-14. Calculation of PM Emission Factors (12/15/01)

Test		12/15/2001 (ave)			
1	Sampling time (min)	479.4			
2	TF sample	T102201S	T102201T	T102201Q	T102201R
3	PM mass on filter (mg)	2.867	2.979	2.978	2.999
4	Array flow (sL/min)	8.541	8.541	8.541	8.541
5	PM concentration at filter (mg/L)	0.000700	0.000728	0.000727	0.000732
6a	avg. PM concentration at filter (mg/L)	0.000722			
6b	PM mass on dilution chamber filter (mg)	0.000			
6c	Array flow (sL/min)	8.466			
6d	PM concentration at dilution air (mg/L)	0.000000			
6e	Net PM mass concentration after dilution (mg/L)	0.000722			
7	Probe flow (sL/min)	23.20			
8	Probe flow (m³)	11.12			
9	Dilution air (sL/min)	851.97			
10	Dilution air (m³)	408.43			
11	Dilution ratio	37.72			
12	PM concentration at stack (mg/L)	0.0272			
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	15,429.7			
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	356.93		20.43	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	1845.4		65.2	
25	Fuel mass feed rate (lb/min)	4069.0		143.7	
26	Fuel heating value (Btu/lb)	4208		19,374	
27	Fuel heat feed rate (Btu/min)	17,122,360.4		2,784,113.5	
28	Total fuel mass feed rate (kg/min)	1910.5			
29	Emission factor (mg/kg)	8.08			
30	Total fuel heat feed rate (Btu/min)	19,906,473.93			
31	Emission factor (µg/kJ)	0.73			

Table C-15. Calculation of PM Emission Factors (12/16/01)

Test		12/16/2001 (ave)			
1	Sampling time (min)	479.58			
2	TF sample	T082101N	T100301A	T100301C	T100301D
3	PM mass on filter (mg)	2.725	2.706	2.743	2.806
4	Array flow (sL/min)	8.586	8.586	8.662	8.662
5	PM concentration at filter (mg/L)	0.000662	0.000657	0.000660	0.000675
6a	avg. PM concentration at filter (mg/L)	0.000664			
6b	PM mass on dilution chamber filter (mg)	0.005			
6c	Array flow (sL/min)	8.700			
6d	PM concentration at dilution air (mg/L)	0.000001			
6e	Net PM mass concentration after dilution (mg/L)	0.000662			
7	Probe flow (sL/min)	22.91			
8	Probe flow (m³)	10.99			
9	Dilution air (sL/min)	856.03			
10	Dilution air (m³)	410.53			
11	Dilution ratio	38.36			
12	PM concentration at stack (mg/L)	0.0254			
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	14,401.3			
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	454.54		0	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	2350.0		0.0	
25	Fuel mass feed rate (lb/min)	5181.8		0.0	
26	Fuel heating value (Btu/lb)	4208		19,374	
27	Fuel heat feed rate (Btu/min)	21,804,829.2		0.0	
28	Total fuel mass feed rate (kg/min)	2350.0			
29	Emission factor (mg/kg)	6.13			
30	Total fuel heat feed rate (Btu/min)	21804829.25			
31	Emission factor (µg/kJ)	0.63			

Table C-16. Calculation of Individual Filter PM Emission Factors (12/14/01)

Test		12/14/2001 (individual filters)			
1	Sampling time (min)	400			
2	TF sample	T102201J	T102201K	T102201L	T102201N
3	PM mass on filter (mg)	1.743	1.705	1.684	1.757
4	Array flow (sL/min)	8.528	8.528	8.566	8.566
5	PM concentration at filter (mg/L)	0.000511	0.000500	0.000491	0.000513
6b	PM mass on dilution chamber filter (mg)	0.002			
6c	Array flow (sL/min)	8.528			
6d	PM concentration at dilution air (mg/L)	0.000001			
6e	Net PM mass concentration after dilution (mg/L)	0.000510	0.000499	0.000491	0.000512
7	Probe flow (sL/min)	22.67			
8	Probe flow (m³)	9.07			
9	Dilution air (sL/min)	841.28			
10	Dilution air (m³)	336.51			
11	Dilution ratio	38.11			
12	PM concentration at stack (mg/L)	0.0195	0.0190	0.0187	0.0195
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	11,021.0	10,780.5	10,600.2	11,060.3
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	491.43		0	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	2540.7		0.0	
25	Fuel mass feed rate (lb/min)	5602.3		0.0	
26	Fuel heating value (Btu/lb)	4208		19,374	
27	Fuel heat feed rate (Btu/min)	23,574,486.8		0.0	
28	Total fuel mass feed rate (kg/min)	2540.7			
29	Emission factor (mg/kg)	4.34	4.24	4.17	4.35
30	Total fuel heat feed rate (Btu/min)	23,574,486.82			
31	Emission factor (µg/kJ)	0.44	0.43	0.43	0.44
32	Ave. Emission Factor (mg/kg)	4.28			
33	Ave. Emission Factor (µg/kJ)	0.44			

Table C-17. Calculation of Individual Filter PM Emission Factors (12/15/01)

Test		12/15/2001 (individual filters)			
1	Sampling time (min)	479.4			
2	TF sample	T102201S	T102201T	T102201Q	T102201R
3	PM mass on filter (mg)	2.867	2.979	2.978	2.999
4	Array flow (sL/min)	8.541	8.541	8.541	8.541
5	PM concentration at filter (mg/L)	0.000700	0.000728	0.000727	0.000732
6b	PM mass on dilution chamber filter (mg)	0.000			
6c	Array flow (sL/min)	8.466			
6d	PM concentration at dilution air (mg/L)	0.00000			
6e	Net PM mass concentration after dilution (mg/L)	0.000700	0.000728	0.000727	0.000732
7	Probe flow (sL/min)	23.20			
8	Probe flow (m³)	11.12			
9	Dilution air (sL/min)	851.97			
10	Dilution air (m³)	408.43			
11	Dilution ratio	37.72			
12	PM concentration at stack (mg/L)	0.0264	0.0274	0.0274	0.0276
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	14,966.4	15,551.1	15,545.9	15,655.5
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	356.93		20.43	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	1845.4		65.2	
25	Fuel mass feed rate (lb/min)	4069.0		143.7	
26	Fuel heating value (Btu/lb)	4208		19,374	
27	Fuel heat feed rate (Btu/min)	17,122,360.4		2,784,113.5	
28	Total fuel mass feed rate (kg/min)	1910.5			
29	Emission factor (mg/kg)	7.83	8.14	8.14	8.19
30	Total fuel heat feed rate (Btu/min)	19,906,473.93			
31	Emission factor (µg/kJ)	0.71	0.74	0.74	0.75
32	Ave. Emission Factor (mg/kg)	8.08			
33	Ave. Emission Factor (µg/kJ)	0.73			

Table C-18. Calculation of Individual Filter PM Emission Factors (12/16/01)

Test		12/16/2001 (individual filters)			
1	Sampling time (min)	479.58			
2	TF sample	T082101N	T100301A	T100301C	T100301D
3	PM mass on filter (mg)	2.725	2.706	2.743	2.806
4	Array flow (sL/min)	8.586	8.586	8.662	8.662
5	PM concentration at filter (mg/L)	0.000662	0.000657	0.000660	0.000675
6b	PM mass on dilution chamber filter (mg)	0.005			
6c	Array flow (sL/min)	8.700			
6d	PM concentration at dilution air (mg/L)	0.000001			
6e	Net PM mass conc after dilution (mg/L)	0.000661	0.000656	0.000659	0.000674
7	Probe flow (sL/min)	22.91			
8	Probe flow (m³)	10.99			
9	Dilution air (sL/min)	856.03			
10	Dilution air (m³)	410.53			
11	Dilution ratio	38.36			
12	PM concentration at stack (mg/L)	0.0253	0.0252	0.0253	0.0259
13	Stack gas velocity (ft/min)	1021			
14	Stack temperature (°F)	160.1			
15	Stack pressure (in. Hg)	29.882			
16	Stack area (ft²)	23.0438			
17	Stack flow (sft³/min)	20,007.8			
18	Stack flow (sL/min)	566,621.9			
19	PM emission rate from stack (mg/min)	14,360.0	14,259.7	14,328.0	14,657.7
20	Fuel type	Black Liquor		#2 Oil	
21	Fuel volumetric feed (gal/min)	454.54		0	
22	Fuel density (lb/gal)	11.4			
23	Fuel density (kg/gal)	5.17		3.19	
24	Fuel mass feed rate (kg/min)	2350.0		0.0	
25	Fuel mass feed rate (lb/min)	5181.8		0.0	
26	Fuel heating value (Btu/lb)	4208		19374	
27	Fuel heat feed rate (Btu/min)	21,804,829.2		0.0	
28	Total fuel mass feed rate (kg/min)	2350.0			
29	Emission factor (mg/kg)	6.11	6.07	6.10	6.24
30	Total fuel heat feed rate (Btu/min)	21,804,829.25			
31	Emission factor (µg/kJ)	0.62	0.62	0.62	0.64
32	Ave. Emission Factor (mg/kg)	6.13			
33	Ave. Emission Factor (µg/kJ)	0.63			

Appendix D

Data Tables for Individual PM_{2.5} Mass Measurements

Contents

<u>Table</u>	<u>Page</u>
D-1. Gravimetric Measurements: Electrical Low Pressure Impactor Stages - Filters	D-3
D-2. Gravimetric Measurements: Teflon Filters	D-4

Table D-1. Gravimetric Measurements: Electrical Low Pressure Impactor Stages - Filters

ID		Initial Weight (mg)	Final Weight (mg)	PM Mass (mg)
A101701T	IB121501H ELPI 1	33.852	33.86	0.008
A101701R	IB121501H ELPI 2	33.766	33.789	0.023
A101701Q	IB121501H ELPI 3	32.769	32.909	0.14
A101701P	IB121501H ELPI 4	33.004	33.35	0.346
A101701O	IB121501H ELPI 5	32.919	33.345	0.426
A101701M	IB121501H ELPI 6	33.92	34.547	0.627
A101701L	IB121501H ELPI 7	32.93	33.352	0.422
A101701K	IB121501H ELPI 8	34.053	34.228	0.175
A101701J	IB121501H ELPI 9	33.353	33.439	0.086
A101701H	IB121501H ELPI 10	33.45	33.404	-0.046
A101701G	IB121501H ELPI 11	33.887	33.909	0.022
A101701F	IB121501H ELPI 12	34.409	34.395	-0.014
A101701E	IB121501H ELPI 13	33.529	33.553	0.024
A101701U	IB121501H ELPI FB	33.138	33.144	0.006
A102101I	IB121601H ELPI 1		33.33	
A102101H	IB121601H ELPI 2		32.962	
A102101G	IB121601H ELPI 3		33.765	
A102101F	IB121601H ELPI 4		33.187	
A102101E	IB121601H ELPI 5		33.234	
A102101D	IB121601H ELPI 6		33.102	
A102101C	IB121601H ELPI 7		34.012	
A102101B	IB121601H ELPI 8		32.837	
A102101A	IB121601H ELPI 9		33.257	
A101701Y	IB121601H ELPI 10	33.459	33.577	0.118
A101701X	IB121601H ELPI 11	32.229	32.263	0.034
A101701W	IB121601H ELPI 12	33.249	33.257	0.008
A101701V	IB121601H ELPI 13	33.952	33.965	0.013

Table D-2. Gravimetric Measurements: Teflon Filters

ID		Initial Weight (g)	Final Weight (g)	PM Mass (g)	PM Mass (mg)
T102201M	IB121401HD1B1	0.174085	0.174087	0.000002	0.002
T102201J	IB121401HR2A1	0.195529	0.197272	0.001743	1.743
T102201K	IB121401HR2B1	0.181935	0.18364	0.001705	1.705
T102201L	IB1121401HR6A1	0.170991	0.172675	0.001684	1.684
T102201N	IB121401HR6B1	0.174756	0.176513	0.001757	1.757
T102201O	IB121401H FB	0.177514	0.17751	-0.000004	-0.004
T102201U	IB121501HD1B1	0.19466	0.194656	-0.000004	-0.004
T102201S	IB121501HR2A1	0.159946	0.162813	0.002867	2.867
T102201T	IB121501HR2B1	0.158719	0.161698	0.002979	2.979
T102201Q	IB121501HR6A1	0.185376	0.188354	0.002978	2.978
T102201R	IB121501HR6B1	0.179448	0.182447	0.002999	2.999
T082101M	IB121601HD1B1	0.18583	0.185835	0.000005	0.005
T082101N	IB121601HR2A1	0.189623	0.192348	0.002725	2.725
T100301A	IB121601HR2B1	0.191138	0.193844	0.002706	2.706
T100301C	IB121601HR6A1	0.19494	0.197683	0.002743	2.743
T100301D	IB121501HR6B1	0.194825	0.197631	0.002806	2.806

Appendix E

Data Tables for Individual Carbonyl Samples

Contents

<u>Table</u>	<u>Page</u>
E-1. Carbonyls, Individual Tube Results, Blanks, Test Dates: 12/14/01 - 12/16/01	E-3
E-2A. Carbonyls, Individual Tube Results, Field Samples (12/14/01)	E-4
E-2B. Carbonyls, Individual Tube Results, Field Samples (12/15/01)	E-6
E-2C. Carbonyls, Individual Tube Results, Field Samples (12/16/01)	E-8
E-3A. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day	E-10
E-3B. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day	E-11
E-3C. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day	E-12
E-4. Carbonyls Summary: Smelt Tank Vent, 12/14/01 - 12/16/01	E-13

Table E-1. Carbonyls, Individual Tube Results, Blanks, Test Dates: 12/14/01 - 12/16/01

Compound	CAS No.	Method Blank µg	Field Blank µg
formaldehyde	50-00-0	0.0280	0.0230
acetaldehyde	75-07-0	0.0230	0.0210
acetone	67-64-1	0.2210	0.2280
propionaldehyde	123-38-6	ND	ND
crotonaldehyde	4170-30-0	ND	ND
butyr/isobutyraldehyde	123-72-8	0.0780	0.0840
benzaldehyde	100-52-7	ND	ND
isovaleraldehyde	590-86-3	ND	ND
valeraldehyde	110-62-3	ND	ND
<i>o</i> -tolualdehyde	529-20-4	ND	ND
<i>m</i> -tolualdehyde	620-23-5	ND	ND
<i>p</i> -tolualdehyde	104-87-0	ND	ND
hexaldehyde	66-25-1	ND	0.0280
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND
diacetyl	431-03-8	ND	ND
methacrolein	78-85-3	ND	ND
2-butanone	78-93-3	ND	0.0050
glyoxal	107-22-2	ND	0.0820
acetophenone	98-86-2	ND	ND
methylglyoxal	78-98-8	0.0390	0.0490
octanal	124-13-0	ND	ND
nonanal	124-19-6	0.0670	0.1070
Sum, Speciated		0.4560	0.6270
Sum, Unspeciated		0.8170	0.8850
Total (Speciated + Unspeciated)		1.2730	1.5120

Table E-2A. Carbonyls, Individual Tube Results, Field Samples (12/14/01)

Site ID	Field ID	Characterization	Volume Sampled	ERG ID	Sampling Date	Analysis Date	Data File	WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyls	Carbonyls
								WSTV	WSTV	WSTV	Three Tubes	WSTV	WSTV	WSTV	Three Tubes	RC-DA	RC-DA ^a
								DA, FRONT	DA, MIDDLE	DA, REAR	12/14/01	RC, FRONT	RC, MIDDLE	RC, REAR	12/14/01	12/14/01	12/14/01
								310.17	310.17	310.17		290.78	290.78	290.78			
								24566	24567	24568		24570	24571	24569			
								12/14/01	12/14/01	12/14/01		12/14/01	12/14/01	12/14/01			
								12/28/01	12/28/01	12/28/01		12/28/01	12/28/01	12/28/01			
								F1L~031	F1L~032	F1L~033		F1L~035	F1L~036	F1L~034			
Compound		CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
E-4	formaldehyde	50-00-0	0.0750	0.0400	0.0420	0.1570	0.0390	0.0390	0.1290	0.2070	0.0500	0.0500					
	acetaldehyde	75-07-0	0.0950	0.0470	0.0580	0.2000	0.0900	0.1110	2.2720	2.4730	2.2730	2.2730					
	acetone	67-64-1	0.2780	0.2550	0.2520	0.7850	ND ^b	ND	ND	ND	-0.7850	ND					
	propionaldehyde	123-38-6	ND	ND	ND	ND	ND	ND	0.0770	0.0770	0.0770	0.0770					
	crotonaldehyde	4170-30-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
	butyr/isobutyraldehyde	123-72-8	0.1290	0.1270	0.1220	0.3780	0.2920	0.1370	0.2110	0.6400	0.2620	0.2620					
	benzaldehyde	100-52-7	ND	ND	ND	ND	ND	ND	0.0080	0.0080	0.0080	0.0080					
	isovaleraldehyde	590-86-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
	valeraldehyde	110-62-3	ND	ND	ND	ND	0.0100	ND	0.0350	0.0450	0.0450	0.0450					
	<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
	<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
	<i>p</i> -tolualdehyde	104-87-0	ND	ND	ND	ND	ND	ND	0.0130	0.0130	0.0130	0.0130					
	hexaldehyde	66-25-1	0.0280	0.0180	0.0190	0.0650	0.0220	0.0200	0.0450	0.0870	0.0220	0.0220					
	2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					

(continued)

Table E-2A. Carbonyls, Individual Tube Results, Field Samples (12/14/01) (concluded)

Site ID	WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyls	Carbonyls
Field ID	Hd3A1	Hd3A2	Hd3A3	Three Tubes	Hr3A1	Hr3A2	Hr3A3	Three Tubes	RC-DA	RC-DA ^a
Characterization	DA, FRONT	DA, MIDDLE	DA, REAR	12/14/01	RC, RONT	RC, MIDDLE	RC, REAR	12/14/01	12/14/01	12/14/01
Volume Sampled	310.17	310.17	310.17		290.78	290.78	290.78			
ERG ID	24566	24567	24568		24570	24571	24569			
Sampling Date	12/14/01	12/14/01	12/14/01		12/14/01	12/14/01	12/14/01			
Analysis Date	12/28/01	12/28/01	12/28/01		12/28/01	12/28/01	12/28/01			
Data File	F1L~031	F1L~032	F1L~033		F1L~035	F1L~036	F1L~034			
Compound	CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
E-5 diacetyl	431-03-8	ND	ND	ND	ND	ND	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	78-93-3	0.0030	0.0050	0.0040	0.0120	1.0860	0.0830	0.3460	1.5150	1.5030
glyoxal	107-22-2	0.0850	0.0720	ND	0.1570	0.2320	ND	ND	0.2320	0.0750
acetophenone	98-86-2	ND	ND	ND	ND	ND	ND	0.0300	0.0300	0.0300
methylglyoxal	78-98-8	0.0510	0.0450	0.0450	0.1410	0.0490	0.0410	0.0520	0.1420	0.0010
octanal	124-13-0	0.0380	ND	ND	0.0380	ND	ND	0.0420	0.0420	0.0040
nonanal	124-19-6	0.1320	0.0950	0.0880	0.3150	0.0790	0.0930	0.1490	0.3210	0.0060
Sum, Speciated		0.9140	0.7040	0.6300	2.2480	1.8990	0.5240	3.4090	5.8320	4.3690
Sum, Unspeciated		1.0185	0.9380	0.9155	2.8720	1.0645	0.9195	2.1265	4.1105	1.2385
Total (Speciated + Unspeciated)		1.9325	1.6420	1.5455	5.1200	2.9635	1.4435	5.5355	9.9425	5.6075

^a Negatives eliminated^b ND = not detected

Note: When the subtraction of the value of the Dilution Air from the Residence Chamber air results in a negative number, the value of "0" rather than the negative number is used for all subsequent calculations.

Table E-2B. Carbonyls, Individual Tube Results, Field Samples (12/15/01)

Site ID	WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyls	Carbonyls
Field ID	Hd3A1	Hd3A2	Hd3A3	Three Tubes	Hr3A1	Hr3A2	Hr3A3	Three Tubes	RC-DA	RC-DA ^a
Characterization	DA, FRONT	DA, MIDDLE	DA, REAR	12/15/01	RC, FRONT	RC, MIDDLE	RC, REAR	12/15/01	12/15/01	12/15/01
Volume Sampled	399.32	399.32	399.32		388.02	388.02	388.02			
ERG ID	24572	24573	24574		24577	24576	24575			
Sampling Date	12/15/01	12/15/01	12/15/01		12/15/01	12/15/01	12/15/01			
Analysis Date	12/28/01	12/28/01	12/28/01		12/28/01	12/28/01	12/28/01			
Data File	F1L~037	F1L~038	F1L~039		F1L~044	F1L~043	F1L~040			
Compound	CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
formaldehyde	50-00-0	0.0960	0.0500	0.0410	0.1870	0.0530	0.0590	0.2660	0.3780	0.1910
acetaldehyde	75-07-0	0.1090	0.0990	0.0500	0.2580	0.0640	0.2790	5.7420	6.0850	5.8270
acetone	67-64-1	0.3250	0.2930	0.2810	0.8990	1.4540	5.2810	0.9830	7.7180	6.8190
propionaldehyde	123-38-6	0.0060	ND ^b	ND	ND	ND	ND	0.340	0.3400	0.3400
crotonaldehyde	4170-30-0	ND	ND	ND	ND	ND	ND	0.011	0.0110	0.0110
butyr/isobutyraldehyde	123-72-8	0.1380	0.1270	0.1100	0.3750	0.1350	0.6170	0.2810	1.0330	0.6580
benzaldehyde	100-52-7	ND	ND	ND	ND	ND	ND	0.0860	0.0860	0.0860
isovaleraldehyde	590-86-3	ND	ND	ND	ND	ND	ND	ND	ND	ND
valeraldehyde	110-62-3	ND	ND	ND	ND	ND	0.032	0.060	0.0920	0.0920
<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	ND	ND	ND	ND	ND	ND
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND	ND	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	ND	ND	ND	ND	ND	0.012	0.076	0.0880	0.0880
hexaldehyde	66-25-1	0.0330	0.0240	0.0190	0.0760	0.0170	0.0250	0.0850	0.1270	0.0510
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	ND	ND	ND	ND	0.021	0.0210	0.021

(continued)

Table E-2B. Carbonyls, Individual Tube Results, Field Samples (12/15/01) (concluded)

Site ID		WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyl	Carbonyls
Field ID		Hd3A1	Hd3A2	Hd3A3	Three Tubes	Hr3A1	Hr3A2	Hr3A3	Three Tubes	RC-DA	RC-DA ^a
Characterization		DA, FRONT	DA, MIDDLE	DA, REAR	12/15/01	RC, FRONT	RC, MIDDLE	RC, REAR	12/15/01	12/15/01	12/15/01
Volume Sampled		399.32	399.32	399.32		388.02	388.02	388.02			
ERG ID		24572	24573	24574		24577	24576	24575			
Sampling Date		12/15/01	12/15/01	12/15/01		12/15/01	12/15/01	12/15/01			
Analysis Date		12/28/01	12/28/01	12/28/01		12/28/01	12/28/01	12/28/01			
Data File		FIL~037	FIL~038	FIL~039		FIL~044	FIL~043	FIL~040			
Compound	CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
E-7 diacetyl	431-03-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	78-93-3	0.0290	0.0300	0.0130	0.0720	0.1370	2.8140	0.5170	3.4680	3.3960	3.3960
glyoxal	107-22-2	0.0750	ND	ND	0.0750	0.0810	ND	ND	0.0810	0.0060	0.0060
acetophenone	98-86-2	ND	ND	ND	ND	ND	ND	0.041	0.0410	0.0410	0.0410
methylglyoxal	78-98-8	0.0540	0.0540	0.0510	0.1590	0.0380	0.0500	0.0630	0.1510	-0.0080	ND
octanal	124-13-0	0.0320	ND	ND	0.0320	ND	ND	0.0610	0.0610	0.0290	0.0290
nonanal	124-19-6	0.1550	0.1170	0.0710	0.3430	0.0820	0.0880	0.2350	0.4050	0.0620	0.0620
Sum, Speciated		1.0520	0.7940	0.6360	2.4820	2.0610	9.2570	8.8680	20.1860		17.7100
Sum, Unspeciated		0.9655	0.9275	0.9000	2.7930	0.9310	1.3150	2.8640	5.1100		2.3170
Total (Speciated + Unspeciated)		2.0175	1.7215	1.5360	5.2750	2.9920	10.5720	11.7320	25.2960		20.0270

^a Negatives eliminated^b ND = not detected

Note: When the subtraction of the value of the Dilution Air from the Residence Chamber air results in a negative number, the value of "0" rather than the negative number is used for all subsequent calculations.

Table E-2C. Carbonyls, Individual Tube Results, Field Samples (12/16/01)

Site ID		WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyls	Carbonyls
Field ID		Hd3A1	Hd3A2	Hd3A3	Three Tubes	Hr3A1	Hr3A2	Hr3A3	Three Tubes	RC-DA	RC-DA ^a
Characterization		DA, FRONT	DA, MIDDLE	DA, REAR	12/16/01	RC, FRONT	RC, MIDDLE	RC, REAR	12/16/01	12/16/01	12/16/01
Volume Sampled		401.5	401.5	401.5		401.5	401.5	401.5			
ERG ID		24578	24579	24580		24581	24582	24583			
Sampling Date		12/16/01	12/16/01	12/16/01		12/16/01	12/16/01	12/16/01			
Analysis Date		12/29/01	12/29/01	12/29/01		12/29/01	12/29/01	12/29/01			
Data File		F1L~045	F1L~046	F1L~047		F1L~048	F1L~049	F1L~050			
Compound	CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
formaldehyde	50-00-0	0.0580	0.0400	0.0360	0.1340	0.1060	0.0430	0.0340	0.1830	0.0490	0.0490
acetaldehyde	75-07-0	0.0820	0.0570	0.0570	0.1960	2.7830	0.1030	0.0480	2.9340	2.7380	2.7380
acetone	67-64-1	0.1710	0.2470	0.2350	0.6530	0.8570	2.7860	0.3350	3.9780	3.3250	3.3250
propionaldehyde	123-38-6	ND ^b	ND	ND	ND	0.1170	ND	ND	0.1170	0.1170	0.1170
crotonaldehyde	4170-30-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
butyr/isobutyraldehyde	123-72-8	0.1420	0.1280	0.1110	0.3810	0.2280	0.3650	ND	0.5930	0.2120	0.2120
benzaldehyde	100-52-7	ND	ND	0.0020	0.0020	0.0050	ND	ND	0.0050	0.0030	0.0030
isovaleraldehyde	590-86-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
valeraldehyde	110-62-3	ND	ND	ND	ND	0.0410	0.0110	ND	0.0520	0.0520	0.0520
<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	ND	0.0090	ND	ND	0.0090	0.0090	0.0090
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	ND	ND	ND	ND	0.0110	ND	ND	0.0110	0.0110	0.0110
hexaldehyde	66-25-1	0.0250	0.0180	0.0170	0.0600	0.0530	0.0230	0.0180	0.0940	0.0340	0.0340
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

(continued)

Table E-2C. Carbonyls, Individual Tube Results, Field Samples (12/16/01) (concluded)

Site ID	WSTV	WSTV	WSTV	Dilution Air	WSTV	WSTV	WSTV	Residence Chamber	Carbonyls	Carbonyls
Field ID	Hd3A1	Hd3A2	Hd3A3	Three Tubes	Hr3A1	Hr3A2	Hr3A3	Three Tubes	RC-DA	RC-DA ^a
Characterization	DA, FRONT	DA, MIDDLE	DA, REAR	12/16/01	RC, FRONT	RC, MIDDLE	RC, REAR	12/16/01	12/16/01	12/16/01
Volume Sampled	401.5	401.5	401.5		401.5	401.5	401.5			
ERG ID	24578	24579	24580		24581	24582	24583			
Sampling Date	12/16/01	12/16/01	12/16/01		12/16/01	12/16/01	12/16/01			
Analysis Date	12/29/01	12/29/01	12/29/01		12/29/01	12/29/01	12/29/01			
Data File	FIL~045	FIL~046	FIL~047		FIL~048	FIL~049	FIL~050			
Compound	CAS No.	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)	(µg)
E-9 diacetyl	431-03-8	ND	ND	ND	ND	ND	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	78-93-3	0.0160	0.0150	0.0110	0.0420	0.4680	1.3220	0.0140	1.8040	1.7620
glyoxal	107-22-2	0.0950	ND	ND	0.0950	ND	ND	ND	ND	-0.0950
acetophenone	98-86-2	ND	ND	ND	ND	ND	ND	ND	ND	ND
methylglyoxal	78-98-8	0.0500	0.0380	0.0410	0.1290	0.0530	0.0460	0.0440	0.1430	0.0140
octanal	124-13-0	0.0410	ND	ND	0.0410	0.0360	ND	ND	0.0360	-0.0050
nonanal	124-19-6	0.1660	0.0910	0.0820	0.3390	0.1740	0.0820	0.1030	0.3590	0.0200
Sum, Speciated		0.8460	0.6340	0.5920	2.0720	4.9410	4.7810	0.5960	10.3180	8.2460
Sum, Unspeciated		0.9370	0.9250	0.8910	2.7530	1.5075	1.1375	0.9930	3.6380	0.8850
Total (Speciated + Unspeciated)		1.7830	1.5590	1.4830	4.8250	6.4485	5.9185	1.5890	13.9560	9.1310

^a Negatives eliminated^b ND = not detected

Note: When the subtraction of the value of the Dilution Air from the Residence Chamber air results in a negative number, the value of "0" rather than the negative number is used for all subsequent calculations.

Table E-3A. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day

Compound	CAS No.	RC-DA			
		12/14/01 (µg)	Uncertainty Plus/Minus	% Total	Uncertainty Plus/Minus
formaldehyde	50-00-0	0.05	0.0055	0.074	0.008
acetaldehyde	75-07-0	2.2730	0.0259	3.362	0.038
acetone	67-64-1	ND ^a	2.6230	91.707	3.879
propionaldehyde	123-38-6	0.0770	0.0005	0.114	0.001
crotonaldehyde	4170-30-0	ND	ND	ND	ND
butyr/isobutyraldehyde	123-72-8	0.2620	0.0153	0.387	0.023
benzaldehyde	100-52-7	0.0080	0.0002	0.012	ND
isovaleraldehyde	590-86-3	ND	ND	ND	ND
valeraldehyde	110-62-3	0.0450	0.0043	0.067	0.006
<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	ND
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	0.0130	0.0007	0.019	0.001
hexaldehyde	66-25-1	0.0220	0.0020	0.033	0.003
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	ND	ND
diacetyl	431-03-8	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND
2-butanone	78-93-3	1.5030	0.1222	2.223	0.181
glyoxal	107-22-2	0.0750	0.0020	0.111	0.003
acetophenone	98-86-2	0.0300	0.0014	0.044	0.002
methylglyoxal	78-98-8	0.0010	0.0001	0.001	ND
octanal	124-13-0	0.0040	0.0003	0.006	ND
nonanal	124-19-6	0.0060	0.0005	0.009	0.001
Sum, Speciated		4.3690			
Sum, Unspeciated		1.2385			
Total (Speciated + Unspeciated)		5.6075			

^a ND = not detected

Table E-3B. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day

Compound	CAS No.	RC-DA		% Total	Uncertainty Plus/Minus
		12/15/01 (µg)	Uncertainty Plus/Minus		
formaldehyde	50-00-0	0.1910	0.0210	0.9533	0.1051
acetaldehyde	75-07-0	5.827	0.0664	29.0841	0.3316
acetone	67-64-1	6.819	0.2884	34.0354	1.4397
propionaldehyde	123-38-6	0.34	0.0022	1.6970	0.0112
crotonaldehyde	4170-30-0	0.011	0.0003	0.0549	0.0014
butyr/isobutyraldehyde	123-72-8	0.6580	0.0384	3.2843	0.1918
benzaldehyde	100-52-7	0.0860	0.0026	0.4292	0.0131
isovaleraldehyde	590-86-3	ND ^a	ND	ND	ND
valeraldehyde	110-62-3	0.092	0.0088	0.4592	0.0440
<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	ND
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	0.088	0.0049	0.4392	0.0246
hexaldehyde	66-25-1	0.051	0.0047	0.2546	0.0237
2,5-dimethylbenzaldehyde	5779-94-2	0.021	0.0006	0.1048	0.0032
diacetyl	431-03-8	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND
2-butanone	78-93-3	3.3960	0.2761	16.9503	1.3781
glyoxal	107-22-2	0.0060	0.0002	0.0299	0.0008
acetophenone	98-86-2	0.0410	0.0020	0.2046	0.0097
methylglyoxal	78-98-8	ND	ND	ND	ND
octanal	124-13-0	0.0290	0.0023	0.1447	0.0117
nonanal	124-19-6	0.0620	0.0050	0.3095	0.0249
Sum, Speciated		17.7180			
Sum, Unspeciated		2.3170			
Total (Speciated + Unspeciated)		20.0350			

^a ND = not detected

Table E-3C. Carbonyls: Smelt Tank Vent Carbonyls for Each Test Day

Compound	CAS No.	RC-DA	Uncertainty Plus/Minus	%	Uncertainty Plus/Minus
		12/16/01 (µg)			
formaldehyde	50-00-0	0.049	0.0054	0.5308	0.0585
acetaldehyde	75-07-0	2.738	0.0312	29.6609	0.3381
acetone	67-64-1	3.3250	0.1406	36.0199	1.5236
propionaldehyde	123-38-6	0.117	0.0008	1.2675	0.0084
crotonaldehyde	4170-30-0	ND ^a	ND	ND	ND
butyr/isobutyraldehyde	123-72-8	0.212	0.0124	2.2966	0.1341
benzaldehyde	100-52-7	0.003	0.0001	0.0325	0.0010
isovaleraldehyde	590-86-3	ND	ND	ND	ND
valeraldehyde	110-62-3	0.052	0.0050	0.5633	0.0540
<i>o</i> -tolualdehyde	529-20-4	0.009	0.0001	0.0975	0.0013
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	0.011	0.0006	0.1192	0.0067
hexaldehyde	66-25-1	0.034	0.0032	0.3683	0.0343
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	ND	ND
diacetyl	431-03-8	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND
2-butanone	78-93-3	1.7620	0.1433	19.0879	1.5518
glyoxal	107-22-2	ND	ND	ND	ND
acetophenone	98-86-2	ND	ND	ND	ND
methylglyoxal	78-98-8	0.0140	0.0017	0.1517	0.0186
octanal	124-13-0	ND	ND	ND	ND
nonanal	124-19-6	0.02	0.0016	0.2167	0.0175
Sum, Speciated		8.3460			
Sum, Unspeciated		0.8850			
Total (Speciated + Unspeciated)		9.2310			

^a ND = not detected

Table E-4. Carbonyls Summary: Smelt Tank Vent, 12/14/01 - 12/16/01

Compound	CAS No.	Field	Carbonyls	Carbonyls	Carbonyls
		Blank	RC-DA	RC-DA	RC-DA
		(µg)	12/14/01	12/15/01	12/16/01
		(µg)	(µg)	(µg)	(µg)
formaldehyde	50-00-0	0.0230	0.0500	0.1910	0.0490
acetaldehyde	75-07-0	0.0210	2.2730	5.8270	2.7380
acetone	67-64-1	0.2280	ND ^a	6.8190	3.3250
propionaldehyde	123-38-6	ND	0.0770	0.3400	0.1170
crotonaldehyde	4170-30-0	ND	ND	0.0110	ND
butyr/isobutyraldehyde	123-72-8	0.0840	0.2620	0.6580	0.2120
benzaldehyde	100-52-7	ND	0.0080	0.0860	0.0030
isovaleraldehyde	590-86-3	ND	ND	ND	ND
valeraldehyde	110-62-3	ND	0.0450	0.0920	0.0520
<i>o</i> -tolualdehyde	529-20-4	ND	ND	ND	0.0090
<i>m</i> -tolualdehyde	620-23-5	ND	ND	ND	ND
<i>p</i> -tolualdehyde	104-87-0	ND	0.0130	0.0880	0.0110
hexaldehyde	66-25-1	0.0280	0.0220	0.0510	0.0340
2,5-dimethylbenzaldehyde	5779-94-2	ND	ND	0.0210	ND
diacetyl	431-03-8	ND	ND	ND	ND
methacrolein	78-85-3	ND	ND	ND	ND
2-butanone	78-93-3	0.0050	1.5030	3.3960	1.7620
glyoxal	107-22-2	0.0820	0.0750	0.0060	ND
acetophenone	98-86-2	ND	0.0300	0.0410	ND
methylglyoxal	78-98-8	0.0490	0.0010	ND	0.0140
octanal	124-13-0	ND	0.0040	0.0290	ND
nonanal	124-19-6	0.1070	0.0060	0.0620	0.0200
Sum, Speciated		0.6270	4.3690	17.7180	8.3460
Sum, Unspeciated		0.8850	1.2385	2.3170	0.8850
Total (Speciated + Unspeciated)		1.5120	5.6075	20.0350	9.2310

^a ND = not detected

Appendix F

Data Tables for Individual NMOC Samples

Contents

<u>Table</u>	<u>Page</u>
F-1. Smelt Tank Vent: Field Test (12/14/01) SNMOC Analysis from Laboratory Blanks and Field Ambient Sampling	F-3
F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters	F-6
F-2B. Smelt Tank Vent: Field Test (12/15/01), SNMOCs Collected in Canisters	F-11
F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters	F-16
F-3. Smelt Tank Vent: Field Test (12/14/01 - 12/16/01), Summary of SNMOCs Collected in Canisters	F-21
F-4A. Smelt Tank Vent: Field Test (12/14/01), Total SNMOCs Collected	F-23
F-4B. Smelt Tank Vent: Field Test (12/15/01), Total SNMOCs Collected	F-26
F-4C. Smelt Tank Vent: Field Test (12/16/01), Total SNMOCs Collected	F-30
F-5A. SNMOC Values for 12/14/01 in SPECIATE Format	F-33
F-5B. SNMOC Values for 12/15/01 in SPECIATE Format	F-36
F-5C. SNMOC Values for 12/16/01 in SPECIATE Format	F-39
F-6. SNMOC, Reported as Weight Percent of Total	F-42

Table F-1. Smelt Tank Vent: Field Test (12/14/01) SNMOC Analysis from Laboratory Blanks and Field Ambient Sampling

Compound	CAS No.	Laboratory	
		Blank 12/14/01 ERG #24592 (µg/m ³)	Ambient 12/14/01 ERG #24593 (µg/m ³)
ethylene	74-85-1	0.48	1.17
acetylene	74-86-2	ND ^a	0.56
ethane	74-85-1	0.49	1.63
propylene	115-07-1	0.24	0.54
propane	74-98-6	0.50	3.11
propyne	74-99-7	ND	ND
isobutane	75-28-5	0.26	0.68
isobutene/1-butene	115-11-7/106-98-0	0.27	0.51
1,3-butadiene	106-99-0	ND	ND
<i>n</i> -butane	106-97-8	0.43	1.57
<i>trans</i> -2-butene	624-64-6	0.19	0.28
<i>cis</i> -2-butene	590-18-1	0.23	0.31
3-methyl-1-butene	563-45-1	ND	ND
isopentane	78-78-4	0.43	1.37
1-pentene	109-67-1	0.22	0.30
2-methyl-1-butene	563-46-2	ND	ND
<i>n</i> -pentane	109-66-0	0.22	0.98
isoprene	78-79-4	0.25	0.30
<i>trans</i> -2-pentene	646-04-8	ND	ND
<i>cis</i> -2-pentene	627-20-3	0.32	0.32
2-methyl-2-butene	513-35-9	ND	ND
2,2-dimethylbutane	75-83-2	0.40	0.57
cyclopentene	142-29-0	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND
cyclopentane	287-92-3	0.21	0.29
2,3-dimethylbutane	79-29-8	0.45	0.61
2-methylpentane	107-83-5	0.27	0.83
3-methylpentane	96-14-0	0.38	3.63
2-methyl-1-pentene	763-29-1	ND	ND
1-hexene	592-41-6	0.39	0.55

(continued)

Table F-1. Smelt Tank Vent: Field Test (12/14/01) SNMOC Analysis from Laboratory Blanks and Field Ambient Sampling (continued)

Compound	CAS No.	Laboratory	
		Blank 12/14/01 ERG #24592 (µg/m ³)	Ambient 12/14/01 ERG #24593 (µg/m ³)
2-ethyl-1-butene	760-21-4	ND	ND
<i>n</i> -hexane	110-54-3	0.37	139.09^b
<i>trans</i> -2-hexene	4050-45-7	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND
methylcyclopentane	96-37-7	0.23	18.17
2,4-dimethylpentane	108-08-7	0.30	0.43
benzene	71-43-2	0.27	1.09
cyclohexane	110-82-7	0.39	0.45
2-methylhexane	591-76-4	ND	0.62
2,3-dimethylpentane	565-59-3	0.48	0.60
3-methylhexane	589-34-4	0.32	0.38
1-heptene	592-76-7	ND	ND
2,2,4-trimethylpentane	540-84-1	0.24	0.44
<i>n</i> -heptane	142-82-5	0.24	0.34
methylcyclohexane	108-87-2	0.30	0.41
2,2,3-trimethylpentane	564-02-3	ND	ND
2,3,4-trimethylpentane	565-75-3	0.22	0.32
toluene	108-88-3	0.70	1.22
2-methylheptane	592-27-8	0.19	0.29
3-methylheptane	589-81-1	0.19	0.25
1-octene	111-66-0	ND	ND
<i>n</i> -octane	111-65-9	0.20	0.36
ethylbenzene	100-41-4	ND	ND
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	0.19	0.49
styrene	100-42-5	ND	0.17
<i>o</i> -xylene	95-47-6	0.15	0.24
1-nonene	124-11-8	ND	ND
<i>n</i> -nonane	111-84-2	0.15	0.47
isopropylbenzene	98-82-8	ND	0.15
alpha-pinene	80-56-8	ND	15.24

(continued)

Table F-1. Smelt Tank Vent: Field Test (12/14/01) SNMOC Analysis from Laboratory Blanks and Field Ambient Sampling (concluded)

Compound	CAS No.	Laboratory	
		Blank 12/14/01 ERG #24592 ($\mu\text{g}/\text{m}^3$)	Ambient 12/14/01 ERG #24593 ($\mu\text{g}/\text{m}^3$)
<i>n</i> -propylbenzene	103-65-1	0.17	0.24
<i>m</i> -ethyltoluene	620-14-4	0.07	1.02
<i>p</i> -ethyltoluene	622-96-8	0.15	0.35
1,3,5-trimethylbenzene	108-67-8	ND	0.25
<i>o</i> -ethyltoluene	611-14-3	ND	0.27
beta-pinene	127-91-3	ND	0.42
1,2,4-trimethylbenzene	95-63-6	0.20	0.57
1-decene	872-05-9	ND	ND
<i>n</i> -decane	124-18-5	0.23	0.60
1,2,3-trimethylbenzene	526-73-8	ND	0.23
<i>m</i> -diethylbenzene	141-93-5	ND	0.16
<i>p</i> -diethylbenzene	105-05-5	ND	ND
1-undecene	821-95-4	ND	ND
<i>n</i> -undecane	1120-21-4	0.20	0.37
1-dodecene	112-41-4	ND	ND
<i>n</i> -dodecane	112-40-3	ND	0.96
1-tridecene	2437-56-1	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND
Total Speciated		12.70	206.77
Total Unspeciated		1.77	43.02
Total (Speciated + Unspeciated)^c		14.47	249.79

^a ND = not detected

^b *n*-hexane deleted from 12/14/01 data as a contaminant from the denuders

^c Total NMOC with unknowns in $\mu\text{g}/\text{m}^3$ is an estimate based on propane only.

Table F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters

	Compound	CAS No.	Residence	Dilution	No Negs ^b		
			Chamber	Air	SNMOC		
			12/14/01	12/14/01	RC-DA ^a		
			V=3.900L	V=3.900L	12/14/01		
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
	ethylene	74-85-1	2.68	0.0105	1.2300	0.0048	0.0057
	acetylene	74-86-2	0.74	0.0029	0.5300	0.0021	0.0008
	ethane	74-85-1	4.12	0.0161	2.4600	0.0096	0.0065
	propylene	115-07-01	1.98	0.0077	0.9600	0.0037	0.0040
	propane	74-98-6	8.94	0.0349	6.0900	0.0238	0.0111
	propyne	74-99-7	ND ^c	ND	ND	ND	ND
	isobutane	75-28-5	0.87	0.0034	0.4500	0.0018	0.0016
	isobutene/1-butene	115-11-7/106-98-0	0.69	0.0027	0.3400	0.0013	0.0014
	1,3-butadiene	106-99-0	ND	ND	ND	ND	ND
	<i>n</i> -butane	106-97-8	1.68	0.0066	0.6200	0.0024	0.0041
	<i>trans</i> -2-butene	624-64-6	0.71	0.0028	0.1700	0.0007	0.0021
	<i>cis</i> -2-butene	590-18-1	0.86	0.0034	0.2600	0.0010	0.0023
	3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND
	isopentane	78-78-4	1.61	0.0063	0.5800	0.0023	0.0040
	1-pentene	109-67-1	0.69	0.0027	0.2000	0.0008	0.0019
	2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND
	<i>n</i> -pentane	109-66-0	1.21	0.0047	0.5900	0.0023	0.0024
	isoprene	78-79-4	0.74	0.0029	ND	ND	0.0029
	<i>trans</i> -2-pentene	646-04-8	ND	ND	ND	ND	ND

(continued)

Table F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Dilution		No Negs ^b	
			Chamber	Residence	Air	Dilution	SNMOC
			12/14/01	Chamber	12/14/01	Air	RC-DA ^a
			V=3.900L	12/14/01	V=3.900L	12/14/01	12/14/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
	<i>cis</i> -2-pentene	627-20-3	0.95	0.0037	0.2900	0.0011	0.0026
	2-methyl-2-butene	513-35-9	ND	ND	ND	ND	ND
	2,2-dimethylbutane	75-83-2	1.46	0.0057	0.4500	0.0018	0.0039
	cyclopentene	142-29-0	ND	ND	ND	ND	ND
	4-methyl-1-pentene	691-37-2	ND	ND	ND	ND	ND
	cyclopentane	287-92-3	ND	ND	0.3400	0.0013	-0.0013
F-7	2,3-dimethylbutane	79-29-8	1.91	0.0074	0.4900	0.0019	0.0055
	2-methylpentane	107-83-5	0.98	0.0038	0.3100	0.0012	0.0026
	3-methylpentane	96-14-0	2.24	0.0087	0.4000	0.0016	0.0072
	2-methyl-1-pentene	763-29-1	ND	ND	ND	ND	ND
	1-hexene	592-41-6	1.63	0.0064	0.4600	0.0018	0.0046
	2-ethyl-1-butene	760-21-4	ND	ND	ND	ND	ND
	<i>n</i> -hexane	110-54-3	ND ^e	ND ^e	0.4500	0.0018	0.1105
	<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND	ND
	<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND	ND
	methylcyclopentane	96-37-7	5.21	0.0203	0.2600	0.0010	0.0193
	2,4-dimethylpentane	108-08-7	1.36	0.0053	0.3500	0.0014	0.0039
	benzene	71-43-2	1.67	0.0065	0.2800	0.0011	0.0054
	cyclohexane	110-82-7	1.58	0.0062	0.4100	0.0016	0.0046

(continued)

Table F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence		Dilution		No Negs ^b	
			Chamber	Residence	Air	Dilution	SNMOC	SNMOC
			12/14/01	Chamber	12/14/01	Air	RC-DA ^a	RC-DA
			V=3.900L	12/14/01	V=3.900L	12/14/01	12/14/01	12/14/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
F-8	2-methylhexane	591-76-4	ND	ND	ND	ND	ND	ND
	2,3-dimethylpentane	565-59-3	2.36	0.0092	0.4200	0.0016	0.0076	0.0076
	3-methylhexane	589-34-4	0.89	0.0035	0.3300	0.0013	0.0022	0.0022
	1-heptene	592-76-7	1.45	0.0057	ND	ND	0.0057	0.0057
	2,2,4-trimethylpentane	540-84-1	1.01	0.0039	0.2700	0.0011	0.0029	0.0029
	<i>n</i> -heptane	142-82-5	1.02	0.0040	0.2400	0.0009	0.0030	0.0030
	methylcyclohexane	108-87-2	0.90	0.0035	0.3200	0.0012	0.0023	0.0023
	2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND	ND	ND
	2,3,4-trimethylpentane	565-75-3	0.83	0.0032	0.2500	0.0010	0.0023	0.0023
	toluene	108-88-3	4.14	0.0161	0.4000	0.0016	0.0146	0.0146
	2-methylheptane	592-27-8	0.82	0.0032	0.1700	0.0007	0.0025	0.0025
	3-methylheptane	589-81-1	ND	ND	0.1900	0.0007	-0.0007	ND ^d
	1-octene	111-66-0	ND	ND	ND	ND	ND	ND
	<i>n</i> -octane	111-65-9	0.99	0.0039	0.2200	0.0009	0.0030	0.0030
	ethylbenzene	100-41-4	ND	ND	ND	ND	ND	ND
	<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	0.00	ND	ND	ND	ND	ND
	styrene	100-42-5	ND	ND	ND	ND	ND	ND
	<i>o</i> -xylene	95-47-6	0.73	0.0028	ND	ND	0.0028	0.0028
	1-nonene	124-11-8	ND	ND	ND	ND	ND	ND

(continued)

Table F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Dilution		No Negs ^b	
			Chamber	Residence	Air	Dilution	SNMOC
			12/14/01	Chamber	12/14/01	Air	RC-DA ^a
			V=3.900L	12/14/01	V=3.900L	12/14/01	12/14/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
	<i>n</i> -nonane	111-84-2	ND	ND	ND	ND	ND
	isopropylbenzene	98-82-8	0.82	0.0032	0.2000	0.0008	0.0024
	alpha-pinene	80-56-8	1.12	0.0044	0.2200	0.0009	0.0035
	<i>n</i> -propylbenzene	103-65-1	ND	ND	0.1400	0.0005	ND ^d
	<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND	ND
	<i>p</i> -ethyltoluene	622-96-8	ND	ND	0.1600	0.0006	ND ^d
F-9	1,3,5-trimethylbenzene	108-67-8	0.82	0.0032	0.1500	0.0006	0.0026
	<i>o</i> -ethyltoluene	611-14-3	0.67	0.0026	0.1800	0.0007	0.0019
	beta-pinene	127-91-3	ND	ND	ND	ND	ND
	1,2,4-trimethylbenzene	95-63-6	0.92	0.0036	0.1900	0.0007	0.0028
	1-decene	872-05-9	ND	ND	ND	ND	ND
	<i>n</i> -decane	124-18-5	ND	ND	0.2500	0.0010	ND ^d
	1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND
	<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND	ND
	<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND
	1-undecene	821-95-4	ND	ND	ND	ND	ND
	<i>n</i> -undecane	1120-21-4	0.70	0.0027	0.1500	0.0006	0.0021
	1-dodecene	112-41-4	ND	ND	ND	ND	ND
	<i>n</i> -dodecane	112-40-3	0.81	0.0032	0.7100	0.0028	0.0004

(continued)

Table F-2A. Smelt Tank Vent: Field Test (12/14/01), SNMOCs Collected in Canisters (concluded)

Compound	CAS No.	Residence		Dilution		No Negs ^b	
		Chamber	Residence	Air	Dilution	SNMOC	SNMOC
		12/14/01	Chamber	12/14/01	Air	RC-DA ^a	RC-DA
		V=3.900L	12/14/01	V=3.900L	12/14/01	12/14/01	12/14/01
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
1-tridecene	2437-56-1	ND	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND	ND
Total Speciated		67.51	0.2633	24.1300	0.0941	0.1692	0.1751
Total Unspeciated		62.79	0.2449	3.3700	0.0131	0.2317	0.2317
Total (Speciated + Unspeciated)^f		130.30	0.5082	27.5000	0.1073	0.4009	0.4069

^a RC = residence chamber; DA = dilution air.^b When subtraction of the value of the Dilution Air from the Residence Chamber Air results in a negative number, the value "0" rather than the negative value is used for all subsequent calculations.^c ND = not detected^d When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."^e *n*-hexane deleted from 12/14/01 data as a contaminant from the denuders^f Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-2B. Smelt Tank Vent: Field Test (12/15/01), SNMOCs Collected in Canisters

	Compound	CAS No.	Residence	Residence	Dilution		No Negs ^b
			Chamber	Chamber	Air	Dilution	SNMOC
			12/15/01	12/15/01	12/15/01	Air	RC-DA ^a
			V=3.900L	V=3.900L	V=3.900L	12/15/01	12/15/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
	ethylene	74-85-1	12.0400	0.0470	1.8100	0.0071	0.0399
	acetylene	74-86-2	3.2200	0.0126	0.7400	0.0029	0.0097
	ethane	74-85-1	13.6400	0.0532	4.3400	0.0169	0.0363
	propylene	115-07-01	4.6300	0.0181	0.6700	0.0026	0.0154
	propane	74-98-6	8.6200	0.0336	4.2100	0.0164	0.0172
	propyne	74-99-7	ND ^c	ND	ND	ND	ND
	isobutane	75-28-5	1.2400	0.0048	0.3700	0.0014	0.0034
	isobutene/1-butene	115-11-7/106-98-0	2.2800	0.0089	0.4100	0.0016	0.0073
	1,3-butadiene	106-99-0	0.6000	0.0023	ND	ND	0.0023
	<i>n</i> -butane	106-97-8	2.4000	0.0094	0.5300	0.0021	0.0073
	<i>trans</i> -2-butene	624-64-6	1.0600	0.0041	0.1900	0.0007	0.0034
	<i>cis</i> -2-butene	590-18-1	1.2700	0.0050	0.2700	0.0011	0.0039
	3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND
	isopentane	78-78-4	1.8400	0.0072	0.5400	0.0021	0.0051
	1-pentene	109-67-1	1.0000	0.0039	0.2100	0.0008	0.0031
	2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND
	<i>n</i> -pentane	109-66-0	1.3600	0.0053	0.3900	0.0015	0.0038
	isoprene	78-79-4	0.9800	0.0038	0.2000	0.0008	0.0030
	<i>trans</i> -2-pentene	646-04-8	ND	ND	0.5200	0.0020	-0.0020

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F-12

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Table F-2B. Smelt Tank Vent: Field Test (12/15/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Residence	Dilution		No Negs ^b	
			Chamber	Chamber	Air	Dilution	SNMOC	SNMOC
			12/15/01	12/15/01	12/15/01	Air	RC-DA ^a	RC-DA
			V=3.900L	12/15/01	V=3.900L	12/15/01	12/15/01	12/15/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
F-13	2-methylhexane	591-76-4	ND	ND	ND	ND	ND	
	2,3-dimethylpentane	565-59-3	2.6700	0.0104	0.5200	0.0020	0.0084	
	3-methylhexane	589-34-4	ND	ND	0.3900	0.0015	ND ^d	
	1-heptene	592-76-7	ND	ND	ND	ND	ND	
	2,2,4-trimethylpentane	540-84-1	1.0500	0.0041	0.2600	0.0010	0.0031	
	<i>n</i> -heptane	142-82-5	0.8300	0.0032	0.1900	0.0007	0.0025	
	methylcyclohexane	108-87-2	1.1600	0.0045	0.3000	0.0012	0.0034	
	2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND	ND	
	2,3,4-trimethylpentane	565-75-3	0.7700	0.0030	0.1700	0.0007	0.0023	
	toluene	108-88-3	7.5200	0.0293	0.4200	0.0016	0.0277	
	2-methylheptane	592-27-8	0.9400	0.0037	0.2000	0.0008	0.0029	
	3-methylheptane	589-81-1	0.6300	0.0025	0.1900	0.0007	0.0017	
	1-octene	111-66-0	ND	ND	ND	ND	ND	
	<i>n</i> -octane	111-65-9	0.8100	0.0032	0.2700	0.0011	0.0021	
	ethylbenzene	100-41-4	ND	ND	0.1500	0.0006	ND ^d	
	<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	1.4100	0.0055	ND	ND	0.0055	
	styrene	100-42-5	0.6700	0.0026	ND	ND	0.0026	
<i>o</i> -xylene	95-47-6	0.6000	0.0023	ND	ND	0.0023		
1-nonene	124-11-8	ND	ND	ND	ND	ND		

(continued)

Table F-2B. Smelt Tank Vent: Field Test (12/15/01), SNMOCs Collected in Canisters (continued)

		Residence		Dilution		No Negs ^b	
		Chamber	Residence	Air	Dilution	SNMOC	SNMOC
		12/15/01	Chamber	12/15/01	Air	RC-DA ^a	RC-DA
		V=3.900L	12/15/01	V=3.900L	12/15/01	12/15/01	12/15/01
	Compound	CAS No.	(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
F-14	<i>n</i> -nonane	111-84-2	ND	ND	0.1500	0.0006	ND ^d
	isopropylbenzene	98-82-8	0.9600	0.0037	ND	ND	0.0037
	alpha-pinene	80-56-8	ND	ND	ND	ND	ND
	<i>n</i> -propylbenzene	103-65-1	ND	ND	0.1800	0.0007	ND ^d
	<i>m</i> -ethyltoluene	620-14-4	ND	ND	0.1400	0.0005	ND ^d
	<i>p</i> -ethyltoluene	622-96-8	1.2700	0.0050	0.2100	0.0008	0.0041
	1,3,5-trimethylbenzene	108-67-8	ND	ND	0.1400	0.0005	ND ^d
	<i>o</i> -ethyltoluene	611-14-3	ND	ND	0.1500	0.0006	ND ^d
	beta-pinene	127-91-3	ND	ND	ND	ND	ND
	1,2,4-trimethylbenzene	95-63-6	1.1100	0.0043	0.1700	0.0007	0.0037
	1-decene	872-05-9	ND	ND	ND	ND	ND
	<i>n</i> -decane	124-18-5	ND	ND	0.2700	0.0011	ND ^d
	1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND
	<i>m</i> -diethylbenzene	141-93-5	ND	ND	0.1500	0.0006	ND ^d
	<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND
	1-undecene	821-95-4	ND	ND	ND	ND	ND
	<i>n</i> -undecane	1120-21-4	0.6600	0.0026	0.1900	0.0007	0.0018
	1-dodecene	112-41-4	ND	ND	ND	ND	ND
	<i>n</i> -dodecane	112-40-3	ND	ND	0.9700	0.0038	ND ^d

(continued)

Table F-2B. Smelt Tank Vent: Field Test (12/15/01), SNMOCs Collected in Canisters (concluded)

Compound	CAS No.	Residence	Dilution		No Negs ^b	
		Chamber	Residence	Air	Dilution	SNMOC
		12/15/01	Chamber	12/15/01	Air	RC-DA ^a
		V=3.900L	12/15/01	V=3.900L	12/15/01	12/15/01
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
1-tridecene	2437-56-1	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND
Total Speciated		107.0900	0.4177	34.9200	0.1362	0.2815
Total Unspeciated		62.1600	0.2424	7.0500	0.0275	0.2149
Total (Speciated + Unspeciated)^c		169.2500	0.6601	41.9700	0.1637	0.4964

^a RC = residence chamber; DA = dilution air.

^b When subtraction of the value of the Dilution Air from the Residence Chamber Air results in a negative number, the value "0" rather than the negative value is used for all subsequent calculations.

^c ND = not detected

^d When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."

^e Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters

	Compound	CAS No.	Residence	Residence	Dilution		No Negs ^b
			Chamber	Chamber	Air	Dilution	SNMOC
			12/16/01	12/16/01	12/16/01	12/16/01	RC-DA ^a
			V=4.300L	V=4.500L	V=4.500L	V=4.500L	RC-DA
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
F-16	ethylene	74-85-1	2.4100	0.0104	1.0700	0.0048	0.0055
	acetylene	74-86-2	0.7200	0.0031	0.6900	0.0031	ND ^c
	ethane	74-85-1	5.1600	0.0222	3.4100	0.0153	0.0068
	propylene	115-07-01	1.5500	0.0067	0.5200	0.0023	0.0043
	propane	74-98-6	3.5900	0.0154	2.4300	0.0109	0.0045
	propyne	74-99-7	ND	ND	ND	ND	ND
	isobutane	75-28-5	0.7400	0.0032	0.4300	0.0019	0.0012
	isobutene/1-butene	115-11-7/106-98-0	0.7500	0.0032	0.4300	0.0019	0.0013
	1,3-butadiene	106-99-0	ND	ND	ND	ND	ND
	<i>n</i> -butane	106-97-8	1.6200	0.0070	0.7900	0.0036	0.0034
	<i>trans</i> -2-butene	624-64-6	0.8000	0.0034	0.2500	0.0011	0.0023
	<i>cis</i> -2-butene	590-18-1	1.0300	0.0044	0.3500	0.0016	0.0029
	3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND
	isopentane	78-78-4	1.4800	0.0064	0.6300	0.0028	0.0035
	1-pentene	109-67-1	0.8500	0.0037	0.2500	0.0011	0.0025
	2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND
	<i>n</i> -pentane	109-66-0	1.2200	0.0052	0.4000	0.0018	0.0034
	isoprene	78-79-4	0.9600	0.0041	0.2200	0.0010	0.0031
	<i>trans</i> -2-pentene	646-04-8	ND	ND	0.3000	0.0014	-0.0014
							ND ^d

(continued)

Table F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Dilution	SNMOC	No Negs ^b
			Chamber	Air		
			Residence	Dilution		
			12/16/01	12/16/01		
			V=4.300L	V=4.500L		
			(µg/m ³)	(µg/m ³)	RC-DA ^a	RC-DA
			(µg)	(µg)	12/16/01	12/16/01
					(µg)	(µg)
	<i>cis</i> -2-pentene	627-20-3	1.2800	0.3300	0.0015	0.0040
	2-methyl-2-butene	513-35-9	ND	ND	ND	ND
	2,2-dimethylbutane	75-83-2	1.6700	0.4700	0.0021	0.0051
	cyclopentene	142-29-0	ND	ND	ND	ND
	4-methyl-1-pentene	691-37-2	ND	ND	ND	ND
	cyclopentane	287-92-3	0.6900	0.3600	0.0016	0.0013
	2,3-dimethylbutane	79-29-8	1.8300	0.5500	0.0025	0.0054
	2-methylpentane	107-83-5	1.2800	0.3100	0.0014	0.0041
	3-methylpentane	96-14-0	1.5300	0.4600	0.0021	0.0045
	2-methyl-1-pentene	763-29-1	ND	ND	ND	ND
	1-hexene	592-41-6	1.7100	0.5000	0.0023	0.0051
	2-ethyl-1-butene	760-21-4	ND	ND	ND	ND
	<i>n</i> -hexane	110-54-3	1.6700	1.1400	0.0051	0.0021
	<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND
	<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND
	methylcyclopentane	96-37-7	0.9200	0.3800	0.0017	0.0022
	2,4-dimethylpentane	108-08-7	1.2100	0.3300	0.0015	0.0037
	benzene	71-43-2	0.9900	0.3600	0.0016	0.0026
	cyclohexane	110-82-7	1.5700	0.4500	0.0020	0.0047

(continued)

Table F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Residence	Dilution		No Negs ^b
			Chamber	Chamber	Air	Dilution	SNMOC
			12/16/01	12/16/01	12/16/01	Air	RC-DA ^a
			V=4.300L	V=4.500L	V=4.500L	12/16/01	12/16/01
			(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
F-18	2-methylhexane	591-76-4	1.3800	0.0059	0.3600	0.0016	0.0043
	2,3-dimethylpentane	565-59-3	3.0700	0.0132	0.7500	0.0034	0.0098
	3-methylhexane	589-34-4	0.6600	0.0028	0.3500	0.0016	0.0013
	1-heptene	592-76-7	ND	ND	ND	ND	ND
	2,2,4-trimethylpentane	540-84-1	0.9800	0.0042	0.3000	0.0014	0.0029
	<i>n</i> -heptane	142-82-5	0.9400	0.0040	0.2000	0.0009	0.0031
	methylcyclohexane	108-87-2	0.9800	0.0042	0.3300	0.0015	0.0027
	2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND	ND
	2,3,4-trimethylpentane	565-75-3	1.0600	0.0046	0.2400	0.0011	0.0035
	toluene	108-88-3	3.1800	0.0137	0.3200	0.0014	0.0122
	2-methylheptane	592-27-8	0.7800	0.0034	0.1800	0.0008	0.0025
	3-methylheptane	589-81-1	0.6700	0.0029	0.2200	0.0010	0.0019
	1-octene	111-66-0	ND	ND	ND	ND	ND
	<i>n</i> -octane	111-65-9	0.8400	0.0036	0.2300	0.0010	0.0026
	ethylbenzene	100-41-4	0.7100	0.0031	ND	ND	0.0031
	<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	0.9400	0.0040	0.2800	0.0013	0.0028
	styrene	100-42-5	ND	ND	ND	ND	ND
	<i>o</i> -xylene	95-47-6	ND	ND	ND	ND	ND
	1-nonene	124-11-8	ND	ND	ND	ND	ND

(continued)

Table F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters (continued)

	Compound	CAS No.	Residence	Residence Chamber 12/16/01 V=4.300L (µg/m³)	Dilution	Dilution Air 12/16/01 V=4.500L (µg)	SNMOC RC-DA ^a 12/16/01 (µg)	No Negs ^b		
			Chamber		Air			Dilution	SNMOC	
			12/16/01		12/16/01			Air	RC-DA ^a	RC-DA
			12/16/01		12/16/01			12/16/01	12/16/01	12/16/01
			(µg/m³)		(µg)			(µg/m³)	(µg)	(µg)
F-19	<i>n</i> -nonane	111-84-2	ND	ND	0.1800	0.0008	-0.0008	ND ^d		
	isopropylbenzene	98-82-8	1.0400	0.0045	ND	ND	0.0045	0.0045		
	alpha-pinene	80-56-8	ND	ND	ND	ND	ND	ND		
	<i>n</i> -propylbenzene	103-65-1	ND	ND	0.1500	0.0007	-0.0007	ND ^d		
	<i>m</i> -ethyltoluene	620-14-4	ND	ND	0.3300	0.0015	-0.0015	ND ^d		
	<i>p</i> -ethyltoluene	622-96-8	0.7200	0.0031	0.1800	0.0008	0.0023	0.0023		
	1,3,5-trimethylbenzene	108-67-8	ND	ND	ND	ND	ND	ND		
	<i>o</i> -ethyltoluene	611-14-3	0.6100	0.0026	0.2000	0.0009	0.0017	0.0017		
	beta-pinene	127-91-3	ND	ND	ND	ND	ND	ND		
	1,2,4-trimethylbenzene	95-63-6	0.7900	0.0034	0.2000	0.0009	0.0025	0.0025		
	1-decene	872-05-9	ND	ND	ND	ND	ND	ND		
	<i>n</i> -decane	124-18-5	0.7500	0.0032	0.1900	0.0009	0.0024	0.0024		
	1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND	ND		
	<i>m</i> -diethylbenzene	141-93-5	ND	ND	0.1600	0.0007	-0.0007	ND ^d		
	<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND	ND		
	1-undecene	821-95-4	ND	ND	ND	ND	ND	ND		
	<i>n</i> -undecane	1120-21-4	ND	ND	ND	ND	ND	ND		
	1-dodecene	112-41-4	ND	ND	ND	ND	ND	ND		
	<i>n</i> -dodecane	112-40-3	ND	ND	ND	ND	ND	ND		

(continued)

Table F-2C. Smelt Tank Vent: Field Test (12/16/01), SNMOCs Collected in Canisters (concluded)

Compound	CAS No.	Residence		Dilution		No Negs ^b
		Chamber	Residence	Air	Dilution	SNMOC
		12/16/01	Chamber	12/16/01	Air	RC-DA ^a
		V=4.300L	12/16/01	V=4.500L	12/16/01	12/16/01
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)
1-tridecene	2437-56-1	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND
Total Speciated		59.3300	0.2551	23.1600	0.1042	0.1509
Total Unspeciated		50.6300	0.2177	3.0300	0.0136	0.2041
Total (Speciated + Unspeciated)^c		109.9600	0.4728	26.1900	0.1179	0.3550

^a RC = residence chamber; DA = dilution air.^b When subtraction of the value of the Dilution Air from the Residence Chamber Air results in a negative number, the value "0" rather than the negative value is used for all subsequent calculations.^c ND = not detected^d When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."^e Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-3. Smelt Tank Vent: Field Test (12/14/01 - 12/16/01), Summary of SNMOCs Collected in Canisters

Compound	CAS No.	No Negs ^a SNMOC RC-DA ^b 12/14/01 (µg)	No Negs ^a SNMOC RC-DA 12/15/01 (µg)	No Negs ^a SNMOC RC-DA 12/16/01 (µg)
ethylene	74-85-1	0.0057	0.0399	0.0055
acetylene	74-86-2	0.0008	0.0097	ND ^c
ethane	74-85-1	0.0065	0.0363	0.0068
propylene	115-07-1	0.0040	0.0154	0.0043
propane	74-98-6	0.0111	0.0172	0.0045
propyne	74-99-7	ND	ND	ND
isobutane	75-28-5	0.0016	0.0034	0.0012
isobutene/1-butene	115-11-7/106-98-0	0.0014	0.0073	0.0013
1,3-butadiene	106-99-0	ND	0.0023	ND
<i>n</i> -butane	106-97-8	0.0041	0.0073	0.0034
<i>trans</i> -2-butene	624-64-6	0.0021	0.0034	0.0023
<i>cis</i> -2-butene	590-18-1	0.0023	0.0039	0.0029
3-methyl-1-butene	563-45-1	ND	ND	ND
isopentane	78-78-4	0.0040	0.0051	0.0035
1-pentene	109-67-1	0.0019	0.0031	0.0025
2-methyl-1-butene	563-46-2	ND	ND	ND
<i>n</i> -pentane	109-66-0	0.0024	0.0038	0.0034
isoprene	78-79-4	0.0029	0.0030	0.0031
<i>trans</i> -2-pentene	646-04-8	ND	ND	ND
<i>cis</i> -2-pentene	627-20-3	0.0026	0.0032	0.0040
2-methyl-2-butene	513-35-9	ND	ND	ND
2,2-dimethylbutane	75-83-2	0.0039	0.0048	0.0051
cyclopentene	142-29-0	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND
cyclopentane	287-92-3	ND	0.0041	0.0013
2,3-dimethylbutane	79-29-8	0.0055	0.0053	0.0054
2-methylpentane	107-83-5	0.0026	ND	0.0041
3-methylpentane	96-14-0	0.0072	0.0045	0.0045
2-methyl-1-pentene	763-29-1	ND	ND	ND
1-hexene	592-41-6	0.0046	0.0048	0.0051

(continued)

Table F-3. Smelt Tank Vent: Field Test (12/14/01 - 12/16/01), Summary of SNMOCs Collected in Canisters (continued)

Compound	CAS No.	No Negs ^a SNMOC RC-DA 12/14/01 (µg)	No Negs ^a SNMOC RC-DA 12/15/01 (µg)	No Negs ^a SNMOC RC-DA 12/16/01 (µg)
2-ethyl-1-butene	760-21-4	ND	ND	ND
<i>n</i> -hexane	110-54-3	ND ^d	ND	0.0021
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND
methylcyclopentane	96-37-7	0.0193	0.0018	0.0022
2,4-dimethylpentane	108-08-7	0.0039	0.0038	0.0037
benzene	71-43-2	0.0054	0.0300	0.0026
cyclohexane	110-82-7	0.0046	0.0033	0.0047
2-methylhexane	591-76-4	ND	ND	0.0043
2,3-dimethylpentane	565-59-3	0.0076	0.0084	0.0098
3-methylhexane	589-34-4	0.0022	ND	0.0013
1-heptene	592-76-7	0.0057	ND	ND
2,2,4-trimethylpentane	540-84-1	0.0029	0.0031	0.0029
<i>n</i> -heptane	142-82-5	0.0030	0.0025	0.0031
methylcyclohexane	108-87-2	0.0023	0.0034	0.0027
2,2,3-trimethylpentane	564-02-3	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	0.0023	0.0023	0.0035
toluene	108-88-3	0.0146	0.0277	0.0122
2-methylheptane	592-27-8	0.0025	0.0029	0.0025
3-methylheptane	589-81-1	ND	0.0017	0.0019
1-octene	111-66-0	ND	ND	ND
<i>n</i> -octane	111-65-9	0.0030	0.0021	0.0026
ethylbenzene	100-41-4	ND	ND	0.0031
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	ND	0.0055	0.0028
styrene	100-42-5	ND	0.0026	ND
<i>o</i> -xylene	95-47-6	0.0028	0.0023	ND
1-nonene	124-11-8	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND
isopropylbenzene	98-82-8	0.0024	0.0037	0.0045
alpha-pinene	80-56-8	0.0035	ND	ND

(continued)

Table F-3. Smelt Tank Vent: Field Test (12/14/01 - 12/16/01), Summary of SNMOCs Collected in Canisters (concluded)

Compound	CAS No.	No Negs ^a SNMOC RC-DA 12/14/01 (µg)	No Negs ^a SNMOC RC-DA 12/15/01 (µg)	No Negs ^a SNMOC RC-DA 12/16/01 (µg)
<i>n</i> -propylbenzene	103-65-1	ND	ND	ND
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	ND	0.0041	0.0023
1,3,5-trimethylbenzene	108-67-8	0.0026	ND	ND
<i>o</i> -ethyltoluene	611-14-3	0.0019	ND	0.0017
beta-pinene	127-91-3	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	0.0028	0.0037	0.0025
1-decene	872-05-9	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	0.0024
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND
<i>n</i> -undecane	1120-21-4	0.0021	0.0018	ND
1-dodecene	112-41-4	ND	ND	ND
<i>n</i> -dodecane	112-40-3	0.0004	ND	ND
1-tridecene	2437-56-1	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND
Total Speciated		0.1751	0.3045	0.1559
Total Unspeciated		0.2317	0.2149	0.2041
Total (Speciated + Unspeciated)^c		0.4068	0.5194	0.3600

^a When subtraction of the value of the Dilution Air from the Residence Chamber Air results in a negative number, the value "0" rather than the negative value is used for all subsequent calculations.

^b RC = residence chamber; DA = dilution air.

^c ND = not detected

^d n-hexane deleted from 12/14/01 data as a contaminant from the denuders

^e Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-4A. Smelt Tank Vent: Field Test (12/14/01), Total SNMOCs Collected

Compound	CAS No.	RC ^a	RC Collected V=345.692	DA ^b	DA Collected V=336.692	No Negs ^c	
		Residence Chamber Canister (µg/m ³)		Dilution Air Canister (µg/m ³)		RC-DA (µg)	RC-DA (µg)
ethylene	74-85-1	2.68	926.455	1.230	414.131	512.323	512.323
acetylene	74-86-2	0.74	255.812	0.530	178.447	77.365	77.365
ethane	74-85-1	4.12	1424.251	2.460	828.262	595.989	595.989
propylene	115-07-1	1.98	684.470	0.960	323.224	361.246	361.246
propane	74-98-6	8.94	3090.486	6.090	2050.454	1040.032	1040.032
propyne	74-99-7	0	0.000	0.000	0.000	0.000	0.000
isobutane	75-28-5	0.87	300.752	0.450	151.511	149.241	149.241
isobutene/1-butene	115-11-7/106-98-0	0.69	238.527	0.340	114.475	124.052	124.052
1,3-butadiene	106-99-0	0	0.000	0.000	0.000	0.000	0.000
<i>n</i> -butane	106-97-8	1.68	580.763	0.620	208.749	372.014	372.014
<i>trans</i> -2-butene	624-64-6	0.71	245.441	0.170	57.238	188.204	188.204
<i>cis</i> -2-butene	590-18-1	0.86	297.295	0.260	87.540	209.755	209.755
3-methyl-1-butene	563-45-1	0	0.000	0.000	0.000	0.000	0.000
isopentane	78-78-4	1.61	556.564	0.580	195.281	361.283	361.283
1-pentene	109-67-1	0.69	238.527	0.200	67.338	171.189	171.189
2-methyl-1-butene	563-46-2	0	0.000	0.000	0.000	0.000	0.000
<i>n</i> -pentane	109-66-0	1.21	418.287	0.590	198.648	219.639	219.639
isoprene	78-79-4	0.74	255.812	0.000	0.000	255.812	255.812
<i>trans</i> -2-pentene	646-04-8	0	0.000	0.000	0.000	0.000	0.000
<i>cis</i> -2-pentene	627-20-3	0.95	328.407	0.290	97.641	230.767	230.767
2-methyl-2-butene	513-35-9	0	0.000	0.000	0.000	0.000	0.000
2,2-dimethylbutane	75-83-2	1.46	504.710	0.450	151.511	353.199	353.199
cyclopentene	142-29-0	0	0.000	0.000	0.000	0.000	0.000
4-methyl-1-pentene	691-37-2	0	0.000	0.000	0.000	0.000	0.000
cyclopentane	287-92-3	0	0.000	0.340	114.475	-114.475	0.000 ^c
2,3-dimethylbutane	79-29-8	1.91	660.272	0.490	164.979	495.293	495.293
2-methylpentane	107-83-5	0.98	338.778	0.310	104.375	234.404	234.404
3-methylpentane	96-14-0	2.24	774.350	0.400	134.677	639.673	639.673
2-methyl-1-pentene	763-29-1	0	0.000	0.000	0.000	0.000	0.000
1-hexene	592-41-6	1.63	563.478	0.460	154.878	408.600	408.600
2-ethyl-1-butene	760-21-4	0	0.000	0.000	0.000	0.000	0.000
<i>n</i> -hexane ^d	110-54-3	0	0.000	0.450	151.511	-151.511	0.000 ^c
<i>trans</i> -2-hexene	4050-45-7	ND ^e	ND	ND	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND	ND	ND
methylcyclopentane	96-37-7	5.21	1801.055	0.260	87.540	1713.515	1713.515

(continued)

Table F-4A. Smelt Tank Vent: Field Test (12/14/01), Total SNMOCs Collected (continued)

Compound	CAS No.	RC ^a	DA ^b	Dilution Air	DA Collected	No Negs ^c	
		Residence Chamber Canister (µg/m ³)	RC Collected V=345.692 (µg)			RC-DA (µg)	RC-DA (µg)
2,4-dimethylpentane	108-08-7	1.36	470.141	0.350	117.842	352.299	352.299
benzene	71-43-2	1.67	577.306	0.280	94.274	483.032	483.032
cyclohexane	110-82-7	1.58	546.193	0.410	138.044	408.150	408.150
2-methylhexane	591-76-4	ND	ND	ND	ND	ND	ND
2,3-dimethylpentane	565-59-3	2.36	815.833	0.420	141.411	674.422	674.422
3-methylhexane	589-34-4	0.89	307.666	0.330	111.108	196.558	196.558
1-heptene	592-76-7	1.45	501.253	ND	ND	501.253	501.253
2,2,4-trimethyl- pentane	540-84-1	1.01	349.149	0.270	90.907	258.242	258.242
<i>n</i> -heptane	142-82-5	1.02	352.606	0.240	80.806	271.800	271.800
methylcyclohexane	108-87-2	0.9	311.123	0.320	107.741	203.381	203.381
2,2,3-trimethyl- pentane	564-02-3	ND	ND	ND	ND	ND	ND
2,3,4-trimethyl- pentane	565-75-3	0.83	286.924	0.250	84.173	202.751	202.751
toluene	108-88-3	4.14	1431.165	0.400	134.677	1296.488	1296.488
2-methylheptane	592-27-8	0.82	283.467	0.170	57.238	226.230	226.230
3-methylheptane	589-81-1	ND	ND	0.190	63.971	-63.971	ND ^c
1-octene	111-66-0	ND	ND	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	0.99	342.235	0.220	74.072	268.163	268.163
ethylbenzene	100-41-4	ND	ND	ND	ND	ND	ND
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	ND	ND	ND	ND
styrene	100-42-5	ND	ND	ND	ND	ND	ND
<i>o</i> -xylene	95-47-6	0.73	252.355	ND	ND	252.355	252.355
1-nonene	124-11-8	ND	ND	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND	ND	ND	ND
isopropylbenzene	98-82-8	0.82	283.467	0.200	67.338	216.129	216.129
alpha-pinene	80-56-8	1.12	387.175	0.220	74.072	313.103	313.103
<i>n</i> -propylbenzene	103-65-1	ND	ND	0.140	47.137	-47.137	ND ^c
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	ND	ND	0.160	53.871	-53.871	ND ^c
1,3,5-trimethyl- benzene	108-67-8	0.82	283.467	0.150	50.504	232.964	232.964
<i>o</i> -ethyltoluene	611-14-3	0.67	231.614	0.180	60.605	171.009	171.009
beta-pinene	127-91-3	ND	ND	ND	ND	ND	ND

(continued)

Table F-4A. Smelt Tank Vent: Field Test (12/14/01), Total SNMOCs Collected (concluded)

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence Chamber Canister ($\mu\text{g}/\text{m}^3$)	RC Collected V=345.692 (μg)	Dilution Air Canister ($\mu\text{g}/\text{m}^3$)	DA Collected V=336.692 (μg)	RC-DA (μg)	RC-DA (μg)
1,2,4-trimethylbenzene	95-63-6	0.92	318.037	0.190	63.971	254.065	254.065
1-decene	872-05-9	ND	ND	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	0.250	84.173	-84.173	ND ^e
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	0.70	241.984	0.150	50.504	191.481	191.481
1-dodecene	112-41-4	ND	ND	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	0.81	280.011	0.710	239.051	40.959	40.959
1-tridecene	2437-56-1	ND	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND	ND
Total Speciated		67.51	23337.667	24.130	8124.378	15213.289	15728.428
Total Unspeciated		62.79	21706.001	3.370	1134.652	20571.349	45737.110
Total (Speciated + Unspeciated)^f		130.30	45043.668	27.500	9259.030	35784.638	61465.538

^a RC = residence chamber = combustion air + dilution air^b DA = dilution air^c When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."^d *n*-hexane deleted from 12/14/01 data as a contaminant from the denuders^e ND = not detected.^f Total NMOC with unknowns in $\mu\text{g}/\text{m}^3$ is an estimate based on propane only.

Table F-4B. Smelt Tank Vent: Field Test (12/15/01), Total SNMOCs Collected

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence Chamber Canister (µg/m ³)	RC Collected V=419.539 (µg)	Dilution Air Canister (µg/m ³)	DA Collected V=408.417 (µg)	RC-DA (µg)	RC-DA (µg)
ethylene	74-85-1	12.040	5051.249	1.810	739.235	4312.014	4312.014
acetylene	74-86-2	3.220	1350.916	0.740	302.229	1048.687	1048.687
ethane	74-85-1	13.640	5722.512	4.340	1772.531	3949.980	3949.980
propylene	115-07-1	4.630	1942.466	0.670	273.640	1668.826	1668.826
propane	74-98-6	8.620	3616.426	4.210	1719.437	1896.989	1896.989
propyne	74-99-7	ND ^d	ND	ND	ND	ND	ND
isobutane	75-28-5	1.240	520.228	0.370	151.114	369.114	369.114
isobutene/1-butene	115-11-7/106-98-0	2.280	956.549	0.410	167.451	789.098	789.098
1,3-butadiene	106-99-0	0.600	251.723	ND	ND	251.723	251.723
<i>n</i> -butane	106-97-8	2.400	1006.894	0.530	216.461	790.432	790.432
<i>trans</i> -2-butene	624-64-6	1.060	444.711	0.190	77.599	367.112	367.112
<i>cis</i> -2-butene	590-18-1	1.270	532.815	0.270	110.273	422.542	422.542
3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND	ND
isopentane	78-78-4	1.840	771.952	0.540	220.545	551.406	551.406
1-pentene	109-67-1	1.000	419.539	0.210	85.768	333.771	333.771
2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND	ND
<i>n</i> -pentane	109-66-0	1.360	570.573	0.390	159.283	411.290	411.290
isoprene	78-79-4	0.980	411.148	0.200	81.683	329.465	329.465
<i>trans</i> -2-pentene	646-04-8	ND	ND	0.520	212.377	-212.377	ND ^e
<i>cis</i> -2-pentene	627-20-3	1.130	474.079	0.310	126.609	347.470	347.470
2-methyl-2-butene	513-35-9	ND	ND	ND	ND	ND	ND
2,2-dimethylbutane	75-83-2	1.620	679.653	0.400	163.367	516.286	516.286
cyclopentene	142-29-0	ND	ND	ND	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND	ND	ND	ND
cyclopentane	287-92-3	1.290	541.205	0.240	98.020	443.185	443.185
2,3-dimethylbutane	79-29-8	1.850	776.147	0.490	200.125	576.023	576.023
2-methylpentane	107-83-5	0.600	251.723	0.670	273.640	-21.916	ND
3-methylpentane	96-14-0	1.690	709.021	0.530	216.461	492.560	492.560
2-methyl-1-pentene	763-29-1	ND	ND	ND	ND	ND	ND
1-hexene	592-41-6	1.720	721.607	0.500	204.209	517.398	517.398
2-ethyl-1-butene	760-21-4	ND	ND	ND	ND	ND	ND
<i>n</i> -hexane	110-54-3	5.520	2315.855	8.140	3324.517	-1008.662	ND ^e
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND	ND	ND

(continued)

Table F-4B. Smelt Tank Vent: Field Test (12/15/01), Total SNMOCs Collected (continued)

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence	RC	Dilution	DA		
		Chamber	Collected	Air	Collected		
		Canister	V=419.539	Canister	V=408.417	RC-DA	RC-DA
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
methylcyclopentane	96-37-7	1.750	734.193	1.300	530.943	203.251	203.251
2,4-dimethyl-pentane	108-08-7	1.290	541.205	0.310	126.609	414.596	414.596
benzene	71-43-2	8.060	3381.484	0.370	151.114	3230.370	3230.370
cyclohexane	110-82-7	1.330	557.987	0.480	196.040	361.947	361.947
2-methylhexane	591-76-4	ND	ND	ND	ND	ND	ND
2,3-dimethyl-pentane	565-59-3	2.670	1120.169	0.520	212.377	907.792	907.792
3-methylhexane	589-34-4	ND	ND	0.390	159.283	-159.283	ND ^c
1-heptene	592-76-7	ND	ND	ND	ND	ND	ND
2,2,4-trimethyl-pentane	540-84-1	1.050	440.516	0.260	106.189	334.327	334.327
<i>n</i> -heptane	142-82-5	0.830	348.217	0.190	77.599	270.618	270.618
methylcyclohexane	108-87-2	1.160	486.665	0.300	122.525	364.140	364.140
2,2,3-trimethyl-pentane	564-02-3	ND	ND	ND	ND	ND	ND
2,3,4-trimethyl-pentane	565-75-3	0.770	323.045	0.170	69.431	253.614	253.614
toluene	108-88-3	7.520	3154.933	0.420	171.535	2983.398	2983.398
2-methylheptane	592-27-8	0.940	394.367	0.200	81.683	312.683	312.683
3-methylheptane	589-81-1	0.630	264.310	0.190	77.599	186.710	186.710
1-octene	111-66-0	ND	ND	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	0.810	339.827	0.270	110.273	229.554	229.554
ethylbenzene	100-41-4	ND	ND	0.150	61.263	-61.263	ND ^c
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	1.410	591.550	ND	ND	591.550	591.550
styrene	100-42-5	0.670	281.091	ND	ND	281.091	281.091
<i>o</i> -xylene	95-47-6	0.600	251.723	ND	ND	251.723	251.723
1-nonene	124-11-8	ND	ND	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	0.150	61.263	-61.263	ND ^c
isopropylbenzene	98-82-8	0.960	402.757	ND	ND	402.757	402.757
alpha-pinene	80-56-8	ND	ND	ND	ND	ND	ND
<i>n</i> -propylbenzene	103-65-1	ND	ND	0.180	73.515	-73.515	ND ^c
<i>m</i> -ethyltoluene	620-14-4	ND	ND	0.140	57.178	-57.178	ND ^c
<i>p</i> -ethyltoluene	622-96-8	1.270	532.815	0.210	85.768	447.047	447.047
1,3,5-trimethyl-benzene	108-67-8	ND	ND	0.140	57.178	-57.178	ND ^c
<i>o</i> -ethyltoluene	611-14-3	ND	ND	0.150	61.263	-61.263	ND ^c

Table F-4B. Smelt Tank Vent: Field Test (12/15/01), Total SNMOCs Collected (concluded)

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence Chamber Canister	RC Collected V=419.539	Dilution Air Canister	DA Collected V=408.417	RC-DA	RC-DA
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
beta-pinene	127-91-3	ND	ND	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	1.110	465.688	0.170	69.431	396.257	396.257
1-decene	872-05-9	ND	ND	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	0.270	110.273	-110.273	ND ^c
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	0.150	61.263	-61.263	ND ^c
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	0.660	276.896	0.190	77.599	199.296	199.296
1-dodecene	112-41-4	ND	ND	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	ND	ND	0.970	396.165	-396.165	ND ^c
1-tridecene	2437-56-1	ND	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND	ND
Total Speciated		107.090	44928.431	34.920	14261.935	30666.496	33008.094
Total Unspeciated		62.160	26078.544	7.050	2879.343	23199.201	53865.697
Total (Speciated + Unspeciated)^c		169.250	71006.975	41.970	17141.277	53865.697	86873.792

^a RC = residence chamber = combustion air + dilution air^b DA = dilution air^c When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."^d ND = not detected.^e Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-4C. Smelt Tank Vent: Field Test (12/16/01), Total SNMOCs Collected

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence	RC	Dilution	DA		
		Chamber	Collected	Air	Collected		
		Canister	V=421.522	Canister	V=410.535	RC-DA	RC-DA
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
ethylene	74-85-1	2.410	1015.868	1.070	439.272	576.596	576.596
acetylene	74-86-2	0.720	303.496	0.690	283.269	20.227	20.227
ethane	74-85-1	5.160	2175.054	3.410	1399.924	775.130	775.130
propylene	115-07-1	1.550	653.359	0.520	213.478	439.881	439.881
propane	74-98-6	3.590	1513.264	2.430	997.600	515.664	515.664
propyne	74-99-7	ND	ND	ND	ND	ND	ND
isobutane	75-28-5	0.740	311.926	0.430	176.530	135.396	135.396
isobutene/1-butene	115-11-7/106-98-0	0.750	316.142	0.430	176.530	139.612	139.612
1,3-butadiene	106-99-0	ND	ND	ND	ND	ND	ND
<i>n</i> -butane	106-97-8	1.620	682.866	0.790	324.323	358.543	358.543
<i>trans</i> -2-butene	624-64-6	0.800	337.218	0.250	102.634	234.584	234.584
<i>cis</i> -2-butene	590-18-1	1.030	434.168	0.350	143.687	290.481	290.481
3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND	ND
isopentane	78-78-4	1.480	623.853	0.630	258.637	365.216	365.216
1-pentene	109-67-1	0.850	358.294	0.250	102.634	255.660	255.660
2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND	ND
<i>n</i> -pentane	109-66-0	1.220	514.257	0.400	164.214	350.043	350.043
isoprene	78-79-4	0.960	404.661	0.220	90.318	314.343	314.343
<i>trans</i> -2-pentene	646-04-8	ND	ND	0.300	123.160	-123.160	ND ^c
<i>cis</i> -2-pentene	627-20-3	1.280	539.548	0.330	135.477	404.072	404.072
2-methyl-2-butene	513-35-9	ND	ND	ND	ND	ND	ND
2,2-dimethyl-butane	75-83-2	1.670	703.942	0.470	192.951	510.990	510.990
cyclopentene	142-29-0	ND	ND	ND	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND	ND	ND	ND
cyclopentane	287-92-3	0.690	290.850	0.360	147.793	143.058	143.058
2,3-dimethyl-butane	79-29-8	1.830	771.385	0.550	225.794	545.591	545.591
2-methylpentane	107-83-5	1.280	539.548	0.310	127.266	412.282	412.282
3-methylpentane	96-14-0	1.530	644.929	0.460	188.846	456.083	456.083
2-methyl-1-pentene	763-29-1	ND	ND	ND	ND	ND	ND
1-hexene	592-41-6	1.710	720.803	0.500	205.267	515.535	515.535
2-ethyl-1-butene	760-21-4	ND	ND	ND	ND	ND	ND

(continued)

Table F-4C. Smelt Tank Vent: Field Test (12/16/01), Total SNMOCs Collected (continued)

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence	RC	Dilution	DA		
		Chamber	Collected	Air	Collected		
		Canister	V=421.522	Canister	V=410.535	RC-DA	RC-DA
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
<i>n</i> -hexane	110-54-3	1.670	703.942	1.140	468.010	235.932	235.932
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND	ND	ND
methylcyclopentane	96-37-7	0.920	387.800	0.380	156.003	231.797	231.797
2,4-dimethylpentane	108-08-7	1.210	510.042	0.330	135.477	374.565	374.565
benzene	71-43-2	0.990	417.307	0.360	147.793	269.514	269.514
cyclohexane	110-82-7	1.570	661.790	0.450	184.741	477.049	477.049
2-methylhexane	591-76-4	1.380	581.700	0.360	147.793	433.908	433.908
2,3-dimethylpentane	565-59-3	3.070	1294.073	0.750	307.901	986.172	986.172
3-methylhexane	589-34-4	0.660	278.205	0.350	143.687	134.517	134.517
1-heptene	592-76-7	ND	ND	ND	ND	ND	ND
2,2,4-trimethylpentane	540-84-1	0.980	413.092	0.300	123.160	289.931	289.931
<i>n</i> -heptane	142-82-5	0.940	396.231	0.200	82.107	314.124	314.124
methylcyclo-hexane	108-87-2	0.980	413.092	0.330	135.477	277.615	277.615
2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	1.060	446.813	0.240	98.528	348.285	348.285
toluene	108-88-3	3.180	1340.440	0.320	131.371	1209.069	1209.069
2-methylheptane	592-27-8	0.780	328.787	0.180	73.896	254.891	254.891
3-methylheptane	589-81-1	0.670	282.420	0.220	90.318	192.102	192.102
1-octene	111-66-0	ND	ND	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	0.840	354.079	0.230	94.423	259.655	259.655
ethylbenzene	100-41-4	0.710	299.281	ND	ND	299.281	299.281
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	0.940	396.231	0.280	114.950	281.281	281.281
styrene	100-42-5	ND	ND	ND	ND	ND	ND
<i>o</i> -xylene	95-47-6	ND	ND	ND	ND	ND	ND
1-nonene	124-11-8	ND	ND	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	0.180	73.896	-73.896	ND ^c

(continued)

Table F-4C. Smelt Tank Vent: Field Test (12/16/01), Total SNMOCs (concluded)

Compound	CAS No.	RC ^a		DA ^b		No Negs ^c	
		Residence	RC	Dilution	DA		
		Chamber	Collected	Air	Collected		
		Canister	V=421.522	Canister	V=410.535	RC-DA	RC-DA
		(µg/m ³)	(µg)	(µg/m ³)	(µg)	(µg)	(µg)
isopropylbenzene	98-82-8	1.040	438.383	ND	ND	438.383	438.383
alpha-pinene	80-56-8	ND	ND	ND	ND	ND	ND
<i>n</i> -propylbenzene	103-65-1	ND	ND	0.150	61.580	-61.580	ND ^c
<i>m</i> -ethyltoluene	620-14-4	ND	ND	0.330	135.477	-135.477	ND ^c
<i>p</i> -ethyltoluene	622-96-8	0.720	303.496	0.180	73.896	229.600	229.600
1,3,5-trimethylbenzene	108-67-8	ND	ND	ND	ND	ND	ND
<i>o</i> -ethyltoluene	611-14-3	0.610	257.128	0.200	82.107	175.021	175.021
beta-pinene	127-91-3	ND	ND	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	0.790	333.002	0.200	82.107	250.895	250.895
1-decene	872-05-9	ND	ND	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	0.750	316.142	0.190	78.002	238.140	238.140
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	0.160	65.686	-65.686	ND ^c
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	ND	ND	ND	ND	ND	ND
1-dodecene	112-41-4	ND	ND	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	ND	ND	ND	ND	ND	ND
1-tridecene	2437-56-1	ND	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND	ND
Total Speciated		59.330	25008.903	23.160	9507.988	15500.915	15960.714
Total Unspeciated		50.630	21341.661	3.030	1243.921	20097.740	35598.656
Total (Speciated + Unspeciated)^d		109.960	46350.564	26.190	10751.908	35598.656	51559.370

^a RC = residence chamber = combustion air + dilution air^b DA = dilution air^c When the value in Dilution Air is greater than that in the Residence Chamber Air, a negative number results from the subtraction. This negative number is treated as ND, or "0."^d ND = not detected.^e Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-5A. SNMOC Values for 12/14/01 in SPECIATE Format

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
ethylene	74-85-1	512.32	83.38	0.72	0.12
acetylene	74-86-2	77.37	76.97	0.11	0.11
ethane	74-85-1	595.99	69.84	0.84	0.10
propylene	115-07-1	361.25	44.19	0.51	0.06
propane	74-98-6	1040.03	78.39	1.46	0.11
propyne	74-99-7	ND ^b	ND	ND	ND
isobutane	75-28-5	149.24	39.91	0.21	0.06
isobutene/1-butene	115-11-7/106-98-0	124.05	25.66	0.17	0.04
1,3-butadiene	106-99-0	ND	ND	ND	ND
<i>n</i> -butane	106-97-8	372.01	71.98	0.52	0.10
<i>trans</i> -2-butene	624-64-6	188.20	46.32	0.26	0.07
<i>cis</i> -2-butene	590-18-1	209.76	69.13	0.29	0.10
3-methyl-1-butene	563-45-1	ND	ND	ND	ND
isopentane	78-78-4	361.28	103.34	0.51	0.15
1-pentene	109-67-1	171.19	57.73	0.24	0.08
2-methyl-1-butene	563-46-2	ND	ND	ND	ND
<i>n</i> -pentane	109-66-0	219.64	71.98	0.31	0.10
isoprene	78-79-4	255.81	8.55	0.36	0.01
<i>trans</i> -2-pentene	646-04-8	ND	ND	ND	ND
<i>cis</i> -2-pentene	627-20-3	230.77	86.23	0.32	0.12
2-methyl-2-butene	513-35-9	ND	ND	ND	ND
2,2-dimethylbutane	75-83-2	353.20	105.47	0.50	0.15
cyclopentene	142-29-0	ND	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND	ND
cyclopentane	287-92-3	ND	ND	ND	ND
2,3-dimethylbutane	79-29-8	495.29	121.87	0.69	0.17
2-methylpentane	107-83-5	234.40	56.30	0.33	0.08
3-methylpentane	96-14-0	639.67	107.61	0.90	0.15
2-methyl-1-pentene	763-29-1	ND	ND	ND	ND
1-hexene	592-41-6	408.60	109.04	0.57	0.15
2-ethyl-1-butene	760-21-4	ND	ND	ND	ND
<i>n</i> -hexane	110-54-3	ND ^c	82.67	ND ^c	ND ^c
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND
methylcyclopentane	96-37-7	1713.52	68.42	2.40	0.10

(continued)

Table F-5A. SNMOC Values for 12/14/01 in SPECIATE Format (continued)

Compound	CAS No.	RC-DA ^a	Uncertainty	Percent	Uncertainty
		(µg)	(µg)	Total	as % Total
2,4-dimethylpentane	108-08-7	352.30	85.52	0.49	0.12
benzene	71-43-2	483.03	54.16	0.68	0.08
cyclohexane	110-82-7	408.15	121.15	0.57	0.17
2-methylhexane	591-76-4	ND	ND	ND	ND
2,3-dimethylpentane	565-59-3	674.42	71.27	0.95	0.10
3-methylhexane	589-34-4	196.56	59.86	0.28	0.08
1-heptene	592-76-7	501.25	59.15	0.70	0.08
2,2,4-trimethylpentane	540-84-1	258.24	71.98	0.36	0.10
<i>n</i> -heptane	142-82-5	271.80	36.35	0.38	0.05
methylcyclohexane	108-87-2	203.38	69.13	0.29	0.10
2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	202.75	49.89	0.28	0.07
toluene	108-88-3	1296.49	28.51	1.82	0.04
2-methylheptane	592-27-8	226.23	27.79	0.32	0.04
3-methylheptane	589-81-1	ND	ND	ND	ND
1-octene	111-66-0	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	268.16	14.25	0.38	0.02
ethylbenzene	100-41-4	ND	ND	ND	ND
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	ND	ND
styrene	100-42-5	ND	ND	ND	ND
<i>o</i> -xylene	95-47-6	252.36	19.24	0.35	0.03
1-nonene	124-11-8	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND	ND
isopropylbenzene	98-82-8	216.13	28.51	0.30	0.04
alpha-pinene	80-56-8	313.10	14.97	0.44	0.02
<i>n</i> -propylbenzene	103-65-1	ND	ND	ND	ND
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	ND	ND	ND	ND
1,3,5-trimethylbenzene	108-67-8	232.96	20.67	0.33	0.03
<i>o</i> -ethyltoluene	611-14-3	171.01	22.09	0.24	0.03
beta-pinene	127-91-3	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	254.07	20.67	0.36	0.03
1-decene	872-05-9	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	ND	ND
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND

(continued)

Table F-5A. SNMOC Values for 12/14/01 in SPECIATE Format (concluded)

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	191.48	13.54	0.27	0.02
1-dodecene	112-41-4	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	40.96	30.64	0.06	0.04
1-tridecene	2437-56-1	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND
Total Speciated		15728.43			
Total Unspeciated		45737.11			
Total (Speciated + Unspeciated)^d		61465.54			

^a RC = residence chamber = combustion air + dilution air; DA = dilution air.^b ND = not detected.^c *n*-hexane deleted from 12/14/01 data as a contaminant from the denuders^d Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-5B. SNMOC Values for 12/15/01 in SPECIATE Format

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
ethylene	74-85-1	4312.01	101.64	5.02	0.12
acetylene	74-86-2	1048.69	93.82	1.22	0.11
ethane	74-85-1	3949.98	85.14	4.60	0.10
propylene	115-07-1	1668.83	53.86	1.94	0.06
propane	74-98-6	1896.99	95.56	2.21	0.11
propyne	74-99-7	ND ^b	ND	ND	ND
isobutane	75-28-5	369.11	48.65	0.43	0.06
isobutene/1-butene	115-11-7/106-98-0	789.10	31.27	0.92	0.04
1,3-butadiene	106-99-0	251.72	46.04	0.29	0.05
<i>n</i> -butane	106-97-8	790.43	87.74	0.92	0.10
<i>trans</i> -2-butene	624-64-6	367.11	56.47	0.43	0.07
<i>cis</i> -2-butene	590-18-1	422.54	84.27	0.49	0.10
3-methyl-1-butene	563-45-1	ND	ND	ND	ND
isopentane	78-78-4	551.41	125.97	0.64	0.15
1-pentene	109-67-1	333.77	70.37	0.39	0.08
2-methyl-1-butene	563-46-2	ND	ND	ND	ND
<i>n</i> -pentane	109-66-0	411.29	87.74	0.48	0.10
isoprene	78-79-4	329.46	10.42	0.38	0.01
<i>trans</i> -2-pentene	646-04-8	ND	ND	ND	ND
<i>cis</i> -2-pentene	627-20-3	347.47	105.12	0.40	0.12
2-methyl-2-butene	513-35-9	ND	ND	ND	ND
2,2-dimethylbutane	75-83-2	516.29	128.57	0.60	0.15
cyclopentene	142-29-0	ND	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND	ND
cyclopentane	287-92-3	443.19	59.94	0.52	0.07
2,3-dimethylbutane	79-29-8	576.02	148.55	0.67	0.17
2-methylpentane	107-83-5	ND	ND	ND	ND
3-methylpentane	96-14-0	492.56	131.18	0.57	0.15
2-methyl-1-pentene	763-29-1	ND	ND	ND	ND
1-hexene	592-41-6	517.40	132.92	0.60	0.15
2-ethyl-1-butene	760-21-4	ND	ND	ND	ND
<i>n</i> -hexane	110-54-3	ND	ND	ND	ND
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND

(continued)

Table F-5B. SNMOC Values for 12/15/01 in SPECIATE Format (continued)

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND
methylcyclopentane	96-37-7	203.25	83.40	0.24	0.10
2,4-dimethylpentane	108-08-7	414.60	104.25	0.48	0.12
benzene	71-43-2	3230.37	66.02	3.76	0.08
cyclohexane	110-82-7	361.95	147.69	0.42	0.17
2-methylhexane	591-76-4	ND	ND	ND	ND
2,3-dimethylpentane	565-59-3	907.79	86.87	1.06	0.10
3-methylhexane	589-34-4	ND	ND	ND	ND
1-heptene	592-76-7	ND	ND	ND	ND
2,2,4-trimethylpentane	540-84-1	334.33	87.74	0.39	0.10
<i>n</i> -heptane	142-82-5	270.62	44.31	0.32	0.05
methylcyclohexane	108-87-2	364.14	84.27	0.42	0.10
2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	253.61	60.81	0.30	0.07
toluene	108-88-3	2983.40	34.75	3.47	0.04
2-methylheptane	592-27-8	312.68	33.88	0.36	0.04
3-methylheptane	589-81-1	186.71	33.01	0.22	0.04
1-octene	111-66-0	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	229.55	17.37	0.27	0.02
ethylbenzene	100-41-4	ND	ND	ND	ND
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	591.55	36.49	0.69	0.04
styrene	100-42-5	281.09	59.94	0.33	0.07
<i>o</i> -xylene	95-47-6	251.72	23.46	0.29	0.03
1-nonene	124-11-8	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND	ND
isopropylbenzene	98-82-8	402.76	34.75	0.47	0.04
alpha-pinene	80-56-8	ND	ND	ND	ND
<i>n</i> -propylbenzene	103-65-1	ND	ND	ND	ND
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	447.05	46.04	0.52	0.05
<i>o</i> -ethyltoluene	611-14-3	ND	ND	ND	ND
beta-pinene	127-91-3	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	396.26	25.19	0.46	0.03
1-decene	872-05-9	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	ND	ND

(continued)

Table F-5B. SNMOC Values for 12/15/01 in SPECIATE Format (concluded)

Compound	CAS No.	RC-DA ^a Uncertainty		Percent Uncertainty	
		(µg)	(µg)	Total	as % Total
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	199.30	16.51	0.23	0.02
1-dodecene	112-41-4	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	ND	ND	ND	ND
1-tridecene	2437-56-1	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND
Total Speciated		33008.094			
Total Unspeciated		53865.697			
Total (Speciated + Unspeciated)^c		86873.792			

^a RC = residence chamber = combustion air + dilution air; DA = dilution air.^b ND = not detected.^c Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-5C. SNMOC Values for 12/16/01 in SPECIATE Format

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
ethylene	74-85-1	576.60	60.32	1.12	0.12
acetylene	74-86-2	20.23	55.68	0.04	0.11
ethane	74-85-1	775.13	50.53	1.50	0.10
propylene	115-07-1	439.88	31.97	0.85	0.06
propane	74-98-6	515.66	56.72	1.00	0.11
propyne	74-99-7	ND ^b	ND	ND	ND
isobutane	75-28-5	135.40	28.87	0.26	0.06
isobutene/1-butene	115-11-7/106-98-0	139.61	18.56	0.27	0.04
1,3-butadiene	106-99-0	ND	ND	ND	ND
<i>n</i> -butane	106-97-8	358.54	52.07	0.70	0.10
<i>trans</i> -2-butene	624-64-6	234.58	33.51	0.45	0.07
<i>cis</i> -2-butene	590-18-1	290.48	50.01	0.56	0.10
3-methyl-1-butene	563-45-1	ND	ND	ND	ND
isopentane	78-78-4	365.22	74.76	0.71	0.15
1-pentene	109-67-1	255.66	41.76	0.50	0.08
2-methyl-1-butene	563-46-2	ND	ND	ND	ND
<i>n</i> -pentane	109-66-0	350.04	52.07	0.68	0.10
isoprene	78-79-4	314.34	6.19	0.61	0.01
<i>trans</i> -2-pentene	646-04-8	ND	ND	ND	ND
<i>cis</i> -2-pentene	627-20-3	404.07	62.39	0.78	0.12
2-methyl-2-butene	513-35-9	ND	ND	ND	ND
2,2-dimethylbutane	75-83-2	510.99	76.31	0.99	0.15
cyclopentene	142-29-0	ND	ND	ND	ND
4-methyl-1-pentene	691-37-2	ND	ND	ND	ND
cyclopentane	287-92-3	143.06	35.58	0.28	0.07
2,3-dimethylbutane	79-29-8	545.59	88.17	1.06	0.17
2-methylpentane	107-83-5	412.28	40.73	0.80	0.08
3-methylpentane	96-14-0	456.08	77.85	0.88	0.15
2-methyl-1-pentene	763-29-1	ND	ND	ND	ND
1-hexene	592-41-6	515.54	78.89	1.00	0.15
2-ethyl-1-butene	760-21-4	ND	ND	ND	ND
<i>n</i> -hexane	110-54-3	235.93	59.81	0.46	0.12
<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND
<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND
methylcyclopentane	96-37-7	231.80	49.50	0.45	0.10

(continued)

Table F-5C. SNMOC Values for 12/16/01 in SPECIATE Format (continued)

Compound	CAS No.	RC-DA ^a	Uncertainty	Percent	Uncertainty
		(µg)	(µg)	Total	as % Total
2,4-dimethylpentane	108-08-7	374.57	61.87	0.73	0.12
benzene	71-43-2	269.51	39.19	0.52	0.08
cyclohexane	110-82-7	477.05	87.65	0.93	0.17
2-methylhexane	591-76-4	433.91	10.31	0.84	0.02
2,3-dimethylpentane	565-59-3	986.17	51.56	1.91	0.10
3-methylhexane	589-34-4	134.52	43.31	0.26	0.08
1-heptene	592-76-7	ND	ND	ND	ND
2,2,4-trimethylpentane	540-84-1	289.93	52.07	0.56	0.10
<i>n</i> -heptane	142-82-5	314.12	26.30	0.61	0.05
methylcyclohexane	108-87-2	277.62	50.01	0.54	0.10
2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	348.28	36.09	0.68	0.07
toluene	108-88-3	1209.07	20.62	2.35	0.04
2-methylheptane	592-27-8	254.89	20.11	0.49	0.04
3-methylheptane	589-81-1	192.10	19.59	0.37	0.04
1-octene	111-66-0	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	259.66	10.31	0.50	0.02
ethylbenzene	100-41-4	299.28	13.92	0.58	0.03
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	281.28	21.65	0.55	0.04
styrene	100-42-5	ND	ND	ND	ND
<i>o</i> -xylene	95-47-6	ND	ND	ND	ND
1-nonene	124-11-8	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND	ND
isopropylbenzene	98-82-8	438.38	20.62	0.85	0.04
alpha-pinene	80-56-8	ND	ND	ND	ND
<i>n</i> -propylbenzene	103-65-1	ND	ND	ND	ND
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	229.60	27.33	0.45	0.05
1,3,5-trimethylbenzene	108-67-8	ND	ND	ND	ND
<i>o</i> -ethyltoluene	611-14-3	175.02	15.98	0.34	0.03
beta-pinene	127-91-3	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	250.90	14.95	0.49	0.03
1-decene	872-05-9	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	238.14	11.34	0.46	0.02
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND

(continued)

Table F-5C. SNMOC Values for 12/16/01 in SPECIATE Format (concluded)

Compound	CAS No.	RC-DA ^a (µg)	Uncertainty (µg)	Percent Total	Uncertainty as % Total
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	ND	ND	ND	ND
1-dodecene	112-41-4	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	ND	ND	ND	ND
1-tridecene	2437-56-1	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND
Total Speciated		15960.714			
Total Unspeciated		35598.656			
Total (Speciated + Unspeciated)^c		51559.37			

^a RC = residence chamber = combustion air + dilution air; DA = dilution air.^b ND = not detected.^c Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Table F-6. SNMOC, Reported as Weight Percent of Total

	Compound	CAS No.	RC-DA ^a	Percent Total	RC-DA	Percent Total	RC-DA	Percent Total
			12/14/01 (µg)		12/15/01 (µg)		12/16/01 (µg)	
	ethylene	74-85-1	512.3234	0.718884	4312.014	4.963538	576.5958	1.118314
	acetylene	74-86-2	77.3653	0.108558	1048.687	1.207138	20.2268	0.03923
	ethane	74-85-1	595.9887	0.836282	3949.98	4.546803	775.1299	1.503373
	propylene	115-07-1	361.2458	0.506894	1668.826	1.920977	439.881	0.853154
	propane	74-98-6	1040.032	1.459356	1896.989	2.183615	515.6644	1.000137
	propyne	74-99-7	ND ^b	ND	ND	ND	ND	ND
	isobutane	75-28-5	149.2406	0.209412	369.1139	0.424885	135.3963	0.262603
	isobutene/1-butene	115-11-7/106-98-0	124.0522	0.174068	789.0978	0.908327	139.6115	0.270778
F-42	1,3-butadiene	106-99-0	ND	ND	251.7234	0.289758	ND	ND
	<i>n</i> -butane	106-97-8	372.0135	0.522003	790.4324	0.909863	358.5432	0.695399
	<i>trans</i> -2-butene	624-64-6	188.2037	0.264084	367.112	0.422581	234.5839	0.454978
	<i>cis</i> -2-butene	590-18-1	209.7552	0.294325	422.5418	0.486386	290.4805	0.56339
	3-methyl-1-butene	563-45-1	ND	ND	ND	ND	ND	ND
	isopentane	78-78-4	361.2828	0.506946	551.4064	0.634721	365.2157	0.70834
	1-pentene	109-67-1	171.1891	0.24021	333.7713	0.384203	255.66	0.495856
	2-methyl-1-butene	563-46-2	ND	ND	ND	ND	ND	ND
	<i>n</i> -pentane	109-66-0	219.639	0.308194	411.2903	0.473434	350.0429	0.678912
	isoprene	78-79-4	255.8121	0.358951	329.4647	0.379245	314.3435	0.609673
	<i>trans</i> -2-pentene	646-04-8	ND	ND	ND	ND	ND	ND
	<i>cis</i> -2-pentene	627-20-3	230.7667	0.323808	347.4697	0.399971	404.0717	0.783702
	2-methyl-2-butene	513-35-9	ND	ND	ND	ND	ND	ND

(continued)

Table F-6. SNMOC, Reported as Weight Percent of Total (continued)

	Compound	CAS No.	RC-DA ^a		RC-DA		RC-DA	
			12/14/01	Percent	12/15/01	Percent	12/16/01	Percent
			(µg)	Total	(µg)	Total	(µg)	Total
	2,2-dimethylbutane	75-83-2	353.1989	0.495603	516.2862	0.594295	510.9904	0.991072
	cyclopentene	142-29-0	ND	ND	ND	ND	ND	ND
	4-methyl-1-pentene	691-37-2	ND	ND	ND	ND	ND	ND
	cyclopentane	287-92-3	ND	ND	443.1851	0.510148	143.0577	0.277462
	2,3-dimethylbutane	79-29-8	495.2926	0.694987	576.0226	0.663057	545.5912	1.05818
	2-methylpentane	107-83-5	234.4036	0.328911	ND	ND	412.2824	0.799627
	3-methylpentane	96-14-0	639.6733	0.897579	492.5597	0.566983	456.0827	0.884578
	2-methyl-1-pentene	763-29-1	ND	ND	ND	ND	ND	ND
	1-hexene	592-41-6	408.5996	0.57334	517.3984	0.595575	515.5353	0.999887
	2-ethyl-1-butene	760-21-4	ND	ND	ND	ND	ND	ND
F-43	<i>n</i> -hexane	110-54-3	ND ^c	ND ^c	ND	ND	235.9321	0.457593
	<i>trans</i> -2-hexene	4050-45-7	ND	ND	ND	ND	ND	ND
	<i>cis</i> -2-hexene	7688-21-3	ND	ND	ND	ND	ND	ND
	methylcyclopentane	96-37-7	1713.515	2.404377	203.2506	0.233961	231.797	0.449573
	2,4-dimethylpentane	108-08-7	352.2989	0.49434	414.5959	0.477239	374.5652	0.726474
	benzene	71-43-2	483.0319	0.677783	3230.37	3.718463	269.5143	0.522726
	cyclohexane	110-82-7	408.1496	0.572709	361.9465	0.416635	477.0489	0.925242
	2-methylhexane	591-76-4	ND	ND	ND	ND	433.9079	0.841569
	2,3-dimethylpentane	565-59-3	674.4225	0.946339	907.7921	1.044955	986.1715	1.912691
	3-methylhexane	589-34-4	196.5575	0.275806	0	0	134.5173	0.260898
	1-heptene	592-76-7	501.2534	0.703351	ND	ND	ND	ND

(continued)

Table F-6. SNMOC, Reported as Weight Percent of Total (continued)

Compound	CAS No.	RC-DA ^a		RC-DA		RC-DA	
		12/14/01 (µg)	Percent Total	12/15/01 (µg)	Percent Total	12/16/01 (µg)	Percent Total
2,2,4-trimethylpentane	540-84-1	258.2421	0.362361	334.3274	0.384843	289.9311	0.562325
<i>n</i> -heptane	142-82-5	271.7998	0.381385	270.6181	0.311507	314.1237	0.609247
methylcyclohexane	108-87-2	203.3814	0.285381	364.14	0.41916	277.6151	0.538438
2,2,3-trimethylpentane	564-02-3	ND	ND	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	202.7514	0.284497	253.6141	0.291934	348.285	0.675503
toluene	108-88-3	1296.488	1.819211	2983.398	3.434175	1209.069	2.345003
2-methylheptane	592-27-8	226.2298	0.317442	312.6832	0.359928	254.8909	0.494364
3-methylheptane	589-81-1	ND	ND	186.7103	0.214921	192.1021	0.372584
1-octene	111-66-0	ND	ND	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	268.1628	0.376282	229.5539	0.264238	259.6555	0.503605
ethylbenzene	100-41-4	ND	ND	ND	ND	299.2807	0.580458
<i>m</i> -xylene/ <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	591.55	0.68093	281.281	0.545548
styrene	100-42-5	ND	ND	281.0911	0.323563	ND	ND
<i>o</i> -xylene	95-47-6	252.3552	0.354101	251.7234	0.289758	ND	ND
1-nonene	124-11-8	ND	ND	ND	ND	ND	ND
<i>n</i> -nonane	111-84-2	ND	ND	ND	ND	ND	ND
isopropylbenzene	98-82-8	216.129	0.303269	402.7574	0.463612	438.3829	0.850249
alpha-pinene	80-56-8	313.1028	0.439341	ND	ND	ND	ND
<i>n</i> -propylbenzene	103-65-1	ND	ND	ND	ND	ND	ND
<i>m</i> -ethyltoluene	620-14-4	ND	ND	ND	ND	ND	ND
<i>p</i> -ethyltoluene	622-96-8	ND	ND	447.0469	0.514593	229.5996	0.445311

(continued)

Table F-6. SNMOC, Reported as Weight Percent of Total (concluded)

Compound	CAS No.	RC-DA ^a	Percent Total	RC-DA	Percent Total	RC-DA	Percent Total
		12/14/01 (µg)		12/15/01 (µg)		12/16/01 (µg)	
1,3,5-trimethylbenzene	108-67-8	232.9636	0.326891	ND	ND	ND	ND
<i>o</i> -ethyltoluene	611-14-3	171.0091	0.239957	ND	ND	175.0215	0.339456
beta-pinene	127-91-3	ND	ND	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	254.0652	0.3565	396.2573	0.45613	250.8954	0.486615
1-decene	872-05-9	ND	ND	ND	ND	ND	ND
<i>n</i> -decane	124-18-5	ND	ND	ND	ND	238.1399	0.461875
1,2,3-trimethylbenzene	526-73-8	ND	ND	ND	ND	ND	ND
<i>m</i> -diethylbenzene	141-93-5	ND	ND	ND	ND	ND	ND
<i>p</i> -diethylbenzene	105-05-5	ND	ND	ND	ND	ND	ND
1-undecene	821-95-4	ND	ND	ND	ND	ND	ND
<i>n</i> -undecane	1120-21-4	191.4806	0.268682	199.2964	0.229409	ND	ND
<i>n</i> -dodecene	112-41-4	ND	ND	ND	ND	ND	ND
<i>n</i> -dodecane	112-40-3	40.9592	0.057473	ND	ND	ND	ND
1-tridecene	2437-56-1	ND	ND	ND	ND	ND	ND
<i>n</i> -tridecane	629-50-5	ND	ND	ND	ND	ND	ND
Total Speciated		15728.43		33008.09		15960.71	
Total Unspeciated		45737.11		53865.70		35598.66	
Total (Speciated + Unspeciated)^d		61465.54		86873.79		51559.37	

^a RC = residence chamber = combustion air + dilution air; DA = dilution air.^b ND = not detected.^c *n*-hexane deleted from 12/14/01 data as a contaminant from the denuders^d Total NMOC with unknowns in µg/m³ is an estimate based on propane only.

Appendix G

**Data Tables for Individual
Air Toxics Samples**

Contents

<u>Table</u>	<u>Page</u>
G-1. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Laboratory Blanks and Field Ambient Sampling	G3
G-2A. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference	G5
G-2B. Smelt Tank Vent: Field Test (12/15/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference	G7
G-2C. Smelt Tank Vent: Field Test (12/16/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference	G9

Table G-1. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Laboratory Blanks and Field Ambient Sampling

Compound	CAS No.	Laboratory	
		Blank 12/14/01 (µg/m ³)	Ambient 12/14/01 (µg/m ³)
acetylene	74-86-2	ND ^a	0.49
propylene	115-07-1	ND	ND
dichlorodifluoromethane	75-71-8	ND	2.94
chloromethane	74-87-3	ND	1.43
dichlorotetrafluoroethane	1320-37-2	ND	ND
vinyl chloride	75-01-4	ND	ND
1,3-butadiene	106-99-0	ND	ND
bromomethane	74-83-9	ND	ND
chloroethane	75-00-3	ND	ND
acetonitrile	75-05-8	ND	ND
acetone	67-64-1	ND	ND
trichlorofluoromethane	75-69-4	ND	1.40
acrylonitrile	107-13-1	ND	ND
1,1-dichloroethene	75-35-4	ND	ND
methylene chloride	75-09-2	ND	159.71 ^b
trichlorotrifluoroethane	26523-64-8	ND	0.30
<i>trans</i> -1,2-dichloroethylene	56-60-5	ND	ND
1,1-dichloroethane	75-34-3	ND	ND
methyl <i>tert</i> -butyl ether	1634-04-1	ND	ND
methyl ethyl ketone	78-93-3	ND	ND
chloroprene	126-99-9	ND	ND
<i>cis</i> -1,3-dichloroethylene	156-59-2	ND	ND
bromochloromethane	74-97-5	ND	ND
chloroform	67-66-3	ND	ND
ethyl <i>tert</i> -butyl ether	637-92-3	ND	ND
1,2-dichloroethane	107-06-2	ND	ND
1,1,1-trichloroethane	71-55-6	ND	ND
benzene	71-43-2	0.30	1.10
carbon tetrachloride	56-23-5	ND	0.21
<i>tert</i> -amyl methyl ether	994-05-8	ND	ND
1,2-dichloropropane	78-87-5	ND	ND
ethyl acrylate	140-88-5	ND	ND

(continued)

Table G-1. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Laboratory Blanks and Field Ambient Sampling (concluded)

Compound	CAS No.	Laboratory	
		Blank 12/14/01 (µg/m ³)	Ambient 12/14/01 (µg/m ³)
bromodichloromethane	75-27-4	ND	ND
trichloroethylene	79-01-6	ND	ND
methyl methacrylate	80-62-6	ND	ND
<i>cis</i> -1,2-dichloropropene	10061-01-5	ND	ND
methyl isobutyl ketone	108-10-1	ND	ND
<i>trans</i> -1,2-dichloropropene	10061-02-6	ND	ND
1,1,2-trichloroethane	79-00-5	ND	ND
toluene	108-88-3	0.70	1.28
dibromochloromethane	124-48-1	ND	ND
1,2-dibromoethane	106-93-4	ND	ND
<i>n</i> -octane	111-65-9	ND	ND
tetrachloroethylene	127-18-4	ND	ND
chlorobenzene	108-90-7	ND	ND
ethylbenzene	100-41-4	ND	0.25
<i>m</i> -, <i>p</i> -xylene	108-38-3/106-42-3	ND	0.60
bromoform	75-25-2	ND	ND
styrene	100-42-5	ND	ND
1,1,2,2-tetrachloroethane	79-34-5	ND	ND
<i>o</i> -xylene	95-47-6	ND	0.19
1,3,5-trimethylbenzene	106-67-8	ND	ND
1,2,4-trimethylbenzene	95-63-6	ND	0.44
<i>m</i> -dichlorobenzene	541-73-1	ND	ND
chloromethylbenzene	100-44-7	ND	ND
<i>p</i> -dichlorobenzene	106-46-7	ND	ND
<i>o</i> -dichlorobenzene	95-50-1	ND	ND
1,2,4,-trichlorobenzene	120-82-1	ND	ND
hexachloro- 1,3-butadiene	87-68-3	ND	ND

^a ND = not detected.

^b Methylene chloride from 12/14/01 has been deleted as a contaminant from the solvents used for the denuders.

Table G-2A. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference

Compound	CAS No.	RC ^a	DA ^b	Air Toxics	
		Residence	Dilution	RC-DA	Ambient
		Chamber	Air	RC-DA	Ambient
		(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)
acetylene	74-86-2	ND ^c	0.59	-0.59	0.49
propylene	115-07-1	ND	0.77	-0.77	ND
dichlorodifluoromethane	75-71-8	4.06	4.72	-0.66	2.94
chloromethane	74-87-3	1.38	1.97	-0.59	1.43
dichlorotetrafluoroethane	1320-37-2	ND	ND	ND	ND
vinyl chloride	75-01-4	ND	ND	ND	ND
1,3-butadiene	106-99-0	ND	ND	ND	ND
bromomethane	74-83-9	ND	ND	ND	ND
chloroethane	75-00-3	ND	ND	ND	ND
acetonitrile	75-05-8	ND	ND	ND	ND
acetone	67-64-1	ND	ND	ND	ND
trichlorofluoromethane	75-69-4	ND	ND	ND	1.40
acrylonitrile	107-13-1	ND	ND	ND	ND
1,1-dichloroethene	75-35-4	ND	ND	ND	ND
methylene chloride	75-09-2	ND	3.87	-3.87	159.71 ^d
trichlorotrifluoromethane	26523-64-8	ND	ND	ND	0.30
<i>trans</i> -1,2-dichloroethylene	56-60-5	ND	ND	ND	ND
1,1-dichloroethane	75-34-3	ND	ND	ND	ND
methyl <i>tert</i> -butyl ether	1634-04-1	ND	ND	ND	ND
methyl ethyl ketone	78-93-3	12.67	ND	12.67	ND
chloroprene	126-99-9	ND	ND	ND	ND
<i>cis</i> -1,3-dichloroethylene	156-59-2	ND	ND	ND	ND
bromochloromethane	74-97-5	ND	ND	ND	ND
chloroform	67-66-3	ND	ND	ND	ND
ethyl <i>tert</i> -butyl ether	637-92-3	ND	ND	ND	ND
1,2-dichloroethane	107-06-2	ND	ND	ND	ND
1,1,1-trichloroethane	71-55-6	ND	ND	ND	ND
benzene	71-43-2	1.16	0.36	0.80	1.10
carbon tetrachloride	56-23-5	ND	ND	ND	0.21
<i>tert</i> -amyl methyl ether	994-05-8	ND	ND	ND	ND
1,2-dichloropropane	78-87-5	ND	ND	ND	ND
ethyl acrylate	140-88-5	ND	ND	ND	ND

(continued)

Table G-2A. Smelt Tank Vent: Field Test (12/14/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference (concluded)

Compound	CAS No.	RC ^a	DA ^b	Air Toxics	
		Residence	Dilution		
		Chamber	Air	RC-DA	Ambient
		(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)
bromodichloromethane	75-27-4	ND	ND	ND	ND
trichloroethylene	79-01-6	ND	ND	ND	ND
methyl methacrylate	80-62-6	ND	ND	ND	ND
<i>cis</i> -1,2-dichloropropene	10061-01-5	ND	ND	ND	ND
methyl isobutyl ketone	108-10-1	ND	ND	ND	ND
<i>trans</i> -1,2-dichloropropene	10061-02-6	ND	ND	ND	ND
1,1,2-trichloroethane	79-00-5	ND	ND	ND	ND
toluene	108-88-3	3.83	0.37	3.46	1.28
dibromochloromethane	124-48-1	ND	ND	ND	ND
1,2-dibromoethane	106-93-4	ND	ND	ND	ND
<i>n</i> -octane	111-65-9	ND	ND	ND	ND
tetrachloroethylene	127-18-4	ND	ND	ND	ND
chlorobenzene	108-90-7	ND	ND	ND	ND
ethylbenzene	100-41-4	ND	ND	ND	0.25
<i>m</i> -, <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	ND	0.60
bromoform	75-25-2	ND	ND	ND	ND
styrene	100-42-5	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	79-34-5	ND	ND	ND	ND
<i>o</i> -xylene	95-47-6	ND	ND	ND	0.19
1,3,5-trimethylbenzene	106-67-8	ND	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	ND	ND	ND	0.44
<i>m</i> -dichlorobenzene	541-73-1	ND	ND	ND	ND
chloromethylbenzene	100-44-7	ND	ND	ND	ND
<i>p</i> -dichlorobenzene	106-46-7	ND	ND	ND	ND
<i>o</i> -dichlorobenzene	95-50-1	ND	ND	ND	ND
1,2,4,-trichlorobenzene	120-82-1	ND	ND	ND	ND
hexachloro- 1,3-butadiene	87-68-3	ND	ND	ND	ND

^a RC = residence chamber.

^b DA = dilution air.

^c ND = not detected.

^d Methylene chloride from 12/14/01 has been deleted as a contaminant from the solvents used for the denuders.

Table G-2B. Smelt Tank Vent: Field Test (12/15/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference

Compound	CAS No.	RC ^a	DA ^b	Air Toxics RC-DA
		Residence Chamber (µg/m ³)	Dilution Air (µg/m ³)	
acetylene	74-86-2	2.48	0.67	1.81
propylene	115-07-1	ND ^c	ND	ND
dichlorodifluoromethane	75-71-8	2.57	2.73	-0.16
chloromethane	74-87-3	ND	1.19	-1.19
dichlorotetrafluoroethane	1320-37-2	ND	ND	ND
vinyl chloride	75-01-4	ND	ND	ND
1,3-butadiene	106-99-0	ND	ND	ND
bromomethane	74-83-9	ND	ND	ND
chloroethane	75-00-3	ND	ND	ND
acetonitrile	75-05-8	ND	ND	ND
acetone	67-64-1	ND	ND	ND
trichlorofluoromethane	75-69-4	ND	ND	ND
acrylonitrile	107-13-1	ND	ND	ND
1,1-dichloroethene	75-35-4	ND	ND	ND
methylene chloride	75-09-2	28.20	18.70	9.5
trichlorotrifluororthane	26523-64-8	ND	ND	ND
<i>trans</i> -1,2-dichloroethylene	56-60-5	ND	ND	ND
1,1-dichloroethane	75-34-3	ND	ND	ND
methyl <i>tert</i> -butyl ether	1634-04-1	ND	ND	ND
methyl ethyl ketone	78-93-3	ND	ND	ND
chloroprene	126-99-9	ND	ND	ND
<i>cis</i> -1,3-dichloroethylene	156-59-2	ND	ND	ND
bromochloromethane	74-97-5	ND	ND	ND
chloroform	67-66-3	ND	ND	ND
ethyl <i>tert</i> -butyl ether	637-92-3	ND	ND	ND
1,2-dichloroethane	107-06-2	ND	ND	ND
1,1,1-trichloroethane	71-55-6	ND	ND	ND
benzene	71-43-2	7.91	0.35	7.56
carbon tetrachloride	56-23-5	ND	ND	ND
<i>tert</i> -amyl methyl ether	994-05-8	ND	ND	ND
1,2-dichloropropane	78-87-5	ND	ND	ND
ethyl acrylate	140-88-5	ND	ND	ND

(continued)

Table G-2B. Smelt Tank Vent: Field Test (12/15/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference (concluded)

Compound	CAS No.	RC ^a	DA ^b	Air Toxics
		Residence Chamber (µg/m ³)	Dilution Air (µg/m ³)	RC-DA (µg/m ³)
bromodichloromethane	75-27-4	ND	ND	ND
trichloroethylene	79-01-6	ND	ND	ND
methyl methacrylate	80-62-6	ND	ND	ND
<i>cis</i> -1,2-dichloropropene	10061-01-5	ND	ND	ND
methyl isobutyl ketone	108-10-1	ND	ND	ND
<i>trans</i> -1,2-dichloropropene	10061-02-6	ND	ND	ND
1,1,2-trichloroethane	79-00-5	ND	ND	ND
toluene	108-88-3	7.13	0.28	6.85
dibromochloromethane	124-48-1	ND	ND	ND
1,2-dibromoethane	106-93-4	ND	ND	ND
<i>n</i> -octane	111-65-9	ND	ND	ND
tetrachloroethylene	127-18-4	ND	ND	ND
chlorobenzene	108-90-7	ND	ND	ND
ethylbenzene	100-41-4	ND	ND	ND
<i>m</i> -, <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	ND
bromoform	75-25-2	ND	ND	ND
styrene	100-42-5	ND	ND	ND
1,1,2,2-tetrachloroethane	79-34-5	ND	ND	ND
<i>o</i> -xylene	95-47-6	ND	ND	ND
1,3,5-trimethylbenzene	106-67-8	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	ND	ND	ND
<i>m</i> -dichlorobenzene	541-73-1	ND	ND	ND
chloromethylbenzene	100-44-7	ND	ND	ND
<i>p</i> -dichlorobenzene	106-46-7	ND	ND	ND
<i>o</i> -dichlorobenzene	95-50-1	ND	ND	ND
1,2,4-trichlorobenzene	120-82-1	ND	ND	ND
hexachloro- 1,3-butadiene	87-68-3	ND	ND	ND

^a RC = residence chamber.

^b DA = dilution air.

^c ND = not detected.

Table G-2C. Smelt Tank Vent: Field Test (12/16/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference

Compound	CAS No.	RC ^a	DA ^b	Air Toxics RC-DA ($\mu\text{g}/\text{m}^3$)
		Residence	Dilution	
		Chamber ($\mu\text{g}/\text{m}^3$)	Air ($\mu\text{g}/\text{m}^3$)	
acetylene	74-86-2	ND ^c	0.57	-0.57
propylene	115-07-1	ND	ND	ND
dichlorodifluoromethane	75-71-8	ND	1.67	-1.67
chloromethane	74-87-3	ND	0.87	-0.87
dichlorotetrafluoroethane	1320-37-2	ND	ND	ND
vinyl chloride	75-01-4	ND	ND	ND
1,3-butadiene	106-99-0	ND	ND	ND
bromomethane	74-83-9	ND	ND	ND
chloroethane	75-00-3	ND	ND	ND
acetonitrile	75-05-8	ND	ND	ND
acetone	67-64-1	ND	ND	ND
trichlorofluoromethane	75-69-4	ND	ND	ND
acrylonitrile	107-13-1	ND	ND	ND
1,1-dichloroethene	75-35-4	ND	ND	ND
methylene chloride	75-09-2	2.99	4.11	-1.12
trichlorotrifluororthane	26523-64-8	ND	ND	ND
<i>trans</i> -1,2-dichloroethylene	56-60-5	ND	ND	ND
1,1-dichloroethane	75-34-3	ND	ND	ND
methyl <i>tert</i> -butyl ether	1634-04-1	ND	ND	ND
methyl ethyl ketone	78-93-3	ND	ND	ND
chloroprene	126-99-9	ND	ND	ND
<i>cis</i> -1,3-dichloroethylene	156-59-2	ND	ND	ND
bromochloromethane	74-97-5	ND	ND	ND
chloroform	67-66-3	ND	ND	ND
ethyl <i>tert</i> -butyl ether	637-92-3	ND	ND	ND
1,2-dichloroethane	107-06-2	ND	ND	ND
1,1,1-trichloroethane	71-55-6	ND	ND	ND
benzene	71-43-2	ND	0.30	-0.30
carbon tetrachloride	56-23-5	ND	ND	ND
<i>tert</i> -amyl methyl ether	994-05-8	ND	ND	ND
1,2-dichloropropane	78-87-5	ND	ND	ND
ethyl acrylate	140-88-5	ND	ND	ND

(continued)

Table G-2C. Smelt Tank Vent: Field Test (12/16/01) Air Toxics Analysis from Residence Chamber, Dilution Air, and the Difference (concluded)

Compound	CAS No.	RC ^a	DA ^b	Air Toxics
		Residence Chamber (µg/m ³)	Dilution Air (µg/m ³)	RC-DA (µg/m ³)
bromodichloromethane	75-27-4	ND	ND	ND
trichloroethylene	79-01-6	ND	ND	ND
methyl methacrylate	80-62-6	ND	ND	ND
<i>cis</i> -1,2-dichloropropene	10061-01-5	ND	ND	ND
methyl isobutyl ketone	108-10-1	ND	ND	ND
<i>trans</i> -1,2-dichloropropene	10061-02-6	ND	ND	ND
1,1,2-trichloroethane	79-00-5	ND	ND	ND
toluene	108-88-3	2.94	0.26	2.68
dibromochloromethane	124-48-1	ND	ND	ND
1,2-dibromoethane	106-93-4	ND	ND	ND
<i>n</i> -octane	111-65-9	ND	ND	ND
tetrachloroethylene	127-18-4	ND	ND	ND
chlorobenzene	108-90-7	ND	ND	ND
ethylbenzene	100-41-4	ND	ND	ND
<i>m</i> -, <i>p</i> -xylene	108-38-3/106-42-3	ND	ND	ND
bromoform	75-25-2	ND	ND	ND
styrene	100-42-5	ND	ND	ND
1,1,2,2-tetrachloroethane	79-34-5	ND	ND	ND
<i>o</i> -xylene	95-47-6	ND	ND	ND
1,3,5-trimethylbenzene	106-67-8	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	ND	ND	ND
<i>m</i> -dichlorobenzene	541-73-1	ND	ND	ND
chloromethylbenzene	100-44-7	ND	ND	ND
<i>p</i> -dichlorobenzene	106-46-7	ND	ND	ND
<i>o</i> -dichlorobenzene	95-50-1	ND	ND	ND
1,2,4,-trichlorobenzene	120-82-1	ND	ND	ND
hexachloro- 1,3-butadiene	87-68-3	ND	ND	ND

^a RC = residence chamber.

^b DA = dilution air.

^c ND = not detected.

Appendix H

**Data Tables for Individual
PM_{2.5} Elemental Samples**

Table H-1. Smelt Tank Vent Individual PM_{2.5} Elemental Samples: XRF Elemental Analysis Results by Sample

Element	wt% of PM _{2.5} Mass					
	T102201J IB121401H	T102201K IB121401H	T102201S IB121501H	T102201T IB121501H	T082101N IB121601H	T100301A IB121601H
	R2A1	R2B1	R2A1	R2B1	R2A1	R2B1
Sodium	13.55	13.93	16	19.97	11.05	11.21
Magnesium	0.0206	0.0287	0.0288	0.0346	0.0233	0.0202
Silicon	0.0637	0.0737	0.0694	0.0622	0.052	0.055
Phosphorus	0.0045		0.0058	0.0056	0.0047	0.0063
Sulfur	9.03	9.49	10.72	11.69	7.05	7.33
Chlorine	1.87	1.59	1.66	1.69	1.32	1.41
Potassium	4.98	4.97	5.27	5.14	4.47	4.68
Calcium	0.057	0.056	0.0533	0.0508	0.0554	0.0585
Vanadium	ND ^a	ND	ND	ND	ND	ND

^a ND = not detected

Appendix I

**Data Tables for Individual
PM_{2.5} EC/OC Samples**

Table I-1. Smelt Tank Vent EC/OC Carbon Samples: NIOSH Method 5040 EC/OC Data by Sample

Filter ID	wt% of PM _{2.5} Mass	
	OC	EC
Q101501H IB121401HR4A1	2.8	0.3
Q101501K IB121401HR4B1	2.9	0.1
Q101501J IB121401HR8A1	2.1	0.2
Q101501L IB121401HR4B1	2.1	0.2
Q101501M IB121401HR10A3	2.2	0.2
Q101501N IB121401HR10B1	1.7	0.1
Q101501T IB121501HR4A1	4.5	0.2
Q101501U IB121501HR4B1	4.6	0.2
Q101501S IB121501HR8A1	4.7	0.2
Q101501R IB121501HR8B1	4.6	0.2
Q101501P IB121501HR10A3	4.6	0.2
Q101501Q IB121501HR10B3	3.6	0.1
Q101601C IB121601HR4A1	3.2	0.2
Q101601B IB121601HR4B1	3.4	0.3
Q101601D IB121601HR8A1	5.7	0.2
Q101601E IB121601HR8B1	5.7	0.2
Q101601F IB121601HR10A3	8.0	0.3
Q101601G IB121601HR10B3	3.7	0.2

Appendix J

Data Tables for Individual PM_{2.5} Inorganic Ion Samples

Contents

<u>Table</u>	<u>Page</u>
J-1. Ion Chromatography Calibration Ranges for PM _{2.5} Inorganic Ion Analysis: Smelt Tank Vent	J-3
J-2. Smelt Tank Vent Inorganic Ion Samples: Ion Chromatography Results by Sample .	J-4

Table J-1. Ion Chromatography Calibration Ranges for PM_{2.5} Inorganic Ion Analysis: Smelt Tank Vent

Ion	High Conc. (ppm)	Low Conc. (ppm)
Ammonium	2.67	0.97
Calcium	2.3	0.83
Chloride	5.2	2.8
Magnesium	2.8	1.02
Nitrate	5.2	2.8
Potassium	2.6	0.95
Sulfate	5.3	2.85

Table J-2. Smelt Tank Vent Inorganic Ion Samples: Ion Chromatography Results by Sample

Ion	wt% of PM _{2.5} Mass					
	T102201L	T102201N	T102201Q	T102201R	T100301C	T100301D
	IB121401H	IB121401H	IB121501H	IB121501H	IB121601H	IB121601H
	R6A1	R6B1	R6A1	R6B1	R6A1	R6B1
Ammonium	ND ^a	ND	ND	ND	ND	ND
Calcium	ND	ND	ND	ND	ND	ND
Chloride	1.94	1.92	1.61	1.65	1.84	1.74
Magnesium	ND	ND	ND	ND	ND	ND
Nitrate	ND	ND	ND	ND	ND	ND
Potassium	4.72	4.64	4.50	4.51	4.79	4.70
Sulphate	11.69	11.32	18.43	20.10	9.40	9.48
S ₂ O ₃	14.10	13.37	10.75	10.67	12.30	12.01

^a ND = not detected

Appendix K

**Data Tables for Individual
Semivolatile Organic Compounds**

Contents

<u>Table</u>	<u>Page</u>
K-1. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 1	K-3
K-2. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 2	K-5
K-3. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 3	K-7

Table K-1. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 1

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
dimethyl phthalate	19	0.8
diethyl phthalate	19	0.8
naphthalene	10	0.8
2-methylnaphthalene	21.28	0.968
1-methylnaphthalene	21.28	0.896
2,7-dimethylnaphthalene	18.24	0.768
1,3-dimethylnaphthalene	18.24	0.768
2,6-dimethylnaphthalene	18.24	0.768
acenaphthalene	38	1.6
acenaphthene	19	0.8
fluorene	3.8	0.16
1-methylfluorene	9.5	0.4
phenanthrene	1.9	0.08
anthracene	1.9	0.08
9-methylanthracene	18.62	0.784
octylcyclohexane	9.5	0.4
norpristane	9.5	0.4
decylcyclohexane	9.5	0.4
pristane	9.5	0.4
phytane	9.5	0.4
tridecylcyclohexane	9.5	0.4
dibutyl phthalate	19	0.8
butyl benzyl phthalate	19	0.8
<i>bis</i> (2-ethylhexyl) phthalate	19	0.8
dioctyl phthalate	19	0.8
fluoranthene	3.8	0.16
pyrene	1.9	0.08
chrysene	1.9	0.08
benzo[a]anthracene	1.9	0.08
benzo[k]fluoranthene	1.9	0.08
benzo[b]fluoranthene	3.8	0.16
benzo[a]pyrene	1.9	0.08

(continued)

Table K-1. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 1 (concluded)

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
nonadecylcyclohexane	9.5	0.4
squalane	19.855	0.836
ideno[1,2,3-cd]pyrene	1.9	0.08
dibenzo[a,h]anthracene	3.8	0.16
benzo[ghi]perylene	3.8	0.16
coronene	2.375	0.1
cholestane 1	0.95	0.04
cholestane 2	0.95	0.04
cholestane 3	0.95	0.04
cholestane 4	0.95	0.04
ABB-20R-24S-methylcholestane	0.95	0.04
ABB-20R-ethylcholestane	0.95	0.04
17A(H)-22,29,30-trisnorhopane	0.95	0.04
17B(H)-21A(H)-norhopane	0.95	0.04
17B(H)-21B(H)-hopane	0.95	0.04
17B(H)-21A(H)-hopane	0.95	0.04
17A(H)-21B(H)-hopane	0.95	0.04

Table K-2. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 2

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
<i>n</i> -decane (n-C10)	8.2	0.41
<i>n</i> -undecane (n-C11)	8.2	0.41
<i>n</i> -dodecane (n-C12)	8.2	0.41
<i>n</i> -tridecane (n-C13)	8.2	0.41
9h-fluoren-9-one	8.68	0.434
<i>n</i> -tetradecane (n-C14)	8.2	0.41
<i>n</i> -pentadecane (n-C15)	8.2	0.41
<i>n</i> -hexadecane (n-C16)	8.2	0.41
<i>n</i> -heptadecane (n-C17)	8.2	0.41
1-octadecene	15.32	0.766
<i>n</i> -octadecane (n-C18)	8.2	0.41
2-methylnonadecane (<i>iso</i> -C20)	1.96	0.098
3-methylnonadecane (<i>anteiso</i> -C20)	1.96	0.098
<i>n</i> -nonadecane (n-C19)	8.2	0.41
<i>n</i> -eicosane (n-C20)	8.2	0.41
<i>n</i> -heneicosane (n-C21)	8.2	0.41
<i>n</i> -docosane (n-C22)	8.2	0.41
<i>n</i> -tricosane (n-C23)	8.2	0.41
<i>iso</i> -docosane (n-C23)	8.2	0.41
<i>anteiso</i> -docosane (n-C23)	8.2	0.41
pyrene	0.4	0.02
anthraquinone	4.72	0.236
naphthalic anhydride	8.16	0.408
methylfluoranthene	0.4	0.02
retene	1.96	0.098
acepyrene (cyclopenta[c,d]pyrene)	1.96	0.098
benzanthraquinone	8.28	0.414
1-methylchrysene	0.4	0.02
benzo[a]pyrene	3.92	0.196
<i>n</i> -tetracosane (n-C24)	8.2	0.41
<i>iso</i> -tricosane (C24)	8.2	0.41
<i>anteiso</i> -tricosane (C24)	8.2	0.41
<i>n</i> -pentacosane (n-C25)	8.2	0.41
<i>iso</i> -tetracosane (C25)	8.2	0.41

(continued)

Table K-2. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 2 (concluded)

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
<i>anteiso</i> -tetracosane (C25)	8.2	0.41
<i>n</i> -hexacosane (n-C26)	8.2	0.41
<i>iso</i> -pentacosane (C26)	8.2	0.41
<i>anteiso</i> -pentacosane (C26)	8.2	0.41
heptacosane (<i>n</i> -C27)	8.2	0.41
<i>iso</i> -hexacosane (C27)	8.2	0.41
<i>anteiso</i> -hexacosane (C27)	8.2	0.41
<i>iso</i> -heptacosane (C28)	8.2	0.41
<i>anteiso</i> -heptacosane (C28)	8.2	0.41
<i>iso</i> -octacosane (C29)	8.2	0.41
<i>anteiso</i> -octacosane (C29)	8.2	0.41
octacosane (<i>n</i> -C28)	8.2	0.41
nonacosane (<i>n</i> -C29)	8.2	0.41
<i>iso</i> -nonacosane (C30)	8.2	0.41
<i>anteiso</i> -nonacosane (C30)	8.2	0.41
squalene	16.56	0.828
dibenzo[a,e]pyrene	0.4	0.02
hexatriacontane-d74	10.15	10.15
<i>n</i> -triacontane (n-C30)	17.2	0.86
<i>n</i> -hentriacontane (n-C31)	17.2	0.86
<i>iso</i> -triacontane (C31)	17.2	0.86
<i>anteiso</i> -triacontane (C31)	17.2	0.86
<i>iso</i> -hentriacontane (C32)	8.2	0.41
<i>anteiso</i> -hentriacontane (C32)	8.2	0.41
<i>iso</i> -dotriacontane (C33)	8.2	0.41
<i>anteiso</i> -dotriacontane (C33)	8.2	0.41
dotriacontane (<i>n</i> -C32)	8.2	0.41
tritriacontane (<i>n</i> -C33)	8.2	0.41
tetratriacontane (<i>n</i> -C34)	8.2	0.41
<i>iso</i> -tritriacontane (C34)	8.2	0.41
<i>anteiso</i> -tritriacontane (C34)	8.2	0.41
pentatriacontane (<i>n</i> -C35)	8.2	0.41
hexatriacontane (<i>n</i> -C36)	8.2	0.41
tetracontane (<i>n</i> -C40)	8.2	0.41

Table K-3. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 3

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
caproic or hexanoic acid, methyl ester	18.68	0.75
succinic or butanedioic acid, methyl ester	6.13	0.25
caprylic or octanoic acid, methyl ester	18.53	0.74
glutaric or pentanedioic acid, dimethyl ester	7.25	0.29
nonanoic acid, methyl ester	14.66	0.59
adipic or hexanedioic acid, dimethyl ester	6.27	0.25
capric or decanoic acid, methyl ester	14.66	0.59
undecanoic acid, methyl ester	14.66	0.59
pimelic or heptanedioic acid, dimethyl ester	6.32	0.25
suberic or octanedioic acid, dimethyl ester	6.32	0.25
dodecanoic acid, methyl ester	17.16	0.69
azelaic or nonanedioic acid, dimethyl ester	5.64	0.23
tridecanoic acid, methyl ester	17.16	0.69
pinonic acid, methyl ester	22.11	0.88
dimethyl phthalate	6.18	0.25
1,4-benzenedicarboxylic acid, methyl ester	6.08	0.24
1,3-benzenedicarboxylic acid, methyl ester	6.42	0.26
1,2-benzenedicarboxylic acid, 4-methyl	6.27	0.25
1,2,4-benzenetricarboxylic acid, methyl ester	6.03	0.24
benzenetetracarboxylic acid, methyl ester	5.93	0.24
abietic acid, methyl ester	17.16	0.71
pimaric acid, methyl ester (secondary)	17.16	0.71
sandaracopimaric acid, methyl ester (secondary std)	17.16	0.69
isopimaric acid, methyl ester (secondary std)	17.16	0.71
6,18,11,13-abetatetraen-18-oic acid, methyl ester	17.16	0.71
dehydroabdietic acid, methyl ester (secondary std)	17.16	0.71
sebacic or decanedioic acid, dimethyl ester	5.74	0.23
tetradecanoic acid, methyl ester	15.05	0.6
pentadecanoic acid, methyl ester	15.05	0.6
palmitoleic or 9-hexadecanoic acid, methyl ester	15.74	0.63
hexadecanoic acid, methyl ester	14.71	0.59
heptadecanoic acid, methyl ester	14.71	0.59

(continued)

Table K-3. Calibration Ranges for PM Speciated Organic Compounds, Standard Suite 3 (concluded)

Compound	High Conc. (µg/mL)	Low Conc. (µg/mL)
linoleic or 8,11-octadecadienoic acid, methyl ester	14.07	0.56
oleic or 9-octadecenoic acid, methyl ester	16.52	0.66
linolenic or 9,12,15-octadecatrienoic acid, methyl ester	17.6	0.7
octadecanoic acid, methyl ester	11.67	0.47
nonadecanoic acid, methyl ester	11.67	0.47
eicosanoic acid, methyl ester	12.06	0.48
heneicosanoic acid, methyl ester	12.06	0.48
docosanoic acid, methyl ester	12.21	0.49
tricosanoic acid, methyl ester	12.21	0.49
tetracosanoic acid, methyl ester	13.73	0.55
pentacosanoic acid, methyl ester	13.73	0.55
hexacosanoic acid, methyl ester	13.73	0.55
heptacosanoic acid, methyl ester	14.85	0.59
octacosanoic acid, methyl ester	14.85	0.59
nonacosanoic acid, methyl ester	14.85	0.59
triacontanoic acid, methyl ester	14.85	0.58

Appendix L

List of ERG SOPs and EPA MOPs by Title

Table L-1. ERG Standard Operating Procedures by Title

SOP No.	SOP Title
1	Documentation of Field Recovery Activities
2	Gravimetric Determination for Particulate Emissions Measurements
3	Field Procedure for Collecting Ambient Air Toxics and Carbonyl Compounds Samples using the ERG:AT/C Sampling System
3B	Field Procedure for Collecting Ambient Air Toxics and Carbonyl Compounds Samples using the ERG:AT/C Sampling System
4	SOP for Preventive Maintenance in the Gas Chromatography/Mass Spectrometry Laboratory
5	SOP for the Concurrent GC/FID/MS Analysis of Canister Air Toxic Samples
6	SOP for the Analysis of Tenax Tubes According to EPA Method TO-1/TO-17
7	SOP for the Preparation of Review Packages for Mass Spectrometry Data Sets
8	Procedure for Preparation of Standard Operating Procedures
9	SOP for the Operation of the Documentation System
10	SOP for the Determination of Method Detection Limits in the GC/MS Air Toxics Laboratory
11	SOP for Sample Storage and Checkout from Freezers/Refrigerators at the Laboratory
12	SOP for Basic Training Requirements for Sample Preparation Laboratory Personnel
13	Field Procedure for Collecting Ambient Air Hexavalent Chromium Samples Using the ERG:CR6 Sampling System
14	SOP for Sample Preparation Quality Control
15	SOP for Documentation Procedures for the Sample Preparation Laboratory
16	SOP for the Varian 9000 Series High Performance Liquid Chromatograph (HPLC)
17	SOP for Developing, Documenting, and Evaluating the Accuracy of Spreadsheet Data
18	Maintaining and Recording Data Records
19	SOP for Transferring, Storing, and Using Confidential Business Information (CBI)
20	SOP for Conducting a Laboratory Systems Audit
21	Calibration and Operation of Analytical Balances
22	SOP for the Preparation of Standards in the ERG Organic Preparation Laboratory
23	SOP for the Use of Significant Figures and Rounding Off Numbers When Reporting Data
24	SOP for Preparing Aldehyde Derivatizing Reagents and Extracting Derivatized Samples
25	SOP for the Operation of the Rainin High Performance Liquid Chromatography System
26	SOP for Documentation: Labeling of Samples and Standards Prepared in the Laboratory
27	SOP for the Operation of a Gas Chromatograph
28	SOP for Quality Assurance/Quality Control in Gas Chromatography/Mass Spectrometry
29	SOP for Concentration of Sample Extracts Using the Kuderna-Danish Concentrator
30	SOP for Canister Sampling System Certification Procedures

(continued)

Table L-1. ERG Standard Operating Procedures by Title (continued)

SOP No.	SOP Title
31	SOP for Cleaning Glassware and Syringes for Organic Analysis
32	Statistical Manual Standard Operating Procedure
33	SOP for Solid and Hazardous Waste Disposal
34	Analytical Chemistry Training at PPK Laboratory
35	SOP for Quality Assurance/Quality Control
36	SOP for Laboratory Security
37	SOP for Chemical Inventory
38	SOP for Personal Protective Equipment Program
39	SOP for Maintaining Laboratory Notebooks
40	SOP for Chemical Storage Facilities
41	SOP for Tracer Gas Release and Integrated Bag Sampling for Analysis by FTIR Spectroscopy
42	SOP for the Dionex-300 Ion Chromatograph
43	SOP for the Analysis of Semivolatile Organic Compounds in Gaseous Emissions using the SemiVOST Method
44	SOP for Method 82'70C - GC/MS Analysis of Semivolatile Organics
45	SOP for Sample Log-in at the ERG Chemistry Laboratory
46	Field Procedure for Collecting Speciated and/or Total Nonmethane Organic Compounds Ambient Air Samples Using the ERG:S/NMOC Sampling System
47	Field Procedure for Collecting Ambient Carbonyl Compounds Samples Using the ERG:C Sampling System
47B	Field Procedure for Collecting Ambient Carbonyl Compounds Samples Using the ERG:C Sampling System
48	SOP for Cleaning XAD-2 with Quality Control Measures to Assure Cleanliness
49	SOP for the Extraction and Analysis of PAHs from XAD-20 Traps
50	SOP for Separatory Funnel Liquid-Liquid Extraction by EPA SW-846 Method 3510C
51	SOP for Continuous Liquid-Liquid Extraction by EPA SW-846 Method 3520C
52	SOP for Acid-Base Partition Cleanup by EPA SW-846 Method 3650B
53	SOP for Soxhlet Extraction by EPA SW-846 Method 3540C
54	SOP for Preparation, Evaluation, and Shipping of Performance Evaluation Samples for Method 24
55	SOP for Maintenance of NANOPure-A Deionized Water System
56	SOP for Daily Maintenance of Cold Storage Units
57	SOP for Project Peer Review
58	SOP for Preparing Method 25 Audit Samples Using the Transfill System
59	SOP for High Performance Liquid Chromatography

(continued)

Table L-1. ERG Standard Operating Procedures by Title (concluded)

SOP No.	SOP Title
60	SOP for PDFID Sample Analysis
61	SOP for Standard Preparation Using Dynamic Flow Dilution System
62	SOP for UATMP and NMOC Canister Cleaning
63	SOP for the Analysis of Ambient Air for Hexavalent Chromium by IC
64	SOP for Shipping Method 6, 7, 8, and 26 Audit Samples
65	SOP for the ERG Sample Database
66	Cylinder Recycling
67	SOP for Producing Standard Mixtures of Organic Compounds in Air by Liquid Injection
68	SOP for Refrigerator and Freezer Temperature Monitoring
69	SOP for Shipping Method 23 Audit Samples
70	SOP for Storing and Shipping Method 13A, 13B, and 29 Audit Samples
71	SOP for Documentation Requirements for the GC/MS Laboratory and for GC/MS Systems in the VOC Laboratory
72	SOP for Stack Sampling Using FTIR Spectroscopy
73	SOP for the ECD Wipe Test
74	SOP for the Preparation of Spiked Sorbent Samples Using Liquid Spiking into Tenax-GC Tubes
75	SOP for the Preparation of Spiked Sorbent Samples Using Liquid Spiking onto XAD-2
76	SOP for the Preparation of Spiked Sorbent Samples Using Flash Evaporation Spiking onto XAD-2
77	SOP for Method 624
78	SOP for Method 625
79	SOP for Method 1624C
80	SOP for Method 1625C
81	SOP for the Preparation of Spiked Method 8 Samples as Stationary Source Audit Materials

Table L-2. EPA Method Operating Procedures by Title

MOP No.	MOP Title
2501	Preparation of Clean Substrates, Glassware, and Other Materials
2502	Purification of Benzene Solvent
2503	Mass Measurements of Blank and Exposed Sampling Substrates
2504	Solvent Extraction of Samples and Extract Concentration
2505	Diazomethane Preparation and Extract Methylation
2506	Silylation of Methylated Extracts
2507	GC/MS Calibration and Analysis of Extracts
2508	Denuder Coating, Cleanup, and Extraction
2509	PUF Cleanup and Extraction
NIOSH Method 5040	Elemental/Organic Carbon Analysis

TECHNICAL REPORT DATA

1. REPORT NO. EPA-600/R-03/101b		2.		3. RECIPIENT'S ACCESSION NO.	
4. TITLE AND SUBTITLE Source Sampling Fine Particulate Matter: Stationary Source Characterization Testing of a Smelt Tank at a Pulp and Paper Facility: Volume 2, Appendices				5. REPORT DATE November 2003	
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7. AUTHORS Joan T. Bursey and Dave-Paul Dayton				8. PERFORMING ORGANIZATION REPORT NO.	
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				14. SPONSORING AGENCY CODE EPA/600/13	
15. SUPPLEMENTARY NOTES The EPA Project Officer is N. Dean Smith, mail drop E343-02, phone (919) 541-2708					
16. ABSTRACT The report provides a profile of the chemical composition of particulate matter (PM) with aerodynamic diameter 2.5 µm or less (PM _{2.5}) emitted from a smelt tank at a pulp and paper facility using the Kraft pulping process. The first step in the Kraft process is to form pulp by digesting wood chips in an aqueous solution of sodium sulfide and sodium hydroxide at elevated temperature and pressure. This extracts the cellulose from the wood by dissolving the lignin that binds the cellulose fibers together. The pulp is washed, and the spent digestion liquor/wash water solution (black liquor) is separated from the cellulose (which forms the paper) and is sent through a process to recover the digestion chemicals. The black liquor undergoes a sequence of evaporation steps to yield a concentrated black liquor which is sent as fuel to a recovery boiler used to generate heat for process steam in the plant. Combusting the black liquor results in a molten smelt, which is composed primarily of inorganic chemicals, at the bottom of the recovery furnace. The smelt is collected, dissolved in water, and transferred to a tank where quicklime is added to regenerate the digestion reactants, sodium sulfide and sodium hydroxide. The data obtained during this research will assist States in determining the major sources of PM _{2.5} so they can devise and institute a control strategy to attain the ambient concentrations set by the National Ambient Air Quality Standard for PM _{2.5} that was promulgated in July 1977 by the U.S. EPA. Along with the PM _{2.5} emission profile, data are also provided for gas-phase emissions of several organic compounds. Data are provided in a format suitable to be included in the EPA source profile database, SPECIATE.					
17. KEY WORDS AND DOCUMENT ANALYSIS					
a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS		c. COSATI Field/Group	
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