

**LABORATORY REPORT**

July 22, 2009

Matt Fragala  
Environmental Health & Engineering, Inc.  
117 Fourth Avenue  
Needham, MA 02494

**RE: 16512**

Dear Matt:

Enclosed are the results of the samples submitted to our laboratory on July 14, 2009. For your reference, these analyses have been assigned our service request number P0902384.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at [www.caslab.com](http://www.caslab.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein. Your report contains 12 pages.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-08-TX. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Kate Aguilera  
Project Manager

Client: Environmental Health & Engineering, Inc.  
Project: 16512

CAS Project No: P0902384

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### CASE NARRATIVE

The samples were received intact under chain of custody on July 14, 2009 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

#### Aldehyde Analysis

The samples were analyzed for aldehydes according to EPA Method TO-11A using high performance liquid chromatography (HPLC).

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.*

**Client:** Environmental Health & Engineering, Inc.  
**Project:** 16512

**Service Request:** P0902384

**SAMPLE CROSS-REFERENCE**

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
P0902384-001	99168	7/13/09	00:00
P0902384-002	99173	7/13/09	00:00
P0902384-003	99178	7/13/09	00:00
P0902384-004	99183	7/13/09	00:00
P0902384-005	99184	7/13/09	00:00
P0902384-006	99193	7/13/09	00:00



**Columbia Analytical Services, Inc.**  
**Sample Acceptance Check Form**

Client: Environmental Health & Engineering, Inc.

Work order: P0902384

Project: 16512

Sample(s) received on: 07/14/09

Date opened: 07/14/09

by: MZAMORA

*Note:* This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- |    |   | <b>Yes</b>                          | <b>No</b>                           | <b>N/A</b>                          |
|----|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1  | Were <b>sample containers</b> properly marked with client sample ID?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 2  | Container(s) <b>supplied by CAS</b> ?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 3  | Did <b>sample containers</b> arrive in good condition?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 4  | Was a <b>chain-of-custody</b> provided?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5  | Was the <b>chain-of-custody</b> properly completed?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 6  | Did <b>sample container labels</b> and/or tags agree with custody papers?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 7  | Was <b>sample volume</b> received adequate for analysis?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 8  | Are samples within specified holding times?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 9  | Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?<br>Cooler Temperature <u>5</u> °C    Blank Temperature _____ °C   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 10 | Was a <b>trip blank</b> received?<br>Trip blank supplied by CAS: _____  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 11 | Were <b>custody seals</b> on outside of cooler/Box?<br>Location of seal(s)? _____ Sealing Lid? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/><br>Were signature and date included? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/><br>Were seals intact? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/><br>Were custody seals on outside of sample container?<br>Location of seal(s)? _____ Sealing Lid? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/><br>Were signature and date included? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/><br>Were seals intact? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 12 | Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information?<br>Is there a client indication that the submitted samples are <b>pH</b> preserved?<br>Were <b>VOA vials</b> checked for presence/absence of air bubbles?<br>Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 13 | <b>Tubes:</b> Are the tubes capped and intact?<br>Do they contain moisture?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 14 | <b>Badges:</b> Are the badges properly capped and intact?<br>Are dual bed badges separated and individually capped and intact?  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0902384-001.01	Silica Gel DNPH Tube					
P0902384-002.01	Silica Gel DNPH Tube					
P0902384-003.01	Silica Gel DNPH Tube					
P0902384-004.01	Silica Gel DNPH Tube					
P0902384-005.01	Silica Gel DNPH Tube					
P0902384-006.01	Silica Gel DNPH Tube					

Explain any discrepancies: (include lab sample ID numbers): \_\_\_\_\_

Chain of Custody is missing time collected \_\_\_\_\_

\*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12);

**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.  
**Client Sample ID:** 99168  
**Client Project ID:** 16512

CAS Project ID: P0902384  
 CAS Sample ID: P0902384-001

**Test Code:** EPA Method TO-11A  
**Instrument ID:** Waters LC Module I Plus/UV\_Vis 360/LC1  
**Analyst:** Hani Cherazaie  
**Sampling Media:** Silica Gel DNPH Tube  
**Test Notes:** BC

**Date Collected:** 7/13/09  
**Date Received:** 7/14/09  
**Date Analyzed:** 7/14/09  
**Desorption Volume:** 1.0 ml  
**Volume Sampled:** 25.5 Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	Formaldehyde	2,800	110	3.9	90	3.2	M
75-07-0	Acetaldehyde	1,300	50	3.9	28	2.2	
123-38-6	Propionaldehyde	190	7.3	3.9	3.1	1.7	
4170-30-3	Crotonaldehyde, Total	< 100	ND	3.9	ND	1.4	
123-72-8	Butyraldehyde	240	9.3	3.9	3.2	1.3	
100-52-7	Benzaldehyde	340	13	3.9	3.1	0.90	
590-86-3	Isovaleraldehyde	120	4.8	3.9	1.4	1.1	
110-62-3	Valeraldehyde	820	32	3.9	9.1	1.1	
529-20-4	o-Tolualdehyde	< 100	ND	3.9	ND	0.80	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	ND	7.8	ND	1.6	
66-25-1	n-Hexaldehyde	3,300	130	3.9	31	0.96	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	ND	3.9	ND	0.71	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

M = Matrix interference; results may be biased high.

Verified By:     Rc     Date:     7/20/09

**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.  
**Client Sample ID:** 99173  
**Client Project ID:** 16512

CAS Project ID: P0902384  
 CAS Sample ID: P0902384-002

**Test Code:** EPA Method TO-11A  
**Instrument ID:** Waters LC Module I Plus/UV\_Vis 360/LC1  
**Analyst:** Hani Cherazaie  
**Sampling Media:** Silica Gel DNPH Tube  
**Test Notes:** BC

**Date Collected:** 7/13/09  
**Date Received:** 7/14/09  
**Date Analyzed:** 7/14/09  
**Desorption Volume:** 1.0 ml  
**Volume Sampled:** 14.1 Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	Formaldehyde	160	11	7.1	9.1	5.8	M
75-07-0	Acetaldehyde	< 100	ND	7.1	ND	3.9	
123-38-6	Propionaldehyde	< 100	ND	7.1	ND	3.0	
4170-30-3	Crotonaldehyde, Total	< 100	ND	7.1	ND	2.5	
123-72-8	Butyraldehyde	< 100	ND	7.1	ND	2.4	
100-52-7	Benzaldehyde	< 100	ND	7.1	ND	1.6	
590-86-3	Isovaleraldehyde	< 100	ND	7.1	ND	2.0	
110-62-3	Valeraldehyde	< 100	ND	7.1	ND	2.0	
529-20-4	o-Tolualdehyde	< 100	ND	7.1	ND	1.4	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	ND	14	ND	2.9	
66-25-1	n-Hexaldehyde	< 100	ND	7.1	ND	1.7	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	ND	7.1	ND	1.3	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

M = Matrix interference; results may be biased high.

Verified By: Res Date: 7/20/09



**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.

**Client Sample ID:** 99183

**Client Project ID:** 16512

CAS Project ID: P0902384

CAS Sample ID: P0902384-004

Test Code: EPA Method TO-11A  
 Instrument ID: Waters LC Module I Plus/UV\_Vis 360/LC1  
 Analyst: Hani Cherazaie  
 Sampling Media: Silica Gel DNPH Tube  
 Test Notes: BC

Date Collected: 7/13/09  
 Date Received: 7/14/09  
 Date Analyzed: 7/14/09  
 Desorption Volume: 1.0 ml  
 Volume Sampled: 76.7 Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	Formaldehyde	8,400	110	1.3	89	1.1	
75-07-0	Acetaldehyde	2,800	37	1.3	20	0.72	
123-38-6	Propionaldehyde	580	7.6	1.3	3.2	0.55	
4170-30-3	Crotonaldehyde, Total	< 100	ND	1.3	ND	0.45	
123-72-8	Butyraldehyde	560	7.3	1.3	2.5	0.44	
100-52-7	Benzaldehyde	880	11	1.3	2.6	0.30	
590-86-3	Isovaleraldehyde	300	3.9	1.3	1.1	0.37	
110-62-3	Valeraldehyde	2,000	26	1.3	7.5	0.37	
529-20-4	o-Tolualdehyde	< 100	ND	1.3	ND	0.27	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	ND	2.6	ND	0.53	
66-25-1	n-Hexaldehyde	8,100	110	1.3	26	0.32	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	ND	1.3	ND	0.24	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

Verified By:     Res     Date:     7/20/09

**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.

**Client Sample ID:** 99184

**Client Project ID:** 16512

CAS Project ID: P0902384

CAS Sample ID: P0902384-005

**Test Code:** EPA Method TO-11A  
**Instrument ID:** Waters LC Module I Plus/UV\_Vis 360/LC1  
**Analyst:** Hani Cherazaie  
**Sampling Media:** Silica Gel DNPH Tube  
**Test Notes:** BC

**Date Collected:** 7/13/09  
**Date Received:** 7/14/09  
**Date Analyzed:** 7/14 - 7/15/09  
**Desorption Volume:** 1.0 ml  
**Volume Sampled:** 99.3 Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	<b>Formaldehyde</b>	<b>9,900</b>	<b>100</b>	1.0	<b>81</b>	0.82	
75-07-0	<b>Acetaldehyde</b>	<b>3,500</b>	<b>35</b>	1.0	<b>20</b>	0.56	
123-38-6	<b>Propionaldehyde</b>	<b>700</b>	<b>7.1</b>	1.0	<b>3.0</b>	0.42	
4170-30-3	Crotonaldehyde, Total	< 100	ND	1.0	ND	0.35	
123-72-8	<b>Butyraldehyde</b>	<b>650</b>	<b>6.6</b>	1.0	<b>2.2</b>	0.34	
100-52-7	<b>Benzaldehyde</b>	<b>1,100</b>	<b>11</b>	1.0	<b>2.6</b>	0.23	
590-86-3	<b>Isovaleraldehyde</b>	<b>400</b>	<b>4.0</b>	1.0	<b>1.1</b>	0.29	
110-62-3	<b>Valeraldehyde</b>	<b>2,400</b>	<b>25</b>	1.0	<b>7.0</b>	0.29	
529-20-4	o-Tolualdehyde	< 100	ND	1.0	ND	0.21	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	ND	2.0	ND	0.41	
66-25-1	<b>n-Hexaldehyde</b>	<b>9,700</b>	<b>98</b>	1.0	<b>24</b>	0.25	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	ND	1.0	ND	0.18	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

Verified By:     *Rv*     Date:     7/20/09

**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.

**Client Sample ID:** 99193

**Client Project ID:** 16512

CAS Project ID: P0902384

CAS Sample ID: P0902384-006

Test Code: EPA Method TO-11A  
 Instrument ID: Waters LC Module I Plus/UV\_Vis 360/LC1  
 Analyst: Hani Cherazaie  
 Sampling Media: Silica Gel DNPH Tube  
 Test Notes: BC

Date Collected: 7/13/09  
 Date Received: 7/14/09  
 Date Analyzed: 7/14/09  
 Desorption Volume: 1.0 ml  
 Volume Sampled: NA Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	Formaldehyde	< 100	NA	NA	NA	NA	
75-07-0	Acetaldehyde	<b>1,100</b>	NA	NA	NA	NA	
123-38-6	Propionaldehyde	<b>150</b>	NA	NA	NA	NA	
4170-30-3	Crotonaldehyde, Total	< 100	NA	NA	NA	NA	
123-72-8	Butyraldehyde	< 100	NA	NA	NA	NA	
100-52-7	Benzaldehyde	< 100	NA	NA	NA	NA	
590-86-3	Isovaleraldehyde	< 100	NA	NA	NA	NA	
110-62-3	Valeraldehyde	< 100	NA	NA	NA	NA	
529-20-4	o-Tolualdehyde	< 100	NA	NA	NA	NA	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	NA	NA	NA	NA	
66-25-1	n-Hexaldehyde	< 100	NA	NA	NA	NA	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	NA	NA	NA	NA	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

Verified By: Res Date: 7/20/09

**COLUMBIA ANALYTICAL SERVICES, INC.**

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environmental Health & Engineering, Inc.

**Client Sample ID:** Method Blank

**Client Project ID:** 16512

CAS Project ID: P0902384

CAS Sample ID: P090714-MB

Test Code: EPA Method TO-11A  
 Instrument ID: Waters LC Module I Plus/UV\_Vis 360/LC1  
 Analyst: Hani Cherazaie  
 Sampling Media: Silica Gel DNPH Tube  
 Test Notes: BC

Date Collected: NA  
 Date Received: NA  
 Date Analyzed: 07/14/09  
 Desorption Volume: 1.0 ml  
 Volume Sampled: NA Liter(s)

CAS #	Compound	Result ng/Sample	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
50-00-0	Formaldehyde	< 100	NA	NA	NA	NA	
75-07-0	Acetaldehyde	< 100	NA	NA	NA	NA	
123-38-6	Propionaldehyde	< 100	NA	NA	NA	NA	
4170-30-3	Crotonaldehyde, Total	< 100	NA	NA	NA	NA	
123-72-8	Butyraldehyde	< 100	NA	NA	NA	NA	
100-52-7	Benzaldehyde	< 100	NA	NA	NA	NA	
590-86-3	Isovaleraldehyde	< 100	NA	NA	NA	NA	
110-62-3	Valeraldehyde	< 100	NA	NA	NA	NA	
529-20-4	o-Tolualdehyde	< 100	NA	NA	NA	NA	
620-23-5							
104-87-0	m,p-Tolualdehyde	< 200	NA	NA	NA	NA	
66-25-1	n-Hexaldehyde	< 100	NA	NA	NA	NA	
5779-94-2	2,5-Dimethylbenzaldehyde	< 100	NA	NA	NA	NA	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

NA = Not applicable.

Verified By: Re Date: 7/20/09