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Analysis of Field-Collected Air Samples

Customer and Project Information

Report Certification	
Report number	061-026-IH-Nov1815
Report date	November 18, 2015
Certified by (Name/Title)	Raja Tannous, Laboratory Director
Signature	
Date	*November 18, 2015*

Methods	
U.S. EPA TO-17	Determination of Volatile Organic Compounds in Ambient…
ASTM D 5197	Std. Test Method for Determination of Formaldehyde…

Customer Information	
Customer:	US EPA
City/State/Country	San Francisco, CA, USA
Contact name/Title	Jeff Woodlee
Phone number	415-972-3740

Project Information	
Project number	Not given
Project name	IAQ 75 Hawthorne
Project location	Not given
Project date	November 10, 2015

Laboratory Receiving Information	
Date samples received by lab	November 12, 2015
Condition of samples	No observed problems
Lab tracking numbers	061-026-01 to 061-026-20

Sample Information

Sample No.	Sample Description	Sampler No.	Date Collected	Volume (L)	Analysis Type	Specified Method
C6-01	19416	Mi51174	November 10, 2015	5.38	Caprolactam	TO-17
C6-02	12333	Mi51152	November 10, 2015	5.32	Caprolactam	TO-17
C6-03	12172	Mi51198	November 10, 2015	5.30	Caprolactam	TO-17
C6-04	12414	Mi59936	November 10, 2015	5.70	Caprolactam	TO-17
C6-05	18333	Mi59939	November 10, 2015	6.25	Caprolactam	TO-17
C6-06	18448	Mi59926	November 10, 2015	6.09	Caprolactam	TO-17
C6-07	18163	Mi51135	November 10, 2015	6.10	Caprolactam	TO-17
C6-08	17362	Mi59933	November 10, 2015	4.71	Caprolactam	TO-17
C6-09	17355	Mi58836	November 10, 2015	4.66	Caprolactam	TO-17
C6-10	17141	Mi51192	November 10, 2015	4.71	Caprolactam	TO-17
F6-01	19416	Waters Cart	November 10, 2015	51.49	Formaldehyde	D 5197
F6-02	12333	Waters Cart	November 10, 2015	51.88	Formaldehyde	D 5197
F6-03	12172	Waters Cart	November 10, 2015	51.63	Formaldehyde	D 5197
F6-04	12414	Waters Cart	November 10, 2015	55.24	Formaldehyde	D 5197
F6-05	18333	Waters Cart	November 10, 2015	59.85	Formaldehyde	D 5197
F6-06	18448	Waters Cart	November 10, 2015	59.69	Formaldehyde	D 5197
F6-07	18163	Waters Cart	November 10, 2015	57.15	Formaldehyde	D 5197
F6-08	17362	Waters Cart	November 10, 2015	45.61	Formaldehyde	D 5197
F6-09	17355	Waters Cart	November 10, 2015	45.61	Formaldehyde	D 5197
F6-10	17141	Waters Cart	November 10, 2015	44.34	Formaldehyde	D 5197

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Analytical Information

Sample No.	Lab Track. No.	Method	Date Analyzed	Analyst	Data File
C6-01	061-026-01	TO-17	November 13, 2015	R. Gill	T151113_18
C6-02	061-026-02	TO-17	November 13, 2015	R. Gill	T151113_19
C6-03	061-026-03	TO-17	November 13, 2015	R. Gill	T151113_20
C6-04	061-026-04	TO-17	November 13, 2015	R. Gill	T151113_21
C6-05	061-026-05	TO-17	November 13, 2015	R. Gill	T151113_22
C6-06	061-026-06	TO-17	November 13, 2015	R. Gill	T151113_23
C6-07	061-026-07	TO-17	November 13, 2015	R. Gill	T151113_24
C6-08	061-026-08	TO-17	November 13, 2015	R. Gill	T151113_25
C6-09	061-026-09	TO-17	November 13, 2015	R. Gill	T151113_26
C6-10	061-026-10	TO-17	November 13, 2015	R. Gill	T151113_27
F6-01	061-026-11	D 5197	November 17, 2015	T.Cheng	151117\151117018.D
F6-02	061-025-12	D 5197	November 17, 2015	T.Cheng	151117\151117019.D
F6-03	061-026-13	D 5197	November 17, 2015	T.Cheng	151117\151117020.D
F6-04	061-026-14	D 5197	November 17, 2015	T.Cheng	151117\151117021.D
F6-05	061-026-15	D 5197	November 17, 2015	T.Cheng	151117\151117022.D
F6-06	061-026-16	D 5197	November 17, 2015	T.Cheng	151117\151117023.D
F6-07	061-026-17	D 5197	November 17, 2015	T.Cheng	151117\151117024.D
F6-08	061-026-18	D 5197	November 17, 2015	T.Cheng	151117\151117026.D
F6-09	061-026-19	D 5197	November 17, 2015	T.Cheng	151117\151117027.D
F6-10	061-026-20	D 5197	November 17, 2015	T.Cheng	151117\151117028.D

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Project Specific Information

Air samples for the analysis of formaldehyde (CAS # 50-00-0) and caprolactam (CAS # 105-60-2) were received by the laboratory on November 12, 2015. There were ten DNPH cartridges for the analysis of formaldehyde and there were ten multi-sorbent tubes for Caprolactam analysis. The analytical results are reported in Tables 1 – 2. All laboratory data, including but not limited to raw instrument files, calibration files, and quality control checks used to generate the results will be made available to the customer upon request.

Formaldehyde was analyzed by HPLC and quantified using multi-point (4 or more points) calibration curve.

MDL and LOQ – Method detection limit (MDL) for formaldehyde of 15 nanograms was determined from the analysis of ten replicates of the low level standard spiked onto DNPH cartridges; MDL for formaldehyde was The practical lower limit of quantitation (LOQ) is three times the MDL.

Uncertainty – The laboratory uses the ISO GUM method to estimate the uncertainties associated with the measurement of formaldehyde. The expanded uncertainty is equal to two times the relative standard deviation. For 2015, the expanded uncertainty estimated for formaldehyde was <9.0%.

The multisorbent air samples were analyzed for VOCs following U.S. EPA Compendium Method TO-17. Individual VOCs (iVOCs) were quantified using multi-point (4 or more points) with calibration curves prepared with pure standards, unless otherwise noted.

MDL and LOQ – Method detection limit (MDL) for caprolactam was determined from the analysis of three replicates of the low level standard spiked onto multisorbent air sampling tubes; The practical lower limit of quantitation (LOQ) is three times the MDL.

Uncertainty – The laboratory uses the ISO GUM method to estimate the uncertainties associated with the measurement of VOCs . The expanded uncertainty is equal to two times the relative standard deviation. For 2015, the expanded uncertainty estimated for caprolactam was 11%.

All test methods used in this project are contained in the scope of Berkeley Analytical's ISO/IEC 17025 accreditation (TL-383, International Accreditation Service, Inc.).

Results

Table 1. Quantitative analysis of formaldehyde (CAS #50-00-0)

Sample No.	Sample Name	Volume (L)	Mass (ng)	Conc ($\mu g/m^3$)	Conc* (ppb)
F6-01	19416	51.49	323	6.3	5.1
F6-02	12333	51.88	422	8.1	6.6
F6-03	12172	51.63	454	8.8	7.2
F6-04	12414	55.24	428	7.8	6.3
F6-05	18333	59.85	352	5.9	4.8
F6-06	18448	59.69	4.1	7.0	5.7
F6-07	18163	57.15	398	7.0	5.7
F6-08	17362	45.61	245	5.4	4.4
F6-09	17355	45.61	288	6.3	5.1
F6-10	17141	44.34	292	6.6	5.4

Concentration in ppb calculated assuming standard conditions of 25° C and 101.3 kPa.

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Table 2. Quantitative analysis of Caprolactam (CAS # 105-60-2).

Sample No.	Sample Name	Volume (L)	Mass* (ng)	Conc ($\mu g/m^3$)
C6-01	19416	5.38	34.0	6.3
C6-02	12333	5.32	36.8	6.9
C6-03	12172	5.30	39.4	7.4
C6-04	12414	5.70	17.7	3.1
C6-05	18333	6.25	47.3	7.6
C6-06	18448	6.09	50.0	8.2
C6-07	18163	6.10	46.5	7.6
C6-08	17362	4.71	28.8	6.1
C6-09	17355	4.66	49.2	10.6
C6-10	17141	4.71	44.2	9.4

END OF REPORT

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CHAIN-OF-CUSTODY RECORD
for ANALYTICAL SERVICES
2009 Update

Client Information*	
Company:	US EPA
Street Address:	75 Hawthorne st
City/State/Zip Code:	San Francisco, CA 94105
Country:	Contact (for reporting): Jeff Woodlee
Project/Job Name:	IAQ 75 Hawthorne
Project/Job #:	P.O. #:
Phone: (415) 972-3740	Fax:
E-mail address:	woodlee.jeff@epa.gov

Received from BAA (check if applicable)	
Multi-sorbent tube samplers	☑
Aldehyde cartridge samplers	☑
Sampling pump(s)	☐
Other materials (specify):	☐

BAA Analysis Code	
Total VOCs by GC/MS total-ion-current method (TIC)	a
Qualitative GC/MS of individual VOCs	b
Qualitative GC/MS plus quantitation of up to 15 individual VOCs	c
Quantitative GC/MS analysis of target list of compounds	d
Quantitative GC/MS Total VOCs plus 4-PCH	e
Quantitative HPLC analysis of formaldehyde	f
Quantitative HPLC analysis of formaldehyde & acetaldehyde	g
Quantitative HPLC analysis of formaldehyde & C2-C9 carbonyls	h
Quantitative HPLC analysis of glutaraldehyde	i
	k
Other (specify):	z

Air Sampling Record

Tube/Cartridge Sampler No.	Collected Sample ID	Date Collected	Collection Minutes	Collected Volume (L)	Sample Location / Description / Remarks	Analysis Code	BAA Remarks
	F6-01	11/10/15	56	51.49	19416	f	
	F6-02		56	51.88	12333	f	
	F6-03		56	51.63	12172	f	
	F6-04		60	55.24	12414	f	
	F6-05		65	59.85	18333	f	
	F6-06		64	59.69	18448	f	
	F6-07		62	57.15	18163	f	
	F6-08		49	45.61	17362	f	
	F6-09		49	45.61	17355	f	
	F6-10		48	44.34	17141	f	

Sample(s) Handling

Relinquished By	Received By	Signature	Date	Company
Woodlee			11/12/15	US EPA
	Lois Switzer	Lois Switzer	11/12/15	BKA

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CHAIN-OF-CUSTODY RECORD
for ANALYTICAL SERVICES
2009 Update

Client Information*	
Company: US EPA	
Street Address:	
City/State/Zip Code:	
Country:	Contact (for reporting): Jeff Woodlee
Project/Job Name:	
Project/Job #:	P.O. #:
Phone:	Fax:
E-mail address:	

BAA Analysis Code	
Total VOCs by GC/MS total-ion-current method (TIC)	a
Qualitative GC/MS of individual VOCs	b
Qualitative GC/MS plus quantitation of up to 15 individual VOCs	c
Quantitative GC/MS analysis of target list of compounds	d
Quantitative GC/MS Total VOCs plus 4-PCH	e
Quantitative HPLC analysis of formaldehyde	f
Quantitative HPLC analysis of formaldehyde & acetaldehyde	g
Quantitative HPLC analysis of formaldehyde & C2-C9 carbonyls	h
Quantitative HPLC analysis of glutaraldehyde	i
	k
Other (specify):	z

Received from BAA (check if applicable)	
Multi-sorbent tube samplers	☑
Aldehyde cartridge samplers	☑
Sampling pump(s)	☐
Other materials (specify):	☐

Air Sampling Record

Tube/Cartridge Sampler No.	Collected Sample ID	Date Collected	Collection Minutes	Collected Volume (L)	Sample Location / Description / Remarks	Analysis Code	BAA Remarks
~~C6-01~~	C6-01	11/10/15	56	5.38	Mi 51174 19416	Caprolactam	
~~C6-02~~	C6-02		56	5.32	Mi 51152 12333		
Mi51198	C6-03		54	5.30	12172		
Mi59936	C6-04		60	5.70	12414		
Mi59939	C6-05		65	6.25	18333		
Mi59926	C6-06		64	6.09	18448		
Mi51135	C6-07		62	6.10	18163		
Mi59933	C6-08		49	4.71	17362		
Mi58836	C6-09		49	4.66	17355		
Mi51192	C6-10		48	4.71	17141		

Sample(s) Handling

Relinquished By	Received By	Signature	Date	Company
Woodlee			11/12/15	US EPA
	Louis Switzer		11/12/15	BKA

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