
Analytical Report

Air Sampling Fluorochemical Report

DuPont Washington Works – Air Sampling Program Round 4

Exygen Research Report No. L0001359

Testing Laboratory

Exygen Research
3058 Research Drive
State College, PA 16801

Requester

Michael D Aucoin
URS Corporation
Barley Mill Plaza
Building 27 Room 1260
Lancaster Pike and Rt 141
Wilmington, DE 19805

ALL DATA CONTAINED IN THIS REPORT WAS GENERATED BY EXYGEN RESEARCH

Summary

Seven solid media samples were received by Centre Analytical Laboratories, Inc. (dba Exygen Research) (Exygen) from DuPont Corporation. The media represent samples of air collected on OVS tubes. Please see Table 1 for a completed listing of samples received and field air volumes collected.

The samples were analyzed for Perfluorooctanoic Acid (C8 Acid) using liquid chromatography / mass spectrometry (LCMS). The method employed is entitled "Method of Analysis for the Determination of Perfluorooctanoic Acid (PFOA) in OVS Airtubes by LCMS" (James Miller, Exygen Research, February 17, 2003).

The OVS tubes were separated into three fractions for specific fluorochemical analysis. Fraction A consisted of the filter, backing material and plastic ring. Fraction B contained the first bed of XAD resin and the PUF backing. Fraction C contained the second bed of XAD resin and PUF backing. Fractions A and B were extracted with 1 mL of methanol. Fraction C was not analyzed but saved for possible future analysis. Perfluorodecanoic Acid (C10 Acid) was added as a surrogate spike to each fraction prior to extraction. Sample WWK-A-AMS6-E4 was not analyzed as per client request.

Instrument operating conditions can be found at the beginning of each analytical run. Raw instrument data is given in Appendix A. Chain-of-custody information can be found in Appendix B.

Results Summary

Request #	Air Volume Sampled (L)	C8 Acid (mg/m3)
WWK-A-AMS1-E4 A	1432	< 0.00007
WWK-A-AMS1-E4 B	1432	< 0.00007
WWK-A-AMS1-E4 C	1432	NA
WWK-A-AMS1-E4 (Total)		< 0.00014
WWK-A-AMS2-E4 A	1458	0.0002
WWK-A-AMS2-E4 B	1458	< 0.00007
WWK-A-AMS2-E4 C	1458	NA
WWK-A-AMS2-E4 (Total)		0.0002
WWK-A-AMS3-E4 A	1468	0.0002
WWK-A-AMS3-E4 B	1468	< 0.00007
WWK-A-AMS3-E4 C	1468	NA
WWK-A-AMS3-E4 (Total)		0.0002
WWK-A-AMS4-E4 A	1421	< 0.00007
WWK-A-AMS4-E4 B	1421	< 0.00007
WWK-A-AMS4-E4 C	1421	NA
WWK-A-AMS4-E4 (Total)		< 0.00014
WWK-A-AMS5-E4 A	1435	< 0.00007
WWK-A-AMS5-E4 B	1435	< 0.00007
WWK-A-AMS5-E4 C	1435	NA
WWK-A-AMS5-E4 (Total)		< 0.00014

NA – Not Analyzed. Fraction B was below the quantitation limit, therefore the backup fraction does not require analysis.

1. “<” is defined as not detected at or above the reported level.
2. Sample results have not been corrected for blank results or control spike recoveries.
3. Please note the following descriptions of the OVS sample tube fractions:

Fraction	Fraction Description
A	Frit Extract
B	1st set beads extract
C	2nd set beads extract (not analyzed)

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QC Data

LCS

Please note: One control sample was spiked with each perfluorooctanoic acid to give a final concentration of 500 ppb. Air was pulled through the tube at a rate of 1-liter per minute for one hour (60 liters of air). The fractions were separated and analyzed. The acceptable range for control recovery is 75-125%.

Request #	C8 Acid (amount spiked - ppb)	C8 Acid (amount recovered - ppb)	C8 Acid (percent recovery)
Control 1	500	499	100

Blanks

Request #	Vol. Of Air (L)	C8 Acid (ug/fraction)
WWK-A-AMSFBLK-E4 A	0	< 0.10
WWK-A-AMSFBLK-E4 B	0	< 0.10

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Surrogates

A surrogate spike (C10 Acid) was added to all OVS tubes to give a final concentration of 500 ppb in the extract. Surrogate spike recoveries are given in the following table. There are no set criteria for surrogate spike recoveries. Advisory ranges are 75-125%.

Sample #	Amount Spiked (ppb)	Amount Recovered (ppb)	Percent Recovery (%)
WWK-A-AMSFBLK-E4 A	500	931	186*
WWK-A-AMSFBLK-E4 B	500	443	89
WWK-A-AMS1-E4 A	500	946	189*
WWK-A-AMS1-E4 B	500	465	93
WWK-A-AMS2-E4 A	500	802	161*
WWK-A-AMS2-E4 B	500	498	100
WWK-A-AMS3-E4 A	500	797	159*
WWK-A-AMS3-E4 B	500	474	95
WWK-A-AMS4-E4 A	500	794	159*
WWK-A-AMS4-E4 B	500	471	94
WWK-A-AMS5-E4 A	500	804	161*
WWK-A-AMS5-E4 B	500	424	85
Control Spike A	500	889	178*
Control Spike B	500	412	82

* Surrogate recovery outside of advisory range.

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Calculations

Request #	Vol. Of Air (L)	C8 Acid (raw-ppb)	C8 Acid (ug/fraction)	C8 Acid (mg/m3)
WWK-A-AMSFBLK-E4 A	0	< 10	< 0.10	< 0.00007
WWK-A-AMSFBLK-E4 B	0	< 10	< 0.10	< 0.00007
WWK-A-AMS1-E4 A	1432	< 10	< 0.10	< 0.00007
WWK-A-AMS1-E4 B	1432	< 10	< 0.10	< 0.00007
WWK-A-AMS2-E4 A	1458	311	0.31	0.0002
WWK-A-AMS2-E4 B	1458	< 10	< 0.10	< 0.00007
WWK-A-AMS3-E4 A	1468	314	0.31	0.0002
WWK-A-AMS3-E4 B	1468	< 10	< 0.10	< 0.00007
WWK-A-AMS4-E4 A	1421	< 10	< 0.10	< 0.00007
WWK-A-AMS4-E4 B	1421	< 10	< 0.10	< 0.00007
WWK-A-AMS5-E4 A	1435	< 10	< 0.10	< 0.00007
WWK-A-AMS5-E4 B	1435	< 10	< 0.10	< 0.00007
Control Spike A	0	499	0.50	< 0.00007
Control Spike B	0	< 10	< 0.10	< 0.00007

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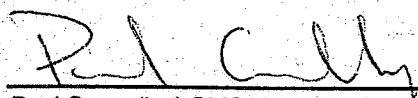
Example Calculation

For sample WWK-A-AMS2-E4 A C8 Acid,

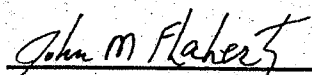
$$= \frac{[311 \text{ ng/ml of C8 Acid} \times (1 \text{ ml}) \times (1 \text{ ug} / 1000 \text{ ng}) \times (1 \text{ mg} / 1000 \text{ ug})]}{[(1458 \text{ L}) \times (1 \text{ m}^3 / 1000 \text{ L})]}$$

$$= 0.0002 \text{ mg} / \text{m}^3$$

Signatures


Paul Connolly, LCMS Team Leader

2/25/04
Date


John M. Flaherty, Vice President

3/25/04
Date

Other Lab Members Contributing to Data

James Miller

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Table 1. Login Information / Field Data

Sample ID	Exygen Lab ID	Date Received	Description	Air Volume Sampled (L)
WWK-A-AMSFBLK-E4 A	L0001359-1	11/25/03	Frit extract	0
WWK-A-AMSFBLK-E4 B	L0001359-2	11/25/03	1st set beads extract	0
WWK-A-AMSFBLK-E4 C	L0001359-3	11/25/03	2nd set beads extract	0
WWK-A-AMS1-E4 A	L0001359-4	11/25/03	Frit extract	1432
WWK-A-AMS1-E4 B	L0001359-5	11/25/03	1st set beads extract	1432
WWK-A-AMS1-E4 C	L0001359-6	11/25/03	2nd set beads extract	1432
WWK-A-AMS2-E4 A	L0001359-7	11/25/03	Frit extract	1458
WWK-A-AMS2-E4B	L0001359-8	11/25/03	1st set beads extract	1458
WWK-A-AMS2-E4 C	L0001359-9	11/25/03	2nd set beads extract	1458
WWK-A-AMS3-E4 A	L0001359-10	11/25/03	Frit extract	1468
WWK-A-AMS3-E4 B	L0001359-11	11/25/03	1st set beads extract	1468
WWK-A-AMS3-E4 C	L0001359-12	11/25/03	2nd set beads extract	1468
WWK-A-AMS4-E4 A	L0001359-13	11/25/03	Frit extract	1421
WWK-A-AMS4-E4 B	L0001359-14	11/25/03	1st set beads extract	1421
WWK-A-AMS4-E4 C	L0001359-15	11/25/03	2nd set beads extract	1421
WWK-A-AMS5-E4 A	L0001359-16	11/25/03	Frit extract	1435
WWK-A-AMS5-E4 B	L0001359-17	11/25/03	1st set beads extract	1435
WWK-A-AMS5-E4 C	L0001359-18	11/25/03	2nd set beads extract	1435
Control Spike A	L0001359-19	11/25/03	Frit extract	0
Control Spike B	L0001359-20	11/25/03	1st set beads extract	0
Control Spike C	L0001359-21	11/25/03	2nd set beads extract	0

Table 2. Chain of Custody

Sample ID	Date Collected	Date Received at Exygen	Date Extracted by Exygen	Date Analyzed by Exygen
WWK-A-AMSFBLK-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMSFBLK-E4 B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMSFBLK-E4 C	11/23/03	11/25/03	NA	NA
WWK-A-AMS1-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS1-E4 B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS1-E4 C	11/23/03	11/25/03	NA	NA
WWK-A-AMS2-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS2-E4B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS2-E4 C	11/23/03	11/25/03	NA	NA
WWK-A-AMS3-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS3-E4 B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS3-E4 C	11/23/03	11/25/03	NA	NA
WWK-A-AMS4-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS4-E4 B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS4-E4 C	11/23/03	11/25/03	NA	NA
WWK-A-AMS5-E4 A	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS5-E4 B	11/23/03	11/25/03	12/3/03	12/9 - 12/10/03
WWK-A-AMS5-E4 C	11/23/03	11/25/03	NA	NA
Control Spike A	NA	NA	12/3/03	12/9 - 12/10/03
Control Spike B	NA	NA	12/3/03	12/9 - 12/10/03
Control Spike C	NA	NA	NA	NA



3058 Research Drive
State College, PA 16801

Phone: 814-272-1039
Fax: 814-231-1580

Login

Login Group: L0001359

Login #: L0001359 > 1,469
Project: P0000419
Project Storage:
Submitted By: Michael D. Aucoin
Status: Unreceived
Login Type: Immediate Receipt of Samples
Started: T
Date Start: 11/25/2003 11:21:15AM
Due Date: 12/09/2003
Received Date: 11/25/2003
Received By: AMMERMAN, MARK
Spread Sample:
Label:
Project Title/Type: Analysis of PFOA in OVS Tubes / ROUTINE

Conform COC Sample: True
Conform COC: True
Conform Sample: True
Conform Request: True

A+B Fracs.

Login Notes:

Conform Notes: As per Mike Aucoin, sample WWK-A-AMS6-E4 is cancelled. MSA 11/25/03

Packages / Containers

<u>Package</u>	<u>Carton</u>	<u>Mail Date / Condition</u>	<u>Shipper / ID</u>	<u>Temp. Control / Temperat</u>	<u>Direction / Handled By</u>	
PK0001939		11/25/2003 10:50:59AM Package & Contents Uncompromised	FEDEX 8363913019820200	RT	RECEIVED AMMERMAN, MARK	
<u>Container #</u>	<u>Gross Weight</u>	<u>pH</u>	<u>Container Type</u>	<u>Preservative</u>	<u>Mfg. Lot</u>	<u>Mfg. ID</u>
C0020181	7.2 g		Other	NONE		
C0020182	7.2 g		Other	NONE		
C0020183	7.2 g		Other	NONE		
C0020184	7.2 g		Other	NONE		
C0020185	7.2 g		Other	NONE		
C0020186	7.2 g		Other	NONE		
C0020187	7.2 g		Other	NONE		
C0020188	7.2 g		Other	NONE		
C0020189	7.2 g		Other	NONE		
C0020190	7.1 g		Other	NONE		
C0020191	7.1 g		Other	NONE		
C0020192	7.1 g		Other	NONE		
C0020193	7.2 g		Other	NONE		
C0020194	7.2 g		Other	NONE		
C0020195	7.2 g		Other	NONE		
C0020196	7.1 g		Other	NONE		
C0020197	7.1 g		Other	NONE		
C0020198	7.1 g		Other	NONE		
C0020199	7.1 g		Other	NONE		
C0020200	7.1 g		Other	NONE		
C0020201	7.1 g		Other	NONE		

ICOC

Miscellaneous

Item Key

None

Description

0054



Login

Samples

Sample ID	Matrix	Fraction	Sample	Date Sampled	Date Received	Date Due
0001359-0001	GAS	OVS Tubes	WWK-A-AMSFBLK-E4 A		11/25/2003	12/09/2003
001359-0002	GAS	OVS Tubes	WWK-A-AMSFBLK-E4 B		11/25/2003	12/09/2003
L0001359-0003	GAS	OVS Tubes	WWK-A-AMSFBLK-E4 C		11/25/2003	12/09/2003
L0001359-0004	GAS	OVS Tubes	WWK-A-AMS1-E4 A		11/25/2003	12/09/2003
L0001359-0005	GAS	OVS Tubes	WWK-A-AMS1-E4 B		11/25/2003	12/09/2003
L0001359-0006	GAS	OVS Tubes	WWK-A-AMS1-E4 C		11/25/2003	12/09/2003
L0001359-0007	GAS	OVS Tubes	WWK-A-AMS2-E4 A		11/25/2003	12/09/2003
L0001359-0008	GAS	OVS Tubes	WWK-A-AMS2-E4 B		11/25/2003	12/09/2003
L0001359-0009	GAS	OVS Tubes	WWK-A-AMS2-E4 C		11/25/2003	12/09/2003
L0001359-0010	GAS	OVS Tubes	WWK-A-AMS3-E4 A		11/25/2003	12/09/2003
L0001359-0011	GAS	OVS Tubes	WWK-A-AMS3-E4 B		11/25/2003	12/09/2003
L0001359-0012	GAS	OVS Tubes	WWK-A-AMS3-E4 C		11/25/2003	12/09/2003
L0001359-0013	GAS	OVS Tubes	WWK-A-AMS4-E4 A		11/25/2003	12/09/2003
L0001359-0014	GAS	OVS Tubes	WWK-A-AMS4-E4 B		11/25/2003	12/09/2003
L0001359-0015	GAS	OVS Tubes	WWK-A-AMS4-E4 C		11/25/2003	12/09/2003
L0001359-0016	GAS	OVS Tubes	WWK-A-AMS5-E4 A		11/25/2003	12/09/2003
L0001359-0017	GAS	OVS Tubes	WWK-A-AMS5-E4 B		11/25/2003	12/09/2003
L0001359-0018	GAS	OVS Tubes	WWK-A-AMS5-E4 C		11/25/2003	12/09/2003
L0001359-0019	GAS	OVS Tubes	Control 1 A		11/25/2003	12/09/2003
L0001359-0020	GAS	OVS Tubes	Control 1 B		11/25/2003	12/09/2003
L0001359-0021	GAS	OVS Tubes	Control 1 C		11/25/2003	12/09/2003

0055



Login

Bottles

0001359-0001

Container
C0020181 / Other / NONE

Method

L0001359-0002

Container
C0020182 / Other / NONE

Method

L0001359-0003

Container
C0020183 / Other / NONE

Method

L0001359-0004

Container
C0020184 / Other / NONE

Method

L0001359-0005

Container
C0020185 / Other / NONE

Method

L0001359-0006

Container
C0020186 / Other / NONE

Method

L0001359-0007

Container
C0020187 / Other / NONE

Method

L0001359-0008

Container
C0020188 / Other / NONE

Method

L0001359-0009

Container
C0020189 / Other / NONE

Method

L0001359-0010

Container
C0020190 / Other / NONE

Method

L0001359-0011

Container
C0020191 / Other / NONE

Method

L0001359-0012

Container

Method

JU56



Login

C0020192 / Other / NONE

L0001359-0013

Container

C0020193 / Other / NONE

Method

L0001359-0014

Container

C0020194 / Other / NONE

Method

L0001359-0015

Container

C0020195 / Other / NONE

Method

L0001359-0016

Container

C0020196 / Other / NONE

Method

L0001359-0017

Container

C0020197 / Other / NONE

Method

L0001359-0018

Container

C0020198 / Other / NONE

Method

Lu001359-0019

Container

C0020199 / Other / NONE

Method

L0001359-0020

Container

C0020200 / Other / NONE

Method

L0001359-0021

Container

C0020201 / Other / NONE

Method

3057



PROJECT INFORMATION

Client (name & address):

ADQM
Du Pont Washington Works

Phone: (302) 892-1698

Fax: _____

Sampler: REF LINK

Please fill out this form *completely* to ensure correct analysis and proper handling of your samples.

ANALYSES REQUESTED

Project Manager (Name & E-mail Address):

Mike Fucini

Project Name: _____

Air Sampling Program

P.O. #: 1280

Quotation #:

STANDARD

ExyLIMS#	Client Sample Identification	Collection Date	Collection Time
	WWK-A - AMSFBK-E4	11/24/03	0715
	WWK-A - AMS1-E4		0612
	WWK-A - AMS2-E4		0622
	WWK-A - AMS3-E4		0622
	WWK-A - AMS4-E4		0634
	WWK-A - AMS5-E4		0601
	WWK-A - AMS6-E4	11/24/03	0645
	Control 1		

LAB USE ONLY

[illegible]

TO THE STUDENTS OF

Relinquished by	Date	Time
J. Kendall	11/24/03	0830

LAB USE ONLY

OTHER INFORMATION

Event 2

PROJECT REQUIREMENTS

Results Deadline:

Cooler ID # NA0006 Cooler Temp. (°C) NA

Received by	Date	Time
<i>[Signature]</i>	10/24/23	0530
<i>[Signature]</i>	11/25/23	1050

Laboratory Report Options:

☐ Sample results only

☐ Add case narrative

☐ Add quality control summary

☐ Add calibration summary

☐ Add raw data

☐ Other

**DuPont Washington Works
Air Sampling Program**

Sampler(s): LK, REK

FedEx Airbill #: 836391301982

Event Number Event 4

Pump #	Station #	Exogen ID	Calibration (pre)	Date	Start Time	Date	Stop Time	Calibration (post)	Total Minutes	Total Volume
669842	AMS-1	WWK-A-AMS1-E4	1.018	23-Nov	6:35	24-Nov	6:12	1.003	1428	
669908	AMS-2	WWK-A-AMS2-E4	1.029	23-Nov	6:30	24-Nov	6:22	1.008	1434	
669878	AMS-3	WWK-A-AMS3-E4	1.028	23-Nov	6:30	24-Nov	6:22	1.022	1433	
669901	AMS-4	WWK-A-AMS4-E4	1.021	23-Nov	6:44	24-Nov	6:34	0.9668	1431	
669769	AMS-5	WWK-A-AMS5-E4	1.015	23-Nov	6:09	24-Nov	6:01	0.9892	1434	
669865	AMS-6	WWK-A-AMS6-E4	1.014	23-Nov	6:56	24-Nov	6:45	*	880	

Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes
0	0	5	300	10	600	15	900	20	1200
1	60	6	360	11	660	16	960	21	1260
2	120	7	420	12	720	17	1020	22	1320
3	180	8	480	13	780	18	1080	23	1380
4	240	9	540	14	840	19	1140	24	1440

Field Blank: yes WWK-K-AMSFBLK-E4
yes or no

Weather: 11/23 = 48 degrees and clear, expect temperature to go to upper 60's.
11/24 = 45 degrees and clear, expect rain and drop in temperature to 30's.

SAFER operational: yes
yes or no

Comments: Total minutes column is the reading from the monitor counter.
* The pump for AMS6 was not running when we collected the sample and the counter only read 880 minutes. We can not get the AMS6 pump to run for Post Calibration even plugged into building outlet. We will replace pump before next test.

Another Calculation

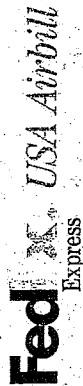
1442 994
1460 529
1468 825
1422 2709
1437 0114
#VALUE!

0060

11/25/2003

Page 2 of 2

airdataevent14



USA Airbill

FedEx Tracking Number

836391301982

1 From Date 11/14/02

Sender's Name Dr. P. A. ... Phone 348/2441471

Company ...

Address ...

City ... State ... ZIP ...

2 Your Internal Billing Reference

3 To Recipient's Name ... Phone ...

Company ...

Address ... We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address ...

City ... State ... ZIP ...



0200

Recipients Only

4a Express Package Service
Delivery commitment may be void in some areas.
☒ FedEx Priority Overnight Next business morning
☐ FedEx Standard Overnight Next business afternoon
☐ FedEx Express Saver Third business day
FedEx overnight rate not available. Minimum charge: One-pound rate.

4b Express Freight Service
Delivery commitment may be void in some areas.
☐ FedEx 10Day Freight* Next business day
☐ FedEx 20Day Freight Second business day
☐ FedEx 30Day Freight Third business day
Call for Confirmation.

5 Packaging
☐ FedEx Envelope*
☐ FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Study Pak
☒ Other
Declared value limit: \$500

6 Special Handling
☐ SATURDAY Delivery Available only on FedEx Priority or FedEx 2Day to select ZIP codes.
☐ HOLD Saturday at FedEx Location Available only on FedEx Priority Overnight and FedEx 2Day to select locations.
Include FedEx address in Section 3.
Does this shipment contain dangerous goods?
☒ No One box must be checked.
☐ Yes As per attached Shipper's Declaration
Dangerous Goods (including Dry Ice) cannot be shipped in FedEx packaging.
☐ Dry Ice Dry ice 3, UN 1845
☐ Cargo Aircraft Only

7 Payment Bill to:
☒ Sender Recipient
Enter FedEx Acct. No. or Credit Card No. in Section 3.
☐ Third Party
☐ Credit Card
☐ Cash/Check
Obtain Recip. Acct. No.

Total Packages Total Weight Total Declared Value Total Charges
Credit Card Num.

8 Release Signature
Your liability is limited to \$100 unless you declare a higher value. See back for details.
Sign to authorize delivery without obtaining signature.

By signing you authorize us to give this shipment without obtaining a signature and agree to indemnify and hold harmless from any resulting claims.
Questions? Visit our Web site at fedex.com
or call 1.800.Go.FedEx. 800.333.3333.
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